

Prevalence of Gastrointestinal Parasites of Poultry in Selected Locations in Jos Metropolis, Plateau State, Nigeria

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ABSTRACT

Poultry production plays a vital role as a source of protein thereby impacting the growth of the meat subsector and contributes significantly to the national economy. The study was conducted to determine the prevalence of gastrointestinal parasites in poultry birds slaughtered within Jos metropolis. A total of one hundred and seventy-two (172) intestinal segments were collected using a convenience sampling technique across four locations including; Bukuru, Farin Gada, Terminus and the Poultry Unit of the Veterinary Teaching Hospital (VTH), University of Jos, Nigeria, in Jos metropolis. Samples were analyzed using floatation technique for recovery of ova and oocyst. A total prevalence of 56.40% (97/172) was recorded for ova and oocysts while for adult worms, a prevalence of 11.05% (19/172) was observed. Terminus recorded the highest prevalence of parasites' ova and oocysts with a prevalence of 62.79% (27/43). In terms of adult worm recovery, Bukuru, Farin Gada and VTH recorded a prevalence of 11.63% (5/43) with Terminus alone recording a prevalence of 9.30% (4/43). The large intestine ranked as the highest parasite predilection site with prevalence 53.64% (81/151) while Farin Gada had the highest prevalence in terms of distribution of parasites than the other locations. *Eimeria* species had the highest prevalence of oocysts while *Ascaridia* had the highest prevalence in terms of adult worms. This current study highlights the need for a more consistent routine screening and strategic prophylactic treatment of birds in Jos metropolis.

Keywords: Poultry, *Eimeria*, *Ascaridia*, Parasite, Oocysts, Worms, Gastrointestinal tract, Jos metropolis



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INTRODUCTION

The world's poultry population is on the increase due to a rise in demand for poultry and poultry products such as egg as a result of increase in human population, rising income and change in dietary preferences (Korver, 2023). In Africa, 25% of meat consumed is poultry hence poultry production is a vital means of providing high quality protein for human consumption (Guèye, 2025). Over the past few decades, poultry production has steadily risen globally (Korver, 2023).

Gastrointestinal parasites have caused significant challenges globally in the poultry industry, thus affecting deterring the consistent and rapid continual development, health production performance of the industry (Patrice *et al.*, 2024). Parasitic infections are high and common in tropical sub-Saharan Africa where extensive and semi-intensive management systems are practiced. These disease-causing agents includes; gastrointestinal parasites, viruses, Bacteria and ectoparasites and are responsible for increased mortality in poultry production (FAO, 2021), (A. Al-Badrani and A. Al-Muffti, 2023).

Generally, parasitism ranks high among factors that serve as a threat to poultry, while few parasites may not cause problems, large numbers can have a devastating effect on growth leading to delayed maturity and egg production. Although reduction in poultry parasitic infection has been achieved in commercial production systems, mostly due to improvement in hygiene biosecurity and improved management practices, the prevalence of gastrointestinal parasites is still very high as reported by Ameji *et al.*, (2022).

Helminth parasites of poultry are commonly divided into three major groups; Cestodes, Nematodes and Protozoa, *Eimeria* species in particular, (Bharti *et al.*, 2024). These gastrointestinal parasites lodge in the digestive tract of chickens and cause diversity of diseases and production problems. These problems include impaired nutrient absorption, stunted growth, reduced weight gain, and increased morbidity and mortality rates (Imafidor *et al.*, 2025). These helminthes interfere with the bird's metabolism resulting in poor feed utilization, thus impairing growth and productivity (Van *et al.*, 2020). However, little is known about the helminthic prevalent status of birds in Jos metropolis. Hence, this study focused on providing information on the prevalence of gastrointestinal parasites of poultry in birds slaughtered in Jos metropolis.

Aim of the Study

The aim of the study was to investigate the prevalence of gastrointestinal parasites in poultry birds in Jos metropolis.

Objectives of the Study

The objectives of the study are to;

- (i) Collect portions of gastrointestinal GI tracts of poultry slaughtered in four major locations in Jos metropolis.
- (ii) Morphologically characterize parasites of the GI tracts of poultry in four major locations in Jos metropolis.
- (iii) Determine the prevalence and predilection sites of GI parasites of poultry in four major locations of Jos metropolis.

