


**Contextual Assessment of Livestock Farming as an
Intervention for Food Security in Mpumalanga Province,
South Africa**

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**A thesis submitted for the Doctor of Philosophy (PhD)
degree in Agriculture**

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May 2026



DECLARATION OF THE THESIS

I, Jabulani Johannes Mokoena, student number 230347657, do hereby declare that this thesis entitled 'Contextual Assessment of Livestock Farming as an Intervention for Food Security in Mpumalanga Province, South Africa' is prepared by me. It contains original research work done by me as part of my Doctor of Philosophy in Agricultural Extension and Rural Resource Management degree. I have acknowledged the sources from which I have derived any ideas or extracts. I further affirm that the thesis has not been submitted anywhere else for publication, and that it has not previously been submitted for assessment or completion of any postgraduate qualification to another University or for another qualification. All sources and materials used in the study have been properly acknowledged.



Jabulani Johannes Mokoena

Date: April 2026



Dr. A.I. Agholor - Supervisor

Date: April 2026

DEDICATION

This thesis is dedicated to my supportive family who encouraged and inspired me in conducting this study. I dedicate the thesis to my dear three sisters, Lomasonto, Agnes, and Winter, and my only brother Tonny, who have always been on my side and are so special to me. I also dedicate this thesis to my friends who supported me throughout the process. I will always appreciate all they have done to me.

ACKNOWLEDGEMENTS

I would like to express my deepest appreciation to my family and friends who supported me throughout the process of this thesis. Their support and engagement were a pillar of my strength throughout this process. I sincerely and truthfully thank my supervisor Dr. Agholor AI for his insightful criticism, guidance, unwavering support, and critical eye during this project. His advice had a positive effect on my research methodology as well as this thesis. Our work together not only resulted in publication; I am proud of but also challenged me to broaden my perspective in ways I had not anticipated. Your guidance pushed me to think in new directions, thank you for that, Dr. Agholor. Not forgetting Mom Cynthia Rakale who edited my work within a short space of time. She worked tirelessly, but in the end, she succeeded in breaking through. I would also like to extend my gratitude to all the data collectors who assisted me in data collection from the research sites, Thabang Mokoena, Maxwell Maluka, Oscah Maluka, Thabo Mgwanya, Samantha Madubandlela, Bonginkosi Masilela and Thato Moholwane. Finally, not to forget to acknowledge and thank my daughter, Wethu, for assisting me during the data entry of my study. A special feeling of gratitude to my loving family, my former colleagues, especially Dr. Themba Sambo, who supported me during the initial stage of my questionnaire development. I also appreciate my friends who supported me throughout the process. My appreciation also goes to Mr. Moses Sithole for helping me during data analysis.

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ACRONYMS

ARC:	Agricultural Research Council
ASF:	Animal Source Food
BMP:	Best Management Practice
CSA:	Climate Smart Agriculture
DAFF:	Department of Agriculture Forestry and Fisheries
DALRRD:	Department of Agriculture Land Reform and Rural Development
DARDLEA:	Department of Agriculture Rural Development land and Environmental Affairs
FAO:	Food and Agricultural Organization
FS:	Food Security
GDP:	Gross Domestic Products
GNP:	Gross National Products
GOVT:	Government
HESM:	Household Expenditure Survey Method
HH:	Household
HSRC:	Human Science Research Council
IDP:	Integrated Development plan
CASP:	Comprehensive Agricultural Support program
MAFISA:	Micro Agricultural Financial Institutions of South Africa
MESP:	Masibuyele Esibayeni Support Program
MP:	Mpumalanga Province
MPO:	Milk Producers' Organization

NAMC:	National Agricultural Marketing Council
NDP:	National Development Plan
NERPO:	National Emergent Red Meat Producers' Organization
NLS:	National Livestock Statistics
NOPSA:	National Ostrich Processors of South Africa
PKM:	Phezu Komkhono Mlimi
ROI:	Return on Investment
RPO:	Red Meat Producers' Organization
RSA:	Republic of South Africa
SADI:	South African Dairy Industry
SADC:	Southern Africa Development Countries
SAFA:	South African Feedlot Association
SALGA:	South African Local Government Association
SAMPRO:	South African Milk Processors' Organisation
SAOBC:	South African Ostrich Business Chamber
SAOPO:	South African Ostrich Producers' Organisation
SAPPO:	South African Pork Producers' Organisation
SAPA:	Southern African Poultry Association
SPSS:	Statistical Package for Social Science
SDG:	Sustainable Development Goals
SLF:	Sustainable Livelihood Framework
SSA:	Sub-Saharan African countries
STATS SA:	Statistics South Africa

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Thesis: **CONTEXTUAL ASSESSMENT OF LIVESTOCK FARMING
AS AN INTERVENTION OF FOOD SECURITY IN MPUMALANG
PROVINCE, SOUTH AFRICA**

Date completed: 24 October 2025



Signed:

Date: 24/10/2025

ABSTRACT

The study focused on the assessment of Livestock farming as an Intervention for food security in Ehlanzeni District, Mpumalanga Province, South Africa. The objectives of the study were to: (i) assess the socio-economic impact of livestock farming as an intervention to food security. (ii) examine the contributions of livestock production to farmers' livelihood. (iii) determine the challenges faced by livestock farmers in the study area. (iv) examine the best practices of livestock farming among livestock producers. (v) determine the levels of acceptance of the best practices in livestock farming among livestock producers. The study followed a stratified sampling method used in selecting the target group from 400 population. Livestock farmers were categorised as smallholders, commercial, and subsistence producers. Three hundred and sixty (360) participants were interviewed. Slovin's formula was used to calculate the sample size for the study. The research project followed the quantitative research design. Pre-testing of the questionnaire was, used to identify and resolve any problems or issues before the full-scale study was, conducted to ensure correct interpretation, as well as assessing clarity and relevance of the questionnaire. The Structured questionnaire instrument was used to collect quantifiable data from the participants. The study employed the IBM-SPSS Statistics version 27 software to analyse data. Males were found to have more percentage than females, with 63.3% (male) and 36.7% (female). Secondary level of education was found to be at 32.78%. The majority, 64.4% of the livestock farmers, depend on local buyers to sell their livestock. The study adopted a binary logistic regression model, because binary logistic regression method helps to estimate the probability of events as a function of a set of independent variables

that are hypothesized to influence an outcome. The findings of the study revealed that the age of the respondents, kind of livestock rearing, farm extension officers visits, often extension officers' visits, marital status and the level of education were the significant variables, which influenced the adoption of best livestock management practices. Amongst the challenges, results indicated a high rate of stock theft; furthermore, the study reveals that cattle as a commodity are also rated high on stock theft. There is little contribution of smallholder farmers towards household food security, and actual challenges faced by livestock farmers in the study area. These challenges seem to have negatively impacted the farmers' efforts to improve their livelihood and level of economic status. The study examined the contribution of livestock farmers towards food security in the study area. It is recommended that the government consider designing a policy dealing with stock theft reduction in the study area. This implies that the government should also establish formal markets that include rural farmers to sell their livestock anytime, rather than waiting for local buyers. The government should make policies aligned with rural livestock markets.

Keywords: Assessment, Livestock farming, Intervention, Food security, Rural livelihoods, Communities,

CHAPTER 1

INTRODUCTION

1.1. Introduction

In South Africa, livestock have traditionally formed an integral part of rural livelihoods in many communities, providing multiple functions beyond direct food supply: a source of income, asset accumulation, and draught power, social and cultural value (Herrero, et al., 2013). In most Sub-Saharan African countries and in South Africa particularly, livestock ownership is an important buffering strategy for rural households facing climatic shocks, market volatility, and high unemployment (Herrero, et al., 2013; Food and Agricultural Organization, 2018). Current analyses emphasize that livestock contributes to dietary diversity and nutritional outcomes through the provision of animal-source foods and as a source of cash that households can use to purchase foods (FAO, 2018; Njisane & Muchenje, 2019).

The Mpumalanga Province occupies a distinct position within South Africa's agricultural economy. It has a mixed agro-ecologies, a high rural population share in certain districts, and varying degrees of smallholder and communal livestock production alongside commercial farming.

Current provincial and national statistics show that animals and animal products remain a major component of agricultural sales and rural livelihoods, and that livestock numbers and livestock income have continued to matter for regional agricultural economies. However, household food insecurity persists in many parts of Mpumalanga, especially in rural districts where poverty, limited market access and climatic stressors constrain livelihoods (Stats SA, 2025). There is mixed evidence on the extent to which smallholder livestock production in Mpumalanga effectively reduces food insecurity or improves nutrition. Some studies have

found positive associations between livestock ownership and household welfare and food consumption (Acosta, Nicolli, & Tirkaso, 2024). While others report that market constraints, animal diseases like foot-and-mouth disease, lack of veterinary services, and low market participation limit the poverty-reducing and nutritional benefits of livestock (Lengoabala, Makhura, Oluwatayo, 2023).; (Hlatshwayo, Ojo, Modi, et al. 2022). Furthermore, many smallholder households own few productive animals and maintain livestock mainly for cultural and social functions rather than regular food production and market sale, thereby weakening the direct link between livestock and food access.

With this understanding, livestock as a straightforward intervention for food security can be misleading, as local socio-economic issues and agro-ecological conditions mediate outcomes. In Mpumalanga Province, studies highlight pockets of chronic and seasonal food insecurity even where agricultural activity is present. A case study in Bushbuckridge and Gert Sibande districts of Mpumalanga shows that involvement in agriculture does not uniformly translate into secure food access, with constraints including low asset endowments and limited access to extension support (Rusere, Hunter, Collinson, et al., 2024); Agboola, 2023). The current national survey and current government research further emphasize that only a minority of South African households are actively engaged in livestock production and that participation and benefits are unequally distributed (DALRRD–HSRC, 2024; Stats SA food 2025). Therefore, understanding how livestock farming can be mobilised as a viable intervention to reduce household food insecurity in Mpumalanga requires a contextual assessment that links household livelihoods, livestock production, market access, institutional support, and climatic risk (Rusere et al, 2024). Numerous literature on livestock production and food security spans production-focused, market-oriented, and livelihoods frameworks. Production-focused analysis indicates that the contributions of livestock products to diets and income, and to livelihood perspectives, place livestock within broader asset portfolios (human, social, natural,

physical, and financial) that households draw on for resilience. While the market and value-chain studies highlight how participation in markets transforms livestock from subsistence assets into regular income sources (Herrero et al., 2013; FAO, 2018; Hlatshwayo et al., 2023). Nevertheless, research has combined these lenses in Mpumalanga Province to show that variability in market participation and extension support explains much of the heterogeneity in outcomes among smallholders (Hlatshwayo et al., 2022; Kapari, Hlophe-Ginindza, Nhamo, et al., 2023). Significant challenges identified in the literature include animal health shocks, limited access to quality feed and water exacerbated by climate change, poor infrastructure and distance to formal markets, and governance constraints around communal grazing and land tenure systems (Lengoabala et al., 2023; Njisane et al., 2019). On the contrary, enabling factors that amplify livestock's effect on food security include secure land and grazing rights, accessible veterinary and extension support, cooperative or collective market organisation, and diversified livestock portfolios combining small stock and poultry with larger ruminants for both immediate consumption and long-term asset storage (FAO, 2018; Herrero et al, 2013). However, this mixed evidence implies that interventions, must be tailored to local circumstances and context-based assessments are required for promoting livestock intensification in Mpumalanga Province. Furthermore, the study aims to provide policy-relevant evidence on whether and how livestock farming can function as an effective intervention to improve household food security in Mpumalanga. The research will adopt a mixed-methods, place-based approach to capture quantitative relationships (e.g., between livestock ownership and food insecurity indicators) and qualitative insights (household strategies, market interactions, extension experiences). The findings are intended to inform provincial agricultural policy, extension programming, veterinary and animal health planning, and donor-supported livelihood interventions by identifying which livestock-focused strategies are likely to be effective under different local conditions. The study will pay particular attention

to smallholders and communal producers, gendered dimensions of livestock management, and climate-related vulnerabilities that may undermine livestock's food security potential.

1.2. Problem statement

The Province of Mpumalanga exhibits diverse agro-ecological zones and a mix of commercial and smallholder farming systems in which livestock like cattle, goats, sheep, poultry, and pigs play a significant role for food and nutrition sources, savings, income-generation, draught power, and social capital (Smith, 2013). The derivatives from livestock, such as milk, eggs, and meat, are high in protein and several micronutrients that are critical to child growth and maternal health. The interventions that increase access to these foods have been associated with improved dietary diversity and child feeding outcomes in low- and middle-income countries (Muema, Mutono, Kisaka, et al., 2023).

Despite the National improvements in some agricultural indicators in South Africa, food insecurity remains a persistent challenge and is unevenly, distributed across households (Statistics South Africa, 2025). The Province of Mpumalanga contains districts with deep-rooted rural poverty and seasonal food shortages. For instance, household panel data from the Agincourt in the Bushbuckridge area show fluctuating but persistent food insecurity dynamics over the last decade, illustrating spatial and temporal specific vulnerability patterns (Rusere, et al., 2023).

Nevertheless, livestock production is an important component of Mpumalanga's agricultural economy. Poultry (broiler) production contributes substantially to provincial output, and small ruminants like goats and cattle remain central to many smallholder livelihoods. However, the potential for livestock to reliably function as an intervention for household food security depends on multiple factors, like biological, market, institutional, and social conditions ranging from disease control and feed supply to access to veterinary services, value-chain linkages, and

control over animals and animal products (Department of Agriculture, Land Reform and Rural Development, Directorate: Communication Services, Pretoria, 2023)

Notwithstanding the policy interest in promoting livestock production as pathways to improve household food access and nutrition in rural South Africa, there is insufficient contextualised evidence that links specific livestock systems in Mpumalanga to measurable food security and nutrition outcomes. Numerous livestock intervention programmes are frequently enacted across districts without fully accounting for spatial heterogeneity in agro-ecological conditions, market structure, service provision, and socio-cultural factors that mediate outcomes. Further expansion of these difficulties shows three interrelated problems that undermine the effectiveness, equity, and sustainability of livestock-based food security interventions in Mpumalanga: i) Disjointed and non-contextual evidence on impact. Current studies provide strong general evidence that nutrition-sensitive livestock interventions can increase consumption of animal-source foods and improve dietary diversity, but much of that evidence is global or regional and not always disaggregated to the province or district level in South Africa. In particular, there is inadequate household-level empirical studies that link local livestock production to outcomes such as household dietary diversity scores, months of adequate household food provisioning, and valuable data for assessing nutritional status in Mpumalanga (Muema, et. al, 2023).

ii) Structural and operational challenges: The capacity of livestock to improve food security hinges on infrastructure, markets, and services like reliable veterinary care and extension, feed availability, credit and insurance, and market access. The Provincial and national value-chain analyses for livestock (e.g., broiler and smallholder poultry value-chain work) indicate that market concentration, transaction costs, and weak linkage mechanisms limit benefits for smallholders, thus reducing the likelihood that livestock assets translate into improved

household food consumption and stable incomes (Garcia-Dorado, Queenan, Shankar, et. al. 2021).

iii) Inequality, gender, and governance approach, such as ownership, control, and decision-making around livestock and animal-source foods are gendered: women often manage poultry and small stock that contribute disproportionately to household nutrition, while larger ruminants may be controlled by men or subject to communal land governance arrangements. Many interventions have failed to assess intra-household dynamics, tenure regimes, and social norms, thereby exacerbating inequalities and failure to reach nutritionally vulnerable groups at the household level. Studies (Hlatshwayo, et al., 2022) in the region indicate that access to extension services and markets significantly influences food security outcomes, but the coverage of these services remains insufficient at the provincial and national levels. A context-specific assessment on livestock production for Mpumalanga Province should explicitly aim to close these enumerated gaps. Against this backdrop, the study undertakes the contextual assessment of livestock farming as an intervention for food security in Mpumalanga Province, South Africa.

1.2.1 Purpose of the study

Livestock-source foods are among the most efficient dietary sources of key micronutrients essential for early childhood development and maternal health. Livestock interventions have been shown to increase animal source food (ASF) consumption and raise the probability of meeting minimum dietary diversity among old and young children in low-resource settings. Improving household access to milk, eggs, and meat can therefore be a high-impact strategy for lowering stunting and micronutrient deficiencies when interventions are well designed and integrated with nutrition education and gender-sensitive targeting. However, from a provincial planning perspective, Mpumalanga faces the dual imperative of reducing food insecurity,

which undermines human capital and rural livelihoods while ensuring sustainable natural-resource management under climate variability. Generally, livestock interventions that are not tailored to local resource endowments and resilience capacities can increase vulnerability, thus exposing households to asset loss in times of drought and disease outbreaks. On the other hand, well-targeted livestock development can enhance both short-term food access and longer-term resilience through diversified income streams, seasonality smoothing, and the creation of local markets and value-addition opportunities. The findings of the study will also assist the government in designing the best policies and programmes to reduce hunger, promote food security, and enhance sustainable agriculture

1.2.2 Objectives

1. To assess the Socio-economic impact of livestock farming as an intervention to food security.
2. To examine the contributions of livestock production to farmers' livelihood.
3. To determine the challenges faced by livestock farmers in the study area.
4. To examine the best practices of livestock farming among livestock producers.
5. To determine the levels of acceptance of the best practices in livestock farming among livestock producers.

1.2.3 Research questions

1. What are the socio-economic impacts of livestock farming as an intervention to food security?
2. What are the contributions of livestock production to farmers' livelihoods?
3. Are there any challenges faced by livestock farmers in the study area?
4. What are the best practices for livestock farming among livestock producers?

5. What are the levels of acceptance for best practices in livestock farming among livestock producers?

1.2.4 Limitations of the study

The researcher might not be able to meet the target set of 400 participants in livestock farming due to time constraints. This can be caused by unforeseen circumstances such as public protests and weather patterns that may limit the research process.

1.2.5 Delimitations of the study

The study will prioritise assessments of smallholder, communal, and peri-urban livestock systems and those most directly linked to household food security across representative districts in Mpumalanga, such as the Nkomazi area, Umjindi farming areas, and Mbombela areas. The study will combine quantitative household surveys, value-chain mapping, service provider audits, and qualitative inquiry (focus groups, key informant interviews). Evidence-based, context-sensitive livestock interventions could accelerate progress on Mpumalanga's food security and nutrition goals while supporting resilient rural livelihoods. However, further study in the future on a similar topic may include all provinces in South Africa.

1.2.6 Originality of the study

The thesis contains no material previously published or written by another person nor does it include contents that are forged or fabricated, it does not overstep upon anyone's copyright nor violate any proprietary rights and that any ideas, techniques, quotations or any other material from the work of other people included in my thesis. Additionally, I did not use other sources except as noted by citations.

1.2.7 The structure of the thesis

Chapter one of the thesis outlines the background, problem statement, research objectives, and questions of the study. Chapter one further highlights the definition of key points and the purpose of the study. Chapter two highlights the overview of livestock production. Chapter

three concentrates on the review of concepts. Chapter four discusses the theoretical and conceptual frameworks of livestock production for food security. The fifth chapter looks at the methodology of the study. Chapter six focused on results and discussions. Chapter seven discusses empirical results of the study, and chapter eight focuses on reviewing the summary, conclusion, and recommendations.

1.2.8 Definitions of Key Terms

- a. Subsistence farmer is a person who produces food in which nearly all of the crops or livestock raised are used to maintain the farmer and the farmer's family, leaving little, if any, surplus for sale or trade (Augustyn, 2023).
- b. Smallholder farmer means a producer who rears livestock, raises fish or cultivates crops on a limited scale (Knight, 2022).
- c. Commercial farmers are defined as farmers that practice agriculture where the crops and livestock are, raised to sell products to the market to make money (Tractor Junction, 2021).
- d. Food Security refers to a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (Gibson, 2012).

CHAPTER 2

OVERVIEW OF LIVESTOCK PRODUCTION

2.1 Introduction

Chapter two discusses the overview of livestock farming globally. Additionally, this chapter further explains the livestock production in South Africa, livestock numbers, which include cattle, sheep, goats, pigs, poultry of different breeds, marketing, imports and exports of those commodities and their products, tables, and figures.

2.2 Overview of livestock production

The demand for beef globally was estimated at 70 million tonnes in 2019 and is projected to increase to 74 million tonnes by 2023. Moreover, beef is a high-quality source of protein that provides highly required nutrients. It also served as the third most consumed meat after poultry (125 tonnes) and pork (118 million tonnes) in 2019 (Greenwood, 2021). Additionally, the increasing population growth and environmental constraints will continue to put pressure on beef producers and beef industries globally, to improve productivity, efficiency, and sustainability. Studies conducted by Ritchie and Roser (2020) indicate that land zoned for livestock production represents 77% (40 million km²) of land used for agriculture (51 million km²) and contributes 18% of global food energy intake and 37% of global food protein supply.

2.3 Livestock production in South Africa

Livestock production in South Africa has formed the basis of human wellbeing through its contribution to the household economy, social status and food security (Meissner, Scholtz, & Engelbrecht, 2013). In South Africa, 80% of the allocated agricultural land is appropriate for livestock production, through the sector contributing approximately 40% to the agricultural income (Department of Agriculture Forestry and Fisheries, (DAFF). 2018). The practice of pasture-based livestock farming systems in South Africa is susceptible to climate-related events, low production output, income fluctuation, and by extension low adaptive capability

(Oduniyi, Rubhara, & Antwi, 2020). The gross income from animal products increased by 6,1% and amounted to R193 869 million for the year ended June 2024, compared to R182 722 million the previous period. This was due to the increase in income from eggs by 19,0%, milk (12,9%) and poultry meat (10,0%). The income received from sheep slaughtered decreased by 6,0% and cattle and calves slaughtered by 3,2% (Department of Agriculture, Land Reform and Rural Development, 2023/24).

The livestock division is recognised as a major consumer of natural resources with approximately 80% of the agricultural land used for grazing and 8% of water consumption for livestock systems (Rojas-Downing, Nejadhashemi, Harrigan, et al, 2017). South Africa has a projected 12.8 million cattle of which the majority is owned by four million black farmers who live and farm on agricultural land in the rural areas of former homeland areas of South Africa (National Livestock Statistics, 2018).

Livestock ownership plays a significant role in South Africa, particularly among rural societies, as compared to other African countries. However, apart from providing income and food security, livestock acts as investments and protection devices, holds cultural significance, and serves as an adaptation strategy during droughts (Bahta & Musara, 2023) and (Zenda, & Malan, 2024). The Eastern Cape Province has a high livestock population, through sheep as a dominating commodity, followed by cattle, then chickens, goats, and pigs (Stats SA, Census 2022). Furthermore, sheep thrive well due to the cool climate which favors most sheep and goats in the province.

2.4 Livestock numbers

South Africa has a vast extensive livestock farming, which is approximately four-fifths of the agricultural land. Nevertheless, livestock farming is also found in areas where there are mixed farming enterprises. Below normal rainfall over recent years has meant that the area involved in cattle, sheep and goat farming (approximately 590 000 km²) has been negatively affected, further affecting grazing area which is 53% of all agricultural land in the country. Livestock conditions were found to be reasonably good in most provinces in recent years. Commercial sheep farms also occur in other areas such as the Kgalagadi, the winter rainfall area and the grasslands of Mpumalanga, as well as the eastern Free State and KwaZulu-Natal, with challenges of wild animals and stock theft threatening the successful farming thereof. Foot-and-mouth disease is still prevalent in some parts of Limpopo, KwaZulu-Natal, Gauteng, North West and Free State, with movement restrictions in place for identified locations and biosecurity measures encouraged. Other diseases that continue to affect the industry are African swine fever, Lameness and eye infection.

2.4.1 Cattle

South Africa is, dominated by cattle commodities that are found, throughout all the nine provinces, but mainly in the Eastern Cape, KwaZulu-Natal, Free State, and North-West. Herd sizes vary according to type of cattle, ranging between less than 50 and 300 for dairy cattle, while beef cattle herds range from small (less than 20 head of cattle) to large farms and feedlots (figure1). Some farms in North West and Gauteng have been found to have some of the largest cattle herds in the country. The production of weaners for the feedlot industry is the main form of cattle farming – feedlots account for approximately 75% of all beef produced in the country. Prices (R/kg) for weaners and live animals are lower for the first half of the year in comparison to 2018 (SA Feedlot Association, 2023). The total number of cattle in South Africa at the end of August 2023 is, estimated at 12,196 million, comprising various international dairy and beef

cattle breeds in addition to indigenous breeds such as the Afrikaner and the Nguni. The number is approximately 0,01% lower than the estimate of 12,197 million as at the end of August 2022 (Table 1). Beef cattle contribute approximately 80% to the total number of cattle in the country, while dairy cattle make up the remaining 20%. Holstein-Friesian, Jersey, Guernsey, and Ayrshire are the four major dairy breeds found in South Africa.

Table 1: Cattle numbers per province since 2019

Province	2019	2020	2021	2022	2023*
	'000 (August)				
Western Cape	488	466	467	468	467
Northern Cape	433	419	419	419	419
Free State	2 109	2 054	2 030	2 062	2 028
Eastern Cape	3 082	3 050	3 068	3 045	3 073
KwaZulu-Natal	2 481	2 380	2 339	2 311	2 339
Mpumalanga	1 243	1 248	1 247	1 230	1 234
Limpopo	898	860	841	838	841
Gauteng	246	246	246	245	246
<u>North West</u>	1 578	1 576	1 576	1 580	1 574
Total	12 558	12 299	12 233	12 197	12 196

Source: DALRRD, 2024.

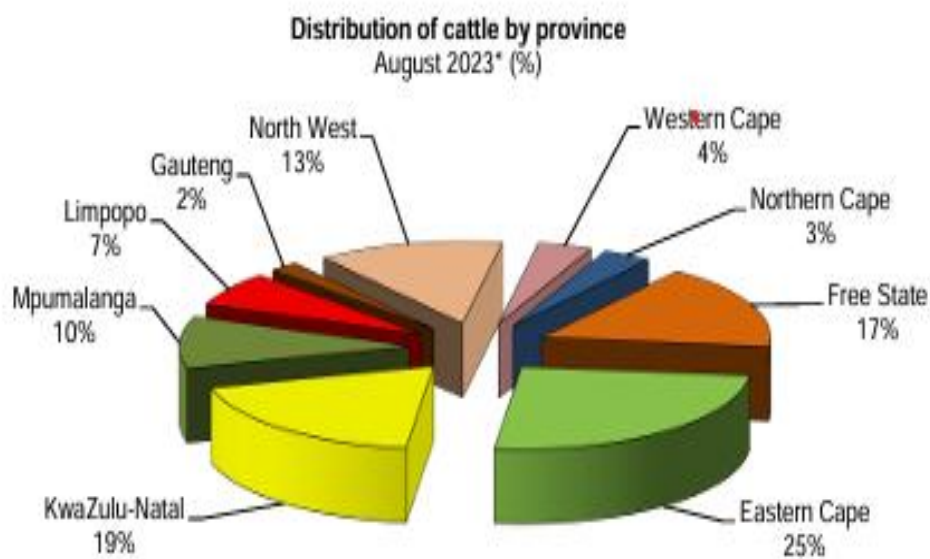


Figure 1: Distribution of cattle by province August 2023 (%)

There are various breeders' organisations representing most international and indigenous cattle breeds. Most of the organisations are, affiliated with the South African Studbook and Animal Improvement Association. The Milk Producers' Organisation (MPO) is the most prominent producer organisation in the South African dairy sector. The Red Meat Producers' Organisation (RPO) and the National Emergent Red Meat Producers' Organisation (NERPO) represent producers in the commercial and emerging agricultural sectors, respectively. Sheep farming is found in all provinces of the country nonetheless it is mostly concentrated in the more arid parts of the country. The total number of sheep in South Africa at the end of August 2023 were estimated at 21,42 million, 0,04% lower than the estimated 21,43 million as at the end of August 2022. For August 2023, the largest numbers of sheep were estimated to be in Eastern Cape (30%), Northern Cape (24%), Free State (20%) and Western Cape (12%).

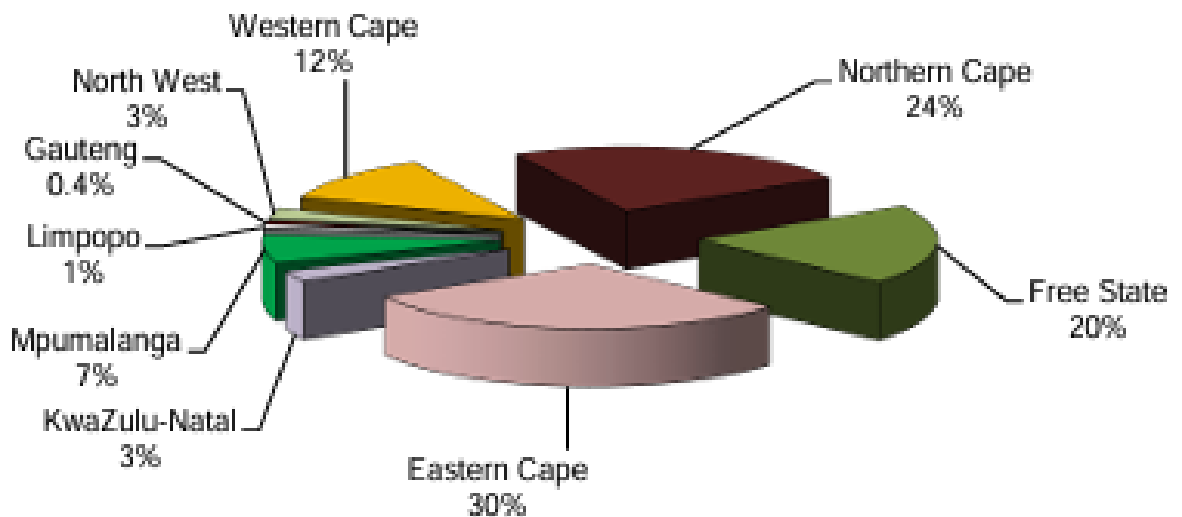


Figure 2: Distribution of sheep per province

Source: DALRRD, 2023

Flock sizes vary between 50 and 10 animals. Sheep flocks in Eastern Cape, Western Cape and Northern Cape tend to be much larger than those in the other provinces, including Free State.

The animals are kept mainly for wool and mutton production, and the industry is therefore represented by organisations from mutton as well as the wool industry. The sheep industry also has various breeders' associations, with the Dorper Sheep Breeders' Society of South Africa and Merino SA being the most prominent. Western Cape, the inland Karoo and Overberg produce wool, mutton, and pedigree Merino breeding stock.

Table 2: The number of sheep in the various provinces since 2019

Province	2019	2020	2021	2022	2023*
	'000 (August)				
Western Cape	2 623	2 545	2 540	2 538	2 532
Northern Cape	5 305	5 182	5 172	5 149	5 177
Free State	4 518	4 330	4 309	4 314	4 262
Eastern Cape	6 531	6 513	6 442	6 434	6 417
KwaZulu-Natal	656	628	617	615	615
Mpumalanga	1 554	1 527	1 512	1 513	1 520
Limpopo	204	199	192	192	223
Gauteng	87	84	84	84	84
North West	607	596	596	593	593
Total	22 085	21 604	21 464	21 432	21 423

Source: DALRRD, 2023.

2.4.2 Goats

Goats are largely found in the Eastern Cape, Limpopo, KwaZulu-Natal, and North West. Estimates indicate that there was a decrease of 0,35% in the number of goats, from 5,139 million in August 2022 to 5,121 million in August 2023. Flocks of goats intended for meat production are usually smaller than sheep flocks, averaging approximately 300 goats per farm. Angora goats are kept primarily for mohair production, while Boer goats are mainly for meat production. According to the SA Milch Goat Breeders' Society, (2025), some farmers have adopted a market differentiating strategy by producing goat's milk, and these are increasing in numbers.

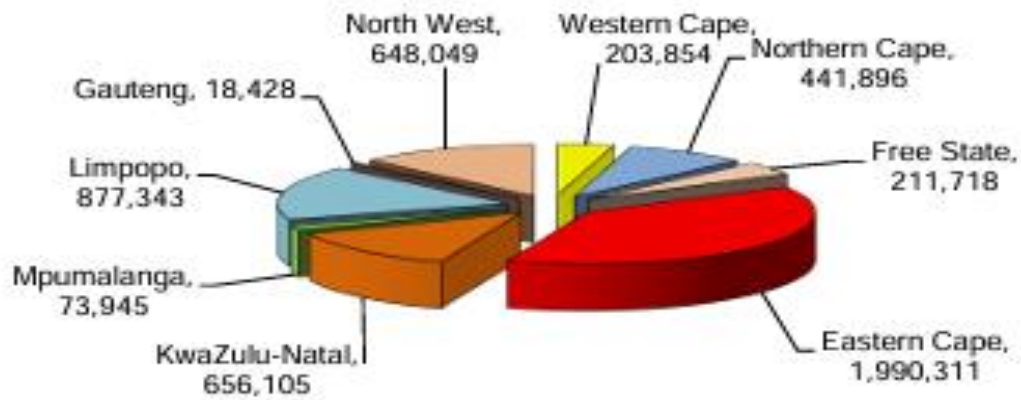


Figure 3: Distribution of goats by province

Source: *DALRRD, 2023*

2.4.3 Distribution of pigs per province

Pigs are found in high numbers in the provinces of Limpopo, Northwest, Gauteng and Western Cape. There are approximately 400 commercial pork producers and 19 stud breeders in South Africa. It is estimated that pig numbers remained almost the same at 1,323 million between August 2022 and August 2023. The South African Pork Producers' Organisation (SAPPO) is the official mouthpiece for pork producers in South Africa. The organisation is primarily concerned with administration, liaison with government, the promotion of pork and pork products and matters of national interest such as health and research. The organisation is also concerned with consumer education, as well as business development for sustainable, economic viability and profit maximisation of producers. According to SAPPO, most pork meat imports, originate from Europe and Brazil, while a few SA neighbouring countries are export destinations. The total number of employees in the formal pork production industry in South Africa is estimated to be approximately 10 000, comprising about 4 000 farm workers and 6 000 workers in the processing and abattoir sectors.

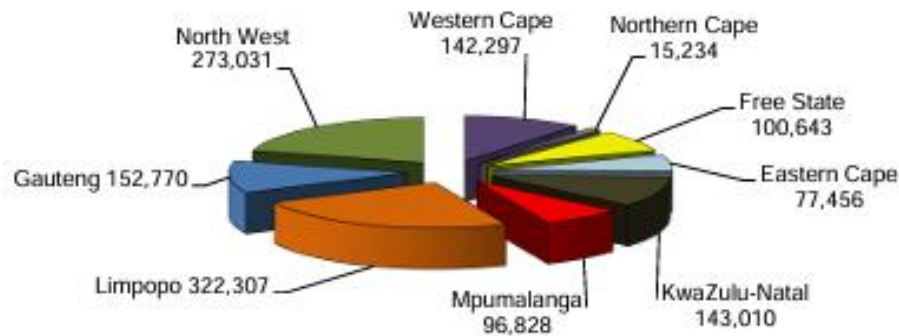


Figure 4: Distribution of pigs per province.

Source: DALRRD 2023

2.4.4 Red meat.

The red meat industry is one of the most important growing industries in the South African agricultural sector. It contributed approximately 16,6% to the gross value of agricultural production in the Republic of South Africa (RSA) during 2021/22. While sheep farming is mainly extensive, a large percentage of beef animals are supplied by feedlots.

2.4.5 Livestock slaughtering

It is estimated that the total number of cattle slaughtered decreased by 3,7%, sheep (including lambs) slaughtered decreased by 2,1% and pigs slaughtered increased by 1,2% from 2021/22 to 2022/23.

Table 3: Commercial slaughtering of red meat producing livestock categories over the past five years were as follows:

Year	2018/19	2019/20	2020/21	2021/22	2022/23
Cattle	2 445 125	2 592 605	2 629 884	2 579 000	2 484 300
Sheep and lambs	3 657 328	4 464 404	3 920 889	3 840 496	3 759 923
Pigs	3 025 292	3 281 635	3 396 979	3 728 838	3 774 960

2.4.6 Marketing

Auction prices.

The prices for red meat are primarily determined by the interaction between demand and supply (the latter two are affected by the level of the consumers' disposable income, the prices of substitute products and import parity prices, etc.). In the case of mutton, for example, the level of wool prices also influences the domestic supply of mutton.

