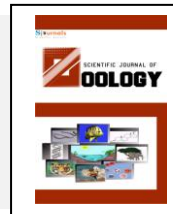


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**Original article**

**Ectoparasites and haemoparasites of chickens in sokoto, northwestern Nigeria**

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**ABSTRACT**

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A study to determine the prevalence of ecto and haemoparasites of chickens was carried out in Sokoto metropolis between April and August 2010. A total of 200 adult chickens from 2 different production systems (commercial and free range) were sampled. Thin blood smear was used to analyse the blood sample while the ectoparasites recovered were properly examined. All chickens from the free range production system were infested with ectoparasites and 12% had haemoparasites. Only 50% of the chickens in the commercial system had ectoparasites. One tick, five lice and one species of haemoparasite were identified with the following prevalences (free range %/commercial %): Tick; *Argas persicus* (66/0); Lice; *Amyrsidea powelli* (50/0), *Gonicotes gallinae* (74/16), *Goniodes gigas* (56/16), *Lipeurus tropicalis* (94/34), *Menacanthus cornutus* (100/50) and haemoparasite; *Plasmodium gallinaceum* (12/0). In general, the occurrence of the parasites was significantly influenced by production system being significantly higher in the free range system than the commercial system of production ( $p < 0.0001$ ).

## 1. Introduction

Poultry has been accepted as one of the most important sources of animal protein for human beings in Nigeria and elsewhere. The incidence of mortality due to different parasitic diseases in chicken demands serious efforts to curtail the diseases. Some of the ectoparasites of poultry like ticks, lice and mites play an important role in the transmission of certain pathogens which cause heavy economic losses to poultry industry in addition to direct effect of causing morbidity by sucking blood and causing irritation to the birds which adversely affects economic production of poultry (Arends, 2003).

In Nigeria the most important ectoparasites include the tropical fowl mite *Bdellonyssus bursa* which is important among sitting birds and very young stocks, the fowl tick *Argas persicus*, which not only affects birds deleteriously by direct action but also by being the vector of the deadly diseases spirochaetosis and aegyptianellosis, and the chicken body louse *Menacanthus cornutus* which is especially important among grown birds and under the more confined management systems, in particular deep litter and semi-intensive types (Fabiyyi, 1980). The degree of infestation with lice is rated as heavy, medium, and low on the basis of the average number of lice per chicken, but values differ depending on author. Infestation are regarded as high when more than 1000, medium when more than 500 but less than 1000, and low when less than 500 (Yagi, 1963). Sychra et al. (2008) regarded infestation as very heavy when more than 2500, heavy when between 1001-2500, medium when its between 101-1000, light when between 26-100 and very light at 1-25. Fabiyyi (1980) regarded infestation as heavy when number is in the region of 10,000 and higher. The limited research that has been carried out on the arthropod parasites of domestic chickens in Nigeria has been confined almost entirely to few towns including Ibadan South Western Nigeria where *Menopon gallinae*, *Megninia cubitalis*, *Lipeurus caponis*, *Cnemidocoptes mutans*, *Menacanthus stramineus*, *Goniodes gigas*, *Goniodes dissimilis*, *Goniocotes gallinae*, *L. tropicalis*, *Bdellonyssus bursa* were isolated (Adene and Dipeolu, 1975, Caswell, 1959), Maiduguri North Eastern Nigeria where *Argas persicus* *Goniodes gigas*, *Manacanthus stramineus* and *Lipeurus caponis* were isolated from chicken (Biu et al., 2007), Zaria North Western Nigeria where *Menacanthus stramineus* *Goniodes gigas* and *Plasmodium spp* had been recorded (George et al., 2004). In Nuskka, South Eastern Nigeria where *G. gigas*, *L. caponis*, *M. stramineus*, *Ceratophyllus gallinae* and *Amblyomma spp* were reported (Ugochukwu and Omije 1986). In Kainji, Central Nigeria where *M. stramineus*, *M. gallinae*, *G. gallinae* *L. caponis*, *Bdellonyssus bursa*, *Argas persicus*, *Dermamyssus gallinae*, *Echidnophaga gallinacea* have been reported (Okaeme, 1988). The most comprehensive work was carried out on the Jos Plateau, where not less than 19 species had been found (Fabiyyi 1980b). The most frequently encountered haemoparasites in village poultry were *Plasmodium relictum* and *Borrelia anserina* (Abdulahi et al., 1992). *Aegyptianella pullorum*, *Haemoproteus columbae* and *Leucocytozoon spp* appeared not to cause any clinical disease in local poultry. Spirochaetosis was described as a fatal disease that spread rapidly and caused death in ducks and chickens (Macfie and Johnson, 1914). The disease is associated with *Aegyptianella pullorum* infection and was a common cause of mortality during the rainy season (Barnes. 1974).

