

Intestinal Parasites of Domestic Chicken (*Gallus gallus domesticus*) in Akure, Nigeria

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Abstract

A survey of intestinal parasites of chickens was carried out in Akure, Ondo State, Nigeria from January to December, 2015. A total of 327 chickens of different breeds were examined for gastrointestinal infections. Fecal samples obtained from these chickens were prepared for microscopy using flotation technique. The results showed that 67 (20.5%) of the 327 chickens examined were infected with various gastrointestinal parasites. Among the infected chickens, the layers were the most susceptible to gastrointestinal parasites with a prevalence of 88.4%, while broilers were the least susceptible with a prevalence of 7.2%. It was further observed that the highest prevalence of gastrointestinal infection (37.6%) was recorded among the chickens that were kept in an extensive management system, while the lowest prevalence (9.6%) was recorded among the chickens kept in an intensive management system. Laboratory screening of the fecal samples for parasites revealed three types of protozoa: *Eimeria* spp. (7.7%), *Histomonas meleagridis* (0.6%), and *Giardia lamblia* (0.3%); and five types of nematodes: *Ascaridia galli* (7.0%), *Heterakis gallinarum* (1.8%), *Capillaria* spp. (0.9%), *Syngamus trachea* (0.6%), and *Trichostrongylus tenuis* (1.6%). Of all these parasites, *Eimeria* spp. was the most prevalent (7.7%), while *Giardia lamblia* was the least prevalent (0.3%). From the results of this study, it is evident that the chickens sold in the study area were infected with gastrointestinal parasites. Hence, it is suggested that an intensive poultry management system and regular treatment of the chickens should be encouraged in the study area.

Keywords: Prevalence, Intestinal Parasites, Domestic Chickens, Poultry System

1. Background

Parasitic diseases are problems wherever poultry are raised, whether in large commercial operations or in small backyard flocks, and economic losses caused by parasites on poultry can be significant (1). The domestic chicken has a wide range of feeding habits including feeding on feces which may be carrying stages of parasites, thus predisposing them to parasitic infections. These parasitic infections have been found to be a major constraint to profitable livestock and poultry production in several countries including Nigeria (2). In most cases, presence of a few parasites does not usually cause a problem. However, large numbers can have a devastating effect on growth, egg production, and over-all health. Gastrointestinal parasites which invade the chickens possess morphological and physiological features such as small thread-like cylindrical bodies, hooks and a hard body cuticle which enhance their adaptation to long living and existence in chickens. The concentration of parasite eggs in the chicken's environment is one factor which plays a major role in determining the severity of the infection. Heavy gastrointestinal helminthiasis is characterized by retarded growth, emaciation, decreased egg production, mucoid diarrhea, catarrh, loss of appetite, anemia, weakness, paralysis, and death. These

are causes of great economic losses (1, 3). In Nigeria, three major poultry managements are being practiced. These include intensive poultry system where the poultry are kept in confinement and are adequately catered for, semi-intensive poultry system where the poultry are allowed to feed within a restricted area, and extensive poultry system or free-range poultry where the chickens are allowed to feed without any restriction and proper care. Scavenging, backyard, and free-range poultry production systems have by definition a much greater degree of contact with potential disease-causing organisms and so diseases prophylaxis is rare (4). It has been reported that parasitic infections or their concurrent infections result in immunosuppression, especially in response to vaccines against some poultry diseases. Studies in other countries have shown that the prevalence of parasitic infections in village chicken flocks is close to 100%, and in most cases individual birds harbor more than one parasite type (5). In Zambia, (6) reported helminth prevalence at 95.2%; while in Tanzania (7) reported a prevalence of 52%. In northern Nigeria, a study showed that the prevalence of helminth infection is about 70% (8). Meanwhile, there is a definite paucity of information on parasitic infections of chickens in the city of Akure, Nigeria. There is therefore need for a general survey of gas-

trointestinal parasites in Akure to evaluate the intestinal parasites that are prevalent in domestic chickens.

2. Methods

2.1. Study Area

The study was conducted in Akure City, Nigeria. Akure is the capital of Ondo State and is located within the south-west with a land area of 14,793 square kilometers. It lies between latitude 7 °15 '0 "N and longitude 5 °11 '42 "E. Akure has a population of 484,798. The people are of the Yoruba ethnic group. The study vicinity has subtropical weather; the raining season is usually from April to October while the dry season begins in November and ends in March.

