ASSESSING THE PREVALENCE AND CONTROL OF INTERNAL PARASITES IN GOATS IN CHIPINGE DISTRICT, ZIMBABWE.

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APPROVAL FORM

The signatories confirm that they have read and recommended to the Bindura University of Science Education for acceptance of the project title: Assessing the prevalence and control of internal parasites in goats in Chipinge District, Manicaland Province Zimbabwe

SUPERVISON SIGN _____ _____ Date ___17/09/2025_____

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CHAIRPERSON SIGN _____ _____ Date_____06/10/25_____

DECLARATION

I Gracious Macharaga declare that this write up was developed from the true information obtained from Chipinge District. This survey has never been published or submitted by anyone or anywhere with the hope of attaining a degree. The project is submitted for the Bachelor of Science Honors degree in Animal Health Production and Extension

DEDICATION

I dedicate this study to my family, whose unwavering support, encouragement, and belief in my academic journey have been a source of strength. I also dedicate this work to the hardworking goat farmers of Chipinge District, whose experiences and insights provided valuable contributions to this research. Their resilience and commitment to livestock farming despite numerous challenges continue to inspire efforts toward improving animal health and productivity.

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ABSTRACT

This study aimed to assess the prevalence, awareness, and control of internal parasites in goats among farmers in Chipinge District, Zimbabwe. The research specifically focused on evaluating farmers' knowledge of gastrointestinal parasites, the challenges they faced in parasite control, and the effectiveness of their management practices. A cross-sectional research design was employed, utilizing structured questionnaires and interviews to collect data from 100 randomly selected goat farmers. Additionally, key informant interviews with agricultural extension officers and local authorities provided qualitative insights into parasite control practices. Descriptive statistics and thematic analysis were used to interpret the data, highlighting trends in awareness, management strategies, and major constraints. The data analysis revealed that 86% of the farmers were aware of the economic impact of internal parasites, but only 45% regularly monitored their goats for infections. The results indicated that 4.36 was the highest mean score recorded for the implementation of integrated pest management strategies, suggesting that farmers recognized the importance of combining control methods. However, only 3.74 was recorded for rotational grazing, indicating that land constraints hindered its adoption. Additionally, inconsistent deworming practices, reported by 38% of the farmers, contributed to the growing challenge of anthelmintic resistance. Farmers with more experience and better access to veterinary services demonstrated higher awareness and adoption of effective parasite control measures compared to those with fewer resources. The study concluded that while farmers had substantial knowledge of internal parasites, practical challenges such as limited veterinary access, poor diagnostic practices, and financial constraints hindered effective control. It was recommended that policymakers strengthen veterinary extension services, subsidize diagnostic tools, and promote sustainable deworming practices to reduce anthelmintic resistance. Farmers were encouraged to adopt integrated parasite management strategies, including targeted deworming, rotational grazing, and improved sanitation. Future research should focus on the effectiveness of traditional herbal dewormers and the impact of climate change on parasite prevalence.

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GI – Gastrointestinal

IPM – Integrated Parasite Management

SSA – Sub-Saharan Africa

FAO – Food and Agriculture Organization

FEC – Faecal Egg Count

DVS – Department of Veterinary Services

TST – Targeted Selective Treatment

ZIMSTAT – Zimbabwe National Statistics Agency

NRC – National Research Council

FECRT – Faecal Egg Count Reduction Test

CHAPTER ONE: INTRODUCTION AND BACKGROUNG OF THE STUDY

1.1 Introduction

This research aims to investigate the prevalence and control of internal parasites in goats in Zimbabwe, focusing on Chipinge District. The objectives include evaluating demographic characteristics of goat farmers, assessing awareness levels, examining animal management practices, and exploring the impact of Agro-ecological zones on parasite prevalence. The research will contribute to enhancing parasite control strategies in small ruminants. The economic impact of gastrointestinal parasitism includes decreased productivity, impaired animal performance, increased morbidity, and mortality rates. Symptoms of parasitic infections in goats may manifest as a rough coat, weakness, diarrhoea, loss of appetite, weight loss, anaemia, and other health-related issues (Roeber et al., 2019).

Additionally, coccidiosis caused by Eimeria species can have moderate to high pathogenic effects, particularly when co-infected with trichostrongyle nematodes (Regassa et al., 2019). Various risk factors contribute to the onset of GIN infections, such as environmental conditions, animal husbandry practices, host species, sex, age, body condition, breed, parasite species, and worm population intensity (Ratanapob et al., 2021). Limited area-specific studies conducted in Zimbabwe have provided restricted information on the prevalence of gastrointestinal parasites across diverse Agro-ecological regions and associated risk factors. Understanding the prevalence and species composition of gastrointestinal parasites is essential for implementing effective control strategies (Rooyen & Tui, 2019). Globally, internal parasites pose a significant threat to small ruminant health and productivity, leading to substantial economic losses in the livestock industry.

According to the Food and Agriculture Organization , (2024), it is estimated that gastrointestinal parasites account for about 60% of the total infectious diseases in small ruminants worldwide. In Africa, particularly in the Southern African region, internal parasites have been reported to affect up to 90% of small ruminants, impacting their growth, reproduction, and overall welfare (National Research Council, 2023). In Zimbabwe, internal parasite infestations have been identified as one of the major constraints to small ruminant production, with studies showing prevalence rates ranging from 70% to 90% in sheep and goats (Department of Veterinary Services, 2023).

However, goats play a pivotal role in the livelihoods of rural communities in Zimbabwe and worldwide. To mitigate economic losses and ensure the well-being of these valuable animals, it is crucial to develop and implement effective parasite control measures. Further research

focusing on the outlined objectives, such as evaluating demographic characteristics of goat farmers, assessing awareness levels, examining animal management practices, and exploring the impact of Agro-ecological zones, is essential for enhancing parasite control strategies and safeguarding small ruminant health.

1.2 Background of the study

Internal parasites, particularly gastrointestinal (GI) parasites, are among the most significant constraints to goat production worldwide, especially in tropical and subtropical regions. Globally, GI parasites cause economic losses exceeding $2 billion annually due to reduced productivity, increased veterinary costs, and mortality in small ruminants (Tadesse et al., 2022). The most prevalent parasites include Haemonchus contortus, Trichostrongylus spp., and Teladorsagia spp., which can lead to severe anaemia, malnutrition, and death. This challenge is exacerbated by the rise of anthelmintic resistance, driven by the indiscriminate use of dewormers, necessitating more sustainable control methods (Kotze et al., 2020). Over 70% of global goat populations are raised in developing countries, where parasitic infections disproportionately affect resource-poor farmers (Kumar et al., 2021). In Asia, for instance, GI parasite infections account for up to 40% of morbidity cases in goats (Dhillon et al., 2021). Control measures in developed countries often involve advanced diagnostic tools and integrated parasite management (IPM), but such approaches are rarely feasible in low-income settings.

In Sub-Saharan Africa (SSA), gastrointestinal parasites are a major cause of reduced livestock productivity. Studies indicate a prevalence rate of GI parasites ranging from 60% to 80% among goats in the region (Adekunle et al., 2023). Warm temperatures and high humidity in many SSA countries, including Zimbabwe, create favourable environments for parasite proliferation (Fikru et al., 2021). The most common parasites in SSA are Haemonchus spp., Trichostrongylus spp., and Oesophagostomum spp., all of which cause significant economic losses. The economic impact of GI parasites in SSA is profound. For example, in Ethiopia, the annual financial loss due to reduced goat productivity caused by GI parasites is estimated at over $200 million (Getachew et al., 2022). Moreover, limited access to veterinary services and the high cost of anthelmintics make it difficult for smallholder farmers to manage these infections effectively.

In Zimbabwe, goats are a critical component of the rural economy, with over 3.8 million goats recorded in 2022, primarily raised by smallholder farmers (Zimbabwe National Statistics Agency [ZIMSTAT], 2022). Goats serve as a source of income, food, and cultural significance

for many households. However, GI parasites, including Haemonchus contortus and Trichostrongylus spp., are a leading cause of morbidity and mortality among goats, particularly in rural areas like Chipinge District. The prevalence of gastrointestinal parasites in goats in Zimbabwe ranges from 40% to 70% depending on the season, with higher rates observed during the wet season (Chibwana et al., 2021). In addition, Zimbabwe faces challenges in implementing effective parasite control measures due to a lack of awareness, limited access to veterinary care, and the high cost of dewormers (Madzimure et al., 2023). These challenges highlight the need for improved farmer education and integrated control strategies.

Globally, the control of GI parasites in goats has shifted towards integrated approaches combining chemical and non-chemical methods. For instance, strategic deworming, rotational grazing, and the use of forage species with natural anthelmintic properties are increasingly adopted (Kotze et al., 2020). Additionally, diagnostic tools like faecal egg count reduction tests (FECRT) are used to monitor the effectiveness of anthelmintics and minimize resistance development. Sustainable control strategies are essential to address the rise of anthelmintic resistance. In Australia, for example, the introduction of targeted selective treatment (TST) reduced dewormer usage by 50% while maintaining livestock productivity (Leathwick et al., 2022). Such innovative practices can serve as models for other regions, including SSA, where similar challenges exist.

In SSA, researchers and policymakers emphasize the importance of low-cost, sustainable strategies for parasite control. The use of ethnoveterinary medicine, involving traditional plant-based remedies, is common among smallholder farmers and has shown promising results in managing GI parasites (Adekunle et al., 2023). For example, Vernonia amygdalina and Moringa oleifera have demonstrated anthelmintic properties in several studies across the region (Fikru et al., 2021). Community-based veterinary services and farmer training programs have also proven effective. In Kenya, integrated pest management programs that combine farmer education with rotational grazing reduced GI parasite prevalence by 30% within two years (Dhillon et al., 2021). Such initiatives underscore the potential of education and community engagement in improving parasite control.

In Zimbabwe, efforts to control GI parasites in goats are hampered by limited resources and inconsistent implementation of veterinary policies. However, recent projects, such as the Livestock Development Program funded by international organizations, have introduced community-based training to improve awareness of GI parasite management (Madzimure et al., 2023). These programs teach farmers about sustainable practices such as rotational grazing and proper use of anthelmintics. Despite these efforts, gaps remain in scaling up such

interventions. Access to affordable veterinary services is limited, particularly in rural districts like Chipinge. Moreover, the adoption of integrated parasite management practices is hindered by low farmer education levels and financial constraints (Chibwana et al., 2021).

Significant progress had been made globally and regionally in understanding and controlling gastrointestinal (GI) parasites; however, substantial gaps remained in knowledge and practice at the local level. In Zimbabwe, empirical data on the demographic characteristics of goat farmers, their awareness levels, and the specific animal management practices employed to control GI parasites were limited. Addressing these gaps through research was crucial for designing targeted interventions. This study provided evidence-based insights into the prevalence and control of GI parasites in Chipinge District. Through evaluating farmer demographics, awareness levels, and management practices, the findings contributed to the development of effective, context-specific strategies for improving goat health and productivity.

