

ISSN 1682-8356  
ansinet.org/ijps



INTERNATIONAL JOURNAL OF  
**POULTRY SCIENCE**

**ANSI***net*

308 Lasani Town, Sargodha Road, Faisalabad - Pakistan  
Mob: +92 300 3008585, Fax: +92 41 8815544  
E-mail: editorijps@gmail.com

## Survey of Helminth Parasites of Free Range Muscovy Ducks (*Anas platyrhynchos*) Slaughtered in Gombe, North Eastern Nigeria

B.T. Paul<sup>1</sup>, J.R. Lawal<sup>2</sup>, E.F. Ejeh<sup>3</sup>, J.J. Ndahi<sup>1</sup>, I.D. Peter<sup>4</sup>, A.M. Bello<sup>2</sup> and Y. Waki<sup>2</sup>

<sup>1</sup>Veterinary Teaching Hospital University of Maiduguri, Borno State, Nigeria

<sup>2</sup>Department of Veterinary Medicine, University of Maiduguri, Borno State, Nigeria

<sup>3</sup>Department of Veterinary Microbiology and Parasitology, University of Maiduguri, Borno State, Nigeria

<sup>4</sup>Department of Veterinary Surgery and Theriogenology, University of Maiduguri, Borno State, Nigeria

**Abstract:** This study was conducted to investigate the prevalence of helminths of Muscovy ducks slaughtered at six poultry dressing slabs (N = 600) within Gombe metropolis by postmortem and parasitological examination of gastrointestinal tracts and trachea. A total of eight Nematode species were identified in this present study with an overall prevalence of 98.2%. Two nematode species recovered from the intestine were *Ascaridia galli* 514 (85.67%) and *Trichostrongylus tenus* 18 (3.00%). *Heterakis gallinarum* 477 (79.50%), *Subulura brumpti* 242 (40.33%), *Capillaria contorta* 221 (36.83%) and *Capillaria annulata* 131 (21.83%) were recovered from the caecum while *Tetrameres fissipina* 5 (0.83%) was recovered from the gizzard and *Syngamus trachea* 4 (0.67%) was recovered from trachea. The prevalence of single infection with nematode species (67.2%) and was higher than mixed infection (32.8%). A total of three 3 Cestode species were recovered from the small intestine with an overall prevalence of 20.3%. Cestode species identified include *Raillietina echinobothrida* 62 (10.33%), *Raillietina tetragona* 50 (8.33%) and *Hymenolepis cantaniana* 10 (1.67%). The prevalence of mixed infection (17.0%) with cestodes was higher than single infection (3.3%). This study revealed that the prevalence and species distribution of nematodes was higher than cestodes in the study area. This study provides baseline data on prevalence and species distribution of helminths of Muscovy ducks in Gombe. There is therefore the need for further studies on epidemiology and economic significance of helminths of Muscovy ducks under the traditional free range management system.

**Key words:** Helminth, parasite, duck, Gombe, Nigeria

### INTRODUCTION

Poultry include all species of domestic birds used for meat and egg production (Al-Nasser *et al.*, 2007). These include chicken, ducks, turkey, guinea fowl, goose, quail, pheasant and peafowl (Al-Nasser *et al.*, 2007; Adejinmi and Oke, 2011). Domestic duck (*Anas platyrhynchos*) is a very important species of poultry bird kept in most parts of the world (Ikani, 2003; Muhairwa *et al.*, 2007; Farjana *et al.*, 2008; Pingel and Germany, 2011; Adejinmi and Oke, 2011; Adang *et al.*, 2014). Muscovy duck is the most popular variety in Nigeria due to its morphological, meat and egg attributes which makes it the ideal water fowl for Nigerian poultry farmers (Yakubu, 2013). The economic importance of duck is mainly related to food security and varies considerably in different parts of the world (Adejinmi and Oke, 2011; Pingel and Germany, 2011). Although duck meat production is negligible on a global scale in Africa (Pingel and Germany, 2011), it significantly contribute to the economy and household food security of rural localities in this region (Adejinmi and Oke, 2011; Yakubu, 2013). They have also been recognized as biological agents used in the control of snails in

Fasciolosis control program (Soulsby, 1982) and also used in the control of arthropods of veterinary importance such as ticks (Jonsson, 2004).

