



## PREVALENCE OF GASTROINTESTINAL PARASITES IN LOCAL AND EXOTIC CHICKENS IN BAUCHI METROPOLIS

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### ABSTRACT

The study was conducted to determine the prevalence of gastrointestinal tract (GIT) parasites in local and exotic chickens slaughtered at Muda Lawal and Railway slaughter slabs (MSS and RSS) in Bauchi metropolis during dry and wet seasons of 2021. A total of 320 GITs were collected randomly and transported to NVRI diagnostic laboratory, Bauchi for laboratory examination and microscopy. The result of the analysis revealed that, overall prevalence was 144 (45%) comprising six (6) difference parasites specie. Out of samples examined 76 (23.8%) tested positive at RSS while 68 (21.3%) at MSS. Of those parasites identified and tested positive at MSS; *Coccidia species* were the most prevalent parasites 47 (14.7%) among slaughtered chickens followed by *Ascaridia galli*, *Heterakis gallinarum*, *Strongyloides avium*, *Choanotaenia infundibulum*. and *Raillietina species* with 14 (4.4), 7 (2.2), 5 (1.6%), 2 (0.6%) and 1 (0.3%) prevalence respectively. In the case of RSS, *Coccidia sp* also had the highest prevalent 44 (13.8%), followed by 13 (4.1%) for *Ascaridia galli*, 5 (1.6%) *Heterakis sp*, 3 (0.9%) *Strongyloides avium*, 2 (0.6%) *Choanotaenia infund.* and 1 (0.3%) *Capillaria species*. The result further indicated a significant ( $P<0.05$ ) difference by seasonal distribution of parasites affecting chickens. The result also showed a significant ( $P<0.05$ ) difference among age groups with highest prevalence recorded in adult ((32.5%). Even though, local breeds had highest prevalence than the exotic, there was no significant effect in prevalence rate of infection between local and exotic chickens. Also, there was no significant difference by infection rate among sexes. The high prevalence (45%) indicated Chickens in Bauchi metropolis were susceptible to infectious diseases causing cross-contamination while handling, processing and meat consumption. It is therefore, recommended that farmers should imbibed the culture of good hygiene and routine deworming to reduce losses due to parasites infestation.

**Key words:** Chickens, Gastrointestinal parasites, Season

### INTRODUCTION

The challenge of poultry production and how the rate of production in the industry are slowed includes; high rate of diseases and pest attack, high cost of poultry feed, supply of poor quality chicks, inadequate access to and high cost of veterinary services (Anosike *et al.*, 2020). Similarly, Sonia (1990) reported that more than 750 million chickens, guinea fowls and turkeys die each year as a result of various infections. Even though, reduction in birds' parasitic infection achieved in commercial production system due to improved housing and management practices, the prevalence of gastrointestinal parasites is still rampant (Ogbaje *et al.*, 2012).

Parasitism ranks high among factors that serves as threat to chickens, the present of a few do not caused a problem but large number can have a devastating effect on the growth, egg production and overall health (Garry and Richard, 2016). Signs of G.I parasites infection in



chickens include; retarded growth, reduced weight gain, diarrhea, intestinal obstruction and poor feathers. Stress from parasites could affect the blood and anorexia (Dube *et al.*, 2010). Poultry play a vital role in the nation economy. Despite the role play by these birds in times of comparatively faster return to investment than any other animals, they are faced with number of challenges. The greatest impediment to poultry production is diseases (Hai 2008 and Lawal *et al.*, 2009). Poultry which includes chicken, duck, guinea fowl, turkey and ostrich are very important to farmers but enteric pathogens inflict colossal monetary losses in the form of morbidity and mortality, decrease egg production and low meat quality (Henye *et al.*, 2017).

The poultry farmers are equally at risk of cross infection as he/she carried out managerial practice on the farm or poultry slaughter slabs (Lane and Lloyd, 2002). Parasites are prevalent in many part of the world (Hadaisi, 1978). The cases of diarrhea in chickens are presented continuously to the veterinary clinic of unknown cases that may be due to burden of endoparasites and treatment done tentatively without laboratory confirmation. The study was conceived to evaluate the gastrointestinal parasitic loads in both local and exotic chickens for a period of one year.

## **MATERIALS AND METHODS**

### **Study Area**

The study was done at Muda Lawal and Railway Poultry slaughter slabs in Bauchi Local Government Area of Bauchi state, Nigeria. It was created in 1976 with a population size of 65,37,300 (NPC, 2006). The area located at longitude 10, 10'N and latitude 9<sup>0</sup>, 46'E. Its attitude is 690.2M above 33.5 – 40.7 square radiometers (NPC, 1991). The area experienced two seasons per year i.e. rainy and dry seasons (Wikipedia, 2016).

