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Intestinal Nematode and Cestode Parasites of Domestic birds (*Gallus gallus domesticus*) of Major Markets in Port Harcourt Metropolis, Nigeria

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Abstract

The health of domestic birds is a major concern to a nation and her populace because limiting productivity in the poultry industry can result in food reduction. Domestic birds suffer health challenges such as loss of energy, stunted growth, low egg production, loss of appetite and emaciation, due to high infection rates of endoparasites (such as, nematodes and cestodes). Intestinal samples were obtained from 120 domestic birds (*Gallus gallus domesticus*) between May and June, 2019. The samples were obtained from butchers at Mile 3, Creek Road and Mile 4 markets in Port Harcourt, and were examined for parasites using standard parasitological techniques. Three parasite species were obtained from the specimens: *Ascaridia galli* (nematode), and *Choanotaenia infundibulum* and *Raillietina* species (cestodes). Twenty-two hosts from Mile 3 market were infected, giving a prevalence of 36.67%. In hosts from Mile 4, eight samples were infected with parasites with a prevalence of 26.7%, while 22 (73.3 %) were uninfected. At Creek Road market, a total of five hosts were infected, giving a prevalence of 16.7%, while 25 (83.8%) were uninfected. This research was aimed at investigating the endo-helminth parasite community of *Gallus gallus domesticus* which is a serious problem facing poultry production, sustainability of agriculture and

Keywords: Domestic birds, *Gallus gallus domesticus*, endoparasites, sustainability

INTRODUCTION

In Nigeria, domestic birds make up about 80% of poultry, while the exotic birds make up the remaining 20% (RIM, 1992). Endoparasites are one of the major health and welfare risks of domestic birds due to their diet and mode of feeding. The health of domestic birds due to bacterial, viral or parasitic infections can result in food reduction. High infection rates with roundworms such as *Ascaridia galli* and tapeworms, such as, *Choanotaenia infundibulum* and *Raillietina* species can affect the health of domestic birds, thus leading to loss of appetite, and inability to lay eggs (Van de Weerd *et al.*, 2009).

Nematodes and Cestodes are intestinal parasites which live in their definitive hosts. The level of their infection and clinical pathogenicity is characteristics of each species, and the severity of the infection depends on the age of the domestic birds (Poultry World, 2015). Avian cestodiasis constitutes one of the most common endoparasitic infections causing serious difficulties in poultry production. It does not only cause reduction of body weight of the birds, but also may cause severe problems in affected flocks such as enteritis, anaemia due to blood loss, low egg production, nervous manifestations and death (Calnek *et al.*, 1991). *Raillietina echinobothrida* is the most important cestode species in terms of prevalence and pathogenicity in poultry production (Permin and Hansen, 2003). *Raillietina cesticillus* is quite harmless in terms of symptoms (McDougald, 2003) whereas *R. echinobothrida* causes nodular tapeworm disease under heavy infection. *Gallus gallus domesticus* suffers a considerable damage; tapeworms sap its energy, cause stunted growth, lower egg production, and bring about emaciation and death (McDougald, 2011). In heavy infection, the bowel may be occluded and the normal movement of the intestinal contents greatly disturbed; behaviours like twisting of the head and neck in an abnormal position and paralysis of one or two legs, may occur (Lalchhandama, 2009).

Choanotaenia infundibulum infections are moderately pathogenic and, in most cases, affected birds do not show serious clinical signs. Different pathogenic impacts have been attributed to *C. infundibulum* such as loss of appetite, drooping, thrust, anaemia, emaciation and reduction in egg production.

However, in severe infections death may occur (Ohaeri and Okwum 2013).

Adult *Ascaridia galli* is mostly found in the small intestine of poultry birds (McDougald, 2003). Chicks (1-2 months of age) are more susceptible and heavily infested; chicks present anaemia, droopiness, emaciation and diarrhea. The primary damage consists of reduced feed, death has also been observed in severe infections (Kaufmann *et al*., 2005). It also causes anorexia, dehydration, stunted growth, drooping wings, ruffled feathers, weight loss, and change in behaviour, lethargy and mis-shaped soft thin shelled eggs in poultry. Manifestation of disease symptoms are more pronounced in domestic birds up to 3 months of age, after which the worm burden normally decreases but can still be very high (Kaufmann *et al*., 2011). *Ascaridia galli* has been reported from the egg of domestic birds, but this has only been an occasional finding (Reid and McDougald, 1997).

MATERIALS AND METHOD

Description of study areas

This study was conducted at three study areas; Mile 3 market (N04° 48.16, E006° 59.33), Mile 4 market (N 04º 49.6237', E006º 58.8932), and Creek Road market (N 04° 4529, E007° 0115), Port Harcourt Local Government Area, Rivers State, Nigeria. All three markets are known for their huge trading activities.

