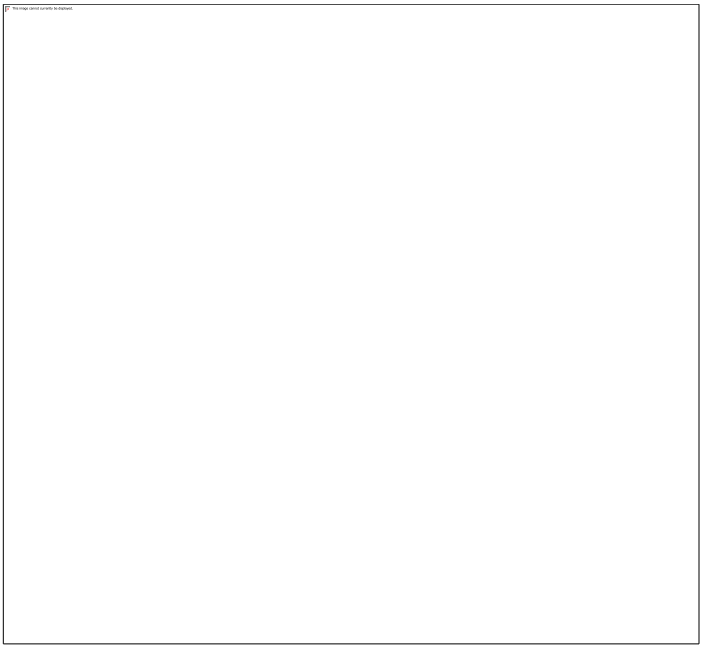
BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCE

INVESTIGATING THE ROLE OF ETHNOVETERINARY MEDICINAL PLANTS AS COMPLEMENTARY MEDICINES IN POULTRY HEALTH CARE



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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF THE BACHELOR OF AGRICULTURAL SCIENCE HONORS DEGREE IN ANIMAL SCIENCE

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DECLARATION

Student

I, Thelma, do hereby declare to Bindura University of Science Education that this research project is a result of my original research work. It is being submitted in partial fulfillment of the Bachelor of Agricultural Science Honors Degree in Animal Science. The findings of this research have never been submitted to any other institution.

Signature:  Date: 31/08/25

Supervisor: **Date:**

I have supervised the research project for the above mentioned student and I am convinced that the research project can be submitted.

Signature  …….. Date…31.8.25

ABSTRACT

This study investigated the role of ethnoveterinary medicinal plants (EVM) as complementary medicines in poultry healthcare within the female-dominated (57.5%) and experienced (46.7% aged 30-49 years) poultry industry of Majuru area, Goromonzi North district, Zimbabwe. Data from 120 respondents, primarily farmers (59.17%) with varying levels of education, revealed that 86% utilize EVM to manage common avian health constraints, with coccidiosis (98% prevalence) being a major concern addressed by the highest number of plant species. The other frequently cited diseases in the study were wounds (85%), coughing (81%), new castle diseases (79%) and the least cited were blindness (6%) and helminthiasis (3%). Twenty-five plant species were identified, with *Aloe vera (120)* being the most frequently used, primarily prepared by crushing and administered orally (68%). Other frequently pointed plant species were *Erythrina abyssinica* (94), *Lippia javani*a (81), *Albizia adianthifolia* (80) and *Xinemia Americana* (78). Farmers largely perceived EVM as very effective (81.6%), driven by cost (41 respondents) and availability (37 respondents). Several plants, including *Moringa oleifera* and *Capsicum frutescens*, show potential for feed additive development. Despite this reliance, challenges including limited scientific evidence and lack of standardization were noted. The study concludes that EVM plays a significant complementary role due to economic and accessibility factors, highlighting the need for scientific validation and standardized practices to optimize their integration with conventional veterinary medicine for improved poultry health and livelihoods in the district.

DEDICATION

Special dedication goes to my late mother, Maud Chiketero. Rest in Peace Mum.

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My heartfelt appreciation goes to my grandmothers who have been always there for me, Mrs. Alice Chiketero and Mrs. Caroline Museka, my aunt Miss Princess Chiketero and my uncle who stood by my side Mr. Tanaka E Museka, for their undying love and unwavering support and encouragement during stressful moments. A special acknowledgement goes to my supervisor, Mr. TNC. Mangwiro, I benefited immensely from his vast experience, advice given, and encouragement towards the successful accomplishment of this research project. He selflessly rose to the occasion anytime I sought after his feedback which helped me to navigate through the unavoidable hurdles I faced. I would also like to pass my gratitude to my personal mentor Mr. C. Bvukumbwe who has always been there for me whenever I needed help. I would also like to extend my gratitude to Dr. Sikireta and Mrs. Sikireta for their financial support and encouragement towards the success of my education. I would like to be also grateful to my colleagues; special mention goes to Jowa Jean for her unwavering support. Much gratitude goesto the entire BUSE staff especially Animal Sciencedepartment for their immeasurable support towards the success of this research. Above all, I would like to thank the LORD Almighty for granting me the strength and courage to endure through hard times and for giving me the ability to understand whatever I was tasked to do.

Contents

ABBREVIATIONS

EVM	Ethnoveterinary medicine
WHO	World Health Organization
ATR	African Traditional Religion
FAO	Food and Agriculture Organization
AMR	Antimicrobial Resistance

TABLE OF FIGURES

LIST OF TABLES

Chapter One: Introduction

1.1Introduction

Poultry production is a vital component of livelihoods and food security in Zimbabwe, including the Goromonzi district, contributing significantly to household income and nutrition (Zimbabwe Ministry of Agriculture, 2021). However, the sector faces persistent challenges from avian diseases, which can severely impact productivity and economic viability, particularly for smallholder farmers who constitute a significant portion of the poultry industry (FAO, 2020). Conventional veterinary medicines, while often effective, can be financially prohibitive and geographically inaccessible for these farmers, necessitating the continued use of traditional knowledge and locally sourced ethnoveterinary medicinal plants (EVM) for poultry healthcare (Matekaire & Meyer, 2002).

This study centers on the role of these EVM as complementary medicines in poultry healthcare within the Goromonzi North district, ward 16. The study aims to identify the repertoire of plant species employed, elucidate the socio-economic and cultural determinants influencing their application, evaluate farmers' perceptions regarding their effectiveness, and explore the potential for integrating these traditional remedies with contemporary poultry management practices, including their possible development as natural feed additives.

Investigating the current utilization of EVM in poultry healthcare in Goromonzi district holds significant relevance. Firstly, it serves to document and potentially validate a rich body of indigenous knowledge that could offer sustainable and affordable solutions for disease management in poultry (Gobvu et al., 2023). Secondly, it provides critical insights into the healthcare strategies adopted by resource-constrained farmers in response to the limitations of conventional veterinary services. Thirdly, a scientific understanding of the efficacy and safety of these plant-based remedies can inform evidence-based approaches for their potential integration into mainstream poultry healthcare, ultimately contributing to improved animal health and enhanced livelihoods for farmers (Jambwa et al., 2021).

This research aims to identify the specific plant species that are recognized and utilized as EVM for poultry healthcare by farmers in Goromonzi district in order to understand their different roles as complementary medicines in poultry healthcare. It also aims to assess the perceptions and attitudes of poultry farmers in Goromonzi district, ward 16, towards the utilization of

ethnoveterinary medicinal plants in addressing poultry health challenges. Additionally, it aimed to investigate the economic and livelihoods strategies that significantly influence the reliance and continued use of ethnoveterinary medicinal plants in poultry healthcare among farmers in Goromonzi district, ward 16. Furthermore, it aims to identify the socio-economic and cultural factors that are significantly influencing the reliance and continued use of EVM. More to that, the study will explore the potential opportunities and inherent challenges associated with the integration of ethnoveterinary medicinal plant remedies with conventional veterinary practices in poultry healthcare within Goromonzi district, ward 16 including the exploration of natural feed additive development.

Besides the first chapter, the thesis has other chapters which will largely contribute to the overall aim. Chapter Two will provide a comprehensive review of the existing scholarly literature pertaining to ethnoveterinary medicine, the spectrum of prevalent poultry diseases, and the documented potential of medicinal plants in animal healthcare, encompassing both global perspectives and the specific context of Zimbabwe. Chapter Three will meticulously detail the methodological framework employed in this study, including a description of the study area, the sampling techniques utilized, the design and administration of the primary data collection instrument (the questionnaire), and the procedures for data analysis. Chapter Four will present the empirical findings of the research, encompassing the demographic characteristics of the surveyed respondents, their prevailing poultry farming practices, the specific EVM plants identified and their reported uses, the farmers' perceptions of their effectiveness, and the key factors influencing their utilization. Chapter Five will engage in a critical discussion of these results in relation to the existing body of literature and the study's stated objectives, underscoring the significance of EVM within the local context and exploring avenues for future research and potential development. Finally, Chapter Six will synthesize the key findings of the study, offer a comprehensive conclusion, and propose recommendations for future research endeavors and the potential integration of EVM into mainstream poultry healthcare systems.

1.2 Background of the study

Globally, the poultry industry is a significant contributor to food security and economic development, particularly in developing countries where small-scale farming plays a vital role (FAO, 2021). However, the sustainability and profitability of poultry production are often threatened by the prevalence of various infectious and non-infectious diseases. The reliance on

conventional veterinary medicines, including antibiotics and synthetic drugs, has raised concerns regarding issues such as antimicrobial resistance, high costs for smallholder farmers, and limited accessibility in remote areas (WHO, 2019).

In the African context, and specifically in Zimbabwe, smallholder poultry production is a critical component of rural livelihoods, providing income, protein, and social capital (Zimbabwe Ministry of Agriculture, 2021). However, these systems often face significant challenges in accessing timely and affordable veterinary care. This has historically fostered the development and perpetuation of traditional knowledge systems for managing animal health, utilizing locally available plant resources (Gonese et al., 2008). Ethnoveterinary medicine (EVM), the holistic interdisciplinary study of indigenous knowledge and its skills, practices, beliefs, and social organization applied to the treatment of animal diseases and the maintenance of animal health and production, represents a valuable repository of such knowledge (Mathias, 1996).

Numerous studies across Africa have documented the diverse range of plant species used traditionally for treating poultry ailments (Hedimbi, 2008; Wanzala et al., 2005). These practices often involve readily available plants prepared through simple methods, offering a cost-effective and accessible alternative to conventional drugs. Research has begun to scientifically validate the efficacy of some of these plants, identifying bioactive compounds with antimicrobial, anti-parasitic, and immunomodulatory properties (Bizimenyera et al., 2006). However, comprehensive documentation and scientific scrutiny of EVM practices in specific regions like Goromonzi district in Zimbabwe remain crucial for understanding their potential and limitations.

Existing literature suggests that the use of EVM is influenced by a complex interplay of factors, including economic constraints, the availability of conventional veterinary services, cultural beliefs, and the perceived efficacy of traditional remedies (Matekaire & Meyer, 2002). Understanding these dynamics is essential for determining the current role of EVM and exploring pathways for its potential integration into mainstream animal health management. Furthermore, the growing interest in natural feed additives to improve animal health and reduce reliance on synthetic compounds presents an opportunity to explore the potential of some of these traditionally used plants in poultry nutrition (Brennan & Shah, 2011). This research aims to contribute to this body of knowledge by providing a detailed investigation of EVM use in poultry healthcare within

Goromonzi district, identifying existing practices, assessing farmer perceptions, and exploring avenues for future research and development.

1.3 Statement of the problem

Poultry health is compromised by diseases outbreaks, resulting in 30-40% mortality rate and significant economic losses in developing countries (Wever et al., 2015). Poultry farmers in Goromonzi district, like many other smallholder producers in Zimbabwe, face significant challenges in maintaining the health of their flocks due to the prevalence of diseases such as coccidiosis (Bhebhe et al., 2005). Access to and affordability of conventional medicines often remains a barrier leading to continued reliance on locally available EVM plants. While these traditional practices are widespread, there is a limited understanding of the specific plant species utilized in this region, the scientific basis for the perceived efficacy and the potential for the integration with modern poultry health care strategies. More to that, the potential for these plants as natural feed additives to promote poultry health and productivity has not been thoroughly explored. This study seeks to address this gap by systematically documenting the EVM practices in Goromonzi North district ward 16, evaluating farmers' perceptions and identifying opportunities for future research and development in this area.

1.4 Justification of the study

Poultry keeping is a vital component of the rural economy and household food security in Ward 16 and similar communities across Zimbabwe. Poultry provide essential products such as meat, and eggs, manure, and income. Maintaining the health and productivity of these livestock is therefore crucial for supporting the overall wellbeing and resilience of small-scale farmers. This study holds a significant importance for several stakeholders. Firstly for the poultry farmers in Goromonzi district, the research provides a documented account of their existing EVM practices, potential for validating their traditional knowledge and highlighting the effective remedies. This information can empower farmers to make more informed decisions regarding poultry healthcare, potentially reducing reliance on expensive conventional medicines and improving the economic sustainability for the operation. Understanding the perceived efficacy and potential risk associated with different EVM practices can also contribute to better flock management and reduce economic losses due to diseases. Secondly, the study offers valuable insights for veterinary practitioners and agricultural extension officers working in this region. Therefore, by identifying commonly used and reportedly effective EVM plants, this research can inform the development of integrated

animal health management strategies that incorporate both traditional and conventional approaches. Understanding farmer perceptions and challenges associated with EVM use can also facilitate more effective communication and the design of relevant training and support groups.

Additionally, this research contributes to broader body of scientific knowledge on EVM in Zimbabwe and beyond. Thus, by documenting the specific plant species utilized their preparation methods, reported uses, the study provides a foundation for future scientific investigations into pharmacological properties of these plants. Identifying plants with potential as feed additives can also contribute to the development of natural and sustainable solutions for improving poultry health and productivity, potentially reducing the reliance on synthetic drugs and mitigating the risk of antimicrobial resistance.

1.5 Study objectives

1.5.1 Main objective

- To investigate the role of different ethno veterinary medical plants as complementary medicines in poultry health care.

1.5.2 Specific objectives

- To identify and document complementary plant medicines that are used in poultry ethno veterinary medicine including their local names, part of plants used, level of usage, traditional preparation and application methods.
- To identify ethnoveterinary plants with potential to be used for the development of feed additives.
- To investigate the economic factors and livelihood strategies that influence the reliance on and continued use of ethno-veterinary medicine among small-scale livestock keepers in the study area.
- To identify opportunities and challenges for the sustainable integration of ethno-veterinary practices into mainstream animal healthcare delivery systems in Ward 16 and similar resource-constrained rural communities.
- To evaluate the perception and attitudes of the veterinary medical department towards the utilization of ethno-veterinary medical plants in this community.

- To evaluate the therapeutic efficacy of the identified ethno-veterinary medicinal plants in treating common animal diseases and health problems prevalent in Goromonzi District.

1.6 Hypothesis

H_a 1(Alternative Hypotheses) - There is a significant therapeutic potential of EVM in treating various poultry diseases and conditions prevalent in Ward 16, such as gastrointestinal infections, skin infections, respiratory problems, and reproductive issues.

H_a 2(Alternative Hypotheses) - There is a significant impact on integration of validated and safe ethno-veterinary medicinal plant practices into mainstream animal healthcare delivery systems.

