BINDURA UNIVERSITY OF SCIENCE EDUCATION

DEPARTMENT OF ANIMAL SCIENCE

FARMER'S PERCEPTIONS ON THE EFFECTIVENESS OF ALOE BARBADENSIS MILLER (ALOE VERA) IN CONTROLLING PROTOZOAN PARASITES IN BROILERS.

A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF THE BACHELOR OF AGRICULTURAL SCIENCE HONOURS DEGREE IN ANIMAL SCIENCE AND TECHNOLOGY

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DECLARATION

I MADZORE CHARITY (B203018B) oath that this thesis has not been submitted to another Academic institution. It is my original work conducted under Mr. M. Dhliwayo's supervision. All the help pertaining to the accomplishment of this work and all the academic sources used have been properly accredited.

Madzore Charity…… Date…30/09/24…

Supervisor (s)' declaration:

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

…… …… 01/10/24

Date……

Mr. M. Dhliwayo (Supervisor)

I confirm that I have checked this Research Project and I am satisfied that it conforms to The Department of Animal Science Guidelines for Project Preparation and Presentation. I therefore, authorize the student to submit this dissertation.

…… ……. Date.....…01/10/24

(Chairperson)

DEDICATION

This thesis is dedicated to my mom, dad, brothers and sisters.

ACKNOWLEGEMENTS

Firstly, I sincerely want to express gratitude to my supervisor, Mr. Dhliwayo, for the help, advice and mentorship. His remarkable proficiency, perceptive criticism and unwavering support has played a pivotal role in molding the composition and triumphant fulfillment of this thesis. I would also like to acknowledge members of Pro Feeds, Masvingo branch for granting me the permission to carry out this research at their place, as well as helping in facilitating the interviews.

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ABSTRACT

Most small holder farmers lack the funds to buy commercial veterinary drugs, the poultry industry continuously suffers economic loses as a result of protozoan infections, therefore the need for finding effective alternatives is crucial. The study's main aim was to determine the perceptions of farmers on the effectiveness of Aloe Vera in controlling protozoan parasites in broilers. The research was conducted in Masvingo province, Zimbabwe. Questionnaires were used to gather data from sixty broiler farmers, fifteen from each of the four randomly selected wards. The SPSS software was used to analyse the data and quantitative results were displayed as descriptive statistics in bar graphs using the Microsoft Excel and qualitative data were organized into themes. Seventy four percent (74%) of the interviewed farmers reported that Aloe Vera is able to control protozoan parasites in broilers. The study's findings also revealed that administering Aloe Vera to broilers had some perceived negative effects, such as, reduced feed (23%) and water consumption (8%), diarrhoea (54%) as well as abnormal behaviour (15%). It was also discovered that majority of broiler farmers, that is 67%, learnt about the potential health benefits of Aloe Vera to broilers through social media platforms (Whatsapp and Facebook) as well as verbally from grandparents and friends because the information is not well-researched and marketed. The study's conclusion was that farmers believe Aloe Vera to be a useful ethno-veterinary treatment for managing protozoan infections in broilers.

KEY WORDS: Aloe Vera, Poultry production, Protozoan parasites, Ethno-veterinary medicine.

LIST OF FIGURES

Table of Contents

CHAPTER 1

1.1 INTRODUCTION

One of the fastest and biggest developing livestock industry in the world is the poultry sector with an average annual growth rate of 35% (Ghaly & MacDonald, 2012) .In Zimbabwe, poultry farming represents a significant source of income for rural and urban communities. Poultry is raised by farmers as a supplementary source of revenue as well as to meet household food demands (Gobvu et al., 2023) However, poultry production is hindered by a number of diseases, for example, protozoan diseases such as coccidiosis caused by the protozoan parasite of the genus Eimeria (Asfaw et al., 2021) .Apart from threatening the welfare of the birds, an infection by protozoa can cause an increase in feed conversion rates and reduction in growth rates. It also damages tissues leading to diseases that results in high mortality rates, causing economic as well as production losses (Freitas et al., 2023).

(Gobvu et al., 2023) indicated that lack of access to modern veterinary care causes poor farmers to rely on traditional herbal remedies in controlling and preventing protozoan infections in broilers. In Zimbabwe, Aloe species are one of the most considered plant categories used in supervision of poultry health (Jambwa & Nyahangare, 2019) .Aloe Vera (Aloe barbadensis), a feed additive, is known to possess potential health benefits in various animals. The plant contains different bioactive compounds such as polysaccharides, phenolic compounds and vitamins (Khan et al., 2023) .These compounds characterizes the well-known aloe vera herb with anti-inflammatory, anti-viral, anti-bacterial, anti-fungal, anti-tumor, immunomodulatory, wound-healing and anti-oxidant properties (Egbuna et al., 2022) .Aloe vera possesses immune-boosting qualities that can help prevent diseases and improve the general health of broiler chickens, thereby increasing production and profitability for farmers (Quaye et al., 2023) .However, the purpose of this study is to learn more about farmer's opinions regarding the use of Aloe Barbadensis to control protozoan parasites in broilers. It also aims to evaluate farmers' awareness and knowledge of the potential of aloe vera, look into their experiences while using it to control parasites and determine the factors that influenced their choices. The findings are intended to improve knowledge of Aloe Vera's efficiency in broiler protozoan parasite control, offering suggestions for improved poultry health management techniques. It also serves to confirm if there are any possible negative effects

of using aloe vera or interactions with other dietary ingredients thereby providing valuable insights for researchers and other farmers.

1.2 PROBLEM STATEMENT

Apart from nutrition, health is another key consideration in the poultry industry. Every year, the production of broilers suffers continuous economic losses due to protozoan parasite infections. Protozoan infections have an adverse impact on weight increase, overall development, meat quality and overall performance of broilers. The majority of small holder farmers lack the funds to purchase commercial veterinary drugs that control protozoan parasites and prevent outbreaks of diseases like coccidiosis. Research interest has been triggered by the potential use of ethno veterinary plants like aloe vera (aloe barbadensis) in mitigating the prevalence of protozoan diseases. These plants are widely utilised in small holder regions.

1.3 OBJECTIVES

1.3.1 MAIN OBJECTIVE

To determine the perceptions of farmers on the effectiveness of Aloe Barbadensis in controlling protozoan parasites in broilers.

1.3.2 SPECIFIC OBJECTIVES

1. To assess farmers' knowledge and awareness of Aloe Vera as a potential control measure for protozoan parasites in broilers.

2. To investigate farmers' experience and practices regarding the use of Aloe Vera in controlling protozoan parasites in broilers.

3. To identify the factors influencing farmers' decisions to use or not use Aloe Vera for controlling protozoan parasites in broilers.

1.4 JUSTIFICATION

The study seeks to enlighten farmers about the alternate forms of ethno-veterinary treatment that can be used to lessen the impacts of protozoan parasites in broilers. Compared to the use of commercial medications, the use of ethno-veterinary medicines such as Aloe Barbadensis, is less expensive and provides a potential solution. Aloe Barbadensis is easily accessible and is widely

spread in the natural veld. Understanding the possible benefits provided by the Aloe Barbadensis plant can help reduce expenses associated with buying commercial medications for poultry farming. The base of confidence in using Aloe Barbadensis to suppress protozoan parasites is provided by the thoughts and opinions of some farmers. Aloe Barbadensis offers a dual approach to address the nutritional and protozoan infection challenges. Moreover, the use of Aloe Barbadensis has no recognised negative effects.

