



## Prevalence of Trypanosome and Microfilaria Parasites in Slaughtered Chicken in Jalingo Chicken Market, Taraba state North East Nigeria

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### Key words:

Trypanosome, Microfilaria,  
Chicken market,  
Prevalence, Northeast,  
Nigeria

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### ABSTRACT

Blood parasites of avian host are common among different avian species. However they regularly does not result to noticeable consequences to the health of the avian host, though, their occurrence or absence with their prevalence across the populations of avian host could possibly carry significant information about their health, and body condition with the bird individual viability or in a populaces. Prevalence study of trypanosome and microfilaria parasites was carried out in chickens slaughtered in Jalingo chicken market between the months of Jan 2017 to Dec 2017. A total of 2,838 blood samples were collected from slaughtered chickens (village chickens, broilers, cockerels and spent layers). Direct wet mounts and Giemsa-stained thin blood smears were prepared from each sample and screened for trypanosome and microfilaria parasites microscopically using the  $\times 40$  and  $\times 100$  (oil immersion) objectives respectively. Our results revealed that out of the total 2,838 blood samples collected, 86 (3.0 %) were positive for trypanosome only, 61 (2.1 %) of the samples were positive for filarial and 34 (1.2 %) were positive for both trypanosome and filarial. It could be concluded that, there was a low prevalence of both the trypanosome and microfilaria infection among the slaughtered chickens in Jalingo chicken market. Workable approaches of trypanosome and microfilaria parasites treatment and also control is essential so as to reduce or totally eradicate the infection among chickens in the study area.

### 1. INTRODUCTION

Protozoa of the genus *Trypanosoma* infect wide range of birds all over the globe (Apanius, 1991) comparable to other animals; avian species are vulnerable to diversity of infections. Information regarding the avian category, the anatomical structure of the birds and their management condition will assist in understanding the nature and types of infection different avian types are vulnerable to, since certain categories of avian species are kept for productions of egg and some are for meat production,

for example commercial poultry farming system (Shivaprasad, 1998; Nnadi and George, 2010). Contagious infections can spread speedily between birds kept in restricted housing. Birds could be kept in smaller numbers as backyard chicken (Ramlah and Shukor, 1987; Shivaprasad, 1998). Habitually birds kept in such settings are more frequently unprotected to natural elements and are mostly unvaccinated with poor nutrition and they lack biosecurity which usually result to recurrent parasitic, bacterial, viral, and some time nutritional syndromes (Shivaprasad, 1998)

.Avian *Trypanosoma* (*Trypanosomatidae*) are blood parasites that are prevalent in birds all over the globe (Bishop and Bennett, 1992). Avian trypanosomes are transmitted through widespread diversity of blood-sucking arthropods which belong to the family Culicidae, Ceratopogonidae, Simuliidae, Dermanyssidae and Hippoboscidae, (Baker, 1976; Molyneux, 1977; Miltgen and Landau., 1982; Votýpka et al., 2004). Similar strains and family of trypanosomes can effectively mature in several species of different avian hosts which belongs to dissimilar families and even orders (Bennett, 1961; Sehgal et al., 2001). Despite the extensive study in over 12 decades, the classification of avian trypanosomes has been amazingly poorly developed (Valkiunas et al., 2011). Over 100 species of avian *Trypanosoma* have been defined, largely based on morphological features of hematozoic trypomastigotes, for example the blood circulation forms (Baker, 1976; Bennett et al., 1994b). Several *Trypanosoma* species were inadequately demonstrated and designated in earlier studies which make it challenging and even difficult to utilize most of early descriptions for species documentation and morphological evaluation. Most of species designations of avian trypanosomes are temporary and undefined application (Valkiunas et al., 2011). Filarioid nematodes comprises of species which causes filariasis in human being, alongside with a variety of additional species which infects bird as the definite hosts, and insects which are as vector and intermediary hosts (Bartlett, 2008). Filarioid nematodes (adult) are extremely challenging to be detected and recognized, the identifications of microfilaria to the level of specie is difficult as a result of their morphological features (Bartlett, 2008). Numerous researches have explored microfilaria nematode occurrence in both the wild and domesticated birds. These researchers have reported prevalence of 20% and below (Greiner et al., 1975; Bennett et al., 1991.; Dusek and Forrester, 2002; Sehgal et al., 2005; Akinpelu, 2008; Rodriguez and Matta, 2001; Hauptmanova et al., 2004; Benedikt et al., 2009). Most of these works were carried out through screening the blood of these birds. Also some researchers have reported microfilaria nematodes; in enter peripheral blood at night which later assembles in deep circulation at the day time mainly in the lungs where the blood flow rate is slow (Robinson, 1955; Holmstad et al., 2003). The study of trypanosome and microfilaria in chicken in this region of the country is lacking or limited. Nevertheless, there is paucity of information on the current prevalence of microfilaria

