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FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCE

Control of helminths in beef cattle using veldt grape (*Cissus quandrangularis*) based in water

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A RESEARCH PROJECT SUBMITTED IN PARTIAL FULLFULLMENT OF THE REQUIREMENT FOR THE DEGREE IN ANIMAL HEALTH PRODUCTION AND EXTENSION

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Abstract

An investigation on the control of helminths in beef cattle using veldt grape (*Cissus quadrangularis*) based in water was conducted at Chinhoyi University farm. A total of nine cattle of the same age group and breed were selected and tagged for each of the three treatments. The experiment was conducted over a period of 28 days. On the first day of experiment, faecal samples were collected for analysis at the laboratory for faecal egg counts. Three treatments were administered as follows, three cattle were dewormed using Systemax orally, three cattle were dewormed using a veldt grape based in water and three cattle did not receive any dewormer. All nine animals were fed on hay and survival chewable blocks and fresh clean water was provided ad libitum. Faecal samples were collected weekly and weighing of cattle was done using a digital scale on a weekly basis. This trial was necessary to find out if the veldt grape based in water is effective in controlling helminths in cattle for the future implementation of the use of this herb in helminths control.

Declaration

I Itai Zengeni declare that I did this piece of work, Control of helminths in beef cattle using veldt grape (*Cissus quandrangularis*) based in water in partial fulfilment of the requirements of my Bachelor of Science Honours Degree in Animal Health and Production Extension at Bindura University of Science Education. It includes my work that I did for no other reasons other than the purpose of learning.

Supervisor (TNC Mangwiro) 1.9.2025

Chairperson

Pagute A. Date 06/10/25

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CHAPTER 1

INTRODUCTION

Therapeutic medications and drugs used in health management and disease control have posed various problems leading to people resorting to traditional methods (Maphosa & Masika, 2010). The problems include anthelmintic resistance (AR), allergies, cancers, availability and affordability of the medication. The use of herbs in health management and disease control both in animals and humans is being adopted worldwide (Bucher et al., 2021). Currently herbs are being adopted through science and technology, traditional and or indigenous knowledge. These methods are considered to be environmentally friendly, cheap, easy to use and readily available. However, effectiveness of some of these methods is difficult to tell due to lack of knowledge. According to Sanhokwe et al. 2016 a study in Kwezi and Ntambethemba villages in the Eastern Cape Province, South Africa revealed low knowledge about ethno-veterinary medicine in the study area. It also revealed that information on ethno-veterinary medicine in this area is mostly confined to older people and there is danger that this knowledge can be lost before being passed on to other generations (Sanhokwe et al., 2016).

Therefore, there is need to study the medicinal plants, get to know the correct dosage of the herbs and specific active ingredients in the herbs, specific pathogens they target, other health benefits and potential side effects or hazards if any. The information has to get documented on these plant species so that the future generation can benefit (Sanhokwe et al., 2016). The need for novel therapeutic molecules against GI parasites that are safe, effective, and inexpensive is thus critical if we are to successfully address the current worldwide loads of parasitic disease in humans and livestock. In this context, screening of naturally occurring antiparasitic compounds, including those found in plants, which are cheap and plentiful, is raising high hopes for substitution. Since ancient times, plants have been utilized in traditional medicine as a rich source of bioactive chemicals (Ranasinghe et al., 2023).

1.1 Problem Statement

Internal parasites present a number of direct and indirect economic losses in the production system. They compromise animal welfare, reduce feed intake causing reduced growth rate and weight gains, decreased work capacity, poor reproductive performance, lower milk production, kid mortality, susceptibility to other infections, increased treatment costs, involuntary culling, carcass and organ condemnations, morbidities and mortalities of animals (Kļaviņa et al., 2021). Mortalities are mainly caused by gastroenteritis which is also known as stomach flu. Unfortunately, intensive use or overuse of anthelmintics, insufficient dosing, repeated treatment, and incorrect drug administration routes contribute to the development of selective pressure on the parasites. The increasing resistance of pathogenic gastrointestinal parasites to available anthelmintics is an important veterinary and economic concern of cattle, sheep and goat farms This makes the gastro-intestinal parasites become economically important as they can cause a great economic loss to farmers (Mavungu et al., 2023).