### **Sample Size/Study Population**

Sample size was determined (Thrusfield, 2005) using the formula below:

$$n = \frac{z^2 \times p \times q}{d^2} \quad \text{or} \quad \frac{(1.96)^2 \times P_{\text{exp}} (1-P_{\text{exp}})}{d^2}$$

Where:

n = required sample size (S.S) when the population is greater than 10,000, z = constant given as 1.96 which correspond to the 95% confidence level, p = expected prevalence i.e the expected prevalence of G.I parasites used in the study as according to Dewet *et al.* (2012) who reported prevalence of 66% (0.66) in Jos, Plateau state. q = 1.0 – p and d = desired absolute precision or acceptable error, 5% or 0.05.

### **Research Design**

Research was design as prospective as cross sectional study in order to determine the prevalence of G.I parasites in chickens in Bauchi Metropolis, Bauchi State of Nigeria. It was conducted during dry (April to May, 2021) and wet (July – August, 2021) seasons. The study population was divided into two groups with each comprises 160 GITs which consisted 80 GITs per slaughter slab per season of the year (2021).

### **Age and Sex Determination (Comb and wattles)**

The age and sex of chickens were determined as according to the guidelines made by Chris (2020).

### **Sample Collection and Processing**

A total of 320 GITs both local and exotic breeds of chickens obtained from RMLSS in Bauchi Metropolis during dry (April to May, 2021) and wet (July to August, 2021) seasons. All GITs collected randomly and labeled properly using masking tape while taken their sex,



age and breed records and transported in ice parked cooler to Bauchi NVRI Diagnostic Laboratory and stored at 40<sup>0</sup>C until tested in the laboratory.

### **Laboratory Examination**

In the laboratory, the GITs stretched on dissecting board, separated into small and large intestine (deduonum, jejenum and the ileum). The intestine opened longitudinally to expose their contents as described by Fatihu *et al.* (1991). The contents for each portion of the intestines, scraped, placed in a clean labeled sample bottles and observed for any parasite presents by floatation method under light microscope with X10 and X40 objective lens (WHO, 1999).

The intestinal contents were analyzed in the laboratory using floatation method.

### **Floatation Method Principle and Fecal or Intestinal Content Analysis**

The intestinal contents were analyzed in the laboratory using floatation method. It is a qualitative test for detection of nematodes, cestodes eggs and protozoa in faces or intestinal content. It is based on separation of eggs for fiscal material and concentrating them by means of floatation fluid with and appropriate specific gravity (Cervantes-Rivera *et. al.* 2016).

### **Data Analysis**

The data obtained were subjected to Analysis of Variance (ANOVA) using IBM SPSS Statistical soft Version 2.0. The parasites prevalence among local and exotic chickens slaughtered was analyzed using descriptive statistic in percentages. Chi – square was employed to determine whether there is association between the sex and infestation as well as breed and infestation. The observed prevalence and 95% confidence level were evaluated and ‘P’ values equals to or less than 0.05 was regarded significant.

## **RESULTS**

Based on the findings of this research, 144 (45%) of a total of 320 samples examined and tested positive to gastrointestinal parasite infection by microscopy. Out of 160 samples examined and tested in Muda Lawal 76 (23.8%) were observed to be positive to parasite infection with the highest rate of infection seen in *Coccidia sp* 47 (14.7%) followed by *Ascaridia*, *Heterakis sp* and *Strongyloides avium* with corresponding prevalence of 14 (4.4%), 7 (2.2%) and 5 (1.6%) respectively. While the least parasite isolated and identified were *Rallietina* and *Capillaria sp* whose bracket gave 0.3% prevalence. However, in the case of Railway slaughter slab; *Coccidia sp* also had the highest prevalence rate of infection (13.8%). Among the nematode isolated and identified during the study period were *Ascaridia galli* 13 (4.1%), *Choanotenia infundibulum* 2 (0.3%), *Heterakis sp* 5 (1.6%) and *Strongyloides avium* 3 (0.9%) prevalence.



