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Gastro-intestinal Helminths of Domestic Chickens *Gallus gallus domestica* and Ducks *Anas platyrhynchos* Slaughtered at Gombe Main Market, Gombe State, Nigeria

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ABSTRACT

A study was conducted to determine the prevalence of gastro-intestinal helminths in domestic chickens and ducks slaughtered at the Gombe main market, Gombe State, Nigeria. Faecal samples from 150 chickens and 150 ducks, comprising of 75 male and 75 female samples of each host species, were collected from the dressing unit of the market and examined in the laboratory for helminths, using the intestinal scrapping method. The overall prevalence of helminths was 81.0% in chickens and 4.7% in ducks. More infections with cestodes were recorded in both host species. The helminths identified from chickens comprised *Railleitina tetragona* 52 (34.7%), *R. cesticillus* 32 (21.3%), *R. echinobothrida* 38 (25.3%), *R. magninumida* 5 (3.3%), *Amoebotaenia cuneata* 6 (4.0%), *Hymenolepis carioca* 18 (12.0%) and *Ascaridia galli* 16 (10.7%), while helminths identified from ducks comprised *R. cesticullus* 4 (2.7%), *R. magninumida* 5 (3.3%), *Hymenolepis carioca* 2 (1.3%) and *Ascaridia galli* 1 (0.7%). The males of both host species 67 (89.3%) and 4 (5.3%), respectively were more infected than the females 55 (73.3%) and 3 (4.0%), respectively. Chi square test revealed no significant difference ($p>0.05$) in the infection rates between the sexes. Eighty (53.3%) of the chickens had single infections, 38 (25.3%) had double infections and 4 (2.7%) had triple infections while in ducks, 3 (2.0%) had single infections, 3 (2.0%) had double infections and 1 (0.7%) had triple infection. The study revealed that helminths are common parasites of chickens and ducks in Gombe and could be an impediment to their production in the area.

Key words: Gastro-intestinal, helminths, chickens, ducks, Gombe, Nigeria

INTRODUCTION

Hai *et al.* (2008) in a study conducted in Fulbaria, Upazila, reported that poultry plays a vital role in the national economy as a revenue provider. Factors which hinder the development of poultry to its fullest capacity include poor management systems and diseases (Fabiyi, 1972; Permin *et al.*, 1997). Intestinal parasitism is a major problem in poultry, especially those reared under the extensive and semi extensive systems. Ajayi and Ajayi (1983) found that the major constraint to poultry production in Nigeria is helminthiasis. Fabiyi (1972) and Ahmed and Sinha (1993) reported that helminths constitute a serious problem and great economic loss to poultry production.

The diets of chickens and ducks consist of grains, seeds, leaves, larvae and adult stages of various arthropods, earthworms and snails (Rowan, 1983; Jordan and Pattison, 1996). A considerable number of these food items have been implicated as intermediate hosts of helminthes (Soulsby, 1982).

Poultry such as chickens and ducks are kept in backyards or commercial production systems in most areas of Gombe State. It is one of the most important sources of animal protein and farm manure (Frantovo, 2000; Nnadi and George, 2010).

A survey to identify species of helminths of domestic chickens and ducks occurring in this area, considering the fact that information on common helminths of chickens and ducks in the area is scanty or unavailable, was deemed necessary. This study was therefore conducted to provide information on the common helminths of domestic chickens and ducks in Gombe, using Gombe main market as a case study.

MATERIALS AND METHODS

Study area: The study was conducted using local chickens and ducks slaughtered at the Gombe main market, located behind Idi prayer ground, Gombe, Gombe State, Nigeria.

Sample collection: Three hundred gastro-intestinal tracts of 150 domestic chickens and 150 ducks, slaughtered at the dressing unit of the Gombe main market, Gombe were collected and examined for helminths. The gastro-intestinal tracts were collected in specimen bottles containing 10% formalin. The sex of the bird from which each sample was collected, was noted. All the birds were of the same breed and were all adults. The samples were then taken to the Biological Sciences Laboratory of the Department of Biological Sciences, Gombe State University, Gombe, for processing.

Examination of gastro-intestinal tracts for helminths: Each gastro-intestinal tract was spread on a dissecting board and separated into its different sections. The lumen of each section was opened longitudinally and the content scrapped into a petri dish containing 0.9 physiological saline, as described by Fatihu (1990). The content of each section was then observed under a light microscope for helminths. Helminths from each section were isolated, counted and preserved in labeled vials containing 5% formalin. The helminths were examined and identified microscopically as described by Cheng (1973), Soulsby (1982) and Ruprah *et al.* (1986). Voucher specimens were deposited in the Biological Sciences Laboratory of Gombe State University, Gombe, Nigeria.