1.3 Problem statement

Goat farmers in various regions are grappling with high kid mortality rates attributable to gastrointestinal parasites, even with regular dosing practices in place. This alarming trend poses a severe threat to the sustainability of the goat industry.

1.4 Research Objectives

The main purpose for this study is to evaluate the prevalence, faecal egg load, and control strategies of gastrointestinal parasites among goats in Chipinge District.

1.4.1 Specific Objectives

i. To evaluate the demographic characteristics of goat farmers in Chipinge District with regards to controlling gastrointestinal parasites.
ii. To assess the level of awareness among goat farmers in Chipinge District regarding the prevalence of gastrointestinal parasites.
iii. To examine the animal management practices of farmers in Chipinge District in relation to gastrointestinal parasite control.

1.5 Research Questions

i. What are the demographic characteristics of goat farmers in Chipinge District, and how do these characteristics influence their approach to controlling gastrointestinal parasites?

ii. What is the level of awareness among goat farmers about the prevalence and effects of gastrointestinal parasites in their herds?
iii. What animal management practices do goat farmers in Chipinge District employ to control gastrointestinal parasites?

1.5.1 Research Assumptions

i. The demographic characteristics of goat farmers, such as age, education level, and farming experience, influence their knowledge and practices for controlling gastrointestinal parasites.
ii. Goat farmers in Chipinge District have limited awareness of the prevalence and impact of gastrointestinal parasites on goat health and productivity.
iii. Farmers who adopt integrated management practices, such as rotational grazing and regular deworming, are more effective in controlling gastrointestinal parasites than those who rely solely on anthelmintic treatments.

1.6 Justification

Gastrointestinal parasites were a major constraint to goat production in Zimbabwe, causing significant economic losses and threatening food security. Despite their importance, information on the prevalence, distribution, and impact of gastrointestinal parasites on goat production in Zimbabwe had been limited. This study addressed this knowledge gap by investigating the epidemiology of gastrointestinal parasites in goats in Chipinge District, Zimbabwe. The study provided valuable insights into the demographic characteristics of goat farmers, the level of awareness regarding gastrointestinal parasites, animal management practices, and the impact of Agro-ecological zones on the prevalence and faecal egg loads of gastrointestinal parasites.

The findings of the study had significant implications for the development of effective control strategies for gastrointestinal parasites in goats in Zimbabwe. Through identifying the most prevalent species of gastrointestinal parasites, the study informed the development of targeted control measures, such as vaccination and deworming programs. Additionally, the study highlighted the importance of improving farmers' knowledge and skills on parasite control measures, implementing integrated parasite management strategies, and promoting sustainable animal husbandry practices. Ultimately, the study contributed to improving the productivity and profitability of goat production in Zimbabwe, enhancing food security, and improving the livelihoods of small-scale farmers.

CHAPTER TWO: LITERATURE REVIEW

2.1 Overview of Internal Parasites in Goats

According to Ayaz et al., (2019) goats play a vital role in supporting human livelihoods in developing economies due to their resilience in challenging environmental conditions and their ability to reproduce with minimal resources. With approximately 1 billion goats worldwide, the majority are concentrated in Asia and Africa (Ministry of Agriculture, 2022). In Zimbabwe, smallholder farmers in mixed crop-livestock systems predominantly rear goats. These animals are essential for generating cash income, enhancing food security, and often represent the primary source of wealth for rural households (Ayaz et al., 2019).

In addition to their economic contributions, goats provide manure, hold cultural significance, and play a central role in livelihood strategies within these communities (Badaso & Addis, 2020). Gastrointestinal nematode infections (GIN) pose a significant threat to small ruminant productivity globally, particularly in tropical and subtropical regions (Badran et al., 2020). Herdt & Hoff, (2021) further mention that Common nematode species that affect small ruminants include Haemonchus contortus, Trichostrongylus colubriformis, Teladorsagia circumcincta, and others. Studies conducted across various countries, including Zimbabwe, Namibia, Nigeria, Kenya, Ethiopia, South Africa, Cameroon, and Tanzania, have documented the prevalence of internal parasites. Trichostrongyle nematodes are widely recognized as highly pathogenic and economically detrimental to small ruminants (Asha & Chebo, 2019); (Magona & Musisi, 2022); (Regassa et al., 2019).

Gastrointestinal parasites in goats are caused by various species of helminths (worms) and protozoa. The most common species affecting goats in Zimbabwe include Haemonchus contortus (barber's pole worm), Trichostrongylus spp. (bankrupt worm), Cooperia spp. (small intestinal worm), and Eimeria spp. (coccidiosis). These parasites infect goats through the ingestion of contaminated pasture, feed, or water.

The parasites' life cycles vary, but most involve a stage where eggs or larvae are excreted in the faeces of infected animals, contaminating the environment (Asha & Chebo, 2019). The eggs or larvae then develop into infective stages, which are ingested by other goats, perpetuating the cycle. Poor grazing management, inadequate deworming, and lack of sanitation contribute to the spread of these parasites (Ayaz et al., 2019). The epidemiology of gastrointestinal parasites in goats in Zimbabwe reveals that kids (young goats) are more susceptible to infection than adults (Badaso & Addis, 2020). All breeds of goats are susceptible, but some breeds like Boer goats may be more resistant to certain parasites. Male goats may be

more susceptible to some parasites due to their grazing behaviour, and certain breeds like Nubian goats may be more susceptible to specific parasites (Ayaz et al., 2019). The spatial distribution of gastrointestinal parasites is more prevalent in areas with high rainfall, high temperature, and poor sanitation.

The temporal distribution of gastrointestinal parasites varies by season, with peak prevalence during the wet season (Asha & Chebo, 2019). Transmission occurs through the ingestion of contaminated pasture, feed, or water. The prevalence of gastrointestinal parasites in goats in Zimbabwe is alarmingly high, with 70-80% of goats infected. Mortality rates are also significant, with 10-20% of infected goats dying due to severe infection (Ayaz et al., 2019). Clinical signs and symptoms of gastrointestinal parasites in goats include weight loss, diarrhoea, abdominal pain, lethargy, reduced appetite, pale mucous membranes, coughing (in cases of lungworm infection), and death (in severe cases) (Ratanapob et al., 2021). Diagnosis is based on faecal egg counts (FEC), coproculture, post-mortem examination, and clinical signs and symptoms. Differential diagnosis includes other gastrointestinal parasites (e.g., tapeworms, flukes), bacterial infections (e.g., Johne's disease), viral infections (e.g., caprine arthritis encephalitis), and nutritional deficiencies (e.g., protein-energy malnutrition) (Roeber et al., 2019).

The socio-economic impact of gastrointestinal parasites on goat production in Zimbabwe is substantial, resulting in reduced productivity (meat, milk, and fibre), increased morbidity and mortality, decreased fertility, increased costs (deworming, veterinary care, and mortality), and a negative impact on food security and livelihoods of small-scale farmers (Ratanapob et al., 2021). The economic impact is estimated to be around 20-30% of the total value of goat production, highlighting the need for effective control measures to mitigate the effects of gastrointestinal parasites on goat production in Zimbabwe.

Internal parasites, particularly gastrointestinal (GI) parasites, pose a significant challenge to goat production globally, regionally, and nationally. These parasites are among the leading causes of economic losses in goat farming, especially in tropical and subtropical climates where warm and humid conditions favour their proliferation. Globally, nematodes such as Haemonchus contortus (barber's pole worm), Ostertagia spp., and Trichostrongylus spp. are the most prevalent and pathogenic. They inhabit the stomach and intestines of goats, causing severe health issues like anaemia, diarrhoea, malnutrition, and death (Kotze et al., 2020). Worldwide, the financial burden of GI parasites in small ruminants exceeds $2 billion annually due to reduced productivity, treatment costs, and livestock mortality (Tadesse et al., 2022).

In Sub-Saharan Africa (SSA), gastrointestinal parasites remain a significant impediment to goat production, affecting nearly 80% of small ruminants at varying degrees of severity (Fikru et al., 2021). In this region, Haemonchus contortus is the most dominant species, responsible for over 50% of cases requiring veterinary intervention (Adekunle et al., 2023). The prevalence rates of GI parasites are season-dependent, often exceeding 70% during the wet season, when moisture facilitates parasite survival and transmission (Dhillon et al., 2021). Moreover, poor access to veterinary services and a lack of awareness among farmers exacerbate the problem, leading to untreated infections and continued productivity losses.

In Zimbabwe, goats are a critical component of the rural economy, with over 3.8 million goats recorded in 2022, primarily raised by smallholder farmers (ZIMSTAT, 2022). Gastrointestinal parasites are a leading cause of morbidity and mortality among goats in the country, with prevalence rates ranging from 40% to 70% depending on environmental and management conditions (Chibwana et al., 2021). Haemonchus contortus and Trichostrongylus spp. are the most frequently encountered parasites in Zimbabwe, often resulting in severe production losses, including weight reduction and reduced fertility. The economic impact of GI parasites is significant, as smallholder farmers depend heavily on goat farming for their livelihoods, with limited financial capacity to manage infections effectively (Madzimure et al., 2023).

Globally and regionally, control measures for GI parasites include strategic use of anthelmintics, rotational grazing, and the integration of natural anthelmintic plants into diets (Kotze et al., 2020). However, the indiscriminate use of chemical dewormers has led to widespread anthelmintic resistance, particularly in developing regions such as SSA (Leathwick et al., 2022). In Zimbabwe, similar challenges exist, with evidence of emerging resistance to commonly used anthelmintics (Chibwana et al., 2021). Sustainable management approaches, including targeted selective treatment (TST) and integrated parasite management (IPM), are recommended to mitigate the effects of GI parasites on livestock productivity.

The lack of awareness and resources among smallholder farmers in Zimbabwe further exacerbates the impact of GI parasites. Recent studies emphasize the need for community-based training and education programs to improve awareness and encourage the adoption of integrated management practices (Madzimure et al., 2023). Additionally, the development of affordable diagnostic tools and treatments tailored to resource-poor settings can significantly enhance control efforts. Addressing these challenges is essential for improving goat health and productivity in Zimbabwe and similar contexts.

2.2 Prevalence and Distribution of Gastrointestinal Parasites

The prevalence of gastrointestinal (GI) parasites in goats varies significantly across the globe and is influenced by climatic conditions, animal management practices, and socioeconomic factors. Globally, studies report that GI parasite infections are most common in tropical and subtropical regions where warm and humid conditions promote their survival and transmission. For instance, in Southeast Asia, the prevalence of GI parasites in goats exceeds 70% in most rural areas due to high rainfall and inadequate parasite management strategies (Dhillon et al., 2021). Similarly, in Latin America, prevalence rates range between 60% and 80%, with peak infection periods coinciding with the rainy season (Kotze et al., 2020). These statistics underscore the importance of environmental conditions in determining the geographical distribution of GI parasites.