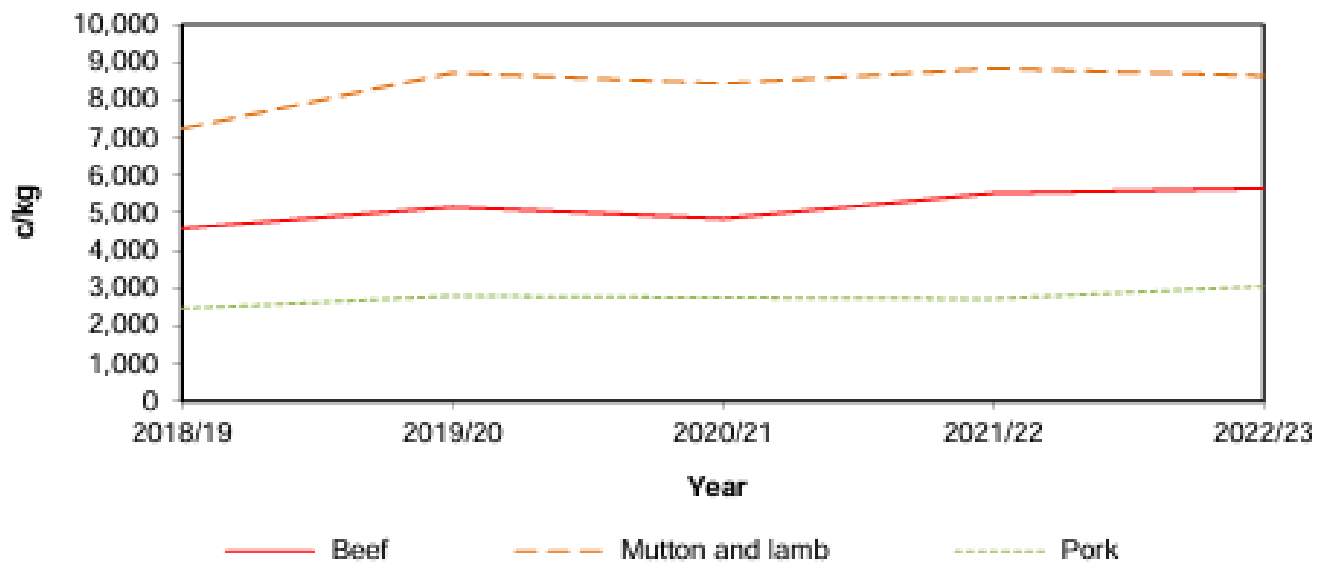


Figure 5: Average producer prices of beef, mutton and pork 2018/19–2022/23 (July to June)

In view of the ever-strong influence of international trade on the local mutton industry, both the cyclical and seasonal price patterns for mutton were influenced by imports. The average producer price for pork increased by 11,9%, from R27,25/kg in 2021/22 to R30,48/kg in 2022/23. The average producer price for beef decreased by 2,2% from R55,21/kg to R56,44/kg in 2022/23. The average producer price for mutton and lamb decreased by 2,1%, from R88,32/kg in 2021/22 to R86,45/kg in 2022/23.

Imports

Imports of red meat decreased by 34,2%, from 29 179 tons in 2021/22 to 19 212 tons in 2022/23 (31,6% lower than the average of approximately 31 308 tons for the five years up to

2022/23). Beef imports amounted to 1 465 tons in 2022/23, which is a decrease of 49,5% from the 2 899 tons imported during 2021/22 and 74,4% lower than the five-year average of 5 734 tons up to 2022/23. Imports of pork amounted to 15 492 tons, a decrease of 36,9% from the 24 554 tons imported during 2021/23 and 31,9% lower than the five-year average of 22 764 tons up to 2022/23. Imports of mutton during 2022/23 amounted to 2 255 tons, an increase of 30,6% from the 1 726 tons imported the previous year but 19,7% lower than the average of 2 809 tons for the five years up to 2022/23.

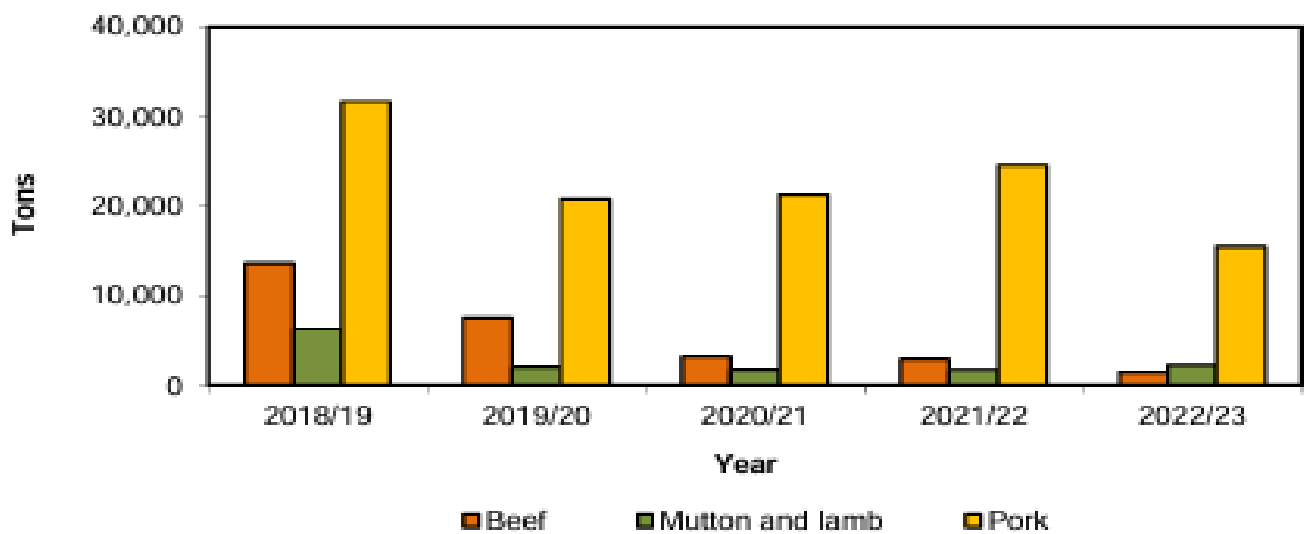


Figure 6: Imports of red meat 2018/19–2022/23

Source: DALRRD.2023

2.5 Poultry Industry

The poultry industry consists of the day-old chick, the broiler, and the egg supply. The Southern African Poultry Association (SAPA) represents both commercial and non-commercial poultry farmers within these three subsectors. This article focuses on the broiler and the egg industry, as the chick supply is an input into both.

2.5.1 Broiler industry.

The broiler industry keeps on dominating the agricultural sector in South Africa as the main supplier of animal protein.

2.5.2 Production

The distribution of broiler birds (including broiler breeders) per province is as indicated below:

Northwest (24,5%), Mpumalanga (22,8%), Western Cape (12,5%), Free State (11,6%), Gauteng (10,4%), KwaZulu-Natal (8,6%), Eastern Cape (6,0%), Limpopo (3,4%) and Northern Cape (0,2%). In 2022, a total of, 1,177-million-day-old chicks were hatched, an increase of 2,2% compared to the previous year. The average number of broilers slaughtered for commercial markets during 2022 was estimated at 1 112,7 million. This is 2,1% more than the 1 090,3 million slaughtered during 2021. Annual production of chicken meat totaled 1,848 million tons in 2022. This includes broilers for commercial markets, production by subsistence farming and meat from the sale of spent broiler breeder hens and cocks and spent hens from the egg industry.

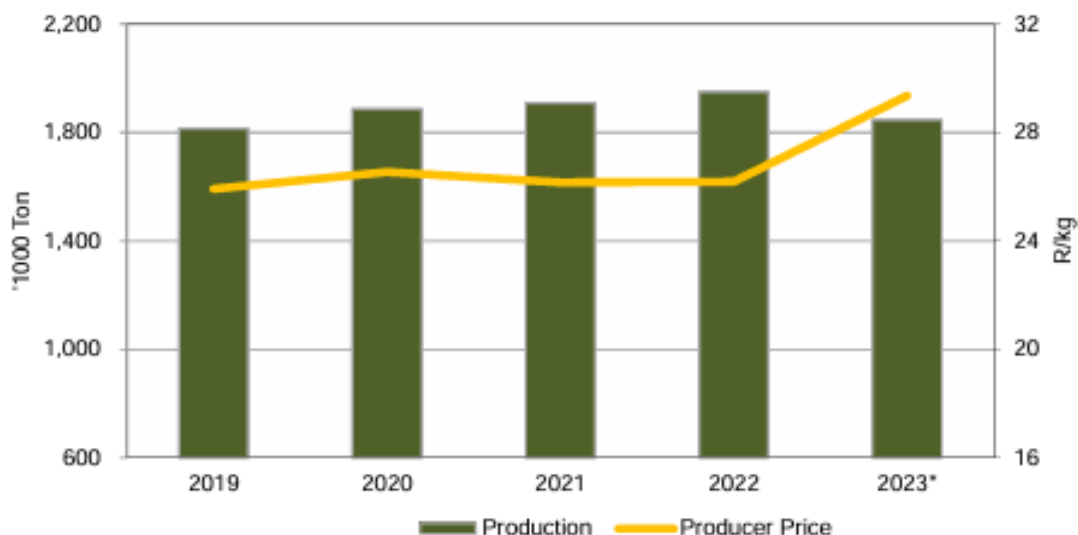


Figure 7: Chicken meat production and average producer prices 2019-2023

Source: DALRRD, 2023

Expected production for 2023 and average producer price for the first nine months of 2023

Prices received by producers The average weighted basic gross price (before rebates, advertising and distribution costs are deducted) received by producers of broilers increased by 12,2%, from R26,18/kg in 2022 to R29,36/kg in 2023.

Table 4. Average weighted producer prices of broilers from 2019 to 2023

Year	2019	2020	2021	2022	2023*
	R/kg				
Price of broilers	25,92	26,54	26,16	26,18	29,36

Preliminary: January to September 2023

Source: DALRRD, 2023.

2.5.3 Consumption

Consumption of poultry meat accounted for 60,6% of the total meat consumed (beef, mutton, goat, pork, and poultry) in 2022 compared to 60,1% of the previous year. The per capita consumption of poultry meat decreased slightly by 1,7%, from 38,1 kg in 2021 to 37,5 kg in 2022.

Table 5: Per capita consumption of commercially produced poultry meat from 2018 to 2022

Year	2018	2019	2020	2021	2022
	kg/year				
Per capita consumption	38,9	39,0	38,7	38,0	37,3

2.5.4 Imports

The value of imports amounted to R4,6 billion. Brazil was the main country of origin of imports in 2022, accounting for 75,6%, or 282,128 tons of total poultry imports into South Africa. The USA was the second-largest importer with 12,6%, followed by Argentina with 9,0%. The EU

contributed 0,6% to total poultry imports. The forecasting model used to predict broiler breeder bird numbers and the number of broilers slaughtered was updated in 2021. The hatcheries projected 22.57 million chicks per week, which increased by 2,2% as compared to the 22,09 million during 2021. Based on the number of day-old parents pulled placed, the size of the breeder laying flock is expected to increase by 4,7% or 7, 40 million during the first four months of 2023.

2.6 Egg industry

Based on information provided by SAPA, the distribution of layers per province is as follows: Gauteng (25,1%), Western Cape (16,4%), Free State (16,1%), North West (12,6%), KwaZulu-Natal (12,2%), Limpopo (7,4%), Mpumalanga (6,2%) Eastern Cape (3,7%) and Northern Cape (0,3%). The number of layers increased by 2,1%, from 26,85 million in 2021 to 27,40 million in 2022. An average flock of 26,64 million layers is projected for the first four months of 2022; this will be a decrease of 2,0% compared to the same period in 2022.

Table 6: The average price received by egg producers during 2023 was 12,8% more than the average price received during the same period of 2022.

Year	2019	2020	2021	2022	2023*
	R/dozen				
Price of eggs	11,74	11,58	12,41	14,43	16,27

2.6.1 Production

Egg production showed a year-on-year increase of 2,3% in 2022. The average number of cases produced per week was 462 200 compared to 451 800 cases per week in 2021. The total production of eggs for human consumption in 2022 was 723 million dozen, an increase of 2,3% as compared to 707 million dozen of the previous year.

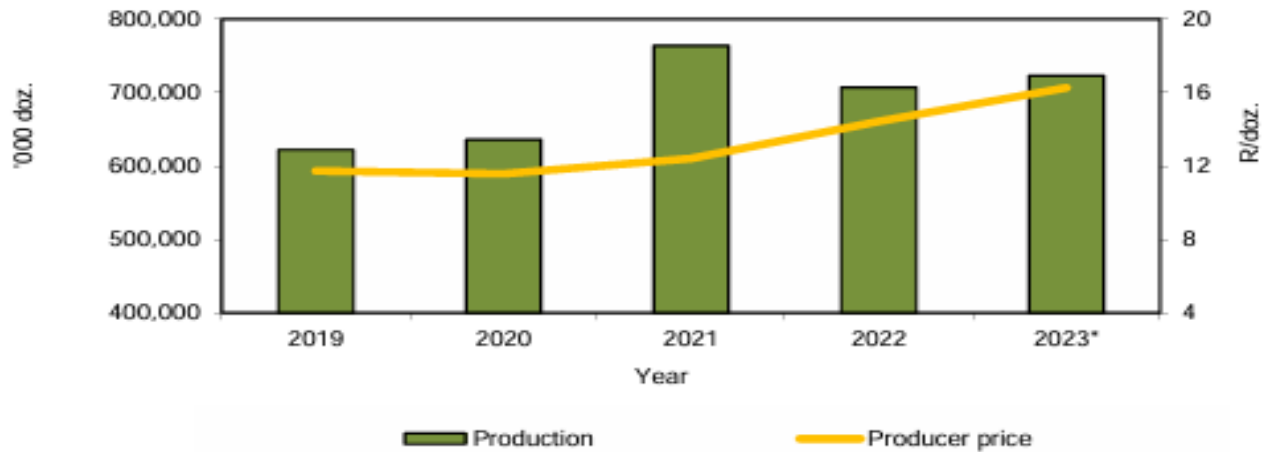


Figure 8: Production of eggs and prices received by producers 2019–2023

Source: DALRRD, 2023.

2.6.2 Consumption

The per capita consumption in 2022 was 148,6 eggs or 9,08 kg compared to 146,4 eggs or 8,95 kg in 2021. During 2022, the annual turnover was R12,82 million, an increase of 8,0% as compared to R11,87 million in 2021. Eggs are still an affordable animal protein source compared to meat. New breed standards have been applied to the model, and the laying cycle has been extended by 78 weeks. These changes resulted in an increase in the estimated size of the national laying flock in terms of the number of egg cases produced and the mean weight of the egg. Hen numbers decreased from 26,85 million at the end of December 2021 by 0,8%, or 26,64 million, during the same period of 2022. Consequently, egg production is expected to decrease by 2,0% or 448,100 cases per week during the first four months of 2023.

2.7 Milk

South Africa is producing milk that is concentrated largely in the coastal regions because of their mild temperatures and good rainfall conditions, which assure good quality, natural and artificial pastures. In 2022, the Western Cape was the largest milk producer and accounted for

29,3% of the total commercial milk production, followed by KwaZulu-Natal (28,5%), the Eastern Cape (28,0%), Mpumalanga (4,1%), Free State and Gauteng (4,0%) each, North West (1,7%) and Limpopo (0,4%). According to Milk South Africa, the number of milk producers in the country decreased significantly by 702 (44,1%), from 1,593 in January 2017 to 891 producers in January 2023. Local milk production contributes approximately 0,4% to the world milk production. However, in terms of the value of agricultural production, the milk industry is the seventh-largest agricultural industry in South Africa. The gross value of milk produced in 2022, including milk for the producer’s own consumption and on-farm usage, increased by 12,4% and amounted to R23 797 million, compared to R21 170 million in 2021 due to higher producer prices. Milk shortages are rarely reported in South Africa, as the supply is always sufficient to meet the local demand. Production of total milk (which includes production from commercial, informal, and subsistence farms) decreased marginally by 0,9% for the period January to September 2023, when compared to the same period in 2022. The graph below depicts total milk production, human consumption, and average producer price for the period 2019 - 2023.

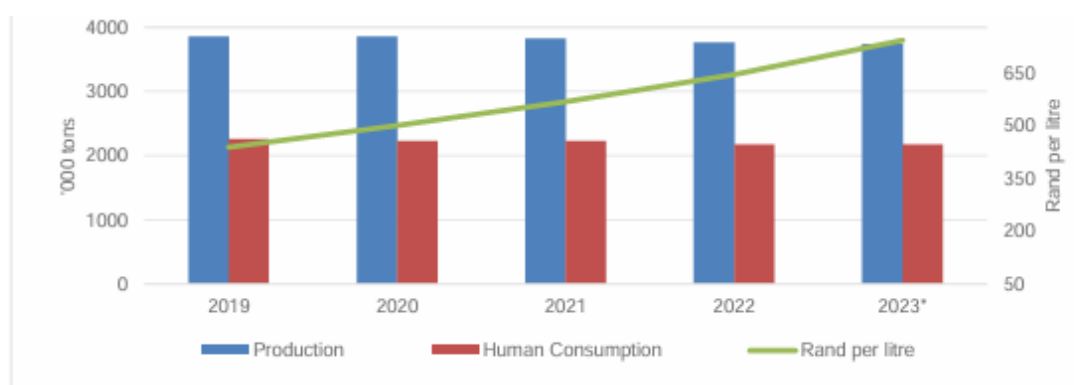


Figure 9: Total milk production, human consumption, and average producer price

Source: Milk SA, 2023, and DALRRD, 2023

Milk production was 1,6% lower in 2022 and estimated at 3,682 million litres, as opposed to 3,740 million litres in 2021. Production further dropped slightly by 0,9% to 2,302 million litres over the period January to September 2023, from 2,323 million litres during the same period in 2022. The average producer price of milk showed an upward trend since 2020 despite slower growth in demand and output levels. The average producer price for the period January to September 2023 increased by 15,7% to R7,43 per litre, as opposed to R6.43 per litre in 2022.

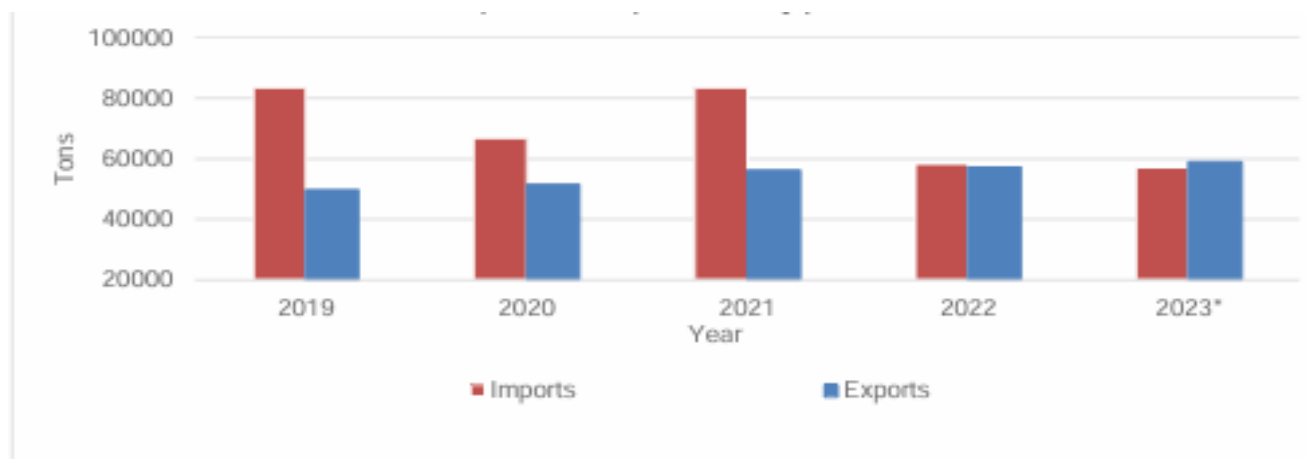


Figure 10: Imports and exports

Source: SAMPRO, 2022

The imports of milk and milk products decreased substantially by 30,0% to 58,332 tons and valued at R2,919 million in 2022, compared to 83,356 tons which were valued at R2,709 million in 2021. Contrarily, the exports increased by 1,9% and amounted to 57,259 tons with the value of R1,854 million in 2022, from 56,208 tons valued at R1,438 million in 2021. Production of and demand for milk for the 2023 season are expected to be approximately 1,2% higher than in 2022. The increase in producer price of milk from R6,43 per litre for the period January - September 2022 to R7,43 per litre during the same period in 2023 may also stimulate production in the last three months of 2023 (October – December).

2.8 Wool

2.8.1 Areas of Production

South Africa is producing wool throughout the country; nevertheless, the main production areas are in the drier regions of the country. Based on annual sales of producer lots, the Eastern Cape was rated the largest wool-producing province during 2022/23 with 16,2 million kg, followed by Free State with 8,6 million kg, Western Cape with 7,9 million kg, Northern Cape with 5,2 million kg, and Mpumalanga with 2,0 million kg, while 1,5 million kg were produced in the remaining four provinces.

2.8.2 Production

South Africa, like Australia, produces mainly apparel wool, while the bulk of the wool of the other major producers, such as New Zealand, China, Uruguay, and Argentina, is the coarse type used in the manufacturing of carpets and interior textiles. The main fibers competing with wool are cotton and man-made fibers such as polyester, nylon, and acrylic. Total receipts for 2022/23 decreased to 47,2 million kg, a decrease of 1,4% from 2021/22. The slight decrease was mainly due to increased volumes by 2, 0% offered for sale by Lesotho producers.

2.8.3 Marketing

An excess of 90% of all greasy wool sold in South Africa is traded by means of weekly auctions taking place from August to June. Usually, there is considerable instability in prices during and between auctions. The price of wool is determined by a complex set of variables, including the level of the market in Australia on a specific day, exchange rate fluctuations quantities offered for sale at auctions. The specific demand for different wool types at various times, the extent and timing of contract commitments by local buyers for delivery to clients, and the prevailing economic conditions in wool-consuming countries. South Africa produces mainly a Merino clip, which comprises more than 80% of all lots offered for sale. Mean fibre diameter is the

major price determinant for Merino wool, with finer micron categories normally commanding a premium over medium and strong wool.



Figure 11: RSA wool production (including Lesotho and Namibia) and average price 2018/19-2022/23

2.8.4 Marketing arrangements

The marketing of wool in South Africa is free from statutory intervention. Wool is traded primarily via the open-cry auction system. Additionally, wool auctions are centralised in Port Elizabeth and run from August of one year to June next year. Alternative selling mechanisms, such as contract growing, forward deliveries and futures, have not been established in the South African wool industry.

The international price for apparel wool is determined in Australia, where the largest volumes of wool are traded. However, South Africa, with its small clip, is therefore a market follower or price-taker.

Numerous sellers and few buyers are typical of wool auctions. Buyers normally must compete for wool over several auctions to make up processing batches to meet their clients' contract specifications in terms of price, quantity and delivery date. Contracts in foreign currencies, such as the euro or the US dollar, have to be converted into buying limits in Rand and the buyer carries the risk. Cape Wools of South Africa promotes the interests of the South African wool industry. It is a non-profit company established and owned by farmers and other directly

affected industry groups registered with the Wool Forum, which represents all role players in the industry. The Board of Directors proportionately represents these groups. Cape Wools started operating on 1 September 1997. Cape Wools' service portfolio comprises market information and statistics; research and development, transfer of wool production and promotion of wool. The Wool Trust from funds transferred from the former Wool Board funds Cape Wools.

2.8.5 Exports

Wool is an export product with approximately 94% of total production being, shipped overseas, in either greasy or semi-processed form (scoured and wool top). Main export destinations for the year under review were China, the Czech Republic and Italy.

Table 7: The major export destinations for South African wool

Wool shipments to the five top export destinations – July 2022 to June 2023								
Country	Greasy		Scoured		Top and noils		Total	% of total FOB value
	Value R1 000	Volume Kg	Value R1 000	Volume Kg	Value R1 000	Volume Kg	Value R1 000	
China/Macau/Hong Kong	3 184 664	33 417	0	0	0	0	3 184 664	69,7
Czech Republic	662 685	5 799	0	0	0	0	662 685	14,5
Italy	439 166	2 670	5 084	76	0	0	439 166	9,6
India	106 532	1 048	0	0	0	0	106 532	2,3
Egypt	100 960	815	0	0	0	0	100 960	2,2

Source: DALRRD, 2023.

2.9 Outlook

The South African government has reached an agreement with China to lift the restriction on the export of wool that was imposed because of foot and mouth disease.

2.9.1 Mohair Production

In South Africa, Mohair production mainly occurs in the Eastern Cape and the adjacent part of the Western Cape. The country produces approximately 53% of the world's mohair clip. However, in realizing the responsibility involved in being the most reliable source of mohair, Mohair South Africa was established to perform functions aimed at the advancement of the entire mohair industry. Moreover, through selective breeding and farming techniques, the Angora goat farmer plays a crucial role in promoting the constant availability of quality natural fibres. South Africa's mohair production was stable at 2,3 million kg in 2022 compared to 2,3 million kg in 2021. The trend continues to surge slightly upward in comparison to the two seasons.

Table 8: Production of mohair by South Africa during the period 2018 to 2022

Year	2018	2019	2020	2021	2022
	Million kg				
Production	2,2	2,1	2,2	2,3	2,3

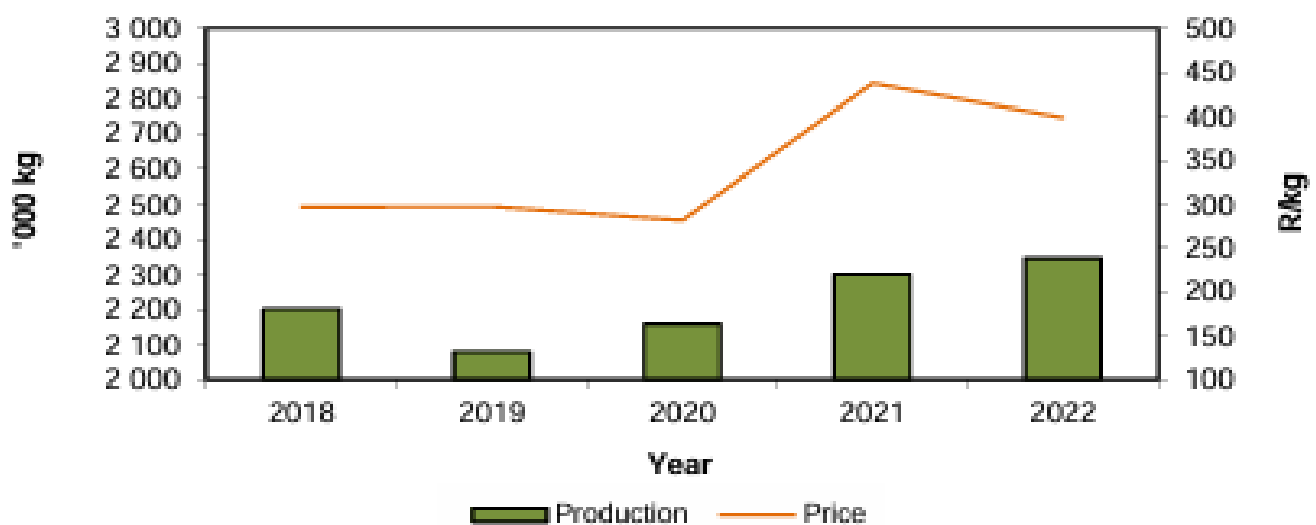


Figure 12: Production and price of mohair 2018–2022

Source: DALRRD, 2023.

2.9.2 Mohair Production and Price

The mohair price started to drop during the last half of 2022. As more than 90% of South African mohair is, exported to countries like Italy, China and the UK, the mohair price is also linked to international economies. The war between Ukraine and Russia had a direct economic impact on the countries purchasing South African mohair, which effected the mohair price towards the end of 2022. The average auction price of mohair decreased by 8,9%, from R437,75 in 2021 to R398,69 in 2022. Although the kid sector experienced some downward pressure, the rest of the clip had good demand.

Table 9: Average auction prices of mohair for the period 2018 to 2022

Year	2018	2019	2020	2021	2022
	R/kg				
Price	297,00	297,48	281,62	437,75	398,69

Source: DALRRD, 2023

2.9.3 Imports and exports

Most of the world mohair production is, imported to South Africa for further processing, after which it is exported together with locally- (including Lesotho) produced mohair. Italy became the leader in mohair imports from South Africa in 2020/2021, followed by China and UK. Mohair exports decreased by 15,63% from 2021 to 2022 at an estimated 0,5 million kg. The imports remained almost the same between 2021 and 2022.

Table 10: Import and Export of Mohair

Year	2018	2019	2020	2021	2022
	Million kg				
Imports	1,3	1,3	1,3	1,3	1,3
Exports	3,3	3,3	3,0	3,2	2,7

Source: DALRRD, 2023.

Mohair South Africa launched an internationally recognised standard in March 2020, called the Responsible Mohair Standard (RMS). This standard ensures that South Africa offers an ethically and sustainably certified product. The beginning of 2021 saw the first RMS-certified mohair being offered to buyers, which increased the demand for South African mohair. About eighty percent (80%) of the South African mohair clip now complies with the internationally recognised. Responsible Mohair Standard, which will become the minimum standard if a farmer wants to sell his mohair at competitive prices. The industry is also working on a life cycle assessment, which will measure the impact we have on the environment. With the world focusing on counteracting the effects of climate change, it is important for us to know our impact and then plan how we can improve.

Mohair production in South Africa is on the rise, with most of the mohair production areas in South Africa receiving good rains after a 6 -7 year drought. Rain means natural feed for the angora goats, which makes it more profitable to farm with angora goats. Mohair price per kg remains lucrative, and angora goat farming has become an attractive farming commodity. Half a year during 2023, production is up by more than 10% compared to the previous year at the same time.

2.10 Ostriches

Commercial ostrich farming in South Africa started in 1864 with large-scale exports of feathers to Europe. The industry flourished during what was referred to as the second ostrich feather boom between 1900 and 1914. At this stage, ostriches were only farmed for their feathers, and a handful of feathers was enough to buy a farm. Soon afterward, the industry virtually collapsed because of changes in world fashion trends, the introduction of the motor car as a means of transport (ladies struggled to get into the cars while wearing their hats with long ostrich feathers), and the First World War.

During the 1960s, industry was transformed into an intensively managed farming activity. The emphasis shifted from feathers to leather production. More recently, ostrich meat became popular because of its health benefits, and compared with beef and chicken meat, it has almost no fat and lower cholesterol, a slightly higher protein content, but lower energy and calcium content, while rich in iron. The greater focus on a healthy lifestyle resulted in a growing demand for ostrich meat worldwide and South Africa is normally the main supplier. Currently, all major stakeholders in the industry are affiliated to either the National Ostrich Processors of South Africa (NOPSA) or the South African Ostrich Producers' Organisation (SAOPO). Both these organisations are key members of the South African Ostrich Business Chamber (SAOBC). The objective of the SAOBC is to facilitate the sustainability and profitability of the ostrich industry in South Africa. The ostrich production season in South Africa runs from 1 July to 30 June and therefore the statistics provided cover this period annually.

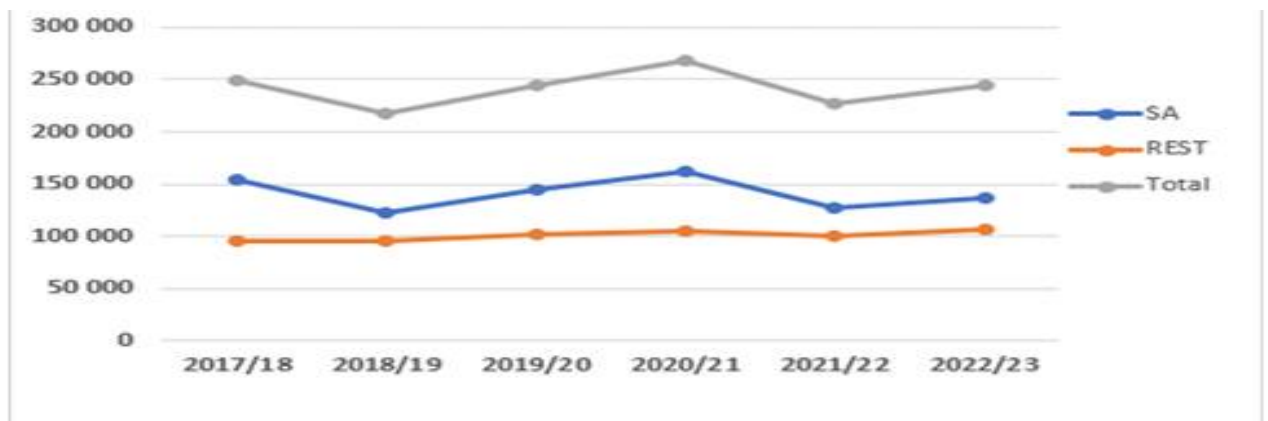


Figure 13: Estimated number of ostriches slaughtered 2017/18-2022/23.

Source: DALRRD, 2023.

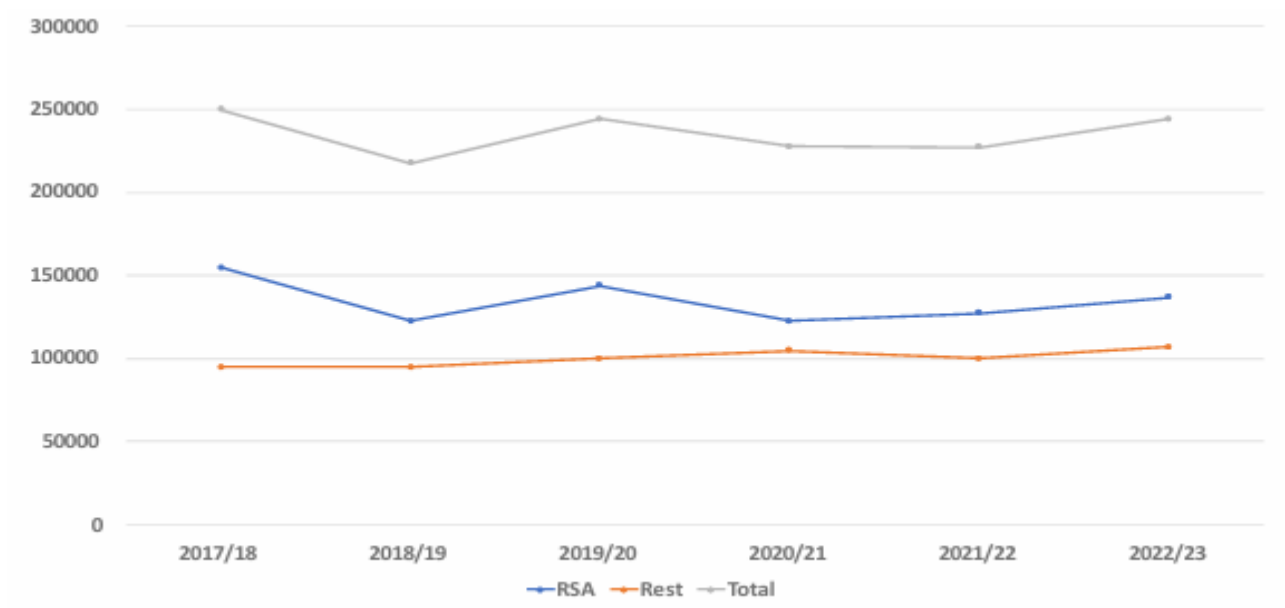


Figure 14: Estimated number ostriches slaughtered 2017/18-2022/23.

Source: DALRRD, 2023.

According to the South African Ostrich Business Chamber (SAOBC), (2023) the number of ostriches slaughtered worldwide is estimated at $\pm 244\ 000$ for the 2022/23 production season. 137 071 (56%) were slaughtered in South Africa. The profitability of ostrich farming enterprises is a huge challenge and therefore production in RSA will only slightly increase by $\pm 8\%$ for the next slaughter season. Worldwide, the demand for ostrich meat is stable and ostrich meat should still benefit from the healthy lifestyle trend—ostrich meat is a tasty red meat. As mentioned before, it contains almost no fat or cholesterol and is high in protein. Demand and price for feathers is excellent with the return of the carnivals, and cabaret shows worldwide and the fact that ostrich feathers are in fashion now with the fashion houses. The demand for the very high-quality ostrich leather for the fashion industry is good and the activity in other segments of the exotic leather market recovered to the volume before the impact of Covid-19 on these markets. Currently, $\pm 45\%$ of the total income for the producers per ostrich will be for leather, $\pm 15\%$ for meat and $\pm 40\%$ for feathers. The income for meat still suffers because of the ban on export of fresh ostrich meat due to Avian Influenza regulations. The export of heat-treated ostrich meat is still possible from some farms and the demand for the

products is increasing. The ostrich industry's aim is to supply mainly higher-grade leather to the market. Various research programmes and projects regarding quality and genetic improvement are therefore being conducted. Prospects for the continued drought in the main ostrich production areas had a huge impact on production costs and ostrich feed still accounts for more than 70% of input costs. Fortunately, these production areas had good rains and the potential for production of own feed for ostriches will improve. New markets need to be developed for leather and heat-treated meat for the export market, therefore the SAOBC partners with the Department of Trade, Industry and Competition to grow the industry's earnings in foreign revenue for South Africa, as well as safeguard the remaining direct jobs in the rural, drier areas of the country. The industry had to employ various strategies during the past two years to prevent further job losses, as the export and movement bans have left most producers in a negative cash flow situation. The biggest risk for the sustainability of the industry lies in the potential outbreaks of animal diseases such as avian influenza; therefore, the industry collaborates with the government to ensure compliance with international requirements in this regard. This is being done via the South African Ostrich Business Chamber, which is the representative body for the entire South African ostrich industry. During 2020, the South African Ostrich Industry implemented the new SAOBC Ostrich Standards, which address all the animal welfare and environmental challenges for the whole production chain. NSF, an independent, international, and experienced third-party auditing firm, audits all farms, hatcheries, and abattoirs. This initiative was welcomed by all clients in the value chain and plays a major role in the long-term sustainability of the South African Ostrich Industry.