H_a 3(Alternative Hypotheses) - There is a significant impact on the economic factors and livelihood strategies influencing the reliance and continued use of EVM by small-scale livestock keepers.

Chapter Two: Literature Review

2.1 Introduction

The use of ethnoveterinary practices, particularly the application of medical plants in animal healthcare, has gained significant attention in recent years. These practices are rooted in traditional knowledge and have been used by various cultures for centuries. In poultry health care, ethnoveterinary medical plants serve as alternatives to conventional veterinary medicines, offering a range of benefits including improved health, reduced disease incidence and enhanced productivity.

2.2 Perspectives on Traditional Knowledge and Ethnoveterinary Practices

Ethnoveterinary medicines refer to the traditional practices and knowledge systems used by local communities to diagnose and treat animal diseases. Ethnoveterinary practices are culturally embedded, and they often include the use of local plants that possess medicinal properties (Tadesse et al. 2016). These practices encompass local knowledge about animal healthcare, including the use of plants, minerals and animal product.

Globally, ethnoveterinary medicine represents a significant aspect of animal healthcare, particularly in resource-limited settings across the globe. Studies from Asia (McCorkle, 1986), Latin America (Lans et al., 2000), and Africa (Hedimbi, 2008) highlight the diverse range of plant species utilized for treating livestock and poultry ailments. These traditional practices often reflect generations of accumulated knowledge regarding the therapeutic properties of local flora. The World Health Organization (WHO) and the Food and Agriculture Organization (FAO) have increasingly recognized the importance of documenting and scientifically evaluating EVM, acknowledging its potential to contribute to sustainable animal healthcare and food security, especially in regions with limited access to conventional veterinary services (WHO, 2000; FAO, 2011).

In Africa, EVM plays a crucial role in livestock and poultry management, often serving as the primary source of healthcare for animals in rural communities (Bizimenyera et al., 2006; Wanzala et al., 2005). Hassan et al., (2020) explored the utilization of indigenous plant species in poultry management among rural communities in Nigeria, emphasizing the cultural significance and effectiveness of these practices. Zimbabwe, with its rich biodiversity and cultural heritage, has a long history of utilizing traditional remedies for both human and animal health (Gelfand et al., 1985). Several studies have documented the use of various plant species

for treating livestock diseases in Zimbabwe (Gonese et al., 2008; Matekaire & Meyer, 2002). Additionally, in Zimbabwe, ethnoveterinary practices are particularly prevalent in rural area, where access of the formal veterinary medicines is limited (Mabaya et al., 2020).

However, research specifically focusing on EVM for poultry healthcare in Zimbabwe, while growing, remains less extensive compared to studies on larger livestock species. Existing studies, such as those by Jambwa et al. (2021) and Gobvu et al. (2023), provide valuable insights into the plant species used and farmer perceptions in specific regions, highlighting the potential of plants like *Aloe Vera*, and *Moringa oleifera*.

Ethnoveterinary practices often make use of locally available resources, making them more accessible to rural farmers (Mekonnen et al., 2018). According to Nekky (2020), these practices are deeply rooted in cultural traditions, enhancing their acceptance among local communities. However, the efficacy of these practices can vary widely, leading to inconsistent results (Giday et al., 2021). Also, some plants used in EVM may have adverse effects if not used correctly (Osei et al., 2021).

2.3 Poultry healthcare

Poultry healthcare encompasses all practices and interventions aimed at maintaining the health, well-being, and productivity of domestic fowl, including chickens, turkeys, ducks, and geese (Mammeri et al., 2020). It involves preventative measures, early disease detection, accurate diagnosis, and effective treatment of ailments, as well as the implementation of biosecurity protocols and appropriate environmental and nutritional management (Alltech, et al., 2024). The ultimate goal of poultry healthcare is to optimize bird performance, minimize losses due to disease, and ensure the production of safe and high-quality poultry products.

Poultry healthcare in Zimbabwe involves various practices including vaccination, biosecurity and diseases management. Vaccination programs are widely implemented to prevent common diseases such as new castle diseases and avian influenza (Mtetwa et al., 2020). Biosecurity measures such as controlling access to poultry houses and regular cleaning with disinfectants are also emphasized to reduce diseases transmission. According to Mtetwa (2020), vaccination and biosecurity measures have led to improved poultry health and productivity. Thus a healthy poultry contributes to income generation for farmers and food security for communities (Mutsvangwa et al., 2021).

In many parts of the world, including Zimbabwe, poultry farmers, particularly those in rural and resource-poor communities, utilize ethnoveterinary medicine (EVM) as a primary or complementary approach to poultry healthcare (Masimba et al., 2011; Gobvu et al., 2023). Similarly, in Goromonzi, local poultry farmers often rely on traditional remedies alongside modern veterinary practices. This dual approach helps managing common ailments but may lack efficacy against more severe diseases (Chikukwa & Nyoni, 2019). Farmers often acquire this knowledge through traditional inheritance and local experience (Maroyi, 2012). Farmers identify and collect specific plants known for their therapeutic properties based on traditional knowledge. However, many smallholder farmers in Goromonzi lack access to veterinary services, leading to inadequate healthcare (Chikumba & Nyoni, 2019). Mutsvangwa (2021) also added that, some farmers are hesitant to adopt modern veterinary practices, preferring traditional methods that may not be effective.

Currently, there is a growing interest in integrating technology into poultry healthcare. Innovations such as mobile health applications and ethno-veterinary services are being explored to improve access to veterinary advice (Chikumba et al., 2022). Additionally, research is on-going into developing vaccines that are more effective against specific local poultry diseases. These include continuous research which aims to develop more effective vaccines, diagnostic tools, and treatment strategies for emerging and existing poultry diseases. There is also increasing interest in alternative disease management strategies to reduce reliance on antibiotics due to the threat of AMR (MDPI, 2024). Also farmers are being provided with access to information, training, and technical support on best practices in poultry health management is crucial for effective disease prevention and control (IFLA Library, 2016).

However, despite advancements in poultry healthcare, the industry continues to face failures and struggles due to several interconnected factors. Firstly, there is inadequate implementation of biosecurity measures which remains a major cause of disease outbreaks (Broiler Health Management, 2023). Secondly, there is failure to recognize early signs of disease can lead to rapid spread and increased mortality within flocks (UNH Extension, 2022). In many regions, particularly in resource-limited settings like parts of Zimbabwe, access to qualified veterinarians and diagnostic facilities is limited (Gororo & Kashangura, 2016). Furthermore, the expense of pharmaceuticals and vaccines can be a significant barrier for smallholder farmers, leading to under-treatment or a lack of preventative measures (Research Gate, 2023).

Also, the constant threat of new and highly contagious diseases, such as highly pathogenic avian influenza, poses a significant challenge to the industry (Guyer, 2020). Lastly, the increasing prevalence of AMR complicates the treatment of bacterial infections, leading to treatment failures and increased mortality (WHO, 2022).

2.4 The poultry industry

The poultry industry globally faces a complex array of challenges that impact its sustainability, profitability, and contribution to food security. These challenges span biological, economic, environmental, and social dimensions. Disease outbreaks, such as Avian Influenza and Newcastle disease, remain a persistent threat, capable of causing significant mortality rates and economic losses, often exacerbated by intensive farming practices and increased trade in poultry products (OIE, 2023). The emergence of antimicrobial resistance (AMR), driven by the overuse of antibiotics in poultry production, poses a significant public health concern, necessitating a shift towards alternative disease management strategies (WHO, 2022).

Economic challenges are also prominent, with fluctuating market prices for poultry products and rising input costs, particularly for feed, placing considerable pressure on producers' profit margins (Farrelly M et al., , 2024). Climate change and environmental concerns add another layer of complexity, with extreme weather events affecting feed production and the need for sustainable waste management practices becoming increasingly critical (Farrelly M. et al., 2024). Furthermore, evolving consumer preferences towards higher welfare standards and antibiotic-free poultry products necessitate adaptations in production systems and supply chains (Brennan & Shah, 2011). Labor shortages and workforce challenges in processing plants and on farms represent a growing social and economic constraint in many regions (Farrelly M. et al., 2024).

In the specific context of Zimbabwe, the poultry industry faces a unique set of challenges, often amplified by the country's economic situation and agricultural context. While the sector has shown resilience (Animal Feed Middle East & Africa, 2025), producers grapple with issues such as the high cost and inconsistent availability of quality feed, reliance on imports for certain inputs, and the impact of climate-related events on local feed production (Zengeni, 2019). Disease management remains a significant hurdle, with outbreaks of Newcastle disease and coccidiosis being common, particularly in smallholder systems with limited access to vaccines and veterinary services (ProAgri Media, 2025). Additionally, access to capital, reliable infrastructure (including energy and water), and technical support services pose considerable constraints for many poultry farmers (Gororo & Kashangura, 2016). Addressing these multifaceted challenges requires integrated strategies that encompass improved biosecurity measures, sustainable feed sourcing, investment in infrastructure and technology, and the exploration of alternative healthcare approaches like ethnoveterinary medicine.

2.5 Importance of poultry in Zimbabwe

Poultry farming is a significant agricultural sector in Zimbabwe, contributing to food security, income generation and employment creation. Poultry farming is a crucial source of income for many households in Goromonzi. According to Matarirano (2020), poultry serves as a viable economic activity that enhances food security and security and provides a steady source of cash. The sale of eggs and meat contributes significantly to household income, enabling families to meet their basic needs and invest in education and healthcare.

Secondly, poultry is a rich source of protein and essential nutrients. As highlighted by Chikangwe et al. (2021), the consumption of poultry products helps combat malnutrition, particularly among vulnerable populations such as children and pregnant women. The affordability and accessibility of poultry products make them a staple in the local diet. Additionally, according to Zimbabwe Poultry Association (2020), poultry production is a vital source of protein for the local population and plays a crucial role in the country's economy.

In addition to that, the poultry sector creates various employment opportunities, ranging from small-scale farming to processing and distribution. The World Bank (2019) highlighted that the expansion of poultry farming has led to job creation in Goromonzi, reducing unemployment rates and improving livelihoods in the community.

The sector not only supports the livelihoods of the smallholder farmers but also engages a vast network of suppliers and distributors. However, health challenges particularly diseases and parasites, threaten poultry productivity (Chaka et al., 2017).

2.6 Efficacy and effectiveness of Ethnoveterinary Practices

EVM utilizes traditional knowledge and practices to manage animal health. Some studies have highlighted the efficacy of ethnoveterinary practices in treating poultry ailments. For example, Moyo et al., (2019) demonstrated that local plants used in Zimbabwe show promising antimicrobial and anti-inflammatory properties. Some studies have also shown that certain herbal treatment can be effective against diseases like coccidiosis and respiratory infections (Khan et al., 2018). Bashir (2021) also added that EVM can enhance the overall health and productivity of poultry when used alongside conventional treatments. However, many EVM practices lack rigorous scientific validation, raising concerns about their reliability (Mekonnen et al., 2018). Thus more systematic research is required to validate these practices and quantify their effectiveness compared to conventional veterinary medicines (Ndlovu et al., 2021).

2.7 Medicinal plants used in poultry healthcare and their application.

Plant parts such as leaves, roots, stems, and fruits are prepared using simple methods like crushing, pounding, boiling, or soaking in water to extract the active compounds (Gobvu et al., 2023). Remedies are typically administered orally through drinking water or feed, or applied topically to wounds and skin conditions (Jambwa et al., 2021). Application to the floors of poultry houses for pest control has also been reported (Jambwa et al., 2021).

Numerous studies have identified specific medicinal plants that are used to treat various ailments in poultry. Research indicates that various medicinal plants are used by poultry farmers in Goromonzi for treating ailments. Commonly used species include *Aloe Vera, Zinger officinale* and *Moringa oleifera* and these plants are used to treat diseases such as coccidiosis, respiratory infections and ectoparasites infestations (Mavundla et al., 2020). Similarly, a study by Nyanga et al. (2017) identified several plants, including *Aloe Vera*, *Zingiber officinale* (ginger) and *Allium sativum* (garlic) are commonly used for their antimicrobial and anti-inflammatory properties. These plants are utilized to alleviate respiratory diseases, improve digestion and enhance overall poultry health. A study by Chukwudi (2021) also highlighted that the antimicrobial properties of plants such as garlic *(Allium sativum)* and ginger *(Zingiber officinale)* are commonly used to enhance immunity and control infections in poultry. In addition to that, Khan (2019) demonstrated the efficacy of a plant called neem (*Azadirachta indica*) in controlling ectoparasites and promoting overall health in chickens. Preparations methods often involve soaking and crushing to create infusions, decoctions and poultices that are administered to the birds with specific parts like leaves, roots, barks, seeds and flowers. However comprehensive documentation of specific plant parts and their preparation methods remains limited, indicating a research gap (Chidyausiku et al., 2022). Key plants species identified in some researches include Aloe Vera which is known for its soothing properties, often applied in cases of skin infections and respiratory issues in poultry (Moyo et al., 2021). Secondly, ginger is recognized for its ability to enhance immunity and boost appetite in chickens, making it a popular choice among local farmers (Chikwanda et al., 2019). Lastly, garlic is widely acknowledged for its antimicrobial and antiviral properties, serving as a preventive measure against various diseases in poultry (Mushonga et al., 2018).

2.8 Cultural Significance of Ethnoveterinary medicine

Ethnoveterinary practices are deeply rooted in the cultural traditions of Zimbabwean communities. EVM practices are often part of the cultural identity of communities, preserving traditional knowledge (Gueye et al., 2020). These practices are often passed down through generations and are intertwined with local beliefs and customs regarding animal husbandry (Munyati et al., 2018). The reliance on EVM in Zimbabwe reflects a broader trend across Africa, where traditional practices are often preferred due to their accessibility and cost effectiveness compared to conventional medicines. Ethnoveterinary practices not only provide immediate solutions for poultry health issues but also preserve cultural heritage and traditional knowledge systems. According to Nekky (2020), these shared practices foster community cohesion and resilience.

2.9 Documentation of Ethnoveterinary Knowledge

Documentation of ethnoveterinary knowledge is crucial for preserving traditional practices. According to Chisoro (2020), some studies have begun to catalogue the medicinal plants used in poultry healthcare. These initiatives to document and catalog traditional knowledge can help in research and education (Gidday et al., 2021). Engaging local communities in documentation can empower them and promote the accuracy of the information (Osei et al., 2021). However, systematic documentation remains sparse. Therefore there is a pressing need for ethno-botanical surveys and the creation of databases to conserve indigenous knowledge and support sustainable practices.

2.10 Level of usage and factors influencing the use of Ethnoveterinary medicines

In many rural areas, farmers rely heavily on traditional practices due to limited access to modern veterinary services (Mekonnen et al., 2018). The utilization of EVM varies amongst poultry farmers in Goromonzi, with some relying heavily on traditional remedies while others prefer conventional veterinary medicines (Mavundla et al., 2020).