## 2. Materials and methods

### 2.1. Study area

The study was carried out in Sokoto State which is located in the semi-arid region of North Western Nigeria between latitudes 10°N and 13°N and longitudes 3°E and 9°E. The state is characterized by two distinct seasons, the short rainy season which runs from May or June to September or October, depending on the pattern of rainfall of the year. The long dry season starts from around October till May or June (Victor et al., 1997). The minimum relative humidity is less than 20% for most part of the year and ambient temperature ranges from 22°C to 43°C (Victor et al., 1997).

## 2.2. Ectoparasites sample collection and processing

Samples of ectoparasites from 200 randomly selected adult chickens from 2 different production systems (intensive and free range) in Sokoto metropolis were taken. Ectoparasites were collected by applying about 2 grams of insecticides (permethrin powder) all over the body of the chicken. Five minutes after insecticide application, the chickens were placed over a white paper then feathers and skin were rubbed and ruffled thoroughly for about 5 minutes.

Ectoparasites that fell off the body were collected and placed in specimen bottles containing 70% alcohol as preservative. Specimens were identified in the Parasitology and Entomology laboratory, Faculty of Veterinary Medicine, Usmanu Danfodiyo University, Sokoto. In the laboratory, specimens were cleared in lactophenol solution, then mounted on a clean grease free glass slide and observed under the microscope for identification.

## 2.3. Techniques for identification of ectoparasites

Species of lice were identified using the keys provided by Emerson (1956). Tick species were identified using tick identification keys provided by Walker *et al.* (2003).

## 2.4. Blood collection

Similarly, blood samples from same chickens were collected from the wing vein using a 1ml syringe. The skin was dampened with alcohol to disinfect the area and make the vein visible. The blood was directly transferred into labelled test tubes containing anticoagulant (EDTA) and transported to the Parasitology laboratory, Faculty of Veterinary Medicine, Usmanu Danfodiyo University, Sokoto for staining and identification.

In the laboratory, blood samples were processed using thin blood smear to detect parasites. A drop of blood was placed on a clean grease free glass slide. A thin smear was made and allowed to dry. It was then fixed in alcohol and then stained with Giemsa stain. The slides were viewed using a light microscope to check for the presence of blood parasites.

## 2.5. Techniques for identification of haemoparasites

Haemoparasites were identified according to guidelines described by Soulsby (1982).

## 3. Results

Five species of chewing lice and one species of ticks were found in this study (Table 1). The lice included *Amyrsidea powelli*, *Goniocotes gallinae*, *Goniodes gigas*, *Lipeurus tropicalis*, and *Menacanthus cornutus*. The tick was *Argas persicus* (larvae).