2.11 Conclusion

South Africa is allocated 80% of the agricultural land, which is appropriate for livestock production of all commodities, even though the sector is contributing approximately 40% to the agricultural income. For that reason, livestock production in South Africa has formed the

basis of human wellbeing through its contribution to the household economy, social status and food security. Access to livestock ownership plays a significant role in South Africa, particularly among rural societies, as compared to other African countries. However, apart from providing income and food security, livestock acts as investments and protection devices, hold cultural significance. Some parts of the country have common challenges of wild animals and stock theft threatening successful farming thereof. Foot-and-mouth disease is still prevalent in some parts of Limpopo, Mpumalanga, KwaZulu-Natal, Gauteng, North West and Free State, with movement restrictions in place for identified locations and biosecurity measures encouraged. Other diseases that continue to affect the industry are African swine fever, Lameness and eye infection. Poultry industry seems to dominate the sector through the demand for broiler chickens and eggs. This commodity contributes positively to food security in the country.

CHAPTER 3

LIVESTOCK FARMING AND FOOD SECURITY

3.1 Introduction

Chapter three assesses other studies on livestock farmers' contribution to food security in Africa. This chapter further highlights the following factors: assessing the Socio-economic impact of livestock farming in Africa, examining the contributions of livestock production on farmers' livelihood in Africa, determining the challenges faced by livestock farmers, examining the best practices of livestock farming among livestock producers, and determining the level of acceptance of the best practices in livestock farming among livestock producers.

3.2 Socio-economic impact of livestock farming in Africa.

The importance of livestock systems is considered for food security, and their potential to impact on poverty, livelihood, health, and nutrition, as well as, the environment, the livestock sector still receives limited attention in the global agriculture and food debate (Ogunkoya, 2014). Livestock farming is a cornerstone of Africa's agricultural sector, which provides food, income, and employment to millions of people across the continent (Green Africa Magazine, 2023). Africa is also known for its key indigenous cattle breeds, which include: Ankole-Watusi, Boran, and Nguni cattle. Socioeconomic burdens are another set of restraints that limit livestock productivity in Senegal and West Africa, due to the rapid growth of population (Eeswaran, Nejadhashemi, Faye, et al, 2022).

Livestock production is seen as a critical component of Sub-Saharan Africa's economy that contributes to food security, income, and employment for a considerable portion of the population. The region has a diverse livestock species, which includes cattle, sheep, goats, and poultry. Though the livestock classifications are progressively vulnerable to the effects of climate change, which include rising temperatures, varying precipitation patterns, droughts, and more regular extreme weather events (Tareke, Zerfu, Hailesilassie, et al, 2024). The

livestock sub-division plays a very substantial socio-economic part in West Africa, providing income and employment for the region's population. Thus, these roles are increasing in their importance as the sub-sector grows because of increasing human populations, incomes, and urbanization rates (Molina-Flores, Manzano, Coulibaly, et.al, 2020). South Africa is still faced with a high rate of youth unemployment with very limited involvement of youth in agriculture-related activities (Baloyi, Wale, Ningi, et al, 2025). For that reason, by separating the agricultural sector and exploring several subsectors that are attractive to youth remains important when thinking of reducing both youth unemployment and poverty in the country (Sarkar 2020) demonstrates that diversification of income and employment portfolio is critical for sustainable rural livelihoods. In addition, the livestock sector can play an important role in poverty alleviation, income enhancement and risk reduction for poor rural households. Livestock is perceived as one of the fastest-growing subsectors of agriculture and related activities.

3.3. Contributions of livestock production to farmers' livelihood in Africa

Agriculture as a sector is critical for the worldwide economy; more people than any other industry depend on it for their livelihood (Man, & Yee, 2023). It further plays a significant role in providing protein food for most of the global population, also uplifting the rural livelihoods and economies in many developing countries. Livestock is leading the world economy and forms the foundation of livelihoods all over rural Africa (Ekwem, Morrison, Reeve, et al, 2021). In Africa livestock sector contributes about 30–80% to its Agricultural Gross Domestic product. However, around 85% of livestock producers in the world are found in SSA countries (Erdaw, 2023). It further states that livestock production is an important contributor to sustainable food security, particularly in low-income areas and marginal habitats. In West Africa, livestock production systems are vital for food security and for sustaining rural

economies (Molina-Flores, et.al, 2020). According to Mandeni, Ogunkoya, and Omotayo, (2019), smallholder livestock systems play a very significant role in supporting rural livelihoods. Moreover, in smallholder systems, livestock satisfy many functions in addition to producing meat, milk, and eggs. Farming with goats in South Africa is a significant economic and social livelihood for rural households.it is further stated that goats produce milk, meat, skins, cashmere, mohair and play an essential part in religious and cultural ceremonies, (South Africa.co.za, 2025), Goats in South Africa produce fibre, skins and milk, but the key reason for keeping goats is for goat meat production. Livestock farming is a livelihood activity and is critically important for the food and nutritional security of most of the population in West African countries, including Senegal (Eeswaran, et al, 2022). Foods resulting from animals are critically important for a healthy and productive society. Furthermore, consumption of chicken products globally is now outshining that of other animal-source foods of animal sources. Even if chicken production is one of the quickest-growing agricultural sectors globally, such growth is not reflected in many Sub-Saharan African countries (SSA) (Erdaw & Beyene, 2022). Hence, the poultry sector in SSA needs to respond to the increasingly growing demands of poultry meat and eggs, and it should also enhance its contribution to both by drawing back the malnourishment and in that way, improving the health of the society. Additionally, poultry production has increased its significance in South Africa due to its acceptability, consumption, and demand across the country. Therefore, its products are a major source of protein and an important means of income to the poultry producers (Idowu, Zishiri, Nephawe, et al, 2021). Livestock currently plays a significant and outstanding role in societies around the globe. So, keeping livestock fulfills various needs in societies. These vary from very apparent aspects, such as providing food security, proteins, and income for farmers, to more concealed aspects such as fulfilling cultural or religious roles, providing ecosystem services, and satisfying their owners' passion for keeping and caring for animals (Busch, 2023). Productivity improvement

in livestock management includes increasing the output of animal products, such as meat, milk, and eggs, while ensuring the welfare of the animals and the sustainability of the production system (Khairi, Maharani, & Aditya, 2025). Promoting a small-scale indigenous village chicken production system can be beneficial to the rural farmers. Some smallholder farmers need to be involved in the raising of indigenous chickens as their full-time farming business. These village farmers have numerous Indigenous knowledge in poultry and have preference to chicken types and traits (Bett, Bett, Peters, et al. 2011), and (Desta, 2021). This Indigenous knowledge provides an opportunity to specialise knowledgeable and interested groups in a subsistence and semi-intensive chicken production system. However, this can help to increase the size of the family flock and income and meet the growing market demand.

3.4. Challenges faced by livestock farmers

Recent study conducted in Free State Province reveal that, lack of camp systems, drought prevalence, increased feed costs, poor veterinary interventions, insufficient breeding stock, the that high cost of fuel and transportation, lack of equipment, disease, stock theft and pilfering, and lack of suitable grazing land were the most predominant factors that affected smallholder cattle and sheep farming (Ogunkoya, 2024). In Africa, livestock production is vital to local and national economies, but their productivity is controlled by infectious diseases (Ekwem, et al, 2021).

Animal diseases have significant effects on animal productivity and welfare as well as on human well-being (Grace, Songe, & Jones, 2015). Lack of knowledge and resources for disease treatment and control because of poor availability and updating information on veterinary services (Mandeni, et al, 2019). Some countries in Africa are faced with challenges such as land degradation, drought, and disease outbreaks (e.g., foot-and-mouth disease, Rift Valley fever) that threaten their food productivity (Green Africa Magazine, 2023). An increase in livestock production is expected to increase the supply of inputs, including feeds. Though,

poor-quality feed is one of the major factors that limit animal production, for example, dairy production (Erdaw, 2023). Livestock production in West Africa suffers from an overall lack of highly qualified technical workers (veterinarians, animal feed specialists, lab technicians) and extension services (Molina-Flores, et.al, 2020). If livestock farming does not have enough agricultural personnel who can provide technical information on livestock management, then sustainable production on livestock will be greatly affected. Several livestock producers, especially smallholders in Africa, are faced with challenges in accessing markets to sell their livestock. Some of these challenges include poor infrastructure, inadequate transportation and a lack of market information which hinder farmers from selling their animals at fair prices (Adegboye, 2024). However, some of these smallholder livestock farmers do not have access to financial support and resources, which prevent them from investing in better-quality breeds and required infrastructure for sustainable livestock management. Eeswaran, et al, (2022), state that livestock farming in West African countries which include Senegal, operates far below the optimum production potential, mainly due to, demographical, biophysical, economic, environmental, and sociopolitical challenges.

In South Africa, farmers are also confronted with a number of difficulties, such as lack of capital, poorly maintained farm roads, low-priced products, difficulties in enforcing contracts, strict food safety rules, lack of production skills, location in remote areas, lack of transportation, scarcity of information, difficulties in drawing up contracts, lack of infrastructure and weak institutional markets (Jari and Fraser, 2009).

Simals (2024), emphasised that disease management is one of the most important challenges in livestock farming, and further stated that livestock are susceptible to a variety of diseases that can affect their health, productivity, and even the safety of the food supply. Diseases such as foot-and-mouth disease, avian influenza, and others can spread rapidly, leading to severe

economic losses which can end up affecting export markets. Challenges that are prioritised as top challenges are: Disease management, market fluctuations, feed costs, labor shortages, environmental regulations, consumer preferences, climate change, and financial management (Simals, 2024).

Land degradation is a major risk to sub-Saharan Africa's rangelands, which are key for livestock farming and the livelihood of the masses of people in the region. The key factors that drive land degradation such as soil erosion, drought, deforestation, and climate change, as well as socio-economic factors like poverty, land tenure issues, population pressure, and economic instability. These factors have serious implications, as land degradation can lead to poor quality of forage, an increased prevalence of diseases, higher mortality rates among livestock, and a significant decline in livestock productivity (Slayi, Zhou, Dzvene, et.al, 2024). However, these socio-economic consequences of this degradation are important, leading to reduced household income, increased poverty, and heightened food insecurity.

Some studies reveal that stock theft and predation are the major concerns to livestock farmers. However, farmers should employ biosecurity measures to ensure the supply of safe products to the consumer. Moreover, the Government and the livestock industries will have to show a clear and strong commitment to address the challenges and opportunities to ensure the sustainability of the livestock sector (Meissner, Scholtz, & Engelbrecht, 2013). Additionally, livestock production in communal and small-scale sectors requires rapid commercialisation to get rid of poverty and contribute to gross domestic product.

The study that was conducted in the Eastern Cape reveals that livestock production is vulnerable and at risk of being severely affected by climate change. Low-income, rural subsistence farming families are particularly at danger of being affected. The loss of livestock

as assets can cause severe poverty and influence livelihoods over time. The promotion of sustainable agriculture and livestock rearing in communal areas will be of importance to ensure that the impact of climate change is minimized (Rust, & Rust, 2023). The real effects of climate change are mostly linked with heat and the indirect effects with feed sources, ecosystem changes and diseases (Scholtz, et al, 2023). Mudzengi, Dahwa and Kapembeza, (2020), states that livestock production is the major source of rural livelihoods in the semi-dry regions of Southern Africa. Nevertheless, nutrition is the major limiting factor of livestock production in these areas that are characterised by drops in rangeland productivity due to the increases in drought incidence, considerate overstock by farmers, and climate change and inconsistency.

3.5. Best practices of livestock farming

Agriculture as a sector is critical for the worldwide economy, countless people than any other industry depend on it for their livelihood (Man, & Yee, 2023). Livestock farmers practicing fodder bank establishment have feed for their livestock available all year round. Which lead to their stock numbers increasing (Mandleni, Ogunkoya, & Omotayo, 2019). Some of these key practices that promote environmental stewardship in livestock farming include rotational grazing, agroforestry, manure management, efficient feeding conversion, water conservation, genetic selection and animal welfare, renewable energy integration, collaboration and knowledge sharing and monitoring and continuous improvement (South African farmers Magazine, 2023). If farmers can implement them, long-term sustainability of agriculture as a sector could be promoted. Effective livestock management is essential for South African farmers to maximise productivity, ensure animal welfare, and maintain sustainable farming operations.

Farmers magazine, (2024), reveals that livestock management in South Africa requires a combination of traditional knowledge, modern techniques, and a commitment to animal

welfare. By employing these best practices, livestock farmers can guarantee the health of their animals, boost productivity, and achieve long-term success in the agricultural sector. The best management practice (BMP) that can significantly increase the effectiveness of your farming operation, is when more pasture is divided into smaller camps, and the consumption of fodders by grazing livestock can increase. As consumption of forages is increased and cattle are moved more frequently, the ungrazed camps will have new forage available for grazing and the previously grazed camps will have time to rest (Pennington, Pennington, & Pennington, 1914). Macharia, Kinyamario, Ekaya, et al. (2010) reveal that other ways of improving the productivity of range lands are through mixing forage legumes into natural pastures, particularly in smallholder livestock production systems. Approaches for enhancing livestock productivity may include improving animal genetics, optimizing feed efficiency, and implementing better health management practices (Thornton, 2020). Usually, livestock farmers familiarise themselves and cope with agricultural drought through various strategies. Yet, choosing drought-resistant breeds and selling livestock to lower herd size to a manageable number were the more viable strategies that farmers mostly adopted (Bahta, Maré, Moshugi, 2025).

The use of tropically adapted breeds can be introduced to smallholder farmers, provided that a comparative advantage exists. This could help to proficiently utilize the genetic gain attained under a similar management system (Desta, 2021). Additionally, tropically adapted synthetic breeds can be developed from a three-way cross of layers, broilers, and red junglefowl, and/or through a two-way cross of dual-purpose. There are many different indigenous and adapted beef cattle breeds in southern Africa. These breeds are hardy and can survive in harsh local conditions and display low susceptibility to diseases and adaptation to diverse environmental conditions. These breeds such as the Afrikaner and Nguni show valuable and can be regarded

as South Africa's heritage for food security (Scholtz, Grobler, Jordaan, et al, 2023). Furthermore, improved efficiency of production will have positive effects on sustainability and can serve as a mitigation strategy.

3.6. Adoption of the best practices in livestock farming

Sharing of knowledge, experiences, and innovations can hasten the adoption of environmentally friendly livestock farming practices (South African farmers Magazine, 2023). By adopting best practices intended for South Africa's various climates and agricultural landscapes, farmers can improve the health and profitability of their livestock. However, here are key approaches for effective livestock management that the farmers should follow:

Ensure proper nutrition, maintain clean water supply, implement proper housing and shelter, focus on disease prevention, practice good breeding management, monitor animal health, optimise grazing practices, and reduce stress in livestock, embrace technology and data management, ensure compliance with animal welfare standards (Farmers magazine, 2024).

Some research findings reveal that there is limited research on the adoption of Climate Smart Agriculture (CSA) by communal livestock farmers in South Africa. However, some farmers are already practicing some aspects of CSA, although they might not be aware of it. It has also been noted that unavailability and unaffordability of technology is a big challenge to smallholder farmers. Thus, the media is a valuable source of information for communal farmers on matters of climate change adaptation and CSA adoption (Molieleng, Fourie, & Nwafor, 2021). It provides a reason relating to some techniques that are inapplicable to communal farmers or too expensive for communal farmers to implement. Studies reveal that farmers in dry weather are more attracted in adopting scientific innovations that provide instant benefits, such as increased productivity, cost savings, or ease of management. However, Extension

support has a positive effect on the adoption process of innovation because it has provided relevant information on livestock technologies and practices that are adaptive to dry climate conditions (Simamora, Tahuk, Rofiq, et.al, 2025). Furthermore, farmer characteristics also influence adoption, with older farmers being more resistant due to long-standing traditional practices, compared to young farmers who quickly adopt the innovation if beneficial. Additionally, innovations that offer direct benefits, such as increased productivity and improved livestock health, are more likely to be adopted, especially when they suit dry climate conditions where there is little annual rainfall.

Balehegn, Duncan, Tolera, (2020) states that the failures of adoption of feed improvement technologies result from systemic constraints that make their adoption difficult and from paying limited attention to socio-cultural and economic standards. Even when technical and resource limitations are addressed, the limited scale of improvement in livestock productivity from some technologies may not adequately influence adoption of the technology.

3.7 Conclusion

Livestock production is seen as a critical component of some parts of Africa's economy that contributes to food security, income generation, and employment for a considerable portion of the population. Livestock farming serves as a basis of Africa's agricultural sector, which provides food, income, and employment to millions of people across the continent. Livestock production is an important contributor to sustainable food security, particularly in low-income areas and marginal habitats. Some of livestock farmers are faced with challenges including diseases (Foot and mouth diseases, which prevent them from selling their animals at formal markets and in accessing markets to sell their livestock. Adoption of best livestock farming practices can be hastened by sharing knowledge, experiences, and innovations.

CHAPTER 4

THEORETICAL AND CONCEPTUAL FRAMEWORKS ON LIVESTOCK PRODUCTION FOR FOOD SECURITY

4.1. Introduction

This chapter gives a description of both theoretical and conceptual frameworks on livestock production for food security. Dickson, Emad, and Joe (2018), define the theoretical and conceptual framework as frameworks that explain the path of research and ground it firmly in theoretical constructs. The overall aim of the two frameworks is to make research findings more meaningful, acceptable to the theoretical concepts in the research field, and ensure generalisability. They assist in stimulating research while ensuring the extension of knowledge by providing both direction and impetus to the research inquiry

4.2 Theoretical framework (TF)

The theoretical framework is a guide that resonates with every aspect of the research process, from the definition of the problem, literature survey, methodology, presentation, and discussion of the findings as well as the conclusions that are drawn (Dickson et al., 2018). Additionally, it guides the paths of research and offers the foundation for establishing credibility. The theoretical framework (TF) is also defined as a systematically developed set of concepts and foundations, made up from one or more theories, with the purpose of supporting a study (Salawu & Shamsuddin, 2023). It therefore intends to explain the existing theories that are relevant to the study being conducted and the way they connect. Additionally, the TF) also underscores the theory that forms the foundation of the study. It is also known as the starting point for paper analysis. Kerlinger, (1986) describes theory as a set of interrelated structures, definitions, and propositions that give a systematic view of events by creating relationships among variables with the objective of explaining and predicting phenomena. Furthermore, a

theory can be utilised to successfully expect outcomes. This projecting capacity can also contribute to direct researchers in selecting acceptable study questions. The theoretical framework for livestock production, as shown in Fig. 15, is based on the Sustainable Livelihood Framework (SLF), which aims to maximise a farming household's utility through diverse livelihood assets, including human, natural, physical, and financial capital, which is adopted and modified by Manyike, Turuvinga, and Zhou (2025). This framework discovers how these resources can help to lessen risks, shape livestock production, and influence the welfare of livestock farmers (Wang, Jiang, and He, 2023). In the SLF, the vulnerability of farming households arises from weather-related, environmental (such as changes in temperature and precipitation), and economic shocks (Oyarzo Kaulen, Marchant, et. al. 2024). Livestock Smallholder farmers who are farming on a small scale are characterised by restricted access to opportune information related to weather systems, market prices, limited assets, and the integral vulnerability of agriculture as the main source of income to social-ecological change (Dasgupta Morton, Karapinar, et al, 2014). As shown in Figure1 Theoretical animal production framework is a framework with six interlinked elements (Wang, et al., 2023). Vulnerability situation discusses the exterior, related, and physical conditions in which people live. Vulnerability of farming households arises from weather-related shock, environmental factors (such as water, soil, changes in temperature and precipitation), and economic shocks Oyarzo, et al. (2024), Maziya Nkonki-Mandleni, Mbizana, et al. (2024) and Alva and Rojas, (2022). Households become vulnerable if farming is not taking place, due to a lack of or insufficient water, poor soil structure, extreme temperatures as well as low rainfall distribution. Low productivity could also make people to be food insecure, subsequently leading to low cash flows, low income, as well as hunger. If people have enough land, they are then able to produce food and feed the nation. Even if people can have enough food, not all of them will have access to it. Mohamed, Wassie, and Teferi (2021) define vulnerability as the vulnerability of the

household during food scarcity will positively affect the food security status of the household. This will ultimately lead to shocks. To be food secure, households must always have access to sufficient food. Food should be regularly produced and supplied to markets for sustainable use by households. The most key stage of the livestock activity is the sale of animals; for this, it is necessary to have an adequate road that allows access to the trucks that will pick the animals up without complications or accidents. Otherwise, producers will be forced to transport their animals on foot, exposing them to complications such as their loss, which could result in serious losses for the farmer. Another key point for livestock management is the availability of corrals and materials for sectorisation to achieve adequate management of species, requiring essential supplies such as wood, wire, nails, and others. In addition, basic services such as water and electricity are important to improve families' life quality. For this, solar panels are a good option in areas where there is no electrical wiring; in the case of water, if there are no sewerage and public systems, the choice would be training households on how to purify available water from both under soil and rivers to prevent the occurrence of diseases.

4.2.1 Five Forms of capital to enhance farmers' livelihood.

Human capital, which refers to assets that are believed have an influence to engage in livestock farming and involve age and education, which are more relevant to livestock production and have an emphasis on maximizing the herd Ahmad, Oxley, Ma, et al, (2023), and Manyike, Turuvinga, and Zhou, (2025), Modiba, and Mamashila (2024) and Ahmad et al, (2023). Additionally, through livestock management training, it is possible for families to have access to basic services and education to increase their herd size in ensure their members enjoy a quality life. Opondoh, Muga, Kaluwa, et al, (2023) refer to human capital as individual skills, knowledge, education, health, and leadership, which, when combined, allow populations to engage in promoting skills and employability-related outcomes through training and capacity building.

Social capital, comprising networks and affiliations such as farming groups and religious organisations, community-based organisations, traditional leaders, and traditional healers, plays a crucial role in agricultural production decisions in each community (Opondoh et al, 2023). Access to information, which is facilitated by certain communication tools like mobile phones, enhances networking and provides valuable resources that influence the strength of agricultural activities, (Alsaleh, & Yang, 2023). Strong social status leads to a more cohesive group of farming households with different skills.

Financial capital refers to income, savings, and financial security that are the capital base, which are essential for the security of a woman and her family, as well as her transformation and development (Opondoh et al, 2023). Households with more income enjoy the liberty of having financial services, credits and financial security.

Natural capital refers to most livestock producers use pasture for feeding their animals; however, this technique is not sustainable because of wastage. Land with fertile soil and sufficient water helps livestock farmers to improve their pastures and grazing capacity. Alva, and Rojas, (2022) refer to natural capital as resources like land as a production factor, which is vital for livestock production.

Physical capital refers to natural resources, basic infrastructure, information, equipment, and production inputs needed to support livelihoods through the provision of security, shelter, and food (Opondoh et al, 2023). Furthermore, physical capital incorporates the infrastructure and resources needed for farming, such as housing and equipment (Tong, Yuan, Zhang, et al. 2024) and (Alva, & Rojas, 2022). Large herds need infrastructure and equipment for better handling and treatment.

As shown in Figure 15, SLF is a people-centered framework with six interlinked elements. Vulnerability context refers to the external, contextual, and structural conditions in which people exist. The livelihood assets pentagon lies at the core of SLF, including individuals'

human, social, natural, physical, and financial capital and their inter-relationships. Transforming structures and processes refer to the private and public organisations and their interactions that set and implement policy and legislation and perform all other functions that affect livelihoods. Influence and access that considers the link between livelihood assets and the transforming structures and processes. Livelihood strategy is an overarching term referring to the combination of activities and choices people conduct to achieve their livelihood goals. Livelihood outcomes are the achievements or outputs of livelihood strategies.

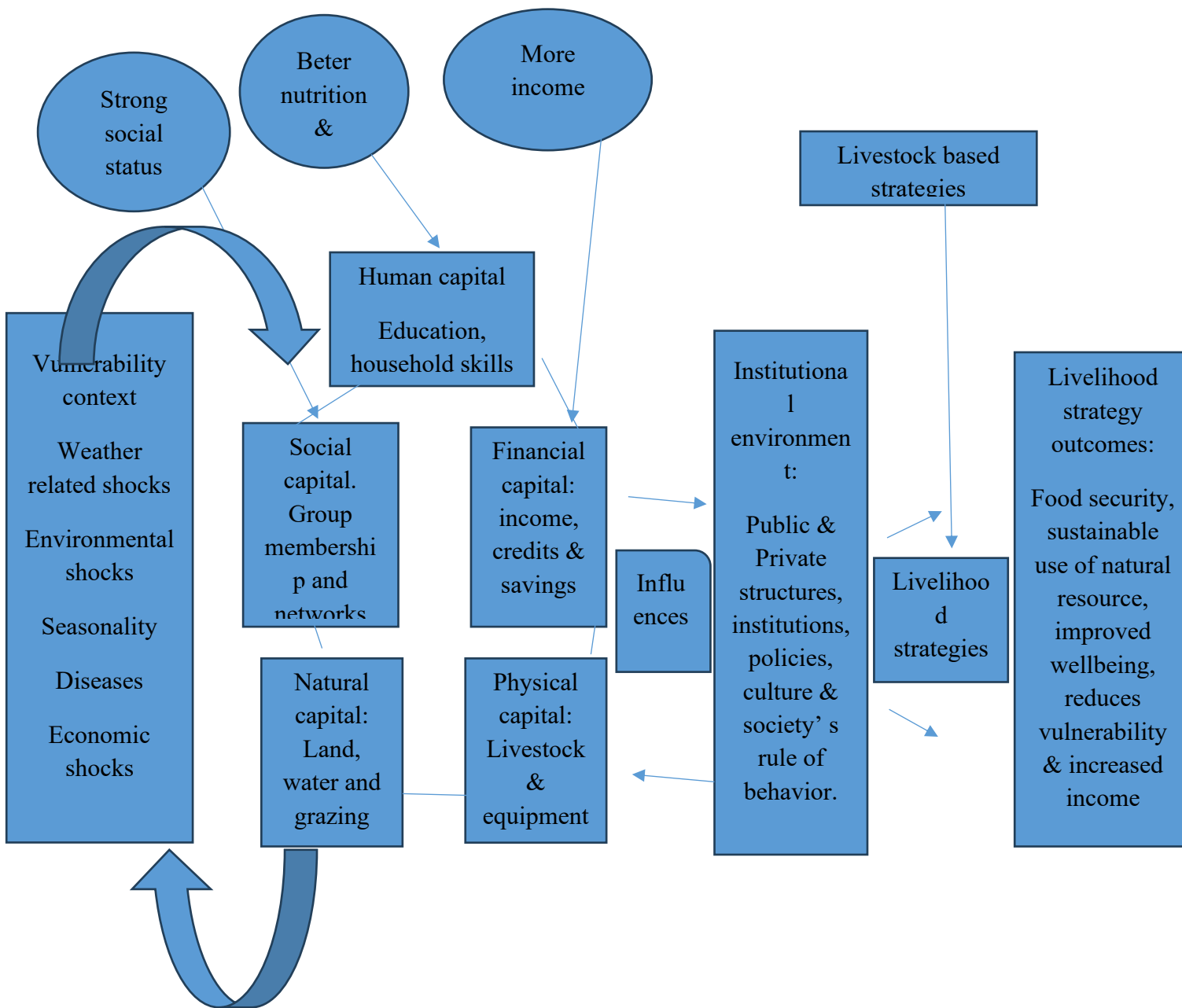


Figure 15: Theoretical framework based on the livestock production for household livelihood. Source: Adopted and modified from Manyike, et al., (2025).

4.3 The conceptual framework

A conceptual framework is defined by Kivunja, (2018), as the total, logical alignment and links of anything and everything that forms the fundamental thinking, constructions, strategies and practices and implementation of your whole research project. The role of conceptual

framework used to be highlighted by Ravitch and Riggan, (2017) and the authors try to guide potential scholars on how to answer the following questions:

- (i) What do I want to study about?
- (ii) Who cares about that?
- (iii) What literature do I need to include in my study, and when have I done more?
- (iv) How do I know what kind of data to collect and how to analyse them?
- (v) How do my own position and way of seeing the world shape the framing and execution of my research?
- (vi) How do I deal with shocks in the data or unexpected developments in the field?

This section demonstrates the conceptual framework for food security in Mpumalanga. There are many definitions that explain food security. According to (Mohammed, Wassie and Teferi, 2021), food security refers to access to sufficient, safe, and nutritious food by all people at all times for their healthy lives. The relationships between Food Security and Food Insecurity are that food security and food insecurity are self-motivated, equal and time dependent and the resultant status depends on the interaction between the stresses of food insecurity and the coping strategies to deal with them (Peng & Berry, 2019). However, the stresses of food insecurity may occur at any point along the food security trail. Food availability, accessibility, as well as utilisation and stability, form the pillars of food security.

Study conducted by Sims, Van der Pligt, John, et al, (2021), states that, food insecurity is a significant contributor to health. It also serves as a factor in both underweight and malnutrition, and overweight and obesity. Moreover, countries where both undernutrition and overweight and obesity coexist are said to be experiencing a double burden of malnutrition. India alone is one example of a country experiencing this double burden. Women have been found to experience the negative impacts of food insecurity and obesity, nevertheless, the reasons that women experience the impact of malnutrition more so than men are complex and are under-

researched. However, Nkwana and Mazenda (2025), reveal that households headed by uneducated, widowed, or large families are more likely to experience food insecurity. Furthermore, to manage this food insecurity, these households use consumption and asset-based strategies such as consuming less desirable, lower quality, or cheaper foods and depend on donations from friends or relatives.

The coping responses may take place at the national, household or individual levels. As per the study of Peng and Berry, (2018), the two processes of food security and food insecurity are interrelated with reiterative feedback coils such that stress leads to coping responses that may or may not be enough, thereby requiring adjustments in the coping strategies until food security is regained. Food and nutrition security can only be attained when all people have, when desired, physical, social, and economic access to adequate, safe (free of pollutants), and nutritious food to satisfy their nutritional needs and choices for an active and healthy life (Simelane & worth, 2020) and (Gross, Schoeneberger, Pfeifer, et al, 2000).

Food availability as one of the four food security dimension/pillars refers to food that is locally available and within reach by the local people. Livestock production and factors affecting the production levels are mainly considered. Increase in livestock production leads to job creation to local people, which results to increased food security. Available technology and extension services play a pivotal role in enhancing food security for sustainability.

The second dimension is food access, which is referred as food that is accessible and affordable by individuals in large quantities. Livestock farmers can earn their income through the sales of their animals, such as poultry, eggs, cattle, goats, and sheep, through on-farm (farm gate/off-farm markets).

The third dimension is “food utilisation” which is referred to as food of quality. Even if the food is available and accessible, it should be of good quality and high nutritional value. The food should always be safe and free from contamination.

The last dimension is ‘vulnerability’ which means that the vulnerability of the household during the food scarcity will positively affect the food security status of the household. This will ultimately lead to shocks. To be food secure, households must have access to sufficient food at all times. Food should be regularly produced and supplied to markets for sustainable use by households (Figure 16). There are two risks factors that are based at the household level. The first anticipated risk factor is health that can present in the form of illness, disability, and/or injuries. The other risk factor can be life cycle-related, which includes old age, death, and so forth. Social-related risk factors include those that can arise due to inequitable food distribution among households in a society or among household members within individual households (Simelane & Worth, 2020). A study conducted by Gomez, Paloma, Laura, et al, (2020) on the Role of Smallholder Farms in Food and Nutrition Security found that food and nutrition security has become one of the most significant items on the current international political agenda and a serious issue for governments globally. Despite the availability of sufficient food globally, over a billion people continue to suffer from the lack of nutritious food.

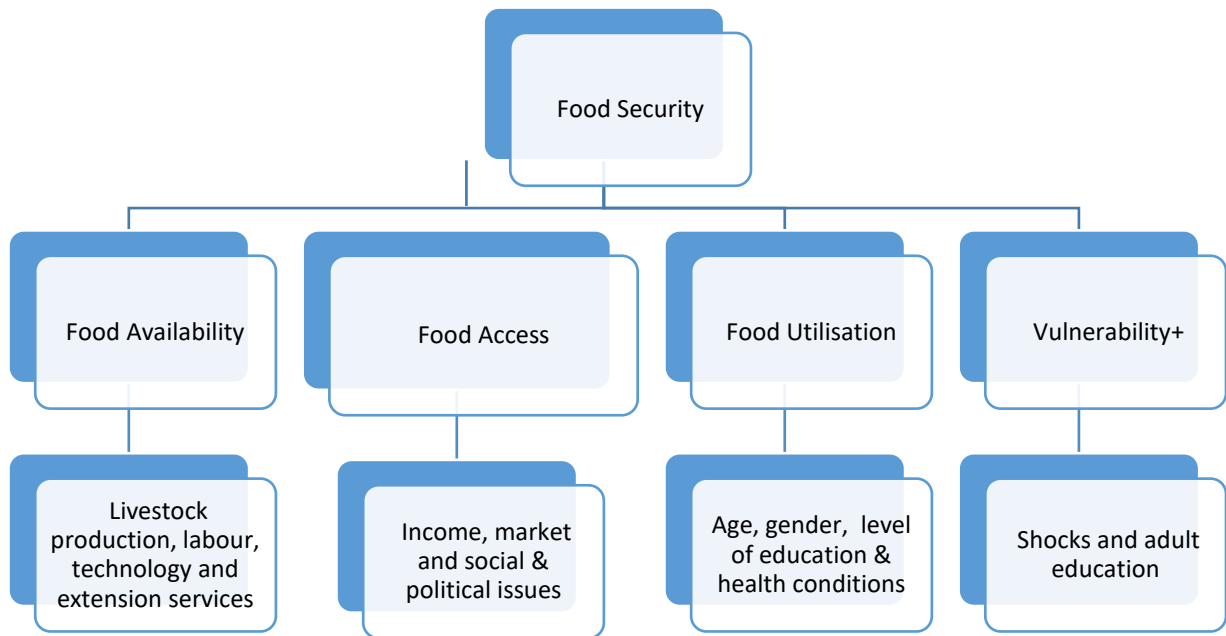


Figure 16: The Conceptual Framework for Food Security
 Source: Adapted from Mohammed, et al. (2021)

4.4 Conclusion

Food should be regularly produced and supplied to markets for sustainable use by households and the enhancement of food security. Additionally, it is necessary to have an adequate road that allows access to the trucks that will pick the animals up without complications

Human capital as a form to enhance farmers' livelihood has an influence to engage in livestock farming and involve age and education, which are more relevant to livestock production and have an emphasis on maximizing the herd. Food that is accessible and affordable by individuals can help livestock farmers to earn their income through the sales of their animals, such as poultry, eggs, cattle, goats, and sheep, through existing markets. Despite the availability of sufficient food globally, over a billion people continue to suffer from the lack of nutritious food. Food producers should produce more food that is of good quality and nutritious, for the health risks minimization.

CHAPTER 5

METHODOLOGY

5.1. Introduction

This chapter gives a description of the study area, sampling method, and sample size, method of data collection, method of data analysis, research ethics, and lastly the project timeline. The study conducted employed the quantitative research method. The rationale of the study was to get the beneficiary's perceptions about climate change response strategies in Ehlanzeni district, in Mpumalanga Province, South Africa.

5.2 Selection and description of the study area

The study was carried out in the Mpumalanga Province, which is divided into four district municipalities (Ehlanzeni, Bohlabela, Gert Sibande and Nkangala Districts). Apart from the other districts, Ehlanzeni District has been identified as a study area. Ehlanzeni district is mostly dominated by gold mines (Sheba Mines, Fair View mines and Consort Mines), sugarcane farms (especially in Nkomazi Local Municipality), Macadamia farms, goat, and cattle producers in many villages (Figure 17). The study area consists mainly of subsistence and smallholder farmers. Commercial farmers are at a developing stage and are mainly cattle farmers.