The adoption and continued use of EVM are influenced by a complex interplay of socio-economic and cultural factors. Cost-effectiveness and local availability often drive the reliance on traditional remedies, particularly in resource-limited settings where access to conventional veterinary services is constrained (Matekaire & Meyer, 2002). Cultural beliefs, traditional knowledge passed down through generations, and the perceived efficacy based on experience

also play significant roles (Mathias, 1996). However, factors such as a lack of awareness about proper usage, distrust of traditional practices, the influence of modern veterinary medicine, and a potential generational knowledge gap can hinder the wider adoption and integration of EVM (Jambwa et al., 2021).

2.11 Benefits of ethnoveterinary medicine

The application of ethnoveterinary practices offers several advantages. Firstly, the use of medical plants can reduce reliance on synthetic drugs, thereby reducing the risk of antibiotic resistance (Saeed et al. 2021). Secondly, integrating ethnoveterinary practices with conventional approaches can lead to better health outcomes and increased productivity in poultry farming (Sharma et al. 2021). More so, according to Chigwedere (2020) ethnoveterinary medicines are often less expensive than conventional veterinary services, making them more accessible and affordable for smallholder, hence sustainable agricultural practices. Zimudzi et al., (2021), highlighted that local farmers have a strong cultural affinity for traditional practices, which enhances compliance and trust in the treatment methods used. The utilization of local plants promotes sustainable agricultural practices and biodiversity conservation according to Muposhi et al., (2017).

2.12 Perception on ethnoveterinary medical plants

The perception of ethnoveterinary medical plants varies amongst different stakeholders, including farmers, learners and conventional veterinary departments; firstly, many farmers particularly in rural areas have a strong belief in the efficacy of traditional remedies. According to Meyer (2021), farmers prefer using local plants due to their accessibility and low costs. However, there is also recognition of the need for scientific validation to enhance trust in those practices (Moyo et al., 2019).

Secondly, veterinary students and other researchers often express interest in incorporating ethnoveterinary knowledge into their studies. Their perception is shaped by a desire to bridge traditional knowledge with scientific research, emphasizing the importance of integrating the practices into veterinary education (Ndlovu et al., 2021).

In addition to that, conventional veterinary practitioners may exhibit skepticism towards ethnoveterinary practices, primary due to a lack of scientific evidence supporting their efficacy

(Meyer et al., 2021). However, there is growing recognition of the potential benefits of integrating EVM into conventional practices, particularly in resource-limited settings.

2.13 Potential for the Integration of Ethnoveterinary and Conventional Practices

Integrating ethnoveterinary medicine with convectional veterinary practices presents numerous opportunities and challenges. The collaborative approach can enhance the overall effectiveness of poultry healthcare by combining the strength of both systems. According to Ndlovu et al., (2021), using ethnoveterinary remedies alongside conventional medications can reduce the dosage of synthetic medications and minimize side effects. However successful integration requires addressing the skepticism among conventional veterinarians and this can be achieved through collaborative research efforts that validate the efficacy of ethnoveterinary plants and establish guidelines for their use in conjunction with conventional treatments (Meyer et al., 2021).

2.14 Challenges and considerations

Despite the benefits, there are challenges associated with the use of ethnoveterinary medical plants. Variability in plant efficacy, potential toxicity, and lack of standardization are significant concerns (Mishra et al. 2020). To add on to that, Mugabe (2021), stated that the effectiveness of medical plants can vary based on factors such as preparation methods and environmental conditions, which may lead to inconsistent results. Many ethnoveterinary practices lack rigorous scientific validation, leading to skepticism among some stakeholders (Chikozho et al., 2020). The rapid modernization of agriculture threatens the transmission of traditional knowledge, as younger generation may not be familiar with these practices (Kange'ethe et al., 2018). Furthermore, the erosion of traditional knowledge due to modernization and globalization poses a significant threat to the sustainability of these practices.

2.15 Scientific Validation of Medicinal Plants in Animal Health

The increasing interest in EVM has spurred scientific investigations into the pharmacological properties of traditionally used plants. Studies have explored the antimicrobial (Okpekon et al., 2007), anti-parasitic (Bizimenyera et al., 2006), anti-inflammatory (Chiu et al., 2013), and immunomodulatory (Fahey, 2005) activities of various plant extracts and compounds relevant to poultry diseases. For instance, research on Aloe Vera has demonstrated its potential wound-healing and antimicrobial properties (Choi & Chung, 2003), while capsaicin from Capsicum

frutescens has shown promise as a natural growth promoter and immune stimulant in poultry (Lee et al., 2017). Similarly, Moringa oleifera has been investigated for its nutritional and antimicrobial benefits (Fahey, 2005), and ginger (Zingiber officinale) for its antioxidant and anti-inflammatory effects (Zhang et al., 2009). However, the scientific validation of many traditionally used EVM plants, used to treat poultry diseases in Zimbabwe, remains limited.

2.16 Future direction of EVM practices.

The future of ethnoveterinary medicine lies in its strategic integration with conventional veterinary practices, moving beyond anecdotal evidence through rigorous scientific validation of traditionally used remedies (Abo-El-Sooud, 2018). This necessitates collaborative, multidisciplinary research involving ethno botanists, pharmacologists, and veterinarians to identify bioactive compounds, establish standardized preparations and dosages, and assess safety and efficacy (Matekaire & Meyer, 2002). Furthermore, recognizing the socio-economic and cultural significance of EVM within communities like Goromonzi district is crucial for developing sustainable animal healthcare systems that are both accessible and affordable (McCorkle et al., 1999). Future efforts should also focus on knowledge preservation through documentation and intergenerational transfer, sustainable harvesting practices, and exploring the potential of EVM plants as natural feed additives to promote poultry health and reduce reliance on synthetic drugs, ultimately contributing to a more holistic and resilient approach to animal healthcare (WHO, 2000).

Chapter Three: Methodology

3.1 Study area

The research was conducted in Ward 16, Goromonzi North District of Mashonaland East Province in Zimbabwe. The study area is located in Region 2 of Zimbabwe. The latitude and longitude of Goromonzi, Zimbabwe are approximately -17.856242 and 31.3798921 respectively. It lies approximately 70 kilometres east of Harare, the capital city. The average elevation ranges between

1,200 and 1,500 meters above sea level. The average annual rainfall is around 700-800 mm, concentrated in the summer months (November to March). The average annual temperature is approximately 20°C.

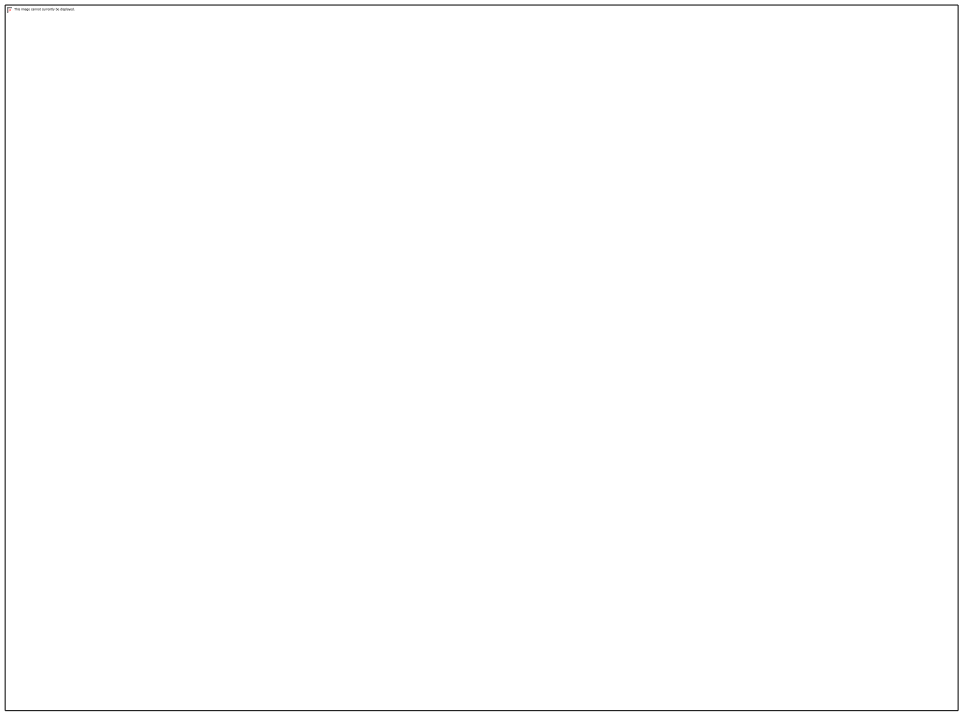


Figure 1: Map of Goromonzi District showing the study area

3.2 Data collection and methods

3.2.1 Ethno-botanical Survey

This study employed a descriptive cross-sectional survey design to investigate the role of ethnoveterinary medicinal plants (EVM) as complementary medicines in poultry healthcare within the Goromonzi district, ward 16, Zimbabwe. A structured questionnaire served as the primary data collection tool to gather both quantitative and qualitative information from poultry farmers.

The researcher administered the questionnaires through face-to-face interviews with the selected poultry farmers using the both local language (Shona) and English. Informed consent was obtained from each participant before the commencement of the interview. The interviews were conducted at the farmers' residences or poultry rearing sites to ensure a comfortable and familiar environment.

A total of 180 questionnaires were issued and 120 were returned. The researcher spent time with local poultry farmers in some surrounding villages in the area (Chiketero village, Muchatuta

village, Yafele village, Gwaze village, and Majuru area), observing their practices and interacting with them. In-depth interviews were conducted with key informants that included traditional healers, experienced farmers, and veterinary practitioners in the convectional veterinary department.

Detailed information on the ethnoveterinary plants used was recorded by the researcher including their vernacular name, parts of plant used, method of preparation, administration method and the different health constraints they treat. Demographic information of the respondents was also collected including gender, age, level of education, age, occupation and religion. The collected data also included types of poultry species reared, scale of poultry farming, and level of usage of ethnoveterinary medicinal plants, effectiveness and efficacy as well as challenges being experienced through the use of ethnoveterinary medicinal plants.

The questionnaire was pre-tested on a small group of poultry farmers outside the study ward to ensure clarity, comprehensibility, and the relevance of the questions. Necessary adjustments were made to the questionnaire based on the pre-test feedback.

3.2.2 Plant collection and identification

Information of medicinal plants was pointed out by the respondents. A total of 25 plant species were mentioned by the respondents. They provided the local names (Shona names) of these plants. Some field observations helped the researcher to identify the different plant species that were pointed out by the respondents. A botanist by the name Mrs. Nyambi helped identify the botanical names of the mentioned plant species.

3.2.3 Socio-economic Surveys

A survey was done to the farmers on their socio-economic characteristics like age, education, income and access to veterinary services. Also an investigation was done by the researcher to find the factors influencing their choice of treatment options which included cost, availability, efficacy, convenience and cultural beliefs based on the questionnaire. The information obtained was used to assess the perceived benefits and limitations of using ethno veterinary medicine.

3.3 Study population

The key informants included poultry farmers both in small scale and commercial poultry farmers, traditional herbalists (those who specialize in ethno-veterinary medicines) and veterinary practitioners (those in the con-vet department).

3.4 Sampling procedure

A purposive sampling technique was utilized to select participants who had experience using ethnoveterinary medicinal plants for their poultry. This ensured that the data collected was relevant to the research objectives. Snowball sampling was also employed to identify additional participants through referrals from initial respondents, thereby maximizing the inclusion of EVM users within the study area.

3.5 Data analysis

The researcher identified themes, patterns, and key concepts within the transcribed data and assigned codes to different segments of text that represented these themes. The data were analyzed for variance using statistical packages like MS excel, Google sheets and SPSS. This was done to ensure data completeness and accuracy, remove duplicate entries and irrelevant information as well as to correct errors or inconsistences in the data. The identified themes were analyzed to understand the underlying beliefs, practices, and experiences related to ethno-veterinary medicine. The researcher also calculated frequencies and percentages. Also the characteristics of the study population and the prevalence of different practices were summarized. In addition to that, the researcher created graphs, charts, and tables to visually represent the data and findings.

3.6 Quality assurance

Quality of data was assured by conducting a pilot study to test and refine data collection tools and procedures before full-scale data collection. The data was entered into the database twice and the entries were compared to identify and correct any errors. Regular reviews of the data were conducted to ensure accuracy and completeness. Preliminary findings with participants and seeking their feedback to ensure accuracy and relevance were also done. The researcher frequently involved colleagues and other experts in qualitative research to review the analysis and provide feedback. Some ethical considerations were done to ensure quality assurance thus the researcher adhered to ethical guidelines throughout the research process, including informed consent,

confidentiality, and data security. Overally, quality was assured through the maintenance of a detailed documentation of all research procedures, data collection methods, and analysis steps.

Chapter Four: Results

4.1 Response rate

This is also known as the respondents' rate. It refers to the percentage of people who respond to a survey, questionnaire out of all the individuals who were invited or selected to participate which affects the validity and generalizability of the findings. The researcher administered 180 questionnaires, 120 (67%) were returned and 60 (33%) were not returned. Thus Saunders (2007) indicated that the response rate that can accepted in research ranges from 41-100%. Since the response rate was 67%, which can be an indicator that the results will be reliable and valid for analysis.

4.2 Demographic information

This refers to the characteristics or attributes of a population or group of individuals that can provide insights on behavior which helps making proper judgment and conclusions.

The demographic information of this research is shown below:

4.2.1 Gender

It can be observed from the data represented in the graph shown on figure 1 below that the poultry industry in Goromonzi district, ward 16 is female dominated. This was evidenced by the highest number of respondents being obtained from females, 69 respondents (57.5%) out of the 120 respondents (100%) and a total of 51 males responded (42.5%).

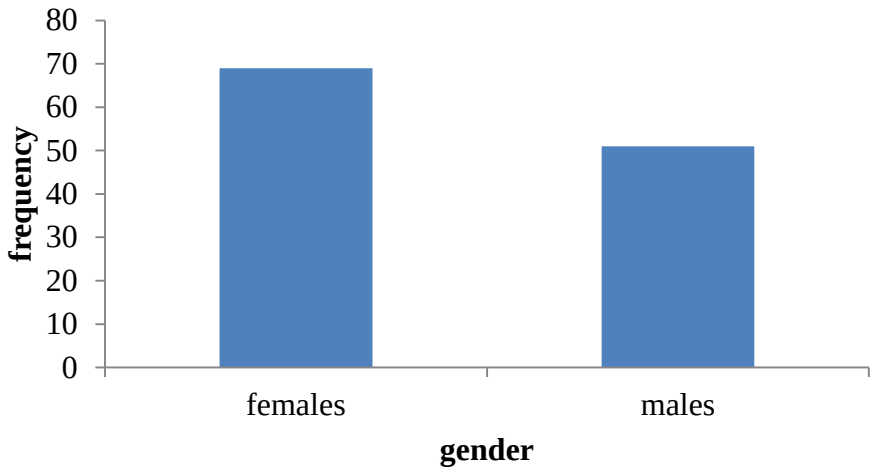


Figure 2: Frequency distribution of gender of respondents

4.2.2 Age

The graph below indicates that established adults (30-49 years) dominate the poultry industry in Goromonzi district, ward 16, with a hold 56 respondents (46, 7%), followed by the retirees (50 and above) with a hold of 44 respondents (36.7%), with the emerging adults following with a sum of 15 respondents (12.5 %) and the age group with the least respondents being the teenagers with a total of 5 respondents (4.2%).