1.2 Justification

Despite advancements in contemporary veterinary and human medicine, gastrointestinal (GI) parasite infections continue to pose a serious global health threat, particularly in developing nations. Research into alternative medications to treat parasitic illnesses has increased as a result of mounting evidence of these parasites' multi-drug resistance as well as the adverse effects of currently available synthetic pharmaceuticals. In this case, investigating possible plant antiparasitic could be a good alternative because they are widely available and affordable (Ranasinghe et al., 2023). This research study of using herbs to control helminths is a promising avenue to fight against anthelmintic resistance on a global scale. Veldt grape has potential to control helminths in livestock the same way anthelmintic drugs do. Moreover, herbs are more environmentally friendly and less prone to anthelmintic resistance as compared to commercial drugs on the market. Anthelmintic resistance is a heritable loss of sensitivity of a drug in worm populations which they were previously exposed to that designed to destroy them when used correctly (Ranasinghe et al., 2023). This means that the drug can no longer be effective in treating or controlling a specific disease. Resistance may be as a result of long term and heavy use of drugs, wrong administration of drugs for example, administering less concentration than the required concentration or dosage of a drug resulting in the pathogen learning to fight the drug and building memory that in future if the same drug is used correctly to fight against it, it is no longer effective (Beleckė et al., 2021).

1.3 Objectives

To determine the efficacy of using veldt grape based in water to control helminths in beef cattle.

Specific objectives

- To determine the effect of veldt grape based in water on egg counts in the faecal samples of cattle using the mc master chamber technique

- To determine the effect of veldt grape based in water on weekly weights of cattle in kilograms (Kg) using a digital scale

1.4 Hypothesis

H_0 Veldt grape has no effect on the number of helminthic eggs in faeces of cattle.

H_1 Veldt grape has an effect on the number of helminthic eggs in faeces of cattle.

H_0 Veldt grape has no effect on the weekly weights of cattle.

H_1 Veldt grape has an effect on the weekly weights of cattle.