Data analysis: Prevalence, intensity and mean intensity were expressed according to Margolis *et al.* (1982). Chi square test was used to determine any association between sex and infection.

RESULTS

Prevalence of helminths in domestic chickens: Out of the 150 gastrointestinal tracts of chickens examined 122 (81.3%) harboured helminths. Seven species of helminths comprising of six cestodes and one nematode were identified. The cestodes were *Raillietinate tragona* 52 (34.7%), *R. cesticillus* 32 (21.3%), *R. echinobothrida* 38 (25.3%), *R. magninumida* 5 (3.3%), *Amoebotaenia cuneata* 6 (4.0%), *Hymenolepis carioca* 18 (12.0%) and the nematode *Ascaridia galli* 16 (10.7%) (Table 1).

Table 1: Prevalence of helminths in domestic chickens and ducks slaughtered at Gombe main market, Gombe, Nigeria (n = 300)

	Chicken (♂ = 75, ♀ = 75, n = 150)				Duck (♂ = 75, ♀ = 75, n = 150)			
Helminth	No. of infected (%)	No. of parasites collected (%)	Mean intensity±SE	Range	No. of infected (%)	No. of parasites collected (%)	Mean intensity±SE	Range
Raillietina tetragona	52 (34.7)	740 (34.5)	14.2±0.15	1-94	0 (0.0)	0 (0.0)	0.0±0.0	0-0
	♂32 (42.7)	♂566 (39.8)	♂17.7±1.21	(♂, ♀)	(♂, ♀)	(♂, ♀)	(♂, ♀)	(♂, ♀)
	♀20 (26.7)	♀174 (24.0)	♀8.7±0.54					
Raillietina echinobothrida	38 (25.3)	781 (36.4)	20.6±1.05	1-97	0 (0.0)	0 (0.0)	0.0±0.0	0-0
	♂23 (30.7)	♂596 (41.9)	♂25.9±0.53	(♂, ♀)	(♂, ♀)	(♂, ♀)	(♂, ♀)	(♂, ♀)
	♀15 (20.0)	♀185 (25.5)	♀12.3±0.96					
Raillietina cesticillus	32 (21.3)	320 (14.9)	10.0±1.02	1-65	4 (2.7)	7 (21.9)	1.8±0.05	1-2
	♂8 (10.7)	♂56 (3.9)	♂7.0±1.03	(♂, ♀)	♂2 (2.7)	♂4 (16.7)	♂2.0±1.00	(♂, ♀)
	♀24 (32.0)	♀264 (36.4)	♀11.0±0.25		♀2 (2.7)	♀3 (37.5)	♀1.5±1.02	
Raillietina magninumida	5 (3.3)	32 (1.5)	6.4±0.20	1-10	5 (3.3)	11 (34.4)	2.2±0.10	1-3
	♂2 (2.7)	♂20 (1.4)	♂10.0±1.00	(♂, ♀)	♂3 (4.0)	♂7 (29.2)	♂2.3±1.03	(♂, ♀)
	♀3 (4.0)	♀12 (1.7)	♀4.0±0.20		♀2 (2.7)	♀4 (50.0)	♀2.0±0.01	
Amoebotaenia cuneata	6 (4.0)	12 (0.6)	2.0±0.02	1-4	0 (0.0)	0(0.0)	0.0±0.0	0-0
	♂4 (5.3)	♂10 (0.7)	♂2.5±0.52	(♂, ♀)	(♂, ♀)	(♂, ♀)	(♂, ♀)	(♂, ♀)
	♀2 (2.7)	♀2 (0.3)	♀1.0±0.01					
Hymenolepis carioca	18 (12.0)	178 (8.3)	9.9±1.20	1-57	2 (1.3)	13 (40.1)	6.5±0.03	3-10
	♂13 (17.3)	♂143 (10.1)	♂11.0±0.02	(♂, ♀)	♂2 (2.7)	♂13 (54.2)	♂6.5±0.03	(♂, ♀)
	♀5 (6.7)	♀35 (4.8)	♀7.0±0.15		♀0 (0.0)	♀0 (0.0)	♀0.0±0.0	
Ascaridia galli	16 (10.7)	83 (3.9)	5.2±1.02	1-17	1 (0.7)	1 (3.1)	1.0±0.0	1-1
	♂6 (8.0)	♂30 (2.1)	♂5.0±005	(♂, ♀)	♂0 (0.0)	♂0 (0.0)	♂0.0±0.0	(♂, ♀)
	♀10 (13.3)	♀53 (7.3)	♀5.3±0.22		♀1 (1.3)	♀1 (12.5)	♀1.0±0.0	
Total	122 (81.3)	2146 (100.0)	17.6±1.22	1-97	7 (4.7)	32 (100.0)	4.6±0.17	1-10
	♂67 (89.3)	♂1421 (66.4)	♂21.2±1.02	(♂, ♀)	♂4 (5.3)	♂24 (75.0)	♂6.0±1.00	(♂, ♀)
	♀55 (73.3)	♀725 (33.8)	♀13.2±1.04		♀3 (4.0)	♀8 (25.0)	♀2.7±2.01	