CHAPTER 2

2.0 LITERATURE REVIEW

2.1 INTRODUCTION

Despite its contribution to food security, the poultry industry suffers gaps in biosecurity because of infectious diseases and growing feed costs, which makes birds prone to illness resulting in high mortalities as well as monetary losses (Ullah et al., 2022) . According to Dhama et al., (2015), it is therefore necessary to use integrative measures such as vaccinations, therapies and antibiotics. However, many nations have prohibited the use of chemotherapy in treatment of fatal parasitic diseases, like avian coccidiosis (Khan et al., 2023) , due to the threats it imposes to the environment, public human health, antibiotic resistance, declining avian immunity, and security. The use of microbial growth promoters is also forbidden due to the evolution of resistant bacteria as well as the discovery of residual microbes in meat and eggs (Amber et al., 2021) .Since the poultry industry has been banned from using antibiotics, safer substitutes are therefore strongly recommended for the management of infectious microorganisms. Traditional herbal plants such as aloe vera have proven to be advantageous in providing a potential substitute for antibiotics hence recording these herbs is essential because of the growing pharmaceutical costs and the potential for organic production.

2.2 ALOE VERA AND ITS BIOACTIVE CONSTITUENTS

Aloe Vera, a succulent plant with no stem (Qiao et al., 2013), has been used for years in medicine and therapy due to its healing potentials (Saini et al., 2022). In accordance with Qiao et al., (2013) it is well known for the gel-like material that is present inside its turgid and lance-shaped leaves with rough edges and sharp points. Over 200 nutrients, bioactive substances, polysaccharides, and saponins are found in Aloe Vera (Khan et al., 2023). Some of the most important bioactive substances includes polysaccharides, anthraquinones, phenolic compounds, enzymes, minerals and vitamins (Ebrahim et al., 2020).

2.2.1 Polysaccharides

Acemannan, one of the most significant bioactive constituents of Aloe Vera gel, is among the many polysaccharides the plant possesses (Liu et al., 2019). According to Kim et al., (2023) polysaccharides has anti-inflammatory, immunomodulatory, and wound-healing characteristics.

2.2.2 Anthraquinones

Aloin, aloesin, and emodin are only a few of the anthraquinones found in Aloe Vera and are similar to prebiotics in that they increase Lactobacillus spp. colonies and reduce Gram-negative bacteria (Ebrahim et al., 2020). This enables Aloe Vera to work against dangerous bacteria like Staphylococcus Aureus and Escherichia Coli. Due to their laxative properties and possible advantages for digestive health (Ma et al., 2022), these substances are frequently utilized in traditional medicine.

2.2.3 Phenolic compounds

Aloe Vera is a rich source of phenolic chemicals, such as tannins, coumarins, and flavonoids (Bista et al., 2020). These substances have antioxidant qualities that aid in defending cells against oxidative stress and damage brought on by free radicals (Khanam & Sharma, 2013).

2.2.4 Enzymes

According to Adlakha et al., (2022), Aloe Vera gel is rich in enzymes, including catalase, amylase and bradykinase. These enzymes are thought to be a part of the plant's therapeutic abilities because of their anti-inflammatory characteristics.

2.2.5 Minerals and vitamins

Vitamin C, E, and several B vitamins are among the many vitamins that Aloe Vera has in abundance (Adlakha et al., 2022) .It also includes vital minerals like calcium, magnesium, and zinc, which the body needs for a number of physiological processes (Kamble et al., 2022).

2.3 EFFECTS OF ALOE VERA IN POULTRY

2.3.1 Anti-parasitic effects

Yim et al., (2011) reported that faecal oocysts shedding was significantly reduced in all birds under Aloe Vera treatment compared to those that did not receive Aloe Vera supplements. Compared to birds that did not receive Aloe Vera, those administered Aloe Vera exhibited significantly fewer intestinal lesions after infection. Research has demonstrated that different amounts of crude Aloe gel possess anticoccidial properties, as they are able to significantly reduce the sporulation of unsporulated Eimeria oocytes compared to control groups (Desalegn & Ahmed, 2020). It is believed that Aloe Vera gel infusion can prevent Eimeria oocytes from maturing into the infectious stage, or at least inhibit their proliferation. This anti-sporulation effect may be attributed to the antioxidant phytochemicals and polysaccharide derivatives in Aloe Vera, which can interfere with the physiological processes necessary for spore formation, such as blocking oxygen access and

inhibiting sporulation-related enzymes (Desalegn & Ahmed, 2020). Additionally, the anticoccidial activity and saponin content of Aloe Vera gel are thought to be the source of the observed anticoccidial action, since they react with the cholesterol on the parasite cell membrane, leading to death of the parasite, and reduced protozoan proliferation (Zaman et al., 2012). According to Islam et al., (2017) the literature has reported conflicting results when treating broiler chickens with and without coccidian illness using Aloe Vera. However, Aloe Vera gel has been shown to have various medicinal uses, including the management of digestive disorders. Khan et al., (2023) revealed that Aloe Vera includes auxins and gibberellins, which are growth promoting hormones and polysaccharides like glucomannan that can reduce intestinal inflammation and haemorrhages caused by Eimeria species, thereby enhancing digestion and encouraging weight gain. The antioxidant activity of Aloe Vera contributes to its therapeutic benefits by reducing the severity of illness (Kaingu et al., 2017). Aloe vera has several benefits against a number of diseases because it consists of active ingredients that efficiently control the proliferation of oocysts in the intestines and caeca of birds. These active ingredients includes beta-carotene, folic acid, choline, vitamins C and E, vitamin b12, acemannans, glucomannans, proteins and minerals (Adlakha et al., 2022). Khan et al., (2023) proposes that Aloe Vera may also help lower coccidiosis due to the anthraquinone derivatives such as isobarbaloin, aloetic acid, and emodin in its gel, which interact with the gut mucosa to accelerate peristalsis and the discharge of coccidiosis through feces. According to the findings of Babak & Nahashon (2014), Aloe Vera gel-containing feed has been shown to progress intestinal health and reduce coccidiosis, but the optimal amount and level of efficacy is yet to be fully discovered. Both ethanolic and aqueous Aloe Vera extracts have shown the ability to be effectively fight coccidiosis in broilers (Akhtar et al., 2012).

2.3.2. Growth effects in poultry

In broiler chicks, Aloe Vera has the ability to stimulate growth in a manner similar to that of antibiotic growth stimulants (Singh et al., 2013). A comparison between growth promoting properties of terramysin and Aloe Vera in broiler chickens showed that Aloe Vera treatment led to broilers gaining weights at a significantly faster pace (Khan et al., 2023). Raziq et al., (2012)found that broilers given aqueous plant extracts of poly-herbal plants, such as Aloe Vera (20 ml/L of drinking water), showed improved weight gain and feed efficiency. In accordance with Nalge et al., (2017), Aloe Vera gel extract in drinking water is more efficient than antibiotic growth boosters in improving the performance of broilers with no adverse effects on the overall health of the

broilers. Aloe Vera has been shown to have several beneficial effects, including improving the consumption of feed, endogenous digestive enzyme secretion, anti-oxidation status, and anti-bacterial capabilities (Elwan et al., 2019). When mixed with feed at a rate of 1.5%, Aloe Vera powder was found to be more efficient than enramycin, an antibiotic, at improving the performance of broilers and reducing Salmonella and Escherichia coli species that affects the intestines (Khan et al., 2023). The enhanced growth rate can be attributed to Aloe Vera's capacity to both raise the number of helpful bacteria as well as decrease the amount of harmful bacteria. Shokraneh et al., (2016) revealed that broilers under aloe vera treatment showed an increase in Lactobacillus bacteria, widely recognized for their role in enhancing the digestion and absorption of nutrients in the broiler's gut. This enables the broilers to fully utilize the feed and nutrients more efficiently since there are fewer harmful bacteria present. Aloe Vera also contains plant-based bio-catalysts like lipase and amylase that can assist in digestion by helping to break down fats and carbohydrate (M. S. Islam et al., 2020). Additionally, Aloe Vera gel's acemannan strengthens the immune system thereby making the body more resistant to bacteria and viruses (Ebrahim et al., 2020). Brunetti et al., (2022) however noted that various factors, for example, parts of the plant, physical characteristics, gene variation of birds, age, dosage, form, time of harvest as well as compatibility with other ingredients, may affect performance when examining the effectiveness of herbal supplements on broilers.