**Table 1:** Prevalence Distribution of Gastrointestinal Parasites Observed from Chickens in Bauchi Metropolitan Slaughter Slabs

Slaughter slabs	Parasite species	No. examined	No. positive	% positive
Muda Lawal	<i>Ascaridia galli</i>	160	14	4.4
	<i>Coccidian sp</i>	160	47	14.7
	<i>Choanotaenia infund.</i>	160	02	0.6
	<i>Heterakis sp</i>	160	07	2.2
	<i>Rallietina sp</i>	160	01	0.3
	<i>Strongyloides avium</i>	160	05	1.6
	Sub-total	160	76	23.8
Railway	<i>Ascaridia galli</i>	160	13	4.1
	<i>Coccidian sp</i>	160	44	13.8
	<i>Capillaria sp</i>	160	01	0.3
	<i>Choanotaenia infund.</i>	160	02	0.6
	<i>Heterakis sp</i>	160	05	1.6
	<i>Strongyloides avium</i>	160	03	0.9
Sub-total		160	68	21.3
Grand total		360	144	45

**Table 2:** Prevalence of Gastrointestinal Parasites in local and Exotic Chickens Slaughtered at Muda and Railway Slaughter Slabs in Bauchi Metropolis

Slaughter slabs	No. examined	No. positive (%)	X <sup>2</sup>
Muda Lawal	160	76 (23.8)	0.8081 (0.3687)
Railway	160	68 (21.3)	
Total	320	144 (45.1)	

DF = 1

Out of the 144 (45%) of the positive samples, 78 (23.8%) were from Muda Lawal while 68 (21.3) were from Railway live birds markets. Conversely, out of 176 (55%) of the samples examined and tested to be negative, 92 (28.8%) encountered negative from Muda Lawal slaughter slab while 84 (26.3%) encountered to be negative in Railway slaughter slab in Bauchi metropolis. Despite the numerical differences, statistically there was no significant ( $P < 0.05$ ) effect of GI parasites by slaughter slabs in Bauchi Metropolis.

**Table 3:** Influence of Gastrointestinal Parasites by Sex of Chicken Slaughtered at Some Poultry Slaughter Slabs in Bauchi Metropolis

Sex	No. involved	No. positive (%)	X <sup>2</sup>
Male	224	106 (33.1)	1.6255 (.020229)
Female	96	38 (11.9)	
Total	320	144 (45)	

DF = 1

Out of 320 birds examined and tested 224 involved male while 96 were females. Out of 224 male birds tested 106 (33.1%) positive while 118 36.9%) negative. Out of the 96 female birds examined, 38 (11.9%) positive while 58 (18.1%) negative. The overall number of positive



was 144 (45%) while 176 representing 55% were recovered to be negative during the study period. However, the result indicated that there was significant ( $P < 0.05$ ) effect of GI parasites on the sex of chickens slaughtered at some poultry slaughter slabs in metropolis.

**Table 4:** Influence of Season by Gastrointestinal Parasites on local and exotic Chickens Slaughtered at Some Poultry Slaughter Slabs in Bauhi Metropolis

Season	No. Screened	No. Positive (%)	$X^2$
Wet	160	88(55)	12.9293 (.00001)
Dry	160	56 (35)	
Total	320	144(45)	

DF = 1

Table (4) above shows the influence of season by gastrointestinal parasites on slaughtered chickens at the main slaughter slabs in Bauhi metropolis. The result indicated that out of 320 chickens slaughtered 144 (45) encountered to be positive by microscopy. However, 88 (55.0) tested positive in the dry season while 56 (35.0) were tested positive in the wet season by microscopy. The result further revealed that there was significant ( $P < 0.05$ ) influence of GI parasites by season in which the chickens slaughtered.

**Table 5:** Prevalence of Gastrointestinal Parasites in Relation to Age and Breeds of Chickens Slaughtered at Muda Lawal and Railway Slaughter slabs in Bauhi Metropolis

Variable		No. Screened	No. Positive (%)	No. Negative (%)	$X^2$
Breeds	Local	150	73 (22.8)	77 (24.1)	1.5338 (0.2155)
	Exotic	170	71 (22/2)	99 (30.9)	
Age	Adult	170	104 (32.5)	66 (20.6)	38.3442 (.00001)
	Young	150	40 (12.5)	160 (18.8)	

DF = 1

Out of the 320 birds studied, 150 were local while 170 were exotic of the 150 local breeds 73 (22.8%) tested positive while 77 (24.1%) tested negative. As regards to exotic birds (170), 71 (22.2%) tested positive while 99 (30.9%) were found to be negative. In the case of age, 170 were adult while 150 were young birds. Among the adult, 104 (32.5) tested positive while 66 (20.6) tested negative. In the young category, 40 (12.6) tested positive while 160 (18.8%) tested negative. The overall prevalence was 144 respectively 45%.

