

# Prevalence of Gastrointestinal Parasites of Domestic Turkey (*Meleagris Gallopavo*) Linnaeus, (1758) Slaughtered in Kaduna Metropolis, Kaduna State, Nigeria

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## Abstract

A study on the prevalence of gastrointestinal parasites of domestic turkey (*Meleagris gallopavo*) was carried out in Kaduna metropolis, northern Nigeria. The gastrointestinal tracts of 196 Turkeys comprising 114 males and 82 females were examined for gastrointestinal parasites. The gastrointestinal tracts were collected from five slaughter slabs in Kaduna. Out of the 196 gastrointestinal tracts examined, the overall prevalence of 113 (57.7%) was recorded. The parasite with the highest prevalence was *Ascaridia* spp 51 (26.0%), followed by *Eimeria* 44 (22.45%), *Subulura brumpti* 7(3.6%) *Raillietina cesticillus* 5 (2.6%), *Heterakis gallinarum* 2(1.0%) *Choanotaenia infundibulum*, *Davainea meleagridis*, *Methroliasthes lucida* and *capillaria* spp had the least prevalence of 1(0.5%). Higher prevalence was recorded in males (62.3%) than females (47.6%). Double infection was more common (32.1%) than single infection (22.9%), triple (26.02%), quadruple (13.1%) and pentuple infection had the least (5.1%). Based on the prediction sites, small intestines harboured more parasites. No parasite was recovered in the proventriculus. There was statistically significant difference in prevalence rates between the sexes ( $p < 0.05$ ). Odd ratio (OR=1.8) value greater than one showed association between the prevalence of parasites and sex of the animal. Results of the study suggest that more attention be focused towards the improvement, management and care of domestic turkeys.

**Keywords:** gastrointestinal parasites, domestic turkeys, Kaduna State, Nigeria.

## 1. Introduction

The poultry industry is the largest and the most automated, vertically integrated and intensified of the animal production industries (Grandin & Deesing, 1988). In many countries in the world, poultry has become one of the most popular components of the livestock industry. The domestic turkeys (*Meleagris gallopavo*) are one of the most important and widely distributed game bird species in Northern America, Europe, but in the rest of the world, especially in developing countries, its potential has been overlooked largely because modern turkeys are highly bred for intensive production, thereby rendering the birds inappropriate for home production (NRC, 1991).

Turkeys are large poultry birds, fast gaining popularity among peasant farmers in Nigeria due to their quick turn over rate, higher feed conversion rate and minimum land requirements. The turkeys compliment chicken production. They are said to thrive more in arid conditions, they tolerate heat as compared to chickens. The turkey has higher quality meat with low fat content. Their males are bigger than the female turkeys. Smith (1990) and Oso *et al.* (2008) reported that the carcass of turkeys contains a higher amount of protein than the carcass of chicken. Domestic turkeys are omnivores, feeding on ground dwelling arthropods, molluscs and amphibians, vegetables, nuts, seeds and leaves (Eaton, 1992).

Gastrointestinal parasites constitute a major factor limiting productivity of the poultry industry by affecting the growth rate of the host resulting in malnourishment which could eventually lead to death (Soulsby, 1982; Jordan & Pattison, 1999). Parasites that commonly invade the gastrointestinal tract of the turkeys include protozoans, nematodes, Acanthocephalas, Cestodes and Trematodes (Soulsby, 1982). These parasites when found in the gastrointestinal tract could lead to loss of appetite, emaciation, diarrhea, anaemia, reduced egg production, retarded growth therefore reducing their economic value. A few Ascarids may depress weight while large numbers may block the intestinal tract. *Ascaridia dissimilis* (Turkey roundworm) may also migrate out of the intestine through the portal system into the liver thereby causing hepatic granulomas (Gordon, 1997).

The demand for protein as a vital component of nutrients is very important. Poultry production is the most efficient and economic means of meeting this demand; due to the relative small capital required to start off, the ease of feed availability and the fast maturity of the birds.