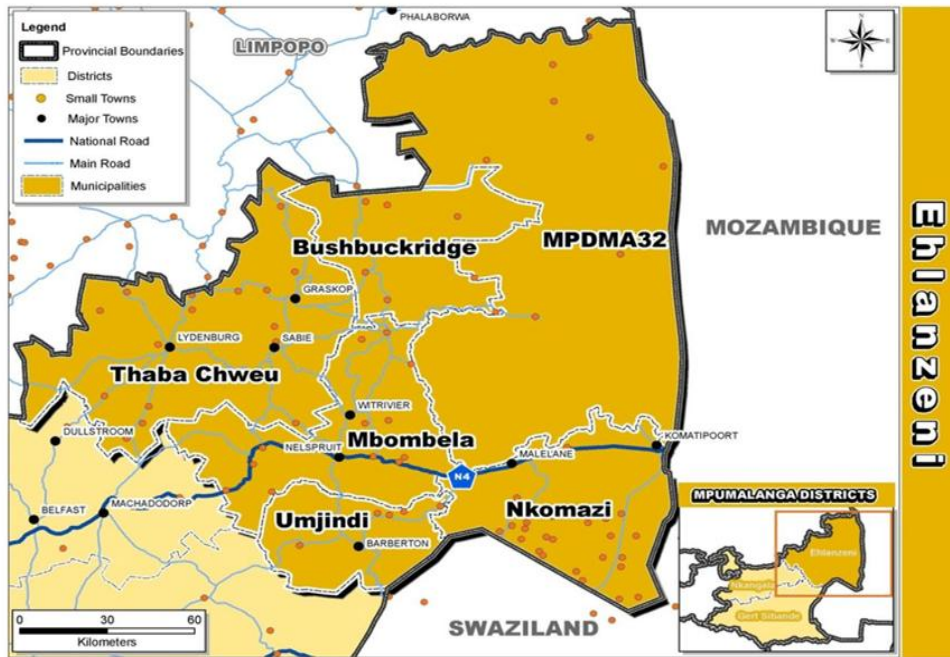


Figure 17: The map of the Study Area (Ehlanzeni District Municipality)

Source: Ehlanzeni District Report (2020)

5.3 Research design for the study

The research project followed a quantitative design; a survey was used to collect data through face-to-face interviews in the study area. Structured and semi-structured questionnaires were used to collect quantifiable data from the participants. The Household Expenditure Survey Method (HESM) was used to measure the food security of individual participants. This method is a direct method to obtain information from the households on their expenditures on food and nutritional diet consumed daily (Bashir & Schilizzi, 2012).

5.4. The selection of the respondents

The population of the study was the smallholder livestock farmers in the Mbombela, Umjindi and Nkomazi Local Municipalities that are under Ehlanzeni District Municipality. The targeted population was the farmers who produce livestock (cattle, goats, sheep, poultry, and pigs) that are of great concern to food security.

5.5 Sampling method

The study followed a stratified random sampling method that was used in selecting the target group. This method was chosen to afford each member of the population an equal chance and probability of being sampled to participate in the study. According to Welman and Kruger (2001), simple random sampling accords all members of a community or population same chance of being sampled as a participant in any given research project. Moreover, simple random sampling provides the base from which more complex sampling methodologies are derived (Kenya Projects Organization, 2012).

5.6 Sample size

The total population of livestock farmers in Ehlanzeni district is 4000, based on the 2021/22 district database (DARDLEA, 2022). The department's database includes all the categories of livestock farmers in the district. The categories of livestock include smallholder, commercial and subsistence livestock producers. As per data base, there are 1500 livestock farmers in Mbombela Local Municipality, 2000 livestock producers in Nkomazi Local Municipality and 500 livestock farmers are based in Umjindi Local Municipality. The Slovin's' formula was used to calculate the sample size for the proposed study from the total target population (Glen, 2023). The calculation of the sample size for the proposed study has been indicated below. The study assumed the 95% confidence level, with a margin of error of 5% (0.05) with the total target population of 4000 livestock farmers.

Slovin's formula where:

n = Size of the participants' group

N = The total size of the population

e = Margin of error assumed for the proposed study

$$\begin{aligned} N &= \frac{N}{1 + Ne^2} \\ &= \frac{4000}{1 + 4000(0.05)^2} \\ &= 400 \end{aligned}$$

5.7. Method of data collection

The researcher employed and trained Data collectors in how to collect the data using questionnaires on a face-to-face interview with the participants. This study used a descriptive research method for data collection. The questionnaires were used during face-to-face interviews with the participants to collect primary data from the participants. However, of the targeted 400 participants, only 360 questionnaires had accurate data collected with relevant information to the study. This is because some of the questionnaires were spoiled with incomplete information, weather patterns, lack of funding adding to fuel costs, travel costs for enumerators and public protests.

5.8. Methods of Data Analysis

The study employed the Statistical Package for Social Science (SPSS) IBM version 27 software. The analysis of each objective is provided below:

1. In objective 1 of the study, which was to assess the Socio-economic impact of livestock farming as an intervention to food security in Mpumalanga Province, South Africa. The study has used the mean, frequency, Chi -square, percentage, plus Likert scale of 1 – 5 to analyse this objective. The Likert scale was arranged on, household monthly income level, which is as follows: 1= less than R1000, 2= between R1000 to R3000, 3= R3001 to R5000, 4= R5001 to R10 000, and 5= above R10 000.

2. In objective 2 of the study which was, to examine the contributions of livestock farming to livelihoods in the study area. The study used the mean, frequency, Chi-square, Likert scale model of 1 – 5 to analyse this objective. The Likert scale was arranged on level of stock theft in the study area as: 1= Low,2= Moderate, 3= High, 4=Extremely high and 5= Other.
3. In objective 3 of the study, which was, to determine the challenges of livestock farming in the study area. The study used the mean, frequency, Chi-square, Likert scale model of 1 – 5 to analyse this objective. The Likert scale was arranged on the severity of challenges faced by livestock farmers to be as follows: 1= less severe, 2= severe, 3= undecided, 4=more severe and 5= extremely severe.
4. In objective 4 of the study, which was, to examine the best practices of livestock farming in the study area). The study used the mean, frequency, Chi-square, Likert scale model of 1 – 5 to analyse this objective. The Likert scale model was arranged on the best management practices of livestock farming in the study area to be 1= less important, 2=important, 3= undecided, 4=more important and 5=extremely important.

In objective 5 of the study, which was to determine the level of acceptance of best practices in livestock farming among livestock farmers in Mpumalanga Province, a binary logistic regression was employed. The method that was utilized to determine adoption behaviour is outlined in this way:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_{11} X_{11} + \mu \dots$$

Where:

Y = choice to accept best management practices (Farmers accept local best management practices. 1=Yes =,2=No)

X₁ - X₉= predictor variables demarcated as:

(Demographics)

X₁ = Gender (Female = 1, Male = 2)

X₂ = Age (years)

X₃ = Level of education (1= Not educated, 2= Primary School, 3 = Secondary level, 4=Tertiary,5 = other)

X₄ = Farm experience (Years)

X₅ = Farm Size (Numeric)

X₆ = Access to market (1=Yes, 2= No)

X₇ = Acceptance of livestock production management practices (Yes= 1, No = 2,)

X₈ = Access to government support (1=Yes, 2= No)

X₉ = Availability of extension services (1=Yes, 2=No)

β_0 = constant

B₁- β_9 = Regression coefficients

μ = error term

Table 11: Summary of independent variables hypothesized with their operational description, measurement, and expected signs

Variables and code	Operational description	Measurement unit	Expected sign
Gender (GNDR)	Participant's gender: Female or Male	1= Female 2=Male	+/-
Age (AGE)	Years of Respondents	1= (<25 years) 2= (25-35 years) 3= (36-50 years) 4= (51 60years) 5= (>60years)	-
Level of education (LEVLEDC)	Highest grade accomplished	1=No formal education, 2= Primary, 3=Secondary, 4=Tertiary level, and 5= Other.	+
Farm experience (FARMEXP)	Years of farming	1= (< 5years), 2= (6 – 10 years), 3 = (11- 15years), 4 = (16 – 20years) and 5 = (> 20years).	+

Farm size (FARMSIZ)	Size of the farm	1= (< 5ha), 2 = (6 -10ha), 3= (11– 15ha), 4= (16 – 20ha), and 5= (> 20ha).	+
Access to market (MARKTACCS)	Respondent's access to the market	(Yes=1, No=2)	-/+
Adoption of livestock production management practices (ADOLIVTKMANPRACT)	Respondent's adoption to livestock management practices information	1=Yes, 2= No	-/+
Access to extension services (EXTSEVSACES)	Respondent's access to extension services	1 = Yes, 2 = No	+
Access to government support (GOVSUPPACCS)	Respondent's access to government support	1 = Yes, 2 = No	+
Market type (MRKTTYPE)	Respondent's type of market	1=Farm gate, 2=Abattoirs, 3=Local buyers 4, Auctions and 5= Other.	+
Extension officer's visits (EXTOFVISTS)	Respondent's access to extension officers farm visits	1 = yes, 2 = no	+
Head of household (HHHEAD).	Head of the household	1=Yes, 2=No	+
Livestock kind (LIVSTOKIND)	Livestock kind.	1=Cattle,2= Goats, 3= Sheep,4=Pigs, and 5= Poultry	+

5.9. The adopted model of the study

The study has adopted binary logistic regression model. The binary logistics regression model was used to analyse the factors determining livestock farmers' choice of accepting the best management practices on livestock production. Logistic regression is much easier to implement than other models. Binary logistic regression is a statistical technique for predicting

the association between independent and dependent variables, where the dependent variable is binary. The binary logistic regression method helps to estimate the probability of events as a function of a set of independent variables that are hypothesized to influence an outcome.

When one set of predictor variables is known, the logistic regression model is used to organize individuals into one or two groups and identify which features or qualities best predict choice making (Agresti & Kateri, 2017). Another study by Thanda (2024), describes regression analysis is a type of predictive modeling technique that is used to find the relationship between a dependent variable (usually known as the “Y” variable) and either one independent variable (the “X” variable) or a series of independent variables. Moreover, it is further explained that when two or more independent variables are used to predict or explain the outcome of the dependent variable, this is known as multiple regression. Logistic regression is defined as a classification procedure used to predict a binary outcome based on a set of independent variables (Thanda, 2024). Additionally, logistic regression is also used to calculate the probability of a binary event occurring and to deal with issues of classification.

Table 12: Summary table of objectives, data and analytical tools used

Objective	Data	Analytical tool used
To assess the Socio-economic impact of livestock farming as an intervention to food security.	Qualitative	Statistical Software: SPSS
To examine the contributions of livestock production to farmers’ livelihood.	Qualitative	Statistical Software: SPSS
To determine the challenges faced by livestock farmers in the study area.	Qualitative	Statistical Software: SPSS
To examine the best practices of livestock farming among livestock producers.	Qualitative	Statistical Software: SPSS
To determine the levels of acceptance of the best practices in livestock farming among livestock producers.	Quantitative	Regression Analysis (Binary logistic regression)

CHAPTER 6

RESULTS OF THE STUDY

6.1 Introduction

The sample of the study comprised 360 respondents from Ehlanzeni District Municipality of Mpumalanga Province. The specific local municipalities are Mbombela, Umjindi and Nkomazi that form Ehlanzeni District. The results of the study are presented in nine sections: a). Socio-economics of study households, b) farm and production, c) socio-economic impact of livestock farming and intervention for food security, d) the contribution of livestock production on farmers livelihood, e) the challenges faced by livestock farmers, f) the best management practices of livestock farming among livestock producers, g) the levels of adoption of the best practices in livestock farming among livestock producers and h) livestock farmers and extension services.

6.2 Socio-economics of study households

6.2.1 Gender of the respondents

The study showed that majority 63.3% of the respondents were males and 36.7% were females (Figure 18). Males were found to have more percentage compared to females in the study. This is because males are more interested in livestock than females, especially cattle and goats. This finding is consistent with the study of Kanayo, Olamide, Agholor, et al (2021), in their study of gender differences in South Africa, and found that gender disparity is 54.5% male and 45.6% female gender differences in Sustainable Entrepreneurship indicators amongst SMEs. Another study by Mthi, Thubela, Nyalambisa, et al, (2020) asserted that males were the majority (69%) with females representing, only 31%. Similar study by Bahta, et al., (2025) and Gosbert, Athman, Jumanne, et al., (2019), agree to this finding that male farmers have improved access to means of agricultural production, than females, who have limited to resources.

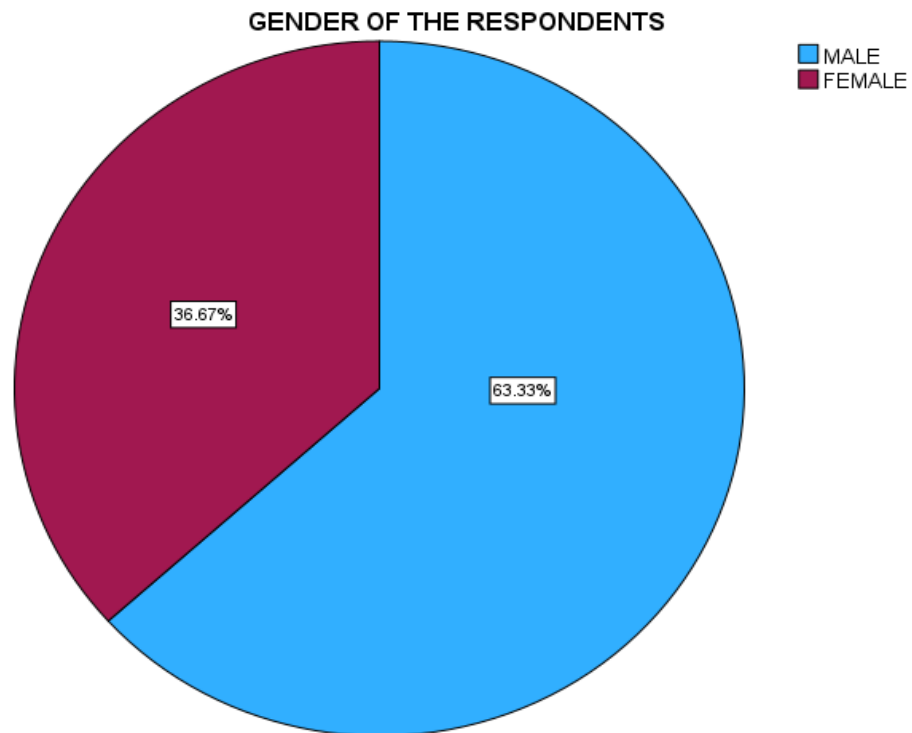


Figure 18: Gender of the respondents

6.2.2 Distribution of the age of respondents

The results indicate 39.2% of the respondents were of the age group 36-50 years of age, while (1.9%) were of the minority age group < 25 years and 21.7% of the respondents were of the age group 25-35 years. 16.4% of the respondents were of the age group 51-60. Only 20.8% of the respondents were above 60 years of age. The finding is consistent with Mthi et al, (2020) in their study of cattle production and breeding practice in communal farming system in the Eastern Cape Province, and found that 49% of farmers are of the age between 35 to 55 years (Figure 19),

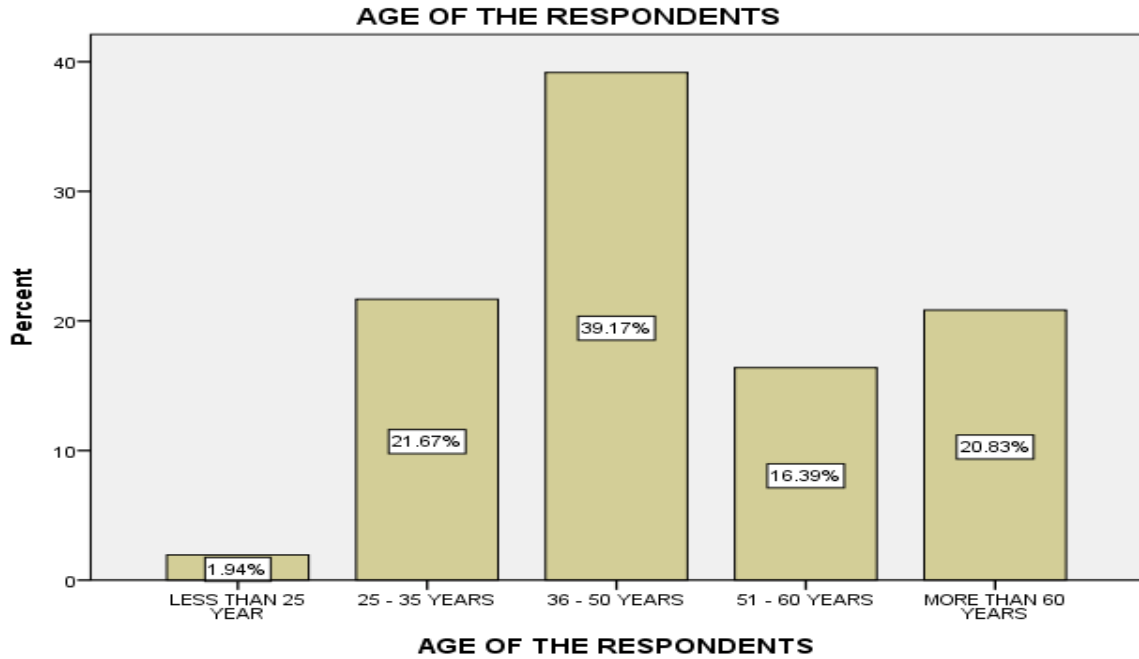


Figure 19: Age of the respondents

6.2.3 Distribution of the level of education

The findings reveal that 22.2% of the respondents have no formal education, which means that they have never gone to school, followed by 14.2% of the respondents with primary education. There are 32.8% of the respondents who have Secondary education. Furthermore, there are also 27.8% respondents who have tertiary education. Lastly only 3.1% of other respondents are in minority and have other as their level of education (Figure 20). The above results imply that farmers who are educated have significantly influence productivity, adoption of improved technologies, market engagement, and sustainable agricultural practices. This finding is consistent with the study of Khoza, Senyolo, Mmbengwa, et al (2019), in their study of Socio-economic factors influencing smallholder farmers' decision to participate in agro-processing industry in Gauteng province and found that smallholder farmers with secondary education level are more likely to participate in agro-processing. Another consistency with the study of Agholor & Ogujiuba, (2021), in the study of information communication technology: perception and adoption of drought resilience strategy for producers in Driekoppies and found that most agricultural farmers have secondary school as their highest level of education.

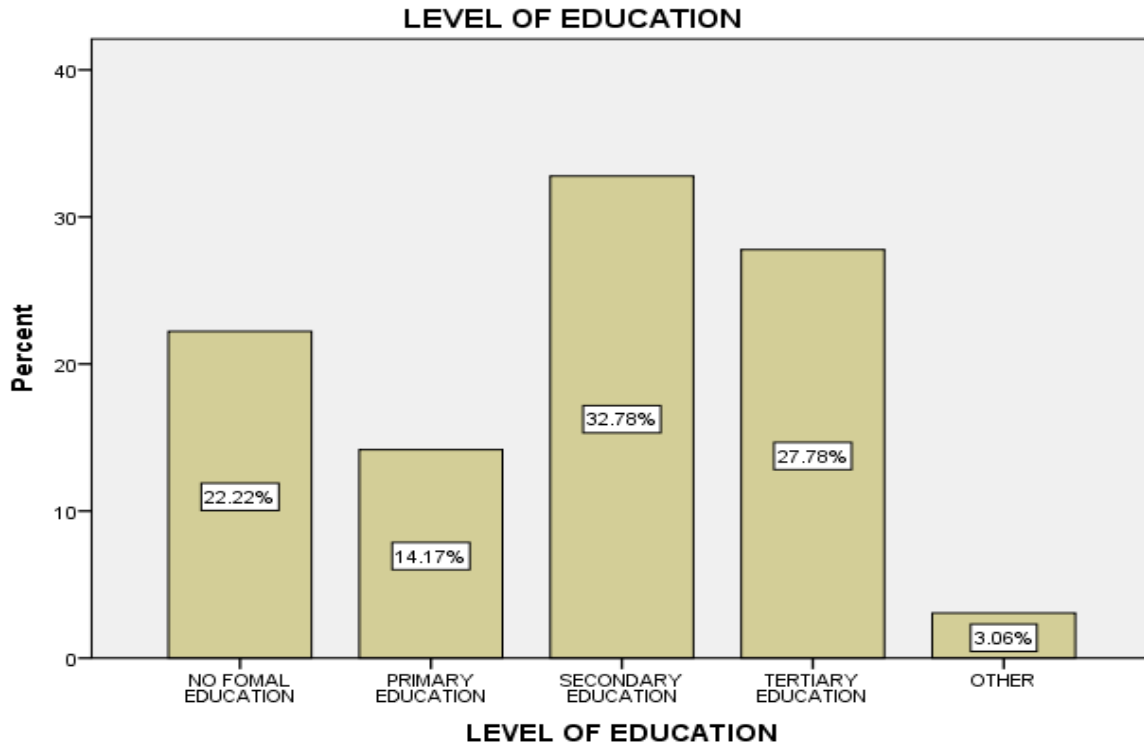


Figure 20: Distribution of the level of education

6.2.4 Highest tertiary qualification

The finding shows that 41.9% of the respondents, have other qualifications, meaning that they did not have any tertiary qualification. Only 26.9% of the respondents have certificates, whereas 11.7% of them have diplomas. The finding also demonstrates that 14.7% of the respondents have advanced diplomas/degrees, which is slightly higher than those with diplomas. In addition to that, only 4.7% of the respondents have an honours/postgraduate diploma, which is the lowest percentage.

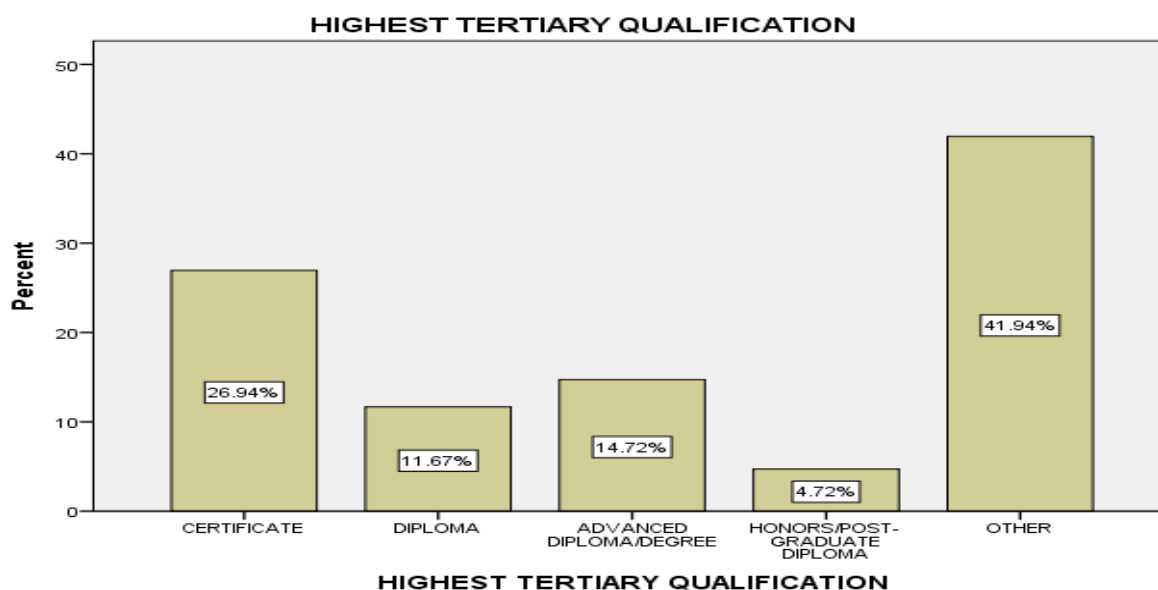


Figure 21: Highest tertiary qualification

6.2.5 Distribution of Marital Status of respondents

The result indicates that 40.3% of the respondents are married, while the lowest 6.9% of the respondents are separated. Followed by a slightly higher 10.3% of the respondents who are divorced. A slight majority 31.1% of the respondents are single. Followed by 11.4% of the respondents who are widows. This finding concurs with the results of Mthi et al, 2020, reported in *Applied Animal Husbandry & Rural Development 2020*, Volume 13 and found that married women were in majority with 42% (Figure 22). Correspondingly, with related studies Agholor, Olorunfemi and Ogujiuba (2023), Gosbert, et al., (2019), Mandleni, et al., (2019) Markos, Belay, and Dessie, (2015), also found that married women were dominating the other women in marital status. This meant that most of the farmers were constant in their places of residence and had access to more family labour. Other study by Bahta, Mare, et al., (2025) supported this finding that married women are the most dominant in the marital status.

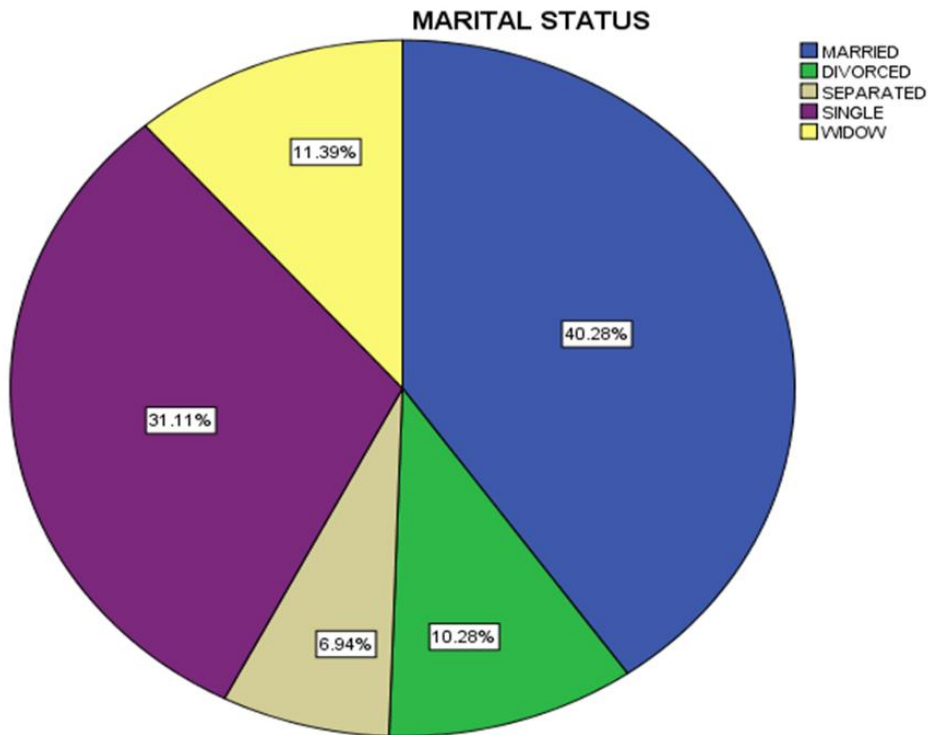


Figure 22: Distribution of Marital Status of respondents

6.2.6 Distribution of household head in the study area

The result reveals that majority 78.9% of the respondents are heads of the household, while only 21.1% are not heading the households (Figure 23). The finding suggests that livestock farmers are more responsible in ensuring that food is available for their families and children are schooling as well. During data collection most respondents indicated that they are active in farming because they are unemployed, some were retrenched from work. The male headed household in South Africa is more than the female headed household, while the ratio is three out of every five households have a male head while two out of every five have a female head (Statistics South Africa, 2021). The study of demonstrates that in Gauteng male headed households are more than female headed households. However, in some other cases, some households are female-headed because of factors that female heads would not choose such as the death of male partners, or fathers who do not take responsibility for children.

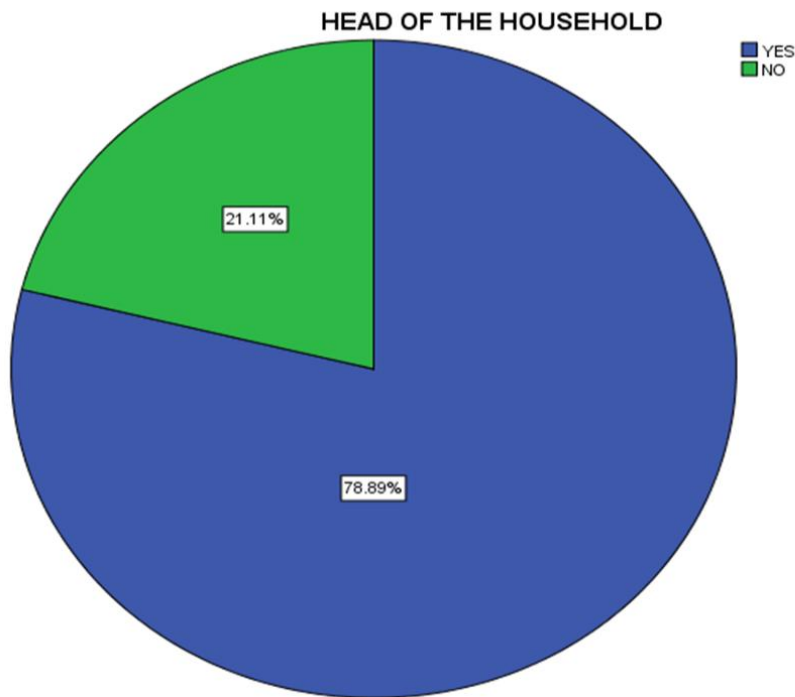


Figure 23: Distribution of household head in the study area

6.2.7 Distribution of household size

The study results reveal that 46.4% of the respondents are 3-5 per household in size, while only 1.7% of the respondents are greater than 10 members per household in size. The slightly percentage of 25.3% shows household size of less than 3 members per household, followed by 17% of the respondents that have between 6-7 members per household. Lastly, the results reveal that only 9.4% of household size are between 8-10 members (Table 13). This showed that some of the household members were likely to provide family labour for farm activities. This finding is reliable with the study of Mandleni, et al., (2018), in their study of Socio-economic factors influencing livestock production among Smallholder farmers in the Free State Province and found majority (76%) of the respondents had up to five occupants per household. Agholor, et al., (2023), have reported similar findings on the household size of between 4 to 6 members as their highest household size.

Table 13: Distribution of household size

Variable	Frequency	Percent
<3	91	25.3
3-5	167	46.4
6-7	62	17.2
8-10	34	9.4
>10	6	1.7
Total	360	100.0

6.3 Farm and production

6.3.1 Distribution of Farm size

This finding in Table 14 demonstrates that 38.1% of the respondents, have less than 5 hectares each, followed by 24.2% who own between 6 to 10 hectares and 10.0% of them own between 11 to 50 hectares. Furthermore, there is a minority 5.6% respondents who own 51 to 100 hectares per farm, and 22.2% of the respondents own greater than one hundred hectares in each farm (Table 14). This finding implies that the more the percentage of respondents, the lesser number of hectares they have, and the lower the percentage of farmers is, the greater the number of hectares they have in their farms. This finding is consistent with the study conducted by Agholor, Ogujiuba, and (2021), who found that the highest number of farmers have farm sizes between 1 to 3 hectares.

Table 14: Distribution of farm size

Variable	Frequency	Percent
<5HA	137	38.1
6-10	87	24.2
11-50	36	10.0
51-100	20	5.6
>100	80	22.2
Total	360	100.0

6.3.2 Acquisition of land for farming

The results in the figure demonstrate that 27.8% of the respondents acquired land for farming through privately owned or title deed, while 48.6% of them, acquired through right to occupy

(RTO). Only a minority 4.4% have acquired through leasehold, and 13.6% acquired through inheritance. However, 5.6% acquired the land through other (Table 15). The findings show that more farmers have a right to occupy (RTO) as ownership of the land, which means they are based in rural areas and use communal grazing, which is difficult to control the stocking rate during the drought season. During data collection, most of participants complained about land invasion that limits animal grazing land to build houses.

Table 15: Acquisition of land for farming

Variable	Frequency	Percent
PRIVATELY OWNED/TITLE DEED	100	27.8
RIGHT TO OCCUPY	175	48.6
LEASEHOLD	16	4.4
INHERITANCE	49	13.6
OTHER	20	5.6
Total	360	100.0

6.3.3. Farming experience in livestock production

The finding demonstrates that 30.3% of the respondents have less than 5 years of experience in livestock production, while 34.2% have between 6 to 10 years of experience, and 12.8% have between 11 to 15 years of experience. The smallest 5.8% have 16 to 20 years of farming experience in livestock production, and lastly, only 16.9% have greater than 20 years (Table 16). This finding is consistent with the study of Agholor and Ogujiuba, (2021), who found that most of the farm experience was in the range of between 5 to 5 years. In addition, farming experience is particularly important such that it offers a deep understanding of animal care, nutrition, and the principles of sustainable farming. Above food production, experience in animal production plays important economic, cultural and social roles and provides multiple functions and services, it is noted as a key component of life and an essential part of agro-ecosystems (Santos, 2023).

Table 16: Farming experience in livestock production

Variable	Frequency	Percent
<5 YEARS	109	30.3
6-10 YEARS	123	34.2
11-15 YEARS	46	12.8
16-20 YEARS	21	5.8
>20 YEARS	61	16.9
Total	360	100.0

6.3.4 Engagement with off- farm activities

The findings reveal that majority 70.8% of the respondents are engaged with off-farm activities, while 29.2% are not (Figure 24). This implies that the respondents who engage themselves with off farm activities have other income sources that complement the one from sells of livestock. These farmers engage themselves in non farming activities to keep themselves busy and it also serves to generate more income during off-farming periods. The money generated through agricultural activities is basically used for capital projects, while the money generated from non-farming activities is used to provide man’s daily needs. Additionally, Yakubu, Bulama and James, (2015), stated some reasons for farmers tending to engage in off farm income activities, which are: (i) To increase income when resources needed for main activities are too limited to provide sufficient livelihood. (ii)To earn cash income to finance farm investments in the face of credit market failures. (iii) To increase income when resources needed for main activities are too limited to provide sufficient livelihood. Regardless of farm income, household members equally participate in off-farm activities to improve their livelihood. By considering income diversification, farmers can potentially invest off-farm earnings into their farm business to enhance productivity and income from farming. On the other hand, working off-farm can lead to a labour-loss effect which can reduce farm performance (Anang & Apedo, 2023).

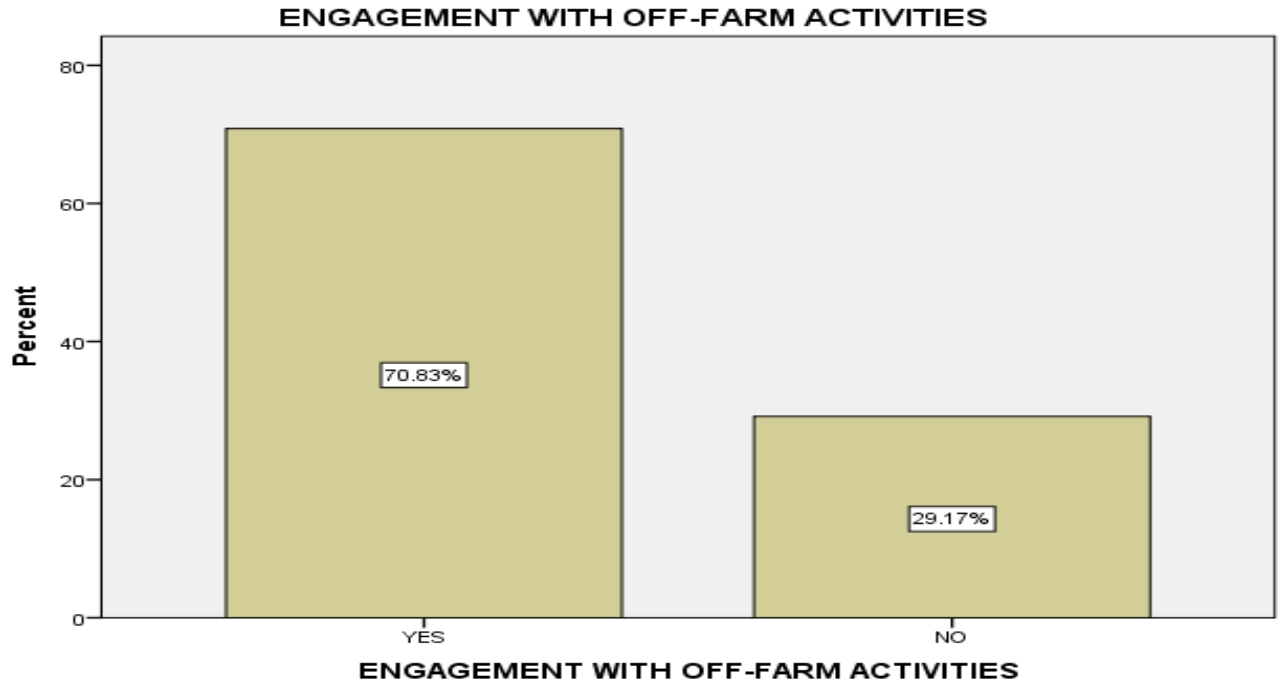


Figure 24: Engagement with off- farm activities

6.3.5. Assistance from family members

The results from the study demonstrate that the majority, 76.4% of the respondents, receive assistance from their family members, while only 23.6% as a minority do not receive assistance from their family members (Figure 25). This implies that those who are in the majority spent less on production costs of the commodities, because of using family members in their livestock production. Those with few members of their family spend more money on the payment of hired labour. Involvement of farming family members contributes to food security but also fosters community resilience, economic sustainability, and social cohesion (Farmers magazine, 2024). Additionally, the involvement of family members promotes sustainability of the project, since everyone is taking ownership in the particular commodity.