2.2. Samples Collection and Examination

The fecal samples were collected weekly from the chickens after securing full consent of the chicken owners. A total of 327 chickens which consisted of 136 chickens kept in intensive poultry system, 106 chickens kept in semi-intensive poultry system, and 85 chickens kept in extensive system (free range) were sampled from January to December, 2015. The fecal samples were collected on clean polythene bags placed directly under the cages. This allowed for registration of the sex, breed, age, and reproductive status of the chickens and avoided repeated samples from the same set of individuals. The fecal samples were put into sample bottles, identified appropriately, and taken to the research laboratory of the biology department, Federal University of Technology, Akure, for examination and parasite identification.

In the laboratory, the fecal samples taken from the chickens were examined for parasites using standard parasitological techniques. The fecal samples were subjected to simple flotation technique to observe the helminth ova and oocytes. Thin smear of the concentrated samples was prepared on sterile slide, stained with hematoxylin stain, and viewed under microscope using X10 objective lens for helminths and oil immersion objective lens (X100) for protozoa.

3. Results

3.1. Prevalence of Intestinal Parasites Among Different Production Types of Chickens

Three different breeds of chicken were examined for gastrointestinal infection in the study area. The breeds included: Layers (n = 289, 88.4%); broilers (n = 7, 2.1%), and cockerels (n = 31, 9.5%). Of the 327 chickens examined for gastrointestinal parasites, 67 of them were infected with parasites, giving a total prevalence of 20.5% in the study

area. The results showed that the prevalence of intestinal infection varied significantly among these breeds ($\chi^2 = 117.016$, $P = 0.003$, $P < 0.05$). The highest prevalence of gastrointestinal infection (20.8%) was observed among the layers while the lowest prevalence (14.3%) was recorded among the broilers (Table 1).

3.2. Prevalence of Gastrointestinal Parasites Among Chickens kept Under Different Poultry Systems

The collection points were designated intensive, semi-intensive, and extensive. Of the total number of chickens screened, 136 (41.6%) were from intensive management systems, 106 (32.4%) were from semi-intensive systems, and 85 (26.0%) were from extensive systems. Out of the numbers examined, 13 chickens (9.6%), 22 chickens (20.8%), and 32 chickens (37.6%) of the intensive system, semi-intensive system and extensive systems, respectively, were found to be infected. It was generally observed from Table 2 that the chickens kept on extensive poultry system (free range) had the highest prevalence of gastrointestinal parasites (37.6%), while those kept in intestine poultry system had the lowest prevalence of gastrointestinal parasites (9.6%).

3.3. Parasite Species Distribution Among the Chickens

Laboratory examination of the chickens' fecal samples revealed three types of protozoa: *Eimeria* spp. (7.7%), *Histomonas meleagridis* (0.6%) and *Giardia lamblia* (0.3%); and five types of nematodes: *Ascaridia galli* (7.0%), *Heterakis gallinarum* (1.8%), *Capillaria* spp. (0.9%), *Syngamus trachea* (0.6%), and *Trichostrongylus tenuis* (0.6%). Among the protozoa, *Eimeria* spp. was the most prevalent (7.7%) protozoan parasite in the study area while *Giardia lamblia* (0.3%) was the least prevalent protozoan. Meanwhile, among the nematodes (roundworms) observed, *Ascaridia galli* was the most prevalent (7.0%) while *Syngamus trachea* was the least prevalent (0.6%) in the study area.

4. Discussion

The occurrence of parasites is probably the most damaging of infections in domestic fowl and a source of serious economic loss. The main effect of helminth parasites is the amazing loss they cause to animal industries through meat contamination and morbidity (9). The overall prevalence of gastrointestinal parasites of chickens reared in Akure was 20.5%. Of the 327 chickens screened during the study, 67 (20.5%) were found to be infected with various species of gastrointestinal parasites by gross examination of their feces. These comprised five species of nematodes and three species of protozoa. There were no cestodes or trematodes encountered throughout the study. This might

Table 1. Prevalence of Parasites Among Production Types of Chickens in Akure^a

Breed	Number of Examined	Number of Chickens Infected	Prevalence
Layers	289 (88.4)	60	20.8
Broilers	7 (2.1)	1	14.3
Cockerels	31 (9.5)	6	19.4
Total	327 (100)	67	20.5