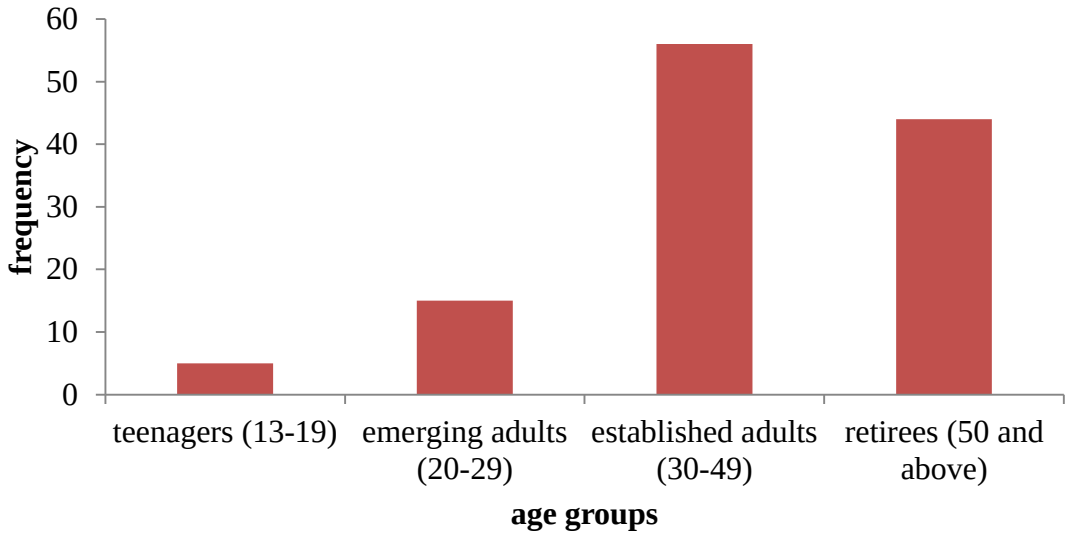


Figure 3: Frequency distribution chart showing the age of the respondents

4.2.3 Education level

During this research, the level of education was also considered in order to understand how professionally trained these respondents are. Respondents who reached tertiary level dominated with a total of 50%, followed by those that reached secondary level who had a total of 39.2%, then those that reached primary level of education followed with a total of 7.5% and the least level of education had 3.3% which constituted of other level (i.e. those that did not receive formal education). The data was represented in the table below:

Table 1: A frequency distribution showing the highest level of education reached by the respondents.

level of education	frequency	percentage	cumulative percentage
Tertiary	60	50.0	50
Secondary	47	39.2	89.2
Primary	9	7.5	96.7
other	4	3.3	100.0

4.2.4 Occupation

Full time farmers had the highest frequency amongst the other occupations, with a total hold of 59.17% and other occupations had the lowest frequency with a hold of 3.33%. The other sector of occupation included occupations like development practitioners, builders and house keepers. Amongst the respondents were, teachers with a total of 4.17% who were involved in poultry farming as well, animal science students with a percentage of 2, 5%, veterinary doctors with the

second highest frequency holding a percentage of 15.83%, animal nutritionist also responded at a percentage of 1.67%, agronomists with a percentage of 8.33% and traditional herbalists who held a total of 5%. The data is shown in the table below:

Table 2: The table indicates the frequency distribution, percentage of the respondents' occupation.

Occupation	Frequency	Percentage	Cumulative percentage
Farmers (full time)	71	59.17	59.17
Teachers	5	4.17	63.33
Animal science students	3	2.50	65.83
Veterinary doctors	19	15.83	81.67
animal nutritionists	2	1.67	83.33
agronomists	10	8.33	91.67
traditional herbalists	6	5.00	96.67
others	4	3.33	100.00

4.2.5 Religion

The most stated religions were Christianity, Islam and African Traditional Religion (ATR), Hinduism and Judaism were none existent. Christianity was the most dominate religion with a total of 54.17% followed closely by the African Traditional Religion with a percentage of 33.33% and the lowest frequently mentioned religion being the Islamic religion with a total of 12.5%.

The frequency distribution of the respondents by religion is shown below:

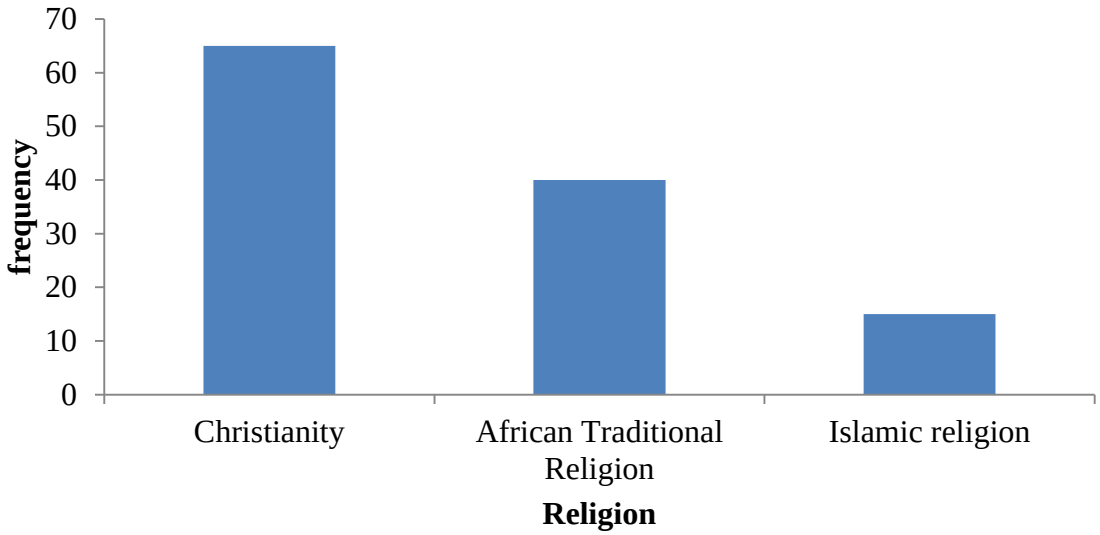


Figure 4: Frequency distribution graph showing religion of the respondents.

4.3 Years of experience in poultry farming

The graph shown below shows that most respondents had 5-10 years of experience in poultry farming with a percentage of 25.83%, followed by those with 1-2 years of experience who had total of 25%, then those that had 2-5 years of experience and those with more than 10 years (>10 years) of experience had the same percentage of 16.67% each and the lowest frequency was obtained from those who had less than 1 year (<1 year) in poultry farming with a percentage of 15.83%. The information is represented on the graph below:

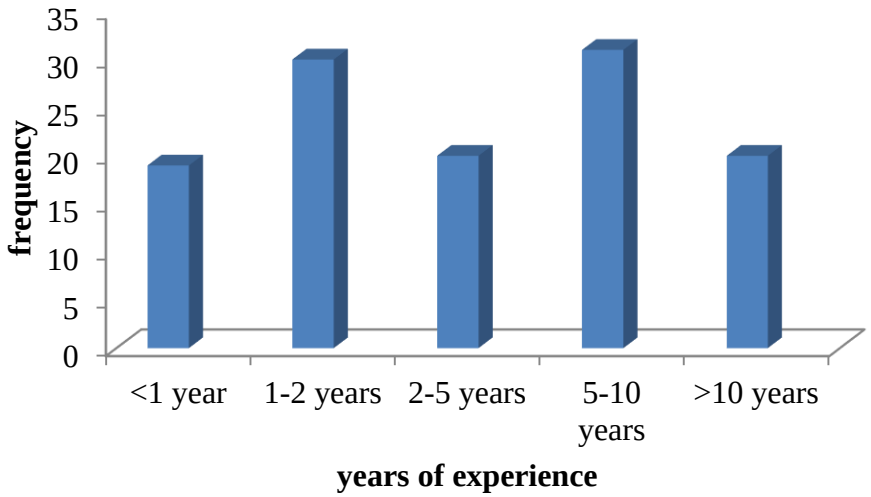


Figure 5: Frequency distribution of the years of experience in poultry industry of the respondents.

4.4 Types of poultry data of the respondents

It was obtained that 40.83% of the respondents reared broilers, followed by 30% of the respondents who had indigenous chickens (roadrunners), then 19.17% of the respondents had layers and the lowest frequency of poultry species with 10% was obtained from those with other poultry, this percentage included that of poultry species like turkeys, geese, ducks and guinea fowls. The data shows the percentage for the poultry species reared by the respondents:

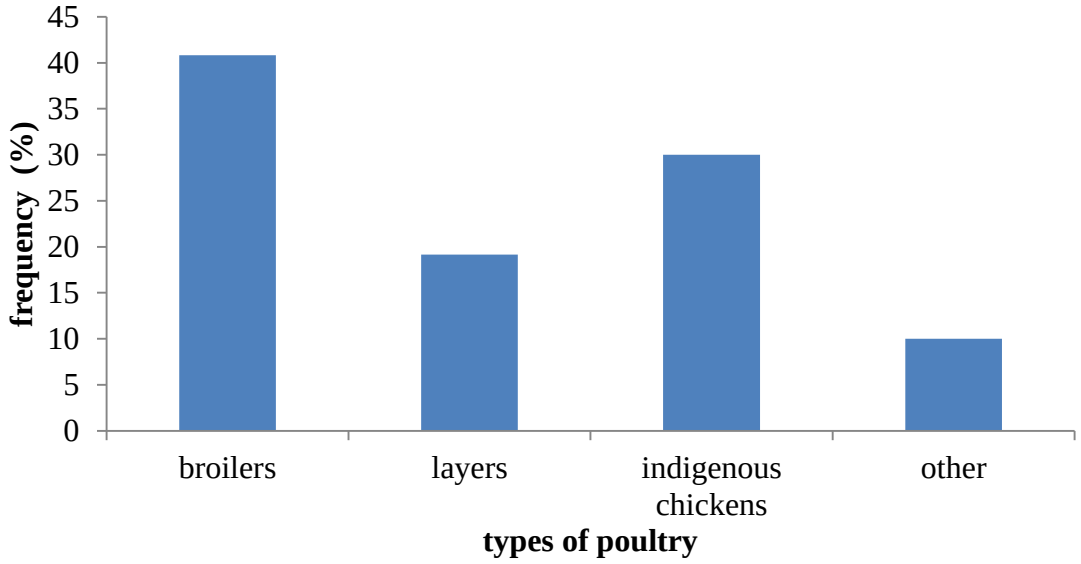


Figure 6: Frequency % value of types of poultry data of the respondents

4.5 Scale of poultry farming

The highest number of respondents practiced backyard poultry farming with a sum of 58 respondents (48.33%) out of the total 120 respondents. The second highest frequency was obtained from the respondents who practiced small scale poultry farming holding a total of 37 respondents (30.83%) out of the total. Commercial poultry production system had the lowest frequency of 25 respondents (20.83%). **The pie chart below shows the frequency of the respondents in accordance to the scale of production practiced:**

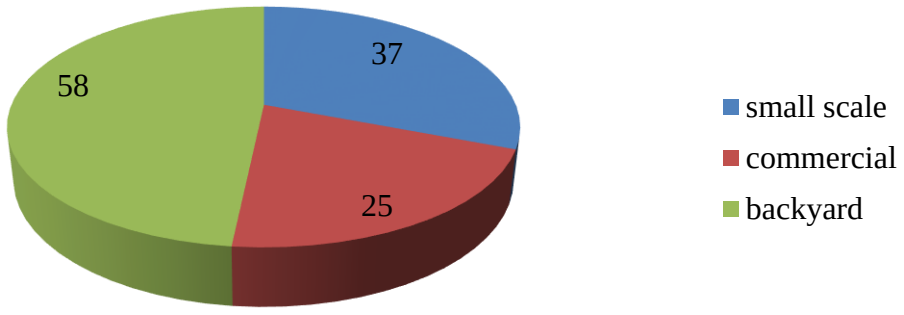


Figure 7: Chart showing frequency of the different scales of poultry production practised.

4.6 Use of ethnoveterinary medicinal plants

Data on the use of ethnoveterinary medicinal plants or local plants was obtained in order to identity the species, diseases treated by these plants, parts of plants used and the methods of administering these medicines. The information was presented below:

4.6.1 Use of ethnoveterinary or local plants to treat poultry diseases

Out of the 120 respondents, a total of 117 respondents (98%) agreed that they make use of the available ethnoveterinary medicinal plants to treat poultry diseases and a total of 3 respondents (2%) mentioned that they do not use these local plants for their poultry. The data is represented below:

TABLE 3: A frequency distribution for the use of ethnoveterinary medicine.

	frequency	percentage	cumulative percentage
use ethnoveterinary medicinal plants	117	98	98
do not use ethnoveterinary medicinal plants	3	2	100

4.6.2 The parts of the plants used for poultry diseases treatment.

The most frequently used parts of the plants were the leaves with a total of 32% of the preparations being made from them. Barks and whole plants were the second frequently mentioned parts with a total of 16% each. Roots had a total 12% together with tubers which had the same percentage. The least mentioned parts were seeds and pods that had the same percentage of 4%.

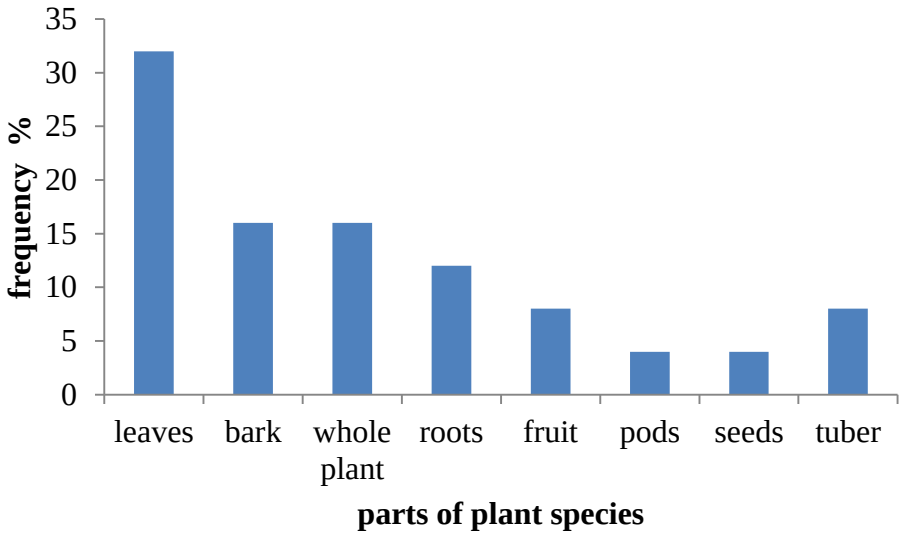


Figure 8: Parts of plants used for avian diseases treatments

4.6.3 Common poultry health problems or conditions.

A total of 15 poultry health conditions and diseases were identified by the respondents. The poultry disease with the highest frequency was coccidiosis which held a total of 98% showing that 117 of the 120 respondents agreed to the issue of coccidiosis followed by coughing (81%), wounds (85%), new castle disease (79%), flue-like symptoms (70%) and ectoparasites (61%). The least cited diseases were gastrointestinal infections (28%), respiratory infections (24%), diarrhoea (20%), weight loss (12%), egg laying (12%), fowl pox (10%), lethargy (8%), blindness (6%) and the lowest frequently cited being Helminthiasis (3%). Coccidiosis had the highest number of species used for its treatment (12), followed by wounds and coughing respectively. The diseases with the least plant species for their treatment were Helminthiasis (1), egg laying (1) and respiratory disease (1) which had one plant species mentioned for each of them.