Method of Sample Collection

Sampling was conducted between May and June, 2019. Thirty intestinal samples were collected from local breed domestic birds at Mile 4 and Creek Road markets, and 60 from Mile 3 market. The locations were visited weekly with about five to ten intestinal samples collected during each visit for parasitological examination until the total number was achieved. The samples were collected into plastic bags and taken to the Parasitology Laboratory in Rivers State University for examination and identification.

Examination of samples

The samples were weighed using an electronic weighing balance (Denver Instrument, Model TP-512A), separated into small intestine, large intestine and caecum after which each region was cut open by longitudinal incision using a dissecting scissors. Intestine scrapping was done with a scalpel and any parasite seen was picked up with forceps and dropped in a Petri dish containing 0.9% normal saline.

Fixation of Parasites

Nematodes were stretched in hot water and fixed in 70% ethanol. Cestodes were flattened in between glass slides containing 5% formal saline for about ten minutes and fixed in the same solution.

Computation of Parasite Prevalence and Mean Intensity

Parasite species were identified according to Soulsby (1982). Prevalence and intensity of infection were calculated for the parasites according to the formula of Bush *et al*. (1997).

RESULTS

A total of 120 intestinal samples were examined: 30 from each of Mile 4 and Creek Road markets, and 60 from Mile 3 market. The weight of the intestines were 128.5 ± 53.4 g, 117.2 ± 33.5 g and 94 ± 25.4 g for Mile 4, Creek Road and Mile 3 markets, respectively. Three parasite species were obtained from the specimens: *Ascaridia galli* (nematode), and *Choanotaenia infundibulum* and *Raillietina* sp. (cestodes). The nematode was recovered from all locations. *Ascaridia galli* and *C. infundibulum* were recovered from Creek Road market samples, while those from Mile 4 market had all three parasites (*A. galli*, *C. infundibulum* and *Raillietina* sp.). In one sample from Creek Road market, *C. infundibulum* was found with *A. galli*, this host with the double infection had one *C. infundibulum* and fifteen *Ascaridia galli*. In hosts from Mile 4 market, double infection was observed in one sample which was infected with both *C. infundibulum* and *Raillietina* sp.

Twenty-two hosts were infected at Mile 3 market giving a prevalence of 36.67%. All hosts from this location were infected with only *A. galli*. Therefore, prevalence of *A. galli* infection in this location was 36.67%. The least number of *A. galli* in domestic birds from this location was three worms, and the highest was thirty in a single host. Among these specimens, the mean intensity was about twelve worms of *A. galli* per infected host.

In hosts from Mile 4, a total of eight samples were infected with parasites (prevalence, 26.7 %) while 22 (73.3 %) were uninfected. Four samples were infected with *Ascaridia galli*, three with only *Choanotaenia infundibulum*, and one with both *C. infundibulum* and *Raillietina* sp. The parasite burden ranged from five to ten *A. galli*, two *Raillietina sp*. and seven to forty *C. infundibulum* in these samples. The mean intensity of infection was 9 *A. galli*, 2 *Raillietina sp.* and 18.5 *C. infundibulum* per infected hosts from this location.

At Creek Road market, a total of five hosts were infected giving a prevalence of 16.7% while 25 (83.8%) were uninfected. The number of *A. galli* in infected *Gallus gallus domesticus* of Creek Road market was between the ranges of one and twenty-four. Tapeworm infection occurred in only one host. The mean intensity of infection showed that there were about nine *A. galli* per infected host, and four *C. infundibulum* per infected host at the Creek Road market. However, the prevalence of *C. infundibulum* was very low (3.3%).

The prevalence of helminth infection in all locations is presented in Table 1 while the mean intensity values are presented in Figure 1. Photomicrographs of the parasites are presented in Plates 1 and 2.

Table 1: Prevalence of parasite infection in domestic birds (*Gallus gallus domesticus*) from major markets in Port Harcourt metropolis

	Mile 3		**Mile 4**		**Creek Road**	
Parasite	Number positive	Number negative	Number positive	Number negative	Number positive	Number negative
Nematode						
Ascaridia galli (Single infection)	22 (36.67%)	38 (63.33%)	4 (13.3%)	26 (86.7%)	4 (13.3%)	25 (83.3%)
Cestode						
Choanotaenia infundibulum alone	-	-	-	-	-	-
Co-infection of *A. galli* and *C.infundibulum*	-	-	-	-	1 (3.3%)	29 (96.7%)
Raillietina sp. alone	-	-	1 (3.33%)	29 (96.7%)	-	-
Total Prevalence/location	22 (36.7%)	38 (63.3%)	8 (26.7%)	22 (73.3%)	5 (16.7%)	25 (83.3%)