and trypanosome parasites in Taraba State. Hence, a study was conducted to determine the prevalence of trypanosome and microfilaria parasites in slaughtered chickens in Jalingo chicken market, Taraba state in the Northeastern Nigeria.

## 2. MATERIAL AND METHODS

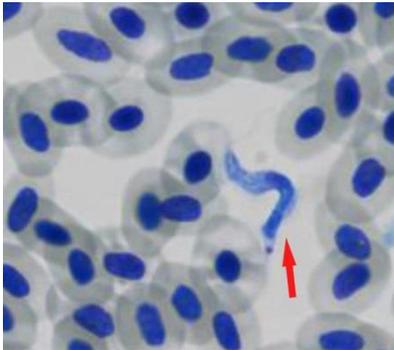
### 2.1. Study area

Jalingo is a city in Northern Nigeria. It is the capital city of Taraba State and has an estimated population of 118,000 persons. Jalingo lies in the savanna-covered foothills of the shebshi Mountain about 25 miles (40km) southeast of the Benue River. Jalingo is positioned at 8°54'N and 11°20'E. Two main seasons are experienced yearly in Jalingo: the wet and the dry seasons. The annual average rainfall is 100mm, with peak temperature of 41°C between February and March the lowest temperature of about 20°C as seen between December and January. Jalingo is a market town which has a government dairy farm and many private's poultry farms, and is connected by road with Yola and Wukari. The major occupation of the people of Jalingo and Taraba state at large is crop farming and livestock production. Backyard poultry is the main practice of the people in Jalingo and Taraba state at large (NBS, 2016).

### 2.2. Collection of blood samples and microscopy detection

A total of 2,838 blood samples were collected from slaughtered chickens (Village chicken (1,155), broilers (792), cockerels (331) and spent layers (560)) in Jalingo chicken market from January 2017 to December 2017. The blood samples were collected in Ethylenediaminetetraacetic acid (EDTA) tubes. The blood samples were transported on ice packed to the biological sciences laboratory College of Agriculture Jalingo, Taraba state for parasitological detection using light microscopy. Direct wet mount and Giemsa-stained thin blood smears were prepared from each sample and screened for trypanosome and microfilaria parasites microscopically using the ×40 and ×100 (oil immersion)(Fig.1 & Fig.2) objectives respectively. Blood sample found to be positive through direct wet mount where confirm by thin blood smear and picture of the parasite was taken and recorded. A minimum of 10,000 red blood cells (and corresponding microscopic fields) were screened for each slide to determine the presence of trypanosome and microfilaria for the thin blood smear.

**3.3. Analysis of data** Analysis of data was done using t-test for the prevalence of trypanosome and microfilaria parasites detected in this study.



**Fig 1.** Giemsa stained blood smear from the chicken blood (*Gallus gallus domesticus*) with red arrow showing trypanosome parasites. Primary magnification 1000×.



**Fig 2.** Giemsa stained blood smear from the chicken blood (*Gallus gallus domesticus*) with red arrow showing microfilaria parasites. Primary magnification 1000×.

