

A Three-Year Retrospective Study on the Occurrences and Management of Gastrointestinal Parasites in Small Ruminants at the Veterinary Teaching Hospital, Jos

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ABSTRACT

A retrospective study on the occurrence of helminthosis in small ruminants was conducted using clinical records from January 2022 to December 2024 at the Veterinary Teaching Hospital, University of Jos. Out of 799 cases recorded, 397 (49.69%) were sheep, 395 (49.44%) goats, and 7 (0.88%) mixed herds. Helminthosis was diagnosed in 208 (49.88%) ovine, 205 (49.16%) caprine, and 3 (0.38%) mixed cases. The highest number of cases occurred in 2023 (157), followed by 2022 (143) and 2024 (120), with no significant difference ($P>0.05$). Based on sex, females had the highest occurrence (132; 38.48%), followed by males (106; 30.61%) and others (105; 30.61%), with no significant variation ($P>0.05$). By age, adults were most affected (107; 63.69%), followed by kids (43; 25.60%) and lambs (18; 10.71%). Breed distribution showed highest cases in Yankasa (25; 27.47%), followed by Red Sokoto and Uda (17 each; 18.68%), Balami (12; 13.19%), Kano Brown (8; 8.79%), and others with lower frequencies. Breed was not significantly associated with occurrence ($P>0.05$). Seasonal index indicated lowest occurrence from January (0.10) to March (0.15), rising from April (0.20) to a peak in September (0.47), then declining to December (0.15). Occurrence was significantly higher in the rainy season ($P<0.05$). Albendazole was the most commonly used anthelmintic ($P<0.0001$). The study highlights helminthosis as a major health concern, with risks of drug resistance due to intensive and irregular treatment practices, emphasizing integrated parasite control strategies.

KEYWORDS

Helminthosis, Small ruminants, Sheep, Goats, Seasonal occurrence, Anthelmintic resistance, Albendazole, Nigeria.

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Introduction

Sheep and Goats were the first small ruminants to be domesticated in southwestern Asia and redistributed to various parts of the world. In Nigeria, sheep and goats are widespread, across different ecological and climatic zones of the country, with a population

of approximately 73.8 million goats and 42.1million sheep. They are considered a source of cultural and societal assets due to their ability to adapt, good feed conversion efficiency and a readily available market in both urban and rural areas. They serve as source of animal protein, skin, manure, income and some cultural

values such as dowry payment, sacrifice. Basically, their economic importance is primarily because of their small size, as it favors low investment, small risk of loss and their high reproductive efficiency making them vital in global agriculture particularly in developing regions. In Nigeria, it is well known that helminths and parasitic diseases are among the major factors that are responsible for the low profitability and efficiency of livestock production [1].

Gastrointestinal Helminths include nematodes, cestodes, and trematodes cause symptoms, such as reduced feed intake, slow growth, anemia, diarrhea, rough hair, and poor Body Condition Score, which can lead to higher mortality rates in herds. They are a major threat due to their significance in health and economy causing reduced productivity, weight loss and mortality [2]. While both species are susceptible, goats generally exhibit higher parasite burdens and lower resistance compared to sheep due to differences in grazing behavior and immune responses. For instance, goats browse more increasing exposure to larvae on foliage [3] while sheep graze closer to the ground, ingesting more larvae from contaminated pastures [4]. Gastrointestinal epidemics associated with small ruminants are common during wet season than dry seasons [5].

Gastrointestinal parasites (GIPs) remain a major health constraint in small ruminant production worldwide. The primary pharmaceutical approach for controlling these parasites involves three major classes of anthelmintics: benzimidazoles (Albendazole, Fenbendazole, Oxfendazole), Macrocyclic lactones (Ivermectin, moxidectin, doramectin), and Imidazothiazoles (Levamisole) [6]. However, increasing anthelmintic resistance (AR) has significantly reduced treatment efficacy, with reports of multi-drug resistant (MDR) parasites in both sheep and goats. Despite the availability of anthelmintic drugs, the overuse of these treatments has led to widespread anthelmintic resistance (AR), rendering many drugs ineffective [7].

The VTH, Jos serves as a referral center for diverse cases, making it an ideal setting to evaluate trends and management outcomes of gastrointestinal parasitism in small ruminants. Therefore, having a baseline data of the cocktail of drugs used in the veterinary teaching hospital will aid better control and prevention, also in mitigating anthelmintics overuse and resistance of gastrointestinal Parasitic infections.