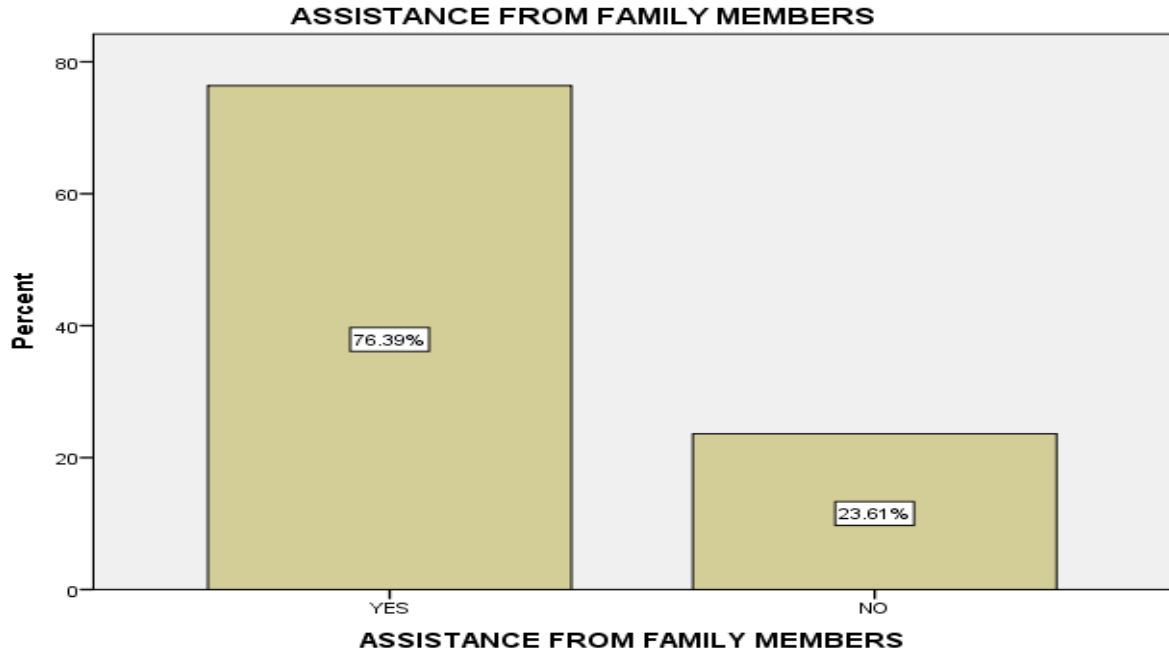


Figure 25: Assistance from family members

6.3.6 Number of family members assisting.

The findings reveal that 41.9% of the respondents, have less than three members of the family assisting them in their farming activities, 30.8% have between 3 to 5, and 6.4% being the least percentage, have greater than five family members. However, there are also 20.8% of the respondents who have none of their family members assisting them in farming activities (Table 17). This implies that the higher percentage of farmers who have family members assisting in their farms, the lower the number of family members assisting their family projects. Additionally, poultry and piggery projects will need people to feed and clean the houses on daily basis, and is where assistance from family members comes in. Farmers with more family members assisting them in their farms, incur less costs of production. Additionally, their productivity tends to increase than those with fewer family members. However, this is due to their duties and responsibilities that are being shared among themselves. Olarewaju (2022) supports this finding that involving every family member in farming activities can enhance productivity, promote knowledge sharing, and strengthen family bonds. Moreover, farming activities are operated by the whole family, with various activities undertaken by the different

members of the family to ensure a successful farm operation and a better livelihood for the family.

Table 17: Number of family members assisting

Variable	Frequency	Percent
<3	151	41.9
3-5	111	30.8
>5	23	6.4
none	75	20.8
Total	360	100.0

6.3.7. Distribution of the kind of livestock rearing

The results of the study state that 45.8% of the respondents are rearing cattle, followed by 9.7% who rear goats, then minority 5.0% rear sheep, 10.6% rear pigs and the second majority 28.9% of the respondents rear chickens (Table 18). This implies that most of the respondents decided to rear cattle and poultry because of the manageability of these commodities. Farmers often choose livestock based on market demand and profitability. In South Africa, beef cattle and broiler/chicken production are common due to high demand domestically and internationally. Sheep and goats may be reared for meat, milk, or wool, depending on regional commodity prices and export opportunities. Specific livestock may be chosen, due to cultural significance or traditional practices. For example, goats may be preferred in rural Mpumalanga for ceremonial purposes, while cattle may symbolise wealth or social status in some groups. In some cases, the type of livestock also depends on the size of the farm and labour availability. The finding is in content with Agri Stuff, (2025), on All about Livestock Definition, Types and Examples, found that some farmers' choice of livestock species depends on several factors, including climate, market demand, and your farming experience. Additionally, different livestock species have different requirements and offer various products. For example, cattle are commonly raised for beef and dairy, while sheep and goats are often kept for meat, milk, or fiber.

6.3.8. Distribution of the number of cattle rearing

The results show that 23.9% of the respondents are rearing less than ten cattle each individual, while 18.3% rear between 10 to 20, then 6.7% rear between 21 to 30, the least percentage 2.5% rear between 31 to 40, and 6.9% rear cattle that are greater than 40 per individual respondent. Lastly, 41.7% have no cattle (Table 18). These findings imply that the highest number of respondents have no cattle, but have other types of commodities such as goats, pigs, poultry and or sheep. Cattle farming requires sufficient space for grazing than any other commodities, such as goats, poultry and sheep the most. Affordability can also be the cause for not having cattle. Stock theft and lack of formal markets for their stock could be the cause. It is noted that the distribution of cattle rearing reflects a standoff environmental suitability, socioeconomic context, cultural norms, and technological inputs. Livestock is usually used as a coping mechanism for vulnerability and food insecurity. However, livestock keepers in SSA face a growing range of pressures such as climate change, land loss, restrictive policies and population increase (Mapfumo, Muchenje, Mupangwa, et al., 2021).

6.3.9. Distribution of the number of goats rearing

The results show that 9.7% of the respondents are rearing less than 10 goats each, while 8.3% rear between, 10 to 20, then 3.1% rear between 21 to 30, and the least percentage 0.8% rear between 31 to 40. There is another .8% of the respondents who each rear goats that are greater than 40 in the study area. Lastly, the majority 77.2% indicated that they have no goats at all (Table 18). This implies that some individuals do not have interests in farming goats, due to certain reasons such as manageability, lack of money to pay herd boys, and insufficient land size. Goats are small stock that primarily brows shrubs and leaves instead of grazing like cattle and sheep. They are also domesticated small ruminants raised globally for meat, milk, fiber, and hides. They are adapted to diverse environments, from arid deserts to high-altitude regions. Goats can be considered a critical rural livelihood asset, particularly for subsistence farmers and smallholder households in developing regions.

6.3.10. Distribution of the number of sheep rearing

The results show that 2.8% of the respondents are rearing less than 10 sheep each, while 1.1% rear between, 10 to 20, followed by 2.2% that rear between 21 to 30. There is an exceedingly small 0.6% that rear between 31 to 40, and another 1.1% rear greater than 40 sheep which is absolutely a bigger number of sheep. Lastly, the majority 92.2% indicated that they have no sheep at all (Table 18). This finding implies that sheep thrive well in cold to moderate climatic conditions. The study area is in the region of high to extremely high temperature, where sheep are rarely thrived and mortality rate is high. The distribution of sheep rearing globally is influenced by a combination of environmental, economic, and cultural factors, as well as breed-specific requirements and agricultural practices. Studies conducted by Chand, (Undated), found that South Africa has about 31 million sheep, almost all of which are kept for wool. The large majorities are merinos, and South Africa is therefore the second largest producer of high-

quality of merino wool. However, the large quantities of sheep are mostly kept in Eastern Cape Province, in Transvaal, and in Orange Free State.

6.3.11. Distribution of the number of pigs rearing

The results show that only 9.7% of the respondents are rearing less than 10 pigs each, while 4.4% rear between 10 to 20, then 2.8% rear between 21 to 30 the least percentage 6% rear between 31 to 40, and another 1.9% rear pigs that are greater than 40 per individual respondent. Lastly, the majority 80.6% indicated that they rear nothing at all (Table 18). This implies that almost more than 80 percent respondents in the area do not produce pigs. It is evident that pigs are too costly to produce, due to infrastructure, feeds, water, sewer/ drainage system and labour. The consumption of pig meat increases with increased wealth or income, as taste and preferences change. It is like in some other parts of the world that the consumption of pork in Africa is largely affected by religious and cultural beliefs that prohibit the consumption of pork. In South Africa there is a diverse population, with a range of dietary preferences, and pork is commonly consumed there. Nevertheless, in countries with larger Muslim or Jewish populations, pork consumption tends to be much lower (Adesehinwa, Boladuro, Dunmade, et al, 2024).

6.3.12. Distribution of the number of poultry rearing

The results show that 10,6% of respondents rear chickens of less than ten per individual, whereas 13.3% produce between 10 to 20, followed by 9.4% producing between 21 to 30, and the least percentage 5.3% rear between 31 to 40, then 10.8% raise chickens that are greater than 40 per respondent. Lastly, the majority 50.6% of respondents indicated that they have no chickens at all (Table 18). This implies that most respondents in the Ehlanzeni District as a study area do not have interest in producing chickens. This is due to lake of formal markets for broilers and layers. High feeds costs are also a challenge to attract farmers to the industry. Those who have chickens in their homes, have indigenous chickens because their maintenance

is low and manageable, The finding is supported by South African Poultry Association (SAPA) (2024), and found that, in the broiler industry, the Mpumalanga local municipalities of Victor Khanye and Lekwa have 9.18 and 7.49 million birds respectively. Rustenburg in North West has 6.94 million birds. A total of 2.60 million birds belonging to the egg industry are in the local municipal district of Drakenstein in Western Cape. A further 2.57 and 1.79 million birds are in City of Tshwane and Mogale City, respectively, in Gauteng.

Table 18: Distribution of number of cattle, goats, sheep, pigs, and poultry rearing

Commodity		Frequency	Percentage
Cattle	< 10	86	23.9
	10 - 20	66	18.3
	21 - 30	24	6.7
	31 - 40	9	2.5
	> 40	25	6.9
	NONE	150	41.7
	Total	360	100
Goats	< 10	35	9.7
	10-20	30	8.3
	21 - 30	11	3.1
	31 - 40	3	0.8
	> 40	3	0.8
	NONE	278	77.2
	Total	360	100
Sheep	< 10	10	2.8
	10-20	4	1.1
	21 - 30	8	2.2
	31 - 40	2	0.6
	> 40	4	1.1
	NONE	332	92.2
	Total	360	100
Pigs	< 10	35	9.7
	10-20	16	4.4
	21 - 30	10	2.8
	31 - 40	2	0.6
	> 40	7	1.9
	NONE	290	80.6
	Total	360	100
Poultry	<10	38	10.6
	10- 20	48	13.3
	21-30	34	9.4
	31-40	19	5.3
	>40	39	10.8
	NONE	182	50.6
	Total	360	100

6.3.13. Engagement in broilers, layers or free-range

The findings reveal that the majority 74.4% of the respondents are engaged in broilers, layers and or free-range chickens, whereas only 25.6% of them are not engaged in those chicken breeds. This finding implies that most rural households contribute to food security and income generation through production of broiler chickens, egg production as well as free range

chickens which serves for both meat and eggs. However, they can produce in a little available space, compared to cattle, sheep and goats, that need more space and so difficult to manage. Raising chickens enhances cash flow through the sales of eggs and meat (Figure 26).

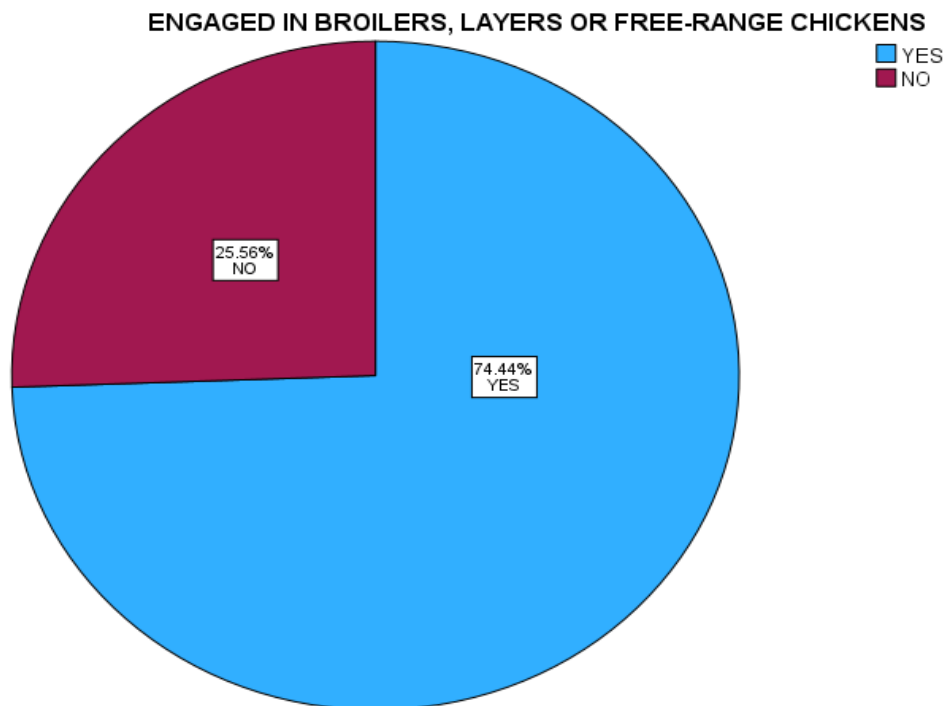


Figure 26: Engagement in broilers, layers or free-range chickens

6.3.14. Distribution of the chickens in the study area

The findings reveal that 26.4% of the respondents have broilers as their specific breed, while 7.2% have layers, then 39.2% have indigenous chickens, and the least 2.2% have others that are not mentioned in the specific breeds above. About 25.6% of the respondents do not have any of the specific breeds. This implies that most of the poultry farmers in the study area have indigenous chickens as their specific poultry breed. However, it is normal in rural areas to keep such a breed for food security purposes as well as fulfilment of rituals. This finding concurs with the study of Desta, T.T. (2021), with the fact that, Indigenous village chickens (IVCs) greatly contribute to food security and rural development. As a result, this breed covers incidental expenses, economically empowers women, and supports the livelihood of

disadvantaged groups. Indigenous chickens, raised in villages, provide essential genetic resources and income for poverty alleviation by providing affordable protein in the rural community (Mogano, Mpofu, Mtileni, et al, 2025).

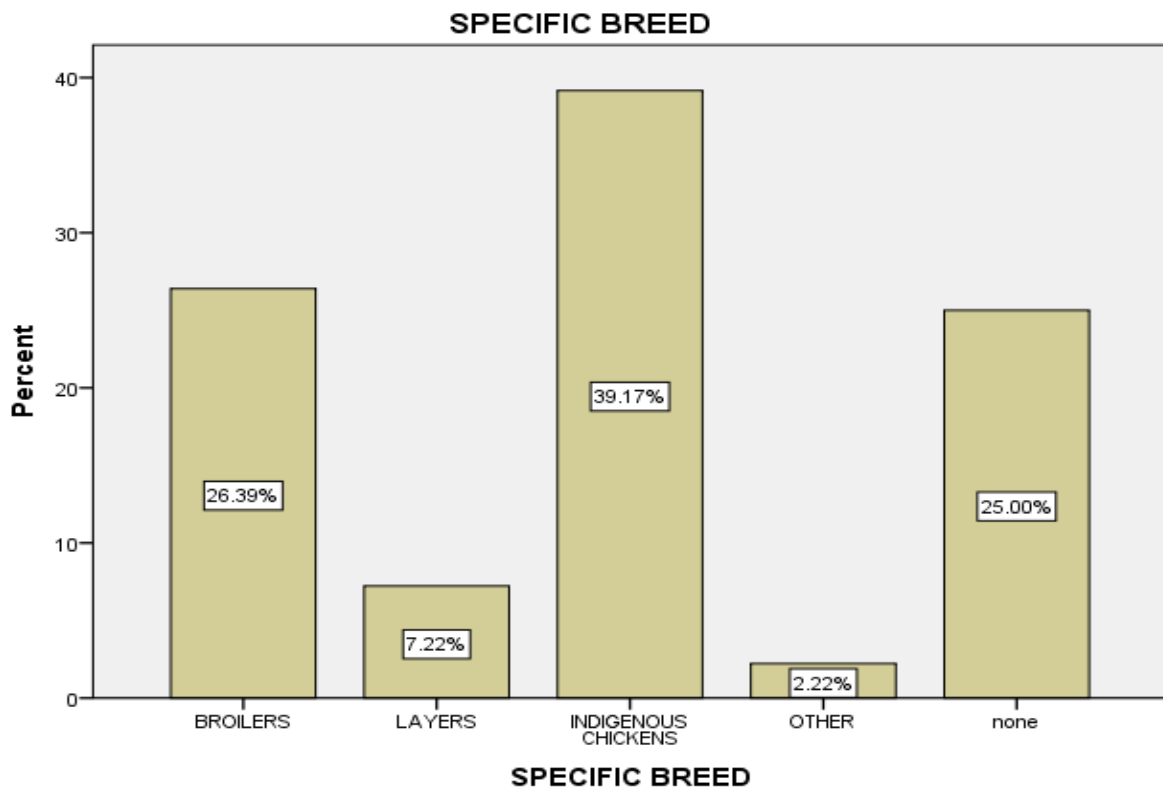


Figure 27: Distribution of chickens (Specific breed)

6.3.15. Number of broilers produced.

The findings reveal that 8.6% of the respondents produce less than fifty broiler chickens in their projects, while 13.9% produce between 50 to 100, 2.8% produce between 101 to 300, followed by the least 1.7% that produce between 301 to 500 and again only 2.8% of the respondents that produce above 500 chickens. Lastly, majority 70.3% do not produce broiler chickens. According to South African Poultry Association (SAPA) (2024), amongst the local municipal districts containing the highest number of broiler industry farms are Victor Khanye with 38 farms and Lekwa with 34 farms in Mpumalanga (Table 19).

Table 19: Number of broilers produced

Variable	Frequency	Percent
< 50	31	8.6
50 - 100	50	13.9
101 - 300	10	2.8
301 - 500	6	1.7
> 500	10	2.8
NONE	253	70.3
Total	360	100.0

6.3.16. Distribution of the number of layers produced

The findings reveal that 3.6% of the respondents produce less than fifty-layer chickens in the area, while the least 1.9% produce between 50 to 100, then again 1.4% produce between 101 to 300, followed by the very least .8% that produce between 301 to 500 and again only 1.6% of the respondents produce above 500 chickens. Lastly, the majority 91.7% do not produce layer chickens (Table 20). These figures indicate that the rural livestock farmers do not have any interest in producing layer chickens. This is due to high costs of production, lack of formal markets, theft and insufficient space for the production of such commodity.

Table 20: Distribution of the number of layers produced

Variable	Frequency	Percent
< 50	13	3.6
50 - 100	7	1.9
101 - 300	5	1.4
301 - 500	3	.8
> 500	2	.6
NONE	330	91.7
Total	360	100.0

6.3.17. Distribution of the number of indigenous chickens produced

The findings reveal that 27.2% of the respondents produce less than fifty-layer chickens in the area, while 10.0% produce between 50 to 100, then again 3.3% produce between 101 to 300, followed by the least 1.4% that produce between 301 to 500 and again the very least 0.8% of the respondents produce above 500 chickens. Lastly, the majority 57.2% do not produce indigenous chickens at all. The findings imply that rural farmers have capacity of producing

indigenous chickens only for food security. It is easy to farm with indigenous chickens, hence their maintenance is low. Additionally, this breed contributes more towards food security especially in rural farmers. Indigenous chickens are solely for food security since they are easily accessible by the rural people. Small holder farmers are in small quantity who can afford to produce in substantial number of indigenous chickens. They run farms that have capacity to produce variety of livestock commodities (Table 21).

Table 21: Distribution of the quantity of indigenous chickens produced

Variable	Frequency	Percent
<50	98	27.2
50-100	36	10.0
101-300	12	3.3
301-500	5	1.4
>500	3	.8
NONE	206	57.2
Total	360	100.0

6.4. Socio-economic impact of livestock farming and intervention for food security

6.4.1. Benefits of livestock to livelihood

The findings of the study demonstrate that the majority 97.5% of the respondents, sees livestock as beneficial to their livelihood. However, at least 2.5% of the respondents do not see any benefits to livestock (Table 22). The focus group from the study area have realized that keeping livestock for themselves offer benefits to their livelihood. Furthermore, livestock farming offers several benefits, making it a crucial component of sustainable agriculture. Apart from other significant benefits is that livestock provides a source of nutrient-rich food, including meat, milk, and eggs. They also serve as essential sources of protein, vitamins, and minerals, making them crucial for human nutrition. Livestock farming can also improve soil fertility and can also contribute to the local economy, especially in rural areas. This industry provides employment opportunities and generates income for farmers, processors, and traders. However, in some cases, livestock farming can also lead to the development of value chains,

which can create additional business opportunities and support local economic development (Admin, 2023).

Table 22: Benefits of livestock to livelihood

Variable	Frequency	Percent
YES		
NO	351	97.5
Total	9	2.5
	360	100.0

6.4.2. Total farm income from livestock production

The findings demonstrate that the majority 53.9% of the respondents, have less than R20 000 total farm income made from livestock production sales. Furthermore, 31.1% of the respondents make between R20 000 to R30 000, followed by 10.6% have between R50 001 to R100 000, and 3.6% have between R100 001 to R500 000. The smallest 0.8% make an income of greater than R500 000 from livestock production (Table 23). This result implies that most rural livestock farmers belong under subsistence farming with small pieces of land. For that reason, they do not have sufficient land to produce what is of their choice to increase their farm income, as compared to smallholder farmers who own enough land and earn sufficient farm income from livestock production. According to Vilar (2024), while consumer preferences and market trends continue to evolve, farmers face new challenges and opportunities in this sector. Thus, poultry farming, especially chicken farming, can be a profitable livestock business, with profit margins ranging from 5-15%, offering multiple revenue streams, relatively low start-up costs, and a faster time to profitability. Additionally, it was further emphasized that, on small farms, chickens, pigs, and cows are often the most profitable, with chickens having the lowest start-up costs and fastest returns. Expected profit margins are 10-20% for pastured/free-range chickens, 20-30% for pigs, and 15-50% for cows.

Table 23: Total farm income from livestock production

Variable	Frequency	Percent
<R20000	194	53.9
R20000-R30000	112	31.1
R50001-R100000	38	10.6
R100001-R500000	13	3.6
>R500000	3	.8
Total	360	100.0

6.4.3. The distribution of household monthly income level

The findings shown on (Table 24), demonstrate that 11.7% of the respondents receive monthly income level of less than R1000 per household. Moreover, 48.1% receive between R1 000 to R3000, followed by 18.9% of between R3001 to R5000 and 10.8% of between R5001 to R10 000. Lastly, 10.6% receive income of greater than R10 000 per household. The result of the study implies that majority of the focus group were old subsistence farmers who rely mostly on government support grant, with the income of not more than R3000 per month. The income is augmented once they have sold either a pig, goat, sheep, or a cow.

Table 24: The distribution of household monthly income level

Variable	Frequency	Percent
<R1000	42	11.7
R1000-R3000	173	48.1
R3001-R5000	68	18.9
R5001-R10000	39	10.8
>R10000	38	10.6
Total	360	100.0

6.4.4. The distribution of household expenditure on food per annum

The results of the study (Table 25), reveal that 30.8% of the respondents spend less than R12 000 as household expenditure per annum. While the majority 51.9% spend between R12 001 to R25 000, followed by 12.8% between R25 001 to R45 000, then 3.9% between R45 001 to R65 000, and only very least .6% spend more than R65 000 on food per annum per household. This implies that very few households have the expenditure of more than R65 000

on food annually. This is where family members are assisting on farm which increases the expenditure on food to maintain the existence of the other family members in the farm.

Table 25: The distribution of household expenditure on food per annum

Variable	Frequency	Percent
<R12000	111	30.8
R12001-R25000	187	51.9
R25001-R45000	46	12.8
R45001-R65000	14	3.9
>R65000	2	.6
Total	360	100.0

6.4.5. The distribution of household monthly expenditure on food

The findings reveal that 49.7% of the respondents confirm that each household spends less than R3 000 on food per month, followed by 38,6% of the respondents who spend between R3001 and R5000. Furthermore, 8,1% of the respondents spend between R5001 to R7000, then 3.1% spend between R7001 and R10 000. Only 0.6% spend more than R10 000 per month (Table 30). More livestock farmers based in rural areas spend very little amount on food because they do not have other sources of income except from farming activities and government support grant. Responses from the focus group indicated that they have very few cattle ranging between 2 and 10, goats up to 20 and indigenous chickens up to 20. They do not stay with many household members in the family (Table 26).

Table 26: The distribution of household monthly expenditure on food

Variable	Frequency	Percent
<R3000	179	49.7
R3001-R5000	139	38.6
R5001-R7000	29	8.1
R7001-R10000	11	3.1
>R10000	2	.6
Total	360	100.0

6.4.6. Government support grant

The findings shown in (Figure 28), demonstrate that majority 57.8% of the respondents receive government support grant, while 42.2 of the remaining respondents do not receive the government support grant. This implies that respondents who do not receive the government support grant are those who are below the required age of 60 years old. According to Hakim, (2024), government provided financial aid to assist vulnerable and disadvantaged individuals and families in South Africa. However, these grants are essential for addressing poverty and promoting social welfare across the country's diverse communities. Some farmers are able to survive when augmenting their grant with the farm income.

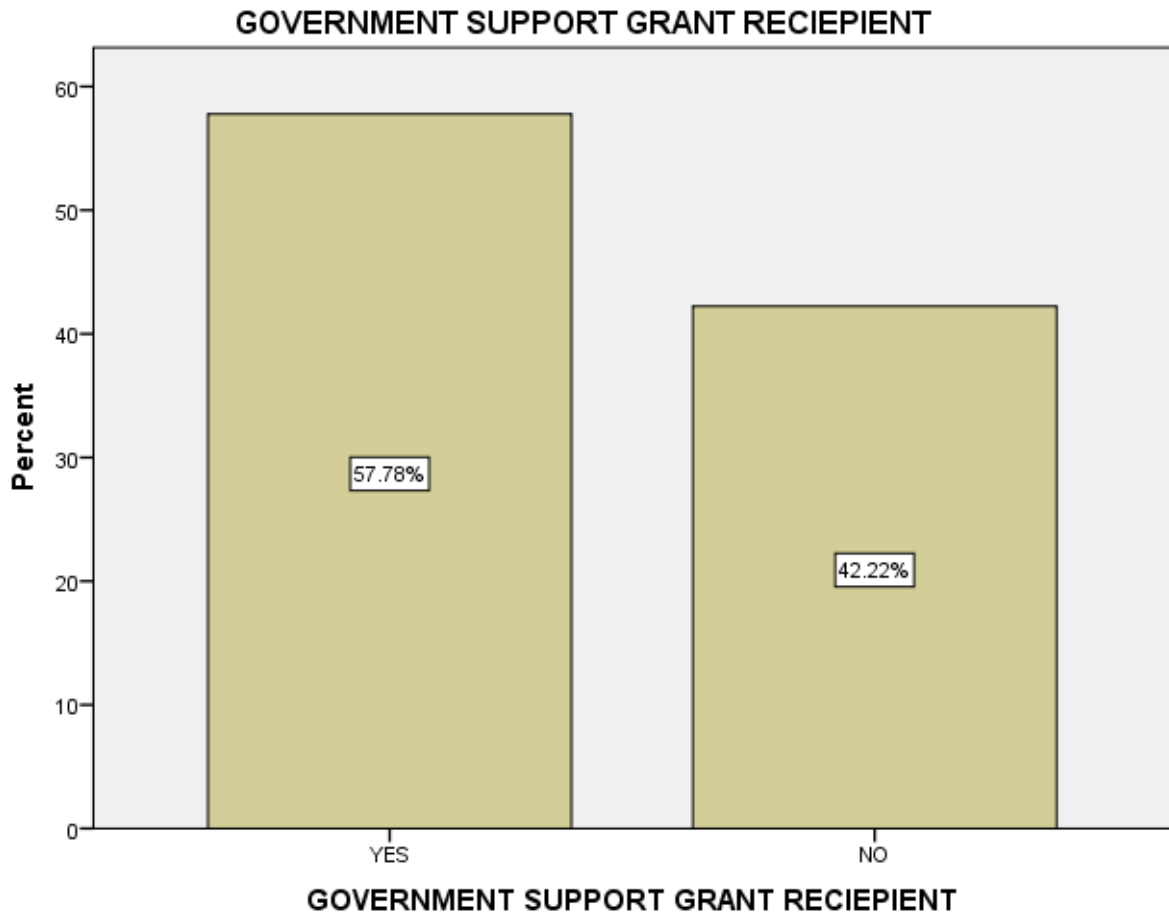


Figure 28: Government support grant recipient

6.4.7. Market for livestock

The findings demonstrate that majority 60.6% of the respondents do have markets for their livestock, whereas 39.4% of the respondents do not have markets to sell their livestock (Figure 29). This implies that rural farmers rely only on local buyers as their way of marketing their livestock. This is because they are adjacent to the borders of Kruger National Park where uncontrolled buffalos are in abundance in spreading the foot and mouth disease. Markets are regarded as the important factors that act as a mechanism for exchange. They are predominantly important to the poor, because their involvement in the use of markets results in co-ordination and allocation of resources, goods and services. Additionally, markets are very important in enhancing food security, reducing poverty and improving livelihoods of households (Jari and Fraser, 2009).

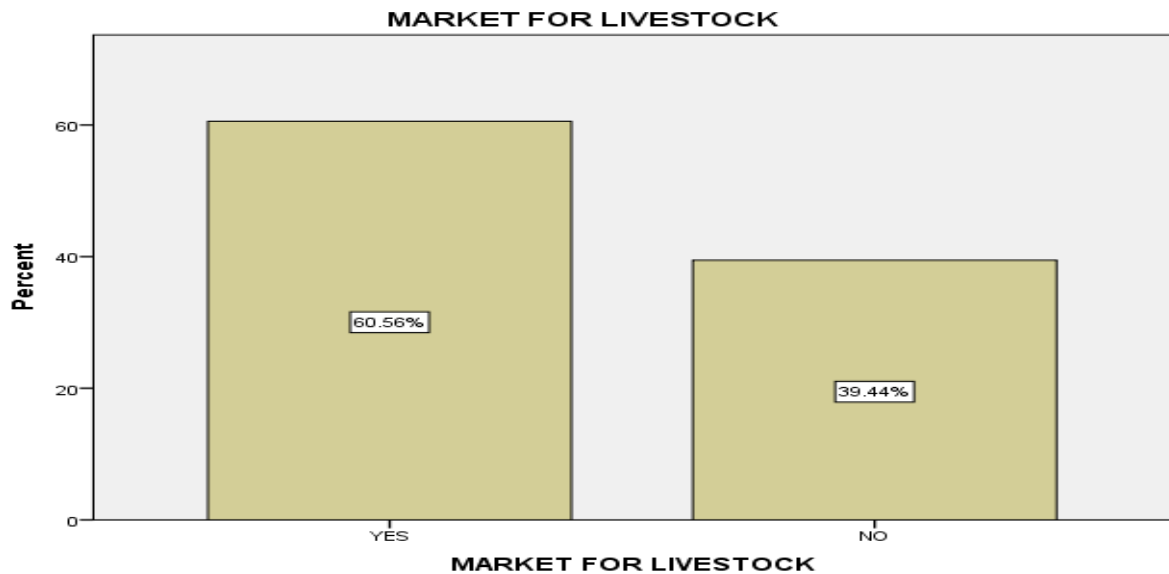


Figure 29: Market for livestock

6.4.8. Market to sell livestock

The results of the study indicate that 12.5% of the respondents sell their livestock to farm gates, while 8.9% sell to abattoirs, followed by the majority 64.4% who sell local buyers, then the lowest 6.9% sell to auctions and 7.2% indicated other. Implying that they don't sell, only for home consumption/ food security (Figure 30). The results showed that most smallholder farmers use informal markets. This finding is therefore consistent with Agholor, Ogujiuba, and Shongwe (2023), who also found that most smallholder farmers use informal markets. Additionally, livestock farmers relying on informal markets do not make sufficient profit. This is due to evident that a farmer cannot sell animals that are in bulk in an informal market. They wait for the buyer to avail himself sometimes once a month. In formal markets you can sell whatever number of animals at once or anytime of the month.

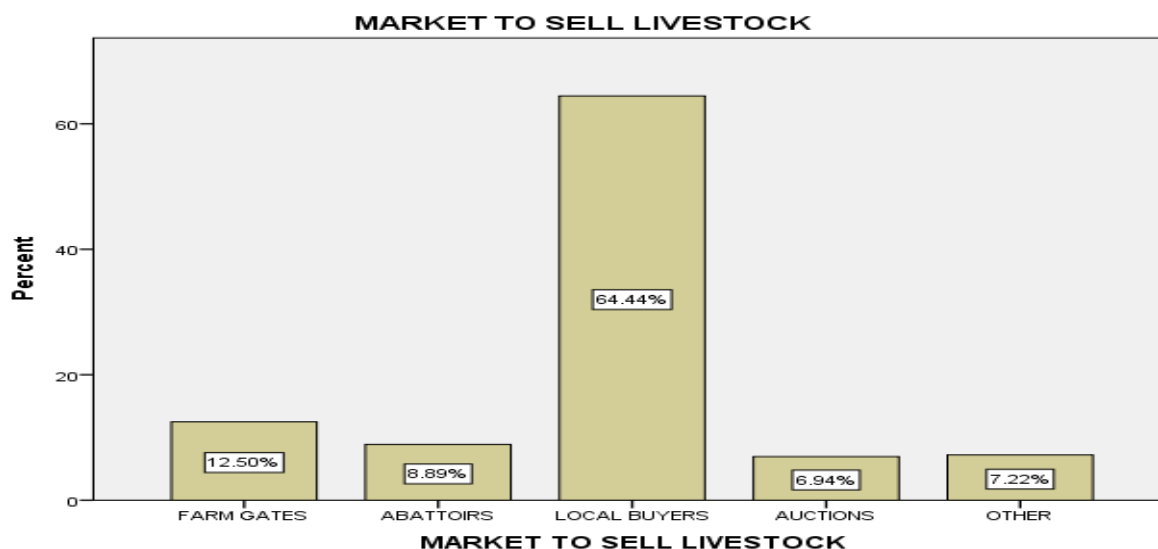


Figure 30: Market to sell livestock.

6.5. The contributions of livestock production on farmers' livelihood

6.5.1. Reason for livestock farming

The findings reveal that 30.6% of the respondents indicated that they farm livestock because of food provisioning for the family, followed by the 48.6% for income generation, then 17.2% for employment creation, the least 1.7% for status and recognition, and lastly 1.9% indicated, other as their reason for livestock farming (Table 27). This finding is supported by another study by Adams (2023), and Monkwe, (2023), with income generation as the most reason for livestock farming.

Table 27: Reason for livestock farming

Variable	Frequency	Percent
PROVISIONING OF FOOD	110	30.6
INCOME GENERATION	175	48.6
EMPLOYMENT CREATION	62	17.2
STATUS AND RECOGNITION	6	1.7
OTHER	7	1.9
Total	360	100.0

6.5.2. Preferred livestock

The findings reveal that 47.8% of the respondents prefer to keep cattle, followed by 11.7% who prefer goats, then the least 3.9% prefer sheep, while, 30.6% prefer to keep poultry, and lastly, 6.1% indicated pigs as their preferred livestock (Figure 31). The above results imply that most of the livestock farmers have cattle as their first preference followed by poultry in rural areas. It is easier to farm with cattle because they eat grass supplements during dry season. Chickens are so quick to mature and multiply quickly. Their choice is based on income generation as well as food security. Sheep is vulnerable to theft and need a strong security. Very few farmers have shown little interest on pigs, since pigs require special food that hasten growth.

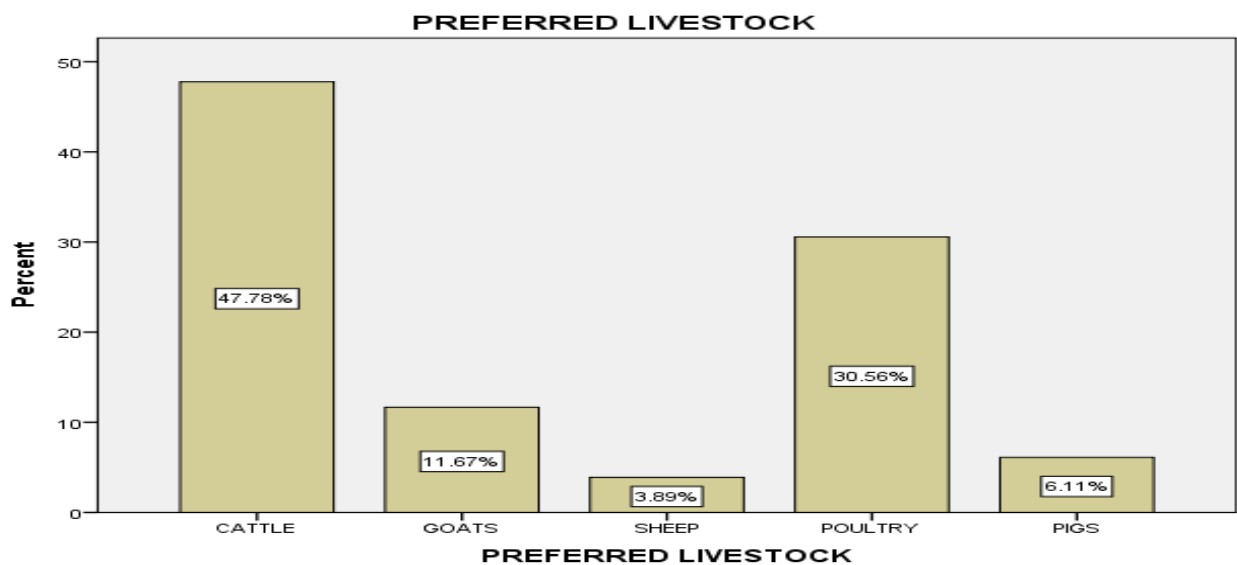


Figure 31: Preferred livestock

6.5.3. Reason for preferred livestock

The findings demonstrate that 29.7% of the respondents prefer livestock keeping for high demand. While 40% keep their preferred livestock because they are manageable, followed by 11.4% that they need small land size, then 14.7% that they have quick income or return, and lastly, the least 4.2% prefer to keep their livestock because of low inputs costs (Table 28). The results imply that livestock farmers have different reasons for keeping certain animals in their

areas. The reasons are because of manageability, such as goats, chickens and cattle. Some prefer commodity that needs a small space such as pigs and poultry, because such animals can be kept at their dwellings, with a minimum risk. Animals are preferred for livestock farming due to several reasons that contribute to their suitability and economic benefits such as food and nutrition, economic benefits, efficient land utilization, environmental benefits, cultural significance, genetic diversity, etc. (Akinbobola, 2025).