MATERIALS AND METHODS

Study location

This study was conducted in Jos metropolis, Plateau State (Figure 2), in two local government areas (LGAs), Jos North (Latitude: 9°55'42.56" N; Longitude: 8°53'31.63" E) and Jos South (Latitude: 9°47'59.99" N; Longitude: 8°51'59.99" E), in the North Central region of Nigeria. The region experiences two distinct seasons, the rainy season from April to October and the dry season from November to March. The city is situated at an altitude of 1,217 m (3,993 ft) above sea level, hence has a relatively temperate climate compared to most parts of Nigeria (Figures 1 and 2) with an average temperature ranging between 21–25°C (70–77°F). During the cold dry harmattan period (mid-November to late January) when night temperatures can drop to as low as 7°C (45 °F). Rainfall averages 1,400 mm (55 inches) annually, resulting from both convective and orographic influences as a result of its altitude.



Figure 1: Map of Africa showing Nigeria © 2025
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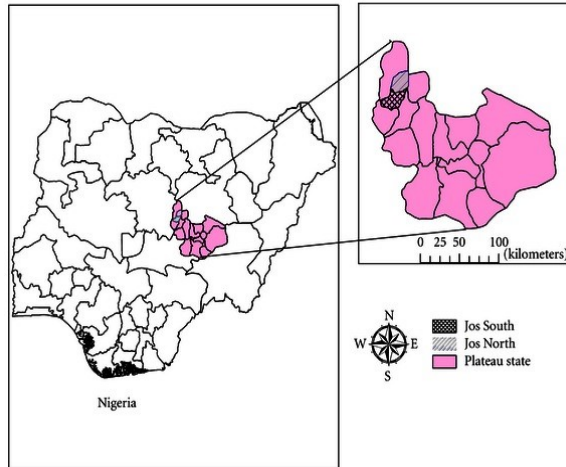


Figure 2: Map of Nigeria with Plateau State insert showing the study location (Adebajo *et al.*, 2012)

Materials

Saturated sodium chloride solution
 Test tubes
 Universal sample bottles
 Glass slide
 Cover slip
 Microscope
 Measuring cylinder
 Test tube rack
 Plain wide mouth sample bottles
 Stirring rod
 Spatula
 Scissors
 Forceps
 Petri dish
 10% Formalin
 Refrigerator

Sample Size

The minimum sample size was determined using the formula by Thrusfield (2007). Assumed prevalence = 10.9% as reported by Sati *et al.*, 2024.
 Z-value = 1.96 at 95% CI, e = 0.05

$$n = \frac{Z^2 \times P(1-P)}{e^2}$$

Where;

Z is the standard normal deviant.
 P is the reported prevalence.
 e is the standard error.
 n is the proposed sample size.

$$n = \frac{1.96^2 \times 0.109(1-0.109)}{0.05^2} = 149.24 \text{ samples}$$

Therefore, the minimum sample size proposed was 149 samples. Consequently, the sampling technique used was to ensure that the total samples collected was not less than the estimated number which was balanced across all sampling locations.

Study Design

Convenience sampling technique was used for collecting Gastrointestinal (GI) tract specimens at slaughter points from four locations namely: Terminus, Farin-gada and Bukuru markets, and the Veterinary Teaching Hospital (VTH), University of Jos, Nigeria. That is, samples were collected from the sampling locations based on availability with no specific order.

Sample Collection

Three GI tract segments namely, caecum, large intestine and small intestine were collected from the poultry birds slaughtered at the sampling locations and placed separately into sterile and well labelled tissue containers. The samples were placed in a cold box and transported to the Parasitology laboratory in the Department of Veterinary Parasitology and Entomology, University of Jos for laboratory analysis.

Laboratory Analysis

The GI tract segments were separately placed in petri dishes with identical labels with their containers and opened by longitudinal incisions using a pair of sterile scissors in normal saline. The contents were examined for the presence of adult helminth parasites as described by Jegede, *et al.* (2015). Adult parasites isolated from the GI tracts were identified by adapting the procedure described by Castro (1996) based on external morphological features such as shape, size and length. The adult parasites identified were preserved in 10% formalin. The gut contents of each segment were poured into 10 ml centrifuge tubes and centrifuged at 1500 rpm for 10 minutes. The supernatant was decanted and the sediments were resuspended in saturated Sodium Chloride (NaCl₂) solution as the floatation medium. Samples were examined microscopically for detection of helminth eggs and protozoan oocysts.