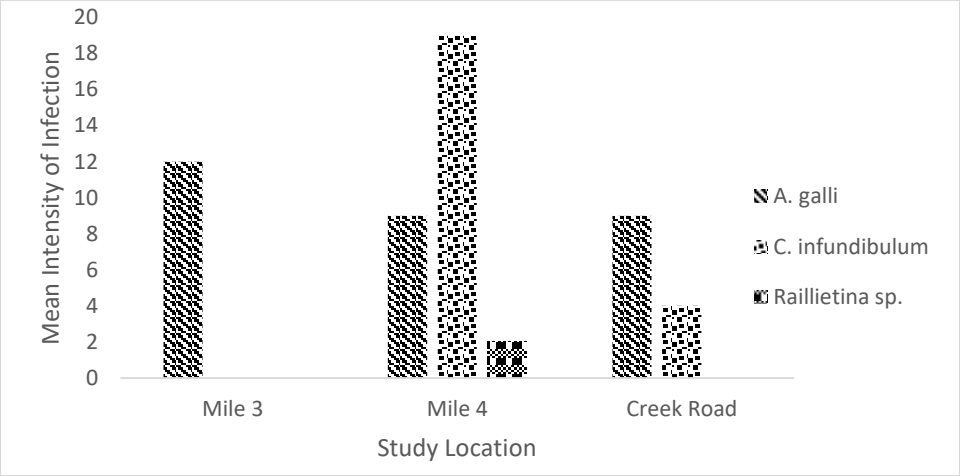

Fig. 1: Mean intensity of parasite infection in the domestic birds (*Gallus gallus domesticus*) from Mile 3, Mile 4 and Creek Road markets, Port Harcourt, Nigeria

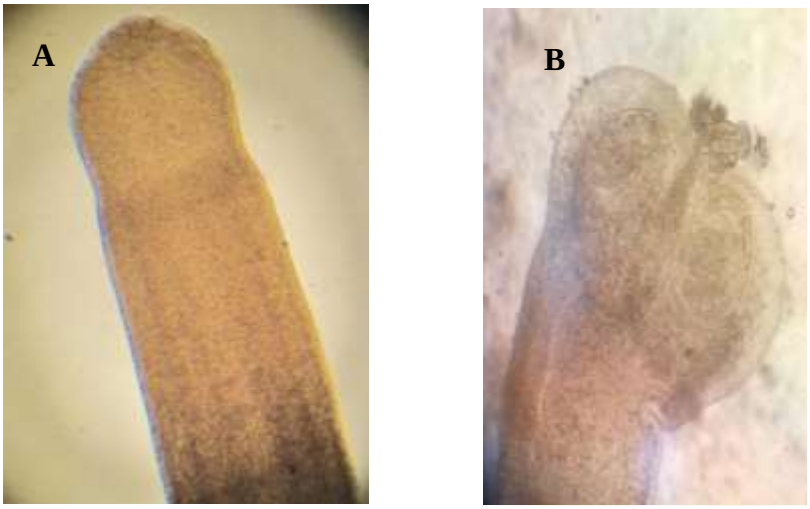

Plate 1: A, *Raillietina* sp.; B, *Choanotaenai infundibulum* (Scolesces; x10 obj.)