In Sub-Saharan Africa (SSA), GI parasites are a pervasive issue among small ruminants, with prevalence rates often exceeding 80% in some regions during the wet season (Fikru et al., 2021). The high prevalence is attributed to a combination of environmental factors, including high humidity and temperature, and management challenges, such as overcrowding, poor sanitation, and insufficient veterinary services. Research in Ethiopia reported an overall prevalence of 76.8% in goats, with Haemonchus contortus accounting for nearly 45% of all infections (Getachew et al., 2022). This aligns with findings in Kenya, where the prevalence rate was estimated at 68%, highlighting the widespread nature of the problem across the continent (Adekunle et al., 2023).

In Southern Africa, climatic conditions, including seasonal rainfall patterns, play a significant role in the distribution and prevalence of GI parasites. Zambia, for instance, experiences prevalence rates as high as 85% during the wet season, dropping to 40% in the dry season (Madzimure et al., 2023). Similarly, in South Africa, Haemonchus spp. and Trichostrongylus spp. are the most prevalent parasites, with infection rates ranging from 50% to 75% depending on the region and season (Leathwick et al., 2022). Such data highlight the critical need for region-specific parasite control measures that account for environmental variability.

In Zimbabwe, GI parasites are a significant challenge for goat farmers, particularly in rural districts like Chipinge, where climatic conditions are conducive to parasite survival and transmission. Studies report a prevalence rate of 60% to 70%, with higher rates during the rainy season due to increased moisture levels (Chibwana et al., 2021). Haemonchus contortus, Trichostrongylus spp., and Oesophagostomum spp. are the most commonly identified parasites, affecting goat productivity and health. Smallholder farmers in the country face

challenges such as limited access to veterinary care, low awareness levels, and financial constraints, all of which exacerbate the prevalence of these parasites (Madzimure et al., 2023). Environmental factors such as rainfall and temperature variations significantly influence parasite prevalence and distribution in Zimbabwe. Chipinge District, for instance, experiences an annual average rainfall of 800–1200 mm, which supports the development of parasite larvae in pastures (ZIMSTAT, 2022). Additionally, the district's warm temperatures, ranging between 20°C and 28°C, provide optimal conditions for larval survival. These environmental conditions mirror those of other high-prevalence regions in SSA, emphasizing the need for integrated control strategies tailored to local conditions (Dhillon et al., 2021).

Globally and regionally, socio-economic factors also contribute to the high prevalence of GI parasites in small ruminants. Resource-poor farmers, who often lack access to veterinary services and rely on traditional management practices, are disproportionately affected. For instance, in Kenya, farmers who did not regularly deworm their goats reported prevalence rates 20% higher than those who adhered to recommended deworming schedules (Adekunle et al., 2023). Similarly, in Zimbabwe, the inconsistent use of anthelmintics has led to increased prevalence rates and the emergence of drug-resistant parasite strains (Chibwana et al., 2021).

The impact of GI parasites on goat health and productivity is substantial, affecting growth rates, milk production, and fertility. In Zimbabwe, farmers report average weight losses of up to 15% in infected goats during peak infestation periods (Madzimure et al., 2023). These losses translate to reduced income and food security for smallholder farmers who depend on goat farming for their livelihoods. Addressing this issue requires not only improved awareness and access to veterinary services but also the adoption of sustainable parasite control measures that consider local environmental and economic conditions.

To reduce the prevalence and impact of GI parasites, integrated approaches combining chemical, cultural, and biological control methods are increasingly recommended. These include rotational grazing, targeted selective treatment, and the use of natural anthelmintic plants, which have shown promise in reducing infection rates without contributing to drug resistance (Leathwick et al., 2022). In Zimbabwe, promoting such practices alongside farmer education programs can significantly enhance the effectiveness of parasite management strategies, reducing the burden of GI parasites on smallholder farmers and their livestock.

2.3 Control and Management of Gastrointestinal Parasites in Goats

The control and management of gastrointestinal (GI) parasites in goats involve diverse approaches, ranging from chemical treatments to integrated parasite management (IPM) strategies. Globally, anthelmintic treatments remain the most widely used method for managing GI parasites. However, over-reliance on these treatments has led to significant challenges, including the emergence of anthelmintic resistance. In Australia, for instance, 70% of farms reported resistance to at least one class of anthelmintics in small ruminants, posing a severe threat to the sustainability of chemical control methods (Leathwick et al., 2022). As a result, IPM strategies that integrate chemical, biological, and cultural methods are gaining prominence. These include rotational grazing, targeted selective treatment (TST), and the use of forage plants with anthelmintic properties (Kotze et al., 2020).

In Sub-Saharan Africa (SSA), farmers predominantly use chemical dewormers for parasite control, but these are often applied inconsistently due to financial and logistical constraints. A study in Kenya revealed that only 45% of farmers dewormed their goats on a regular schedule, leading to a higher prevalence of GI parasites (Adekunle et al., 2023). Additionally, the misuse of anthelmintics, such as under-dosing, has accelerated the development of resistance in Haemonchus contortus and other parasites. To address these challenges, research in Ethiopia and Kenya has shown that rotational grazing, which involves moving livestock between pastures to disrupt the life cycle of parasites, can reduce infection rates by 30% (Fikru et al., 2021).

In Zimbabwe, traditional methods of parasite control are still prevalent among smallholder farmers due to limited access to veterinary services and high costs associated with commercial anthelmintics. According to Chibwana et al. (2021), over 60% of farmers in rural Zimbabwe rely on ethnoveterinary medicine, using plants such as Aloe vera and Vernonia amygdalina for deworming goats. These practices, while cost-effective, often lack standardization, reducing their efficacy. Recent studies emphasize the need for integrating these traditional methods with modern practices, such as targeted deworming and improved sanitation, to enhance overall parasite control (Madzimure et al., 2023).

Globally and regionally, nutritional management is recognized as a key component of GI parasite control. Providing goats with high-protein diets has been shown to improve immunity against parasites, reducing the severity of infections (Dhillon et al., 2021). For example, supplementing diets with protein-rich plants like Leucaena leucocephala has reduced worm burdens by 25% in trials conducted in Tanzania (Getachew et al., 2022). Similarly, the use of

bioactive forages such as Moringa oleifera, which possess natural anthelmintic properties, is being promoted as part of IPM strategies in SSA. These approaches not only reduce reliance on chemical treatments but also enhance the overall health and productivity of goats.

In Zimbabwe, efforts to promote sustainable parasite management include community-based programs that educate farmers on IPM practices. These programs emphasize rotational grazing, strategic deworming, and the use of bioactive forages. Despite these efforts, challenges remain in scaling up these initiatives, particularly in rural areas like Chipinge District, where farmers often lack the resources to implement IPM strategies effectively (Madzimure et al., 2023). To address these challenges, stakeholders must prioritize farmer education, improve access to veterinary services, and invest in research on cost-effective, sustainable parasite control methods tailored to local contexts.

2.4 Farmer Awareness and Animal Management Practices

Farmer awareness and animal management practices are critical components in the control of gastrointestinal (GI) parasites. Globally, studies show that a lack of knowledge about parasite infections and improper use of anthelmintics significantly hinder effective parasite management. In Southeast Asia, for instance, over 60% of smallholder farmers were unaware of the clinical signs of parasitic infections, resulting in delayed treatment and higher mortality rates (Dhillon et al., 2021). Mismanagement of anthelmintics, including under-dosing and over-reliance on chemical treatments, has further exacerbated the problem by contributing to the global rise of anthelmintic resistance (Leathwick et al., 2022). This highlights the urgent need for educational programs to improve farmers' understanding of parasite management.

In Sub-Saharan Africa (SSA), low awareness levels among farmers are a significant barrier to effective GI parasite control. In Ethiopia, only 45% of smallholder farmers could identify common symptoms of parasitic infections, such as anaemia and diarrhoea, leading to widespread underreporting and delayed interventions (Getachew et al., 2022). Similarly, in Kenya, a survey revealed that fewer than half of the farmers regularly dewormed their goats, citing a lack of knowledge and financial constraints as primary reasons (Adekunle et al., 2023). This limited awareness is compounded by inadequate access to veterinary services in rural areas, which restricts farmers' ability to implement effective management strategies.

In Zimbabwe, the situation is similar, with low levels of farmer awareness posing a major challenge to GI parasite control. According to Chibwana et al. (2021), only 30% of smallholder goat farmers in rural areas like Chipinge District had received any form of training on parasite

management. This lack of awareness leads to poor identification of infections and improper use of anthelmintics. For example, many farmers use traditional remedies without verifying their efficacy or fail to follow proper dosing protocols for commercial dewormers, which contributes to the persistence of infections and the development of resistance (Madzimure et al., 2023).

Animal management practices also play a crucial role in the transmission and prevalence of GI parasites. Globally, poor grazing practices, such as continuous grazing in the same pasture, facilitate the buildup of parasite larvae, increasing infection rates. Rotational grazing, where goats are moved to different pastures to break the parasite life cycle, has proven effective in reducing infection rates by up to 30% (Fikru et al., 2021). However, in SSA, only 20% of farmers implement rotational grazing due to land constraints and limited awareness (Dhillon et al., 2021). Improved sanitation and housing also significantly reduce parasite burdens by minimizing exposure to contaminated environments.

In Zimbabwe, traditional management practices, such as communal grazing and insufficient sanitation, are major contributors to the high prevalence of GI parasites. A study in Chipinge District revealed that 70% of farmers allowed their goats to graze on communal lands, where the risk of parasite transmission is high (Chibwana et al., 2021). Furthermore, only 25% of farmers provided adequate housing for their goats, leaving them exposed to contaminated environments during the night (Madzimure et al., 2023). To address these challenges, there is a need for targeted interventions that combine farmer education, improved access to veterinary services, and the promotion of best practices in animal management.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Study area

Chipinge District, located in the Manicaland Province of Zimbabwe, has a subtropical climate with diverse vegetation and varied climate conditions. With coordinates at Latitude: 19.6333° S and Longitude: 32.6167° E, the area features Grasslands (Region 5), Woodlands (Region 4), and Forests (Region 3). The climate is characterized by high temperatures above 32°C during summer months (November to March) and low temperatures below 10°C during winter months (June to August), with high rainfall above 600mm in summer and low rainfall below 200mm in winter. The region is divided into three areas: Region 3 (Forests) in Chipinge South, Region 4 (Woodlands) in Chipinge North, and Region 5 (Grasslands) in Chipinge Central. This diverse environment supports a wide range of flora and fauna, making it an ideal location for studying the prevalence and control of gastrointestinal parasites in goats.