2.3.3 Immunomodulatory and antimicrobial effects.

Sinha et al., (2017) reported that strong phytochemical activity found in Aloe Vera can enhance humoral and cellular responses, hence improving immune function. According to Darabighane et al., (2017), broilers supplemented with both aqueous and ethanolic Aloe Vera extract showed superior antibody titres against sheep red blood cells (SRBCs) and New Castle virus (NDV) and also had a stronger reactivity to a phytohemagglutinin-P (PHA-P) injection in comparison with those that did not receive Aloe Vera treatment. Research has shown that acemannan can trigger the production of inflammatory cytokines by macrophages, including IL-6, IL-1, and tumour necrosis factor (TNF), which can promote the growth of B lymphocytes as well as increase the quantity of T lymphocytes (Kim et al., 2023). In accordance with Khan et al., (2014), humoral immunity can be enhanced by particular compounds, including acemannan found in Aloe Vera gel, which can stimulate the production of antibodies and cytokines as well as increase the activity of lymphocytes and natural killer cells. Several investigations have demonstrated the antibacterial

properties of plant extracts, which can boost gut flora populations and alleviate certain diseases to improve the environment of the gastrointestinal tract (Reda et al., 2020). Aloe Vera works against dangerous bacteria like Staphylococcus Aureus and Escherichia Coli because it comprises of anthraquinones, which are similar to prebiotics in that they boost Lactobacillus spp. colonies and lower Gram-negative bacteria (Shokraneh et al., 2016). Salicylic acid, which possesses anti-inflammatory and antibacterial properties that can improve gut micro flora is also found in Aloe Vera (Sharma et al., 2014). Faecal E.Coli and Salmonella counts were reduced in birds fed Aloe Vera as compared to those that did not receive any supplement, however total bacterial count was the same (M. S. Islam et al., 2020).

2.3.4 Haematological and Serum Biochemical Effects

The biochemical and haematological features of blood can be used as an indicator of the internal environment of the bird (Khan et al., 2023). Aloe Vera is known to have the ability to facilitate better nutrient and oxygen entry into cells (Sharma et al., 2014). Rehman et al., (2011) also discovered that the broiler chicks' cholesterol profile was impacted by the period of feeding of certain medicinal herbs, such as Aloe Vera. According to Raziq et al., (2012) broiler chicks' blood cholesterol, triglyceride, and low-density lipoprotein (LDL) levels dropped and their HDL concentration rose when water-base infusion of poly-herbal plants including Aloe barbadensis was administered. Broilers supplemented with Aloe Vera displayed a substantial rise in haematological values for mean corpuscular haemoglobin concentration (MCHC), as well as the highest RBC and mean corpuscular haemoglobin (MCH) levels (Yadav et al., 2017). Aloe Vera has several active ingredients, including glucomannans, acemannans, carotene and vitamin B12, which have proved to increase the total leucocyte count (TLCs) (Singh et al., 2013). Broiler chicks that were given a whole leaf extract of Aloe Vera in drinking water, (20g/L) were shown to have higher levels of total plasma glucose, packed cell volume, serum calcium, and haemoglobin than the control group (Khan et al., 2023). Sahin et al., (2017), noted that Aloe Vera is a natural antioxidant that can be utilized as a fantastic substitute for synthetic antioxidants since it effectively blocks pro-oxidants' ability to damage cells and membranes. It fortifies the body's defences against oxidative stress by stimulating the activity of natural antioxidant enzymes, such as catalase, glucose-6-phosphate dehydrogenase, and superoxide dismutase (Sinha et al., 2017).

2.4 PROTOZOAN DISEASES IN BROILERS

Satbige et al., (2018) indicated that the majority of environments are home to single-celled microscopic organisms called protozoa, which contain several parasitic infections that affect both livestock and humans. Histomonads (H. melegridis), cryptosporidia (Cryptosporidium baileyi), and coccidia (species of the Eimeria genus) are some protozoan parasites that are significant to chicken farmers (McDougald et al., 2019).

2.4.1 Coccidiosis

Coccidiosis, a highly contagious infection caused by coccidia, makes a bird more vulnerable to other poultry illnesses such as necrotic enteritis. Coccidia are by far the most prevalent protozoan parasites infecting chickens and turkeys (Aarthi et al., 2010). About nine species of coccidia infect hens, whereas seven species infect turkeys (McDougald et al., 2019). Due to the species-specific nature of coccidian, domestic animals and other poultry such as turkeys are not impacted by coccidia that afflict chickens (Mesa-Pineda et al., 2021). According to Sharma et al., (2015) the digestive tract is home to coccidian's life and reproduction, which results in destruction of tissues. This damage leads to loss of blood, diarrhoea, and decreased absorption of nutrients and fluids. Symptoms include ruffled feathers, decrease in weight, diarrhoea, abnormal feces, lethargy and even death (Yu & Heo, 2021). Medication included in store-bought feed inhibits but does not eradicate coccidia and young birds can build tolerance by eating such feed (Rumapea et al., 2023), however being exposed to a different species of coccidia can result in signs and symptoms of coccidiosis. Most poultry have coccidia, and chicks are vaccinated to build up immunity without disease development, eliminating the need for routine anticoccidial medications. According to El-Ghany, (2021) good management such as maintaining a clean and dry environment is one effective way of controlling coccidiosis.

2.4.2 Cryptosporidiosis

This is a disease caused by cryptosporidium. Apart from broilers, cryptosporidia can also infect other birds, animals and humans (Lin et al., 2022), and can spread from one flock to another on people and animal feet, polluted water and feed, as well as on wild birds (Wang et al., 2021). Cryptosporidiosis, a more prevalent intestinal infection, can be contracted through inhalation (Sponseller et al., 2014), causing a more serious respiratory infection compared to intestinal. Signs and symptoms are often mild. In birds with yellow skin, pale skin is mostly the only symptom (Alasadiy et al., 2020). Cryptosporidiosis is an infection that requires supportive therapy and

prevention of secondary infections, and after recovering, birds develop immunity to subsequent cryptosporidia infections.

2.4.3 Histomoniasis

Histomonas meleagridis is a protozoan parasite that causes the diseases histomoniasis, also known as blackhead disease due to dark discolouration of the liver in infected birds (Liebhart et al., 2017). It mostly affect turkeys but can as well infect other species like chickens and quails through ingestion of infected cecal worms which leads to discharge of sporocysts into the cecum of the bird (Landim de Barros et al., 2022). Histomonas meleagridis spreads to and destroys the liver (Li et al., 2021) when infective oocysts are consumed via feed, water or litter that has been contaminated. According to (Mitra et al., 2018), reduced appetite, diarrhoea, drooping wings and loss of weight are among other symptoms of infection. Severe cases may result in mortality, jaundice and liver failure (Hatfaludi et al., 2022). Treatment options are very limited since some medications have been banned (Beer et al., 2022). Prevention and control involve good hygiene and biosecurity practices.

CHAPTER 3

3.0 METHODOLOGY

3.1 Study site

The study was carried out in four wards of Masvingo district, located in south-central part of Zimbabwe, at 1097 meters above sea level, with coordinates -20.3148, 30.90008. The precipitation in the area adds up to 622mm annually (Malvern Simba et al., 2013). According to Chikodzi, (2013), the area is characterised by drought tolerant and tough vegetation like Mopani trees. The main agricultural activities include rearing of cattle, as well as the subsistence cultivation of drought-resistant cereal crops such as sorghum and various types of maize. The area is in the dry semi-arid region of Zimbabwe therefore receives minimum rainfall hence small scale farmers concentrate more on poultry production than crop farming (Malvern Simba, 2012).