Table 28: Reason for preferred livestock

Variable	Frequency	Percent
HIGH DEMAND	107	29.7
MANAGEABLE	144	40.0
NEED SMALL LAND SIZE	41	11.4
QUICK INCOME/RETURN	53	14.7
LOW INPUT COSTS	15	4.2
Total	360	100.0

6.5.4. Level of stock theft in the study area

The findings as shown in (Table 29), state that 28.1% of the respondents experienced low level of stock theft in their area, while 34.7% have moderate stock theft level, followed by 30.3% who experience high stock theft level, then 6.1% experience extremely high level of livestock theft in their area, and lastly, only 0.8% as the lowest percentage indicated other which implies that they do not experience any theft in their area. The level of stock theft in the study area differs from place to place and from commodity to commodity. Pigs and sheep in some villages picks the high level while, cattle take a lead in certain areas of farming. Chickens and goats are in the moderate level of theft because they are manageable. According to Clack (2024), KZN Province consistently reports the highest cattle theft rates, followed by the Eastern Cape (EC), while the Northern Cape (NC) and Western Cape (WC) report the lowest. Mpumalanga (MP) and Free State (FS) exhibit stable trends with minor fluctuations. Additionally, sheep theft tends to be the highest across South African provinces, and EC records the highest number of

stolen sheep, followed by the FS, while provinces like the NC, GP, and MP have relatively lower numbers than the EC and FS. However, the regional differences confirm that the EC and FS generally report higher incidences of sheep theft than provinces in the western part, such as the WC.

Table 29: Level of stock theft in the study area

Variable	Frequency	Percent
LOW	101	28.1
MODERATE	125	34.7
HIGH	109	30.3
EXTREMELY HIGH	22	6.1
OTHER	3	.8
Total	360	100.0

6.5.5. Distribution of livestock ranking high on theft

The findings reveal that 46.4% of the respondents' rank cattle as the livestock commodity that is high in theft in the study area, followed by 25.8% of goats, then the lowest 4.2% of sheep, 5.3% of pigs and lastly, 18.3% of poultry (Table 30). Cattle are the main target on stock theft particularly in rural areas. They are targeted in their grazing points, where they are left astray. In certain areas where grazing is monitored, cattle cannot be easily targeted because of their large frame. Cattle are large and difficult to transport, whereas Sheep are regarded as not intelligent animals that flock together when herded and normally do not make a noise at night when disturbed, while goats will blaze like crazy (Maluleke, Mokwena & Olofinbiyi, 2019). Stock thieves are interested in informal channels where the owners are not ready to part with their livestock (Clack. and Maluleke. 2024).

Table 30: Distribution of livestock ranking high on theft

Variable	Frequency	Percent
CATTLE	167	46.4
GOATS	93	25.8
SHEEP	15	4.2
PIGS	19	5.3
POULTRY	66	18.3
Total	360	100.0

6.6. The challenges faced by livestock farmers

6.6.1. Challenges of livestock farmers in the study area

The findings in (Figure 32), reveal that 43.9% of the respondents' place stock theft as one of the challenges faced by livestock farmers in the study area. Followed by 15% of the respondents who place poor marketing and trade as their challenge in the area, then 12.5% who place grazing land and invasion, 8.3% as lack of pasture and quality feeds, 6.1% as scarcity of water resource, 3.1% as highly variable climate, .8% as socio-economic constraints, 1.7% as poor access to extension officers, 1.4% as insufficient farm size, .8% as limited access to credits, 3.6% as costs of putting up infrastructure, and 2.8% as limited access to agricultural information. This finding on poor access to extension officers conforms with the study of (Mapiye, Makombe, Molotsi, et al, 2025) who demonstrate that extension officers can only provide services to a few farmers because of the high farmer-to-extension officer ratio. In another study by Monkwe, Gxasheka, and Gunya, (2023), and Mandeni, et al., (2019) asserted that stock theft was regarded as the most challenging factor in their area. If stock theft is not mitigated, livestock farmers will in future lose interest in livestock keeping, which will in the end affect food security. Public policies and support programs are needed so that these farmers can access these prevailing markets and consequently reduce vulnerabilities (Yamanaka, Oliveira, Severino, et al, 2019).

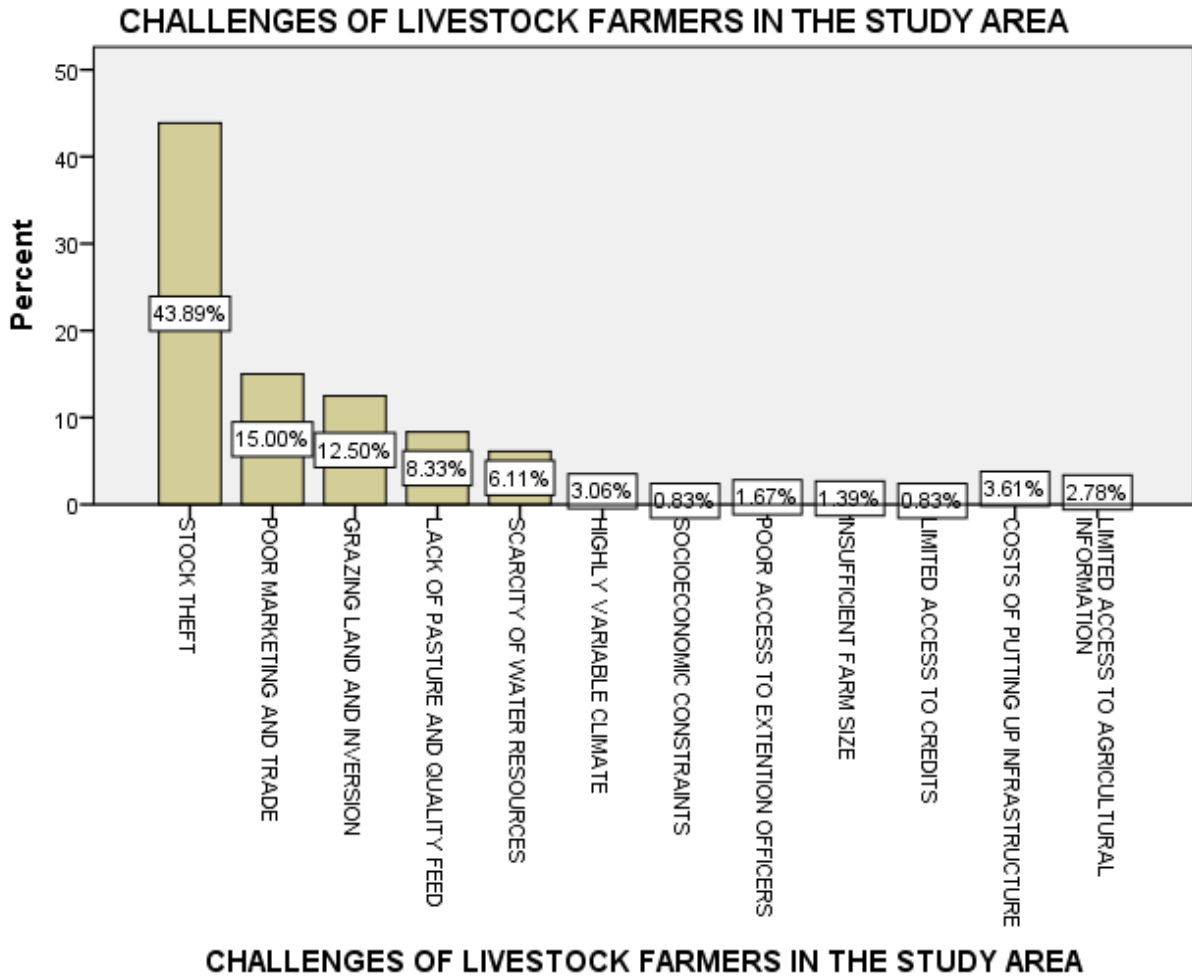


Figure 32. Challenges of livestock farmers in the study area

6.6.2. Severity of the Challenges

The findings of the study (Figure 33), reveal that 16.1% of the respondents have less severe of challenges in the area, while 17.5% have severe, 11.7% were undecided, then 39.4% have more severe and lastly, 15.28% of the respondents regard it as extremely severe in the study area. This finding implies that livestock farmers are harshly affected by livestock theft in the study area. If this challenge is not controlled by the government, stock farmers will move out from farming and search for alternative means for their survival. This will also affect the farmers alone, but the food security chain. Cattle herders will lose jobs. Subsequently, crime in the rural areas will gradually increase.

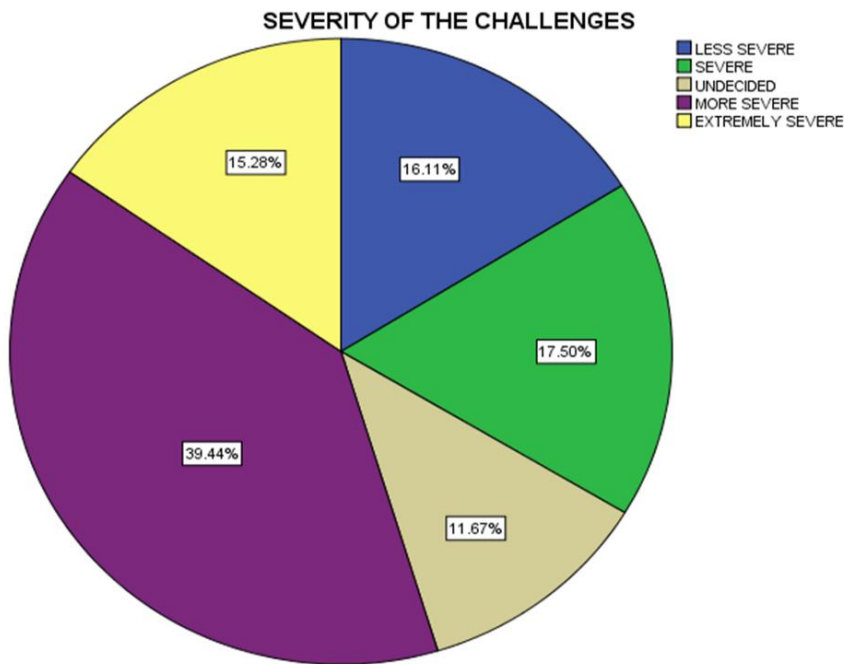


Figure 33: Severity of the challenges

6.6.3. Livestock production contributes to livelihood

The findings demonstrate that majority 90.8% of the respondents are aware of the contribution of livestock production into their livelihood, while only 9.2% of them do not agree on that (Figure 34). This implies that most livestock farmers are active in farming. They are aware that farming is their major source of income that contribute to food security and their livelihood. There are still more awareness campaigns needed for those who are not certain about animal keeping for their livelihood. Contribution of livestock production is critical to livelihoods, offering food security, income, employment, and social empowerment, while supporting sustainable agricultural systems. Beyond food production, animal production plays other important economic, cultural and social roles and provide multiple functions and services

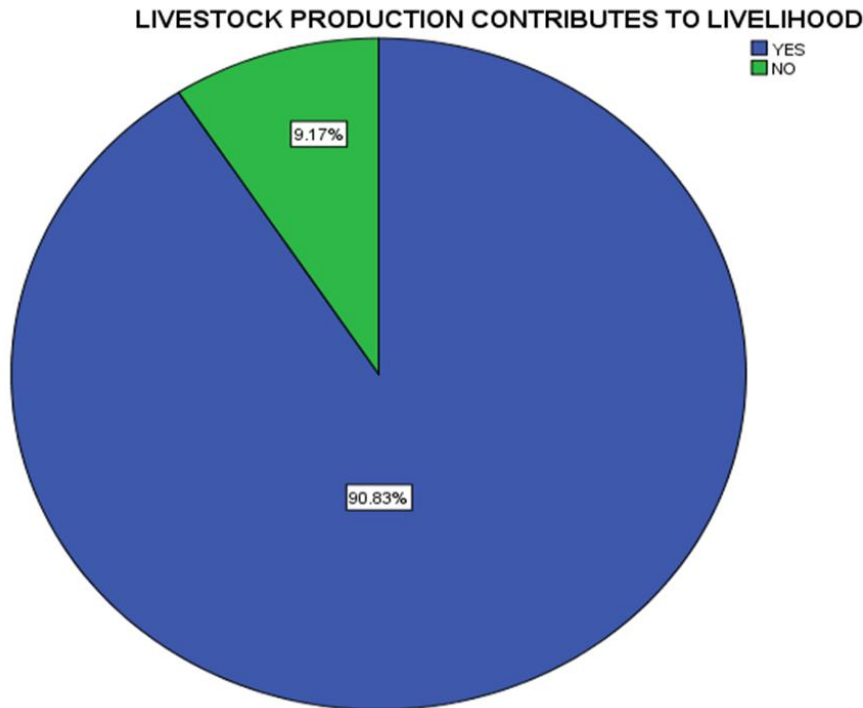


Figure 34: Livestock production contributes to livelihood.

6.7. The best management practices of livestock farming among livestock producers.

This section discusses the best management practices of livestock farming among livestock producers. These management practices are as follows: belief in best practices that exist in livestock production, vaccination as a management practice, deworming as management practice, dehorning as management practice, Artificial insemination, castration, concentrate feeds, provision of clean water, provision of shelter, record keeping, branding and ear tagging, animal keeping principle- free from thirsty, hunger and malnutrition, animal keeping principle- disease prevention and veterinary treatment, animal keeping principle-nutritional feeding, animal keeping principle-nutritional feeding, animal keeping principle-appropriate shelter and realisation of any benefits from following management practices in livestock production,

6.7.1. Belief in best practices that exist in livestock production.

The findings (Table 31) reveal that majority 91.7% of the respondents believe in the best practices that exist in livestock production, while only 8.3% of the respondents do not believe on that. The concept of farmers to belief in best practices within livestock production refers to

the extent to which livestock farmers recognize, trust, and are motivated to implement recommended methods that optimize animal health, productivity, environmental sustainability, and social-economic outcomes. Additionally, this belief is influenced by multiple factors such as cultural, socioeconomic, educational, and technological, which shape the adoption and adaptation of these practices. In some African contexts, livestock serves not only economic purposes but also for cultural rituals, bride-price arrangements, and social prestige (Rankoana, 2024). Furthermore, the study by Adeyemo and Silas, (2020), indicated that decision-making in livestock management often varies by gender, where males may have greater access to land and external support, impacting practice adoption. Implementing the best practices, livestock farmers can ensure the good health of their animals, increase productivity and achieve long term success in the agricultural sector (Farmers Magazine, 2024). Practices must be adapted to local climates, soil, and ecosystem characteristics—rotational grazing and silvopastoral systems are examples of contextualized best practice adoption (Alliance Bioversity-CIAT, 2024; FAO, 2022).

Table 31: Belief in best practices that exist in livestock production

Variable	Frequency	Percent
YES	330	91.7
NO	30	8.3
Total	360	100.0

6.7.2. Vaccination as a management practice

The findings demonstrate that 0.3% of the respondents consider vaccination as a management practice as less important. Whereas 11.1% consider it important, followed by another .3% as being undecided. Then 16.9% regard it as more important, and the majority 71.4% consider it as extremely important (Table 32). Livestock needs to be vaccinated for disease, insects, pests and parasites control. Animals that are vaccinated stay and grow healthier. Moreover, livestock vaccination is crucial for maintaining the health and welfare of animals. Vaccines help animals stay healthy and live longer by preventing diseases, which, in turn, offers farmers sustainable

financial security and benefits to their communities (Mwato, 2025). It is vital to practice the use of vaccines since they are essential for long-term solutions in preventing infectious diseases.

6.7.3. Deworming as management practice

The findings demonstrate that the least 1.7% of the respondents consider deworming as management practice that is less important, while 12.2% consider it as important, then the minority 2,8% consider it as undecided, 33.6% consider it as more important, and 49.7% of the respondents consider it as extremely important (Table 32). According to the focus, deworming is being practiced and considered as one of the management practices that can improve their livestock productivity in the study area. This finding agrees with Moses, (2025), who found that deworming can improved health, productivity, and overall well-being. In addition to that, common parasites in livestock include gastrointestinal worms, such as roundworms (nematodes), tapeworms (cestodes), and flukes (trematodes), as well as external parasites like ticks, lice, and mites. These parasites can cause a range of health issues in animals, including weight loss, poor growth, anemia, reduced milk or meat production, and even death in severe cases.

6.7.4. Dehorning as management practice

The findings (Table 32) reveal that the least 7.8% of the respondents consider dehorning as part of management practice being less important, while 25.6% consider it important, 8.1% consider it undecided and then 44.4% is regarded as more important, and lastly, 14.2% of the respondents consider it as extremely important. Most farmers in the study area are aware of the benefits of dehorning their cattle. However, it is a bit costly to have the tools for individual Kalela, (2025) agrees with the finding that removing horns from cattle at an early age, farmers can reduce veterinary expenses on injuries, minimize damage to farm infrastructure, and

enhance productivity in both dairy and beef operations. However, this practice not only improves animal welfare but also contributes to a more efficient and profitable farm management system. Horns can cause harm to other animals, while animals with no horns are easier to handle and less aggressive.

6.7.5. Artificial insemination as management practice

The findings state that 13.9% of the respondents consider artificial insemination as a management practice to be less important, while 34.7% consider it as important, followed by 24.7% consider it as undecided, then 18.9% consider as more important and lastly, the least minority consider it as extremely important (Table 32). This implies that most rural livestock farmers lack knowledge of Artificial Insemination as one of the best management practices to improve livestock genetic material without using natural breeding. However, those in majority such as smallholder farmers understand the importance and some are practicing it. Artificial Insemination is a cornerstone of modern livestock management, which enhances genetic quality, reproductive efficiency, safety and economic outcomes. It is an important tool for any well managed livestock operation especially in dairy and beef cattle (Agriculture Institute 2023) agrees with the finding that Artificial insemination (AI) enhances breeding efficiency by enabling controlled mating, widespread use of superior genetics, improved reproductive management, disease control, and cost reduction.

6.7.6. Castration as management practice

The findings state that 8.3% of the respondents consider castration as part of management practice being less important, while 34.7% consider it as important, then the least 7.5% consider it as undecided, followed by 40.3% view it as more important. Lastly, only 9.2% view it as extremely important (Table 32). Castration in livestock offers numerous benefits, including improved meat quality, reduced aggression, better herd management, and prevention of

unwanted breeding. More of the focus group interviewed have more understanding of castration and the benefits that it offers. This result agrees with the study by Akinbobola, (2025), who demonstrated that castration is a critical management practice in animal husbandry. Again, it enables livestock farmers to manage breeding on their farms easily than allowing even undesirable bulls to mate with their herds. Castration further prevents inbreeding within the herd and unwanted pregnancies.

6.7.7. Concentrate feeds as management practice

The findings state that at least 2.5% of the respondents consider concentrated feeds as management practice to be less important, followed by the 30.3% view it as important, and 4.2% view it as undecided, and 25.3% of the respondents view it as more important. Lastly, 37.8% of the respondents, consider it as extremely important (Table 32). Concentrate feed is referred as the feed used with another to improve the nutritive balance of the total and is intended to be further diluted and mixed to produce a supplement or a complete feed (Akinbobola, 2025). Proper concentrate feeding plays a vital role in optimizing milk production, maintaining cow health, and improving farm profitability. By balancing forage with quality concentrates, monitoring cow performance, and providing essential nutrients, dairy farmers can maximize efficiency and sustainability in dairy production (Dairyverse Expert, 2025). By implementing these best practices, farmers can achieve higher milk yields, better cow health, and improved farm efficiency while minimizing the risk of metabolic disorders.

6.7.8. Provision of clean water as management practice

The findings reveal that minority 1.7% of the respondents consider the provision of clean water as livestock management practice less important, whereas 18.6% is viewed as important, followed by 1.9% as undecided, then 35.8% as more important and lastly, 41.9% is viewed as extremely important (Table 32). It is vital to provide clean water in livestock, for these reasons: (i) Provision of clean water is a core water resource management practice that intersects public health, environmental sustainability, and socio-economic development; (ii) access to potable water reduces the prevalence of waterborne diseases Mbucho, (2024) from Sustainability Pathways supports the finding that the availability of good sanitation and clean water is critical for improving quality of life through supporting general health and illness prevention. Additionally, water is vital in any society since it is required for the existence of both animals and human beings.

6.7.9. Provision of shelter as management practice

The findings reveal that minority 1.9% of the respondents viewed provision of shelter as management practice to be less important, while 20 % view it as important, 2.8% view it as undecided, then the second majority 35.8% view as more important and lastly, majority 39.4% view it as extremely important (Table 32). Animals need shelter, particularly, poultry, pigs, goats and calves. By providing shelters in livestock, management is essential to protect animals from harsh weather, reduce stress, prevent diseases, and enhance overall productivity and welfare. Well ventilation shelter is essential for maintaining good air quality and reducing the risk of respiratory problems in livestock, particularly chickens and goats.

6.7.10. Record keeping as management practice.

The findings reveal that 12.2% of the respondents view record keeping as important, whereas the minority 2.2% are undecided, followed by 37.5% more important and lastly, 48.1% view it as extremely important. None of the respondents selected option less important (Table 32).

Record keeping is fundamental in livestock farming because it enables informed decision-making, improves productivity, ensures animal health, and enhances farm profitability. Record keeping is also a fundamental management practice that ensures compliance with laws, supports decision-making, enhances accountability, and safeguards organizational operations against risks. Exercising accurate farm records, help track the health status of each animal, including vaccinations, treatments, disease occurrences, and breeding history. Keeping farm records is extremely important for farmers to have full control over the current and the future of the farm management. Keeping records aids in determining the inflow and outflow, in economics terms, of the farm and helps in setting proper pricing for animals which must be sold at the auction. It allows to improve animal welfare and business productivity and to avoid financial losses (Farm4Trade suite, 2021).

6.7.11. Branding and ear tagging as management practice

The findings reveal that minority 1.9% of the respondents regard branding and ear tagging as management practices being less important, while 10.3% being important, then 2.5% of the respondents are undecided, followed by 21.4% being more important, and lastly, majority 63.9% view it as extremely important (Table 32). The main aim of livestock marking or branding is to provide a permanent and reliable means of identification of individual animals, while ear tags are extensively used as a method of identification for livestock including cattle, goats, sheep and pigs (Pansegrouw, 2023).

6.7.12. Animal keeping principle- free from thirsty, hunger and malnutrition

The findings reveal that majority 53.1% of the respondents are said to be strongly agree with animal keeping principle of being free from thirsty, hunger and malnutrition. This is followed by the second majority 36.7% where they agree then the minority 1.9% where they are undecided. However, 4.4% disagree and 3.9% are strongly disagree with the above principle (Table 36). Animals must have access to fresh water and diet to maintain health and vigor. All

animals deserve access to clean water and a well-balanced, nutritious diet. Freedom from hunger and thirst provides an animal's most basic needs by allowing that animal to remain in good health and full of vitality. Food provides animals with energy. If they don't have enough energy they can't move freely, fight disease or think clearly. In time, their bodies no longer perform basic functions like breathing and pumping blood (Society for the Prevention of Cruelty to Animals (SPCA) Auckland, Inc, 2014). Animals need fresh water all the time which allows an animal's body to function properly and to deliver important nutrients throughout their system.

6.7.13. Animal keeping principle-disease prevention and veterinary treatment

The findings reveal that 48.6% of the respondents strongly agree with animal keeping principle on disease prevention and veterinary treatment, 40.3% agree, the least .6% undecided, then 3.3% disagree and 7.2% strongly disagree (Table 32). Livestock in general plays an important economic role for communities and families by providing food, fiber, hides, manure for fuel and fertilizer, and draught power, as well as having cultural significance and playing a role in the status of individuals in certain societies (Perry, and Grace, 2009). Regarding the recent emphasis on improving food safety, food security, biodiversity, and improving animal and public health, measures are increasingly being taken to reduce the risk of disease introduction or spread within animal populations and from animal to human populations (Perry, and Randolph, 2003). The study by Millman, Christley, Rigby, et al, (2017) and Wolff, Boqvist, Ståhl, et al, (2017), reported that providing education, training, and the involvement of all stakeholders are essential for the success of biosecurity at the enterprise, regional, and national levels; these stakeholders include the owners, managers, and workers on livestock enterprises, industry bodies, and rural and urban communities.

6.7.14. Animal keeping principle-nutritional feeding

The findings reveal that the majority 51.9% of the respondents strongly agree with animal keeping principle on nutritional feeding, however, the second majority 40% agree with the principle, then minority 1.9% are undecided. Also 2.2% disagree and lastly, 3,9% strongly disagree with the principle (Table 32). This implies that more livestock farmers are aware that their livestock should be supplemented with quality feeds with required nutrients in their respective diet. This finding is supported by the study of Balehegn, et al, (2020), which states that, insufficient quality feed supply directly and indirectly contributes to worldwide food and nutrition insecurity and the related problems.

6.7.15. Animal keeping principle-appropriate shelter

The findings reveal that majority 52.5% of the respondents strongly agree with animal keeping principle on appropriate shelter, followed by 40.3% that agree, and minority 1.1% are undecided with the above variable. While 2.8% of the respondents disagree, and lastly, only 3.3% of the respondents strongly disagree with the above variable (Table 32). This implies that majority of the respondents are keeping livestock that needs appropriate shelter, such as goats, pigs and chickens, preventing them from harsh environmental factors (rain and high temperatures).

Table 32: Vaccination, deworming, dehorning, Artificial Insemination, castration, concentrate feeds, provision of clean water, provision of shelter, record keeping, branding and ear tagging and animal keeping principle on free from thirsty, hunger and malnutrition, disease prevention and veterinary treatment, nutritional feeding and appropriate shelter.

Vaccination as a management practice	Variable	Frequency	Percentage
	LESS IMPORTANT	1	0.3
	IMPORTANT	40	11.1
	UNDECIDED	1	0.3
	MORE IMPORTANT	61	16.9
	EXTREMELY IMPORTANT	257	71.4
	Total	360	100
Deworming as management practice	Variable	Frequency	Percentage
	LESS IMPORTANT	6	1.7
	IMPORTANT	44	12.2
	UNDECIDED	10	2.8
	MORE IMPORTANT	121	33.6
	EXTREMELY IMPORTANT	179	49.7
	Total	360	100
Dehorning as management practice	Variable	Frequency	Percentage
	LESS IMPORTANT	28	7.8
	IMPORTANT	92	25.6
	UNDECIDED	29	8.1
	MORE IMPORTANT	160	44.4
	EXTREMELY IMPORTANT	51	14.2
	Total	360	100
Artificial insemination as management practice	Variable	Frequency	Percentage
	LESS IMPORTANT	50	13.9
	IMPORTANT	125	34.7
	UNDECIDED	89	24.7
	MORE IMPORTANT	68	18.9
	EXTREMELY IMPORTANT	28	7.8
	Total	360	100

Castration as management practice	Variable	Frequency	Percentage
	LESS IMPORTANT	30	8.3
	IMPORTANT	125	34.7
	UNDECIDED	27	7.5
	MORE IMPORTANT	145	40.3
	EXTREMELY IMPORTANT	33	9.2
	Total	360	100
Concentrate feeds as management practice	Variable	Frequency	Percentage
	LESS IMPORTANT	9	2.5
	IMPORTANT	109	30.3
	UNDECIDED	15	4.2
	MORE IMPORTANT	91	25.3
	EXTREMELY IMPORTANT	136	37.8
	Total	360	100
Provision of clean water as management practice	Variable	Frequency	Percentage
	LESS IMPORTANT	6	1.7
	IMPORTANT	67	18.6
	UNDECIDED	7	1.9
	MORE IMPORTANT	129	35.8
	EXTREMELY IMPORTANT	151	41.9
	Total	360	100
Provision of shelter as management practice	Variable	Frequency	Percentage
	LESS IMPORTANT	7	1.9
	IMPORTANT	72	20
	UNDECIDED	10	2.8
	MORE IMPORTANT	129	35.8
	EXTREMELY IMPORTANT	142	39.4
	Total	360	100
Record keeping as management practice.	Variable	Frequency	Percentage
	IMPORTANT	44	12.2
	UNDECIDED	8	2.2

	MORE IMPORTANT	135	37.5
	EXTREMELY IMPORTANT	173	48.1
	Total	360	100
Branding and ear tagging as management practice	Variable	Frequency	Percentage
	LESS IMPORTANT	7	1.9
	IMPORTANT	37	10.3
	UNDECIDED	9	2.5
	MORE IMPORTANT	77	21.4
	EXTREMELY IMPORTANT	230	63.9
	Total	360	100
Animal keeping principle-free from thirsty, hunger and malnutrition	Variable	Frequency	Percentage
	STRONGLY AGREE	191	53.1
	AGREE	132	36.7
	UNDECIDED	7	1.9
	DISAGREE	16	4.4
	STRONGLY DISAGREE	14	3.9
	Total	360	100
Animal keeping principle-disease prevention and veterinary treatment	Variable	Frequency	Percentage
	STRONGLY AGREE	175	48.6
	AGREE	145	40.3
	UNDECIDED	2	0.6
	DISAGREE	12	3.3
	STRONGLY DISAGREE	26	7.2
	Total	360	100
Animal keeping principle-nutritional feeding	Variable	Frequency	Percentage
	STRONGLY AGREE	187	51.9
	AGREE	144	40
	UNDECIDED	7	1.9
	DISAGREE	8	2.2
	STRONGLY DISAGREE	14	3.9
	Total	360	100

Animal keeping principle-appropriate shelter	Variable	Frequency	Percentage
	STRONGLY AGREE	189	52.5
	AGREE	145	40.3
	UNDECIDED	4	1.1
	DISAGREE	10	2.8
	STRONGLY DISAGREE	12	3.3
	Total	360	100

6.7.16. Realisation of any benefits from following management practices in livestock production

The findings reveal that the majority of 91.1% of the respondents realize benefits from following management practices in livestock production, while only 8.9% do not see any benefits from following the management practices in livestock production (Table 33). This finding implies that more livestock farmers are aware of the benefits resulting from following the correct management practices in livestock production. Some benefits are the provision of food products like meat, milk eggs and wool; generates income, employment, and trade opportunities; supports cultural traditions and strengthens community livelihoods. Additionally, it enhances soil fertility through manure use and supports sustainable agriculture.

Table 33: Realisation of any benefits from following management practices in livestock production

Variable	Frequency	Percent
YES	328	91.1
NO	32	8.9
Total	360	100.0

6.8 The levels of adoption of the best practices in livestock farming among livestock producers

This section discusses the levels of adoption of the best management practices in livestock farming among livestock producers. These twenty two adoption levels are indicated as follows: Adoption of the management practices, ranking of management practices through vaccination, ranking of management practices through deworming, ranking of management practices through dehorning, ranking of management practices through artificial insemination, ranking of management practices through castration, ranking of management practices through concentrate feeds, ranking of management practices through provision of clean water, ranking of management practices through provision of shelter, ranking of management practices through records keeping, ranking of management practices through branding and ear tagging, ranking of management principles on free from thirsty, hunger and malnutrition, ranking of management principles on disease prevention and veterinary treatment, ranking of management principles on nutritional feeding, ranking of management principles on appropriate shelter, ranking of main cause of overgrazing of pastoral land, ranking of good livestock production practice on less livestock mortality rate, ranking of good livestock production practice on increased farm income, ranking of good livestock production practice on sustainable rise in livestock production, ranking of good livestock production practice on create more jobs, ranking of good livestock production practice on less production costs, ranking of good livestock production practice on allowing poor households to join the market economy.

6.8.1. Adoption of the management practices

The findings indicate that majority 88.3% of the respondents have adopted management practices, while only 11.7% did not adopt these practices (Figure 35). It is important to adopt best management practices when dealing with livestock farming. Moreover, adopting effective

management practices in livestock farming enhances productivity, ensures animal welfare, promotes environmental sustainability, and strengthens economic viability for farmers. By adopting management practices farmers can enhance the health and profitability of their livestock. Effective livestock management is also essential for South African farmers to maximize productivity (Farmers Magazine, 2024).

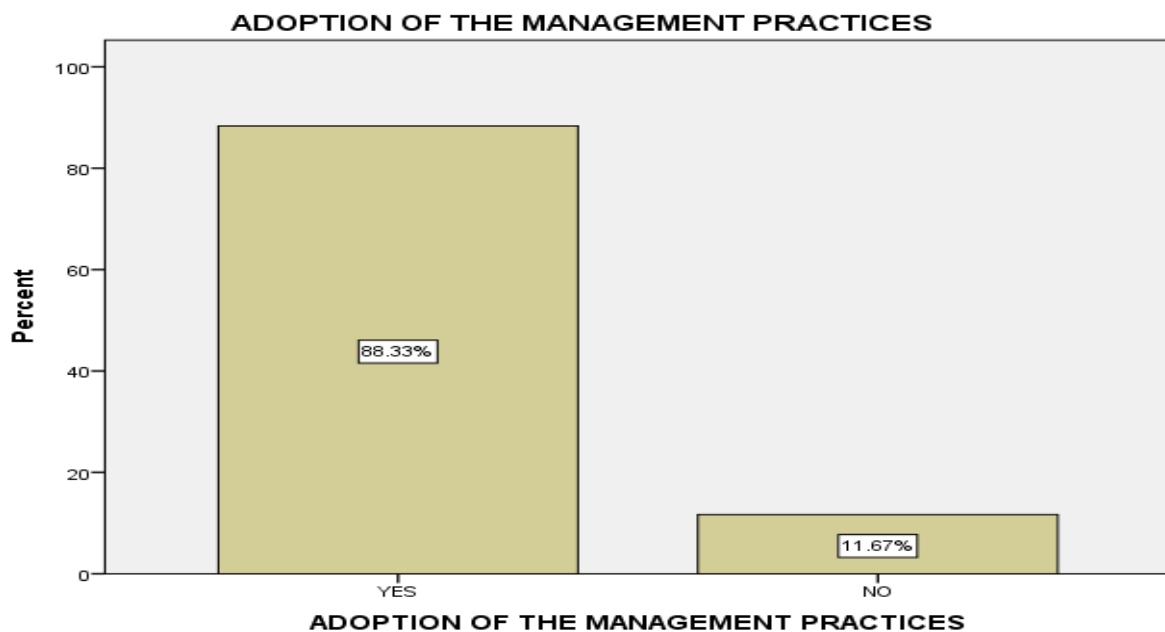


Figure 35: Adoption of the management practices

6.8.2. Ranking of management practices through vaccination

The findings indicate that lowest 0.6% of the respondents ranked management practices through vaccination as highly unaccepted. Followed by again 0.6% that are accepted, then again 0.6% being undecided and the 28.3% being accepted. Lastly, the majority 70% ranked it as highly accepted (Table 34). Vaccination of livestock is playing a significant role in disease control. Livestock farmers need to follow vaccination program provided by local veterinary services to keep their healthy.

6.8.3. Ranking of management practices through deworming.

The findings indicate that minority 0.3% of the respondents, ranked management practices through deworming being highly unaccepted, followed by .6% being unaccepted, then 2.5% being undecided and 43.3% being accepted. Lastly, majority 53.3% being highly accepted (Table 34). Deworming is an oral application of medication aiming to control internal parasites, such as tapeworms, fluke worms, round worms pig mange specifically in calves, goats, sheep and pigs. Deworming of livestock is critical for the prevention and curing of internal and external parasites. Inoculated animals tend to grow slowly with poor diet and ultimately die.