Data Analysis

Prevalences of GI parasitic infections identified were calculated as percentages and presented according to locations, breed of birds, and predilection sites. Two-way analysis of variance (ANOVA) without replication was used to determine the significance of variations in prevalence of GI parasites in the poultry birds by sampling locations and breed using Microsoft Excel. Possible associations between the prevalence of GI parasites and the variables (location, breed and

predilection sites) were determined by Odds Ratio along with Chi-square analyses using the 2 by 2 contingency tables in the Epi-Info™ software. Significance of differences of prevalences and associations were determined at a p-value < 0.05 at 95% confidence interval.

RESULTS

Prevalence of GI Parasites of Poultry Birds in the Study Area

A total of 172 poultry birds were sampled which comprised of a balanced number of 43 per sampling location. This uniformity was not achieved for the breed of birds. Layers had the highest sample size (72) followed by broilers (64), local breed (16), cockerels (14), and other breeds (6) irrespective of their locations. Five (5) GI parasites were identified four (4) of which are helminths and a protozoan.

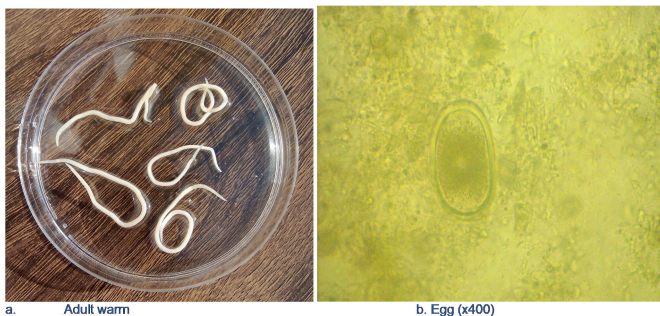


Plate 1: Adult worms and Egg of *Ascaridia galli*

The protozoan *Eimeria* (Plate 3) had the highest prevalence (48.26%) while among the helminths, *Ascaridia* (Plate 1) was the most abundant (11.05%) and *Capillaria* species (Plate 4) the least prevalent (0.58%). *Strongyle* species and *Raillietina* species (Plate 2) had a prevalence of 1.16% and 1.74% respectively (Figure 3). Both adult and eggs of *Ascaridia galli* were recovered. This nematode (Plate 1a) was observed to be cylindrical, creamy-white in appearance with a pin-shaped head and tail parts measuring approximately 10cm in length. The egg of *A. galli* has a thick shell that is smooth with a central morular (Plate 1b). Only the eggs of *Capillaria* species was recovered which was observed to possess its characteristic bi-polar cap (Plate 4).

Adult segmented flat tape worms of the cestode *Raillietina* species and its eggs were also recovered. The adult was observed to be whitish, measuring about 25-35cm in length. Its egg was observed to be oval, with a thin shell and an eccentrically located morular (Plate 2 a & b). The protozoan recovered was the oocysts of *Eimeria* species which was oval-shaped with a polar cap that was visible at x400 magnification with various stages of sporulation (Plate 3).



Plate 2: Adult worms and Egg of *Raillietina tetragona*

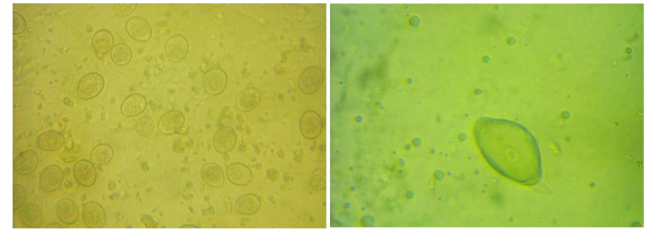


Plate 3: *Eimeria* oocysts

Plate 4: *Capillaria* egg

Prevalence of GI Parasites in Poultry Birds by Sampling Locations

Farin Gada and the VTH had the highest prevalence of parasites species (65.12% each), closely followed by Terminus (62.79%) and Bukuru (58.14%). All the parasite species encountered occurred in the VTH, while Bukuru had the least species occurrence with only two, *Ascaridia* (11.6%) and *Eimeria* (46.51%) species which were the most prevalent and were found in all the sampling locations. *Strongyle* species found in Terminus (4.65%) and the VTH (2.33%), *Raillietina* species occurred in Farin Gada and the VTH (2.33% each), and *Capillaria* species occurred only in the VTH (2.33%). The prevalences of these three parasites were very low (<2%). The 2-way ANOVA without replication revealed insignificant differences in prevalence of GI parasites in poultry birds among sampling locations ($p = 0.0566$) however, the variation in prevalence among parasite species was significant ($p < 0.00001$) (Table 1).