Ducks are susceptible to a wide variety of disease caused by bacteria, viruses, protozoa, spirochaetes and helminths (Abdu, 2014). They are highly susceptible to gastrointestinal helminth parasites due to their habitation of wet environments and scavenging habits, which like chicken, feed on a range of substrates such as grains, fruits, insects, crustaceans, small amphibians and garbage (Mantur *et al.*, 2010). A number of these arthropods have been identified as intermediate hosts of helminth parasites of poultry (Shah-Fischer and Say, 1989). The main groups of gastrointestinal helminths of domestic ducks include *Cestodes*, *Trematodes* and *Nematodes* (Shah-Fischer and Say, 1989). Nematodes have been recognized as the most important group both in terms of number and pathogenicity (Mantur *et al.*, 2010). Their main pathogenic effects being lowered productivity in terms of weight gain, morbidity and mortality (Ikani, 2003). The main genera of importance include *Syngamus*, *Capillaria*, *Tetrameres*, *Amidostomum* and *Trichostrongylus*

(Soulsby, 1982). Local poultry production in Nigeria is constrained by a number of extrinsic factors, prominent among which is disease of parasitic origin (Adejinmi and Oke, 2011), especially helminthosis (Ajayi and Ajayi, 1983).

The prevalence and importance of helminthosis in ducks has been highlighted by several authors working in different parts of the world (Muhairwa *et al.*, 2007; Adang *et al.*, 2014). Several reports are available on the prevalence and importance of gastrointestinal helminths of domestic chicken in Gombe. However, there is paucity of information on helminths infestation in domestic ducks. Therefore, a survey to identify the various species of helminths of domestic ducks occurring in Gombe is necessary. This study was therefore conducted to investigate the prevalence and regional distribution of helminths of domestic ducks in Gombe metropolis.

## MATERIALS AND METHODS

**Study area:** This study was conducted in Gombe metropolis, the capital city of Gombe State, Northeastern Nigeria (Fig. 1), situated between latitude 9° 30' and 12° 3' N and longitude 8° 45' and 11° 45' E (Anonymous, 2007). The state has an estimated population of 2.4 million people based on the 2006 population census (NPC, 2006). Gombe is characterized by a mean annual rainfall of 818.5 mm, with a mean maximum temperature of 37°C and a mean minimum temperature of 12°C. The hottest months are March-May (40°C) and the coldest period is from December to February (harmattan).

**Study population:** The ducks used for this study were adult domestic Muscovy ducks of both sexes slaughtered for human consumption at poultry dressing slabs in Gombe metropolis. These ducks were mainly sourced from local village markets within Gombe state and environs.

**Study design:** A cross sectional study was conducted to investigate the prevalence of helminth parasites of local ducks at poultry dressing slabs located within Gombe Metropolis from January to December, 2013. A total of 600 gastrointestinal tracts and trachea of ducks were randomly collected during the study period. 100 gastrointestinal tracts and trachea were collected from each study site, which includes Gombe main market, Pantami market, Dukku park market, Shongo park market, Riyald/Bagadaza market and Tudun wada market, respectively.

**Postmortem examination:** A postmortem examination was performed according to Fowler (1996). After decapitation, the trachea and gastrointestinal tract of each duck were collected in labeled specimen bottles containing 10% formalin as a preservative.