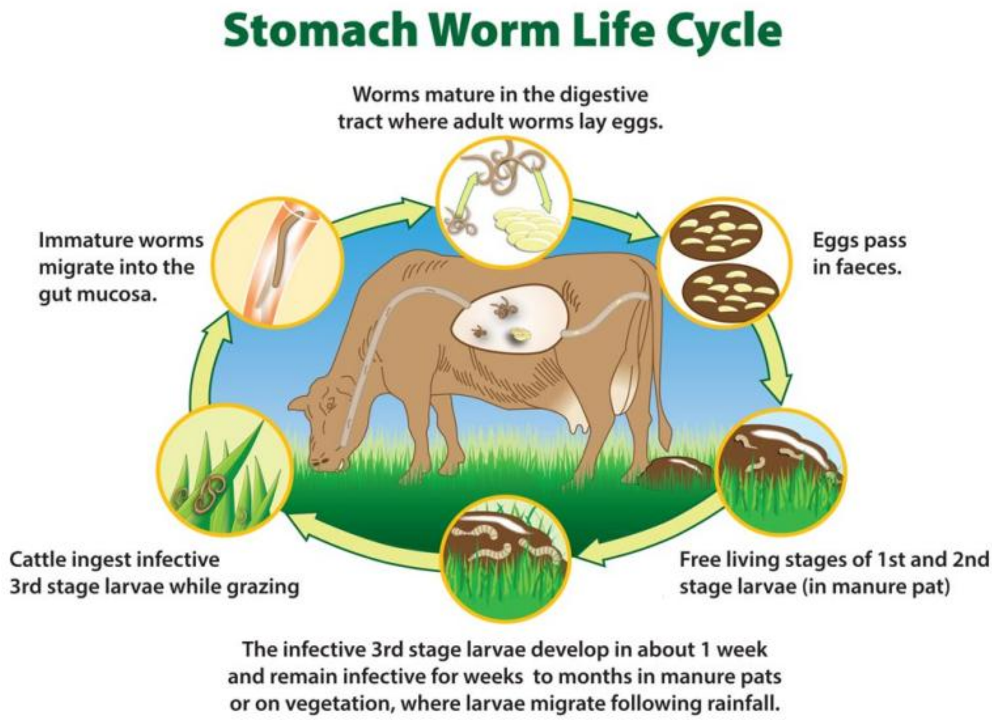
Chapter 2

2.1 Literature Review

Helminths

Parasitic worms, also known as helminths are macro parasites which can be seen by naked eye. These helminths live and feed in living hosts. An infection by helminths is called helminthiasis. All helminths produce eggs during reproduction. The eggs can be passed out of the host through faeces hence their spread into the environment. The eggs are adaptive to adverse conditions and can live up to a number of months or years in the environment. These eggs are taken up by other hosts through ingestion. The eggs hatch into worms inside the gastro-intestinal tract with the suitable environmental conditions in the tract. These parasites are nourished and protected inside the host however they survive at the expense of the host (Kļaviņa et al., 2021).

Figure 2.1. Showing life cycle of gastrointestinal parasites.



https://images.app.goo.gl/bDTQswJ4p1ASC6sr8

Ways of administering anthelmintics

Anthelmintics are commonly administered orally and via injection. They can be administered through feed, drinking water or without anything.

Anthelmintic resistance

There are several commercially available therapeutic medications that provide prophylaxis against parasites in animals. However, there is a greater need for novel approaches to anthelmintic control methods and drugs due to the rise in antiparasitic drug resistance, the growing acceptance of ecologically friendly lifestyle choices and organic farming. The development of antiparasitic that are affordable, efficient, safe for the environment and safe for human health is crucial (Kļaviņa et al., 2021). A number of researches pertaining use of natural alternatives to control helminths in livestock. Worm control techniques come in many forms and are used all over the world. For instance, a diet rich in protein supplements, rumen-protected protein, and amino acids like leucine and methionine enhance immunity, prevent the growth of parasites, support commercial and agricultural productivity, and lower faecal egg counts when an infection is present. Field testing show that the commercial vaccination "Barbervax," which was introduced in Australia, is effective; nevertheless, the recombinant components' manufacture was not successful. Weaning lambs with H.contortus infections can be successfully and safely treated with copper oxide wire particles, which were originally used as a mineral supplement. Pharmaceutical deworming is the most often utilized management technique in Latvia and the Baltic nations (Kļaviņa et al., 2021). Another major worry is the dual anthelmintic resistance of cattle and sheep (Animal Health, 2021). A European sheep flock has shown evidence of multiple anthelmintic resistance of H.contortus to fenbendazole, moxidectin and doramectin, and milbemycins and avermectins. There have also been reports of cattle nematodes resistant to several anthelmintic classes from Argentina and New Zealand (Animal Health, 2021). In sheep in Northern New South Wales, Australia, H. contortus was found to be resistant to broad-spectrum anthelmintic agents (Ranasinghe et al., 2023).

Medicinal plants

In Zimbabwe, ethnoveterinary medicines are becoming more popular than conventional drugs especially because of greater accessibility, lower costs and seemingly efficacy. In Masvingo province, farmers use plants that occur in their respective districts of the province. The farmers support the use of ethno-veterinary remedies by relating it to livestock's health and production performance regarding feed intake, body weight, carcass size and quality (Gobvu et al., 2023). In Ethiopia, Eastern Hararghe, medicinal and aromatic plants are remarkably contributing to primary healthcare for both humans and livestock. In the study, plants were found along roadsides, in home gardens, farmlands, and in the wild. Most of the plants were found as having medical properties, while the remaining ones were used for both aromatic and medicinal purposes. Within the medicinal plant category, the Fabaceae family has the highest species richness (Mengistu et al., 2019).

The most often used plant components that were classified as fragrant and therapeutic were the leaves, which were followed by the roots and barks. The local population should be educated in conservation awareness in order to improve their future use of the fragrant and medicinal plants found in the area. Furthermore, more research is needed to fully understand the phytochemical characteristics and effectiveness of the commonly used plant species. (Mengistu et al., 2019)

Veldt grape (*Cissus quadrangularis*)

Figure 2.1 showing veldt grape (Cissus quadrangularis)plant.

