

Prevalence of Helminth Parasites of Helmeted Guinea fowl (*Numida meleagris galeatus*) in Maiduguri, Northeastern Nigeria

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Abstract: A study was conducted to investigate the prevalence of helminth parasites of Helmeted Guinea fowls slaughtered in Maiduguri Monday market. A total of 100 birds comprising 46 males and 54 females were examined and their gastro – intestinal tracts collected and examined at post-mortem for helminth parasites. An overall prevalence of 88% representing 63% cestode and 25% nematode infection rates were recorded ($P<0.05$). Females had a significantly ($P<0.05$) higher infection rates (79.6%) compared with males (60.9%). Females harboured more helminth parasites compared with the males. Three species each for cestodes and nematodes were isolated and identified. Of these, *Choanotaenia infundibulum* had the highest prevalence (50%) in female birds and *Raillietina echinobothrida* (39.1%) in males followed by *Raillietina tetragona* with 34.8% and 31.5% in male and female birds respectively. While *Heterakis gallinarum* recorded the highest infection rate in both males (13%) and female birds (20.4%). Other nematodes encountered included: *Ascaridia galli* and *Subulura brompti* with infection rates 2.2% and 13% and 13% and 14.8% in male and female birds respectively. These findings indicated that helminthiasis is prevalent in Guinea fowls and this could hinder their production and productivity in Maiduguri. Proper management practices are therefore recommended to remedy helminth infection in these birds.

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1. Introduction

The poultry sector is one of the vital sub-sectors of the livestock sector in Nigeria, providing animal proteins such as meat and egg to man, income and employment opportunities to many peasant farmers as well as revenue provider to the national economy (Nnadi and George, 2010). Nigeria has an estimated poultry population of about 150 million; of which 25% are commercially farmed, 15% semi-commercially and more than 60% in backyard with an asset value of more than 5.75 billion US Dollars (Nnadi and George, 2010).

Guinea fowls, with an estimated population of about 54.7 million is an unimproved avian species commonly found in the Northern Savannah regions of Nigeria; where it is found both in the wild and backyards domesticated for meat and eggs by peasant farmers as well as source of income to small farm holders (Akinwunmi, 1981; Okaeme, 1989; Biu and Etukwudo, 2004). In Nigeria, Guinea fowl ranks

second in the poultry sub-sector and compares favourably with the domestic chicken for meat and egg production with the potential of supplementing the protein deficits in the nutritional status of Nigerians (Ayanda, 1980). However, several disease constraints such as coccidiosis, helminthiasis, bacterial, fungal and viral diseases limits poultry production in Nigeria, resulting in losses due to mortality, morbidity and direct financial losses to poultry farmers (Ikeme, 1970; Calnek *et al.*, 1991; Biu and Etukwudo 2004; Luka and Ndams, 2007). Among these diseases, gastrointestinal helminths particularly cestodes and nematodes rank high.

Biu and Etukwudo (2004) reported a prevalence of 45% for cestode infections among Guinea fowls in Maiduguri, Nigeria; Biu *et al.* (2012), reported an overall prevalence of 90% for nematodes in domesticated Guinea fowls in Maiduguri Metropolis, Nigeria and Ahmed and Sinha, (1993) reported an infection rates of 56% and 16% for cestodes and

nematodes respectively in arid zone of Nigeria. This study is therefore, designed to determine the prevalence of helminth parasites particularly cestodes and nematodes in Guinea fowls in Maiduguri, Northeastern Nigeria.

2. Materials And Method

Study Area: Maiduguri is located in the Sahel Savannah region of Northeastern Nigeria at 11°50' – 11.83° North Latitude and 13°09' – 13.15° East Longitude. It shares border with Niger to the North, Chad to the Northeast and Cameroon to the East. The climate is favourable, with a mean annual rainfall and temperature of about 650mm and 32°C respectively. The months of March and April are the hottest periods of the year with temperatures ranging between 30°C and 40°C. It is usually cold and dry during the harmattan, November to January being the coldest months (<http://en.wikipedia.org/wiki/Maiduguri>).

Sample Collection, Examination And Identification:

A total of 100 Guinea fowls slaughtered at the Maiduguri Monday market were examined at post-mortem for gastrointestinal helminths. Sex of the guinea fowls was determined at the point of slaughter. The intestines of adult Guinea Fowls slaughtered were collected into properly labeled sterile universal bottles and immediately transported to the Parasitology Laboratory of the Department of Veterinary Microbiology and Parasitology, Faculty of Veterinary Medicine, University of Maiduguri for further analysis and examination of the adult worms and their eggs.