Despite the importance of turkey in meeting the demand for protein, effects of parasites on the domestic turkeys is poorly understood especially in Nigeria. Due to the increasing demand of turkey meat by high ranked individuals in Kaduna metropolis, Northern Nigeria and lack of information on the gastrointestinal parasites of the domestic turkeys, the current study was embarked upon to determine the overall and sex specific

prevalence of gastrointestinal tract parasites and predilection sites of the parasites in the tract of turkeys slaughtered in Kaduna metropolis, Northern Nigeria.

## 2. Materials and methods

### 2.1 Study area

The study was conducted in Kaduna metropolis, Kaduna State, Nigeria. Kaduna state is located in north central geopolitical zone covering a land mass area of 45, 567 square kilometres. The climate of the area is tropical continental with an annual rain fall of about 1,270mm. The raining season is from April to October while the dry season is from November to March.

### 2.2 Collection of samples

The study population comprised domestic turkeys slaughtered in five slaughter slabs in Kaduna metropolis. The study was conducted between January and October, 2011. Gastrointestinal tracts of 196 domestic turkeys were collected once every week for ten months. The gastrointestinal tracts were collected in clean sample bottles containing 10% formalin to fix and preserve the parasites. The samples were transported to the Helminthology Laboratory, Department of Veterinary Parasitology and Entomology, Faculty of Veterinary Medicine, Ahmadu Bello University, Zaria, Kaduna State, Nigeria for examination and identification of the parasites.

### 2.3 Processing and Laboratory examination of samples

In the laboratory, the gastrointestinal tracts were separated into different regions: the gizzard, crop, small intestine, large intestine and caecum. Each region was cut open using a dissecting scissors. Intestinal scrapping was done and all adult parasites recovered from the different regions were picked with forceps, washed in saline and identified. The floatation method according to Soulsby, (1982) was used in the examination of the faecal samples for the detection of helminthes and protozoan parasites. The stool preparations were examined under the microscope at X10 and X40 magnification. The helminthes eggs and coccidian oocysts recovered in each sample were counted using the McMaster technique in order to obtain the estimated total number of eggs per gram of each sample. Identification of the parasites was done according to the descriptions of Soulsby, (1982); Ruff, (1984) and Ruprah *et al.* (1986).

### 2.4 Data analysis

The prevalence and mean intensity of the parasites among infected Turkeys were calculated using frequencies and percentages. The Odds ratio was calculated to determine whether there is association between the most infected sex and their predilection sites.

## 3. Results

The prevalence of gastrointestinal parasites of the domestic turkey (*Meleagris gallopavo*) was determined in Kaduna metropolis, Kaduna State, Nigeria. The overall prevalence of the parasitic infection is shown in Table 1. Out of a total of 196 domestic turkeys examined, 113 (57.7%) were infected by Protozoans, Nematode and Cestode parasites. Nematodes had the highest prevalence of 61(31.1%), followed by protozoans 44(22.4%), cestodes had the least prevalence of 8(4.0%).

**TABLE 1: Overall prevalence of gastrointestinal parasites of domestic turkey (*Meleagris gallopavo*) (N= 196)**

Parasites	Number infected	Prevalence(%)
Protozoa	44	22.4
Nematodes	61	31.1
Cestodes	08	4.0
<b>Total</b>	<b>113</b>	<b>57.7</b>

Species specific prevalence is shown in Table 2. The Nematode parasite *Ascaridia* Spp. was the most prevalent parasite recovered 51(26.0%) followed by *Eimeria* spp. 44 (22.4%) the least were *Capillaria*, *Davainea meleagridis* and *Methroliasthes lucida* species were each recovered in .1 (0.5%) of the turkeys. (Table2). On a general note, out of the three parasitic groups encountered in this study, the nematodes were the most prevalent followed by the protozoans and cestode parasites.