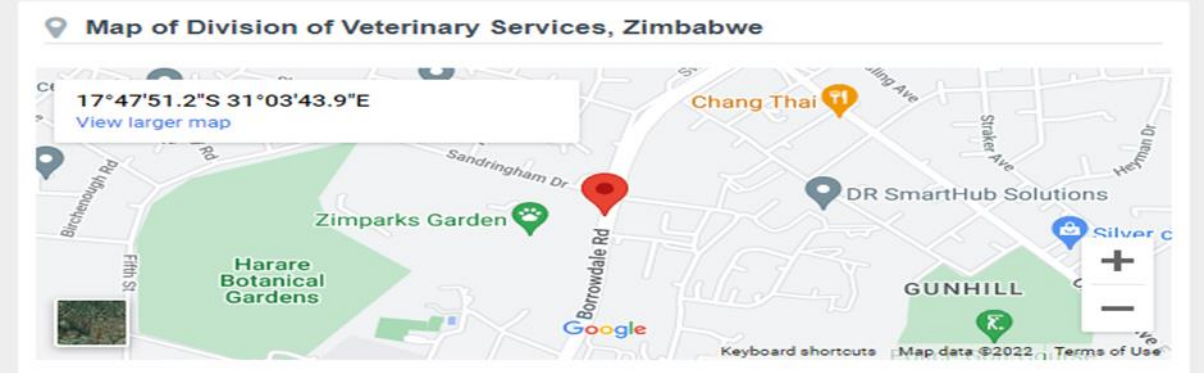

Figure 1: Location Map

3.2 Research Design

This study employed a cross-sectional research design to capture a snapshot of parasite prevalence and control practices among goat farmers in Chipinge District at a specific point in time. A cross-sectional approach was appropriate because it allowed for the simultaneous examination of multiple variables, including demographic characteristics, awareness levels, animal management practices, and the influence of Agro-ecological zones on gastrointestinal parasite prevalence (Bodgan et al., 2020). Through collecting data over a designated period, the study ensured that the information was representative of the prevailing conditions within the study area, enhancing the reliability of the findings. This design has been widely recognized as effective for studying relationships between variables in resource-constrained environments, particularly in agricultural research (Kumar et al., 2021).

The integration of quantitative and qualitative methods within the cross-sectional design provided a comprehensive understanding of the research problem. Quantitative data from surveys and parasite sampling facilitated the measurement of prevalence rates and the statistical analysis of farmer practices, while qualitative data from interviews enriched the findings by capturing the farmers' experiences and perceptions (Blumberg et al., 2019). Cross-sectional studies are cost-effective and time-efficient, making them suitable for rural contexts like Chipinge District, where logistical challenges often limit prolonged data collection (Dhillon et al., 2021). The design's flexibility also supported the exploration of diverse factors affecting parasite control, which was critical for developing actionable recommendations tailored to local conditions.

3.3 Sampling strategy

This study employed a simple random sampling technique to select participants from the population of goat farmers in Chipinge District, Zimbabwe. A total of 100 goat farmers were randomly chosen, ensuring that each farmer had an equal probability of being selected. Simple random sampling was appropriate for this research as it minimized selection bias and ensured a representative sample of the target population (Kothari, 2019). This approach facilitated the generalizability of the findings, enabling accurate conclusions about the demographic characteristics, awareness levels, and practices related to internal parasite control among goat farmers in the district (Kumar et al., 2021).

The simplicity and cost-effectiveness of simple random sampling made it a practical choice for the study, especially in a rural setting like Chipinge District. Through employing this method, the research generated unbiased and reliable data, reflecting the population's diversity in terms of farming practices, education levels, and access to veterinary services (Mugenda & Mugenda, 2021). Simple random sampling has been widely recognized as a robust method for ensuring validity in agricultural and epidemiological studies (Dhillon et al., 2021; Adekunle et al., 2023). This sampling strategy also enhanced the credibility of the study's results by providing a solid foundation for statistical analysis.

3.4 Sample size

The research targeted the population of all goat farmers in Chipinge District, Zimbabwe, with a sample size of 100 farmers. The sampling frame was obtained from the Chipinge District Agricultural Office, which provided a comprehensive list of all goat farmers in the area. Simple random sampling was employed to select participants, utilizing a random number generator to

randomly choose 100 farmers from the list. This approach ensured that every farmer in the sampling frame had an equal chance of being selected, reducing bias and enhancing the representativeness of the sample (Kumar et al., 2021).

Inclusion criteria for the study required that participants own at least one goat, reside in Chipinge District, and provide consent to participate. Farmers who did not own goats, were not residents of the district, or declined to participate were excluded from the study (Blumberg et al., 2019). This careful selection process ensured the relevance of the data collected and improved the reliability of the findings. Using a sample size of 100 participants aligned with similar studies in agricultural research, which emphasized the importance of balancing logistical feasibility with statistical power (Dhillon et al., 2021; Adekunle et al., 2023).

3.5 Data Collection Techniques

Quantitative data were collected using structured questionnaires designed to gather information on the demographic characteristics of goat farmers, their awareness levels regarding gastrointestinal parasites, and their management practices (Bodgan et al., 2020). These questionnaires allowed for the systematic collection of data, ensuring consistency and comparability across respondents (Dhillon et al., 2021). Qualitative data were obtained through in-depth interviews and focus group discussions, which provided detailed insights into farmers' experiences, beliefs, and perspectives on parasite control practices (Kothari, 2019). These methods facilitated the exploration of contextual factors influencing parasite management, enabling a richer understanding of the challenges and opportunities faced by farmers (Adekunle et al., 2023). The combination of these techniques ensured a comprehensive approach to data collection, integrating numerical data with nuanced qualitative insights to enhance the validity of the findings (Kumar et al., 2021).

3.6 Data Analysis

Quantitative data were analysed using statistical software to identify patterns, trends, and relationships between variables such as demographic characteristics, awareness levels, and management practices related to gastrointestinal parasite control (Bodgan et al., 2020). Descriptive statistics, including frequencies, percentages, and means, were used to summarize the data (Kumar et al., 2021). Qualitative data from interviews were analysed thematically, allowing for the extraction of key themes and narratives that provided a deeper understanding of farmers' experiences and perceptions of parasite control practices. This approach enabled the identification of recurring patterns and unique insights, enhancing the richness and validity

of the findings (Dhillon et al., 2021). The combination of quantitative and qualitative analyses ensured a comprehensive understanding of the research problem and facilitated the integration of diverse perspectives in the results (Adekunle et al., 2023).

3.7 Ethical considerations

This study adhered to ethical research principles to ensure the protection and well-being of participants. Informed consent was obtained from all goat farmers before their participation, ensuring they were fully aware of the study's purpose, procedures, potential risks, and benefits. Participants were assured that their involvement was voluntary, and they could withdraw at any stage without any repercussions. Confidentiality and anonymity were maintained by assigning unique identification codes instead of using personal names, ensuring that all collected data remained private and inaccessible to unauthorized individuals (Mugenda & Mugenda, 2021). Additionally, the study was conducted with approval from relevant authorities, such as the Chipinge District Agricultural Office, to ensure compliance with ethical guidelines governing agricultural research (Blumberg et al., 2019).

Furthermore, ethical considerations extended to the humane treatment of animals involved in the study. The research followed veterinary ethical guidelines to minimize any stress or harm to goats during sample collection. Standard procedures were used for faecal sample collection to ensure that animals were not subjected to unnecessary discomfort (Department of Veterinary Services, 2023). Farmers were also provided with feedback on parasite control practices to enhance their knowledge and improve animal welfare. Data integrity and research transparency were upheld by ensuring that all findings were accurately recorded and reported without fabrication or manipulation, thereby maintaining the credibility of the study (Bodgan et al., 2020).

3.8 Limitations

The findings of the study were limited in their generalizability, as the research was conducted within a specific geographic area, which may not have accurately reflected goat farming practices in other regions. Additionally, the reliance on self-reported data from farmers for aspects such as awareness and management practices introduced the potential for response bias and inaccuracies. The sample size and selection process further influenced the study's capacity to draw definitive conclusions about the impact of Agro-ecological zones on parasite prevalence. Moreover, external factors, including weather conditions and seasonal variations

in parasite burden, likely affected the results but were not fully accounted for in the study design.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Introduction

This chapter presented the findings of the study on the prevalence and control of internal parasites in goats in Chipinge District, Zimbabwe. The results were analyzed and interpreted based on the study's objectives, which included evaluating the demographic characteristics of goat farmers, assessing their awareness of gastrointestinal parasites, and examining their animal management practices. Quantitative data obtained from surveys were statistically analyzed to identify patterns and relationships, while qualitative data from interviews and focus group discussions provided deeper insights into farmers' experiences and perceptions. The findings were discussed in relation to existing literature, highlighting key trends, challenges, and best practices for parasite control. This chapter ultimately provided a foundation for the conclusions and recommendations presented in the subsequent section.

4.2 Data reliability analysis

Table 4. 1: Table showing data reliability analysis results

Construct	**Cronbach Alpha (α)**	**N of Items**
Prevalence and Distribution of Gastrointestinal Parasites	0.708	6
Control and Management of Gastrointestinal Parasites in Goats	0.852	6
Farmer Awareness and Animal Management Practices	0.785	6

The Cronbach's Alpha (α) values presented indicate the internal consistency and reliability of the questionnaire used in the study. A reliability coefficient above 0.7 is generally considered acceptable, while values above 0.8 indicate good reliability (Mugenda & Mugenda, 2021). The section on Prevalence and Distribution of Gastrointestinal Parasites obtained a Cronbach's Alpha of 0.708, suggesting a moderate level of reliability, which is sufficient for exploratory research. The Control and Management of Gastrointestinal Parasites in Goats section had the highest reliability score of 0.852, indicating strong internal consistency and suggesting that the items effectively measure the same underlying concept. The Farmer Awareness and Animal Management Practices section recorded a Cronbach's Alpha of 0.785, reflecting good reliability and internal consistency. These results align with previous studies, such as those by Blumberg et al. (2019) and Bodgan et al. (2020), which found that well-structured agricultural surveys typically yield reliability scores between 0.7 and 0.9, demonstrating their consistency

in measuring farmer knowledge and management practices. The findings further reinforce the validity of the data collection tool used in this study, confirming that it provides reliable and reproducible results (Department of Veterinary Services, 2023).