**3. RESULT**

Our result revealed that out of the total 2,838 blood sample collected from chickens (Table 1.), 86 (3.0 %) were positive for trypanosome only, 61 (2.1 %) of the samples were positive for microfilaria and 34 (1.2 %) were positive for both trypanosome and microfilaria. Out of the total 1,155 village chicken sample collected 605 were males and 550 were females and out of the 605 male chickens 27 (4.5 %) were positive for trypanosome only, 19 (3.1 %) were positive for microfilaria only and 10 (1.7 %) were positive for double infection with trypanosome and microfilaria. For the female village chicken, out of the total 550

sample collected 30 (5.5 %) were positive for trypanosome only, 21 (3.8 %) were positive for microfilaria only and 11 (2.0 %) were positive for double infection with trypanosome and microfilaria. From the total 331 samples from cockerels, 10 (3.0 %) were positive for trypanosome only, 6 (1.8 %) were positive for microfilaria only and 4 (1.2 %) were positive for double infection with trypanosome and microfilaria. Also from the total 560 samples from spent layers 19 (3.4 %) were positive for trypanosome only, 15 (2.7 %) were positive for microfilaria only and 9 (1.6 %) were positive for double infection with trypanosome and microfilaria.

**Table 1.** Prevalence of trypanosome and filarial parasite obtained from blood sample collected from slaughtered chickens in Jalingo chicken market

Poultry	No		Trypanosome	Prevalence in %	Filarial	Prevalence in %	Trypanosome/Filarial	Prevalence in %	Total no infected	Total Prevalence in %
Village chicken	605	Male	27	4.5	19	3.1	10	1.7	56	9.3
	550	Female	30	5.5	21	3.8	11	2.0	62	11.3
<b>Sub-total</b>	<b>1155</b>		<b>57</b>	<b>4.9</b>	<b>40</b>	<b>3.5</b>	<b>21</b>	<b>1.8</b>	<b>118</b>	<b>10.2</b>
Broiler	475	Male	00	00	00	00	00	00	00	00
	317	Female	00	00	00	00	00	00	00	00
<b>Sub-total</b>	<b>792</b>		<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>
Cockerel	331	Male	10	3.0	6	1.8	4	1.2	20	6.0
Spent layers	560	Female	19	3.4	15	2.7	9	1.6	43	7.7

Sub-total	891		29	3.3	21	2.4	13	1.5	63	7.1
Total	2838	Overall Total	86	3.0	61	2.1	34	1.2	181	6.4

**4. DISCUSSION.**

The main goal of this study was to determine the prevalence of trypanosome and microfilaria parasites in the slaughtered chickens in Jalingo chicken market Jalingo, Taraba state, Northeastern Nigeria. The presence of trypanosome in chickens slaughtered in Jalingo chicken market is still in order as many studies have shown the presence of trypanosomes parasites in avian species (Sehgal et al., 2001; Votýpka et al., 2002; Votýpka et al., 2004; Valkiunas et al., 2011; Voty’pka et al., 2012; Hamer et al., 2013; Svobodová et al., 2017), Our result for trypanosome is similar to those of Kirkpatrick and Smith (1988) who reported a prevalence of 2.0 % in African (Cameroon) birds. But this was contrary to those of Sehgal et al. (2001) who revealed a prevalence of 35 % in African bird and Apanius (1991) who also detected 70% trypanosome in wild birds which is much higher as compare to the prevalence obtained in this study. This could be as a result of the environmental factor or other factors in those areas that may leads to the breeding of more insect vectors that are responsible for trypanosome transmission, it could also be as a result of the nature of birds they sampled, because in their work all the sampled birds were wild birds which have higher chances to contact the infection because of their exposure to the vectors responsible for trypanosome infection transmission, as in our work the chicken population sampled are less exposed to the insect vectors because they are been provided with housing and in some cases are treated with some drugs which could eliminate the infection or protect the chickens from the infection thereby resulting in lower level of the disease prevalence. Also studies have shown the presence of microfilaria parasites in avian species (Bartlett and Anderson, 1985; Bartlett, 2008; Merkel, 2008; Hamer et al., 2013), The incidence results of microfilaria (2.1 %) in this study is similar to the one obtained by Hamer et al. (2013), who reported a 1.5 % prevalence in the robins birds, even though our study shows a little higher prevalence which could also be as a result of the geographical setting, also the population of birds sampled in this study is larger which may give more detail of the actual prevalence of the infection as compare to when a smaller population of birds is sampled.