Table 2: Prevalence of negative, single and mixed helminth infections in domestic chickens and ducks slaughtered at Gombe main market, Gombe, Nigeria

		Frequency of occurrence (%)	
Infection type	Parasite(s)	Chickens (n = 150)	Ducks (n = 150)
None		28 (18.7)	143 (95.3)
Single	*Raillietina tetragona*	27 (18.0)	0 (0.0)
	R. echinobothrida	22 (14.7)	0 (0.0)
	R. cesticillus	19 (12.7)	01 (0.7)
	R. magninumida	02 (1.3)	02 (1.3)
	Amoebotaenia cuneata	02 (1.3)	0 (0.0)
	Hymenolepis carioca	07 (4.7)	0 (0.0)
	Ascaridia galli	01 (0.7)	0 (0.0)
	Sub total	80 (53.3)	03 (2.0)
Double	*R. tetragona* + *R. cesticillus*	05 (3.3)	0 (0.0)
	R. tetragona + *R. echinobothrida*	10 (6.7)	0 (0.0)
	R. tetragona + *R. magninumida*	02 (1.3)	0 (0.0)
	R. tetragona + *Amoebotaenia cuneata*	01 (0.7)	0 (0.0)
	R. tetragona + *Hymenolepis carioca*	03 (2.0)	0 (0.0)
	R. tetragona + *Ascaridia galli*	03 (2.0)	0 (0.0)
	R. cesticillus + *R. magninumida*	0 (0.0)	01 (0.7)
	R. cesticillus + *Hymenolepis carioca*	01 (0.7)	01 (0.7)
	R. cesticillus + *Ascaridia galli*	06 (4.0)	0 (0.0)
	R. echinobathrida + *Amoebotaeniacuneata*	02 (1.3)	0 (0.0)
	R. echinobathrida + *Ascaridiagalli*	02 (1.3)	0 (0.0)
	Amoebotaenia cuneata + *Hymenolepis carioca*	01 (0.7)	0 (0.0)
	Hymenolepis carioca + *Ascaridia galli*	01 (0.7)	0 (0.0)
	R. magninumida + *Hymenolepis carioca*	01 (0.7)	01 (0.7)
	Sub total	38 (25.3)	03 (2.0)
Triple	*R. tetragona* + *R. echinobothrida* + *A. galli*	01 (0.7)	0 (0.0)
	R. cesticillus + *H. carioca* + *A. galli*	01 (0.7)	0 (0.0)
	R. cesticillus + *R. magninumida* + *A. galli*	0 (0.0)	01 (0.7)
	R. echinobothrida + *H. carioca* + *A. galli*	01 (0.7)	0 (0.0)
	Amoebotaenia cuneata + *H. carioca* + *A. galli*	01 (0.7)	0 (0.0)
	Sub total	04 (2.7)	01 (0.7)

The predilection site for all the helminths was the small intestine (ileum and duodenum). More males 67 (89.3%) were infected than females 55 (73.3%) (Table 1). Chi square test revealed no significant difference ($p>0.05$) in the prevalence of infection between male and female chickens.

The chickens had higher prevalence of single infections 80 (53.3%), compared to double 38 (25.3%) and triple infections 4 (2.7%) (Table 2). The difference in the prevalence of single, double and triple infections was significant ($p<0.05$).