6.8.4. Ranking of management practices through dehorning

The findings indicate that minority 3.3% of the respondents ranked management practices through dehorning being highly unaccepted, followed by 6.9% being unaccepted, then 8.3% being undecided and majority 61.7% being accepted. Lastly, 19.7% being highly accepted (Table 34). Dehorning is the process of removing horns from the cattle at an earlier age. Dehorning cattle is performed primarily for safety, health, and economic reasons, making it a common practice in the cattle industry. The horn buds usually start developing in calves within 2-3 months of age. However, Dehorning is typically done early in an animal's life before the horn buds attach to the skull. Some reasons for dehorning cattle are that horned cattle are dangerous to humans and other animals. Horns allow cattle to seriously injure each other and handlers. Dehorning reduces risks. Horns make handling and transporting cattle difficult (Zain, 2023).

6.8.5. Ranking of management practices through artificial insemination

The findings specify that minority 6.7% of the respondents ranked management practices through artificial insemination being highly unaccepted, followed by 14.4% being unaccepted, then 26.4% being undecided and 41.1% being accepted. Lastly, 11.4% being highly accepted (Table 51). Ranking of management practices in livestock or poultry production through

artificial insemination (AI) involves assessing and organizing animal husbandry and reproductive techniques to optimize outcomes such as conception rates, genetic improvement, and productivity. Some of the importance of Artificial Insemination (AI) are to enables selective propagation of superior males, rapidly disseminating desirable traits such as milk yield, growth rate, disease resistance, and fertility across the herd. It Reduces direct animal contact, lowering the risk of disease transmission and physical injuries associated with natural mating. Enhanced reproductive efficiency (Farmers Magazine, 2024).

6.8.6. Ranking of management practices through castration

The findings indicate that 4.2% of the respondents, ranked management practices through castration being highly unaccepted, followed by 6.9% being unaccepted, then 11.1% being undecided and majority 64.2% being accepted. Lastly, only 13.6% being highly accepted (Table 34). The term castration is referred as the process of removing the testicles of male cattle. This involves surgically removing the testes or using other techniques like banding to cut off blood flow to the scrotum. Reasons for castration are that castration reduces aggression and violent behaviours in bulls. Bull meat has an undesirable taste compared to steers. Consumers prefer the flavour of beef from castrated males. The main purpose of castration is that castration eliminates the risk of unwanted breeding in mixed cow and heifer herds (Zain, 2023).

6.8.7. Ranking of management practices through concentrate feeds

The findings indicate that minority 2.8% of the respondents, ranked management practices through concentrate feeds being highly unaccepted, followed by 15.8% being unaccepted, then 7.8% being undecided and 33.1% being accepted. Lastly, 40.6% being highly accepted (Table 34). Concentrate feeding is crucial for livestock during dry season such as winter where natural grazing is insufficient and unable to satisfy the needs of animals. Concentrate feeds are also essential for monogastric feeding efficiency. Blended into tailored rations, they meet the full

nutritional needs of pigs, poultry and other monogastric livestock. The main purpose of concentrates is to redress the deficit in nutrient supply from forages to allow cattle reach performance targets. Particularly, beef cattle rarely consume sufficient grass silage to achieve their production potential and as a result, energy-rich concentrates are routinely supplemented in practice. Concentrated feeds are formulated to deliver a high concentration of nutrients, including proteins, vitamins, minerals, and energy, in a small amount of feed. Healthy animals are more productive, yielding higher milk production in dairy cattle, better weight gain in meat animals, and increased egg production in poultry (Market research intellect, 2024).

6.8.8. Ranking of management practices through provision of clean water

The findings indicate that 1.4% of the respondents, ranked management practices through provision of clean water being highly unaccepted, followed by 2.2% being unaccepted, then 4.4% being undecided and 45.8% being accepted. Lastly, 46.1% being highly accepted (Table 34). Livestock farmers prefer provision of clean water to their animals due to health issues. Dirty water promotes diseases and bacteria which causes poor growth of livestock. Farmers who do not accept provision of clean water to animals, need training and awareness campaigns.

6.8.9. Ranking of management practices through provision of shelter

The findings indicate that minority 1.1% of the respondents, ranked management practices through provision of shelter being highly unaccepted, followed by 1.7% being unaccepted, then 3.9% being undecided and 49.7% being accepted. Lastly, 43.6% being highly accepted (Table 34). Farmers are aware about the management practices that are significant. Only fewer of them that still need awareness. From the focus group more livestock farmers integrate cattle with chickens and pigs or goats. That is why they rank the provision of shelter being accepted and highly accepted due to the integration of monogastric animals and small stock.

6.8.10. Ranking of management practices through records keeping

The findings specify that minority 0.3% of the respondents, ranked management practices through record keeping being highly unaccepted, followed by 1.4% being unaccepted, then 5.0% being undecided and 43.9% being accepted. Lastly, 49.4% being highly accepted (Table 34). This finding implies that record keeping is key to any business even outside farming. Record keeping is the cornerstone of sustainable farming. It controls your financial cash flow, production schedule and inform you whether your business is growing or going down.

6.8.11. Ranking of management practices through branding and ear tagging

The findings indicate that minority 0.6% of the respondents, ranked management practices through branding and ear tagging being highly unaccepted, followed by 1.4% being unaccepted, then 3.3% being undecided and 31.7% being accepted. Lastly, majority 63.1% being highly accepted (Table 34). This finding implies that ear tagging is more significant in livestock farming. It helps farmers in identifying their animals when counting and for record keeping. Sick animals can easily identify through ear tagging, to know which animal is sick. When dipping the cattle it is easy to notice those not counted during dipping. A farmer can also easily identify missing animals from the herd. The focus group also considered branding and ear tagging as critical for them. In some of the study areas, which are close to Kruger National Park and railway line farmers can identify their cattle when they have been killed by train or lions that came out of the park. Farmers who did not brand, or ear tagged their animals, face challenges during claims for being compensated.

6.8.12. Ranking of management principles on free from thirsty, hunger and malnutrition

The findings demonstrate that 5.8% of the respondents ranked management principles on free from thirsty, hunger and malnutrition being highly unaccepted, followed by 1.4% being unaccepted, again 1.4% being undecided and 39.7% being accepted. Lastly, majority 51.7%

being highly accepted (Table 34). Animals that are not taken care of grow stunted with poor health and malnutrition, with special reference to pigs because they are intensively kept. Clean water is critical to farmers who farm with pigs and chickens. Cattle, goats and sheep must also have access to clean water. Much of the focus group have ranked the finding as highly accepted.

6.8.13. Ranking of management principles on disease prevention and veterinary treatment

The finding demonstrates that minority 1.4% of the respondents ranked management principles on disease prevention and veterinary treatment being unaccepted, followed by 2.2% being undecided, then 34.7% being accepted. Lastly, majority 61.7% being accepted. No one picked option highly unaccepted (Table 34). Through the findings, livestock farmers are aware of the importance of the disease prevention and veterinary treatment since the majority of them considered it as highly acceptable.

6.8.14. Ranking of management principles on nutritional feeding

The findings demonstrate that minority 0.3% of the respondents ranked management principles on nutritional feeding being highly unaccepted, followed by 1.1% being unaccepted, again 3.3% being undecided and 37.8% being accepted. Lastly, majority 57.5% being accepted (Table 34). It is important to understand that ideal nutrition is imperative in livestock feed as it directly influences growth rates, reproduction, disease resistance, and the overall quality of animal-derived products consumed by humans. Livestock farmers must ensure that their livestock receive the appropriate balance of nutrients to stimulate the well-being of the animal also boost their growth, reproduction, and lactation efficiency (Barn world, 2024). It is essential to understand that different animals have different nutritional needs.

6.8.15. Ranking of management principles on appropriate shelter

The findings demonstrate that 1.1% of the respondents ranked management principles on appropriate shelter being highly unaccepted, followed by 0.8% being unaccepted, then 1.4%

being undecided and the 43.3% being accepted. Lastly, majority 53.3% being highly accepted (Table 34). Providing adequate housing and shelter for livestock is a critical component of successful animal husbandry. Provision of proper shelter to animals promotes their health, comfort, and productivity. Farmers to note that livestock are vulnerable to environmental stressors such as extreme temperatures, wind, rain, snow, and predators (Live to plant, 2025).

Table 34: Ranking of management practices through vaccination, deworming, dehorning, artificial Insemination, castration, concentrate feeds, provision of clean water, provision of shelter, record keeping, branding and ear tagging and animal keeping principle on free from thirsty, hunger and malnutrition, disease prevention and veterinary treatment, nutritional feeding and appropriate shelter

Ranking of management practices through vaccination	Variable	Frequency	Percentage
	HIGHLY UNACCEPTED	2	0.6
	UNACCEPTED	2	0.6
	UNDECIDED	2	0.6
	ACCEPTED	102	28.3
	HIGHLY ACCEPTED	252	70
	Total	360	100
Ranking management practices through deworming.	Variable	Frequency	Percentage
	HIGHLY UNACCEPTED	1	0.3
	UNACCEPTED	2	0.6
	UNDECIDED	9	2.5
	ACCEPTED	156	43.3
	HIGHLY ACCEPTED	192	53.3
	Total	360	100
Ranking of management practices through dehorning	Variable	Frequency	Percentage
	HIGHLY UNACCEPTED	12	3.3
	UNACCEPTED	25	6.9
	UNDECIDED	30	8.3
	ACCEPTED	222	61.7
	HIGHLY ACCEPTED	71	19.7
	Total	360	100
Ranking of management practices through artificial insemination	Variable	Frequency	Percentage
	HIGHLY UNACCEPTED	24	6.7
	UNACCEPTED	52	14.4
	UNDECIDED	95	26.4
	ACCEPTED	148	41.1
	HIGHLY ACCEPTED	41	11.4
	Total	360	100

Ranking of management practices through castration	Variable	Frequency	Percentage
	HIGHLY UNACCEPTED	15	4.2
	UNACCEPTED	25	6.9
	UNDECIDED	40	11.1
	ACCEPTED	231	64.2
	HIGHLY ACCEPTED	49	13.6
	Total	360	100
Ranking of management practices through concentrate feeds	Variable	Frequency	Percentage
	HIGHLY UNACCEPTED	10	2.8
	UNACCEPTED	57	15.8
	UNDECIDED	28	7.8
	ACCEPTED	119	33.1
	HIGHLY ACCEPTED	146	40.6
	Total	360	100
Ranking of management practices through provision of clean water	Variable	Frequency	Percentage
	HIGHLY UNACCEPTED	5	1.4
	UNACCEPTED	8	2.2
	UNDECIDED	16	4.4
	ACCEPTED	165	45.8
	HIGHLY ACCEPTED	166	46.1
	Total	360	100
Ranking of management practices through provision of shelter	Variables	Frequency	Percentage
	HIGHLY UNACCEPTED	4	1.1
	UNACCEPTED	6	1.7
	UNDECIDED	14	3.9
	ACCEPTED	179	49.7
	HIGHLY ACCEPTED	157	43.6
	Total	360	100
Ranking of management practices through records keeping	Variables	Frequency	Percentage

	HIGHLY UNACCEPTED	1	0.3
	UNACCEPTED	5	1.4
	UNDECIDED	18	5
	ACCEPTED	158	43.9
	HIGHLY ACCEPTED	178	49.4
	Total	360	100
Ranking of management practices through branding and ear tagging	Variable	Frequency	Percentage
	HIGHLY UNACCEPTED	2	0.6
	ACCEPTED	5	1.4
	UNDECIDED	12	3.3
	ACCEPTED	114	31.7
	HIGHLY ACCEPTED	227	63.1
	Total	360	100
Ranking of management principles on free from thirsty, hunger and malnutrition	Variables	Frequency	Percentage
	HIGHLY UNACCEPTED	21	5.8
	UNACCEPTED	5	1.4
	UNDECIDED	5	1.4
	ACCEPTED	143	39.7
	HIGHLY ACCEPTED	186	51.7
	Total	360	100
Ranking of management principles on disease prevention and veterinary treatment	Variables	Frequency	Percentage
	UNACCEPTED	5	1.4
	UNDECIDED	8	2.2
	ACCEPTED	125	34.7
	HIGHLY ACCEPTED	222	61.7
	Total	360	100
Ranking of management principles on nutritional feeding	Variables	Frequency	Percentage
	HIGHLY UNACCEPTED	1	0.3
	UNACCEPTED	4	1.1

	UNDECIDED	12	3.3
	ACCEPTED	136	37.8
	HIGHLY ACCEPTED	207	57.5
	Total	360	100
Ranking of management principles on appropriate shelter	Variables	Frequency	Percentage
	HIGHLY UNACCEPTED	4	1.1
	UNACCEPTED	3	0.8
	UNDECIDED	5	1.4
	ACCEPTED	156	43.3
	HIGHLY ACCEPTED	192	53.3
	Total	360	100

6.8.16. Main cause of overgrazing of pastoral land

The findings reveal that 36.4% of the respondents consider overstocking as the main cause of overgrazing of pastoral land, followed by 7.5% as lack of camp division, 15.6% as continuous grazing, 7.5% being lack of proper animal management, 6.9% being socio-economic conditions of the farmer, 8.6% drought or decline in precipitation, 7.2% being improper land use, and lastly, 10.3% being livestock in poorly managed agricultural applications (Figure 36). Overgrazing occurs when plants are grazed more quickly than they can recover, primarily caused by excessive livestock densities, poor grazing management, and insufficient pasture availability (Meter T., 2024). Overgrazing causes reduced pasture stands and forces the cattlemen to feed purchased feeds, which are expensive and result in less profit.

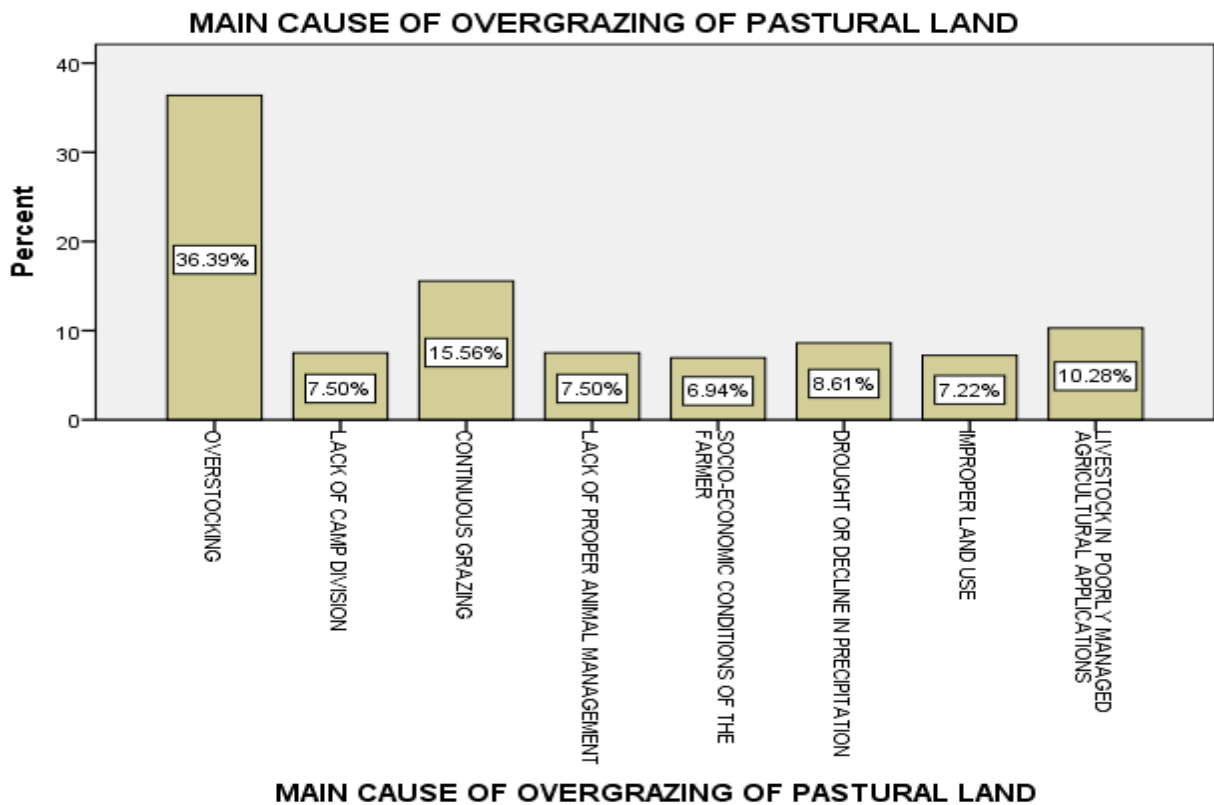


Figure 36: Main cause of overgrazing of pastoral land

6.8.17. Ranking of good livestock production practice on less livestock mortality rate

The findings reveal that 5.3% of the respondents ranked good livestock production practice on less livestock mortality rate as less important, followed by 14.2% as important, then 5.6% being undecided, 33.3% being more important and lastly, 41.7% ranked as being extremely important (Table 35). Every livestock farmer if farming for profit. Encountering a rise in mortality rate of your livestock, know that you are losing profit. Check the root cause of the problem and fix, to avoid running out of your business. Above 80% of the focus group ranked the variable as from important to extreme important. This is evident to their experience gained during training and skills obtained from livestock production. Livestock Mortality Rate is a critical in the agriculture sector. Moreover, it is a direct indicator of animal health, welfare, and the effectiveness of livestock management strategies. A high mortality rate may be the signs of like disease outbreaks, malnutrition, or poor living conditions, prompting immediate corrective

actions. A low mortality rate is often indicative of good animal health and effective farm management practices (Hamada, 2025).

Table 35: Ranking of good livestock production practice on less livestock mortality rate

Variable	Frequency	Percent
LESS IMPORTANT	19	5.3
IMPORTANT	51	14.2
UNDECIDED	20	5.6
MORE IMPORTANT	120	33.3
EXTREMELY IMPORTANT	150	41.7
Total	360	100.0

6.8.18. Ranking of good livestock production practice on increased farm income

The results of the study demonstrate that minority 1,7% of the respondents ranked, good livestock production practice on increased farm income as less important, followed by 10,8% as being important. While 8,3% were undecided, then, 36,1% good livestock production practice as more important, and lastly, being 43,1% ranked it as extremely important (Table 36). Agriculture has a key role in reducing poverty since most of the world's poor live in rural areas and are largely dependent on agriculture, while food prices determine the cost-of-living for the urban poor (Upton, 2003).

Additionally, animals are a source of food, more specifically protein for human diets, income, employment and possibly foreign exchange. Thus, for low-income producers, livestock can serve as a store of wealth, provide draught power and organic fertiliser for crop production and a means of transport. Every livestock farmer is looking for any management practice that will increase farm income. Without that there will be no continuity in livestock farming. The results reflected between important to extremely important by most of the respondents. This confirm that continue farming if there is no increase on farm income. This will force other farmers to quit farming and search for alternative jobs if there is no farm profit.

6.8.19. Ranking of good livestock production practice on sustainable rise in livestock production

The results of the study demonstrate that minority 0.6% of the respondents ranked good livestock production practice on sustainable rise in livestock production as less important, followed by 16.9% being important, then 7.8% being undecided, while 39.4% being more important, and lastly, being 35.3% ranked as extremely important (Table 36). Most of the respondents ranked the results of the practice as more than extremely important. Meaning that they are willing to see their livestock increasing. Women's empowerment can lead to improved animal husbandry, increased productivity and the adoption of sustainable practices. Increased investments contribute to more efficient value chains within the livestock sector (Wong, 2023).

6.8.20. Ranking of good livestock production practice on create more jobs

The results of the study demonstrate that minority 1.4% of the respondents ranked good livestock production practice on create more jobs as less important, followed by 10.6% being important, then 13.9% being undecided, whereas 36.4% being more important, and lastly, being 37.8% ranked as extremely important (Table 36). Job creation and food security concepts are inseparable. Everyone is willing to see progress in his business. Livestock farmers aim to have their farming stock increasing so that they can employ more people which in turn that will contribute to job creation and ultimately food security.

6.8.21. Ranking of good livestock production practice on less production costs

The results of the study demonstrate that minority 1.4% of the respondents ranked good livestock production practice on less production costs as less important, followed by 16.9% being important, then 10.3% being undecided, whereas 41.4% being more important, and lastly, being the second majority 30.0% ranked as extremely important (Table 36). These results imply that the livestock production practice that are less on production costs is the one that the livestock farmers can recommend for better productivity. High feeding costs in particular,

poultry and pigs result in less profit. However, farmers cannot sustain their projects with high costs of production and that will collapse the project, reduce workers and finally, sell or lease the farm.

6.8.22. Ranking of good livestock production practice on allowing poor households to join the market economy

The results of the study demonstrate that minority 2.5% of the respondents ranked good livestock production practice on allowing poor households to join the market economy, as less important, followed by 19.7% being important, then 4.4% being undecided, the majority 50.0% being more important, and lastly, being 23.3% ranked as extremely important (Table 36). Good livestock production practice can attract more interested farmers to the farming industry. Markets accept livestock commodity that are of good quality and meeting the market requirements. Following the above practice can improve management style of the farmer.

Table 36: Ranking of good livestock production practice on increased farm income, sustainable rise in livestock production, create more jobs, less production costs and allowing poor households to join the market economy

	Variables	Frequency	Percentage
Increased farm income	LESS IMPORTANT	6	1.7
	IMPORTANT	39	10.8
	UNDECIDED	30	8.3
	MORE IMPORTANT	130	36.1
	EXTREMELY IMPORTANT	155	43.1
	Total	360	100
Sustainable rise in livestock production	LESS IMPORTANT	2	0.6
	IMPORTANT	61	16.9
	UNDECIDED	28	7.8
	MORE IMPORTANT	142	39.4
	EXTREMELY IMPORTANT	127	35.3
	Total	360	100
Create more jobs	LESS IMPORTANT	5	1.4
	IMPORTANT	38	10.6
	UNDECIDED	50	13.9
	MORE IMPORTANT	131	36.4
	EXTREMELY IMPORTANT	136	37.8
	Total	360	100
Less production costs	LESS IMPORTANT	5	1.4
	IMPORTANT	61	16.9
	UNDECIDED	37	10.3
	MORE IMPORTANT	149	41.4
	EXTREMELY IMPORTANT	108	30
	Total	360	100
Allowing poor households to join the market economy	LESS IMPORTANT	9	2.5
	IMPORTANT	71	19.7
	UNDECIDED	16	4.4
	MORE IMPORTANT	180	50
	EXTREMELY IMPORTANT	84	23.3
	Total	360	100

6.9. Livestock farmers and extension services

6.9.1. Assistance from extension services

The findings demonstrate that majority 80% of the respondents receive assistance from extension services, while only 20% do not receive any assistance from extension services (Figure 37). This finding is consistent to the study by Agholor, (2021), and found to be obvious that majority of farmers were serviced by extension officers in the area. Though, 67.4% of their respondents received services from extension officers. Agricultural extension (also known as agricultural advisory services) plays a crucial role in boosting agricultural productivity, increasing food security, improving rural livelihoods, and promoting agriculture as an engine of pro-poor economic growth. Extension services provide the baseline agricultural support needed by farmers (Department of Agriculture, Environmental Affairs, Rural Development and Land Reform, 2025).



Figure 37: Assistance from extension services

6.9.2. Type of assistance from extension services

The findings demonstrate that 41.7% of the respondents received advisory services as the type of assistance from extension services, followed by 14.2% from demonstrations on livestock feeding, then the lowest 2.8% from management and caring of piglets, 4.7% from management of broiler chickens, 6.1% from culling and selection of livestock, 4.2% from regular farm visits, 9.4% from disease control, 3.6% from marketing of livestock and lastly, 13.3% did not indicate any type of assistance received from extension services (Figure 38). The results imply that advisory services are the service that livestock farmers best receive from the extension services outlined in the figure below. Extension officials play an important role in helping farmers with the dosing and vaccination of crops and livestock to protect them from any insects and diseases that may lead to low productivity in rural agriculture (Mbatha, 2024).

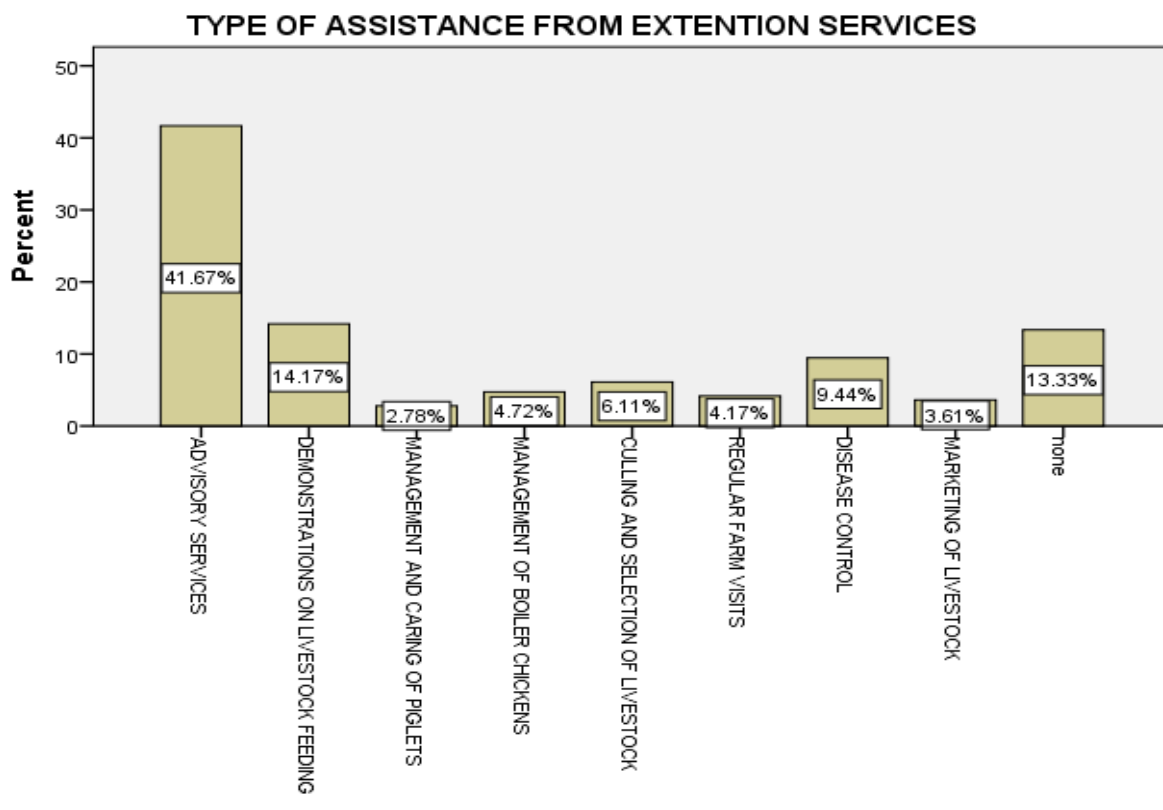


Figure 38: Type of assistance from extension services

6.9.3. Farm extension officers' visits

The findings reveal that majority 64.4% of the respondents agree that extension officers do visit their farms, while only 35.6% of the extension officers do not visit their farms (Figure 39). This finding aligns with previous study of (Mapiye et al, 2025) who asserted that public extension is the primary source of extension services for farmers, who can access the services through farm visits and telephone calls. Constant visits by extension officers to farmers can improve productivity and trust, even though the farmer-extension ratio is still too far to balance. Extension officers can still make use of other effective tools to convey messages to farmers. Group meetings, farmers' days, demonstrations, field days as well as the use of cellphones and creating farmer WhatsApp group as means of communicating with farmers.



Figure 39: Farm extension officers' visits

6.9.4. Frequency extension officers' visits

The findings reveal that 20.8% of the respondents receive extension officers often visits on weekly basis, followed by 2.2% on monthly basis, 14.2% on bi-monthly, 3.1% quarterly, the

majority 25.8% when there is a need, and 19.7% of the respondents did not receive any often visits Table 67). This implies that these farmers did not receive any visits from the extension officers. Often visits to farmers is very important since farmers need revival by regular farm engagements by extension officers. The regular visits reinforced the importance of partnerships between farmers, government, and the private sector. Many extension officers learnt practical lessons from these visits that they can apply in their work, while also offering advice to the host farmers on ways to improve their operations. This is a sharing of experiences between the farmer and the extension officer. However, this approach is also known as participatory extension approach model. The extension officials function as intermediaries between farmers, government agencies, and research institutes, facilitating the exchange of vital information. Extension work is aimed at improving agricultural practices, promoting sustainability, and addressing the specific needs of farming communities (Admin, 2024).

Table 37: Frequency extension officers' visits

	Frequency	Percent	Cumulative Percent
Valid WEEKLY	75	20.8	20.8
BI-WEEKLY	8	2.2	23.1
MONTHLY	51	14.2	37.2
BI-MONTHLY	11	3.1	40.3
QUARTERLY	51	14.2	54.4
WHEN THERE IS A NEED	93	25.8	80.3
NONE	71	19.7	100.0
Total	360	100.0	

6.9.5. Farm extension officers visit satisfaction

The findings reveal that 39.7% of the respondents are strongly satisfied with the farm extension officers visit, followed by second majority 33.3%, being satisfied, then 3.6% undecided, minority 2.5% unsatisfied, 20.3% strongly unsatisfied and lastly, only least minority of respondents did not give any response on the above measures (Table 38). Farmers, perceived satisfaction with the quality of agricultural-extension services. The finding is supported by the

study of Kassem, Alotaibi, Muddassir, et al, (2021) on the factors influencing farmers' satisfaction with the quality of agricultural extension services and found that farmers were moderately satisfied with services that were available, relevant, accessible, and effective in their operations. However, farmers had differing opinions concerning these services.

Table 38: Farm extension officers visit satisfaction

Variable	Frequency	Percent
STRONGLY SATISFIED	143	39.7
SATISFIED	120	33.3
UNDECIDED	13	3.6
UNSATISFIED	9	2.5
STRONGLY UNSATISFIED	73	20.3
NONE	2	.6
Total	360	100.0

6.9.6. Recommendation of extension officer's visits as beneficial to livestock production

The findings reveal that majority 92.5% of the respondents recommended that extension officers visits are beneficial to livestock production, while only 7.5% of the respondents did not recommend (Table 39). Extension officers, visits to farmers are highly recommended because they provide technical guidance, training, and practical support that enhance livestock productivity, improve animal health, and strengthen farmer capacity. This is also evident that much of the focus group have recommended the visits as beneficial to them.

6.9.7. Attendance to livestock production training

The findings reveal that the majority 65.6% of the respondents have attended livestock production training, while only 34.4% did not attend the training (Table 39). Livestock management training provides new farmers with a solid foundation in livestock production. Effective training includes, beef and dairy cattle, sheep and goat production, pig production, artificial insemination, and farm business management. During trainings participants will explore common challenges faced by emerging farmers and discover practical solutions to

ensure healthy, productive herds and sustainable farm businesses. (Buhle Farmers Academy, 2025).

Table 39: Recommendation of extension officer’s visits as beneficial to livestock production and attendance of livestock production training by livestock farmers

		Frequency	Percentage
Extension officer's visits	Yes or No		
	Yes	333	92.5
	No	27	7.5
	Total	360	100
Attendance of livestock production training	Yes or No		
	Yes	236	65.6
	No	124	34.4
	Total	360	100

6.9.8. Attendance to livestock production training satisfaction

The results of the study reveal that the majority 64.2% of the respondents are satisfied with attendance to livestock production training, while only 34.4% are not satisfied (Table 40). The results imply that training of farmers is very significant. Most farmers who attended livestock production training become satisfied. Training is one of the basic needs that addresses some of their felt needs which will as a result improve livestock production. In several instances the organization identified the training needs of the farmers without considering the particular needs and preferences of farmers themselves (Paladan, 2019).

Table 40: Attendance to livestock production training satisfaction

Variable	Frequency	Percent
YES	231	64.2
NO	129	35.8
Total	360	100.0

6.9.9. Preferred training methods of extension delivery

The findings reveal that majority 50% of the respondents prefer training methods of extension delivery, followed by 24.4% prefer demonstrations, then 8.3% prefer farmers day, minority 3.6% prefer field days, 4.4% for mass/group contact, and lastly, 9.2% prefer farmer to farmer

excursion as their preferred training methods of extension delivery (Table 41). This finding implies that many of the focus group have attended workshops followed by demonstrations. Very few of them attended farmers, days and farmer to farmer excursions. The three items are very crucial for livestock farmers to attend for knowledge gain. Demonstrations provide practical experience because of the physical handling of the particular activity such as dehorning, castration, deworming, vaccination, supplementary feeding and artificial insemination (AI) application.

Table 41: Preferred training methods of extension delivery

	Frequency	Percent	Cumulative Percent
Valid WORKSHOP	180	50.0	50.0
DEMONSTRATIONS	88	24.4	74.4
FARMERS DAYS	30	8.3	82.8
FIELD DAY	13	3.6	86.4
MASS/GROUP CONTACT	16	4.4	90.8
FARMER TO FARMER EXCURSION	33	9.2	100.0
Total	360	100.0	

CHAPTER 7

EMPIRICAL RESULTS OF THE STUDY

7.1 Introduction

This chapter discusses the logistic regression results based on the seven independent variables which were hypothesized to influence the adoption of best livestock management practices. The independent variables include age of the age of the livestock farmers, gender of the livestock farmers, kind of livestock rearing by farmers, farm extension officers' visits to farmers, often farm extension officers' visits to farmers, marital status and level of education. Additionally, the chapter also discusses logistic regression results, variables in the equation, explanation of variables, and conclusion.

7.2 Logistic Regression results

The empirical results of the determinants of the acceptance of best management practices in livestock farming by smallholder farmers are presented in Table 42. The Goodness-of-fit test was analysed, and the results revealed that the model was ideal as follows: Chi-square = 194.342, Cox and Snell = 0.165, Nagelkerke = 0.322 (Table42), which implied that the model was suitable for the study. In the logistic regression model, seven variables were considered, which included age, gender, kind of livestock rearing, farm extension officers' visit, often extension officers' visits, level of education, and marital status. The results indicate that age, kind of livestock rearing, farm extension officers' visit, often extension officers visit level of education, and marital status were variables that had a significant influence on the acceptance of best management practices in livestock farming by smallholder farmers. Gender of the respondents did not have a statistically significant influence on the adoption of best management practices in the study area as shown in Table 43.

Table 42: Model summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	194.342 ^a	.165	.322
Hosmer and Lemeshow Test:			
Step	Chi-square	Df	Sig.
1	1.088	3	.780

7.2.1 Age

The age of livestock farmers was significant with $P < 0.008$ and negatively influenced decision making to accept best management practices in livestock farming by smallholder farmers with $\beta = -0.722$ (Table 43). This result implies that the probability of acceptance of best management practices in livestock farming decreases by 0.722 times with an increase in the age of respondents when all other variables in the study are held constant. Further, it implies that older farmers are less likely to accept new management practices. This could be due to resistance to change, preference for traditional methods, or limited capacity to implement modern techniques. This finding lends credence to the study by Agholor, Chowdhury, and Olamide, et.al, (2024) on Evaluating Inspiring Factors and Obstacles in the Start-Up of Owned Agri-Preneurial Businesses: Underlying Evidence from South Africa found that the age of respondents was significant and positively influenced the start-up of Agri-Preneurial businesses in South Africa. Additionally, this result is also supported by the study of Bahta et al., (2025), which also found that the age of respondents was significantly positive and influenced the acceptance of livestock management practices.

Overall, the effect of age on the adoption of livestock management practices is moderately negative, as indicated in Table 43.

7.2.2 Gender

The gender of the livestock farmers was not significant with a $P < 0.238$ and positively influenced decision making to accept best management practices in livestock farming by

smallholder farmers with $\beta = -.723$. This result implies that the probability of adoption of best management practices in livestock farming decreases by 0.723 times with an increase in the gender of respondents (Table 43). This finding is consistent with the study of Bahta et al. (2025) on Strengthening Agricultural Drought Resilience of Commercial Livestock Farmers in South Africa: An Assessment of Factors Influencing Decisions.

However, the coefficient of gender (-0.723) as indicated in Table 43, suggests that one gender (likely women if coded as 1) is less likely to adopt new management practices in livestock production. This may reflect gender-based access gaps to land, inputs, training, and Socio-cultural limitations. Overall, the effect of gender on the adoption of livestock management practices is moderately negative, as indicated in Figure 43.

7.2.3 The kind of livestock rearing

The kind of livestock rearing by farmers was significant with a $P < 0.001$ and positively influenced decision making to adopt best management practices in livestock farming by smallholder farmers with $\beta = .850$. This result implies that the probability of adoption of best management practices in livestock farming increases by 0.850 times with an increase in the kind of livestock rearing when all other variables in the study are held constant (Table 78). This finding is aligned with the study by Godber and Wall (2014). On livestock and food security: vulnerability to population growth and climate change and found that projected population growth is shown to have a highly significant influence on exposure score ($q = 0.92$, $P < 0.01$). However, the coefficient of kinds of livestock rearing (.850) as indicated in Table 43, suggests that the type or diversity of livestock being reared (e.g., poultry, goats, cattle) has a strong positive effect on adopting better management practices. This could be that farmers raising certain livestock may require or be more exposed to improved practices. Overall, the effect of kinds of livestock rearing on the adoption of livestock management practices is a strong positive driver, as indicated in Table 43.