Materials and Methods

Study area

The study was conducted at the Veterinary Teaching Hospital, University of Jos, Jos north, Plateau State Nigeria. The state is made up of three zones; North, central and south with seventeen Local Government Areas. The state is located in the north central geopolitical zone of Nigeria. The vegetation is Guinea savannah and very conducive for livestock, poultry and crop production. The indigenes of plateau state are mainly engaged in agriculture and livestock production. The major livestock produced in the state include; cattle, sheep, goats and pigs with majority of small

ruminants are owned by rural farmers and reared in households.

Study Population

The study population was all small ruminant diagnosed and managed gastrointestinal helminths infection from 2022 to 2024 at the Veterinary Teaching Hospital University of Jos, Plateau State.

Sample Size

The case files retrieved were small ruminants diagnosed with gastrointestinal helminths infections. Recorded and treated suspected cases in a three-year-old (2022-2024) clinical records at the Veterinary Teaching Hospital, University of Jos, Jos, Plateau state.

Data collected includes signalment (breed, species age, sex), laboratory diagnosis results (fecal analysis), treatment administered.

Study Method

The study method was a Retrospective study of Clinical records from the Veterinary Teaching Hospital, University of Jos, Plateau state. The records was traced back to three years starting from 2022 and every treated suspected case of gastrointestinal parasite infection recorded on the clinic floor.

Data Analysis

The data collected was analyzed using descriptive statistics, chi square to determine relationship between variables such as seasonality, age group. The data was displayed using tables, figures and charts.

Results

Occurrence of helminthosis in small ruminants reported to the veterinary teaching hospital university of Jos

Out of a total of 799 cases recorded, 397 (49.69%) were in sheep (ovine), 395 (49.44%) in goats (caprine), and 7 (0.88%) were mixed cases (Table 1). Among these, helminthosis was diagnosed in 208 (49.88%) of the ovine cases and 205 (49.16%) of the caprine cases. Other disease conditions accounted for 189 (23.78%) in sheep, 190 (23.65%) in goats, and 3 (0.38%) in mixed cases. Statistical analysis revealed no significant difference in the occurrence of helminthosis between sheep and goats (P > 0.05).

Table 1: Reported Cases Involving Small Ruminants from 2022-2024.

Cases	Diagnosis		Total	X ² -value	P-value
	Helminthosis	Others			
Ovine	208(49.88)	189(23.78)	397(49.69)	1.55337	0.2156
Caprine	205(49.16)	190(23.65)	395(49.44)		
Mixed	4(0.96)	3(0.38)	7(0.88)		
Total	417(52.19)	382 (47.81)	799(100)		

P-value <0.05 is statistically significant at 95% CI.

The Relationship of Age, Sex, Breed, Species and Season to the Occurrence of Helminthosis

Specie prevalence

Based on species, helminthosis was recorded slightly more

frequently in sheep (ovine) with 208 cases (49.88%) compared to goats (caprine) with 205 cases (49.16%), while mixed infections accounted for 7 cases (0.88%) (Table 2). Statistical analysis ($P > 0.05$) showed no significant association between helminthosis occurrence and species.

Age prevalence

Helminthosis was most frequently recorded in adults with 107 cases (63.69%), followed by kids with 43 cases (25.60%) and young animals with 18 cases (10.71%) (Table 2). However, statistical analysis ($P > 0.05$) indicated no significant association between age and the occurrence of helminthosis.

Sex prevalence

Based on sex, females recorded the highest occurrence of helminthosis with 132 cases (38.48%), compared to males with 106 cases (30.61%) and mixed cases with 105 (30.61%) (Table 2). However, statistical analysis ($P > 0.05$) revealed no significant difference in helminthosis occurrence between sexes.

Breed prevalence

Based on breed distribution, Yankasa recorded the highest occurrence of helminthosis with 25 cases (27.47%), followed by Red Sokoto 17 (18.68%), Uda 17 (18.68%), and Balami 12 (13.19%).

Other breeds included Kano Brown 8 (8.79%), Sokoto Brown 3 (3.30%), Sahel 3 (3.30%), West African Dwarf goat 2 (2.20%), West African Dwarf sheep 1 (1.10%), Arewa White 1 (1.10%), Jacob sheep 1 (1.10%), and Mixed 1 (1.10%), while Sudanese recorded no case (0.00%) (Table 2) Statistical analysis ($P > 0.05$) indicated that breed had no significant association with the occurrence of helminthosis.