Prevalence of helminths in ducks: Out of the 150 gastro-intestinal tracts examined, 7 (4.7%) harboured helminths. Four species of helminths were identified. The cestodes were *Railleitina cesticillus* 4 (2.7%), *R. magninumida* 5 (3.3%), *Hymenolepis carioca* 2 (1.3%) and the nematode *Ascaridia galli* 1 (0.7%) (Table 1).

The predilection site for the helminths was the small intestine. Male ducks 4 (5.3%) were more infected than females 3 (4.0%) (Table 1). Chi square test showed no significant difference ($p>0.05$) in the prevalence of helminths between the sexes.

Prevalence of single, double and triple infections were in the order of 3 (2.0%), 3 (2.0%) and 1 (0.7%), respectively (Table 2).

The difference in the prevalence of single, double and triple infections was not significant ($p>0.05$).

DISCUSSION

The overall prevalence of 81.3% recorded in domestic chickens in the present study is slightly lower than that of Mwale and Masika (2011) of 99.0%, Eshetu *et al.* (2001) of 91.0%, Matur *et al.* (2010) of 90.2%, Eslami *et al.* (2009) of 90.0%, Yoriyo *et al.* (2008a) of 87.8%, Yoriyo *et al.* (2005) of 87.0%, Ashenafi and Eshetu (2004) of 86.3 and 75.8%, Azare (1997) of 83.4%, Yoriyo *et al.* (2008b) of 77.0%, but higher than that of Tolossa *et al.* (2009) of 72.0 and 64.7%, Matur (2002) of 71.0%, Luka and Ndams (2007) of 61.9%, Dawet *et al.* (2012) of 37.9%.

In the present study, 7 species of helminths were identified comprising of 6 cestodes and 1 nematode compared to 14 species of helminths identified by Mwale and Masika (2011) comprising of 8 nematodes, 4 cestodes and 2 trematodes, 12 species by Yoriyo *et al.* (2008a) comprising of 7 cestodes and 5 nematodes, 10 species of by Luka and Ndams (2007) comprising of 5 cestodes and 5 nematodes, 9 species by Yousuf *et al.* (2009) comprising of 5 cestodes and 4 nematodes, 5 species by Kose *et al.* (2009) comprising of 4 nematodes and 1 cestode, 5 species by Rayyan *et al.* (2010) comprising of 3 nematodes and 2 cestodes and 3 species of by Matur (2002) comprising of 2 cestodes and 1 nematodes.

The helminth composition, prevalence and intensity recorded in this study, concur with the studies of Yoriyo *et al.* (2008a, b), Luka and Ndams (2007), Matur (2002), Gadzama and Strivastrava (1996), Azare (1997), Ahmed and Sinha (1993), Oyeka (1989), Fakae *et al.* (1991), Mungube *et al.* (2008), Nonaka *et al.* (1991), Dude *et al.* (2010) and Lu *et al.* (1990). However, some differences exist in the helminth composition, prevalence and intensity of individual helminths between this study and the studies of these previous researchers.

The prevalence of 4.7% recorded in this study for ducks, is lower than 96.7% reported by Farjana *et al.* (2008), 95.4% by Adejinmi and Oke (2011), 81.1% by Yousuf *et al.* (2009), 52.0% by Muhairwa *et al.* (2007) and 53.0, 49.0, 45.0, 36.0, 30.0 and 26.0% reported by Farias and Canaries (1986) for various species of Mexican ducks. This low prevalence may suggest that ducks in this area could be less susceptible to helminthic infections than ducks in other areas and than chickens. This could also be due to the inaccessibility of infective larvae to the ducks by reason of their feeding habits (Islam *et al.*, 1988). The low prevalence could also be attributed to the harsh climate of the area, which may interfere with the development of helminth eggs, coupled with the preventive and control measures adopted by poultry farmers in the area, with complimentary veterinary services.

In the present study, 4 species of helminths were identified comprising of 3 cestodes and 1 nematode compared to 17 species of helminths identified by Farjana *et al.* (2008) comprising of 11 trematodes, 4 cestodes and 2 nematodes, 10 species of helminths identified by Yousuf *et al.* (2009) comprising of 4 trematodes, 2 cestodes, 2 nematodes and 2 acanthocephalans, 14 species by Muhairwa *et al.* (2007) comprising of 5 cestodes and 9 nematodes and 25 species by

Farias and Canaries (1986) comprising of trematodes, cestodes, nematodes and acanthocephalans. The four species of helminths identified in this study have been reported by Farias and Canaries (1986), Farjana *et al.* (2008), Muhairwa *et al.* (2007) and Yousuf *et al.* (2009). However, some of the species of helminths reported by these researchers were not recorded in this study.