**Table 6:** Prevalence Distribution of Cestode, Nematode and Protozoa in Local and Exotic Chickens Slaughtered at main Slaughter Slabs in Bauhi Metropolis

Slaughter slabs	Parasites	No. involved	No. position	% Positive
Muda Lawal	Cestodes	160	3	0.9
	Nematode	160	26	8.1
	Protozoa	160	47	14.7
Sub-total		160	76	23.8
Railway	Cestodes	160	2	0.6
	Nematode	160	22	6.9
	Protozoa	160	44	13.8
Sub-total		160	68	21.3
Grand total		320	144	45





Out of 76 (23.8) gastrointestinal parasites isolated, 3(0.9) positive as cestodes, 26 (8.1) nematodes and 47 (14.7) protozoa. In the case of Railway slaughter slabs; 2 (0.6) were tested and isolated as cestodes, 22 (6.9%) nematodes and 44 protozoa representing 21.3% prevalence. The overall prevalence was 144 (45%).

**Table 7:** Distribution of Infection Level of Gastrointestinal Parasites Recovered in Local And Exotic Chickens at Some Poultry Slaughter Slabs in Bauchi Metropolis

Species Parasites	Infection (%)
<i>Capillaria sp</i>	0 (0)
<i>Coccidia sp</i>	60 (56.07)
<i>Ascaridia galli</i>	06 (5.61)
<i>Heterakis sp</i>	02 (1.87)
<i>Strongyloides avium</i>	02 (1.87)
<i>Raillietina sp</i>	0 (0)
<i>Choanatania infundibulum</i>	1 (0.93)
Mixed infection	36 (33.64)

The distribution of number of infection level of gastrointestinal parasites in chickens shows that 36 (33.64) of the chickens had mixed infection, 60 (56.07) chickens had *Ascaridia galli*, 06 (5.61) Chickens had *Coccidia sp*, 02 (1.87) chickens had *Heterakis sp*, 02 (1.87) chickens had *Strongyloides avium*, 1 (0.93) chicken has *Choanotaenia infundibulum*, 0(0) chicken has *Capillaria sp* and another 0 (0) chickens has *Raillietina sp*. The total number of level of infection was 108 only.

## DISCUSSION

The prevalence of 45% of gastrointestinal parasites observed in both local and exotic chickens (*Gallus gallus domesticus*) in this study is far less than 81.5% prevalence recorded by Junaidu *et al.* (2014) in Zaria, 87.8% recorded by Yoriyo *et al.* (2008) in Bauchi, and 96.3% in eastern Nigeria by Fakae and Nwalusi, (2000). Similarly, the prevalence observed in this study was greatly lower than the 90% recorded by Fabiyi (1972), 92% by Gadzama and Strivastava (1986), 100% by Okon and Enyenihi (1980) and 95.2% by Fatihu *et al.* (1991).

The reduction in the overall prevalence may be due to the good hygiene practices and routine deworming of the flocks that make the environment less conducive for growth and development of the parasites and their intermediate hosts. Moreover, the overall 144 (45) prevalence of infection with gastrointestinal parasites recorded in this study is in agreement with the previous report of 63.6% by Philip *et al.* (2019) Kumasi Ghana, 42.5% by Jegede *et al.* (2015) in Gwagwalada Abuja, 35.5% by Nnadi and George, (2010) from Nsukka and 37.6% by Agbolade *et al.* (2014) from Ijebu North, South Western Nigeria.

The finding revealed a complete absence of trematode and it is in lines with the earlier works of Oyeka (1989) in Anambra State, Fatihu *et al.* (1991) in Zaria, Kaduna State, Luka and Ndams, (2007) in Zaria, Kaduna State and Yoriyo *et al.* (2008) in Bauchi. Complete absence of nematodes in the area that might have been due to information available to some farmers which has also contributed toward reduction in the number of cestodes population and a complete absence of trematodes infection in the area of study.

The study further revealed that protozoa and nematodes were the most common gastrointestinal (14.7% and 8.1%) parasites identified and tested positive in chickens slaughtered by floatation techniques. This however, is in conformity with the findings of Luka



and Ndam, (2007) in Zaria Kaduna state, and Junaidu *et al.* (2014) which stated that cestodes and nematodes were implicated as the major cause of helminth infection in domestic chickens. It is due to the fact that nematodes and protozoa (*Eimeria*) undergo direct or indirect mode of transmission where they make use of intermediate hosts to perpetuate their transmission. These organisms serve as food for scavenging birds and hence transmit the infective stage of the parasites to the bird upon ingestion.

The result of the study also indicated that there was no significant effect of parasites (Table 5) on the breed of chickens slaughtered. This however could be attributed to the fact that the local birds are generally smaller in size than the exotic breeds, their productivity is low, but they are stronger, more resistant to diseases and require less food. Conversely, although the exotic breeds recorded the least prevalence rate in the study area, the figure obtained (55.0%) is high for a commercial production system. This presupposes therefore that the handling and/or management practices at these production sites are woefully poor. The unhygienic conditions have created conducive environment for the survival of the larvae of these parasites.