Prevalence of GI Parasites in Poultry Birds by Breed of Birds

The breeds of birds showed a varying occurrence of GI parasites species. Layers had the highest occurrence harboring four of the five species, with only the cestode *Raillietina* species absent. Broilers harbored three of the five species while cockerels, local breed and others harbored two of the five parasite species each. It is noteworthy however, that the sample sizes of the breed of birds were not balanced as it was in sampling locations. Consequently, only Layers (72) and Broilers (64) had sample sizes that could be regarded as representative of the study population. It turned out Cockerels had the highest prevalence (92.86%) infected

Table 1: Prevalence of GI Parasites in Poultry Birds by Sampling Locations with ANOVA Output Table

Location	No. examined No. positive for the Parasite genera (Prevalence %)						
	<i>Ascaridia</i>	<i>Capillaria</i>	<i>Eimeria</i>	<i>Raillietina</i>	<i>Strongyle</i>	Total	
Bukuru	43	5(11.63)	0(0.00)	20(46.51)	0(0.00)	0(0.00)	25(58.14)
Farin Gada	43	5(11.63)	0(0.00)	22(51.16)	1(2.33)	0(0.00)	28(65.12)
Terminus	43	5(11.63)	0(0.00)	20(46.51)	0(0.00)	2(4.65)	27(62.79)
VTH	43	4(9.30)	1(2.33)	21(48.84)	1(2.33)	1(2.33)	28(65.12)
Total	172	19(11.05)	1(0.58)	83(48.26)	2(1.16)	3(1.74)	108(62.79)

TWO-WAY ANOVA WITHOUT REPLICATION						
Source of Variation	SS	Df	MS	F	P-value	F crit
Locations	6.50538	3	2.16846	0.706925	0.566112	3.490295
Parasite genera	6666.766	4	1666.691	543.3465	1.91×10⁻¹³*	3.259167
Error	36.80947	12	3.067456			
Total	6710.081	19				

*Significant variation in prevalence of infection in poultry birds by parasite genera

Table 2: Prevalence of GI Parasites in Poultry Birds by Breed of Birds with ANOVA output table.

	No. of Birds Positive for the parasites (Prevalence %)						
	No. of Birds Examined	<i>Ascaridia</i>	<i>Capillaria</i>	<i>Eimeria</i>	<i>Raillietina</i>	<i>Strongyle</i>	Total
Broilers	64	6(9.37)	0(0.00)	34(53.12)	0(0.00)	1(1.56)	41(64.06)
Cockerels	14	4(28.57)	0(0.00)	9(64.28)	0(0.00)	0(0.00)	13(92.86)
Layers	72	8(11.11)	1(1.39)	30(41.67)	0(0.00)	2(2.78)	41(56.94)
Local Breed	16	1(6.25)	0(0.00)	8(50.00)	0(0.00)	0(0.00)	9(56.25)
Others	6	0(0.00)	0(0.00)	2(33.33)	2(33.33)	0(0.00)	4(66.67)
Total	172	19(11.05)	1(0.58)	83(48.25)	2(1.16)	3(1.74)	108(62.79)

TWO-WAY ANOVA WITHOUT REPLICATION						
Source of Variation	SS	Df	MS	F	P-value	F crit
Breed of Birds	178.59722	4	44.649304	0.41477531	0.795517	3.006917
Parasite genera	8053.2094	4	2013.30235	18.7028248	7.05×10⁻⁶*	3.006917
Error	1722.3515	16	107.646967			
Total	9954.1581	24				

*Significant variation in prevalence of infection among parasite genera in poultry birds

only with *Eimeria* (64.28%) and *Ascaridia* (28.57%) species; and the least prevalence (56.25%) was observed in the Local breed birds similarly infected with *Eimeria* (50.00%) and *Ascaridia* (6.25%) species (Table 2). Similar to the sampling locations, the two-way ANOVA without replication showed significant ($p < 0.00001$) variation in prevalence among parasite species, but was not significant ($p = 0.795$) among sampling locations (Table 2).

Prevalence of GI Parasites in Poultry Birds by Sampling Locations and Breed of Birds

The interaction effect of the breed of poultry birds and the sampling locations on the prevalence of GI parasites irrespective of their species produced unusually high prevalences of 100 % in Cockerels at Farin Gada and Other Breeds at the VTH. The 2-way ANOVA without replication showed that the interactive effect was not significant ($p = 1.136$ for Sampling Locations; $p = 1.621$ for breed of Birds) as shown in (Table 3).