The data is represented on the table below:

TABLE 4: The common poultry health problems mentioned by the respondents.

Avian health problem or condition	Number of plant species that treat the health problem	Frequency of health problem	Frequency percentage
Coccidiosis	12	117	98
Coughing	09	97	81
Lethargy	04	10	8
Wounds	09	102	85
Flue like symptoms	08	84	70
Fowl pox	05	12	10
New castle	07	95	79
Ectoparasites	02	73	61
Helminthiasis	01	3	3
Diarrhea	03	24	20
Blindness	02	7	6
Weight loss	02	14	12
Respiratory diseases	01	29	24
Gastrointestinal infections	02	34	28
Egg laying	0 1	14	12

4.6.4 Methods of preparation and administering the medicines

The most used method of administering the prepared ethnoveterinary medicinal plants was the oral method which had a total of 17 out of the 25 mentioned plant species (68%), followed by those that had to be applied or pasted on the wound which had a sum of 6 plant species out of the 25 plant species (24%) and the least method of administration was the placement of the medicinal plants in the fowl run with a total of 2 plant species out of the 25 (8%). **The data is represented on the chart below:**

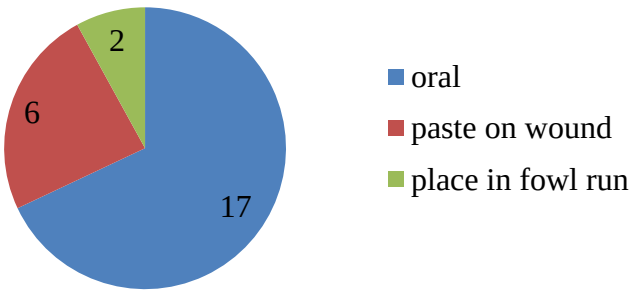


Figure 9: A chart showing the frequency distribution of the methods of administering ethnoveterinary medicinal plants.

4.6.5 Common EVM plants for poultry healthcare found in Goromonzi district.

The respondents managed to mention a total of 25 plant species that are being used in Ward 16, Goromonzi North District. A botanist helped identify the botanical names of these plant species. The frequently mentioned plant species was the *Aloe Vera* known as Gavakava with a total count

of 120 and a total of 10 health problems that it plays a major role as complementary medicines. Other frequently stated plants species were *Erythrina abyssinica* (92), known for treating coccidiosis, new castle disease, coughing, blindness and wounds, *Lippia Javania* (81), mainly used for managing ectoparasites, *Albizia Adianthifolia* (80), used as a wound healing remedy, *Moringa oleifera* (86), mainly used for coccidiosis and coughing . The least mentioned plant species was the *Euphorbia tirucalli L.* (Rusungwe) with a frequency of 1. The data of the plant species mentioned, their botanical; names, vernacular names (Shona), frequency, preparation method, administration methods and ethnoveterinary uses are shown on the table 6.

4.7 Effectiveness and efficacy

According to the World Health Organization (WHO 2003), effectiveness refers to the extent to which a specific intervention, procedure, regimen or service produces a beneficial result under real-world conditions. Efficacy refers to the ability of a treatment to produce the desired therapeutic effect in a control clinical trial (FDA et al., 2018). A total of 98 respondents (81.6 %) stated that using ethnoveterinary medicinal plants is very effective followed by 12 respondents (10%) who mentioned that the use of ethnoveterinary medicinal plants is moderately effective, 7 respondents (6%) said that they are slightly effective and those who found ethnoveterinary medicinal plants not effective were 3 respondents (2.5%).

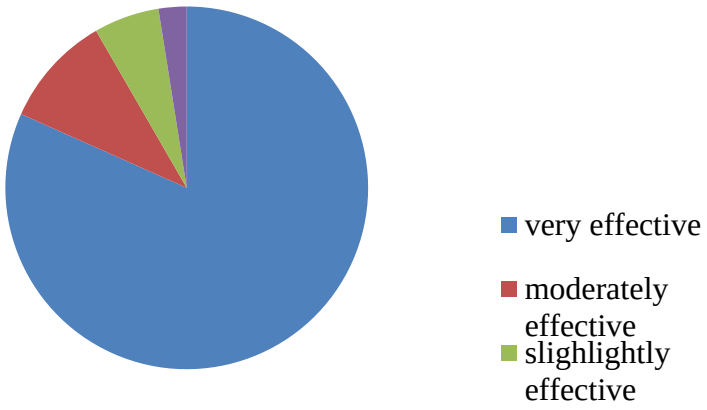


Figure 10: A chart showing the effectiveness of ethnoveterinary medicinal plants as complementary medicines in avian healthcare.

4.7.1 Adverse effects of using EVM

A total of 3 respondents mentioned that they have experienced adverse effects from using EVM whilst the rest (117 respondents) have not experienced any form of side effect. Those frequently

mentioned effects that were mentioned by the 3 respondents were death of the birds (100%, intoxication (75%) and allergic reactions (100%).

4.8 Level of use and the factors influencing the use of EVM plant remedies

Most respondents use these ethnoveterinary medicinal plants as complementary medicines in poultry healthcare. On the 117 respondents who agreed to be using EVM, 17 respondents mentioned that they use them occasionally, 35 respondents use them monthly, 23 respondents use them daily and 42 respondents use them on a weekly basis. The most mentioned factors influencing the use of ethnoveterinary medicinal plants were cost (41 respondents), availability (37 respondents), efficacy (34) and convenience (5 respondents).

4.9 Challenges being faced by these farmers when using these medicinal plants

The respondents managed to mention more than one challenge per individual. Thus the most mentioned challenges being by the respondents were limited scientific evidence (72%), lack of standardization which was frequently mentioned (88%). Other mentioned challenges included, risk of toxicity (34%), ensuring the quality and purity of the plant remedies (41%), potential for overdose or under dose (53%), determining the correct dosage and administration method which can be difficult (19%). Also a percentage of 29% of the respondents mentioned the issue of the interactions of ethnoveterinary medicines with other medicines with convectional medicines.

4.10 Social and cultural barriers hindering the use of EVM plants

The respondents' mentioned more than one socio-cultural barrier to the use of EVM plants. The most frequently stated barriers being lack of awareness (67%), distrust of traditional practices (49%), influence of modern veterinary medicines (33%), generation knowledge gap (27%),and the least mentioned barriers being cultural beliefs (18%) , restrictions and taboos (11%) and community acceptance (5%).

Chapter Five: Discussion of Results

5.1 Demographic information

5.1.1 Gender

The predominance of women reflects broader societal trends in rural Zimbabwe. In many rural African settings, women are central to livestock management, traditionally responsible for small livestock especially poultry, and their role in using and preserving traditional animal healthcare practices is well documented (Ahuja & Sen, 2007; FAO, 2013). The involvement of women in this sector may be increasing as economic opportunities for men decline or as women seek to diversify family income sources (Madzimure et al., 2011). However, despite their prominent role, female poultry farmers may face unique challenges, such as limited access to training, resources, or decision-making platforms that could enhance their practice. These challenges could be addressed through targeted interventions, such as workshops or support groups which could further empower women and improve poultry health care practices in the Ward 16 area.

5.1.2 Age

Age is positively correlated with the depth of ethnoveterinary knowledge, as older farmers tend to retain more traditional practices (McCorkle, 1986; Van der Merwe et al., 2001). Thus the predominance of the 30–49 age groups (46.7%) shows that middle-aged adults are actively involved in poultry farming. This age group is generally economically active and open to innovation, including complementary use of traditional and modern practices. Also it is more likely to be educated, meaning they can evaluate and possibly improve traditional remedies through informed experimentation or blending with conventional methods.

In contrast, the retirees (50 years and above) constitute a substantial segment of the respondents (36.7%), indicating that older generations still play a vital role in poultry farming. These individuals may possess traditional knowledge that has been passed down through generations. Their experience can be invaluable in the context of ethnoveterinary practices, as they may have insights into local plant species and their applications that younger generations may lack (Mwale M. et al., 2005).

However, emerging adults (ages 18-29) and teenagers (ages 13-17) make up a much smaller fraction of the respondents, with only 12.5% and 4.2%, respectively. This demographic trend raises concern about the future of poultry farming in Goromonzi. The low involvement of younger individuals may indicate a lack of interest or opportunities in this sector, which could lead to a

decline in traditional knowledge regarding ethnoveterinary practices. Encouraging youth engagement in poultry farming and education about ethnoveterinary medicinal plants could be crucial for the sustainability of these practices.

5.1.3 Education level

Formal education may lead to a preference for modern veterinary medicine, but can also enhance critical analysis and documentation of traditional practices (Mathias-Mundy & McCorkle, 1986; Gakuya, 2013). In a similar light, this study shows that tertiary-educated respondents (50%) are using elements from traditional practices and modern ones indicating eagerness to bridge traditional knowledge with scientific research. Interest to validate and refine the application of medicinal plants is evidenced.

The use of ethnoveterinary practices was elevated amongst respondents who did not have higher education levels. Thus secondary (39.2%) and primary (7.5%) levels reflected a population with a varying ability to read and document indigenous knowledge, which is crucial for its preservation. Conversely, respondents with lower educational attainment (3.3%) may rely heavily on traditional knowledge without the benefit of formal training, which could affect their understanding of the efficacy and safety of ethnoveterinary medicines, thereby highlighting the importance of inclusive strategies in documenting these practices.

5.1.4 Occupation

The occupation profile is essential for understanding how knowledge of ethnoveterinary medicine is shaped and spread (Amare et al., 2012). Farmers (59.17%) formed the majority, confirming poultry as a core livelihood activity. The presence of veterinary professionals (15.83%) among the respondents could lead to collaborative efforts that validate and promote the use of ethnoveterinary medicines. This collaboration could result in the development of training programs aimed at educating farmers about the benefits and applications of these plants, thereby improving poultry health outcomes while respecting and preserving traditional practices. The presence of agronomists (8.33%) and animal nutritionists (1.67%) reflects a multidisciplinary environment that may enhance the integration of ethnoveterinary medicine into broader poultry health systems. Traditional herbalists (5%) serve as crucial knowledge bearers of plant-based remedies, bridging cultural practices with animal health care.

5.1.5 Religion

Cultural practices and religious beliefs play a role in shaping the choice of animal health interventions, including acceptance of traditional remedies (Martin et al., 2001; Iwu, 1993). The religious distribution—Christianity (54.17%), African Traditional Religion (33.33%), and Islam (12.5%)—affect the acceptability and use of medicinal plants. The dominance of Christianity and significant presence of ATR may influence cultural and spiritual practices related to poultry farming. ATR followers are more likely to fully embrace plant-based treatments due to cultural and spiritual significance supporting the cultural legitimacy of ethnoveterinary medicine in the area. The interplay between this traditional knowledge and modern practices could be crucial for the development of effective complementary medicines. Conversely, some Christians may regard traditional remedies with skepticism, associating them with superstition, though syncretism is common. The absence of Hinduism and Judaism suggests that these faiths have limited presence in the area.

However, different religions may have varying attitudes toward health and wellness, which could influence the willingness of poultry farmers to adopt ethnoveterinary practices. For instance, some religious beliefs may encourage the use of natural remedies, while others may prioritize conventional veterinary care.

5.2 Poultry farming in the area

5.2.1 Years of experience in poultry farming

The majority of respondents have 5-10 years of experience, accounting for 25.83%, indicating a significant presence of established farmers with substantial knowledge. A considerable proportion of respondents (25%) have 1-2 years of experience, suggesting an influx of new entrants into the industry. The distribution of experience levels also shows that 16.67% of respondents have 2-5 years of experience, while another 16.67% have more than 10 years of experience. This indicates a mix of intermediate and highly experienced farmers. The relatively low percentage of respondents with less than 1 year of experience (15.83%) may indicate a moderate barrier to entry or a need for more support for new farmers. Overally, the range of experience levels among respondents provides a comprehensive understanding of the industry, with opportunities for knowledge sharing and skill transfer between established and newer farmers (Mukoti et al., 2021)

5.2.2 Poultry species being reared in the area

Poultry type influences disease exposure and treatment options. This current study recorded the most reared species are broilers (40.83%) and indigenous chickens (30%), showing a mix of commercial and traditional poultry types. Broilers (40.83%) and layers (19.17%) which are reared under intensive systems require higher health input due to susceptibility to diseases. Indigenous chickens (30%), which are hardy and often raised in free-range settings, are more likely to be treated using ethnoveterinary methods compared to broilers, which are associated with both commercial veterinary inputs and ethnoveterinary medicinal plant remedies (Gororo E et al., 2016). Other species (10%) like turkeys and ducks might also benefit from traditional remedies.

5.2.3 Scale of poultry farming

The predominance of backyard (48.33%) and small-scale (30.83%) systems underscores the relevance of traditional medicine. Small-scale and backyard farmers are more likely to use ethnoveterinary practices due to accessibility and low cost. Backyard and small-scale poultry farmers often resort to traditional remedies due to economic constraints and the unavailability of veterinary drugs (Ajayi, 2010; Gueye, 2005). This context creates an enabling environment for the use of ethnoveterinary medicine, which is often more affordable, accessible, and aligned with subsistence production systems. Conversely, commercial farmers (20.83%) may prefer synthetic drugs due to scale and perceived reliability, but some may still integrate ethnoveterinary approaches to reduce costs or meet organic certification requirements.

5.3 Use of ethnoveterinary or local plants to treat poultry diseases

5.3.1 The use of EVM plant remedies.

According to Hassan, (2015), ethnoveterinary medicine is vital in rural areas where veterinary services are limited or costly. Traditional plant-based remedies are often the only accessible and affordable form of healthcare for livestock among smallholder farmers (Kambizi & Afolayan, 2001; Maphosa & Masika, 2010). 98% of farmers use medicinal plants highlights the widespread reliance and trust in ethnoveterinary practices. This reflects that medicinal plants are often freely available in rural environments. They also provide a cost-effective alternative to commercial drugs. Additionally, traditional plant use is embedded in local farming practices. This high usage rate confirms the relevance of these plants as complementary therapies, especially in resource-constrained areas. The continued use also highlights local trust in their efficacy and safety, though it may lack scientific standardization. More so, this reliance on local plants may also reflect the

challenges associated with accessing conventional veterinary services, such as high costs, lack of availability, or limited knowledge of modern veterinary practices (Matope et al.,2018).

Conversely, the 2 % (3 respondents) who do not utilize these plants may indicate a gap in knowledge or a preference for conventional medicine. This group could benefit from targeted educational initiatives that emphasize the efficacy and safety of ethnoveterinary practices, as well as the potential benefits of integrating these methods with conventional veterinary care. By integrating traditional knowledge with modern approaches, poultry farmers can enhance the overall health and productivity of their flocks.