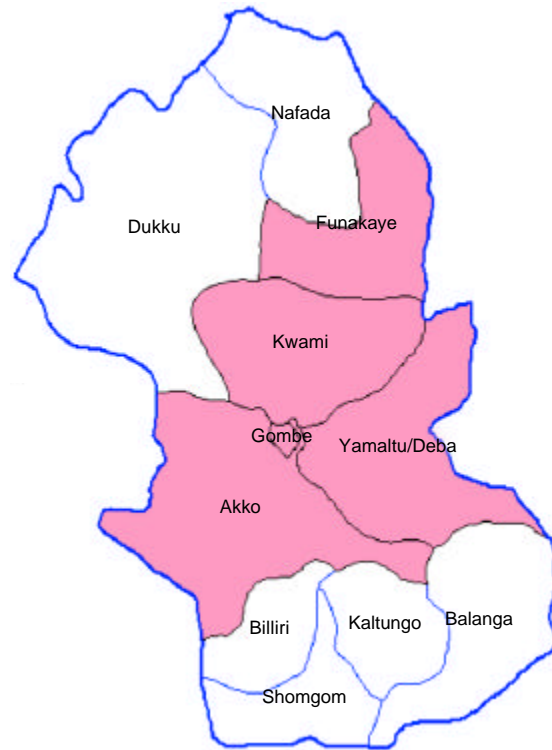


Fig. 1: Map of Gombe state showing study areas

**Parasitological examination:** All samples were examined at the microbiology and entomology diagnostic laboratory, National Veterinary Research Institute (NVRI), Vom, Plateau State, Nigeria. Each gastrointestinal tract was spread out on a dissecting board and separated into various segments (esophagus, crop, proventriculus, gizzard, small intestine and caecum). For regional recovery and identification of helminth parasites, each segment was dissected with a scalpel blade to expose the lumen and the mucosa was scraped into a petridish containing physiological saline solution and examined under a stereo microscope for the presence of adult worms. Similarly, the trachea was longitudinally dissected to expose the epithelium which was carefully examined and adult worms were extracted with the aid of needle. The mucosal scrapings were wet-mounted in glycerin-ethanol and examined under optical microscope at low magnifications of 10 and 40x. Species identification was based on key morphological features described by Soulsby (1982) and Hansen and Perry (1994).

**Data analysis:** All data generated were compiled and managed in Microsoft excel 2007 spreadsheet and presented in tables using descriptive statistics. Prevalence was estimated as  $p = d/n$  (%); where  $p$  = prevalence,  $d$  = number of individuals having disease at

a particular point in time and n = number of individuals in the population at risk at that point in time (Thrusfield, 1995).

**RESULTS**

In this study, a total of 600 ducks were examined for gastrointestinal helminths in Gombe State, Northeastern Nigeria. 589 (98.2%) harbored adult Nematodes. Mixed infection with adult nematodes was observed in 193 (32.2%), while single infection with adult nematodes was observed in 396 (66.0%) of the total ducks sampled. 100% of the total number (n = 100) in Gombe main market, Pantami market, Dukku park market and Tudun wada market were positive for adult nematodes (Table 1).

A total of seven species of adult nematodes were recovered from various regions of the gastrointestinal tract and one species was recovered from the trachea of slaughtered ducks sampled in Gombe metropolis. 514 (85.6%) *Ascaridia galli*, 18 (3.0%) *Trichostrongylus tenus* were recovered from the small intestine. Other species of adult nematodes were recovered from the caecum, with *Heterakis gallinarum* ranking highest (79.5%), while *Capillaria annulata* ranked lowest (21.8%). *Syngamus trachea* was only recovered from the trachea of 4 (0.7%) ducks while *Tetrameres fissipina* was recovered from the gizzard of 5 (0.8%) ducks in markets located in Gombe metropolis (Table 2).

An overall prevalence of 20.3% was recorded for adult Cestodes in the current study. Mixed infection with adult cestodes was observed in 102 (17.0%), while single infection was observed in 20 (3.3%) ducks in the study (Table 3).

A total of three species of adult Cestodes were recovered from the small intestine of 122 (20.3%) slaughtered ducks in Gombe metropolis. *Raillietina echinobothrida* ranked highest (10.33%) while

*Hymenolepis cantaniana* was observed among 10 (1.67%) of ducks sampled in the study (Table 4).