Prevalence of Single and Multiple Infections with GI Parasites

Single parasitic infections (89%) were more common than multiple (11%) infections (Figure 4). The multiple parasite infections observed mostly involved *Eimeria* and

Ascaridia species. The multiple infection that involved *Eimeria* and *Raillietina* species occurred only once. This difference was statistically significant ($P\text{-value} < 0.0001$; chi-square (χ^2) = 65.8781).

Associations of Prevalence of GI Parasites with Sampling Locations, Breed of Birds and Predilection Sites

In the Odds Ratio (OR) analysis used to measure associations that may have existed between prevalence of GI parasites and the factor variables of sampling locations and breed of birds, the output comes with Chi-square (χ^2) analysis and attendant p-values. The OR values that are >1.0 indicate existing associations, while OR values ≤ 1.0 indicate no associations. The significance of associations was established if the lower limits of the 95% Confidence Interval of the OR were >1.0 and the p-value < 0.05 . Based on sampling locations, associations were observed in Terminus (OR = 1.42) and the VTH (OR = 1.10). However, these associations were not significant ($p > 0.05$, Table 4). On the other hand, no association was observed with any of the poultry breeds as all OR values were < 1.0 , Table 4). All GI parasites encountered were recovered from the large (48.25%) and the small (40.12%) intestines, making the large intestine the most preferred predilection site (Table 5). There was only one reported case of adult parasite recovery in the caecum, hence its exclusion from the Odds Ratio

Table 3: Prevalence of GI Parasites of Poultry Birds by Sampling Locations and Breed of Birds with ANOVA output table

SAMPLING LOCATIONS	BREED OF POULTRY BIRDS											
	Broilers		Cockerels		Layers		Local Breed		Other Breeds		Total	
	No. Exam.	No. +ve (Prev. %)	No. Exam.	No. +ve (Prev. %)	No. Exam.	No. +ve (Prev. %)	No. Exam.	No. +ve (Prev. %)	No. Exam.	No. +ve (Prev. %)	No. Exam.	No. +ve (Prev. %)
Bukuru	21	19(47.62)	12	8(66.67)	9	3(33.33)	1	0(0.00)	0	0(0.00)	43	21(48.84)
Farin Gada	20	12(60.00)	2	2(100.00)	13	7(53.85)	3	1(33.33)	5	2(40.00)	43	24(55.81)
Terminus	17	11(64.71)	0	0(0.00)	14	8(57.14)	0	0(0.00)	12	0(0.00)	43	27(62.79)
VTH	6	5(83.33)	0	0(0.00)	36	19(52.78)	0	0(0.00)	1	1(100.00)	43	25(58.14)
Total	64	38(59.38)	14	10(71.43)	72	37(51.39)	4	1(25.00)	18	3(16.67)	172	97(56.40)
TWO-WAY ANOVA WITHOUT REPLICATION												
Source of Variation	SS	df	MS	F	P-value	F crit						
Samling Locations	3548.51	3	1182.837	1.136195	0.373718	3.490295						
Bread of Birds	6751.331	4	1687.833	1.621278	0.232388	3.259167						
Error	12492.61	12	1041.051									
Total	22792.45	19										

Table 4: Associations between Prevalence of GI Parasites with Sampling Locations and Breed of Birds.

Variables		Number Examined	No. Positive (Prevalence %)	Odds Ratio	95% Confidence Interval	Chi-square (χ^2)	p-value
Sampling Locations	Bukuru	43	21(48.84)	0.67	0.33 - 1.33	0.95	0.33
	Farin Gada	43	24(55.81)	0.97	0.48 - 1.94	0.00	1.00
	Terminus	43	27(62.79)	1.42	0.70 - 2.89	0.64	0.42
	VTH	43	25(58.14)	1.10	0.55 - 2.21	0.01	0.93
	Total	172	97(56.40)	-	-	-	-
Breed of Birds	Broilers	64	38(59.38)	1.12	0.65 - 2.27	0.20	0.65
	Cockerels	14	10(71.43)	2.04	0.61 - 6.78	0.81	0.37
	Layers	72	37(51.39)	0.70	0.38 - 1.30	0.94	0.33
	Locals	16	9(56.25)	0.99	0.35 - 2.80	0.00	1.00
	Others	6	3(50.00)	0.77	0.15 - 3.91	0.00	1.00
	Total	172	97(56.40)	-	-	-	-

Table 5: Associations of Prevalence of GI Parasites with Predilection Sites in the Different Breeds of Poultry Birds.