Overall, lice had the highest frequency of occurrence with 100% prevalence in the free range production system. All the local chickens examined harboured one or more ectoparasites with the following prevalences, *Argas persicus* 66%, *Amyrsidea powelli* 50%, *Goniocotes gallinae* 74%, *Goniodes gigas* 56%, *Lipeurus tropicalis* 94%, and *Menacanthus cornutus* 100%. Though *Argas persicus* and *Amyrsidea powelli* were not reported in the commercial production system, there were low prevalences of the other ectoparasites found thus: *Goniocotes gallinae* 16%, *Goniodes gigas* 16%, *Lipeurus tropicalis* 34%, and *Menacanthus cornutus* 50%.

### 3.1. Haemoparasites

Only one species was identified, *Plasmodium gallinaceum* (Table 1). It was isolated from twelve out of the 100 free range chickens examined. The commercial birds were free from the haemoparasite. The overall prevalence of the haemoparasite was 12%.

## 4. Discussion

This study, the first in Sokoto, has demonstrated the occurrence of at least five species of lice, a species of tick and a malarial haemoparasite. These species are also among those identified from Jos Plateau (Fabiya, 1980).

*Lipeurus caponis* was conspicuously absent but the finding parallels that of recent study in Malawi (Njunga, 2003). It is possible to be present at extremely low numbers not readily detected.

*Bdellonyssus bursa*, the tropical fowl mite was equally absent. This mite is commonly associated with setting hens and young chickens. Most part of the study did not include setting hens or young ones. It is also possible though not encountered that *Cnemidocoptes mutans* is present in the area. It is invariably associated with very old chickens generally above 2 years. Birds in this study scarcely included that age.

Species of ticks recovered also did not include *Argas walkarae* and *Ornithodoros moubata* recently reported to occur in Sokoto (Bunza et al., 2008). They might be present in very low numbers.

The malarial parasite, *Plasmodium gallinaceum* was the only haemoparasite detected. This parasite is normally considered to be highly pathogenic to chickens with mortality risks in the range of 30-80%

(Soulsby, 1982). Its record is thus significant in the study. Also, *Aegyptianella pullorum* was not encountered in this study which may be due to its rare occurrence (Kaschula, 1961), as well as *Borrelia anserina* (Barnes, 1975).

**Table 1**

Prevalence of ecto- and haemoparasites found on domestic chickens from two different production systems.

Parasite	Free range (%) (n=100)	Commercial (%) (n=100)	Overall (%) (n=200)
<b>Ticks</b>			
<i>Argas persicus</i>	66	0	33
<b>Lice</b>			
<i>Amrsidea powelli</i>	50	0	25
<i>Goniocotes gallinae</i>	74	16	45
<i>Goniodes gigas</i>	56	16	36
<i>Lipeurus tropicalis</i>	94	34	64
<i>Menacanthus cornutus</i>	100	50	75
<b>Haemoparasites</b>			
<i>Plasmodium gallinaceum</i>	12	0	6

n = number of chickens examined

In this study, 100% of the chickens from the free range production system harboured ectoparasites whereas only 50% was recorded in the commercial system. The significantly ( $P < 0.0001$ ) higher prevalence in free range chickens than the commercial enclosed ones conforms with the study in Malawi (Njunga, 2003) which reported 100% prevalence in the free range system and 8% in the commercial system. Among the lice species, *Menacanthus cornutus* showed a very high prevalence (100%) which conforms to the comprehensive research conducted by Fabiyi (1980b) on Jos Plateau. In this study, *Plasmodium gallinaceum* had a prevalence of 12% which is higher than 2.4% recorded in Zaria by George et al. (2004).

## 5. Conclusion

It was concluded that, all chickens in the free range production system have ectoparasites of some kind. Some of these parasites are known to be of economic importance. Haemoparasites affected only chickens raised under the free range system even though clinical disease was not reported. Some of these parasites are known to be of great economic importance. The occurrence of ectoparasites was highly influenced by production system, being higher in the free range system than the commercial system as observed in this study. To minimise this problem, application of suitable insecticide routinely is recommended especially in the scavenging production system, and as long as sanitary measures are followed, these parasites may not to be a major problem.

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