**DISCUSSION**

The overall prevalence of 92.8% recorded in the present study agrees with Farjana *et al.* (2008) who reported an overall prevalence of 96.6% and Adejinmi and Oke (2011), who reported an overall prevalence of 95.4%. This high prevalence may be associated with the free range system of management under which village ducks are kept as well as the amphibious habits of ducks which exposes them to greater risk of parasitism (Shah-Fischer and Say, 1989). The finding is however not in agreement with Adang *et al.* (2014) who reported 4.7% prevalence in the same area. This discrepancy may be due to difference in the source of ducks used in the two studies. The ducks in this study were mainly sourced from villages within Gombe state and environs. Moreover, local and seasonal differences in prevalence of helminthosis has been observed and frequently linked to the influence of season on survival and transmission of infective stages (Soulsby, 1982).

The present study recovered eight species of nematodes and three species of cestodes, with significantly higher prevalence of nematode infections than cestodes this agree with the study by Adang *et al.* (2014) who recovered 7 species of helminths from docks, comprising of 6 cestodes and 1 nematode and different from the study by Farjana *et al.* (2014) who recovered 17 species comprising of 11 trematodes, 4 cestodes and 2 nematodes. Muhairwa *et al.* (2007) also recovered more helminths species (14 species of helminths) comprising of 12 nematodes and 2 cestodes. All seven species were previously reported but this is the first time that gizzard worm, *Tetrameres fissipina* is being reported in Gombe state.

Table 1: Prevalence of nematode infection in muscovy ducks slaughtered at different markets in Gombe metropolis

| Location               | No. examined | No. (%) infected | No. (%) Single infection | No. (%) mixed infection |
|------------------------|--------------|------------------|--------------------------|-------------------------|
| Gombe main market      | 100          | 100 (100)        | 54 (54.0)                | 46 (46.0)               |
| Pantami market         | 100          | 100 (100)        | 62 (62.0)                | 38 (38.0)               |
| Dukku park market      | 100          | 100 (100)        | 76 (76.0)                | 24 (24.0)               |
| Shongo park market     | 100          | 93 (93)          | 62 (62.0)                | 31 (31.0)               |
| Riyald/Bagadaza market | 100          | 96 (96)          | 68 (68.0)                | 28 (28.0)               |
| Tudun wada market      | 100          | 100 (100)        | 74 (74.0)                | 26 (26.0)               |
| Overall                | 600          | 589 (98.2)       | 396 (66.0)               | 193 (32.2)              |

Table 2: Prevalence and regional distribution of nematode species recovered from muscovy ducks in Gombe metropolis

| Nematode species              | Recovery site   | Locations     |              |               |               |               |               | Overall prevalence |
|-------------------------------|-----------------|---------------|--------------|---------------|---------------|---------------|---------------|--------------------|
|                               |                 | GMM (n = 100) | PM (n = 100) | DPM (n = 100) | SPM (n = 100) | RBM (n = 100) | TWM (n = 100) |                    |
| <i>Ascaridia galli</i>        | Small intestine | 88            | 85           | 83            | 82            | 87            | 89            | 514 (85.67)        |
| <i>Herterakis gallinarum</i>  | Caecum          | 81            | 83           | 72            | 79            | 83            | 79            | 477 (79.50)        |
| <i>Capillaria contorta</i>    | Caecum          | 34            | 42           | 37            | 35            | 39            | 34            | 221(36.83)         |
| <i>Capillaria annulata</i>    | Caecum          | 23            | 21           | 18            | 21            | 23            | 25            | 131 (21.83)        |
| <i>Syngamus trachea</i>       | Trachea         | 1             | 0            | 0             | 1             | 0             | 2             | 4 (0.67)           |
| <i>Subulura brumpti</i>       | Caecum          | 42            | 37           | 31            | 40            | 45            | 47            | 242 (40.33)        |
| <i>Tetrameres fissipina</i>   | Gizzard         | 3             | 0            | 1             | 0             | 0             | 1             | 5 (0.83)           |
| <i>Trichostrongylus tenus</i> | Small intestine | 5             | 0            | 3             | 0             | 3             | 7             | 18 (3.00)          |