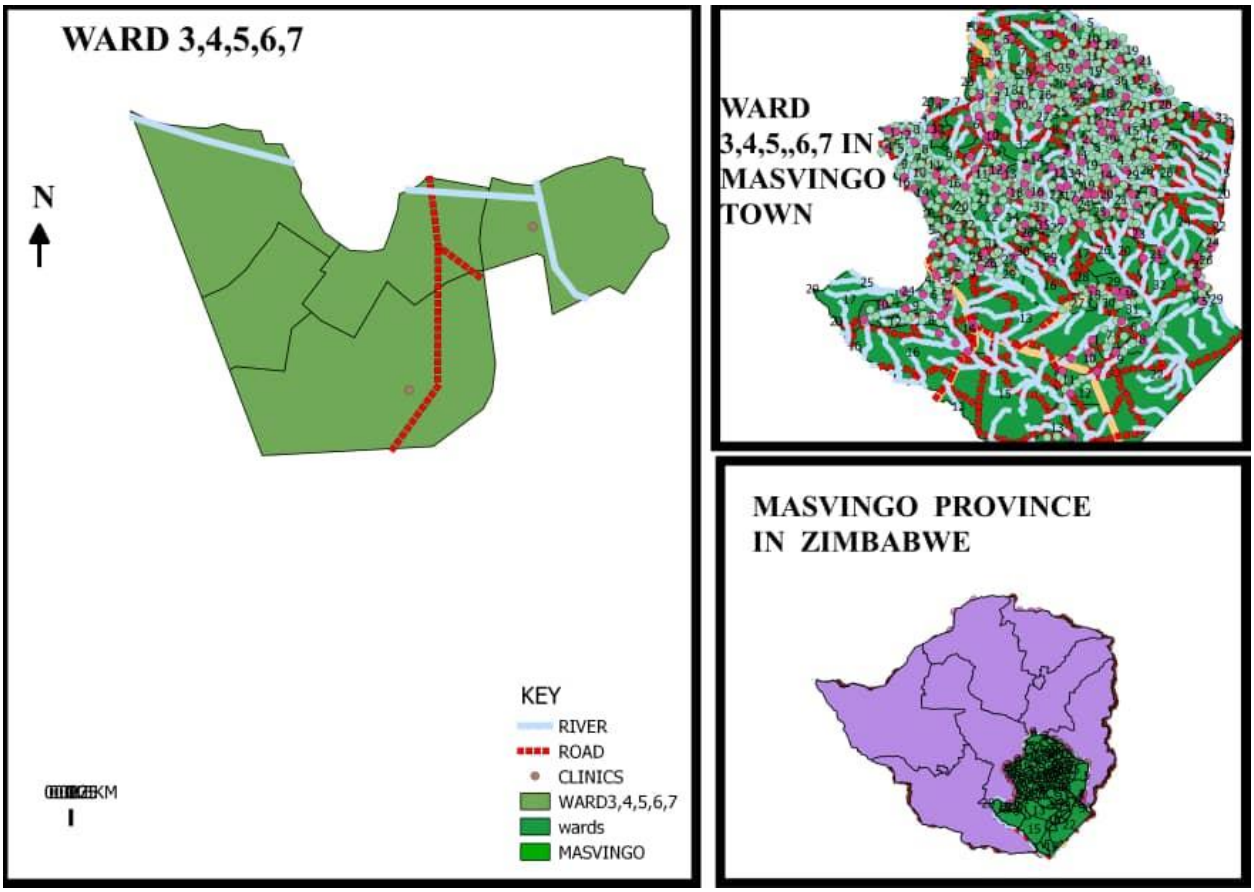

FIG 3.1: Map of study area (Masvingo)

3.2 Selection of farmers

Fifteen regular, small scale poultry farmers (of a stock with at least fifty birds) were selected from the four randomly selected wards adding up to sixty participants. A stratified random sampling method was used to select the participating farmers from the records of farmers who booked for chicks at Pro Feeds Masvingo. Strata were created using Pro Feeds records of addresses (to determine wards) of regular customers from the selected wards. These customers/farmers from each of the four wards were assigned a unique letter and a random sample was obtained within those strata.

3.3 Data Collection

Structured questionnaires were used to collect the data on Masvingo farmers' perceptions on Aloe Vera use. Only farmers above 18 years of age were interviewed. The interview sessions were conducted at Pro Feeds Masvingo branch using the Karanga native language and English. Pre-testing of the questionnaire was done in Mucheke, Masvingo.

To obtain a clear understanding on how poultry farmers use Aloe Vera, a set of questions were prepared and used in focus group discussions. Two sets of poultry producers participated in the focus group discussions. One of the focus groups was made up of five household heads living in Runyararo West (ward 5), whereas the other group consisted of four household heads from Sisk (Ward 3). Questionnaires were created based on the focus group discussions. Moreover, these group discussions addressed the benefits and drawbacks of Aloe Vera, as well as how and when to use it.

3.4 Data analysis

The data set pertaining to questionnaire responses was summarized using descriptive statistics. The data was analysed using the SPSS software. The results were collected and presented as graphs using Microsoft excel. Qualitative data from focus group discussions and open ended questions in questionnaires were organized into logical themes and presented.

CHAPTER 4

4.0 RESULTS

4.1 DEMOGRAPHICS

4.1.1 Gender

The population of broiler farmers that undertook the survey comprised of 27% male participants and 73% of female participants.

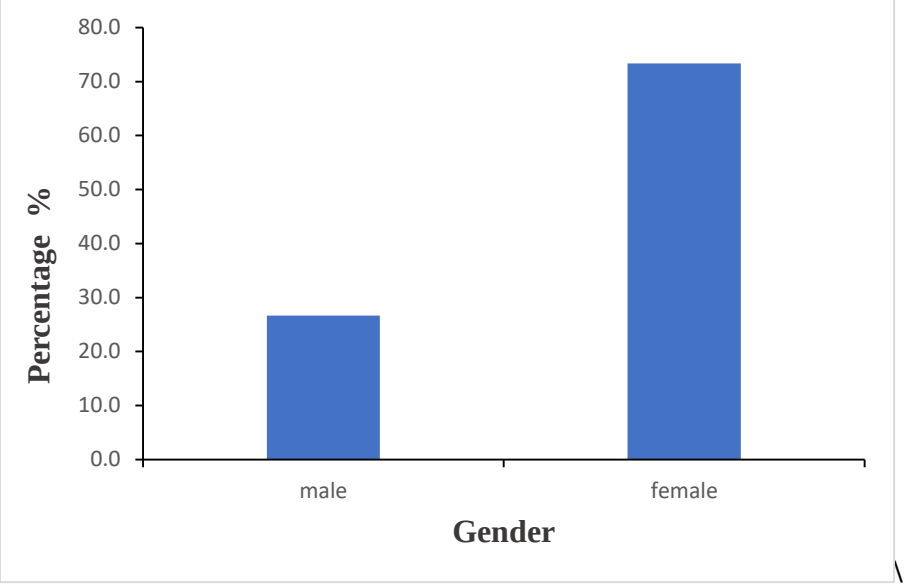

FIG 4.1: Gender of respondents

4.1.2 Age

All the respondents that participated in the survey were above 18 years of age, with 10% of them being within the range of 18 to 25 years and 7% in the 26 to 30 years range. The higher percentages which are 28%, 33% and 22% comprised of respondents within the range of 31 to 40 years, 41 to 49 years and 50+ years respectively.