4.3 Demographic analysis of the respondents

4.3.1 Gender of the respondents

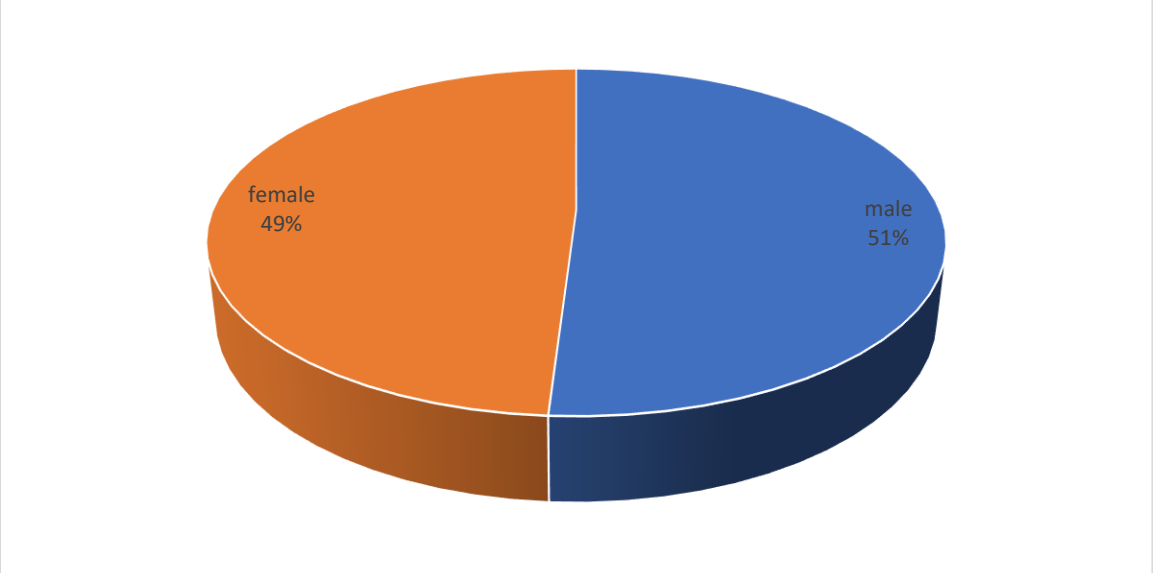

Figure 4. 1: Pie chart showing the distribution of the respondents by gender

The gender distribution results from the figure 4.1 above indicate a nearly equal representation of male (51%) and female (49%) goat farmers in Chipinge District, suggesting that both genders are actively engaged in goat farming. This balance enhances the reliability of the study by ensuring that the findings are not biased toward one gender. Similar trends have been observed in other studies on smallholder livestock farming, where both men and women play significant roles in managing livestock (Mugenda & Mugenda, 2021). According to Badran et al., (2020), gender inclusivity in agricultural research is essential for understanding diverse perspectives on farming practices and challenges. Additionally, Chibwana et al., (2021) emphasized that in many rural communities, women increasingly participate in goat farming due to its relatively low input requirements and its role in household income generation. The near-equal gender representation in this study aligns with findings from the Department of Veterinary Services (2023), which reported that goat farming in Zimbabwe is not male-dominated but rather involves both men and women in decision-making and herd management. This balanced participation underscores the importance of designing interventions that are gender-inclusive to ensure effective adoption of improved livestock management practices.

4.3.2 Education level of the respondents

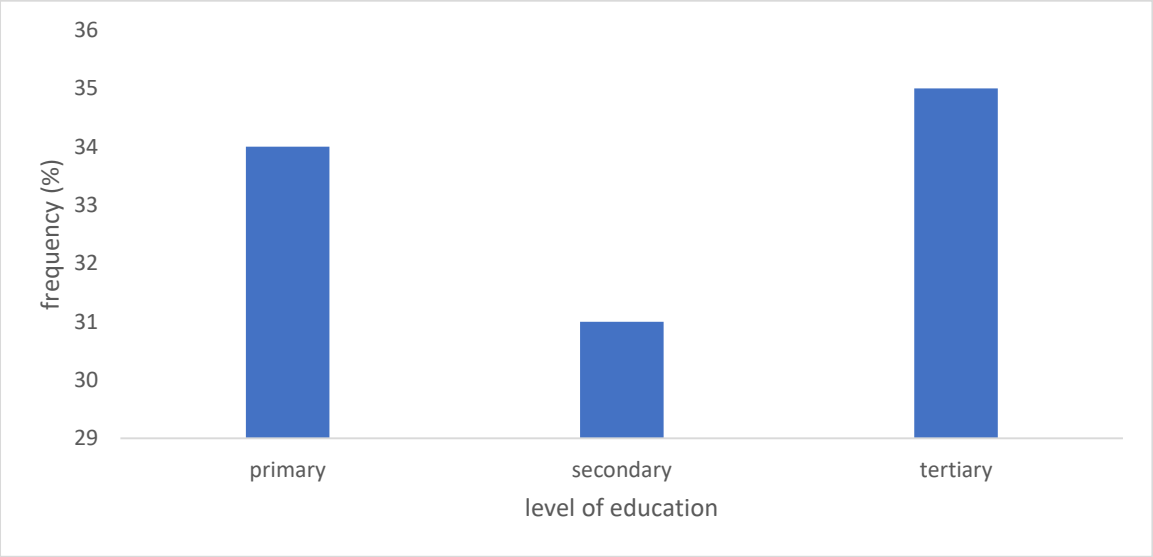

Figure 4. 2: Graph showing the distribution of the respondents by education level

The education qualification results from figure 4.2 above indicate that the majority of goat farmers in Chipinge District had at least some formal education, with 34% having primary education, 31% attaining secondary education, and 35% reaching tertiary education. This relatively balanced distribution suggests that most farmers possess a basic level of literacy, which can positively influence their ability to understand and adopt improved livestock management practices. According to Fikru et al., (2021), education plays a crucial role in farmers' decision-making, particularly in areas such as disease management, deworming schedules, and veterinary consultations. Similarly, Food and Agriculture Organization , (2024) highlighted that farmers with higher education levels are more likely to adopt modern farming techniques, including integrated parasite control strategies. However, Kumar et al., (2021) noted that even those with primary education can effectively implement traditional and community-based livestock management strategies if provided with adequate extension services. The findings align with the Department of Veterinary Services (2023), which reported that smallholder farmers in Zimbabwe, regardless of their education level, can successfully manage livestock if they receive appropriate training and support. These results highlight the importance of farmer education programs to ensure that parasite control measures are effectively communicated and adopted across all education levels.

4.3.3 Age of the respondents

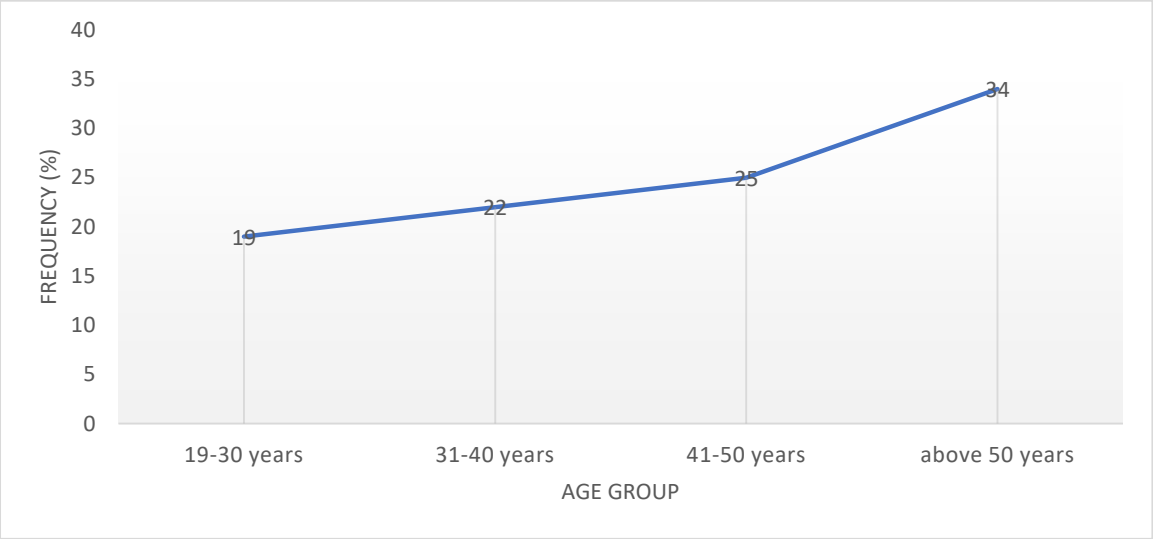

Figure 4. 3: Graph showing the distribution of the respondents by age

The age group distribution indicates that goat farming in Chipinge District is predominantly practiced by individuals aged above 50 years followed by 41–50 years (25%), followed by those aged 31–40 years (22%), and the youngest group, 19–30 years (19%). The dominance of middle-aged and old-aged farmers suggests that goat farming is mainly undertaken by individuals with considerable experience and financial stability, which are crucial for effective livestock management. According to Magona & Musisi, (2022), middle-aged farmers are more likely to adopt improved animal husbandry techniques and invest in veterinary services due to their accumulated knowledge and resources. Similarly, Dhillon et al., (2021) observed that older farmers tend to have more exposure to traditional and community-based livestock management practices, making them key players in sustaining goat farming. However, the lower participation of younger farmers (19%) may indicate a declining interest in livestock farming among youth, a trend also noted by Herdt & Hoff, (2021), who reported that younger generations in rural areas are increasingly shifting towards urban-based employment opportunities. The findings align with the Department of Veterinary Services (2023), which highlighted that aging farmers dominate Zimbabwe's livestock sector, necessitating efforts to encourage youth participation through training and financial incentives. These results underscore the need for targeted interventions to attract younger farmers, ensuring the long-term sustainability of goat farming in the region.

4.3.4 Farming experience

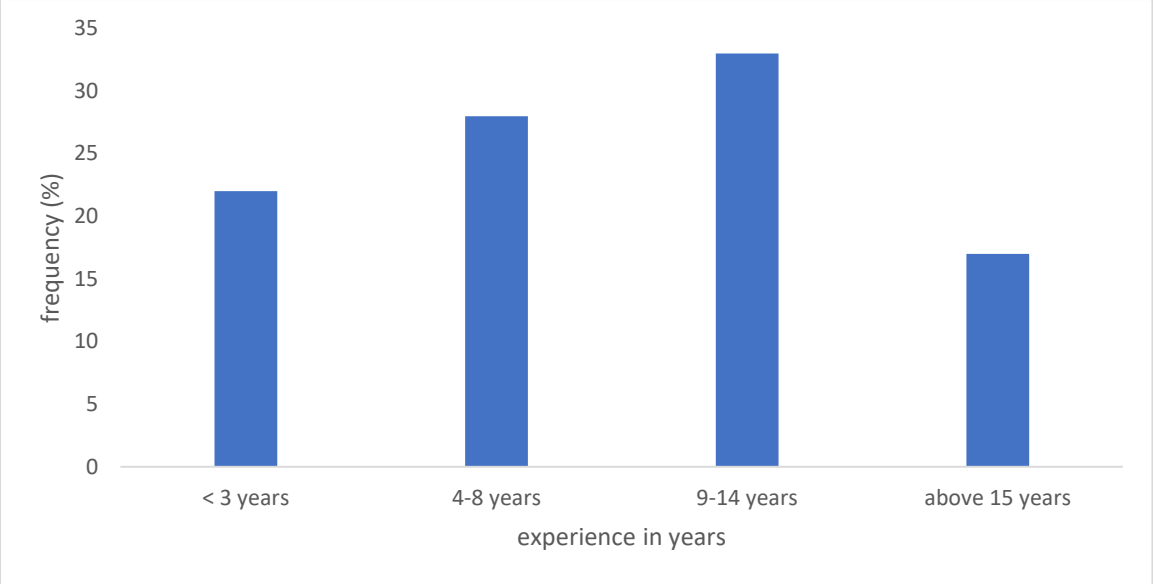

Figure 4. 4: Graph showing the distribution of the respondents by farming experience

The farming experience results above indicate that the majority of goat farmers in Chipinge District had 9–14 years of experience (33%), followed by those with 4–8 years (28%), while 22% had less than 3 years of experience, and 17% had over 15 years of farming experience. This distribution suggests that most farmers have acquired moderate to extensive experience in goat farming, which is essential for effective livestock management, including parasite control. According to Adekunle et al., (2023), farming experience influences the adoption of best practices, with more experienced farmers being better equipped to recognize disease symptoms, implement control measures, and seek veterinary assistance. Similarly, Asha & Chebo, (2019) found that farmers with over 10 years of experience were more likely to adopt integrated parasite management strategies than those with fewer years in livestock production. However, the presence of 22% of farmers with less than 3 years of experience suggests the entry of new farmers into goat production, which aligns with findings by Chibwana et al., (2021) that highlighted a growing interest in small ruminant farming due to its lower capital requirements compared to cattle farming. The Department of Veterinary Services (2023) emphasized that training and extension support are crucial for less-experienced farmers to enhance productivity and improve animal health outcomes. These results underscore the need for targeted extension programs to ensure that both new and experienced farmers have access to knowledge and resources necessary for effective parasite control and sustainable goat farming.