In the laboratory, the intestines were dissected using a sterile pair of scissors and the contents scrapped into clean petri dishes using sterile scalpel blade. The adult worms were then collected and fixed in formalin for further processing and examination. The individual intestinal contents were examined using saturated salt solution and sedimentation techniques to identify helminth eggs using the methods described by Soulsby (1982). After the staining procedures, the adult worms were mounted on glass slides using polyvinyl alcohol and examined microscopically. Cestodes were identified using the size and disposition of suckers, testes, ovaries and alimentary canal under the stereoscope microscope as

keys reported by Singh and Srivastava (1977), while nematodes were identified using position of intestines, reproductive organs and teeth under the stereoscope microscope as described by Sloss and Kemp (1978) and Fleck and Moody (1988).

Statistical Analysis: Descriptive statistics was used to determine the proportions and percentages positive for the respective cestodes and nematodes as well as species identified. Student “t” test was used to determine the statistically significant association between the dependent and independent variables. A 5% level of significance was used, with $P < 0.05$ considered statistically significant.

3. Results

The results of this study as shown in **Table 1**, indicated that out of the 100 Guinea fowls examined at post-mortem, 88 representing 88% (88/100) were infected with highest infection rates seen in cestodes 63% (63/100) compared with 25% (25/100) in nematodes ($P < 0.05$). Female Guinea fowls had a higher prevalence of 79.6% (43/54) compared with the males 60.9% (28/46) and this difference in infection rates was statistically significant ($P < 0.05$) in either sex (**Table 2**).

Cestodes identified were *Choanotaenia infundibulum*, *Raillietina tetragona* and *Raillietina echinobothrida* in both sexes (**Table 3**). In males, *R. echinobothrida* had the highest infection rate of 39.1% (18/46) followed by *R. tetragona*, *C. infundibulum* with 34.8% (16/46), 26.1% (12/46) in descending order of infection rates respectively. However, in females *C. infundibulum* had the highest prevalence of 50% (27/54) followed by *R. tetragona*, *R. echinobothrida* with 31.5% (17/54), 25.9% (14/54) in descending order of infection rates respectively (**Table 3**).

Nematodes identified were *Ascaridia galli*, *Heterakis gallinarum* and *Subulura brumpti* in both sexes (**Table 3**). In males, highest infection rates were seen in *H. gallinarum* and *S. brumpti* with 13.0% (6/46) followed by *A. galli* with 2.2% (1/46). While in females, the highest prevalence was seen in *H. gallinarum* with 20.4% (11/54) and *S. brumpti* with 14.8% (8/54) and the lowest seen in *A. galli* with infection rate of 13.0% (7/54) (**Table 3**).

Table 1: Overall Prevalence of Cestodes and Nematodes infection of Guinea Fowls in Maiduguri, Nigeria.

| Helminths | No. Examined | No. Negative | No. Positive | Prevalence (%) |
|--------------|--------------|--------------|--------------|-------------------|
| Cestodes | 100 | 37 | 63 | 63.0 ^a |
| Nematodes | 100 | 75 | 25 | 25.0 ^a |
| Total | 100 | - | 88 | 88.0 |

^aStatistically significant difference ($P < 0.05$)

Table 2: Sex – wise Prevalence of Helminthic Infection of Guinea Fowls in Maiduguri, Nigeria.

| Sex | No. Examined | No. Negative | No. Positive | Prevalence (%) |
|--------|--------------|--------------|--------------|-------------------|
| Male | 46 | 18 | 28 | 60.9 ^a |
| Female | 54 | 11 | 43 | 79.6 ^a |

^aStatistically significant difference ($P < 0.05$)

Table 3: Sex – wise Prevalence of Cestodes and Nematodes infection of Guinea Fowls In Maiduguri, Nigeria.

| Parasites * | Sex | | | |
|--------------------------|--------------|------------------|--------------|------------------|
| | Male | | Female | |
| | No. examined | No. (%) Positive | No. examined | No. (%) Positive |
| Cestode | | | | |
| <i>C. Infundibulum</i> | 46 | 12 (26.1) | 54 | 27 (50.0) |
| <i>R. tetragona</i> | 46 | 16 (34.8) | 54 | 17 (31.5) |
| <i>R. echinobothrida</i> | 46 | 18 (39.1) | 54 | 14 (25.9) |
| Nematode | | | | |
| <i>A. galli</i> | 46 | 1 (2.2) | 54 | 7 (13.0) |
| <i>H. gallinarum</i> | 46 | 6 (13.0) | 54 | 11 (20.4) |
| <i>S. brumpti</i> | 46 | 6 (13.0) | 54 | 8 (14.8) |

*Cestodes: *Choanotaenia infundibulum*, *Raillietina tetragona*, *Raillietina echinobothrida*; Nematodes: *Ascaridia galli*, *Heterakis gallinarum* and *Subulura brumpti*