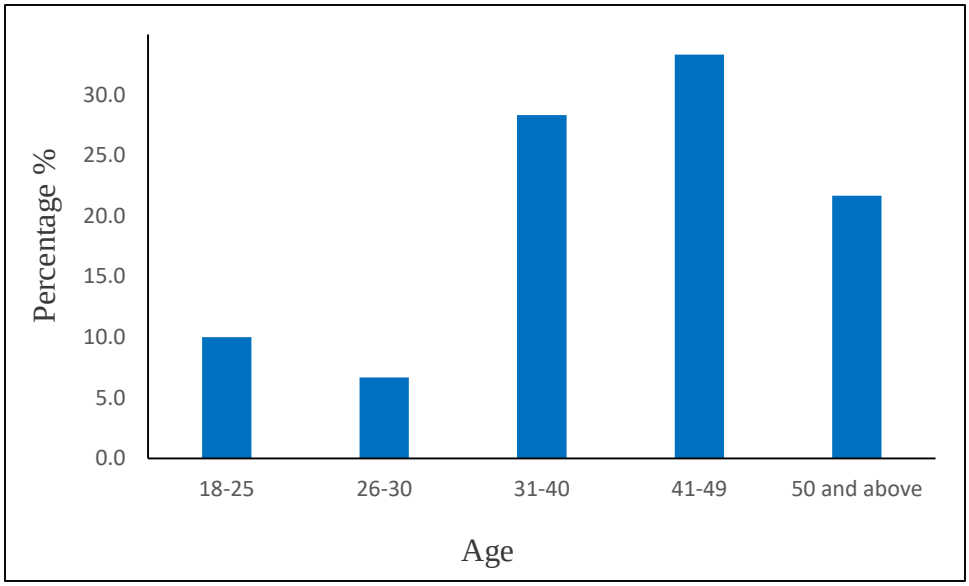

FIG 4.2: Age of respondents

4.2 AWARENESS OF ALOE VERA'S POTENTIAL HEALTH BENEFITS

Seventy two percent (72%) of the farmers who undertook the survey responded that they knew about the potential health benefits associated with feeding Aloe Vera to broilers. However, the other 28% had no idea of these positive effects that comes with feeding Aloe Vera to broilers.

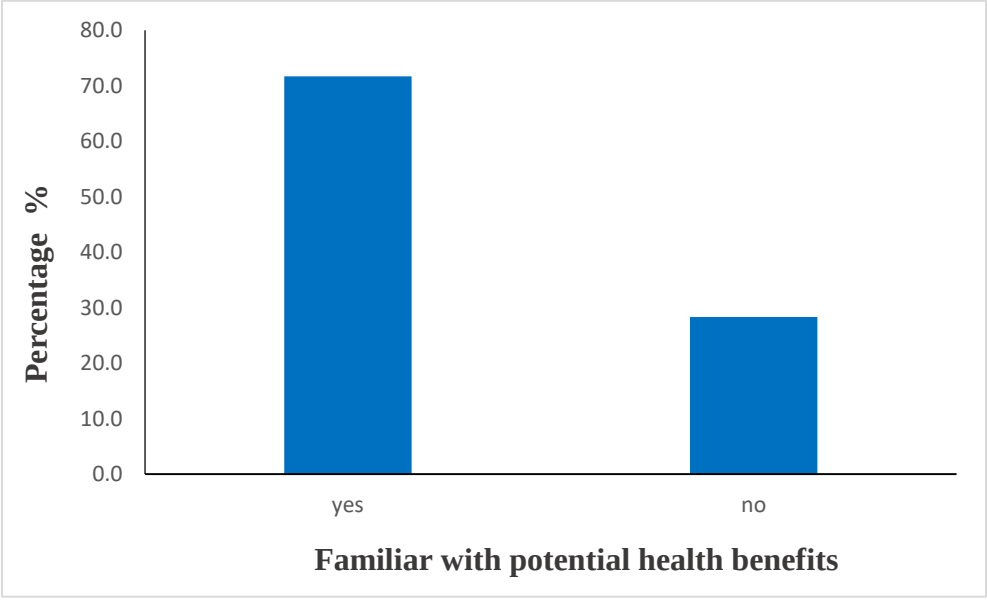

FIG 4.3: Awareness of potential health benefits of Aloe Vera

4.3 FARMER EXPERIENCES AND PRACTICES WHILE USING ALOE VERA

4.3.1 Feeding Regime

5% of the interviewed farmers responded that they administer Aloe Vera to their broilers on a daily basis whereas a majority of 58% said that they feed Aloe Vera on a weekly basis. 14% of the respondents reported that they supplement Aloe Vera after every two weeks and the remaining 23% responded on other.

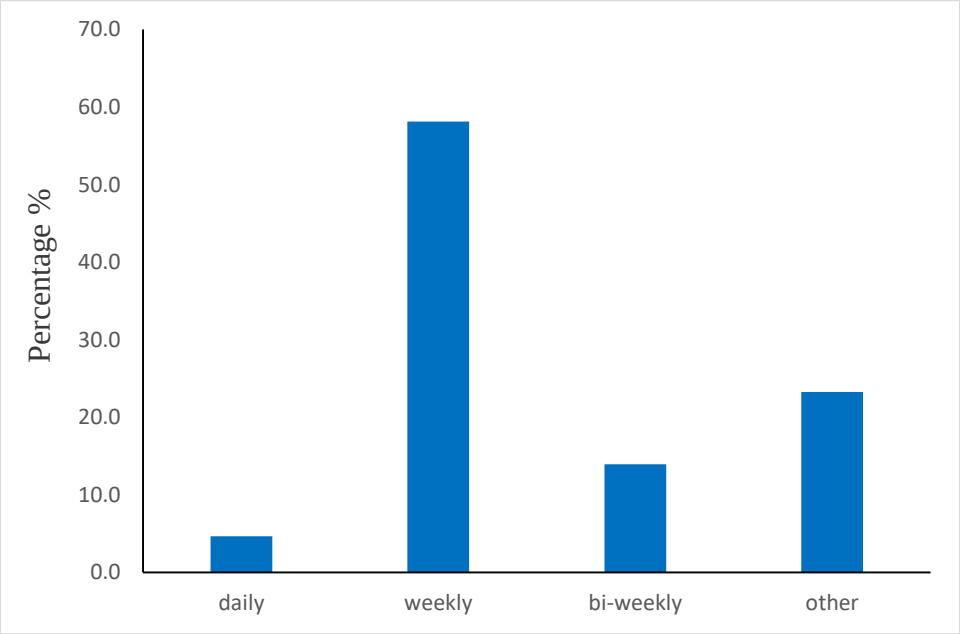

FIG 4.4: Schedule of feeding Aloe Vera

4.3.2 Use of Aloe Vera

72% of the farmers that use Aloe Vera responded that they administer it earlier to prevent the occurrence or outbreak of the diseases. The other 28% reported that they use Aloe Vera to treat the broilers that may be showing signs and symptoms of infection by protozoan parasites.

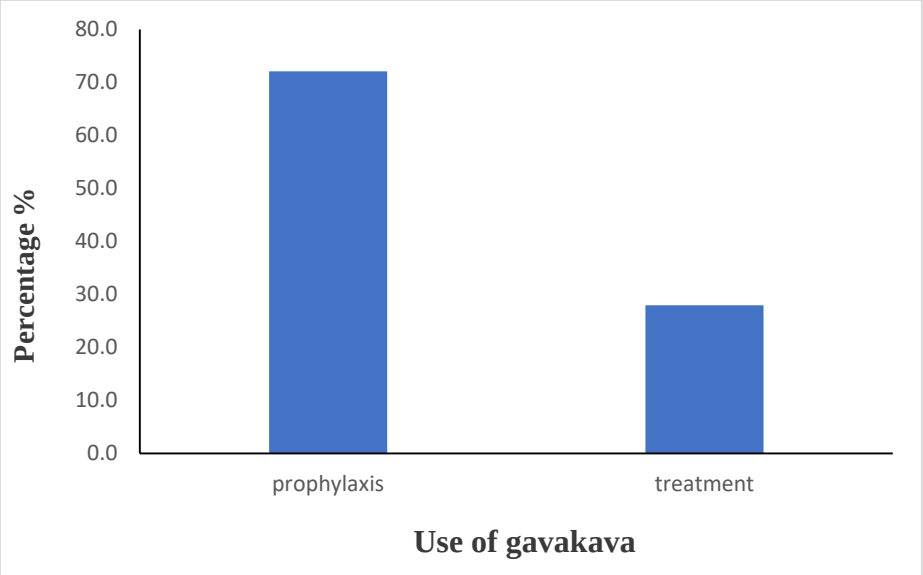

FIG 4.5: Reason for feeding Aloe Vera

4.3.3 Challenges faced by farmers using Aloe vera

23% of the farmers who experienced challenges while using Aloe Vera reported that there was reduced feed intake in the supplemented broilers. 8% noticed a reduction in water intake whereas the majority, that is, 54% reported that Aloe Vera caused diarrhoea to the broilers and the remaining 15% noticed an abnormal behaviour and signs of discomfort (including ruffled feathers and reduced activity).