The occurrence of helminthosis cases showed an increasing trend over the three-year period, with the highest number recorded in 2023 (157 cases), followed by 143 cases in 2022 and 120 cases in 2021 (Figure 1). However, statistical analysis ($P > 0.05$) indicated that the differences across the years were not significant.

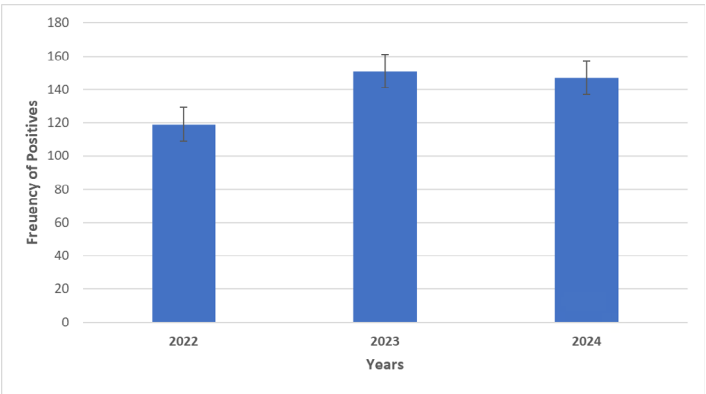


Figure 1: Occurrence of Helminthosis Based on Years under Review.

The seasonal index indicated that the relative frequency of

helminthosis was lowest between January (0.10) and March (0.15). It began to increase in April (0.20), rose further in July (0.40), and reached its peak in September (0.47). Thereafter, it declined steadily from October (0.30) to December (0.15) (Figure 2). Overall, the occurrence of helminthosis was significantly higher during the rainy season compared to the dry season ($P < 0.05$).

Table 2: Age, Sex, Breed and Species influence on Helminthosis.

Parameters	Variables	Frequency (%)	X ² -value	P-value
Specie	Ovine	208(49.88)	0.074	0.9638
	Caprine	205(49.16)		
	Mixed	7(0.88)		
	Total	417(100)		
Age	Kid (day old-5months)	43(25.60)	0.370	0.8314
	Young (6-18 months)	18(10.71)		
	Adult (18 months above)	107(63.69)		
	Total	168(50.76)		
Sex	Male	106(30.61)	3.135	0.2085
	Female	132(38.48)		
	Mixed	105(30.61)		
	Total	343(52.93)		
Breed	West African Dwarf (sheep)	1(1.10)	13.802	0.3136
	Arewa White	1(1.10)		
	Balami	12(13.19)		
	Sokoto Brown	3(3.30)		
	Kano Brown	8(8.79)		
	Jacob sheep	1(1.10)		
	Red Sokoto	17(18.68)		
	Sahel	3(3.30)		
	Sudanese	0(0.00)		
	Uda	17(18.68)		
	West African Dwarf (goat)	2(2.20)		
	Yan Kasa	25(27.47)		
	Mixed	1(1.10)		
	Total	91(56.88)		

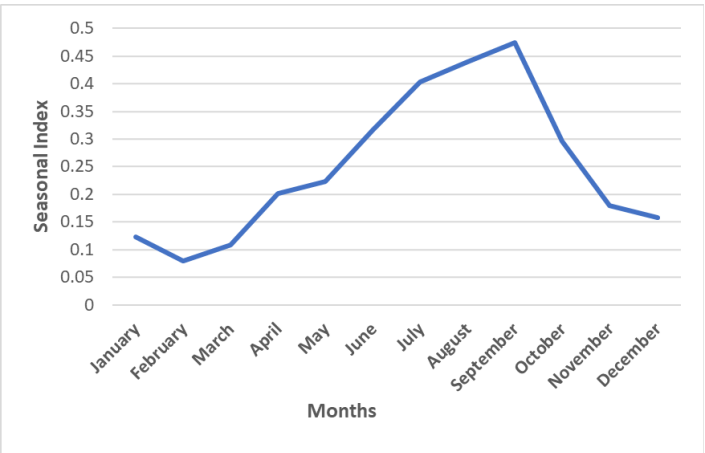


Figure 2: Seasonal Index of Helminthosis Reported to the VTH Unijos from 2022 to 2024.

Frequency of Anthelmintic Used in Treatment of Helminthosis

The frequency of use of commonly administered anthelmintics revealed that **albendazole** had the highest usage, which was statistically significant ($P < 0.0001$). Other anthelmintics reported in the study included ivermectin, closantel, rafoxanide, and levamisole (Figure 3).