Breed of Birds	Predilection Site	No. Examined	No. Positive	Prevalence (%)	Odds Ratio	95% CI	Chi-square (χ^2)	p-value
Broilers	Large intestine	64	29	45.31	1.13	0.56 - 2.28	0.03	0.86
	Small intestine	64	27	42.19	0.88	0.44 - 0.77		
Cockerels	Large intestine	14	8	57.14	1.00	0.22 - 4.47	0.00	1.00
	Small intestine	14	8	57.14	1.00	0.22 - 4.47		
Layers	Large intestine	72	33	45.83	1.41	0.72 - 2.74	0.71	0.40
	Small intestine	72	27	37.50	0.71	0.36 - 1.38		
Local Breed	Large intestine	16	8	50.00	2.20	0.52 - 9.3	0.52	0.47
	Small intestine	16	5	31.25	0.45	0.11 - 1.92		
Others	Large intestine	6	3	50.00	2.00	0.19 - 20.6	0.00	1.00
	Small intestine	6	2	33.33	0.50	0.05 - 5.15		
Total	Large intestine	172	83	48.25	1.36	0.89 - 2.08	1.72	0.16
	Small intestine	172	69	40.12	0.73	0.66 - 1.07		

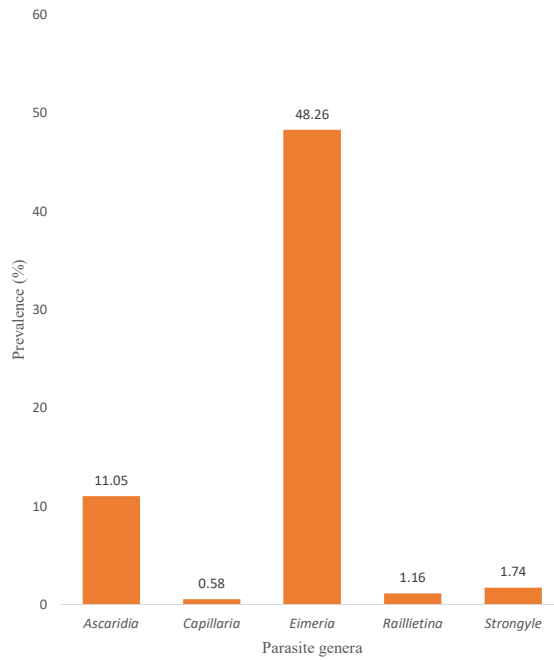


Figure 3: Prevalence of GI Parasites in Poultry Birds in Jos Metropolis.

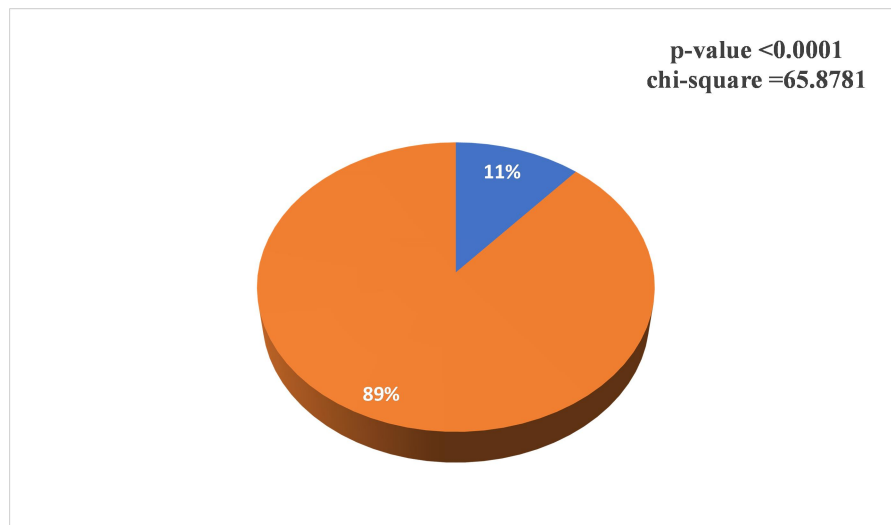


Figure 4: Percentage Prevalence of Single and Multiple Infection with GI Parasites in poultry birds in Jos metropolis.
Key: Single Infestation (Orange), Multiple Infestation (Blue)

analysis for determination of associations. Although associations were observed in the prevalence of GI parasites with large intestine of Broilers, Layers, Local Breed and Other Breeds (OR >1.0), these associations were not significant ($p > 0.05$, Table 5).