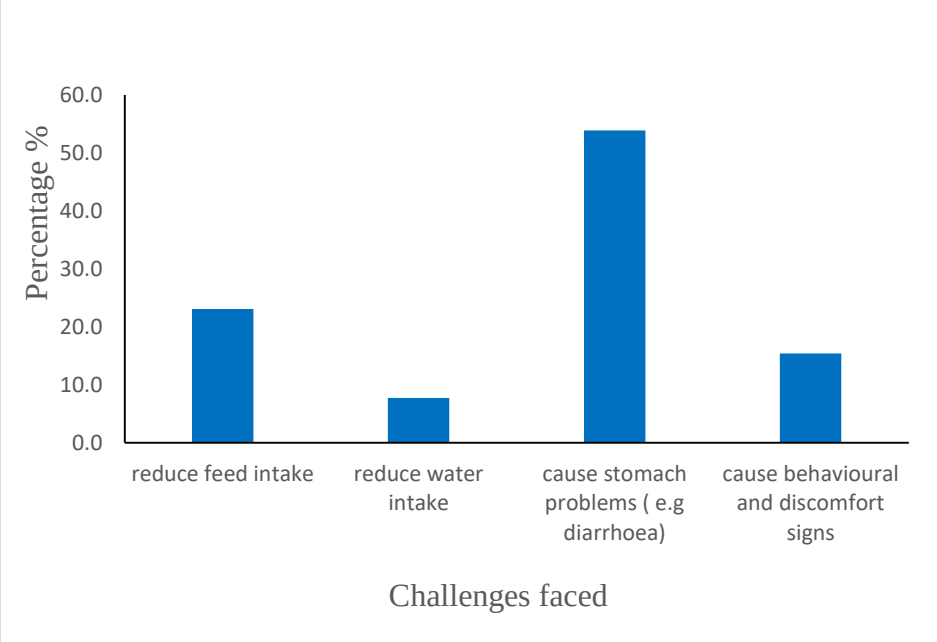

FIG 4.6: Negative effects associated with feeding Aloe Vera

4.4 FARMER INFLUENCERS

4.4.1 Cost effectiveness of using Aloe Vera

Out of the 43 farmers that used Aloe Vera, 28% confirmed that using Aloe Vera to control protozoan parasites saves money, 19% confirmed that Aloe Vera is widely distributed which makes it easily accessible. 14% responded that there was increased weight gain in birds supplemented with Aloe Vera. 32% said that Aloe Vera provides a lot of benefits, (including improved growth performance, reduced mortality rates e.t.c) whereas 7% of the broiler producers responded on other.

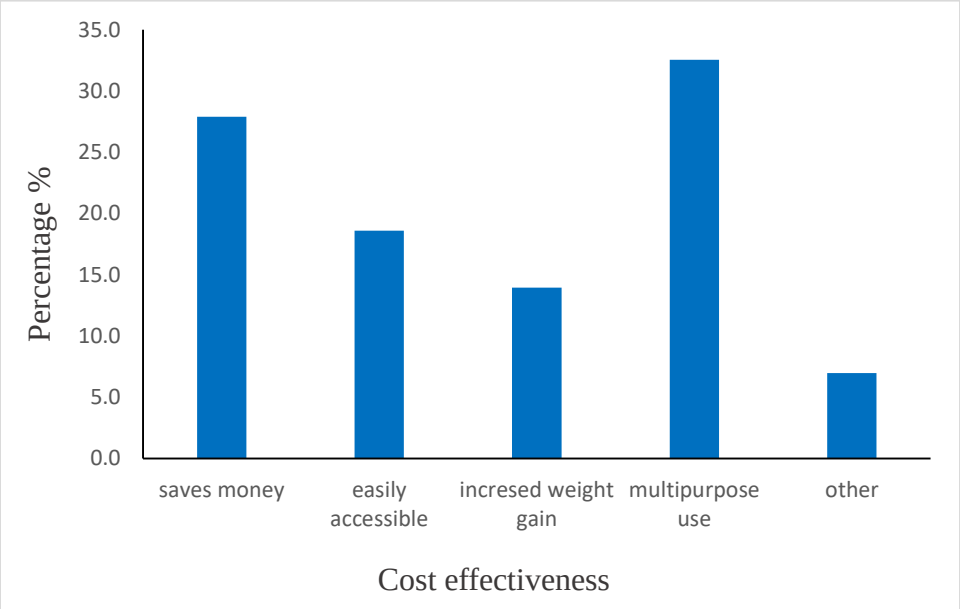

FIG 4.7: Cost effectiveness of using Aloe Vera

4.4.2 Who influenced farmers to use Aloe Vera

35% of the broiler farmers responded that the influence to use Aloe Vera to control protozoan parasites in broilers was passed down to them orally from their grandparents, friends and other family members. 14% learnt about the benefits of Aloe Vera in school through different subjects and practical like Agriculture. Another 14% got the influence through reading books and researching on the internet. Information shared through social media platforms like Facebook and Whatsapp also influenced another 32% of broiler farmers to use Aloe Vera and the remaining 5% were influenced by other factors like agricultural television programs.

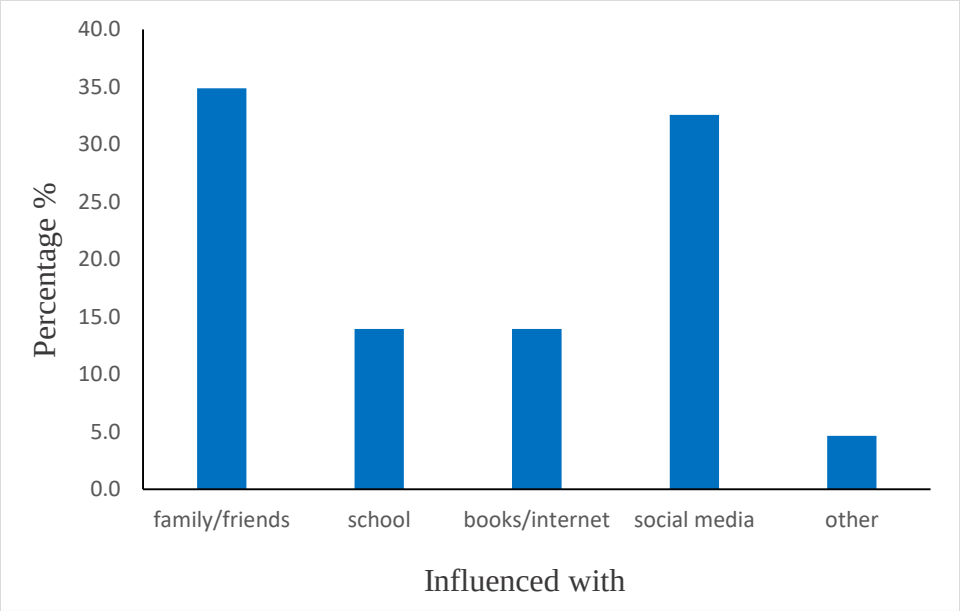

FIG 4.8: Sources of Influence on using Aloe Vera

4.5 OVERALL FARMERS PERCEPTIONS

4.5.1 Effectiveness of Aloe Vera in controlling protozoan parasites in broilers

Out of the 43 participants that used Aloe Vera, 18% responded that the plant was not effective in controlling protozoan parasites and 7% reported that Aloe Vera was not so effective. However, the majority, that is, 63% and 12% reported that the ethno veterinary plant's effectiveness in controlling protozoan parasites was very good and excellent respectively.