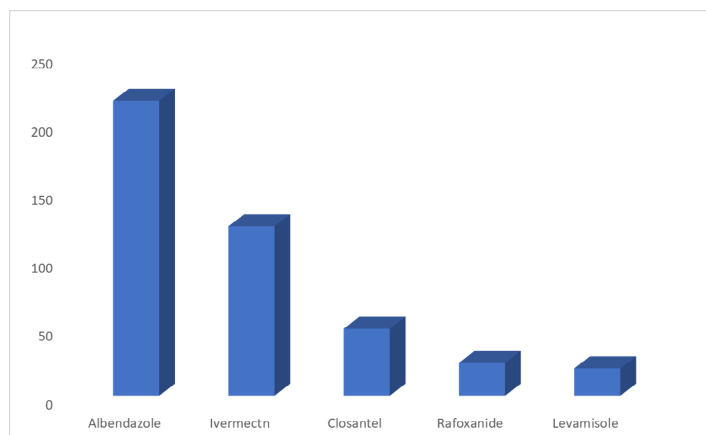


Figure 3: The frequency chart of various anthelmintics commonly used in the VTH unijos from 2022 to 2024.

The frequency chart (Figure 4) shows the distribution of anthelmintics used either as single therapy or in combination for the treatment of helminthosis. Albendazole was the most frequently used drug, followed by combination therapy involving two or more anthelmintics. Ivermectin, Levamisole, and Rafoxanide were reported at the same frequency. The variation in drug usage was statistically significant ($P < 0.0001$).

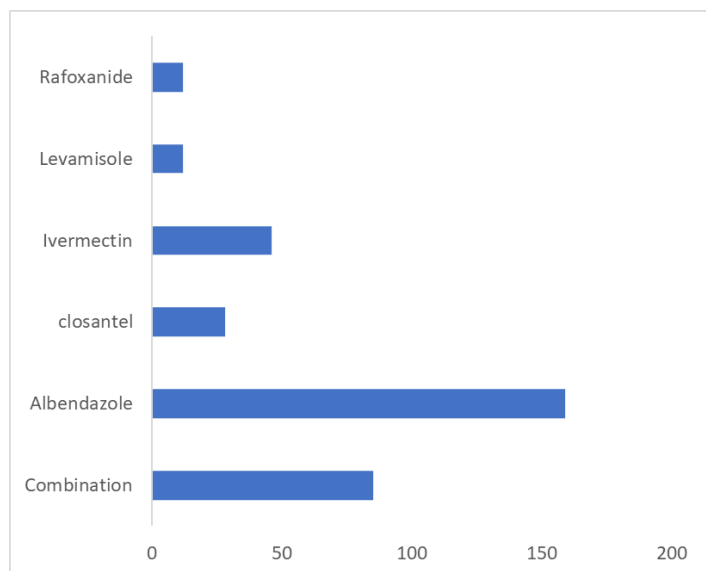


Figure 4: The frequency of anthelmintics used in treatment of helminthosis in VTH Unijos from 2022 to 2024.

The Pie chart (Figure 5) illustrates the distribution of supportive treatments administered at the VTH, University of Jos. Antibiotics accounted for the highest proportion (38%), followed by minerals and vitamins (32%), antipyretics (12%), anti-inflammatories (8%), fluid therapy (6%), and both anti-protozoans and pour-on treatments (2% each). The chi-square value ($\chi^2 = 941.54$, $P < 0.0001$) indicates that the variation in supportive treatments was statistically significant.