The perennial plant *Cissus quadrangularis* belongs to the grape family. It goes by several names, including adamant creeper, winged treebine and veldt grape. The Arabian Peninsula, tropical Asia, and a large portion of Africa are home to the species (Singh, 2017). The in vitro anthelmintic activity of the crude extracts of aerial parts of *Cissus quadrangularis* (veldt grape) against H. contortus was also dose and time- dependent, with the wormicidal activity of the plant extracts at its highest concentration (10 mg/mL) 95% (Ranasinghe et al., 2023). According to Gobvu et al., 2022, *Cissus quadrangularis* is used to treat septic wounds.

Other uses of veldt grape

Veldt grape has been used for health purposes by humans for loss of body weight to reduce obesity. This was proven by a study by Nash et al., 2019 whereby 67 people volunteered to participate in the dietary experiment of using veldt grape and the results came out as expected. There was loss of body weight, reduction in waist and hip circumference, reduction in systolic and diastolic pressures as well as glucose levels and leptin levels (Nash et al., 2019). Veldt grape is also used to treat gout, diabetes, asthma, bone loss, allergies and other disease, however it is necessary for other studies to be carried out to prove its effectiveness (Brahmkshatriya et al., 2015).

Chapter 3

3.0 Methodology

3.1 Study Area

The research was conducted at Chinhoyi university farm located in the city of Chinhoyi, Makonde District, Mashonaland West Province in central northern Zimbabwe its geographical coordinates are 17° 21' 0.00"s, 30° 12' 0.00"e (latitude: 17.3500; longitude: 30.2000) (Mudhanganyi et al., 2020). It is about 113Km from the capital, Harare. It falls under natural farming region 2A. This region receives 750mm-1000mm rainfall per annum. Temperatures range from 23°C-25°C.

3.2 Sampling Design

Nine steers of the same breed and age group were selected and tagged using labelled ear tags for each treatment. Each of the 3 treatments had 3 cattle. All nine cattle were fed on the same diet, hay and water with veldt grape. Treatment 1 (T1) had water containing veldt grape, Treatment 2 (T2) received water without veldt grape and Treatment 3 (T3) was dewormed using Systemax orally and also drink water which did not contain any veldt grape. Water with or without veldt grape was provided ad libitum.

3.3 Experimental Design

Specimen was collected in Rushinga, Mashonaland Central. Knowledge on the use of the plant was obtained through observation and indigenous knowledge system.10 bars (units) of the stem part of plant were crushed and soaked in 7 litres of water for 7 days. Caution was taken during crushing of the plant as it causes skin irritations. The syrup from the plant was added to 100 litres of water.

3.4 Research design

A complete randomized design was used in a bid to create homogeneous experimental units. Each treatment was replicated thrice which were the three experimental units (animals) to increase accuracy of results.

The treatments were administered as follows:

T1 : 3 cattle drinking water with veldt grape

T2 : 3 cattle drinking water without veld grape and dewormed once with Systemax

T3 :3 cattle drinking water without veldt grape and no deworming

3.5 Data Collection Procedure

The animals were weighed and faecal samples collected for examination upon entrance of the animals into the experimental pens. Collection of faecal samples was done on a weekly basis and samples examined at the CUT Animal Production Laboratory using the mc master chamber technique to count the faecal eggs. Collection of faecal samples was done using labeled gloves or plastics. The samples will be collected by waiting up on the cattle to drop fresh dung, which was done early in the morning. Prior collection, the samples will be immediately put in a cooler bag containing ice packs to stop biological processes occurring in the faeces in order to get accurate results. The samples were transported to the laboratory for examination. Weighing of the cattle was done on a weekly basis using a digital scale at the pen fattening production unit at CUT farm. A team of three people drove the cattle to the pen fattening unit to successfully weigh the cattle and drove them back to the pens at the cattle breeding department where they were enclosed during the experiment.

3.6 Data Analysis

Data for weight gains will decrease in faecal egg counts and will be entered in the Microsoft excel and bar graphs will be plotted. SPSS version 20 software will be used for analysis of variance (ANOVA). Mean separation will be done using the least significant difference methods (LSD).

Chapter 4

4.1 Results

Table 4.1 Showing weekly average weight gain in cattle per kilogram (Kg).