Frequency of Recovery of Adult GI Helminth Parasites from Poultry Birds by Sampling Locations

Adult GI helminths were recovered from 5 poultry birds

each at Bukuru, Farin Gada and the VTH; and from 4 birds at Terminus sampling locations (Figure 5). With the balanced sample sizes in all locations, this difference was not significant ($\chi^2 = 0.62$, $p = 0.89$).

DISCUSSION

The high prevalence 97/172 (56.40%) of gastrointestinal parasites recorded in this study was probably due to inadequate poultry management practices. This is in

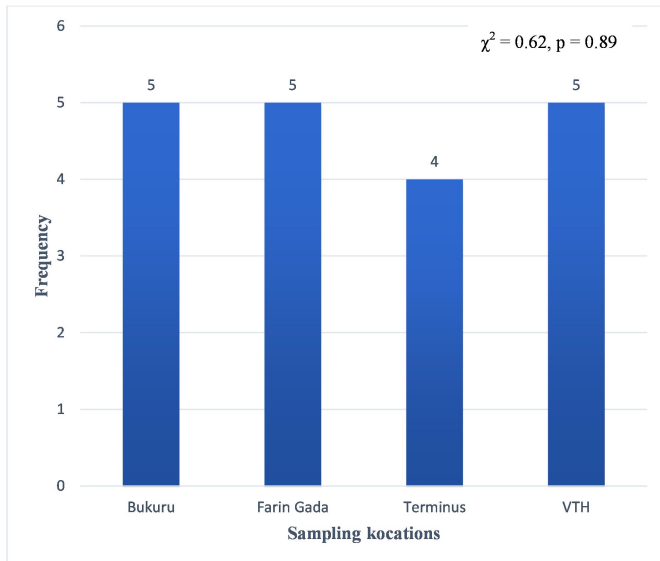


Figure 5: Frequency of Adult GI Helminth Parasites in Poultry Birds by Sampling Locations

agreement with the findings of Van *et al.*, (2020) in Vietnam that reported a prevalence of 54.2% and 54.4% in normal and diseased chickens respectively. On the other hand, Makouloutou-Nzassi *et al.* (2024) reported a higher prevalence in Southeast Gabon (72.9%) and Abdullah *et al.* (2021) in Bangladesh (100%) respectively. The diversity could be justified since we are dealing with data generated from different continents with contrasting climatic conditions. Similarly, Amuna *et al.*, (2023) reported higher prevalence of 89% in Kogi state. The prevalence recorded in this study is higher compared to that reported by Elijah *et al.*, (2022) in Gusau, Zamfara state where they reported a prevalence of 17.8% (Inuwa *et al.*, 2022). In Jalingo, Taraba State, they reported a prevalence of 28.6%. The high prevalence observed in all the bird types was found to be in agreement with the findings of Singh *et al.*, (2021). However, they reported Broilers to have the highest prevalence of 90.8% contrary to our findings in which higher prevalence was in Cockerels (92.86%), although, their study did not include Cockerels. Next to Cockerels, Broilers had higher prevalence (64.06%) than Layers (56.94%). This also agrees with the work of Ola-Fadunsin *et al.*, (2019) which reported a prevalence of GI parasite in Broilers (77.78%) and Layers (33.33%) carried out at Ilorin, Kwara State, compared to other poultry birds which had a much lower prevalence. The variation in prevalence between these locations and Jos, Plateau State could be attributed to management practices, climatic variables and availability of intermediate hosts for helminths. Jos, Plateau State has higher altitude and lower temperature and humidity compared to its surrounding states in northern Nigeria that are at lower altitudes and higher temperature and humidity which favors GI parasites transmission in poultry

birds. The cold weather of Jos metropolis tends to slow down the rate of development of parasites' life cycles, hence their propagation. The non-significant variation in parasite prevalence among different breeds and sampling locations could be attributed to the similarity in environmental variables and management practices of the poultry facilities where the birds were obtained which could have been sub-standard or poor in all the sampling locations. Although this study could not factor in the sources of birds for the various locations sampled, an interaction with the workers at the slaughter slabs revealed that these birds were obtained from all over the metropolis and beyond, hence, practices from the varying sources may vary or be similar.