4.4 Descriptive statistics on the prevalence and control of internal parasites in goats

4.4.1 Prevalence and Distribution of Gastrointestinal Parasites

Table 4. 2: Prevalence and Distribution of Gastrointestinal Parasites

Descriptive Statistics			
	N	Mean	Std. Deviation
I am aware of the risks associated with internal parasites in my goat farm.	100	4.44	.914
I have a good understanding of the signs and symptoms of internal parasites in goats.	100	4.27	1.062
I believe that internal parasites are a significant threat to my goat farm's productivity.	100	4.50	.644
I have experienced losses due to internal parasites in my goat farm.	100	4.27	.973
I think that veterinary services are essential in controlling internal parasites.	100	4.46	.797
I think that internal parasites are a significant challenge to my goat farm's profitability.	100	4.18	.892
Valid N (listwise)	100		

The mean scores in the descriptive statistics indicate a generally high level of awareness and concern among goat farmers regarding internal parasites. The highest mean score (4.50) corresponds to the belief that internal parasites significantly threaten farm productivity, while the lowest mean score (4.18) relates to the perception of profitability challenges due to parasites. These results suggest that farmers acknowledge the economic impact of parasites, which aligns with Chibwana et al. (2021), who found that gastrointestinal parasites significantly reduce livestock productivity in Zimbabwe by causing weight loss, decreased fertility, and increased mortality. The standard deviations, ranging from 0.644 to 1.062, suggest moderate variations in responses, with the lowest variation in the perception of parasites' threat to productivity, indicating widespread agreement on this issue.

The mean score of 4.44 regarding farmers' awareness of internal parasite risks suggests a strong recognition of the problem, though the standard deviation of 0.914 indicates slight variations in perception. This supports findings from Madzimure et al. (2023), who emphasized that while many farmers are aware of parasites, knowledge gaps still exist, particularly in remote areas. The mean score for understanding signs and symptoms (4.27) also demonstrates a high awareness level, though with a higher standard deviation (1.062), reflecting differences in experience or education levels. Studies such as Dhillon et al. (2021) highlight that education and training significantly impact farmers' ability to identify and manage parasites effectively.

Farmers strongly believe in the role of veterinary services in parasite control (mean = 4.46, SD = 0.797). This agrees with Regassa et al. (2019), who found that access to veterinary care significantly reduces parasite prevalence and improves herd health. However, variations in

responses suggest disparities in access to veterinary services. Similarly, a mean of 4.27 for losses due to internal parasites suggests that many farmers have firsthand experience with the economic consequences of infestation, a finding echoed by Getachew et al. (2022), who reported that gastrointestinal parasites cause significant financial losses to smallholder farmers in Africa.

Lastly, the perception that internal parasites challenge farm profitability (mean = 4.18, SD = 0.892) is slightly lower than other indicators, possibly because farmers may attribute profitability issues to multiple factors beyond parasites. Adekunle et al. (2023) noted that while parasites reduce productivity, other factors, such as feed costs and market access, also influence profitability. The standard deviation of 0.892 indicates moderate agreement among farmers on this issue, suggesting varying levels of financial strain due to parasites. Overall, these results confirm that internal parasites are a well-recognized problem among farmers, but variations in experience, access to veterinary services, and education levels influence individual responses.

4.4.2 Control and Management of Gastrointestinal Parasites in Goats

Table 4. 3: Control and Management of Gastrointestinal Parasites in Goats

Descriptive Statistics			
	N	Mean	Std. Deviation
I am aware of the common types of internal parasites that affect goats.	100	4.16	1.229
I know the signs and symptoms of internal parasites in goats.	100	3.90	1.000
I am aware of the economic impact of internal parasites on goat farming.	100	4.26	1.041
I am aware of the control measures for internal parasites in goats.	100	4.02	.964
I understand the importance of monitoring for internal parasites in goats.	100	4.30	.905
I understand the importance of monitoring for internal parasites in goats.	100	4.02	.964
Valid N (listwise)	100		

The descriptive statistics indicate that goat farmers in Chipinge District exhibit a relatively high level of awareness regarding internal parasites. The highest mean score (4.30) corresponds to the understanding of the importance of monitoring for internal parasites, with a standard deviation of 0.905. This suggests a general consensus among farmers, reinforcing findings by Chibwana et al. (2021), who emphasized that regular monitoring is critical in identifying early infections and preventing severe outbreaks. However, while monitoring is recognized as essential, the variation in responses suggests that not all farmers may have the necessary tools or knowledge to implement effective monitoring practices.

Farmers also displayed strong awareness of the economic impact of internal parasites on goat farming, with a mean score of 4.26 and a standard deviation of 1.041. This aligns with

Getachew et al. (2022), who found that gastrointestinal parasites significantly reduce livestock productivity and increase production costs, particularly in smallholder systems. The slight variation in responses indicates that while many farmers recognize the economic threat, their direct experiences with financial losses may differ. Some farmers who implement regular deworming and parasite control strategies may experience fewer economic losses, whereas those with limited access to veterinary services might bear a greater burden.

The lowest mean score (3.90) relates to farmers' knowledge of the signs and symptoms of internal parasites, with a standard deviation of 1.000. This suggests a moderate level of understanding, but with some inconsistencies in identifying clinical signs. Regassa et al. (2019) found that many smallholder farmers misdiagnose parasitic infections due to a lack of formal training, leading to delayed treatments and increased morbidity rates. This variability highlights the need for more farmer education programs to improve parasite identification and early intervention strategies.

Additionally, awareness of control measures for internal parasites had a mean score of 4.02 and a standard deviation of 0.964, indicating that most farmers recognize available parasite management strategies, though some knowledge gaps remain. Madzimure et al. (2023) noted that while farmers are aware of conventional deworming practices, many lack knowledge of integrated parasite management approaches such as rotational grazing and ethnoveterinary medicine. The variation in responses suggests that access to extension services and veterinary support may influence the level of understanding among different farmers. Overall, these findings reinforce the importance of continuous farmer training and extension support to enhance knowledge and adoption of best practices in parasite control.

4.4.3 Farmer Awareness and Animal Management Practices

Table 4. 4: Farmer Awareness and Animal Management Practices

Descriptive Statistics			
	N	Mean	Std. Deviation
I provide clean water and feed to my goats to prevent internal parasites.	100	4.29	.977
I ensure proper sanitation and hygiene in my goat housing to prevent internal parasites.	100	3.81	1.012
I rotate my goats to different grazing areas to prevent internal parasites.	100	3.74	1.011
I use deworming medication regularly to control internal parasites in my goats.	100	3.82	1.209
I seek veterinary advice when I suspect internal parasites in my goats.	100	4.27	1.043
I implement integrated pest management strategies to control internal parasites.	100	4.36	.871
Valid N (listwise)	100		

The descriptive statistics indicate a generally strong commitment among goat farmers in Chipinge District to implementing preventative and control measures for internal parasites. The highest mean score (4.36) is associated with the implementation of integrated pest management (IPM) strategies, with a standard deviation of 0.871. This suggests a high level of agreement among farmers on the importance of combining multiple control methods, such as rotational grazing, deworming, and sanitation, to manage parasites. Madzimure et al. (2023) emphasized the effectiveness of IPM strategies in reducing internal parasite burdens, particularly in smallholder farming systems where financial constraints often limit access to commercial anthelmintics. The relatively low standard deviation implies a shared understanding and adoption of IPM among farmers, likely influenced by extension programs and local veterinary guidance.

Farmers also demonstrated a strong commitment to providing clean water and feed to prevent internal parasites, with a mean score of 4.29 and a standard deviation of 0.977. This aligns with findings by Dhillon et al. (2021), who noted that proper nutrition and clean water sources play a critical role in reducing parasite infections by preventing the ingestion of contaminated materials. However, the variation in responses suggests that while most farmers prioritize hygiene in feeding, some may face challenges in consistently maintaining clean water and feed sources, possibly due to resource constraints or limited awareness of the link between nutrition and parasite control.

Seeking veterinary advice when parasites are suspected also received a high mean score of 4.27, with a standard deviation of 1.043, indicating that many farmers recognize the value of professional consultation. This supports the findings of Regassa et al. (2019), who reported that access to veterinary services significantly improves parasite control effectiveness. However, the variability in responses suggests that not all farmers have equal access to veterinary services, possibly due to financial limitations or the unavailability of veterinary professionals in rural areas. Madzimure et al. (2023) similarly highlighted that many farmers in Zimbabwe struggle to afford veterinary services, leading to delayed or infrequent consultations.

Conversely, the lowest mean score (3.74) is associated with the practice of rotating goats to different grazing areas, with a standard deviation of 1.011. This indicates a moderate level of adoption of rotational grazing as a parasite control measure. Adekunle et al. (2023) found that rotational grazing significantly reduces parasite loads by disrupting parasite life cycles, yet it is often underutilized due to land access limitations. The standard deviation suggests that while some farmers practice rotational grazing effectively, others may face challenges such as land shortages or communal grazing practices that hinder controlled pasture management.

Regular deworming also received a moderate mean score of 3.82 with the highest standard deviation (1.209), indicating varying frequencies and approaches to anthelmintic use among farmers. Kotze et al. (2020) warned that inconsistent deworming practices contribute to anthelmintic resistance, a growing concern in livestock management. The variation in responses suggests that while some farmers adhere to recommended deworming schedules, others may overuse or underuse anthelmintics, leading to ineffective parasite control. This aligns with Leathwick et al. (2022), who emphasized the need for targeted selective treatment (TST) rather than routine mass deworming to slow resistance development.

Sanitation and hygiene in goat housing had a mean score of 3.81 and a standard deviation of 1.012, indicating moderate implementation of hygiene practices among farmers. Chibwana et al. (2021) found that proper housing and sanitation significantly reduce parasite infestation rates, as clean environments minimize exposure to contaminated faeces and parasite larvae. The variation in responses suggests that while some farmers maintain high hygiene standards, others may struggle with implementing proper waste management and housing cleanliness, likely due to resource constraints or a lack of awareness. This highlights the need for targeted farmer education programs emphasizing the role of hygiene in parasite control.