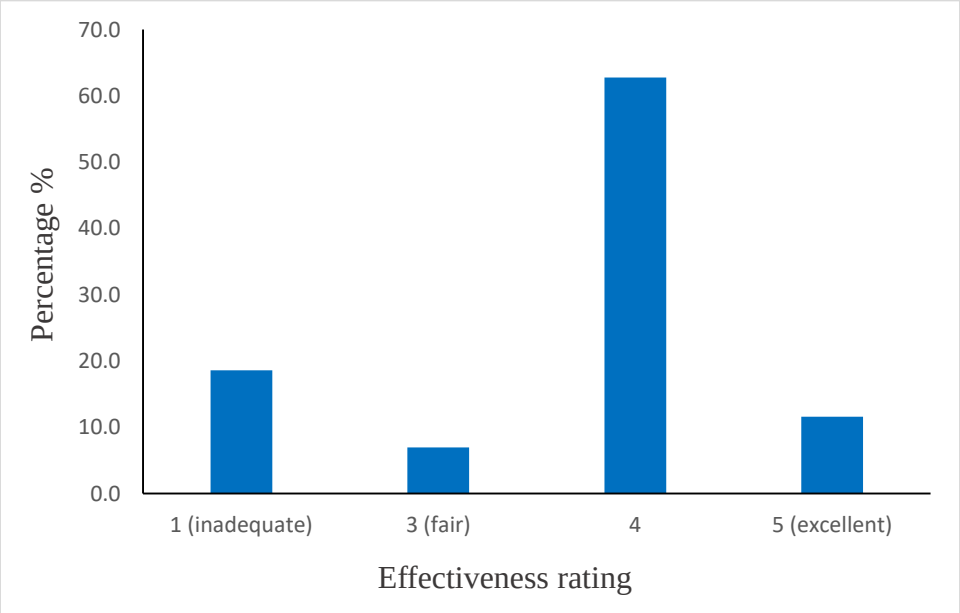

FIG 4.9: Rating of Aloe Vera's effectiveness

4.5.2 Opinions of farmers on the ability of Aloe Vera to control protozoan parasites

74% of the farmers that used Aloe Vera responded that it was able to control protozoan parasites in broilers. However, 26% responded that Aloe Vera is not effective in controlling protozoan diseases in broilers.

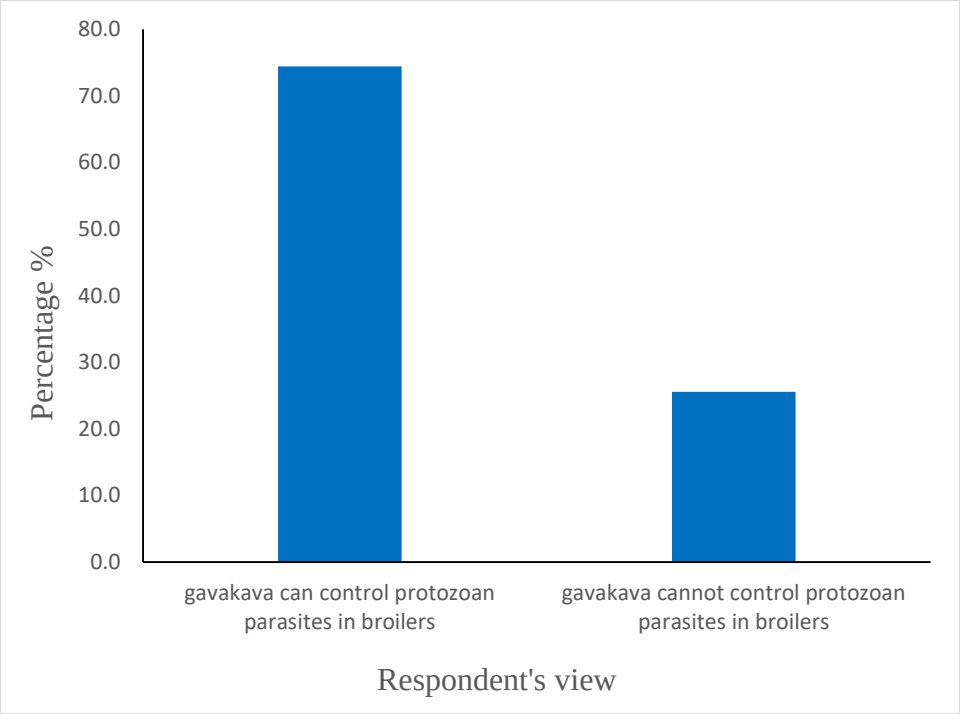

FIG 4.10: Ability of Aloe Vera to control protozoan parasites.

CHAPTER 5

5.0 DISCUSSION OF RESULTS

The study's findings indicated that women outnumbered men among the small-holder farmers surveyed. Gororo & Kashangura, (2016) noted similar results stating that broiler units were informal, small-scale, female-dominated backyard businesses. Furthermore, the majority of broiler farmers are middle-aged and older, with lower levels of education.

According to the study, most small-scale broiler producers were aware that administering Aloe Vera to broilers may have health benefits. This supports the findings of Khan et al., (2023) that Aloe Vera is utilised by rural farmers to prevent and cure chicken infections and lately, the poultry farming sector has become more aware of Aloe Vera, especially when it comes to raising broilers. Fewer people, though, were not aware of these potential health benefits. This may be the result of a lack of research, since it has been noted that although Aloe Vera has been well investigated for its potential medical benefits in people, comparatively little study has been done expressly on the plant's advantages for broilers. The study that was conducted by Jamil et al., (2022) showed that research on the impact of Aloe Vera on broiler health and performance may not be as prevalent or well-publicized as studies in other fields.

The results of the study showed that most farmers feed broilers extract from the Aloe Vera plant on a weekly or bi-weekly basis as a preventative medication. This supports the results of Ebrahim et al., (2020), which shows that acemannan, a polysaccharide in Aloe Vera gel strengthens the immune system and increases the body's resistance to viruses and bacteria due to its excellent immunomodulatory, antiviral, antitumor and tissue regeneration effects . However, a significant proportion of farmers utilize Aloe Vera as a treatment measure, and they administer it to broilers every day until the flock is healed. These healing properties, according to Kim et al., (2023) research has shown that acemannan can trigger the production of inflammatory cytokines by macrophages, including IL-6, IL-1, and tumour necrosis factor (TNF), which can promote the growth of B lymphocytes as well as increase the quantity of T lymphocytes. The findings of the study also show that some broiler farmers feed Aloe Vera to their broilers whenever they feel it is necessary, without following a predetermined feeding regime.

The findings of Akram et al., (2019), showing that supplementing broiler chickens' diets with Aloe Vera supposedly reduced feed intake, according to some researchers, are comparable to the results of this study, which indicated that Aloe Vera supplementation induced a reduction in feed intake. This, however, contradicts the results of Khan et al., (2023)\ that broilers that received 2% Aloe Vera gel gained more weight and consumed more feed. Aloe Vera also caused reduced water intake, gastrointestinal issues like diarrhoea, behavioural changes and indicators of discomfort. This as well goes against the conclusions of Nalge et al., (2017), who found that broiler performance can be improved by Aloe Vera gel extract in drinking water without compromising the overall health of the birds. These contradicting outcomes could be due to various dosages employed.