Table 3: Prevalence of cestode infection in muscovy ducks slaughtered at different markets in Gombe metropolis

| Location               | No. examined | No. (%) infected | Single infection | Mixed infection |
|------------------------|--------------|------------------|------------------|-----------------|
| Gombe main market      | 100          | 14 (14)          | 2 (2.0)          | 12 (12.0)       |
| Pantami market         | 100          | 19 (19)          | 5 (5.0)          | 14 (14.0)       |
| Dukku park market      | 100          | 31 (31)          | 5 (5.0)          | 26 (26.0)       |
| Shongo park market     | 100          | 18 (18)          | 2 (2.0)          | 16 (16.0)       |
| Riyald/Bagadaza market | 100          | 18 (18)          | 3 (3.0)          | 15 (15.0)       |
| Tudun wada market      | 100          | 22 (22)          | 3 (3.0)          | 19 (19.0)       |
| Overall total          | 600          | 122 (20.3)       | 20 (3.3)         | 102 (17.0)      |

Table 4: Prevalence and regional distribution of cestode species recovered from muscovy ducks in Gombe metropolis

| Cestode species                   | Recovery site   | Locations        |                 |                  |                  |                  |                  | Overall prevalence |
|-----------------------------------|-----------------|------------------|-----------------|------------------|------------------|------------------|------------------|--------------------|
|                                   |                 | GMM<br>(n = 100) | PM<br>(n = 100) | DPM<br>(n = 100) | SPM<br>(n = 100) | RBM<br>(n = 100) | TWM<br>(n = 100) |                    |
| <i>Raillietina echinobothrida</i> | Small intestine | 5                | 10              | 15               | 10               | 9                | 13               | 62 (10.33)         |
| <i>Raillietina tetragona</i>      | Small intestine | 7                | 9               | 11               | 6                | 9                | 8                | 50 (8.33)          |
| <i>Hymenolepis cantianiana</i>    | Small intestine | 2                | 0               | 5                | 2                | 0                | 1                | 10 (1.67)          |

The low prevalence of cestode infections observed in this study may be related with composition of the study population which consists mainly of adult ducks. It has been established that the prevalence of cestodes is higher in ducklings than adult ducks (Muhairwa *et al.*, 2007).

The most prevalent species of nematodes identified in this study was *Ascaridia galli* (85.6%), followed by *Heterakis gallinarum* (79.50%), *Subulura brumpti* (40.33%), *Capillaria contorta* (36.83%) and *Capillaria annulata* (21.83%). This finding agrees with Adejinmi and Oke (2011) who observed similar trend in Southwestern Nigeria. *Raillietina echinobothrida* (10.33) was the most frequently encountered cestode species in this study followed by *Raillietina tetragona* (8.33%) and *Hymenolepis cantianiana* (1.67%).

The helminths encountered in this study are common parasites of domestic chickens (Muhairwa, 2007; Mantur *et al.*, 2010; Abdu, 2014). This finding may be due to the practice of rearing chickens and ducks as mixed flock in most rural settings of Northern Nigeria (Yakubu, 2013). This practice allows them to share the same food, water and habitation which allow sharing of parasitic infections (Adejinmi and Oke, 2011). Most importantly their scavenging and amphibious habits expose them to high risk of parasitic infections (Shah-Fischer and Say, 1989; Mantur *et al.*, 2010).

Although majority of ducks (67.2%) carried single nematode species, mixed infections with two or more species were also encountered (32.8%). Conversely, majority of ducks (83.6%) carried mixed infection with adult cestodes with fewer single infections observed (16.4%). A mixed infection with two or more species of helminths in ducks was previously reported by Adejinmi and Oke (2011).

**Conclusions:** The present study demonstrates a high prevalence of helminths in village ducks slaughtered for

human consumption in Gombe metropolis. The study also reveals that single nematode infection dominates mixed infection, while mixed cestode infection dominates single infection. In this study we report for the first time, the occurrence of *Tetrameres fissipina* in ducks from Gombe state.

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