**TABLE 2: Species-specific prevalence of gastrointestinal parasites of Domestic turkeys (*Meleagris gallopavo*) (N=196)**

Parasites	Number infected	Percentage (%)
<b>Protozoan</b>		
<i>Eimeria</i> species	44	22.4
<b>Nematodes</b>		
<i>Ascaridia</i> species	51	26.0
<i>Capillaria</i> species	01	0.5
<i>Heterakis gallinarum</i>	02	1.0
<i>Subulura brumpti</i>	07	3.6
<b>Cestodes</b>		
<i>Raillietina cesticillus</i>	05	2.6
<i>Davainea meleagridis</i>	01	0.5
<i>Choanotaenia infundibulum</i>	01	0.5
<i>Methroliasthes lucida</i>	01	0.5
<b>Total</b>	<b>113</b>	<b>57.7</b>

The sex specific prevalence of gastrointestinal parasitic infection revealed higher prevalence in males 71 (62.3%) than female turkeys 39(47.6%). The different parasites showed high predilection for specific sites in the gastrointestinal tract of the turkeys (Table 3). Most of the nematode and protozoan parasites preferred the small intestine while other nematodes and cestodes were found in the oesophagus, large intestine and caecum. No parasite was recovered in the proventriculus (Table 3). The intensity of infection was light with 1-100 eggs/gram of faeces. Coccidian oocysts recovered in the faecal samples i.e , *Eimeria* spp. had a prevalence of 44 (22.4%) (Table 2) .the intensity of infection was light with 1-100 oocysts/ gram of faeces. Mixed infections of two (32.1%), three (26.0 %), four (13.1%) and five (5.1%) parasitic species per turkey were recorded in this study. No Trematode parasite was recovered during the study.

**Table 3: Predilection sites of gastrointestinal parasites of domestic turkeys (*Meleagris gallopavo*) n==196**

Preferred sites	Parasites	Number infected	Species specific prevalence
Oesophagus	<i>Capillaria</i> sp	01	0.51
Small intestine	<i>Raillietina cesticillus</i> .	05	2.6
	<i>Eimeria</i> sp.	44	22.4
	<i>Choanotaenia infundibulum</i>	2	1.0
	<i>Ascaridia</i> spp	51	26.0
	<i>Davainea meleagridis</i>	01	0.5
	<i>Methroliasthes lucida</i>	01	0.5
	Large intestine	<i>Subulura brumpti</i>	7
Caecum	<i>Heterakis gallinarum</i>	2	1.0

#### 4. Discussion

To the best of our knowledge, this is the first report on gastrointestinal parasites of domestic turkeys in the study area. The study revealed high prevalence of gastrointestinal parasites of turkey. The occurrence of parasites in the Turkey is the most damaging infection and source of high economic losses in the industry through meat condemnation and morbidity (Naem and Eskandari, 2005). The high prevalence recorded in this study could be due to the fact that domestic turkeys are natural forages that can be fed with a wide range of diet that predispose them to parasitic infections with many of the foods such as seeds, kitchen wastes exposing them to the intermediate hosts (such as cockroaches, beetles, grasshopper, earthworms e.t.c.) of certain pathogens (Frantovo, 2000). A feature of this study was the complete absence of trematodes in the gastrointestinal tracts of the domestic turkeys. This could be due to the complex life cycle of the trematodes that requires at least an intermediate host which may be in the same habitat with the turkeys. The absence of such habitats helps to break the lifecycle of the trematodes thereby reducing the spread of the worms (Adang *et al.* 2008).

Over the years, turkeys were only raised under semi intensive conditions by only the rich in Nigeria or their personal consumption. Until recently when more individuals could afford raising these birds in their backyards which to a great extent has increased the chances of the turkeys to harbor more gastrointestinal parasites. In addition to that, a considerable amount of human and animal wastes are discharged into the soil daily thereby leading to seeping of the soil with pathogenic organisms, contamination of the soil occurs and eventually infective stages are swallowed by the birds during feeding (Audu *et al.* 2004).