^aValues are expressed as No. (%).**Table 2.** Prevalence of Intestinal Parasites Among Chickens Kept Under Different Poultry Systems

Management System	Number of Chickens Examined ^a	Number of Chickens Infected	Prevalence ^b
Intensive	136 (41.6)	13	9.6
Semi-intensive	106 (32.4)	22	20.8
Extensive	85 (26.0)	32	37.6
Total	327 (100)	67	20.5

^aValues are expressed as No. (%).^bValues are expressed as number percent.**Table 3.** Parasite Species Distribution Among the Chickens

Parasite Species	Number of Chickens Infected	Species Prevalence ^a
Protozoa		
<i>Eimeria</i> spp.	25	7.7
<i>Histomonas meleagridis</i>	2	0.6
<i>Giardia lamblia</i>	1	0.3
Subtotal	28	8.6
Nematodes		
<i>Ascaridia galli</i>	23	7.0
<i>Heterakis gallinarum</i>	6	1.8
<i>Capillaria</i> spp.	3	0.9
<i>Syngamus trachea</i>	2	0.6
<i>Trichostrongylus tenuis</i>	5	1.6
Subtotal	39	11.9
Total	67	20.5

^aValues are expressed as number percent.

be due to non-accessibility of infected snails. This finding has been supported by the finding of (10). The nematode parasites encountered include *Ascaridia galli*, *Heterakis gallinarum*, *Syngamus trachea*, *Capillaria* spp. and *Trichostrongylus tenuis*, out of which *Ascaridia galli* was the most prevalent (n = 23,7.0%), followed by *Heterakis gallinarum* (n = 6, 1.8%), *Trichostrongylus tenuis* (n = 5, 1.6%), *Capillaria* spp. (n = 3, 0.9%), and then *S. trachea* (n = 2, 0.6%), the

least prevalent.

The finding of more species of nematodes (five species) than protozoa (three species) in this study is in agreement with earlier findings of (8) who reported that domestic fowls are more susceptible to nematodes than protozoa, cestodes, and trematodes. The reasons might be because nematodes do not require intermediate hosts and at the same time they are soil-transmitted parasites. In addi-

tion, adult nematodes lay many eggs daily which can retain their viability for as long as 12 months and so domestic fowls are constantly picking up viable eggs from the droppings that contaminate the environment as they feed (11), and this also predisposes them to heavy parasite burden. More so, cestodes require an intermediate host to complete their lifecycle and so transmission is dependent on the availability of the intermediate hosts. The protozoan parasites encountered were *Eimeria* spp., *Histomonas meleagridis*, and *Giardia lamblia*. Of these, *Eimeria* spp. was the most prevalent (n = 25, 7.7%), followed by *H. meleagridis* (n = 2, 0.6%), and then *Giardia lamblia*, the least abundant (n = 0.3%). It was generally observed that the prevalence of gastrointestinal parasites was higher in chickens kept under extensive management systems (37.6%) compared to the other poultry systems. This suggests that chickens that were kept in extensive poultry system (free range) have higher risk of contracting parasitic infections compared to the chickens kept in intensive poultry system, and this greatly affects meat and egg production.

The low prevalence of gastrointestinal parasites in the study area is contrary to the reports of other authors (12, 13), who reported the prevalence of gastrointestinal parasites in domestic fowls as 62% and 62.7% in Abia and Zaria, respectively. The authors attributed the high prevalence in the areas to favorable environmental conditions for gastrointestinal parasites around the farms where the chickens were reared. The unusually low prevalence of gastrointestinal parasites recorded in this study could be attributed to the regular sanitation of the poultries and vaccination of the chickens in the study area as these exercises were constantly witnessed during samples collection at the poultries. The prevalence of gastrointestinal parasites as observed in the study area suggests that there is need for consistent use of dewormer and vaccines, isolation and regular treatment of helminth-infected birds and control of the intermediate hosts should be carried out to break transmission of the parasites. However, some studies have been carried out in northern and southern Nigeria (1, 14). Poor management systems and most importantly diseases are the major cause of financial loss in poultry production (15).

4.1. Conclusion

Parasitic infections are the major cause of financial loss in poultry and huge losses to the livestock industries. The work carried out revealed low protozoan and helminth infections with nematodes having the highest prevalence. This suggests the need for effective control measures which can interrupt the lifecycle of parasite species and as such, increase the meat and egg production in the study area.

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