In addition to that, high prevalence of protozoa (*Eimeria*), nematodes and cestodes recorded in the local and exotic breed of chickens gives an indication that neither breed is spared by gastrointestinal parasites in the study area. Their prevalence also indicates the availability of their infective stages in the study area and the ability of the infective stages of the parasites to withstand environmental conditions for a long time before they are taken in by the host. This may account for the high prevalence rate seen on breed of chickens in this study.

The influence of gastrointestinal parasites on the age of chickens was also studied. The findings also observed that adults had the highest prevalence (32.5%) while young had the least prevalence (12.6%) of infection. This finding agrees with the observation made by Jegede (2015) who reported that chickens within the age group of 7-15 weeks (growers) were more significantly ( $P < 0.05$ ) infected than the chicks, but not ( $P > 0.05$ ) more than the adults. This however, indicated that age influence the infection of chickens with gastrointestinal parasites. This therefore, could be attributed to the existing maternal immunity in the chicks while immune depression as well as long exposure of the older birds to both helminth ova and coccidian oocysts in the study area.

The effect of gastrointestinal parasites in relation to sex of chickens slaughtered was also studied, the finding revealed that males slaughtered were more significantly ( $P < 0.05$ ) infested with gastrointestinal parasites (33.1%) than the females (11.9%). This however, does not agree with the earlier work by Philip *et al.* (2019) who reported that there is no significant difference in the overall prevalence of the parasites between females (48.0%) and males (38.0%). Conversely, the finding does not agree with the observation made by Junaid (2014) who reported no significant difference ( $P > 0.05$ ) was observed in parasitic infection based on number of species and prevalence of each species in males and female chickens, but he stressed that the parasites showed some degree of preference for female birds as higher infection rate was observed in females than males in both breeds. The prevalence in the females of the local breed (30.0%) was however higher than observed in the females of the exotic breeds (18.0%).

In the current study, the distribution of gastrointestinal parasites by season was also studied and it revealed that the prevalence of GI parasites were more in the wet season (27.5%) than the dry season (17.6%). The finding further revealed that there were significant ( $P < 0.05$ ) differences in seasonal prevalence of gastrointestinal parasites during the study period. This is in agreement with the report made by Magwisha *et al.* (2002) who observed that climatic conditions may alter the population dynamics of the parasites resulting in dramatic changes in the prevalence and intensity of helminths infection. Furthermore, the finding is in accordance with the report made by Dube *et al.* (2010) who stated that many insects that act as vectors for



helminths are also favored by high temperature and to some extent humidity. These factors may explain the wide range and distribution of eimeria, nematode and cestodes species in poultry, especially during the tropical rainy season in the study area.

The Single infection was mostly encountered during the study (56.07%) period. The Mixed infection (Table 7) of two or more parasites species per bird was very common (33.64%) in this study. This agrees with the earlier work of Phillip *et al*, (2019) who observed that frequency of occurrence of the parasites showed that 39.5% of the chickens had single parasitic infection, 34.0% had mixed infection and harbored two parasites, 7.0% had three parasitic infections, 1.0% had four parasitic infections while 18.5% of the chickens were uninfected (Table 3). The prevalence of those with two, three and four parasitic infections were significantly different ( $P < 0.05$ ). This might be attributed to food preference at a particular time which determines the establishment of mixed or single infection in the chicken (Kennedy 1975; Smyth, 1976). Mixed infections in rural free- ranging chickens have been reported in several studies (Luka and Ndams, 2007; Yoriyo *et al.*, 2008; Ohaeri & Okwum, 2013).

## CONCLUSION AND RECOMMENDATIONS

Endoparasites of economic importance were identified of which *Coccidia species* (14.25) and *Ascaridia galli* (4.25%) were the most prevalent gastrointestinal parasites in the study area. The influence of parasites by season studied, wet season has the highest prevalence rate of infection among chickens slaughtered. Similarly the effect of gastrointestinal parasites on age, adult chickens had higher prevalence than the young chickens.

Occurrence of GI parasites may have been attributed to some risk factors and so it is important to develop appropriate control measures against prevalent parasites especially *Coccidia* and *Ascaridia* species. Information obtained from this study should serve as reference material to veterinary personnel and health workers as to the current status of infection by GI parasites in the area. It is also recommended that effective and well planned control measures need to be instituted to check the parasitic population by conducting extensive program to educate poultry farmers on the proper use of anticoccidia and anthelmintics.

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