4. Discussions

This study on the prevalence of helminthic infection among helmeted Guinea fowls in Maiduguri, Northeastern Nigeria reveals that out of the 100 birds examined, 88 (88.0%) were found to harbour intestinal helminths. Previous studies reported that helminthiasis is one of the most prevalent poultry diseases and a major constraint to poultry production in Nigeria; which is responsible for significant economic losses to poultry farmers (Fabiya, 1972). The overall prevalence of 88.0% recorded in this study agrees with previous reports on the prevalence of helminth parasites in chickens. Biu *et al.* (2012) reported a high prevalence of 90% of nematodes among domesticated Guinea fowls in Maiduguri central market; Yoriyo *et al.* (2005) reported a prevalence of 87.0% in free-range chickens in Bauchi; Luka and Ndams (2007) reported 61.9% in Samaru, Zaria; Matur *et al.* (2012) also recorded a high prevalence of 90.2% among chickens slaughtered at the Gwagwalada main market, Abuja. The differences in the prevalence of helminths in these studies could be due to environmental factors, number of chickens sampled, incidence of the infective stages and availability of intermediate hosts in places where these chickens feed and period during which these studies were carried out. The high

prevalence of 88% recorded in this study could also be attributed to the feeding habits of domesticated Guinea fowls feeding on a variety of diets under poor husbandry coupled with the abundance of beetles, cockroaches and earthworms which could serve as intermediate hosts consequently predisposing them to helminthic infections (Luka and Ndams, 2007; Biu *et al.*, 2012).

This study recorded a high prevalence of cestodes compared with the nematode infection (63% vs 25%). This concurs with studies by Ahmed and Sinha (1993), who reported an infection rate of 56% for cestodes compared with 16% for nematodes in arid zone of Nigeria; Oniye *et al.* (2001); Gadzama *et al.* (2005); Yoriyo *et al.* (2005). Among the cestodes, *Raillietina spp.* recorded high in both male and female birds. They are known to be of significant importance (Oniye *et al.*, 2001; Luka and Ndams, 2007), cosmopolitan and contribute to nutrient depletion in birds (Soulsby, 1982). Ants and beetles that serve as intermediate hosts of these helminths are available and abundant in Maiduguri and may constitute an important part of the bird's diets. Therefore, birds might acquire these cestodes through their diets.

This study reveals that more female birds were infected with helminth parasites compared with the

male birds. This is in agreement with previous studies in Nigeria (Biu *et al.*, 2012; Matur *et al.*, 2010). This could be due to the voracious feeding habits of female birds especially during the egg production period, while males largely remain selective in their feeding habits (Sonaiya, 1990).

Six species of helminth parasites comprising *C. infundibulum*, *Raillietina echinobothrida* and *Raillietina tetragona* were identified as cestodes, while *Ascaridia galli*, *Heterakis gallinarum* and *Subulura brompti* as nematodes. *C. infundibulum* and *R. echinobothrida* had the highest prevalence rate among the cestodes. These species had been reported as the common and most important cestodes of poultry (Matur *et al.*, 2010; Biu and Etukwudo, 2004). Among the nematodes, *H. gallinarum* had the highest infection rates in both sexes. This is significant and has been reported by earlier investigations as an outstanding helminth parasite of birds (Biu *et al.*, 2012; Nnadi and George, 2010). It is associated with *Histomonas meleagridis*, the causal agent of black head disease of Guinea fowls (Dunn, 1978; Calnek, *et al.*, 1991; Tibor, 1999; Nnadi and George, 2010), thereby serving as reservoir of infection to other local and exotic domesticated birds in the study area (Biu *et al.*, 2012). Other species that recorded a significant prevalence was *S. brumpti*. The lowest was seen in *A. galli*. This is not in agreement with reports in other parts of the world (Jordan and Pattison, 1996) as well as in other parts of Nigeria: Jos North – central Nigeria (Fabiya, 1972; Pam *et al.*, 2006), Anambra South - eastern Nigeria (Oyeka, 1989) and Zaria North – western Nigeria (Fatiyu *et al.*, 1991; Oniye *et al.*, 2001; Luka and Ndams, 2007). All these findings reported a significantly higher infection rate of *A. galli* in both local and exotic domesticated birds and incriminated helminths as important parasites of birds.

In conclusion, this study as other studies of helminth parasites in Guinea fowls reveals a high prevalence of nematodes and cestodes among the helmeted Guinea fowls population of Maiduguri Metropolis. It is therefore recommended that good management practices focusing on sanitation, proper housing, good nutrition and deworming aimed at improving Guinea fowl farming and production in Maiduguri should be instituted as fowls have the potential of supplementing the protein deficit of Nigerian diets in future.

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