The detection of trypanosome and microfilaria in slaughtered chickens in Jalingo chicken market is in confirmation of the existence of these parasites in the avian species. Also many researchers have reported prevalence of trypanosome of up to 70.0% (Kirkpatrick and Suthers, 1987; Apanius, 1991; Bennett et al., 1994a; Sehgal et al., 2001) and microfilaria of up to 20 % (Greiner et al., 1975; Bennett et al., 1991.; Dusek and Forrester, 2002; Sehgal et al., 2005; Akinpelu, 2008; Rodriguez and Matta, 2001; Hauptmanova et al., 2004; Benedikt et al., 2009) which shows that these parasites may pose a danger to the bird population because of the high prevalence of the infection recorded. Also most of these researchers screened blood smears to check the presence of trypanosome and microfilaria using blood sampled during the day time similarly to our study. No less than ninety six different species of trypanosome have been known to infect birds (Bennett et al., 1982). Though, the legality of several of these species is still uncertain, since most of them were described based on the hypothesis that each trypanosome species is specific to a host (Bennett et al., 1994a). Experimentally it has been revealed that a single avian trypanosome specie can be transmitted to a diversity of bird host (Bennett, 1961; Woo and Bartlett, 1982), therefore disproving the host species specificity theory. Different species of microfilaria exist; filarioid nematodes include species that are the causative agents of filariasis in humans, along with a diversity of other species that infect birds as the definitive hosts, and arthropods as intermediate hosts and vectors (Bartlett, 2008).

Our result shows that the rate of infection both for trypanosome as a single infection and microfilaria as a single infection and even the double infection were higher in the female chickens as compare to the male chickens, this could be that the female chicken which stay longer for breeding, thereby having a higher chance of contracting the infection as they have a higher level of contact with the vectors as compare to the male chickens which mostly grow faster and bigger and are slaughter for meat within a year. The trend of what was seen in the local chicken was also seen in the cockerel and spent layers, the results showed that the prevalence of these parasites were higher in the spent layers as compare to the cockerel, spent layers stay

longer as compare to the cockerel because of egg production while the cockerel are mostly kept for meat within three to six months and the chances of the cockerel contracting these parasites which are transmitted by insect vectors (Svobodová et al., 2017) is less as compare to spent layers which stay longer for egg production which prompt them to be expose to insect vectors thereby contracting the disease. Generally the prevalence of both the parasites in this study was seen to be higher in village chickens as compare to the spent layers and cockerels, this is possible as village chicken stay longer due to their slow growth and maturity rate as compare to the spent layers and cockerels, also the village chickens are scavengers and are mostly provided with housing in the night and therefore are more exposed to the vectors responsible for the transmission of these parasites. Also the prevalence of trypanosome is higher as compare to that of filarial; this could be that trypanosome parasites are more prevalent in this region as a result of the thicker forest in this part of the region thereby harboring the insect vector of trypanosome as compare to that of filaria. There is no prevalence recorded in the broiler chickens which can be attributed to the short life span (< 9 weeks) lived by these species of birds, which prevents the full developmental cycle of the parasites to occur in the broilers before they are slaughtered. Although blood parasite infections in chicken and in general parasitic diseases decrease host capability to a certain level (Merino et al., 2000), they tend to display moderately less pathogenicity (as shown when there is high occurrence of chronic infections in seemingly healthy animal host). Our results also revealed double infection with trypanosome and microfilaria; this also shows that these birds can harbor more than one of these parasites at a time. The presence or absence of parasitic infection and also their prevalence across host populations could possibly carry significant evidence regarding the host health, stress and general body conditions (Paperna et al., 2016). Consequently, continuing monitoring of their epidemiology may help to monitor the possible deviations in population capability conditions (Paperna et al., 2016). Our data, combined with evidence from other studies, proves that a substantial proportion of birds raised in Jalingo are infected with trypanosome and microfilaria.

In conclusion, this study documents the first report of trypanosomes and microfilariae affecting chickens in Taraba state, North east Nigeria. Additionally the study shows that an individual chicken can harbor more than

one parasite at a time. We here recommend that an approach which will consider the spread of these infections, together with the composition and dynamics of the parasite community and their vectors of transmission will help in understanding the consequences of the parasite interactions and offer better forecasts of disease occurrence which will help to develop a good control and prevention strategies.

## 5. ACKNOWLEDGEMENT

The authors wish to acknowledge the staff of Veterinary hospital Jalingo for their assistance during this work. We also want to thank the poultry sellers and butchers in Jalingo chicken market for their assistance and cooperation during the sampling.

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