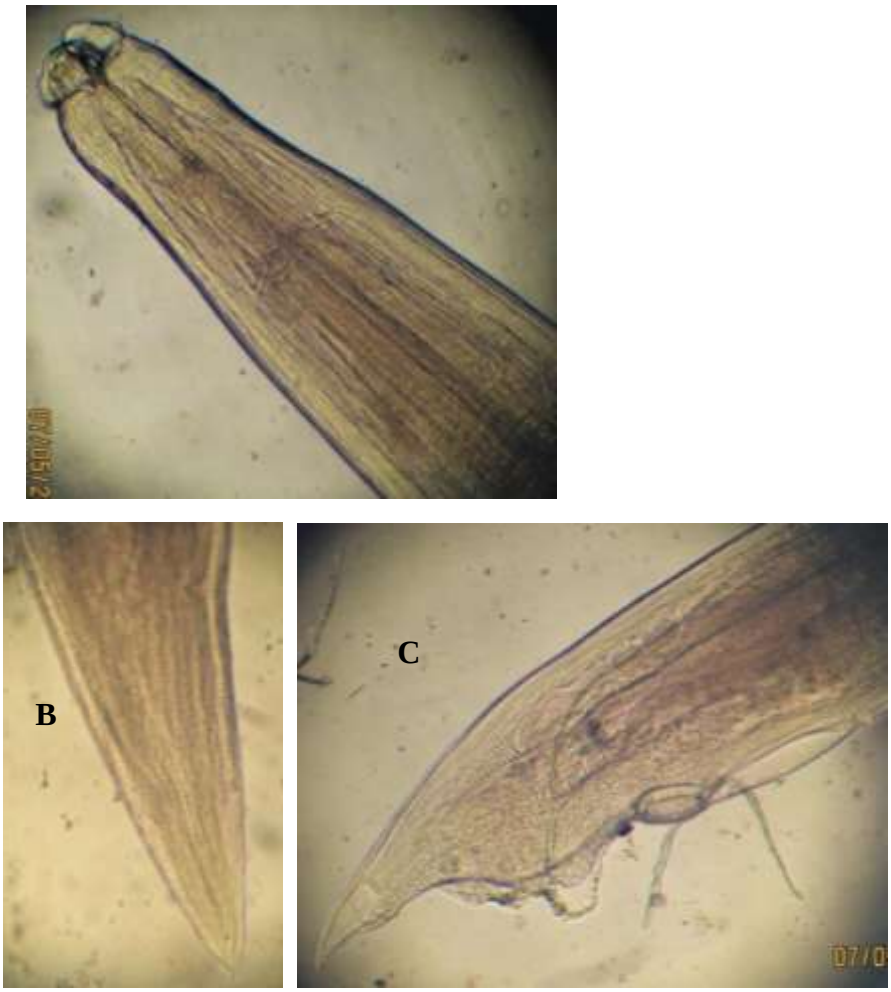

Plate 2: *Ascaridia galli* (Key: A=scolex; B= Posterior of female; C= Posterior of male, x10 obj.)

DISCUSSION

The results obtained from this study revealed the prevalence of gastrointestinal parasites in *Gallus gallus domesticus* as 42%. The recorded prevalence of gastrointestinal infection showed disparity with works reported in Maiduguri by Ogbaje *et al*., 2012 and Giwa, Kaduna in Nigeria by Junaidu *et al.*, 2014; Mukail and Adamu, 2008. This could be attributed to differences in the number of samples collected, exposure of domestic birds to diseases and reservoirs in nature, management system, and control practices on the farm and seasonal differences in the study areas (Jegede *et al.*, 2007).

This study revealed nematodes and cestodes as the common intestinal parasites of domestic birds with high propensity of infestation due to mode of transmission and life cycle of the parasites. This correlates to the works of Luka and Ndams, 2007 in Zaria and Junaidu *et al.*, 2014 in which cestodes and nematodes were implicated in domestic birds' helminthic infection. The modes of transmission, adaptability and invasiveness of their infective stages, and fecundity rate of cestodes and nematodes enhance the infection on domestic birds caused by the feeding habits practice. This study reveals *Ascaridia galli*, *Choanotaenia infundibulum* and *Raillietina* as common parasite species of the gastrointestinal tract of domestic birds, with *A. galli* as the most common. The single infection prevalence of 22 (36.67%) in Mile 3 and its double infection incident in Mile 4 and Creek Road agrees with previous reports by Agbolade *et al.* 2014; Ohaeri and Okwum 2013, which affirmed the domestic birds were reared under poor management practice system. The single modal frequency of *A. galli* in Mile 3, and other places (Mile 4 and Creek Road) showed marked disparity with other isolated parasites can be adduced to its direct mode of

transmission. *Ascaridia galli* causes ascaridiasis evoked by heavy worm infection which is influenced by many factors such as the age of domestic birds, the size of the infective worms, the age of the infective eggs, the sex of the domestic birds and the diet of the host. *Ascaridia galli* is re-emerging in domestic birds and in the immature forms because these roundworms live in the intestinal mucosa, hence, the reason for its high prevalence.

CONCLUSION

This study shows a high prevalence of *Ascaridia galli* in the gastrointestinal tract of the bird, *Gallus gallus domesticus.* Mixed infection of two or more species of parasites per bird was seen in this study. The cestode and nematode infection in the GIT of these birds may be due to ingestion of infected droppings or infected intermediate hosts such as grasshoppers, cockroaches, earthworms and beetles that are available to them in poorly managed poultry. The prevalent rate of these parasites could serve as a source of economic loss to the poultry industry due to reduced productivity. This study suggests the need for proper poultry management practices, proper sanitation of the farmland to break the life cycle and incidence of parasite infection, thereby increasing bird and egg production as well as healthier livestock and sustainable agriculture.

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