	AVERAGE WEIGHT GAIN IN CATTLE PER KILOGRAMS (Kg)			
TREATMENT	WEEK 1	WEEK 2	WEEK 3	WEEK 4
T1 (dewormed using veldt grape based in water)	.767	-.067	-.433	.667
T2 (dewormed using Systamex)	2.767	.800	1.167	.933
T3 No deworming (Control)	.333	.700	1.100	.900

Table 4.2 Showing mean weight gains and standard deviations.

TREATMENT	WEEK	Mean	Std. Deviation
1	1	0.767	1.2503
	2	-0.067	0.8083
	3	-0.433	1.701
	4	0.667	1.193
	Total	**0.233**	**1.2093**
2	1	2.767	0.2517
	2	0.8	1.1136
	3	1.167	0.7638
	4	0.933	0.7024
	Total	**1.417**	**1.0556**
3	1	0.333	0.1528
	2	0.7	0.1732
	3	1.1	0.2646
	4	0.9	0.5292
	Total	**0.758**	**0.401**
Total	1	1.289	1.2946
	2	0.478	0.8059
	3	**0.611**	**1.2252**
	4	0.833	0.7517
	Total	**0.803**	**1.0495**

Figure 4.1 Bar graph showing weekly weight gains in cattle in kilograms (Kg).