5.3.2 Plant parts, methods of preparation and administration for ethnoveterinary medicinal plants used for poultry constraints

With 32% of preparations being made from leaves, it's clear that these plant parts are valued for their medicinal properties. This preference for leaves may be attributed to their high concentration of bioactive compounds, such as alkaloids, glycosides, and flavonoids, which have been shown to possess antimicrobial, anti-inflammatory, and antioxidant properties. These compounds may contribute to the therapeutic effects of leaves in treating various poultry ailments.

The use of barks and whole plants, each accounting for 16% of preparations, suggests that these plant parts are also recognized for their medicinal value. Barks, for instance, may contain compounds like tannins, which have been shown to have antimicrobial and anti-parasitic properties (Taderera T. et al., 2020). The use of whole plants may be attributed to the synergistic effects of different plant parts, where the combination of leaves, stems, and roots may enhance the therapeutic efficacy of the remedy (Mawoza T. et al., 2018).

The moderate use of roots and tubers, each accounting for 12% of preparations, may be due to their perceived efficacy in treating specific ailments. Roots and tubers often contain bioactive compounds like saponins, which have been shown to have immune-modulatory and anti-inflammatory effects (Maroyi A.et al., 2012). The relatively low use of seeds and pods, each accounting for 4% of preparations, may be due to their limited availability, perceived ineffectiveness, or cultural preferences.

5.3.3 Constraints to Poultry production in the area

In the current study, a total of 15 poultry health constraints were identified. Coccidiosis (98%) emerged as the most common and problematic disease. Similarly, a study done by Masimba

(2020) identified coccidiosis as he frequently cited health constraint showing that it was a problematic ailment. Other frequently cited issues were wounds (85%), coughing (81%), and Newcastle disease (79%). However, a study which was done by Maroyi A. (2012) in Nhema area identified fleas as the major health constraint in poultry.

Thus, high disease prevalence, such as coccidiosis, leads to extensive use of ethnoveterinary plants (Moyo B. et al., 2020). Similar studies also identified that in resource-limited settings, farmers often rely on indigenous knowledge to manage diseases like Newcastle disease and coccidiosis (Ssematimba et al., 2018; Gondwe & Wollny, 2007). These findings highlight the need for affordable and effective disease control measures.

Interestingly, the diseases with the highest prevalence also had the greatest number of plant species used for treatment, showing a direct relationship between disease burden and a responsive adaptation of local knowledge to common challenges. Additionally, high-prevalence conditions provide a strong basis for selecting specific plants for scientific validation and standardization (Gumbochuma et al., 2013). However, less prevalent conditions like Helminthiasis and fowl pox had few plants cited for treatment, indicating potential knowledge gaps or under-documentation.

5.3.4 Role of the locally available EVM plants as complementary medicines in poultry healthcare

The data from the Goromonzi district strongly supports the significant role of ethnoveterinary plants in poultry healthcare, evidenced by the widespread use of several species for managing common ailments. A comprehensive review of ethnoveterinary medicines used for poultry health management in Zimbabwe highlighted 53 plant species employed by non-commercial poultry producers, with Aloe species being the most frequently cited for their broad-spectrum applications (Gobvu et al., 2023). This aligns with findings from the Goromonzi district, where *Aloe Vera* also shows high usage. The high frequency of plants like *Aloe Vera, Lippia javania*, and *Albizia adianthifolia* indicates a deeply rooted traditional knowledge system where these readily available resources are the first line of defense against diseases and parasites.

The diverse applications of single plants, such as *Aloe Vera* being used for a wide range of conditions including coccidiosis and Newcastle disease, suggest a holistic approach to poultry health within the community (Masimba E et al., 2020). The findings from the Goromonzi district, highlighting the prominent use of specific plant species in poultry healthcare, resonate with results

from other ethnoveterinary studies conducted across Zimbabwe. The consistent reporting of Aloe species as a key remedy for a wide array of poultry diseases aligns with a study by Gobvu et al. (2023), which, as mentioned earlier, identified Aloe as the most frequently cited genus in Zimbabwean ethnoveterinary practices for poultry. This widespread recognition suggests a well-established understanding of its therapeutic properties across different regions of the country.

Furthermore, the identification of Lippia javania and Chenopodium ambrosioides for ectoparasites control in Goromonzi mirrors observations in other parts of Zimbabwe. For instance, an ethnoveterinary survey in the Masvingo province also documented the use of aromatic plants, including species from the Lamiaceae family (to which Lippia belongs) and Chenopodium, for repelling poultry ectoparasites (Mapara et al., 2011). This suggests a common traditional strategy for managing external parasite burdens in poultry using locally available plant resources.

The diverse use of other plants for specific ailments in Goromonzi, such as Solanum species and Albizia adianthifolia for wound treatment, and Capsicum frutescens for respiratory issues and coccidiosis, also finds parallels in broader Zimbabwean ethnoveterinary research. While specific species might vary regionally, the general categories of plants used for similar conditions often overlap, indicating a shared body of knowledge regarding plant-based remedies for poultry diseases across different communities in Zimbabwe (Matekaire & Meyer, 2002). These convergent findings across various studies strengthen the evidence for the importance and consistency of ethnoveterinary practices in maintaining poultry health within Zimbabwe.

Furthermore, several plants that were identified in this study also present promising potential as feed additives due to their reported ethnoveterinary uses. For instance, *Moringa oleifera* is utilized for coughing and coccidiosis is well-documented for its nutritional richness and antimicrobial compounds, suggesting its potential to enhance poultry health and growth when incorporated into feed (Fahey, 2005). Similarly, *Capsicum frutescens*, containing capsaicin, has demonstrated potential as a natural growth promoter and immune modulator in poultry (Lee et al., 2017) and is traditionally used for coccidiosis and respiratory issues in Goromonzi. *Zingiber officinale* (ginger), used for diarrhoea and gastrointestinal infections, is also recognized for its antioxidant and anti-inflammatory effects that could benefit poultry health and performance when incorporated into feed (Zhang et al., 2009). Furthermore, *Lannea stullmanni*, reported to aid egg-laying, warrant investigation into their potential to naturally enhance poultry productivity through dietary

inclusion (Moreki JC et al., 2015). Further supporting the potential for feed additives, an ethnoveterinary survey across three districts in Zimbabwe identified Moringa oleifera and Capsicum frutescens as promising candidates for phytogenic feed additives due to their traditional use in treating common poultry ailments (Jambwa et al., 2021). The established ethnoveterinary applications of these plants, coupled with existing scientific knowledge of their bioactive compounds, strongly advocate for research into their development as effective and sustainable feed additives, bridging traditional practices with modern poultry production for improved health and performance.

However there is need to identify and isolate the specific bioactive compounds responsible for the observed effects is crucial for standardization and quality control in feed additive development. Also, thorough toxicological assessments are necessary to ensure the safety of these plant extracts or powders for poultry consumption over extended periods. Additionally, the impact of these plant materials on feed palatability and overall feed intake by poultry needs to be evaluated. Lastly, exploring potential synergistic effects by combining different plant extracts could lead to more effective feed additives.

Thus, the ethnoveterinary knowledge in the Goromonzi district highlights several promising plant species (Moringa oleifera, Capsicum frutescens, Zingiber officinale, Aloe Vera, and potentially Lannea stullmanni and others used for general health) with the potential to be developed into natural and sustainable feed additives for poultry. Further scientific investigation is essential to unlock their full potential.

5.4 Effectiveness and efficacy of the identified ethnoveterinary medicinal plants

The overwhelming majority of respondents (81.6%) in the Goromonzi district perceive ethnoveterinary medicinal plants as highly effective in treating poultry ailments, with a further 10% reporting moderate effectiveness. This strong positive perception aligns with findings from other studies in Zimbabwe, where farmers express considerable confidence in the efficacy of traditional remedies for livestock and poultry (Matekaire & Meyer, 2002; Jambwa et al., 2021). While a smaller proportion of respondents in Goromonzi reported slight effectiveness (6%) or ineffectiveness (2.5%), the overall high level of perceived efficacy underscores the continued reliance on and trust in these traditional practices within the community. This strong endorsement

from users provides valuable anecdotal evidence supporting the potential of these plant-based remedies and highlights the need for further scientific investigation to validate their effectiveness and identify the underlying bioactive compounds responsible for the reported therapeutic effects.

The reported uses by farmers provide a strong ethnobotanical basis for the potential efficacy of these plants. The fact that a high percentage of respondents reported positive outcomes further supports this. However, it is crucial to emphasize that ethnobotanical evidence alone is not sufficient to definitively determine efficacy. Rigorous scientific studies involving phytochemical analysis, in vitro and in vivo testing, and controlled clinical trials are necessary to identify the active compounds responsible for the reported effects, determine the mechanisms of action, establish appropriate dosages and administration methods, assess safety and potential toxicity and compare their efficacy to conventional treatments (Jambwa et al., 2021). Thus, the identified plants from the Goromonzi district show promising potential as complementary medicines for poultry healthcare based on traditional use.

5.5 Level of use, the economic and livelihood factors influencing the reliance and continued use of ethnoveterinary medicinal plants

The level of use of ethnoveterinary medicinal plants (EVM) in the Goromonzi district indicates their significant integration into poultry healthcare, with a substantial proportion of the users employing them on a weekly or even daily basis. While a notable number use them monthly and some occasionally the overall frequency highlights a consistent reliance on these traditional remedies as complementary medicines.

The reliance and continued use of ethnoveterinary medicinal plant (EVM) remedies in the Goromonzi district are significantly influenced by several interconnected economic and livelihood strategies. Firstly, the most frequently mentioned factor influencing the use of EVM is cost. Conventional veterinary medicines can be expensive and often unaffordable for smallholder farmers in Zimbabwe (Matekaire & Meyer, 2002; Jambwa et al., 2021). EVM remedies, being locally sourced, are significantly cheaper or even free, allowing farmers to manage poultry health without incurring substantial financial burdens (CUT Journals Online, 2023). This cost-saving aspect is crucial for maintaining the economic viability of small-scale poultry farming, which contributes significantly to household income.

Secondly, availability (37 respondents) is another key driver. Access to conventional veterinary services and drugs can be limited, especially in rural areas due to poor infrastructure, long distances to clinics, and understaffed veterinary services (Qeios et al., 2023).2 EVM plants, being locally accessible, provide a readily available alternative, ensuring timely treatment and reducing potential losses due to untreated diseases. Thus, by effectively managing poultry health through affordable EVM, farmers can reduce mortality rates, maintain productivity (e.g., egg laying, growth), and ultimately improve their economic returns from poultry farming. Healthy poultry translates to a more reliable source of income and food security for households.

Additionally, poultry farming is often an integral part of the broader livelihood strategies of smallholder farmers in Zimbabwe, contributing to both income generation and household food security (Qeios et al., 2023). The reliance on EVM is embedded within these existing farming systems as a practical and traditional approach to animal healthcare. Furthermore, limited access to financial resources and infrastructure compels farmers to utilize locally available resources for various aspects of their livelihoods, including animal health. EVM fits within this context of resourcefulness and self-reliance. Moreover, the use of EVM is often rooted in traditional ecological knowledge passed down through generations (Brill et al., 2022). This knowledge forms a part of the cultural heritage and livelihood skills of the community. The continued use of EVM helps preserve this knowledge and empowers farmers to manage their resources autonomously.

Also, poultry diseases pose a significant risk to the livelihoods of these farmers. The perceived efficacy of EVM provides a sense of control and a means to mitigate these risks, even in the absence of or alongside conventional veterinary interventions. While less prominent than cost and availability, the convenience of sourcing and preparing EVM remedies on-farm contributes to their continued use, especially when compared to the time and effort required to access formal veterinary services.

In essence, the economic realities and livelihood strategies of smallholder farmers in the Goromonzi district create a strong rationale for the reliance and continued use of EVM. The cost-effectiveness and local availability of these remedies directly address the financial constraints and accessibility issues associated with conventional veterinary medicine, thereby supporting the economic viability and sustainability of their poultry farming practices. The integration of EVM

into their traditional knowledge systems and resource-constrained livelihoods further reinforces their continued application.

5.6 Perception and attitude towards the use of ethnoveterinary medicinal plants as complementary medicines

The perception and attitude towards the utilization of ethnoveterinary medicinal (EVM) plants in the Goromonzi district, as reflected by the study results, is largely positive and indicative of a strong reliance on these traditional practices. The fact that a significant majority (81.6%) of respondents perceive EVM as very effective highlights a deeply ingrained belief in their therapeutic value for poultry. This positive perception is further supported by another 10% who find them moderately effective. This high level of perceived efficacy likely contributes to the continued use of EVM, as evidenced by the frequency of their application (daily, weekly, or monthly for many users).

However, the socio-cultural context also reveals potential barriers. While cost, availability, and convenience drive the use of EVM, factors like lack of awareness, distrust of traditional practices, and the influence of modern veterinary medicines can hinder their broader acceptance and integration. The generational knowledge gap also poses a risk to the continuity of this traditional knowledge. The study's findings align with broader trends observed in Zimbabwe and other developing countries. Resource-poor farmers often rely on EVM due to the affordability and accessibility of local plant resources when compared to the potentially high costs and limited availability of conventional veterinary drugs (Matekaire & Meyer, 2002; Jambwa et al., 2021). The perception of EVM as culturally appropriate and understood also contributes to its acceptance (Mathias, 1996).

However, despite the positive perception and reliance on EVM, they were challenges identified by the farmers, such as limited scientific evidence and lack of standardization, can influence attitudes towards their integration with conventional practices. The small percentage of farmers reporting adverse effects also warrants caution and may contribute to some level of skepticism.

5.7 Challenges and limitations to the use of ethnoveterinary medicinal plants

While the vast majority of respondents in the area reported no adverse effects from using ethnoveterinary medicines (EVM) in their poultry, a small proportion did mention experiencing negative outcomes, including bird mortality, intoxication, and allergic reactions. This finding,

although representing a minor fraction of users, is a crucial consideration in the overall evaluation of ethnoveterinary practices. Similarly, other ethnoveterinary studies in Zimbabwe have occasionally documented reports of potential toxicity or adverse reactions associated with certain plant species or preparation methods (Gobvu et al., 2023). Furthermore, the acknowledged risks of toxicity, the difficulty in ensuring plant quality and purity, and the potential for under- or overdosing highlight the inherent variability associated with using natural, unprocessed remedies (Nalule S. et al., 2020). These instances underscore the importance of careful plant identification, appropriate preparation and dosage, and the need for further research, including toxicological assessments, to ensure the safe and effective use of ethnoveterinary remedies in poultry health management.

Additionally, the farmers in the Goromonzi district utilizing ethnoveterinary medicinal plants face several significant challenges, predominantly centered on the lack of robust scientific validation and standardization. The frequently cited limitations of limited scientific evidence and the absence of standardized preparation and dosage guidelines create uncertainty regarding efficacy and optimal use. This echoes broader concerns within the field of ethnoveterinary medicine, where traditional knowledge often lacks rigorous scientific backing (Gobvu et al., 2023). The challenges in determining precise dosages and administration methods, coupled with concerns about potential interactions with conventional medicines, further complicate the integration of ethnoveterinary practices into a comprehensive poultry health management system (Mwale M et al 2022). These limitations underscore the critical need for scientific research, development of standardized protocols, and farmer education to enhance the safety and efficacy of ethnoveterinary medicine in poultry healthcare.