Overall, the results suggest that while farmers in Chipinge District recognize the importance of parasite control measures, variations in their application highlight challenges such as financial constraints, limited access to land for rotational grazing, and inconsistent deworming practices. These findings align with previous studies emphasizing the need for improved farmer training, veterinary support, and sustainable parasite management strategies tailored to local farming conditions.

4.5 Thematic Analysis

Thematic analysis was employed in this study to identify recurring patterns and key themes emerging from interviews with agricultural extension officers, local authorities, and experienced farmers regarding the prevalence, awareness, and management of internal parasites in goats. This approach allowed for an in-depth understanding of farmers' experiences, perceptions, and challenges related to parasite control. Through systematically analyzing qualitative responses, the study identified core themes that reflect the knowledge levels, practices, and barriers influencing effective parasite management in goat farming. The identified themes provide valuable insights into the existing gaps and opportunities for improving internal parasite control strategies, aligning with previous research on smallholder livestock management in Zimbabwe.

4.5.1 Economic Losses Due to Parasites

Farmers reported experiencing financial setbacks due to internal parasites, including reduced growth rates, low fertility, and increased mortality. The decline in productivity forces farmers to spend more on veterinary care and deworming treatments. Losses also stem from reduced market value, as infected goats appear weak and malnourished. Infected livestock produce less milk and meat, negatively affecting household incomes. Many smallholder farmers struggle to recover from these financial burdens. Getachew et al. (2022) found that gastrointestinal parasites significantly increase production costs while reducing profitability. These findings highlight the critical need for effective parasite control to minimize economic losses.

4.5.2 Limited Access to Veterinary Services

Many farmers indicated that veterinary services are either too expensive or unavailable in their rural areas. The shortage of veterinarians' forces farmers to rely on self-diagnosis and traditional remedies. This lack of access leads to delayed or incorrect treatments, worsening the severity of infections. Financial constraints further prevent smallholders from affording veterinary consultations. Consequently, many farmers use over-the-counter dewormers without professional guidance. Madzimure et al. (2023) emphasized that rural Zimbabwean farmers struggle to access veterinary services, leading to ineffective parasite control. Addressing these service gaps is crucial for improved parasite management.

4.5.3 Seasonal Variations in Parasite Prevalence

Farmers noted that parasite infestations are more severe during the rainy season. Increased moisture provides a favourable environment for parasite eggs and larvae to thrive. As a result, grazing areas become heavily contaminated, exposing goats to high infection risks. Many farmers experience peak losses during wet months due to widespread infections. Poor drainage in goat housing further contributes to parasite spread. Chibwana et al. (2021) found that parasite prevalence in Zimbabwe is significantly higher during the rainy season. This underscores the importance of adjusting parasite control strategies based on seasonal changes.

4.5.4 Misuse of Anthelmintics

Farmers reported inconsistencies in deworming schedules, with some overusing or underusing anthelmintics. Some administer dewormers without adhering to recommended dosages, leading to ineffective treatments. Others deworm too frequently, increasing the risk of resistance development among parasites. Limited knowledge about anthelmintic resistance

contributes to improper drug use. Financial constraints also force some farmers to delay deworming, allowing parasite burdens to rise. Kotze et al. (2020) highlighted that the misuse of dewormers accelerates anthelmintic resistance, reducing treatment efficacy. Encouraging targeted selective treatment can help mitigate these issues.

4.5.5 Challenges in Diagnosing Parasites

Farmers rely on physical signs like diarrhoea, weight loss, and weakness to diagnose internal parasites. Many lack access to laboratory tests, leading to misdiagnosis or delayed treatments. This results in ineffective interventions, increasing mortality rates among infected goats. Without proper diagnosis, farmers may treat their goats for the wrong condition. Some farmers mistake nutritional deficiencies for parasitic infections, leading to inappropriate treatments. Regassa et al. (2019) found that smallholder farmers often misdiagnose infections due to a lack of diagnostic tools. Expanding access to affordable diagnostic methods could improve early detection and treatment.

4.5.6 Reliance on Physical Symptoms for Diagnosis

Most farmers detect internal parasites by observing physical symptoms in their goats. Common indicators include weight loss, diarrhoea, and pale mucous membranes. However, relying solely on visible signs often leads to late detection. Some symptoms overlap with other diseases, increasing the chances of misdiagnosis. Many farmers only act when the infection becomes severe, reducing treatment effectiveness. Dhillon et al. (2021) noted that smallholders often use visual assessments due to limited access to laboratory diagnostics. Enhancing diagnostic capabilities can help improve parasite detection and control.

4.5.7 Importance of Farmer Training in Parasite Management

Agricultural officers emphasized that well-trained farmers demonstrate better parasite control practices. Training programs help farmers understand proper deworming schedules and preventive measures. Educated farmers are more likely to monitor their livestock for early signs of infection. Those with training also practice better pasture management to reduce reinfection rates. Without formal training, many farmers struggle to implement effective control strategies. Fikru et al. (2021) found that education improves farmers' ability to recognize and manage internal parasites. Expanding farmer training programs can enhance parasite control outcomes.

4.5.8 Influence of Experience on Awareness Levels

Farmers with more years of experience showed greater awareness of parasite symptoms and control measures. Experienced farmers recognize early signs of infections, allowing for prompt intervention. They also adopt more preventive measures, such as rotational grazing and improved sanitation. Newer farmers often struggle with identifying parasites and managing their spread effectively. Some inexperienced farmers administer dewormers inconsistently, reducing their effectiveness. Adekunle et al. (2023) found that farming experience enhances knowledge of parasite control methods. Encouraging knowledge-sharing between experienced and new farmers could improve awareness.

4.5.9 Inadequate Monitoring Practices

Many farmers admitted they do not regularly check their goats for parasites. Without consistent monitoring, infections go unnoticed until symptoms become severe. Limited monitoring also makes it difficult to assess the effectiveness of deworming programs. Some farmers deworm without confirming infection levels, leading to unnecessary treatments. Regular monitoring can help farmers detect infections early and apply targeted treatments. Leathwick et al. (2022) emphasized that routine parasite monitoring reduces infection rates and minimizes drug resistance. Strengthening monitoring practices can improve overall parasite management.

4.5.10 Role of Traditional Knowledge in Parasite Control

Some farmers rely on indigenous knowledge and medicinal plants to control parasites. They use herbal remedies such as Aloe vera and Vernonia amygdalina to treat infections. Traditional dewormers are preferred due to their affordability and availability. However, not all herbal treatments have been scientifically validated for efficacy. Farmers combine traditional and modern methods, though effectiveness varies. Madzimure et al. (2023) found that ethnoveterinary medicine is widely used in Zimbabwe and has shown promising results. Integrating traditional remedies with scientific research can enhance parasite control strategies.

4.5.11 Importance of Rotational Grazing

Some farmers rotate their goats across different grazing areas to reduce reinfection risks. Rotational grazing helps break the parasite life cycle by limiting exposure to contaminated pastures. However, land shortages make it difficult for all farmers to implement this practice. Communal grazing areas increase the risk of parasite transmission among herds. Farmers with more grazing space report fewer parasite-related losses. Adekunle et al. (2023) found that

rotational grazing significantly lowers parasite infestation rates. Encouraging land management practices can improve parasite control.

4.5.12 Sanitation Practices in Goat Housing

Farmers who maintain clean housing environments report fewer cases of internal parasites. Regular cleaning of pens prevents the buildup of faeces and parasite eggs. However, some farmers struggle with maintaining proper hygiene due to resource constraints. Poor housing conditions contribute to increased parasite transmission among confined goats. Ensuring proper drainage in shelters can further reduce parasite proliferation. Chibwana et al. (2021) confirmed that proper sanitation reduces exposure to contaminated environments. Encouraging improved housing conditions can minimize parasite-related infections.

4.5.13 Variability in Deworming Frequency

Farmers reported different deworming schedules, with some deworming regularly while others do so sporadically. Financial constraints often determine how frequently farmers can afford deworming treatments. Overuse of anthelmintics increases resistance, while underuse allows parasite loads to build up. Some farmers only deworm when they notice severe symptoms, reducing treatment effectiveness. Targeted deworming based on monitoring can improve parasite control. Kotze et al. (2020) warned that inconsistent deworming contributes to drug resistance and poor treatment outcomes. Establishing proper deworming protocols can enhance effectiveness.

4.5.14 Use of Bioactive Plants in Parasite Control

Many farmers incorporate bioactive plants into their parasite control strategies. Commonly used plants include Aloe vera and Moringa oleifera, which are believed to have anthelmintic properties. Farmers prefer these methods due to their affordability and ease of use. However, variations in effectiveness have been reported among different plant species. Some farmers combine herbal treatments with commercial dewormers for better results. Madzimure et al. (2023) found that ethnoveterinary medicine is widely practiced in Zimbabwe. More research is needed to validate the efficacy of traditional dewormers.

4.5.15 Dependence on Veterinary Advice for Parasite Control

Farmers who regularly consult veterinarians report better outcomes in managing parasites. Veterinary advice helps farmers choose effective deworming strategies and preventive measures. However, high consultation fees deter some farmers from seeking professional

assistance. Limited veterinary services in rural areas also make access difficult. Some farmers rely on community knowledge when veterinarians are unavailable. Regassa et al. (2019) found that veterinary guidance improves disease diagnosis and treatment. Expanding veterinary outreach programs can enhance parasite management.

4.6 Chapter Summary

Chapter Four presented the study's findings on the prevalence, awareness, and control of internal parasites in goats among farmers in Chipinge District. Descriptive statistics indicated high awareness levels regarding parasite risks and economic impacts, but variations existed in knowledge of symptoms and control measures. Thematic analysis revealed key challenges, including economic losses, limited veterinary access, seasonal variations in parasite prevalence, and inconsistent deworming practices. While some farmers implemented preventive strategies such as rotational grazing and improved sanitation, others struggled with inadequate monitoring and improper drug use, contributing to anthelmintic resistance. The chapter also highlighted the role of experience and training in improving awareness and management practices. Overall, the results emphasized the need for better farmer education, enhanced veterinary services, and integrated parasite control strategies to improve goat health and productivity.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter provided a summary of the key findings, conclusions, and recommendations based on the study's objectives. The chapter reflected on the major themes identified in Chapter Four, highlighting the challenges that goat farmers faced in managing internal parasites and the effectiveness of existing control measures. It further discussed how farmers' awareness, access to veterinary services, and management practices influenced parasite prevalence and control. Conclusions were drawn from the study's findings, linking them to existing literature, while practical recommendations were proposed for policymakers, farmers, and researchers. The chapter aimed to provide actionable insights to improve parasite management strategies and enhance goat productivity in Chipinge District.