Multiple infestations in GI parasitism is a common phenomenon, however, in this study single infestation was the most common infestation which differs with the findings of (Abdullah *et al.*, 2021) that reported more prevalence of multiple infestation (89%) to single infection (29%) which could depend on the susceptibility or resistance level of the breed being investigated. In their study, backyard chickens were the targets that are mostly reared by extensive or semi-intensive management system which predisposes the birds to a number of GI parasites. In this study, more broilers and layers are raised mostly by the intensive management system thus limiting their exposure to GI parasites.

The associations identified between prevalence of GI parasites and some sampling locations (Terminus and the VTH), breed of poultry birds (Broilers and Cockerels) and predilection sites (large intestine) were insignificant as an indication of equal exposure of the breed of poultry birds to the GI parasites under similar environmental conditions and management practices. The same explanation goes for the prevalence of recovered adult helminth worms from poultry birds that was not significant in all sampling locations in this study. The low occurrence of adult worms reported in this study is in agreement with the findings of Singh *et al.*, (2021) that reported a low occurrence of adult worms in Broilers and Layers attributing it to the fact that these bird types are raised under an intensive management system.

The high occurrence of *Eimeria* species in this study is in agreement with the findings of Ameji *et al.*, (2022) where they reported protozoan infection as the most common gastrointestinal parasite disease of poultry reported in Jos. This could be related to the abundance of rainfall and humidity which allows for the spread and persistence of the protozoans.

Similarly, with respect to helminths occurrence, *Ascaridia* species which was the most prevalent parasite was also reported to be the major cause of helminthosis in the VTH, University of Jos as reported by Ameji *et al.*, (2022), Amuna *et al.*, (2023) in Kogi, Elijah *et al.*, (2022) in Maiduguri and Abdullah *et al.*, (2021) in Bangladesh where they reported a prevalence of (8.3%, 33.67%, 84.1% and 43.51%) respectively indicating the adaptation for survival of the helminths in varying environmental conditions even though the locations differ in climatic

conditions. Makouloutou-Nzassi et al., (2024) and Montes-Vergara et al., (2021) in Colombia and Gabon reported the prevalence in *Cappillaria* species. The low occurrence of *Rallietina* and *Strongyle* species is in agreement with the reports of Ameji et al., (2022) but differ from the reports of Abdullahi who reported a prevalence of 69% for *Rallietina* species and no *Strongyle* species. This could be due to variations in management.

The small intestine is the most conducive microhabitat for most GI parasites, this was previously reported by Nwadike et al., (2025) in Anambra markets where they reported most parasites present being recovered from the small intestine with only *Eimeria* oocyst being recovered from the large intestine and the cecum. This is likely due to the availability of more nutrients in the small intestine which allows for the development of the ova or oocyst.

CONCLUSION

The study highlights a notable burden of gastrointestinal parasites in Jos metropolis in which *Eimeria* species is the most prevalent protozoan parasite and *Ascaridia* species as the major helminth parasite. The variation in prevalence of GI parasites in poultry birds is significant only among the parasite species encountered but is not significant among sampling locations and breed of poultry birds. Associations identified between prevalence of GI parasites and some sampling locations (Terminus and the VTH), breed of poultry birds (Broilers and Cockerels) and predilection sites (large intestine) are not significant, an indication of equal exposure of the breeds of poultry birds to the GI parasites under similar environmental variables and management practices in the study area.

Limitations

Limitations in the present research is the inability to in cooperate seasonal variations, anthelmintic resistance (AR) profiling and species identification of the parasites isolated throughout the sampling and analysis.

Recommendations

1. Poultry birds in Jos metropolis should be given selective targeted routine treatment against *Eimeria* species infection (coccidiosis) and *Ascaridia* species infection (Ascariidosis) aimed at reducing their high prevalence and maintaining it at hypoendemic levels.
2. Conduct anticoccidial and anthelmintic resistance profiling in poultry birds for early detection of emerging and or existing resistance to current therapeutics for systematic search for counter measures against the resistant strains of the parasites.
3. Undertake routine and regular parasitological surveillance for the purpose of detecting emerging hyperendemic parasites that are presently hypoendemic for immediate targeted treatment control.

4. Conduct regular public awareness campaigns to poultry farmers on best poultry management practices along with legislations to discipline offenders by fines who fail to implement those best management practices in their poultry farms.

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