5.8 Opportunities and constraints associated with the integration of ethnoveterinary medicines with conventional medicine

There are significant opportunities associated with the integration of EVM remedies with conventional veterinary practices. Firstly, one key opportunity lies in complementary therapeutic approaches. EVM offers a rich pharmacopeia that can address conditions where conventional treatments may be expensive, unavailable, or less effective, such as in the management of parasitic infections or as supportive therapies for viral diseases (Jambwa et al., 2021). Certain plants may possess immunomodulatory or antimicrobial properties that can enhance the overall health and resilience of poultry, potentially reducing the reliance on synthetic drugs and contributing to reduced antimicrobial resistance (Okpekon et al., 2022). Furthermore, the affordability and local availability of EVM plants make them an accessible option for smallholder farmers, improving their capacity to manage poultry health and productivity sustainably (Maroyi A. et al., 2012). Integrating EVM can also foster a holistic approach to animal health, considering

traditional knowledge and locally adapted solutions alongside modern scientific advancements (Mbiriri B. et al., 2020).

However, despite these opportunities, several challenges hinder the seamless integration of EVM with conventional veterinary medicine. A primary concern is the lack of rigorous scientific validation for many traditional remedies, making it difficult for conventional practitioners to confidently recommend or incorporate them into treatment protocols (Gobvu et al., 2023). In addition to that, the absence of standardized preparation methods, dosages, and quality control measures for EVM raises concerns about efficacy, safety, and the potential for adverse effects or inconsistent outcomes. Also, potential interactions between plant-based compounds and conventional drugs are also poorly understood and require thorough investigation. Moreover, socio-cultural barriers, such as distrust of traditional practices or a lack of awareness among both farmers and veterinary professionals, can impede integration efforts. Overcoming these challenges necessitates collaborative research involving ethno botanists, pharmacologists, and veterinarians to scientifically evaluate the efficacy and safety of promising EVM remedies, develop standardized protocols, and promote knowledge exchange and mutual understanding between traditional and conventional healthcare systems.

Chapter Six: Conclusion and Recommendations

6.1 Conclusion

The findings from the Goromonzi district provide compelling evidence for the significant and multifaceted role of ethnoveterinary medicinal plants (EVM) as complementary medicines in poultry healthcare within the region. The study reveals a rich traditional knowledge system where a diverse array of locally available plant species are utilized to address a wide spectrum of poultry

ailments, ranging from common infections like coccidiosis and respiratory issues to external parasites and wound management.

The high prevalence of use for certain plants, such as *Aloe Vera, Lippia javania*, and *Albizia adianthifolia,* underscores their perceived effectiveness and integration into routine poultry management practices. Farmers demonstrated a nuanced understanding of these plants, employing various parts, preparation methods (primarily crushing and dissolving in water or topical application), and administration routes, with oral delivery being the most common for internal ailments.

The overwhelming positive perception of EVM efficacy among the majority of respondents (81.6% reporting them as very effective) highlights the trust and a significant reliance placed on these traditional remedies within the community. This is further driven by key socio-economic factors, notably the cost-effectiveness and local availability of these plant resources, which provide accessible alternatives to potentially expensive and scarce conventional veterinary drugs. The convenience of on-farm sourcing and preparation also contributes to their sustained use within the existing smallholder farming systems.

However, the study also identifies significant challenges associated with the use of EVM. The lack of robust scientific evidence and standardized protocols raises concerns about consistent efficacy and safety. Farmers themselves acknowledge the difficulties in determining correct dosages and the potential for adverse effects, albeit reported by a small minority. Furthermore, socio-cultural barriers such as a lack of awareness among some, distrust of traditional practices, and the influence of modern veterinary medicine can hinder wider adoption.

Despite these challenges, the potential for integrating EVM with conventional veterinary practices is evident. The complementary nature of these remedies, particularly in addressing conditions where conventional options are limited or costly, offers an opportunity for a more holistic and sustainable approach to poultry healthcare. Moreover, several identified plant species, including *Moringa oleifera*, *Capsicum frutescens*, and *Zingiber officinale*, show promising potential for development as natural feed additives, potentially enhancing poultry health, growth, and disease resistance.

It can be concluded that, EVM plays a vital role as complementary medicines in poultry health care in the Goromonzi district, driven by economic necessity, local availability, and a strong perception of effectiveness rooted in traditional knowledge. To fully harness the potential of these resources and ensure their safe and sustainable use, future efforts should focus on rigorous scientific validation, development of standardized protocols, farmer education, and strategies to bridge the gap between traditional and conventional veterinary practices. This integrated approach can contribute to improved poultry health, enhanced livelihoods for smallholder farmers, and the preservation of valuable traditional ecological knowledge.

6.2 Recommendations

Based on the findings of this study on the role of ethnoveterinary medicinal plants (EVM) as complementary medicines in poultry healthcare in Goromonzi district, the following recommendations are proposed;

Firstly, there is need to promote scientific validation and standardization. Thus, rigorous scientific investigations should be conducted, including phytochemical analysis, in vitro and in vivo studies, and controlled clinical trials, to validate the efficacy of the most frequently used and promising EVM plants identified. There should be an establishment of standardized guidelines for the collection, preparation, dosage, and administration of effective EVM remedies to ensure consistent efficacy and safety. This should involve collaboration between traditional herbalists, farmers, and scientific researchers. More so, there is need to implement strategies for ensuring the quality and purity of plant materials used in EVM, including proper identification, harvesting techniques, and storage methods.

Secondly, there is need to enhance knowledge sharing and education. This can be done through the development and implementation of educational programs for farmers on the proper identification, preparation, and safe use of effective EVM plants. This should address concerns about dosage, potential toxicity, and interactions with conventional medicines. Also the facilitation of programs that promote the transfer of traditional knowledge about EVM from older generations to younger ones to prevent the loss of this valuable resource is highly recommended. There is also need to conduct community-based awareness campaigns to promote the benefits of scientifically validated EVM practices and address misconceptions or distrust of traditional remedies.

Thirdly there is need to foster integration with conventional veterinary practices. This can be done through use of Encouraging dialogue and collaboration between traditional herbalists, farmers, animal health technicians, and veterinary doctors to explore opportunities for integrating EVM into poultry healthcare systems. The incorporation of relevant aspects of ethnoveterinary medicine into the curriculum of animal health training institutions to equip future veterinary professionals with a broader understanding of available resources is also recommended. Also the exploration of the potential for establishing referral systems between traditional healers and veterinary clinics is helpful to ensure comprehensive healthcare for poultry.

More so, promote sustainable harvesting practices to ensure the long-term availability of medicinal plants and prevent overexploitation of vulnerable species. There is need for extension officers to encourage the cultivation of commonly used medicinal plants to reduce pressure on wild populations and ensure a consistent supply of quality plant material.

Moreover, facilitate the development of natural feed additives from EVM plants. Focus research efforts on the identified plants with potential for feed additive development (Moringa oleifera, Capsicum frutescens, Zingiber officinale, Aloe Vera, Lannea stullmanni), investigating their optimal inclusion levels, effects on poultry health and performance, and safety for long-term use. Support the development and testing of standardized feed additive formulations based on these plants in collaboration with animal nutritionists and feed manufacturers.

Lastly, there is need to address the socio-cultural barriers to use of EVM remedies. Thus, community leaders should be engaged with influential figures to promote the acceptance and integration of validated EVM practices. The development of culturally sensitive communication strategies to address distrust and promote understanding of the benefits of EVM is also recommended.

Thereby, implementing these recommendations, the role of ethnoveterinary medicinal plants as valuable complementary medicines in poultry healthcare in the Goromonzi district can be strengthened, contributing to improved poultry health, enhanced livelihoods for farmers, and the preservation of important traditional knowledge.

References

1. Abdel-Wahhab, M. A., & Hafez, H. M. (2022). "Ethnoveterinary practices: An emerging approach for poultry health." Poultry Science, 101(2), 101-110.
2. Aboagye, I. A., & Agyare, C. (2019). The use of medicinal plants in poultry health: A review. Journal of Ethnopharmacology, 245, 112145.
3. Abou El-Nour, M. M., & Abd El-Hack, M. E. (2019). Ethnoveterinary practices for poultry: A review. Tropical Animal Health and Production, 51(5), 1035-1042.
4. Alders, R. G., & Spradbrow, P. B. (2001). Newcastle disease control in village chickens: A review. Avian Pathology, 30(sup1), S93-S111.

5. Alshahrani, S. M., & Abd El-Hack, M. E. (2020). Ethnoveterinary practices in poultry: A review of the literature. Veterinary Sciences, 7(1), 10.
6. Bajpai, V., et al. (2019). "Ethnoveterinary medicine: A potential source of alternative medicine for poultry." Asian Pacific Journal of Tropical Biomedicine, 9(4), 159-165.
7. Benavides, J., et al. (2018). Ethnomedical plants used in poultry farming in the Amazon region: A review. Journal of Ethnobiology and Ethnomedicine, 14, 25.
8. Bizimenyera, E. S., Githiori, J. B., & Eloff, J. N. (2006). In vitro anthelmintic activity of extracts from plants traditionally used against helminths in livestock. Veterinary Parasitology, 141(3-4), 332-339.
9. Brennan, K. M., & Shah, N. (2011). Effect of plant extracts on poultry growth and health. Poultry Science, 90(10), 2391-2400.
10. Cheeke, P. R. (1999). Natural toxicants in feeds, forages, and poisonous plants. Interstate Publishers. (
11. Choi, S., & Chung, M. H. (2003). A review on the relationship between Aloe vera and human health. Evidence-Based Complementary and Alternative Medicine, 1(1), 3-15.
12. Choudhary, R., et al. (2018). Ethnoveterinary medicinal plants and their applications in poultry health. Indian Journal of Poultry Science, 53(1), 1-8.
13. CUT Journals Online. (2023). Ethnoveterinary practices in poultry health management in ward 15 Zvimba district, Zimbabwe. Chinhoyi University of Technology.
14. Dhananjaya, B. L., et al. (2020). Traditional herbal medicines in poultry health management: A review. Journal of Poultry Science, 57(1), 1-15.
15. Duke, J. A. (1985). CRC handbook of medicinal herbs. CRC Press.
16. Durrani, F. R., et al. (2013). "Ethnoveterinary medicine: A new approach for the treatment of poultry diseases." Journal of Animal and Plant Sciences, 23(2), 341-346.
17. El-Hack, M. E. A., et al. (2020). Ethnoveterinary medicine in poultry: A comprehensive review. Veterinary World, 13(1), 1-10.
18. Fahey, J. W. (2005). Moringa oleifera: A review of the medical evidence for its nutritional, therapeutic, and prophylactic properties. Trees1 for Life Journal, 1(5),2 1-15.
19. Fahey, J. W. (2005). Moringa oleifera: A review of the medical evidence for its nutritional, therapeutic, and prophylactic properties. Trees1 for Life Journal, 1(5),2 1-15.
20. Ghosh, P., et al. (2017). Medicinal plants in poultry health management: A review of ethnoveterinary practices. Veterinary Research Communications, 41(3), 223-234.
21. Ghosh, P., et al. (2023)."Exploring the potential of ethnoveterinary plants for poultry health." Journal of Medicinal Plants Research, 17(1), 12-21.
22. Gobvu, V., Pote, W., Poshiwa, X., & Benhura, M. A. (2023). A review of ethnoveterinary medicines used for poultry health management in Zimbabwe. World's Poultry Science Journal,1 79(3), 611-627.
23. Gobvu, V., Pote, W., Poshiwa, X., & Benhura, M. A. (2023). A review of ethnoveterinary medicines used for poultry health management in Zimbabwe. World's Poultry Science Journal,1 79(3), 611-627.

24. Gonese, F. T., Dhoro, M., & Bernard, S. (2008). Traditional veterinary practices in Zimbabwe: A survey. The Zimbabwe Veterinary Journal, 39(1), 1-7.
25. Govindarajan, V. S., & Sathyanarayana, M. N. (1991). Capsicum—production, technology, chemistry, and quality. Part I. History, botany, horticulture, and primary processing. Critical Reviews in Food Science and Nutrition, 29(6), 435-479.
26. Griggs, D., & Nimmo-Smith, R. H. (1992). Aloe vera: A review of the scientific literature. Journal of the Royal Society of Health, 112(1), 18-20.
27. Gunderson, G. (2006). The cultural significance of chickens. In The chicken: A natural and cultural history (pp. 1-25). Reaktion Books.
28. Gyawali, R., & Ibrahim, S. A. (2019). Ethnoveterinary practices in poultry: Current knowledge and future directions. Poultry Science, 98(3), 1325-1338.
29. Hedimbi, M. (2008). Ethnoveterinary medicine practices in Ohangwena region, Namibia. Journal of Ethnopharmacology, 119(3), 628-634.
30. Jambwa, P., Katsande, S., Matope, G., & McGaw, L. J. (2021). Ethnoveterinary remedies used in avian complementary medicine in selected communal areas in Zimbabwe. Planta Medica,2 88(3-04), 313-323.
31. Jambwa, P., Nkadimeng, S. M., Mudimba, T. N., Matope, G., & McGaw, L. J. (2023). Antibacterial and anti-inflammatory activity of plant species used in traditional poultry ethnomedicine in Zimbabwe: A first step to developing alternatives to antibiotic poultry feed additives.3 Journal of Ethnopharmacology, 298, 115687.
32. Khan, M. Z., et al. (2014). "Ethnoveterinary practices in poultry: a review." Journal of Ethnobiology and Ethnomedicine, 10(1), 1-10.
33. Kumari, P., & Singh, R. (2021). Ethnoveterinary practices for the management of poultry diseases: A review. Journal of Animal Health and Production, 9(2), 79-85.
34. Lawal, T. O., & Ogunwande, I. A. (2012). Chemical composition of the essential oil of Lippia javanica (Burm.f.) Spreng. grown in Nigeria. Journal of Essential Oil Bearing Plants, 15(1), 147-151.
35. Lee, K. W., Everts, H., & Beynen, A. C. (2017). Essential oils in broiler nutrition. International Journal of Poultry Science, 6(3), 181-190.
36. Lee, K. W., Everts, H., & Beynen, A. C. (2017). Essential oils in broiler nutrition. International Journal of Poultry Science, 6(3), 181-190.
37. Mabikke, M., & Ndlovu, T. (2017). "Ethnoveterinary Practices in Zimbabwe: A Review." Journal of Ethnobiology and Ethnomedicine, 13(1), 1-10.
38. Mahfouz, N. B., et al. (2019). Role of medicinal plants in poultry health management: A review. Journal of Veterinary Science, 20(3), 1-9.
39. Manzoor, M. F., et al. (2020). Ethnoveterinary medicinal plants used for poultry health: A review. Frontiers in Veterinary Science, 7, 1-10.
40. Mapara, R., Sibanda, S., & Mugabe, P. (2011). Ethnoveterinary practices in the control of poultry diseases in selected communal areas of Masvingo province, Zimbabwe. Livestock Research for Rural Development, 23(12), Article #247.