The differences in the composition, prevalence and intensity of helminths in these studies could be due to the differences in the incidence of the infective stages and intermediate hosts of the parasites in places where chickens and ducks feed, the number of birds examined, the age, sex and breed of the birds, the seasons and areas in which these studies were carried out.

The complete absence of trematodes and acanthocephalans in this study in both chickens and ducks agrees with the reports of Fabiyi (1972), Gadzama and Strivastrava (1986), Oyeka (1989), Fatihu (1990), Luka and Ndams (2007), Yoriyo *et al.* (2005), Permin *et al.* (1997) and Muhairwa *et al.* (2007). These findings suggest that seasonal variations in the availability of free water could have limited exposure of the chickens and ducks to snails, which are the intermediate hosts of trematodes, thus the absence of trematodes in this study. The complete absence of trematodes and acanthocepalans in this study in ducks, however disagrees with the reports of Shaw and Kocan (1980), Eom *et al.* (1984), Farias and Canaries (1986), Kulisic and Lepojev (1994), Schmid *et al.* (1995), Farjana *et al.* (2004), Borgsteede *et al.* (2005), Farjana *et al.* (2008) and Yousuf *et al.* (2009), who reported the presence of trematodes and acanthocephalans in ducks in their studies.

The cestodes *Railleitina* spp., which were the dominant parasites in this study are known to be cosmopolitan and contributes to nutrient depletion in birds as reported by Cheng (1973) and Soulsby (1982). Their intermediate hosts which are ants and beetles are available and more abundant in Gombe and may form an important part of the diets of chickens and ducks in Gombe. It is therefore safe to assume that the birds might have acquired the helminth infections from their diets.

The predilection sites for all the helminths in both chickens and ducks, were the small intestine, where semi-digested food and debris abound and thus, favours the establishment of helminth (Smyth, 1976). Though the effects of the presence of these helminths on the debility, morbidity and mortality chickens and ducks could be investigated, Dawet *et al.* (2012), reported that gastro-intestinal helminth infections interfere with host metabolism, resulting in poor feed utilization, reduced growth rate and size and death in severe cases.

The lower prevalence of helminths in female chickens and ducks recorded in this study concurs with the report of Yoriyo *et al.* (2008a) but contradicts that of Farjana *et al.* (2004) and Yousuf *et al.* (2009). This could be due to the fact that female birds reduce their feeding habits during the incubation period and most owners/farmers take special care of the incubating birds by giving them feed like grains and food remnants and water, to compensate for the time spent in incubation (Yoriyo *et al.*, 2008a). The female birds tend to reduce their realized niche during the breeding season and this reduces their chance of picking infection. The male birds being free, increase their realized niche, by going far in search of food and mate, thus increasing their chances of picking infection. Male chickens and ducks are therefore more exposed to helminthic infections than females.

It is plausible that the higher prevalence/frequency of single infections recorded in this study, which agrees with the observations of Muhairwa *et al.* (2007) and Yousuf *et al.* (2009), could depend on the order of initiation of infection in the hosts, as the first parasite to infect the host may acquire higher micro-habitat and establishment, than the late entrants. Kennedy (1975), argued

that food preference at a particular time may determine the establishment of single or mixed infections and older birds tend to challenge parasites immunologically. The limitation of mixed infections to only a maximum of three helminths per bird indicates that both host species could be less susceptible to mixed infections. Whether nor not these have more significant effects on the health and growth rate of these bird species remains to be investigated.

The study concludes that cestodes are the most common helminths of chickens and ducks in Gombe. Ducks could be potentially resistant to helminthic infections than chickens as observed from the present study, thus, more research on the diseases and management of free range ducks are recommended to promote duck keeping as another source of income and protein to the people of the area.

For the effective control of helminthic infections in the area, proper veterinary attention such as mass de-worming is necessary. The use of anticestodal and antinematodal drugs in free range chickens and ducks could be practiced. Administration of drugs such as piperazine hydrochloride 100% and an ASP bactericidal powder could help ameliorate the problem of heminthiasis in these bird species in the area, as recommended by Matur (2002). Education of poultry farmers on effective farm management practices and integrated control of parasitic diseases needs to be intensified to reduce the infection rate. Frequent sanitary inspection of the dressing units of the Gombe main market is necessary to prevent the contamination of meat with helminth eggs.

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