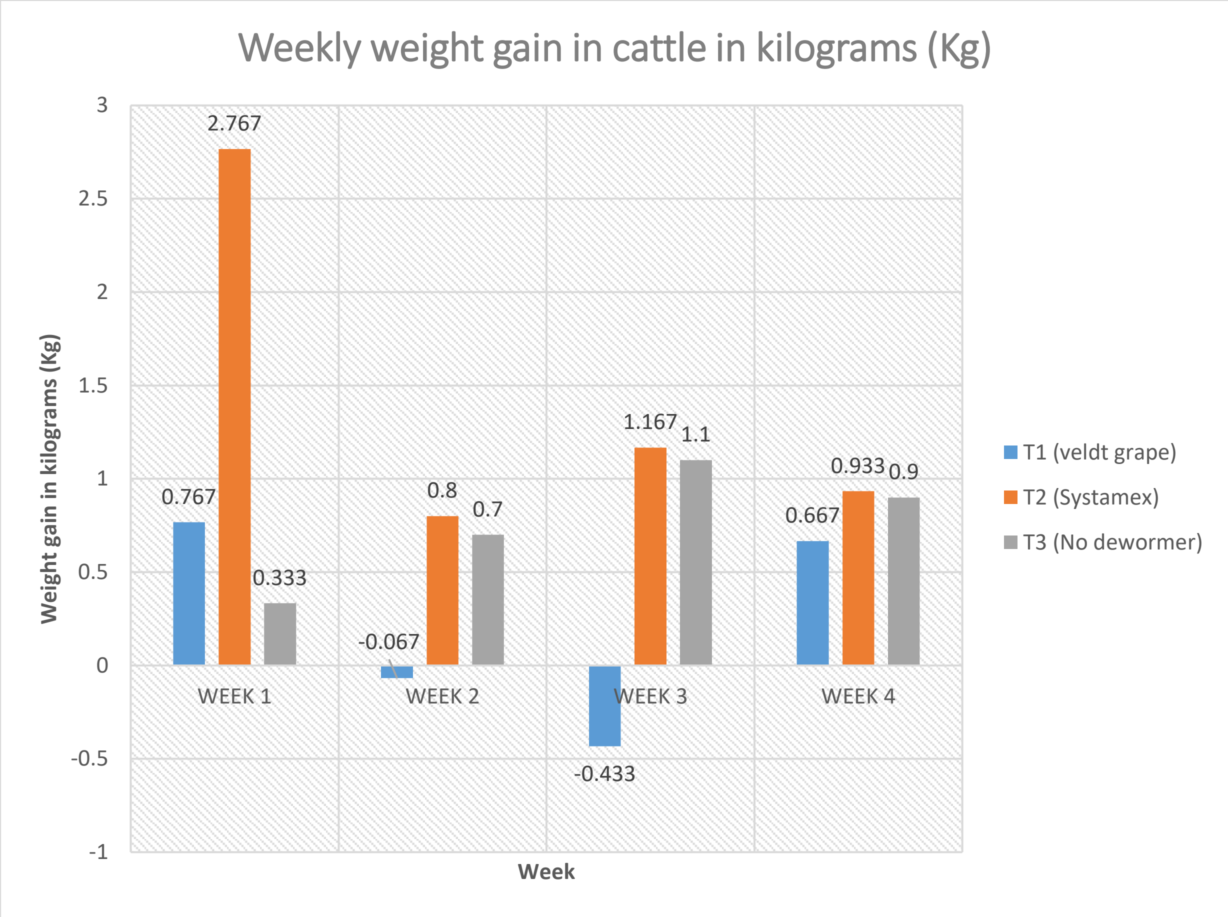


Table 4.3 is showing weekly differences in egg counts per gram of faecal matter.

	WEEKLY NUMBER OF FAECAL EGG COUNTS			
TREATMENT	WEEK 1	WEEK 2	WEEK 3	WEEK 4
T1 (veldt grape)		27	19	50
T2 (Systamex)		332	68	70
T3 No dewormer(**Control**)		-18.33	-5.67	22

Description of Egg Count Data (Eggs per gram, EPG)

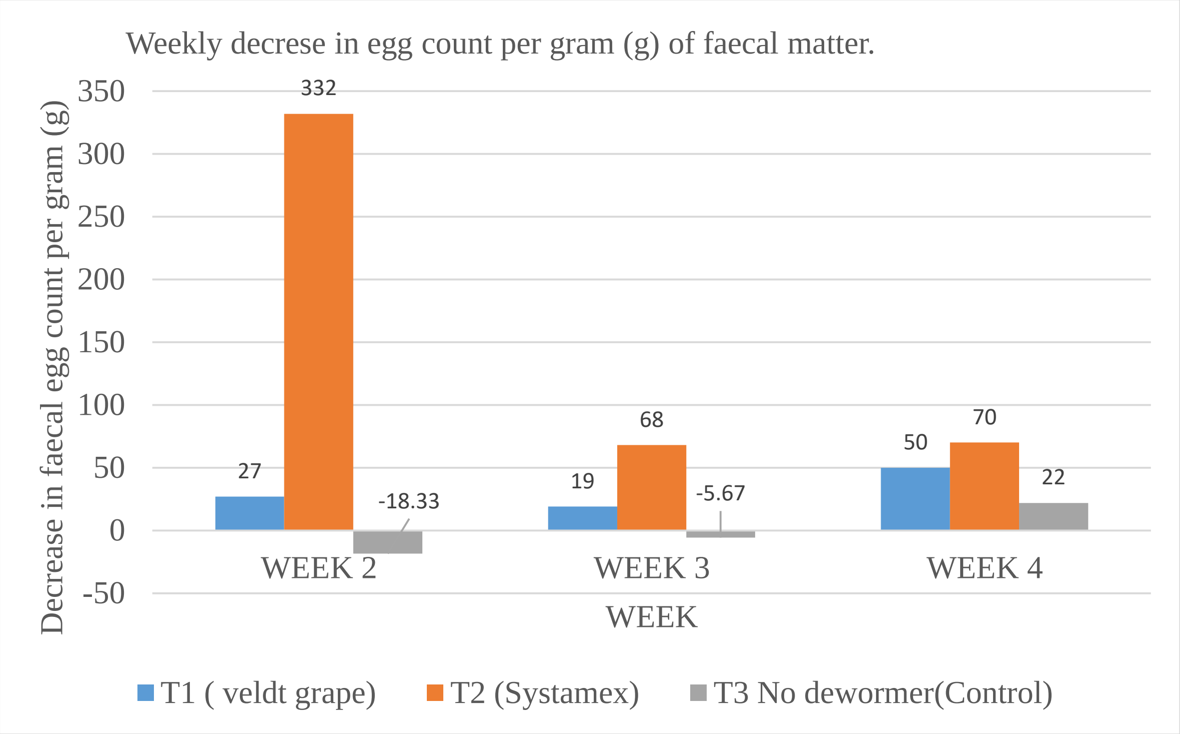
Table 4.3 presents the data on egg counts per gram (EPG) for three different treatments over a span of four weeks. Each treatment shows the mean EPG and the standard deviation (Std. Deviation) for each week, as well as the overall total for each treatment.