41. Mapara, R., Sibanda, S., & Mugabe, P. (2011). Ethnoveterinary practices in the control of poultry diseases in selected communal areas of Masvingo province, Zimbabwe. Livestock Research for Rural Development, 23(12), Article #247.
42. Matekaire, T., & Meyer, J. J. M. (2002). Ethnoveterinary treatments used by farmers in the communal lands of Zimbabwe. Journal of South African Veterinary Association, 73(2), 49-52.
43. Mathews, S., & Moyo, B. (2019). "Traditional Poultry Management Practices in Zimbabwe: Implications for Sustainable Livelihoods." Tropical Animal Health and Production, 51(4), 1013-1020.
44. Mathias, E. (1996). Indigenous knowledge and sustainable development. Indigenous Knowledge and Development Monitor, 4(2), 1-3.
45. Melesse, A., et al. (2019). Herbal medicines in poultry health management: A review of ethnoveterinary practices. Animal Health Research Reviews, 20(1), 1-11.
46. Mishra, A., et al. (2017). "Ethnoveterinary practices and the use of medicinal plants in poultry health management." International Journal of Poultry Science, 16(5), 197-203.
47. Mouahid, L., et al. (2020). "Traditional knowledge and ethnoveterinary practices for poultry health management in rural communities." Animals*, 10(4), 676.
48. Nasir, M. A., et al. (2019). Ethnoveterinary plants for poultry health: A review. Journal of Ethnopharmacology, 243, 112162.
49. Oka, K., et al. (2018). "The role of medicinal plants in poultry health management." Veterinary Research, 49(1), 1-9.
50. Okpekon, T., Poupaert, J. H., Fournet, A., de Pauw, E., & Quetin-Leclercq, J. (2007). New Nigerian plants with potential for use as immunostimulants. Journal of Ethnopharmacology, 112(3), 610-613.
51. Okpekon, T., Poupaert, J. H., Fournet, A., de Pauw, E., & Quetin-Leclercq, J. (2007). New Nigerian plants with potential for use as immunostimulants. Journal of Ethnopharmacology, 112(3), 610-613.
52. Olson, M. E., & Carlquist, S. (2001). Stem and root succulence in Moringa (Moringaceae): a novel adaptive strategy. American Journal of Botany, 88(11), 2059-2078.
53. Omer, A. M., et al. (2020). Ethnoveterinary practices for poultry: A comprehensive review. Veterinary Sciences, 7(3), 1-12.
54. Pasha, T. J., et al. (2020). Ethnoveterinary use of medicinal plants in poultry farming: A review. Veterinary Research Communications, 44(2), 115-124.
55. Permin, A., & Pedersen, G. (2000). A guide to the common diseases of village chickens in Africa. CTA.
56. Qeios. (2023). Ethnoveterinary knowledge and practices in poultry health management in rural communities of Zimbabwe: A review. Qeios ID: 81X34Y.
57. Ramakrishnan, A., et al. (2018). The role of ethnoveterinary medicinal plants in poultry health management. Poultry Science, 97(2), 1-12.
58. Rao, P. V., & Reddy, P. K. (2019). Ethnoveterinary medicinal plants used in poultry: A review. Journal of Applied Animal Research, 47(1), 1-8.

59. Rashid, A., et al. (2023). "Integrating ethnoveterinary knowledge into poultry health management." Veterinary Medicine and Animal Science, 15(1), 100-110.
60. Raza, A., et al. (2020). Medicinal plants used in poultry health management: A review of ethnoveterinary practices. Journal of Animal Science and Technology, 62(1), 1-10.
61. Reddy, S. V., et al. (2021). Ethnoveterinary practices in poultry: A review of traditional knowledge. Veterinary Medicine and Science, 7(1), 1-8.
62. Saeed, M., et al. (2021). "Utilization of ethnoveterinary medicinal plants for poultry health: A review." Journal of Ethnopharmacology, 268, 113554.
63. Sardar, M. F., et al. (2019). Ethnoveterinary practices for poultry health: Current trends and future prospects. Poultry Science, 98(1), 1-10.
64. Scoones, I. (Ed.). (1996). Hazards and opportunities: Farming livelihoods in dryland Africa: Lessons from Zimbabwe. Zed Books.
65. Shah, S. Z. A., et al. (2018). Role of ethnoveterinary medicinal plants in poultry health management: A review. Journal of Agricultural and Food Research, 1, 1-12.
66. Siddique, M. A. B., et al. (2020). Ethnoveterinary practices and the use of medicinal plants in poultry health. Journal of Ethnopharmacology, 245, 112153.
67. Singh, R., et al. (2019). Ethnoveterinary medicinal plants for poultry health management: A review. Asian Journal of Animal and Veterinary Advances, 14(1), 1-10.
68. Sultana, N., et al. (2018). Ethnoveterinary practices in poultry: A review of traditional knowledge and practices. Veterinary World, 11(6), 1-8.
69. Wanzala, W., Okech, G., & Katule, A. (2005). Ethnoveterinary practices and their role in enhancing community-based animal health care in pastoral ecosystems of Kenya. Indigenous Knowledge and Development Monitor, 13(3), 11-14.
70. Zhang, G. F., Yang, Z. B., Wang, Y. Y., Song, W. Z., & Che, T. M. (2009). Effects of ginger root powder on laying performance and antioxidant status of laying hens and on the quality of eggs. Poultry Science, 88(6), 1200-1207.

Appendices

8.1 Role of different plant species as complementary medicines in poultry healthcare

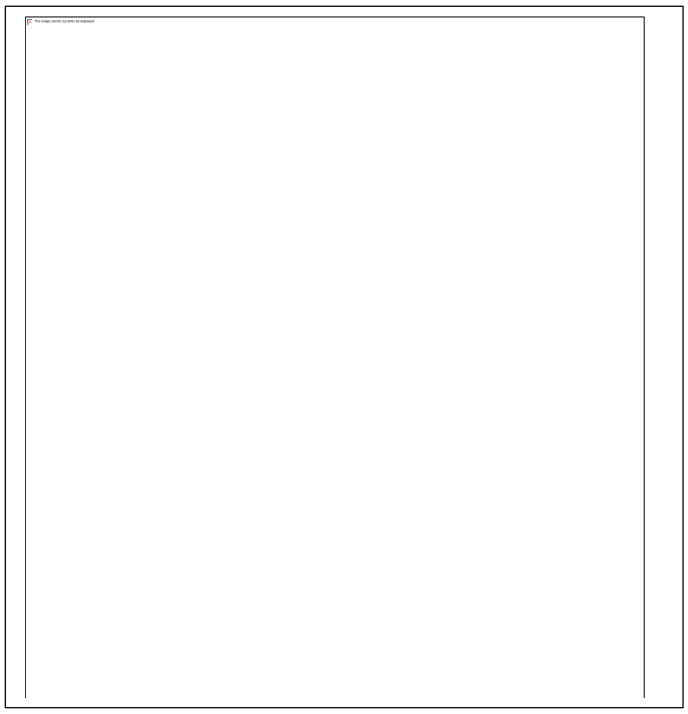
Table 5: Common plant species and their roles as complementary medicines in poultry healthcare in Goromonzi District.

	Plant species botanical name	vernacular name	count	part of plants used	preparation method	administration method	ethnoveterinary use
1	*Aloe vera*	Gavakava	120	leaves	crush the fresh plant and soak in water	Oral	coccidiosis, weight loss, fowl pox, coughing, new castle disease, lethargy, gastrointestinal infections, diarrhea, respiratory infections, flue-like symptoms
2	*Lippia javania*	Zumbani	81	leaves	collect fresh leaves	place in fowl run	ectoparasites control
3	*Solanum lycopersicum*	Mudomasi	12	leaves	pound fresh leaves and extract sap	administer the sap on the wound	wounds and fowl pox
4	Solanum incanum L.	Nhundurwa	54	roots	Grind dried roots and dissolve in drinking water	Oral	wounds
5	Capsicum frutescens L.	Mhiripiri	33	Seeds	Crush the seeds and mix with sugar solution for the birds to drink	Oral	Coccidiosis, Coughing, Flu-like symptoms, Newcastle disease, diarrhoea
6	*Albizia adianthifolia*	Mutowa	80	Roots	crush the roots and paste onto the wound	paste on the wound	wounds
7	*Lannea stullmanni*	Musosoti	73	Bark	Crush the bark, soak and administer orally	Oral	egg laying
8	*Agave sisalana Perrine*	Mukonje	35	leaves	pound and dissolve in drinking water	Oral	coccidiosis, coughing, flue-like symptoms, new castle
9	*Chenopodium ambrosioides*	Munhuwenhuwe	11	whole plant	collect the plant and place in a fowl run	place in fowl run	ectoparasite control
10	*Crinum macowanii*	Dururu	2	tubers	dissolve fresh tuber in	Oral	helminthiasis

					drinking water		
11	*Aspillia pluriseta*	mumharadzi	17	whole plant	burn the plant, dissolve the ashes in water and apply on the wound	apply dissolved ashes on wound	wounds
12	*Ximenia americana L.*	Munhengeni	78	leaves	crush fresh leaves and extract sap	apply sap on wound	wounds and fowl pox
13	*Musa x sapientum L.*	mubhanana	23	roots	crush the roots and mix with saline	Oral	coccidiosis
14	*Moringa oleifera Lam.*	Muringa	86	leaves	crush leaves and dissolve in drinking water	Oral	coughing, coccidiosis
15	*Bobgunnia madagascariensis*	muchekeresa	7	pods	grind the dried pods into powder and dissolve in drinking waters	Oral	coccidiosis, flue-like symptoms, weight loss, coughing, new castle
16	*Morus alba L.*	muhabhurosi/ muhingi	7	leaves	crush the leaves and dissolve in drinking water	Oral	coccidiosis, coughing,flue-like symptoms
17	*Pterocarpus angolensis*	Mubvamaropa	57	bark	pound the bark and apply extract on wounds	apply sap on wound	wounds
18	*Erythrina abyssinica*	Mutiti	94	bark	grind the bark into powder and dissolve in drinking water	oral	coccidiosis, wounds, coughing, flue-like symptoms, new castle diseases, blindness
19	*Bidens pilosa L.*	Tsine	77	leaves	crush the leaves and apply extract on wounds	apply sap on wound	wounds
20	*Strychnos cocculoides*	mutamba	16	fruit	crush the unripe fruit, mix the contents with drinking water	oral	coccidiosis, coughing, new castle, fowl pox

21	*Citrus limon*	muremani	2	fruit	crush fruit and apply extract	apply extract on wound	fowl pox, wounds
22	*Zinger officinale*	tsangamidzi	61	tubers	crush tuber and mix with drinking water	oral	diarrhea, coccidiosis, flue like symptoms, gastrointestinal infections
23	*xeroderris stullmanni*	murumanyama	3	bark	grind bark into powder and dissolve in drinking water	oral	lethargy, coccidiosis
24	*Euphorbia tirucalli L.*	rusungwe	1	whole plant	dissolve the crushed plant in drinking water	oral	lethargy
25	*Adenia gummifera*	Muhore	7	whole plant	pound plant and dissolve in drinking water	oral	lethargy, coccidiosis, coughing, flue-like symptoms, new castle disease, blindness

8.2 Questionnaire used to collect research data.



8.3 Confirmation letter from the botanist

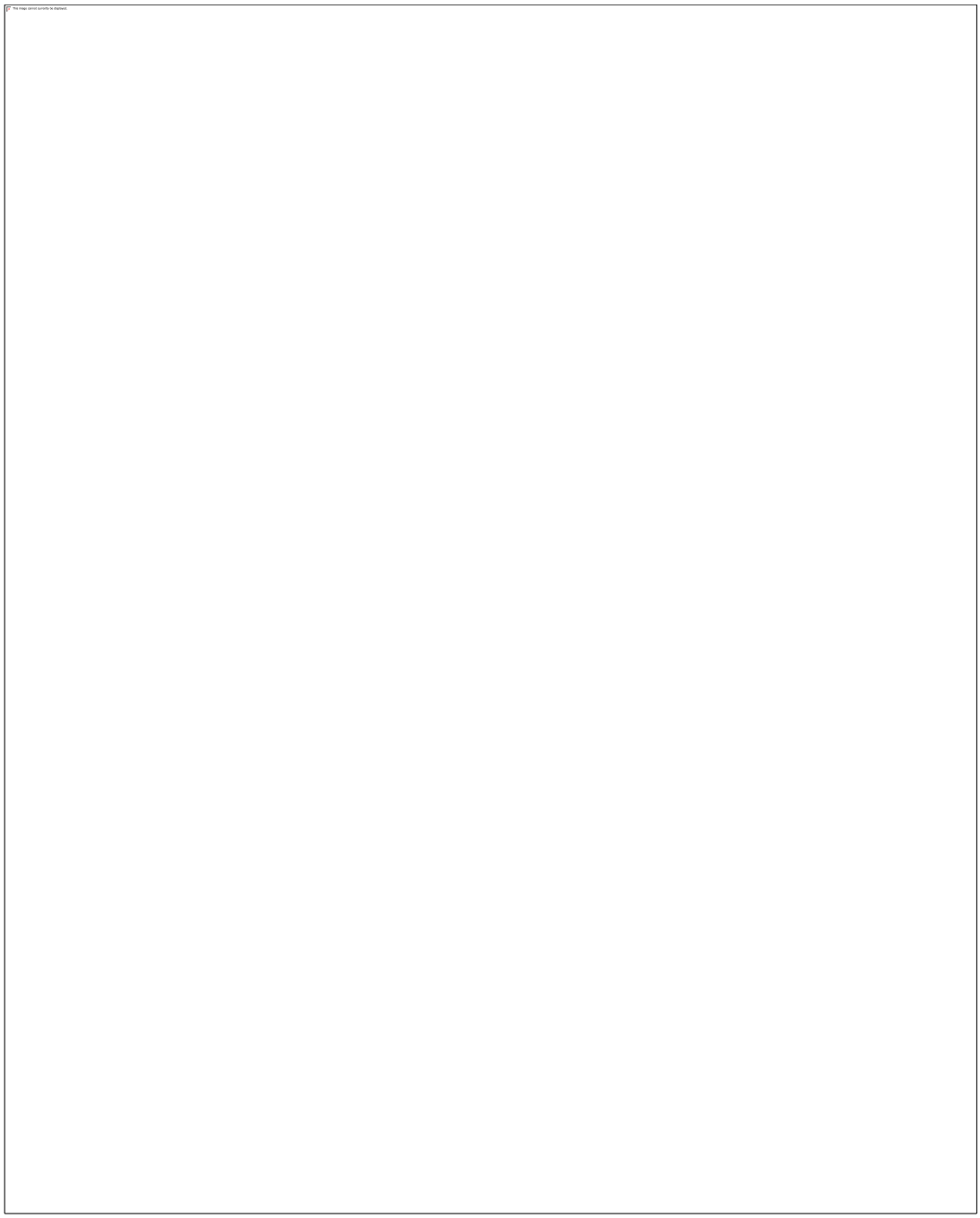


Figure 12: Confirmation for the botanical names of the named plants.