5.2 Summary of key findings

The study revealed that most goat farmers in Chipinge District were aware of the risks associated with internal parasites and their impact on productivity. Farmers recognized the economic losses caused by parasites, including reduced growth rates, poor reproduction, and increased mortality. However, despite this awareness, many farmers struggled with effective parasite control due to challenges such as limited access to veterinary services and the high cost of deworming treatments. The study found that experience and training played a crucial role in improving farmers' knowledge and management practices, as more experienced farmers demonstrated better awareness and control strategies compared to those with less experience.

The findings also indicated that seasonal variations influenced parasite prevalence, with higher infection rates occurring during the rainy season. Increased moisture created a favourable environment for parasite eggs and larvae, leading to widespread infections. Farmers who implemented rotational grazing and improved sanitation reported lower infection rates, while those practicing communal grazing faced higher parasite burdens. Additionally, while most farmers dewormed their goats, inconsistencies in deworming schedules and improper use of anthelmintics contributed to resistance. Some farmers administered dewormers too frequently, while others delayed treatments due to financial constraints, reducing the effectiveness of parasite control measures.

The study further highlighted gaps in diagnostic practices, as most farmers relied on physical symptoms such as diarrhoea and weight loss to detect parasite infections rather than laboratory

tests. The lack of access to faecal egg count testing made it difficult for farmers to determine the severity of infections and the effectiveness of deworming treatments. Additionally, traditional knowledge played a significant role in parasite control, with some farmers using herbal remedies like Aloe vera and Vernonia amygdalina as alternative treatments. While these methods were commonly used, their efficacy varied, and scientific validation was limited. The findings suggested the need for integrating traditional practices with modern veterinary approaches to enhance parasite control effectiveness.

Animal management practices varied among farmers, with some implementing strict hygiene measures and others struggling due to resource limitations. Farmers who maintained clean housing environments and provided clean water and feed reported fewer cases of parasite infections. However, a significant number of farmers lacked adequate housing structures, increasing exposure to parasite-infested environments. The study also found that farmers who regularly sought veterinary advice had better control over parasite infections, but financial barriers prevented many from accessing professional services. The dependence on self-treatment and over-the-counter dewormers without veterinary guidance led to inconsistent treatment outcomes.

Overall, the study demonstrated that while awareness of internal parasites was high, significant challenges hindered effective management. The findings underscored the need for improved veterinary services, targeted farmer training programs, and sustainable parasite control strategies. Integrated parasite management, including rotational grazing, proper sanitation, and strategic deworming, emerged as key recommendations for reducing parasite prevalence. Strengthening extension services and promoting affordable diagnostic tools could further enhance farmers' ability to manage internal parasites effectively, ultimately improving goat productivity and livelihoods in Chipinge District.

5.3 Conclusions

5.3.1 Prevalence and Distribution of Gastrointestinal Parasites

The study concluded that goat farmers in Chipinge District had a high level of awareness regarding internal parasites and their impact on productivity, but gaps remained in their ability to effectively control infections. While most farmers recognized the economic losses caused by parasites, their knowledge of specific symptoms and control measures varied, with more experienced and trained farmers demonstrating better understanding. Limited access to veterinary services and diagnostic tools hindered early detection and treatment, leading many

farmers to rely on visual assessments rather than laboratory tests. These findings align with Chibwana et al. (2021), who reported that awareness alone does not always translate into effective parasite management due to resource constraints and inadequate veterinary support. Similarly, Regassa et al. (2019) emphasized that reliance on physical symptoms for diagnosis often leads to mismanagement, resulting in increased parasite burdens. The study highlighted the need for targeted education programs and improved access to veterinary services to enhance farmers' knowledge and adoption of sustainable parasite control strategies.

5.3.2 Control and Management of Gastrointestinal Parasites in Goats

The study concluded that despite recognizing the importance of parasite monitoring and control, many farmers in Chipinge District lacked proper diagnostic tools and relied on physical symptoms to detect infections. The limited use of faecal egg count testing and veterinary consultations resulted in delayed or inaccurate diagnoses, leading to ineffective treatment strategies. Additionally, inconsistencies in deworming practices contributed to anthelmintic resistance, making parasite control more challenging. These findings are consistent with Leathwick et al. (2022), who emphasized that regular monitoring, including faecal egg count testing, is essential for reducing infection rates and managing drug resistance. Similarly, Kotze et al. (2020) reported that improper deworming practices accelerate resistance, decreasing treatment effectiveness. The study highlighted the need for accessible diagnostic tools and farmer training programs to promote evidence-based parasite management strategies.

5.3.3 Farmer Awareness and Animal Management Practices

The study concluded that while some farmers in Chipinge District implemented effective animal management practices, such as rotational grazing and improved sanitation, many faced challenges due to resource limitations and lack of technical knowledge. Farmers who maintained clean housing environments, provided clean water and feed, and sought veterinary advice reported lower parasite burdens, whereas those practicing communal grazing and irregular deworming experienced higher infection rates. These findings align with Chibwana et al. (2021), who emphasized that poor housing conditions and inadequate grazing management increase parasite transmission. Similarly, Adekunle et al. (2023) found that rotational grazing significantly reduces reinfection risks by disrupting parasite life cycles. The study highlighted the importance of integrating proper housing, sanitation, targeted deworming, and veterinary consultation into comprehensive parasite management strategies to improve goat health and productivity.

5.4 Recommendations

5.4.1 Recommendations for Policy

The study recommends that policymakers prioritize expanding veterinary services in rural areas by subsidizing veterinary costs and increasing the number of trained professionals accessible to smallholder farmers. Government programs should support community-based animal health workers to provide timely parasite diagnosis and treatment. Additionally, policies should promote integrated parasite management strategies, including proper grazing systems and sustainable deworming practices, to reduce anthelmintic resistance. These recommendations align with Madzimure et al. (2023), who emphasized the need for government intervention in improving access to veterinary care and training programs for small-scale farmers.

5.4.2 Recommendations for Practice

Farmers should adopt evidence-based parasite control measures, such as regular faecal egg count testing, rotational grazing, and improved sanitation in goat housing. Training programs should be implemented to enhance farmers' understanding of sustainable deworming practices and parasite monitoring. Collaboration between farmers and extension officers should be strengthened to ensure the effective adoption of integrated pest management strategies. These recommendations are supported by Leathwick et al. (2022), who found that targeted selective treatment and proper grazing management significantly reduce parasite burdens and slow down resistance development.

5.4.3 Recommendations for Future Research

Future studies should investigate the effectiveness of ethnoveterinary medicine, such as the use of Aloe vera and Vernonia amygdalina, in parasite control to provide scientific validation for traditional deworming practices. Research should also focus on the prevalence of anthelmintic resistance in Zimbabwe and evaluate cost-effective diagnostic tools suitable for smallholder farmers. Additionally, studies should assess the impact of climate variability on parasite distribution to develop adaptive control strategies. These recommendations align with Kotze et al. (2020), who highlighted the growing need for research on alternative parasite control methods and sustainable management strategies in livestock farming.

Appendices 1: Questionnaire

Instructions:

1. Please place an (**X**) in the box corresponding to your choice response to the given statement.

Section A: Biographical Details

1. Gender

Male ☐ **Female** ☐

2. Educational Qualifications

Primary Level ☐ **Secondary Level** ☐ **Tertiary Level** ☐

3. Age

<30 years ☐ **31 – 40 years** ☐ **41 – 60 years** ☐ **Above 60 years** ☐

4. Farming Experience

<3 year ☐ **4 – 8 years** ☐ **9 – 14 years** ☐ **Above 15 years** ☐

Section B: Demographic characteristics of goat farmers in Chipinge District with regards to controlling gastrointestinal parasites.

Given below are statements that relate to demographic characteristics of goat farmers in Chipinge District with regards to controlling gastrointestinal parasites. What is your level of agreement with each of the given statements? (**Key: 1** = Strongly Disagree; **2** = Disagree; **3** = Unsure; **4** = Agree; **5** = Strongly Agree)

ID	Question	1	2	3	4	5
B1	I am aware of the risks associated with internal parasites in my goat farm.					
B2	I have a good understanding of the signs and symptoms of internal parasites in goats.					
B3	I believe that internal parasites are a significant threat to my goat farm's productivity.					

B4	I have experienced losses due to internal parasites in my goat farm.					
B5	I think that veterinary services are essential in controlling internal parasites.					
B6	I think that internal parasites are a significant challenge to my goat farm's profitability.					

Section C: Level of awareness among goat farmers in Chipinge District regarding the prevalence of gastrointestinal parasites.

Listed below are statements that relate to level of awareness among goat farmers in Chipinge District regarding the prevalence of gastrointestinal parasites. What is your level of agreement with each of the given statements? (**Key: 1** = Strongly Disagree; **2** = Disagree; **3** = Unsure; **4** = Agree; **5** = Strongly Agree)

ID	Question	1	2	3	4	5
C1	I am aware of the common types of internal parasites that affect goats.					
C2	I know the signs and symptoms of internal parasites in goats.					
C3	I am aware of the economic impact of internal parasites on goat farming.					
C4	I am aware of the control measures for internal parasites in goats.					
C5	I understand the importance of monitoring for internal parasites in goats.					
C6	I understand the importance of monitoring for internal parasites in goats.					

Section D: Animal management practices of farmers in Chipinge District in relation to gastrointestinal parasite control.

Given below are statements that relate to animal management practices of farmers in Chipinge District in relation to gastrointestinal parasite control. What is your level of agreement with the given statements? (**Key: 1** = Strongly Disagree; **2** = Disagree; **3** = Unsure; **4** = Agree; **5** = Strongly Agree).

ID	Statement	1	2	3	4	5
D1	I provide clean water and feed to my goats to prevent internal parasites.					

D2	I ensure proper sanitation and hygiene in my goat housing to prevent internal parasites.					
D3	I rotate my goats to different grazing areas to prevent internal parasites.					
D4	I use deworming medication regularly to control internal parasites in my goats.					
D5	I seek veterinary advice when I suspect internal parasites in my goats.					
D6	I implement integrated pest management strategies to control internal parasites.					

Appendices 2: Interview questions

Objective 1:

1. Can you describe your experience with internal parasites in your goat farm?
2. How do you currently manage internal parasites in your goat farm?
3. What do you think are the most significant challenges in controlling internal parasites?
4. How do you think internal parasites affect your goat farm's productivity?
5. What strategies do you use to prevent internal parasites in your goat farm?

Objective 2:

1. How would you rate your knowledge of internal parasites in goats?
2. Can you describe the signs and symptoms of internal parasites in goats?
3. How do you currently diagnose internal parasites in your goat farm?
4. What do you think are the most effective control measures for internal parasites?
5. How do you stay updated on the latest information about internal parasites in goats?

Objective 3:

1. Can you describe your current animal management practices in relation to internal parasite control?
2. How do you ensure proper sanitation and hygiene in your goat housing?
3. What strategies do you use to prevent internal parasites in your goat farm?
4. How do you monitor your goats for signs of internal parasites?
5. Can you describe your experience with integrated pest management strategies for internal parasites?

Thank you for your time

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