The species specific prevalence of the parasites in this study revealed higher prevalence in males than

female turkeys. This outcome could be due to the fact that female turkeys reduces their feeding range during incubation period and concentrate more on the grains and food remnants being served to them, thereby reducing the chances of acquiring infection. The males on the other hand can go far in search of food, thereby increasing the possibility of picking more parasitic eggs (Adang *et al.* 2008).

The study revealed that the turkeys were parasitized by a variety of helminth parasites especially Nematodes. This could be due to the fact that parasites are said to be more predominant in the tropical countries since the climate and environmental conditions of the area tend to favour the growth of the parasites. Secondly, the management system of the turkey and lifecycle of the parasites determines the variety of the parasites the bird can acquire. Turkeys reared extensively on free range tend to acquire infection with a wide range of parasites having direct life cycle because of their increased exposure to larger areas of land and various intermediate hosts of parasites (Fabiya, 1972)

Nematodes had the highest prevalence as compared to cestodes, with *Ascaris* having a prevalence of 26.0%. This work agrees with earlier findings of Yoriyo *et al.* (2008); Ohaeri & Okwum, (2013) which indicates that nematode parasites are always more prevalent than the cestodes. The nematodes do not require intermediate hosts as the cestodes do and are mostly soil transmitted, their eggs can remain viable for a long time enabling the turkeys to constantly pick up the viable eggs from the droppings that contaminate the environment as they feed and increase parasite burden. (Permin & Hansen, 1998; Ohaeri & Okwum, 2013).

The domestic turkeys raised in backyards are hosts of a greater amount of gastrointestinal parasites this partly explains the low productivity that is common in raising turkeys, which confers greater resilience inherent to the production system to which they belong (Marco-Antonio *et al.* 2014).

Poor sanitary condition and lack of proper hygiene is a major contributing factor to the high prevalence recorded in this study. Most backyard farmers don't bother about keeping their gutters and surrounding clean this exposes the birds to serious infection. Not much have been documented on gastrointestinal parasites of domestic turkeys in Nigeria and Africa the study would therefore serve as a reference point for further studies..

Mixed infections of two or more species of parasites per turkey were common in this study but lower prevalence of mixed infections was recorded as compared to the single infection. This outcome might be attributed to the food preference at a particular time which to a great extent can determine the establishment of mixed or single infection. The ability of two or more parasites to survive within the same host has increased the prevalence of mixed infection but as the number of parasites per host increases, the prevalence decreases due to the inability of the parasites to tolerate one another. (Reid, 1962; Smyth, 1976; Fatihu *et al.* 1991).

Most of the parasites encountered in this study were restricted to the small intestine where prevailing optimum concentration of saline, glucose and other semi digested food and debris abound (Adang *et al.* 2008) the site generally favour absorption of nutrients through the body surface of the parasites. In addition to that, some nematodes like *Subulura brumpti* and *Heterakis gallinarum* were restricted to the large intestine and caecum. This might be attributed to their fairly developed digestive system that gives them greater chances of establishment of a host- parasite relationship. The complete absence of parasites in the proventriculus might be due to the fact that the physiological medium in the site do not favour the existence of parasites as compared to the small intestine.

## 5. Conclusions

This study revealed the presence of protozoans, nematodes and cestode parasites in the domestic turkeys slaughtered in Kaduna metropolis. The domestic turkeys raised are hosts of a greater amount of gastrointestinal parasites which is attributed to the production system to which they belong. Therefore, Turkeys raised in free range condition of breeding should have a boundary and food served to them to reduce their search for food which exposes them to intermediate hosts of parasites. predilection sites are the small intestine, large intestine and caecum. Mixed infections were recorded but as the number of parasites per host increases, the prevalence decreases.

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