Table 4.4 Showing weekly egg counts and standard deviations.

	TREATMENT	WEEK	Mean	Std. Deviation
Eggs per gram (EPG)	1	1	907	145.681
		2	880	138.405
		3	861.67	131.203
		4	811.33	70.465
		Total	865	112.718
	2	1	762.33	52.214
		2	430	113.261
		3	362	145.616
		4	292.67	125.369
		Total	461.75	212.056
	3	1	839.67	88.376
		2	858	88.707
		3	863.67	102.754
		4	841.67	102.754
		Total	850.75	82.499
	Total	1	836.33	108.951
		2	722.67	241.318
		3	695.78	273.7
		4	648.56	281.473
		Total	725.83	236.993

Fig 4.2 shows a bar graph illustrating the trends of faecal egg count decreases on a weekly interval.

Figure 4.2 Bar graph showing weekly decrease in egg counts.



Treatments

Three treatments are labelled as 1, 2, and 3.

Weeks: Data is collected over four weeks.

Mean: Represents the average number of eggs per gram for each treatment and week.

Standard Deviation: Indicates the variability in egg counts within the group.

Overall Analysis:

Week-by-Week Analysis:

Week 1 Mean = 836.33, Std. Deviation = 108.951

Week 2: Mean = 722.67, Std. Deviation = 241.318

Week 3: Mean = 695.78, Std. Deviation = 273.700

Week 4: Mean = 648.56, Std. Deviation = 281.473

Total: Mean = 725.83, Std. Deviation = 236.993

ANOVA RESULTS

Refer to ANOVA table in appendix.

Weight gain

There is a significant difference in weight gain among all three treatments ($p < 0.017$)

Egg count per gram

There is a significant difference in weekly faecal egg counts per gram among the three treatments ($p<0.000$)

CHAPTER 5

5.1 Discussion

The study aimed at finding out the efficacy of veldt grape based block lick.

On weekly weight gain, the cattle supplemented with veldt grape block lick showed an overall loss in weight. This may be due to the fact that veldt grape contains sliming properties. This has been shown in a study by (Ranasinghe et al., 2023) were veldt grape was used to treat obesity in 67 obese people. This resulted in loss of weight as shown by the reduction in waist and hip circumferences (Ranasinghe et al., 2023). There is need for further investigation on the possible effects of veldt grape on feed intake or feed conversion ratio as it may potentially have an effect on digestibility. The control group (no dewormer) and systamex treated group of animals showed a gain of weight.

The study shows some anthelmintic properties of veldt grape as there was decline in faecal egg counts per gram in the faecal matter. This supports other studies which credit veldt grape of having anthelmintic properties. Although systamex treated animals showed the lowest egg counts, veldt grape showed the ability to lower egg counts better than the animals that remained untreated (control group). There is need to further research on possible dosage applications that can increase efficacy of the herb to meet synthetic dewormer standards.

CHAPTER 6

6.1 Conclusion

Veldt grape-based in water shows some efficacy in controlling helminths, with moderate reduction in egg counts. However, it has shown to have a negative impact on weight gain in the animals.

Systamex is the most effective treatment in reducing faecal egg counts and promoting weight gain. The control group shows gradually increasing egg counts and moderate weight gains.

6.2 Recommendations

Conduct long-term studies with larger sample sizes to validate findings. For example some experiments with this plant were conducted over a period more than 6 weeks to obtain credible results. More in-vitro experimental studies required on getting extracts from the plants. There is need for more experiments with other animals with different species, age and physiological statuses.

Educate farmers on the potential benefits and proper use of veldt grape as an alternative to synthetic anthelmintics. There is also need for education in terms of side effects, for example the loss in weight discovered during this study is undesirable in farming.

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APPENDIX 1

ANOVA Table

		Sum of Squares	Df	Mean Square	F	Sig.
WEIGHT GAIN * TREATMENT	Between Groups (Combined)	8.437	2	4.219	4.623	.017
	Within Groups	30.113	33	.913		
	Total	38.550	35			
Eggs per gram (EPG) * TREATMENT	Between Groups (Combined)	1256538.500	2	628269.250	29.231	.000
	Within Groups	709268.500	33	21492.985		
	Total	1965807.000	35			