7.2.4 Farm Extension officers' visits to farmers

Farm Extension officers' visits to farmers were significant, with a $P < 0.001$, and positively influenced decision making to adopt best management practices in livestock farming by smallholder farmers with $\beta = 1.443$. This result implies that the probability of adoption of best management practices in livestock farming increases by 1.443 times with an increase in farm extension officers' visits to farmers when all other variables in the study are held constant. This finding is consistent with Nyangena and Juma (2014) on Impact of improved farm technologies on yields: The case of improved maize varieties and inorganic fertiliser in Kenya, who found that extension services were positively linked to farmers' participation in farming support programmes that were initiated by the government. Additionally, this result also agrees with Agholor, Ogujiuba, and Shongwe (2023), who showed that access to agricultural extension services had a significant relationship and positive influence on decision making to adopt a specific type of market. Though the coefficient of farm extension officers' visits (1.443) as indicated (Table 43), suggests that actual visits from extension officers (especially productive or intensive ones) have a very strong positive effect on adoption. This may reflect high-quality training, advice, or demonstrations.

Overall, the effect of extension officers' visits on the adoption of livestock management practices is the strongest positive, as indicated in Table 43.

7.2.5 The frequent extension officers' visits

Frequency Extension officers' visits to farmers were significant with a $P < 0.001$ and negatively influenced decision making to adopt, best management practices in livestock farming by smallholder farmers with $\beta = -0.325$. This result implies that the probability of adoption of best management practices in livestock farming decreases by 0.325 times with an increase in often visits by extension officers to farmers when all other variables in the study are held constant. This finding agrees with the study of Sulemana, Malongza, and Abdulai (2018), on Assessment

of the Livelihood Empowerment against Poverty programme in Karaga district, Ghana, who found that the income of beneficiaries is significant, and shows a positive relationship between the Livelihood Empowerment Against Poverty (LEAP) programme and income of beneficiaries.

However, the coefficient of the frequent extension officers' visits (-.325) as indicated in Table 43 suggests that, interestingly, more frequent visits alone negatively correlate with adoption of best management practices on livestock production. This could be quantity that does not equal quality, implying visits may be too routine or unproductive, and farmers may feel micromanaged or burdened.

Overall, the effect of often extension officers' visits on the adoption of livestock management practices is moderately negative, as indicated in Table 43.

7.2.6 The level of education

The level of education was significant with a $P < 0.012$ and negatively influenced decision making to adopt best management practices in livestock farming by smallholder farmers with $\beta = -0.468$. This result implies that the probability of adoption of best management practices in livestock farming decreases by 0.468 times with an increase in the level of education when all other variables in the study are held constant. This finding is consistent with the study of the World Bank (2008) report, which indicated that education played a role in influencing the attitude of farmers towards the adoption of modern technology by enhancing the willingness of rural people to adopt new ideas.

However, the coefficient of the level of education (0.468), as indicated in Table 43, suggests that, unexpectedly, more education is associated with lower adoption of best management practices on livestock production. Possible reasons could be that: more educated individuals might move away from agriculture or focus on non-farm income, and they may critique or

distrust recommended practices. Overall, the effect of the level of education on the adoption of livestock management practices is moderately negative, as indicated in Figure 40

7.2.7 Marital status

Marital status of farmers was significant with a $P < 0.018$ and negatively influenced decision making to adopt best management practices in livestock farming by smallholder farmers with $\beta = -0.361$. This result implies that the probability of adoption of best management practices in livestock farming decreases 0.361 times with an increase in level of education, when all other variables in the study are held constant. This finding is consistent with the study of Alex, Magasha, and Mlage (2024) on the contribution of farmers' Organisations on smallholder farmers market access: A case of MVIWATA in Morogoro District, Tanzania found that marital status was significant and positively influenced contribution of farmers' Organisations on smallholder farmers market access, Furthermore, this result also agrees with the study of Mthi, Nyangiwe, Menhas, et al, (2018), that majority of women involved in livestock production were married.

However, the coefficient of marital status (0.361) as indicated in Table 43, suggests that married individuals might be less likely to adopt new practices—possibly due to: higher household responsibilities, and or risk aversion to change that affects the family.

Overall, the effect of marital status on the adoption of livestock management practices is moderately negative, as indicated in Table 43.

The results indicate that age, kind of livestock rearing, farm extension officers' visit, often extension officers' level of education, and marital status were variables that had a significant influence on the adoption/acceptance of best management practices in livestock farming by smallholder farmers. Gender of the respondents was not statistically significant as a

determinant of the adoption of best management practices in livestock farming by smallholder farmers used in the study area.

Table 43: Determinants of the adoption/acceptance of best management practices in livestock

Independent variables	B	SE	df	Sig. (p-value)	Exp(B)	Remarks
Age of the respondents	-.722	.272	1	.008*	.486	Significant
Gender of the respondents	-.723	.613	1	.238	.485	Not significant
Kind of livestock rearing	.850	.178	01	0.001*	2.340	Significant
Farm Extension officers visit	1.443	.420	1	0.001*	1.989	Significant
Often Extension officers visit	-.325	.088	1	0.001*	.722	Significant
Marital status	-.361	.153	1	.019*	.697	Significant
Level of education	-.468	.187	1	.012*	.626	Significant

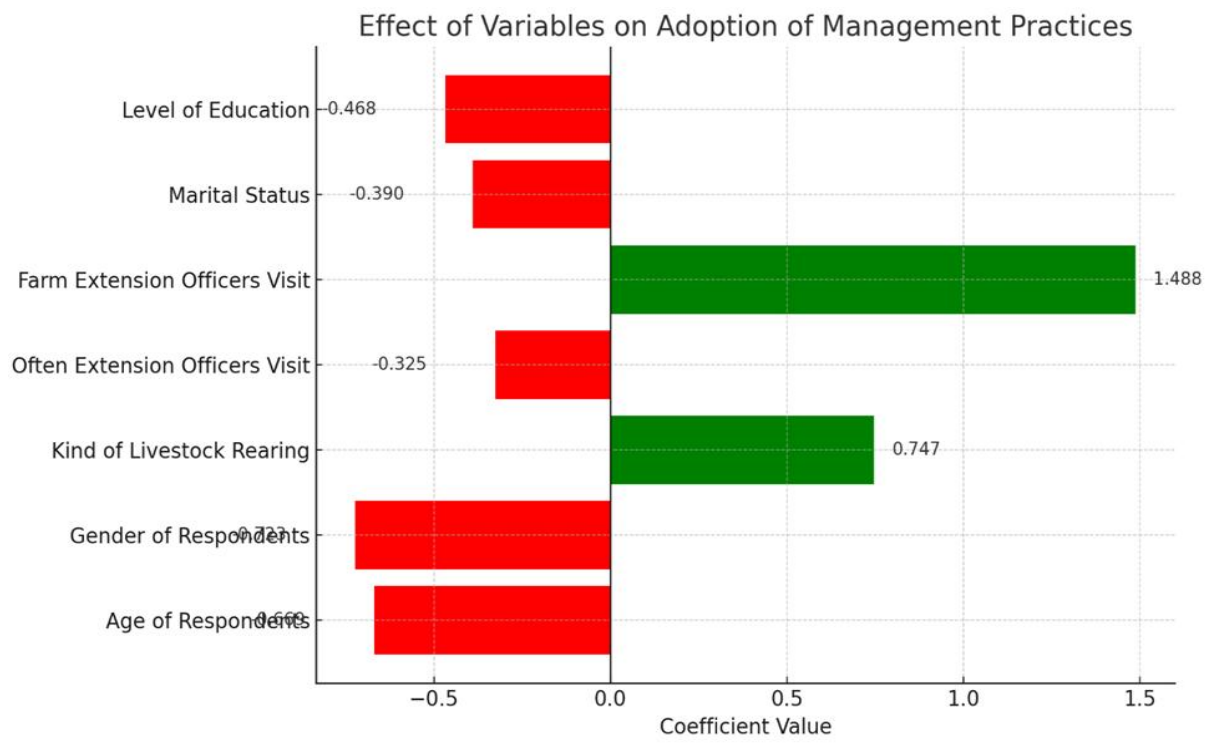


Figure 40: Effects of variables on adoption of management practices

CHAPTER 8

SUMMARY, CONCLUSION, AND POLICY IMPLICATIONS

7.1. Introduction

This chapter discusses summary of the thesis which includes: (i) demographic characteristics; (ii) farm and production; (iii) socio-economic impact of livestock farming and intervention for food security; (iv) the contributions of livestock production on farmer's livelihood; (v) the challenges faced by livestock farmers; (vi) the best management practices of livestock farming among livestock producers; (vii) the levels of adoption of the best practices in livestock farming among livestock producers; (viii) livestock farmers and Extension services, and (ix) conclusions, recommendations, and policy implications.

7.2. Summary of the thesis

The study focused on the contextual assessment of livestock farming as an Intervention for Food Security in Ehlanzeni District, Mpumalanga Province, South Africa. The specific objectives of the study were to: (i) assess the Socio-economic impact of livestock farming as an intervention to food security; (ii) examine the contributions of livestock production to farmers' livelihood; (iii) determine the challenges faced by livestock farmers in the study area; (iv) examine the best practices of livestock farming among livestock producers; and (v) determine the levels of acceptance of the best practices in livestock farming among livestock producers. The simple random sampling technique was used to select 400 respondents from the population of 4000 livestock farmers in all categories, which includes. Subsistence, smallholder, and commercial farmers in the Ehlanzeni District. The random sampling technique was followed because it affords each member of the population an equal chance and probability of being sampled to participate in the study. For data collection, enumerators were trained to collect data using a structured questionnaire. Pre-testing of the questionnaire was used in 20 livestock farmers to Observe how long it takes respondents to complete the

questionnaire, where they hesitate, and which questions seem to cause confusion. Additionally, to improve the reliability and validity of the questionnaire. Data collectors were there after able to continue with the final questionnaire to collect data from the respondents. Data was analysed through descriptive and inferential statistics using the Statistical Package for Social Science (SPSS) IBM version 27 software.

7.2.1 Demographic characteristics

The results of the study showed that 63.3%) of the respondents were males and 36.7% were females. Male participants are in the majority compared to females, who showed less participation in the study. The results on age of the respondents revealed that the majority (39.2%) were of the age group 36-50 years of age, while 1.9%) were of the minority age group < 25 years. In terms of level of education, the respondents were found that 32,8% of the respondents who are in the majority and have Secondary education, 22.2% of the respondents have no formal education, 14.2% of the respondents with primary education, 27.8% respondents who have tertiary education and 3.1% of other respondents have other as their levels of education. In highest tertiary education showed that 41.9% of the respondents, have other qualifications, 26.9% have certificates, 11,7% of them have diplomas, 14.7% of the respondents have advanced diplomas/degrees, and only 4.7% of the respondents have a honours/postgraduate diploma. The marital status of the respondents found that, majority, 40.3% of the respondents, are married, while 6.9% are separated. Followed by 10.3% of the respondents who are divorced, 31.1% of the respondents are single and 11.4% of the respondents who are widows.

The distribution of household heads indicated that 78.9% of the respondents are heads of the household, while only 21.1% are not heading the households. In the distribution of household size, the study results showed that 46.4% of the respondents are 3-5 per household in size, 1.7% are greater than 10 members per household in size, 25.3% are less than 3 members per

household, followed by 17% who have between 6-7 members per household, and only 9.4% of household size are between 8-10 members.

7.2.2 Farm and production

The distribution of farm size showed that 38.1% of the respondents have less than 5 hectare each, 24.2% with 6 to 10 hectares, and 10.0% with 11 to 50 hectares. Furthermore, there is a minority 5.6% with 51 to 100 hectares per farm, and 22.2% of the respondents have more than 100 hectares in each farm. In land acquisition, 48.6% of the respondents acquired land through right to occupy (RTO), 13.6% acquired through inheritance, and a minority, 4.4% have acquired through leasehold. Farming experience in livestock production showed that 34.2% have between 6 to 10 years of experience, and 5.8% have 16 to 20 years of farming experience in livestock production. In the engagement with off-farm activities, the result showed that 70.8% of the respondents are engaged with off-farm activities, while 29.2% are not. Assistance from family members showed that 76.4% of the respondents receive assistance from their family members, while only 23.6%, do not receive the assistance. The quantity of family members assisting in livestock farming activities has shown that 41.9% of the respondents have less than three members of the family assisting, and 6.4% have greater than five family members. The Distribution of the kind of livestock rearing result of the study showed that the 45.8% of the respondents are rearing cattle, followed by 9.7% and 5.0% of them rear sheep. In the distribution of the quantity of cattle rearing 41.7% showed that they have no cattle at all, while 6.9% have cattle that are more than 40 heads of cattle, and 2.5% have between 31 to 40 heads of cattle. For the distribution of the quantity of goats rearing, 77.2% of the respondents did not have goats that they were rearing at all. While 0.8 were producing between 30 to 40, and more than 40, respectively. In the distribution of the quantity of sheep rearing, 92.2% had no sheep rearing, and 1.1% rear more than 40 sheep. The distribution of the quantity of pigs reared has shown that 80.6% did not rear pigs, and 0.6% indicated that they have between 30

to 40 pigs in their pig sties. In the distribution of the quantity of poultry rearing, the results showed that 50.6% did not rear poultry and 5.3% reared 31 to 40 chickens. In the engagement of broilers, layers or free-range 74.4% indicated that they were engaged in broilers, layers or free-range chickens and 25.56% were not engaged in the breeds. The distribution of the quantity of indigenous chickens produced has indicated that 57.2% did not have indigenous chickens while, 0.8% produced above 500 chickens.

7.2.3 Socio-economic impact of livestock farming and intervention for food security

On the benefits of livestock to livelihood, the findings of the study demonstrated that 97.5% of the respondents consider livestock as beneficial to their livelihood, while 2.5% of the did not see it as beneficial to livestock. On the total farm income from livestock production, 53.9% of the respondents indicated that they received less than R20 000 income from livestock per annum, while 0.8% received above R500 000 per annum. On the distribution of household monthly income level, the results indicated that 48.1% of the respondents received household monthly income of between R1 000 to R3000 and then 10.6% of the respondents received more than R10 000 per month. On the distribution of household expenditure on food per annum the results showed that 51.9% of the respondents spent between R12 001 to R25 000 as household expenditure per annum, and 0.6% spent more than R65 000 as household expenditure per annum. On the government support grant, the findings demonstrated that 57.8% of the respondents received a government support grant, while 42.2 of the remaining respondents did not receive the government support grant. The marketing of livestock was found to be 60.6% of the respondent who had markets for their livestock, and 39.4% did not have markets to sell their livestock. The market to sell livestock has shown that 64.4 of the respondents sell their livestock to farm gates, while 6.9% sell to auctions. In the level of stock theft in the study area, 34.7% of the respondents indicated it as moderate and 6.1% as extremely high. On the other

hand, 46.4% of the respondents have ranked cattle as the commodity that is high in livestock theft, while 4.2% ranked sheep in the study area.

7.2.4 The contributions of livestock production on farmer's livelihood.

On the reasons for livestock farming 48.6% indicated that they farm for income generation while 1.7% is for status and recognition.

7.2.5 The challenges faced by livestock farmers. In the level of stock theft in the study area 34.7% of the respondents have indicated it as moderate and 6.1% as extremely high. On the other hand, 46.4% of the respondents have ranked cattle as the commodity that is high in livestock theft, while 4.2% ranked sheep in the study area. On the challenges of livestock farmers in the study area 43.9% of the respondents' place stock theft as critical to the challenges faced by livestock farmers in the study area and 0.83% consider socio-economic constraint and limited to credits as their major constraints respectively. In view of the severity, 39.44% of the respondents view it as more severe, while 15.28% view it as extremely severe.

7.2.6 The best management practices of livestock farming among livestock producers

The findings of the study revealed that 91.7% of the respondents believe in the best management practices that exist in livestock production, while only 8.3% of the respondents did not believe on that. The majority, 71.4% consider it as extremely important. While the minority 0.3% of the respondents, consider vaccination as a management practice that is less important. On Concentrate feeds as a management practice 37.8% of the respondents considered it as extremely important, while 2.5% considered it as less important. On record keeping as management practice 48.1% of the respondents regarded it as extremely important while 2.2% were undecided.

7.2.7 The levels of adoption of the best practices in livestock farming among livestock producers. The findings indicated that 88.3% of the respondents have adopted management practices, while only 11.7% did not adopt these practices. Other findings reveal that the

majority 36.4% of the respondents consider overstocking as the main cause of overgrazing of pastoral land and 6.94% as socio-economic condition of the farmer.

7.2.8 Livestock farmers and Extension services

The findings demonstrated that majority 80% of the respondents receive assistance from extension services, while only 20% do not receive any assistance from extension services.

7.3 Conclusions

From the results of the study, male respondents dominate female respondents, and most of the respondents were married. Looking at the age. Most of the respondents were elderly people, who had permission/ right to occupy to occupy as their proof of land ownership (PTO/ RTO). Most of the respondents have a secondary school as their level of education. Cattle and poultry are the main commodities preferred by the respondents in the study area. It can also be concluded that the respondents received more services and training from veterinary services than from extension officers. Some visits by extension officers are rarely received. The rural livestock farmers do not have access to formal markets to sell their animals anytime and in numbers of their choice. Instead, they rely on local sales due to their proximity to Kruger National Park, where foot and mouth disease is more prevalent. Having no formal markets, livestock farmers are gradually exiting the stock farming industry, which in the end affects food security and job creation in the country.

Stock theft is regarded as the main factor that affect livestock farmers in Ehlanzeni District where farmers are beginning to lose hope in livestock farming, more, especially cattle, goats, broilers and pigs. Livestock farmers from the study area have been pulled out from stock farming due to the high rate of stock theft. Cattle are the main targets, particularly on farms, while cattle, goats, sheep and pigs are main targets in rural areas. Land invasion is a serious concern in rural areas whereby grazing land is being invaded by informal settlement leaving

no more space for natural grazing of rural livestock, especially cattle, goats as well as sheep. This challenge is adding to the effects of food security.

The age of the livestock farmers plays a pivotal role in livestock farming. Aging farmers are still dominating the industry, as compared to young farmers who are still far behind in joining livestock farming. From the logistic regression results age, kind of livestock rearing, farm extension officers' visit, often extension officers' level of education, and marital status were variables that had a significant influence on the adoption/acceptance of best management practices in livestock farming by smallholder farmers. Gender of the respondents was not statistically significant as a determinant of the adoption of best management practices in livestock farming by smallholder farmers used in the study area.

7.4. Recommendations

- Women and youth farmers should be the most target for holistic support on training, farm visits, subsidies, as well as credits and funding for the enhancement of livestock productivity, job creation, income generation, food security and poverty alleviation.
- Rural livestock farmers need to have both formal and informal markets for their livestock. Local buyers alone cannot influence livestock farming in rural areas.
- The existence of local structures such as Traditional authorities, Traditional healers, police forums, farmer organisations, community-based organisations with the help of police should work together in combating this overwhelming crime in the study area.
- Farmer to farmer extension approaches (Excursions) should be arranged for both young and women farmers to learn more on specific commodity. This will boost their skills through interactive engagement with other farmers.
- More campaigns, demonstrations and farmers' days on livestock management and disease control should be arranged for the benefit of both women and young farmers.

With the inclusion of youth and women in any farming related activities will strengthen youth participation in agriculture.

- Government should consider prioritising land that will be allocated to rural farmers specifically for grazing and planting of fodder (fodder flow). Animal feed nutritionists will then be able to offer training on how to plant, harvest and process food for animals. This will help farmers to produce quality animals that meet the required market demands as well as promoting readiness of feed during drier seasons. Alternatively, support should also be prioritised to poultry and piggery projects, because these commodities require a small space to produce more compared to ruminant animals that require more hectareage.
- Local authorities, including the Department of agriculture in the province, are needed to identify alternative solutions that will help livestock farmers overcome these market challenges in the Ehlanzeni district and in other districts of the province.

7.5 Policy Implications

Policy implications highlight how the findings can inform or influence public policies and regulations. Can also guide policymakers in making informed decisions. Government is required to implement the following policies that affect the productivity of livestock farming in the study area:

Rural livestock farmers rely mostly on the local buyers and farm gate markets for marketing their livestock. This is because of the negative impact by their proximity to the Kruger National Park, where the food and mouth disease (FMD) is predominantly high. It is therefore a need for government and policy makers to design and align polices towards addressing those pressing challenges faced by the rural livestock farmers by establishing rural markets where these farmers will sell their cloven-hoofed animals. Additionally, focus is shifted to government to design policies that should prioritise the establishment of rural auctions and

abattoirs in areas that are affected by red line zones. By providing formal livestock markets to the specific areas of the challenges, farmers will be motivated to remain and recruit other new farmers to join livestock farming industry.

The findings of the study reveal that rural livestock farmers have insufficient land for grazing their livestock, which inhibits them from increasing their livestock numbers which also affect food security. This challenge restricts them from embarking on fodder flow plans. The main cause for this restriction is the continuous invading of the grazing and crop land by settlement infrastructure. Government must prioritise purchasing land for these needy and affected livestock farmers who can produce food to enhance food security. Government must also design policy that will control traditional authorities from continue limiting agriculture land by putting residential stands or changing agricultural land into residential sites.

Theft is also a limiting factor to livestock farming, where cattle commodity ranked high in the stock theft level. Most farmers have quitted livestock farming due to high rate of stock theft. The shortage of cattle production will lead to increased costs for beef, eventually food insecurity will emerge and subsequently hunger and lastly poverty trap will come in. Government must therefore redesign policies to cater for alternative strict ways to reduce stock theft in the area. Additionally, there must be an unwavering commitment towards a comprehensive, proactive, and community-centred approach to combat stock theft and safeguard the well-being of rural South Africans.

Other livestock farmers from the findings complained that extension services are biased to crop and vegetable farmers who always receive services and training. To some they have never been visited except for veterinary services officials who always follow their planned schedules in rendering services. Government must also try to design tools to monitor officials who are not following their planned activities towards provision of quality service to the livestock farmers.

Many livestock farmers have aged, and mostly pensioners. For youth to be attracted to agriculture, authorities must design policies that should attract young farmers in agriculture to replace the ageing ones. The policies must be designed in such a way that they aligned to meet the felt needs of young farmers. Capacity building in livestock management and awareness should be directed more to youth level. Young farmers' excursion should be considered whereby youth trips are arranged to high performing livestock projects for interaction and sharing ideas with the experienced farmers in livestock.

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APPENDIX A: RESEARCH QUESTIONNAIRE



QUESTIONNAIRE

TOPIC: CONTEXTUAL ASSESSMENT OF LIVESTOCK FARMING AS AN INTERVENTION FOR FOOD SECURITY IN MPUMALANGA PROVINCE, SOUTH AFRICA

CONSENT AGREEMENT

I am Mr Jabulani Mokoena, a PhD student from the University of Mpumalanga. I am conducting a study titled: Contextual Assessment of livestock farming as an intervention for food security in Ehlanzeni District, Mpumalanga Province. I would like to request your voluntary participation to the study with the above-mentioned topic. If you agree to participate in this study, please note that you are free to withdraw from the study at any given point of time you feel like it. The study is for academic purpose, and your information will be kept confidential. Furthermore, your identification will not be revealed at any point in time, and your views and responses will be treated with strictness of secrecy. Your assistance with the completion of this questionnaire will be highly appreciated.

A handwritten signature in black ink, appearing to be "Jabulani Mokoena", written over a horizontal line.

Signature

19/02/2024

Date

QUESTIONNAIRE INSTRUCTION

Please, participants are allowed to respond to a questionnaire item only once by ticking on the spaces provided.

INTERVIEW SCHEDULE:

Number of the respondent:
 Town or village:
 Local Municipality: District:.....
 Date of interview:..... Enumerator/ Data collector:.....
 Province:

Section A: Demographic

1. Gender:

1.Male	2.Female
--------	----------

2. What is your age? No. of years:

1. < 25 years	2. 25-35	3. 36-50	4. 51-60	5. > 60
---------------	----------	----------	----------	---------

3. What is your level of education?

1. No formal Education	2. Primary Education	3. Secondary Education	4. Tertiary Education	5. Other
------------------------	----------------------	------------------------	-----------------------	----------

4. What is your highest tertiary qualification?

1. Certificate	2. Diploma	3. Advanced Diploma / Degree	4. Honours / Post-Graduate Diploma	5. Other
----------------	------------	------------------------------	------------------------------------	----------

5. What is your marital status?

1. Married	2. Divorced	3. Separated	4. Single	5. Widow
------------	-------------	--------------	-----------	----------

6. Are you the head of the Household?

1. Yes	2. No
--------	-------

7. What is your Household size?

1. < 3	2. 3 – 5	3. 6 - 7	4. 8 - 10	5. > 10
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Section B: Farm and Production

8. What is your farm size in hectares.

1. < 5ha	2. 6 - 10	3. 11 - 50	4. 51 - 100	5. > 100
----------	-----------	------------	-------------	----------

9. How did you acquire the land for farming?

1. Privately owned/Tittle deed	2. Right To Occupy (RTO)	3. Leasehold	4. Inheritance	5. Other
--------------------------------	--------------------------	--------------	----------------	----------

10. What is your farming experience in livestock production?

1.< 5 years	2. 6 - 10 years	3. 11 – 15 years	4. 16 - 20 years	5. > 20 years
-------------	-----------------	------------------	------------------	---------------

11. Do you engage in any off-farm activities?

1. Yes	2. No
--------	-------

12. Are there any other family members assisting you in the farm?

1. Yes	2. No
--------	-------

13. If yes, how many are they, excluding yourself?

1. < 3	2. 3- 5	3. > 5
--------	---------	--------

14. What kind of livestock are you rearing?

1. Cattle	2. Goats	3. Sheep	4. Pigs	5. Poultry
-----------	----------	----------	---------	------------

15. How many livestock do you have?

Livestock	1. < 10	2. 11- 20	3. 21- 30	4. 31-40	5. > 41
Cattle					
Goats					
Sheep					
Pigs					
Poultry					

16. Are you engaged in broilers, layers or free-range chickens?

1. Yes	2. No
--------	-------

17. What is your specific breed?

1. Broilers	2. Layers	3. Indigenous chickens	4. Other. Please, specify
-------------	-----------	------------------------	---------------------------

18. How many of them?

Livestock	1. < 50	2. 50- 100	3. 101- 300	4. 301-500	5. > 500
Broilers					
Layers					
Indigenous					

Section C: Socio-economic impact of livestock farming and intervention for food security.

19. Do you see livestock farming as beneficial to your livelihood?

1. Yes	2. No
--------	-------

20. What is your total farm income from livestock production?

1. < R20 000	2. R20 000- R50 000	3. R50 001-R100 000	4. R100 001- R500 000	5. > R500 000
--------------	---------------------	---------------------	-----------------------	---------------

21. What is your household monthly income level?

1. < R1000	2. R1000 – R3000	3. R3001 – R5000	4. R5001- R10 000	5. > R10 000
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22. What is your household expenditure on food per annum?

1. < R12 000	2. R12 001- R25000	3. R25 001- R45 000	4. R45 001- R65 000	5. > R65 000
--------------	--------------------	---------------------	---------------------	--------------

23. Household monthly expenditure on food.

1. < R3000	2. R3001- R5000	3. R5001- R7 000	4. R7001- R10 000	5. > R10 000
------------	-----------------	------------------	-------------------	--------------

24. Do you receive any Government support grant?

1.Yes	2.No
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25. Do you have markets for your livestock?

1.Yes	2.No
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26. Where do you normally sell your livestock?

1.Farm gates	2.Abattoirs	3.Local buyers	4.Auctions	5.Other.Please specify
--------------	-------------	----------------	------------	------------------------

Section D: The contributions of livestock production on farmers' livelihood.

27. What are the reasons for livestock farming?

1. Provisioning of food	2. Income generation	3. Employment creation	4. Status and recognition	5. Other. Please, specify
-------------------------	----------------------	------------------------	---------------------------	---------------------------

28. Which livestock do you prefer?

1. Cattle	2. Goats	3. Sheep	4. Poultry	5. Pigs
-----------	----------	----------	------------	---------

29. Give reasons for your preferred livestock type?

1. High demand	2. Manageable	3. Need small land size	4. Quick income/return	5. Low input costs
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30. What is the level of stock theft in your area?

1. Low	2. Moderate	3. High	4. Extremely High	5. Other. Please, specify
--------	-------------	---------	-------------------	---------------------------

31. Which livestock rank high on theft?

1. Cattle	2. Goats	3. Sheep	4. Pigs	5. Poultry
-----------	----------	----------	---------	------------

Section E: The challenges faced by livestock farmers.

32. Challenges of livestock farmers in the study area.

ITEM	Tick
1. Stock theft	
2. Poor marketing and trade	
3. Grazing land Inversion	
4. Lack of pasture and quality feed	

5. Scarcity of water resources	
6. Highly variable climate	
7. Socioeconomic constraints	
8. Poor access to Extension officers	
9. Insufficient farm size	
10. Limited access to credits	
11. Costs of putting up infrastructure	
12. Limited access to agricultural information	

Multiple responses possible

33. How severe are these challenges in your opinion? Please give an assessment on the following scale provided below:

1= Less severe, 2= Severe, 3= Undecided, 4= More severe, 5= Extremely severe

ITEM	Scale rate
Stock theft	
Poor marketing and trade	
Grazing land Inversion	
Lack of pasture and quality feed	
Scarcity of water resources	
Highly variable climate	
Socioeconomic constraints	
Poor access to Extension officers	
Insufficient farm size	
Limited access to credits	
Costs of putting up infrastructure	
Limited access to agricultural information	

34. Livestock production contributes to the enhancement of your livelihood.

1. Yes	2.No
--------	------

Section F: The best management practices of livestock farming among livestock producers.

35. Do you think there are best practices that exist in livestock production?

1. Yes	2.No
--------	------

36. What are these best management practices you recommend in livestock production?

1=Less important, 2=Important, 3=Undecided, 4=More important, 5=Extremely important.

ITEM	Scale rate
Vaccination.	
Deworming.	
Dehorning.	
Artificial Insemination	
Castration.	

Concentrate feeds.	
Provision of clean water.	
Provision of shelter.	
Records keeping.	
Branding and ear tagging.	

37. Animals should be kept according to the following principles: Please use the following scale provided below by picking 1 - 5.

1= Strongly agree, 2= Agree, 3=Undecided, 4=Disagree, 5=Strongly disagree

ITEM	Scale rate
Free from thirsty, hunger and malnutrition	
Disease prevention and veterinary treatment	
Nutritional feeding (Supplementary)	
Appropriate shelter	

38. Do you realize any benefit if you follow these management practices in your livestock production?

1. Yes	2. No
--------	-------

Section G: The levels of adoption of the best practices in livestock farming among livestock producers.

39. Do you adopt this livestock management practices?

1. Yes	2. No
--------	-------

40. Rank the adoption of these good management practices to be followed when rearing animals by using the scale of 1-5 below: 1=Highly unaccepted, 2=Unaccepted, 3=Undecided, 4=Accepted, 5=Highly accepted.

ITEM	Scale rate
Vaccination.	
Deworming.	
Dehorning.	
Artificial Insemination	
Castration.	
Concentrate feeds	
Provision of clean water.	
Provision of shelter.	
Records keeping.	
Branding and ear tagging.	

41. Rank the level of adoption of the best livestock management principles by using the scale of 1-5 below: 1=Highly unaccepted, 2=Unaccepted, 3=Undecided, 4=Accepted, 5=Highly accepted.

ITEM	Scale rate
Free from thirsty, hunger and malnutrition	
Disease prevention and veterinary treatment	

Nutritional feeding (Supplementary)	
Appropriate shelter	

42. Which one of the following is the main cause of overgrazing of pastoral land:

ITEM	
1. Overstocking.	
2. Lack of camp division	
3. Continuous grazing.	
4. lack of proper animal management.	
5. Socio-economic conditions of the Farmer	
6. Drought or Decline in Precipitation.	
7. Improper Land Use	
8. Livestock in poorly managed agricultural applications.	

43. What is the advantage of good livestock production practice?

Please use the following scale provided below by picking 1 - 5.

1=Less important; 2= Important; 3= Undecided; 4=More important; 5= Extremely important.

ITEM	Scale rate
Less livestock mortality rate.	
Increased farm income	
Sustainable rise in livestock production.	
Create more jobs.	
Less production costs	
Allows poor households to join the market economy	

Section H: Livestock farmers and Extension Services

44. Do you receive any assistance from the Extension services?

1. Yes	2. No
--------	-------

45. What type of assistance do you receive from the Extension service?

ITEM	Tick
1. Advisory services.	
2. Demonstrations on livestock feeding	
3. Management and caring of piglets.	
4. Management of broiler chickens.	
5. Culling and selection of livestock.	
6. Regular farm visits.	
7. Disease control.	
8. Marketing of livestock.	

Multiple response possible

46. Do Extension officers visit your farm?

1. Yes	2. No
--------	-------

47. How often is their visits?

ITEM	Tick
1. Weekly.	
2. Bi-weekly.	
3. Monthly.	
4. Bi- monthly.	
5. Quarterly.	
6. When there is a need.	

48. How satisfied are you with their visits?

ITEM	Strongly satisfied	Satisfied	Undecided	Unsatisfied	Strongly unsatisfied
Weekly.					
Bi-weekly.					
Monthly.					
Bi- monthly.					
Quarterly.					
When there is a need.					
Not at all.					

49. Do you recommend Extension Officers visits as beneficial to livestock production?

1. Yes	2. No
--------	-------

50. Have you attended any training on livestock production?

1. Yes	2. No
--------	-------

51. Are you satisfied with the training attended?

1. Yes	2. No
--------	-------

52. What training methods of extension delivery do you prefer?

ITEM	
1. Workshop.	
2. Demonstrations.	
3. Farmers days.	
4. Field day.	
5. Mass/ group contact.	
6. Farmer to farmer excursion.	

Multiple response possible

THANK YOU FOR YOUR PARTICIPATION!

APPENDIX B: PROPOSAL APPROVAL CERTIFICATE



UNIVERSITY OF
MPUMALANGA

FACULTY OF AGRICULTURE AND NATURAL SCIENCES
Postgraduate Studies Committee

Certificate of Approval – Research Proposal

Date of this Approval:	19 October 2023
------------------------	-----------------

Student Details

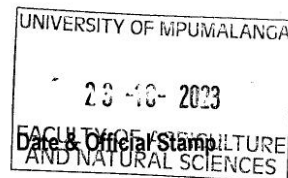
1	Student Name:	Mokoena, JJ
2	Student Number:	230347657
3	School	School of Agricultural Sciences
4	Degree Registered for:	PhD Agric
5	Date of First Registration:	2023
6	Supervisor(s):	Dr I Agholor

The research proposal entitled '**Contextual Assessment of Livestock Farming as an Intervention for Food Security in Mpumalanga Province, South Africa**' has been evaluated and approved by the Postgraduate Studies Committee of the Faculty of Agriculture and Natural Sciences.

Chairperson: Prof. Victor Mlambo

Signature:

A handwritten signature in black ink, appearing to read 'Victor Mlambo'.



APPENDIX C: ETHICAL CLEARANCE



UNIVERSITY OF
MPUMALANGA

Creating Opportunities

B Maoneke (PhD)

School of Computing and Mathematical Sciences

Mbombela Campus.

Dear Jabulani Johannes Mokoena

Protocol Reference Number: UMP/Mokoena/230347657/PHD/2024

Project Title: Contextual Assessment of Livestock Farming as an Intervention for Food Security in Mpumalanga Province, South Africa.

Approval Notification: In response to your application received on 15/01/2024, The Research Ethics Committee Faculty Research Ethics Committee has considered the above mentioned application and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interviews Schedule, Informed Consent form, Title of the project, Location of the study, Research Approach and methods must be reviewed and approved through the amendment/ modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be stored securely in the School/ division for a period of 5 years.

The Ethical Clearance certificate is only valid for a period of 3 years from date of issue. Thereafter, Recertification must be applied for on an annual basis.

Wishing you the best with your study.

Yours faithfully,

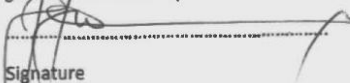

.....

B Maoneke (Chair)

Cc: Faculty Research & Innovation Committee Chair: 
.....

DECLARATION OF INVESTIGATOR(S)

I/We fully understand the conditions under which I am/we are authorised to carry out the abovementioned research and guarantee to ensure compliance with these conditions. I agree to completion of a yearly progress report.


.....
Signature

04/03/2024
.....
Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

APPENDIX D: LANGUAGE EDITING CERTIFICATE

ACADEMIC EDITING CERTIFICATE

Association: Professional Editors' Forum (PEG)

Membership No.: 327545

Name: Cynthia CN Rakale: Academic Editor

Address: 30 Tom Lawrence Street

White River

1241

Contact No.: 084 429 5670

Email Add.: rakale.cynthiacn33@gmail.com

I certify that I am a qualified Academic Editor and provide the following services:

Editing:

- The Table of Contents
- Copy and stylist
- Structural and
- Reference list

I provided the abovementioned editing services to:

Name: Jabulani Johannes Mokoena

Student No.: 230347657

Thesis: **CONTEXTUAL ASSESSMENT OF LIVESTOCK FARMING**

AS AN INTERVENTION OF FOOD SECURITY IN MPUMALANG

PROVINCE, SOUTH AFRICA

Date completed: 24 October 2025

Signed:



Date: 24/10/2025