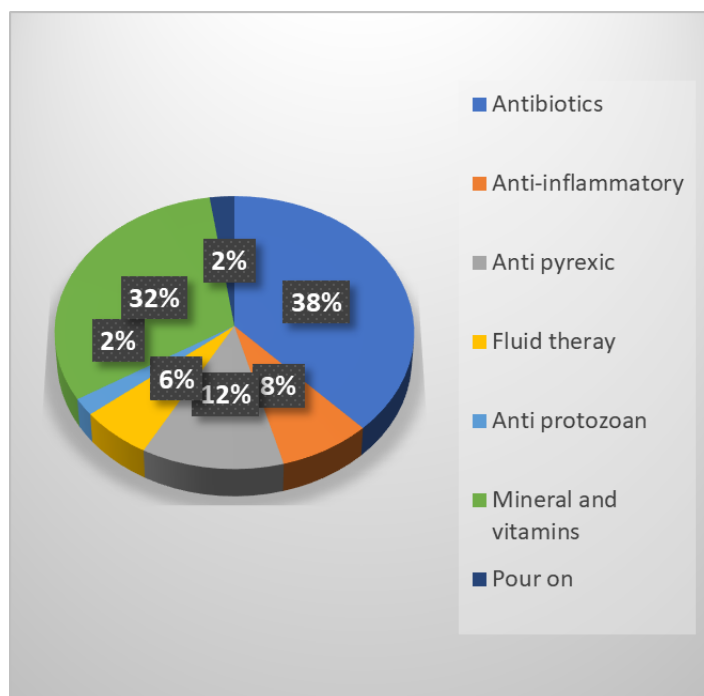


Figure 5: Pie chart showing the various supportive therapy in combinations for clinical management in the VTH Unijos from 2022 to 2023.

Discussion

The present study recorded the highest number of helminthosis cases in 2023, with 157 cases documented at the Veterinary Teaching Hospital (VTH), University of Jos. The disease was more prevalent in small ruminants, particularly in sheep (208; 49.88%) and goats (205; 49.16%). Although the difference between species was not statistically significant, the slightly higher occurrence in sheep may be linked to their grazing behaviour. Sheep tend to graze closer to the ground, and the communal grazing system practiced in the study area could also increase the exposure of goats to infection from sheep [8].

With respect to age, adult animals accounted for the majority of cases (107; 63.69%), which contrasts with the findings of who reported that adults have higher prevalence and disagrees with works of [9] who reported that age has a significant risk factor for gastrointestinal helminthosis as repeated exposure in adult and older animals induces acquired immunity, enabling them to expel parasites before they establish infection. Nevertheless, some studies have reported that young animals may also develop resistance to helminths because they are not allowed to graze frequently as adults.

The study further revealed that female animals had a higher prevalence of helminthosis than males, consistent with reports by. This increased susceptibility in females is often attributed to physiological stress during pregnancy and lactation, coupled with inadequate nutrition, which compromises immune defenses. Similar findings have been documented in Ethiopia and Brazil, where females were more susceptible due to reproductive stress and nutritional deficiencies. Conversely, other studies reported higher prevalence in males, citing genetic predisposition and hormonal factors. This disparity may reflect differences in geographic, environmental, and management conditions.

Breed differences in helminthosis prevalence were not statistically significant in this study. However, the higher frequency observed in Yankasa, Red Sokoto and Uda breeds may be linked to their scavenging management system, where animals are allowed to roam freely and feed indiscriminately before returning to poorly maintained pens. This aligns with findings by, who observed greater helminth prevalence in exotic breeds compared to indigenous ones due to efficient parasite life cycles. A distinct seasonal trend was observed, with helminthosis peaking in September (0.47). Moisture plays a critical role in the development and survival of infective parasite stages, explaining the higher prevalence during the rainy season compared to the dry season. Similar seasonal patterns have been reported by.

Regarding anthelmintic usage, albendazole was the most frequently administered drug, followed by ivermectin, closantel, rafoxanide and levamisole. This pattern aligns with [10], who reported albendazole, ivermectin, and levamisole as the most widely used. However, the intensive and prolonged use of single anthelmintic classes has contributed to the emergence of drug resistance, often exacerbated by substandard drug quality and incorrect dosing most especially in albendazole and ivermectin as reported by [10]. To mitigate this, combination therapy was also employed, in agreement with [11], who advocated for integrated parasite control strategies that combine multiple principles for sustainable helminth management.

Supportive therapies administered alongside anthelmintics included antibiotics (38%), minerals and vitamins (31%), antipyretics (12%), anti-inflammatories (8%), fluid therapy (6%), and both anti-protozoan and pour-on treatments (2% each). The heavy reliance on antibiotics and nutritional supplements underscores their role in managing secondary infections and boosting host resilience during helminth infections.

Conclusion

The findings of this study indicate that gastrointestinal helminthosis remains a major health concern in the research area due to its high prevalence and its association with host factors such as sex, age, species, and season. The occurrence is further influenced by the prevailing management systems, particularly free-range grazing

and poorly maintained housing. The study also revealed that albendazole and a few other anthelmintics are predominantly used, often in an intensive and irregular manner, predisposing to drug resistance. The adoption of combination therapy has, however, shown promise in reducing resistance, while supportive treatments such as antibiotics, vitamins, and minerals play a critical role in improving recovery and resilience in affected animals.

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