The financial viability of supplementing broilers with Aloe Vera were also addressed by the findings of the study. Results indicated that Aloe Vera is easily accessible and using it can save money. Aloe Vera was also found to enhance broiler weight gain. Broilers subjected to Aloe Vera in their drinking water showed a decrease in harmful bacteria and an increase in Lactobacillus bacteria, widely recognized for their role in promoting nutrient digestion and absorption in the gut, leading to improved feed and nutrient utilization by the birds (Shokraneh et al., 2016). The findings also showed that Aloe Vera had multipurpose use. The results of Khan et al., (2023) that Aloe Vera has growth, anti-parasitic, immunomodulatory, and antimicrobial properties as well as haematological and serum biochemical effects are supported by this.

The study's conclusions also showed that most information regarding the possible advantages of Aloe Vera for broilers was communicated verbally from grandparents, among friends and on social media sites like Whatsapp groups. This can be a result of negligence in documentation of these ethno veterinary medicines, as supported by Khan et al., (2023) that not much of this important ethno veterinary knowledge has been recorded. Due to a number of obstacles, for example, lack of support for research, lack of funds, outdated laboratory equipment and failure of elite and policy makers to accept ethno-technologies, navigating this subject has been challenging (Jambwa & Nyahangare, 2019), hence few farmers obtained the knowledge through books, the internet, and schools.

Results of the study showed that majority of farmers who were interviewed gave Aloe Vera a rating of good to excellent for controlling protozoan parasites in broilers. This supports the findings

of Zaman et al., (2012) that Aloe Vera gel possesses an anticoccidial effect which originates from its saponin content and anticoccidial property, which react with cholesterol on the parasite cell membrane to kill the parasite. Others, however, claimed that Aloe Vera was ineffective at controlling protozoan parasites. These conflicting results could be due to variations in dosage, form (powder, gel), and other variables. This confirms the conclusions of Brunetti et al., (2022) that different factors, such as specific parts of the plant used, physical characteristic, genetic variability, age, the dosages employed, extraction method, harvest time, and compatibility with other ingredients, can have different effects on performance when examining the effectiveness of herbal supplements to broilers.

CHAPTER 6

6.0 CONCLUSION AND RECOMMENDATIONS

Aloe Vera is regarded by farmers as a helpful ethno-veterinary herb that effectively control protozoan parasites in broilers year-round. The plant is also known to enhance the productive and physiological performance of broilers. However, the advantages of supplementing broilers with Aloe Vera depends on a number of factors, for example, form (powder, gel, ethanolic or aqueous extract), dosage and genetic make-up of the birds. It is advised that farmers use caution when administering large doses of Aloe Vera to broilers so as to prevent gastrointestinal complications.

CHAPTER 7

7.0 REFERENCES

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APPENDICES

APPENDIX 1

Questionnaire for data collection on the effectiveness on Aloe Vera (Gavakava) in controlling protozoan parasites in broilers.

My name is Charity Madzore. I am a student at Bindura University of Science Education studying Bachelors of Science Honours Degree in Animal Science. I am conducting a school study on the effectiveness of Aloe Vera (Gavakava) in controlling protozoan parasites in broilers.

District……

Ward…….....

1. Age

18 – 25 ☐	26 - 30 ☐	31 - 40 ☐	41 - 49 ☐	50 and above ☐

2. Gender

Male ☐	Female ☐

3. Education

Primary ☐	O level ☐	A level ☐	Diploma/Degree ☐

4. How many broilers do you rear?

50 – 150 ☐	151 - 250 ☐	251 – 350 ☐	350 + ☐

5. How long have you been raising broilers?

1 – 5 years ☐	6 -10 years ☐	10 + years ☐

6. Have you ever lost a bird because of protozoan diseases?

Yes ☐	No ☐

7. Do you know the plant called Gavakava (Aloe Vera)?

Yes ☐	No ☐

8. If yes. How long have you known Gavakava (Aloe Vera)?

< 1 year ☐	2-4 years ☐	5-7 years ☐	8-10 years ☐	>10 years ☐

9. Where do you find Gavakava?

Rangelands ☐	Mountains ☐	Wetlands ☐	Other (specify) ☐

10. Are you familiar with Gavakava's potential health benefits for broilers?

Yes ☐	No ☐

11. Have you ever used Gavakava to supplement or treat your broilers?

Yes ☐	No ☐

12. If yes! Was it able to control protozoan parasites?

Yes ☐	No ☐

13. How do you rate its effectiveness in controlling protozoan parasites on a scale of 1 to 5?

1 (inadequate)	2	3	4	5 (excellent)

14. How often do you feed Gavakava to your broilers?

Daily ☐	Weekly ☐	Bi-weekly ☐	Other (specify) ☐

……

15. Do you have a specific age group you feed Gavakava to?

Yes ☐	No ☐

16. If yes! Which age group do you administer it to?

1 – 2 weeks	2-3 weeks	3-4 weeks	4-5 weeks	5-6 weeks

17. Which parts of the plants do you use?

Roots	Leaves	Other (specify)

18. In what form do you administer Gavakava (Aloe Vera) to your broilers?

Gel	Powder	Other (specify)

19. How do you administer Gavakava (Aloe Vera) to your broilers?

Mix with feed	
Add to drinking water	
Other (specify)	

20. What do you use Gavakava for?

Prophylaxis	Treatment

21. What is your quantity restriction when feeding Gavakava to broilers?

1-14 days old	
15-21 days old	
22- 42 days old	
N/A	

22. Have you come across any challenges associated with using Gavakava?

Yes	No

23. If yes! Did you face any of the following:

Does it kill the broilers	
Does it reduce feed intake	
Does it reduce water intake	

Does it cause any stomach problems (e.g diarrhoea)	
Does it cause any behavioural changes or signs of discomfort (difficulty breathing, decreased activity e.t.c)	

24. In your opinion, what is the cost- effectiveness of using Gavakava (Aloe Vera) as compared to other protozoan parasite management treatments?

    ……

25. Where/how did you get the influence to use Gavakava (Aloe Vera) to control protozoan parasites in broilers? (e.g from friends or family, books, internet, etc…)

    ……

    ……

26. Would you recommend other poultry farmers to use Gavakava (Aloe Vera) to control protozoan parasites? Why or why not?

    ……

    ……

27. What other alternative products have you used or considered for controlling protozoan parasites in broilers?

    ……

    ……

28. Are there any specific factors or conditions you believe may influence the effectiveness of Gavakava (Aloe Vera) in controlling protozoan parasites in broilers?

    ……

    ……....

29. What is your general conclusion of opinions and views on Gavakava controlling protozoan parasites?

    ……

    ……

APPENDIX 2

Focus group questions on understanding the availability and usage of Gavakava (Aloe Vera) in controlling protozoan parasites.

Ward:

Date:

Focus group number:

1. How do poultry farmers cope with protozoan infections on broilers?
2. Do most people in your area know Gavakava?
3. How did most people get to know about Gavakava and its potential health benefits in broiler production?
4. What is Gavakava used for by poultry farmers?
5. What motivated people to consider the use of Gavakava as an antiprotozoal drug in broilers?
6. Where do you find Gavakava?
7. When did people start using Gavakava as an antiprotozoal drug?
8. Which group of people mostly use Gavakava to treat broilers against protozoan parasitic diseases?
9. At what production stage are broilers mostly fed Gavakava?
10. What unusual observations are made on broilers fed Gavakava?
11. When do people administer Gavakava to their broilers to control protozoan parasites?
12. Any other comments of interest on Gavakava, its growth characteristics, potential side effects and safety precautions when using Gavakava in broiler production.