

Prevalence and seasonal fluctuations of ectoparasites infesting backyard turkeys, *Meleagris gallopavo*, in Sokoto, Northwestern Nigeria

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Turkey, ectoparasite, morbidity, Nigeria

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Summary

A systematic survey was conducted during two consecutive years, August 2009 to July 2011, to study the prevalence, abundance and seasonal fluctuations of ectoparasites of turkeys in Sokoto and its environs. The ectoparasites were recovered from the birds using the dust-ruffling technique, fixed in 70% alcohol and identified microscopically following clearing in lactophenol. The results, based on examination of 265 birds, revealed a high prevalence and a high parasite diversity with no less than 12 species recorded. In decreasing order of prevalence, ectoparasites recorded included four louse species (Phthiraptera: Ischnocera and Amblycera): *Lipeurus tropicalis* (78%, hitherto unknown from turkeys), *Menacanthus stramineus* (48%), *Goniocotes gallinae* (35%), and *Chelopistes meleagridis* (33%). Two species of ticks (Acari: Metastigmata) were found: *Argas persicus* (50%) and *Hyalomma impressum* (10%). Five parasitic mites (Acari: Astigmata and Mesostigmata) were observed: *Bdellonyssus bursa* (45%), *Megninia cubitalis* (32%), *Epidermoptes bilobatus* (20%), *Freyana chanayi* (12%) and *Cnemidocoptes mutans* (10%). Only one flea species (Siphonaptera: Ceratophylloidea), *Echidnophaga gallinacea*, was found. Many infestations consisted of a few to a dozen individuals per bird, but *L. tropicalis* and *B. bursa* were very abundant and could reach thousands of individuals on some birds, and *A. persicus*, *M. stramineus* and *E. gallinacea* were abundant, sometimes with hundreds of individuals, on some others. Infestations fluctuated seasonally and were more often present in the hot dry season ($p < 0.01$) and the warm wet season ($p < 0.05$) than in the cool dry harmattan season. The findings suggest the need to develop effective preventive and control options to deal with ectoparasites which flourish in numbers and diversity in the area.

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■ INTRODUCTION

Introduced about 100 years ago during the colonial era, large numbers of turkeys are now found in various parts of Nigeria. Although they had been initially raised for wealthy Christians at Christmas, they have started to be marketed throughout the year (Bourn et al., 1992) and have potential to contribute substantially to the protein demand of the country, which only meets today about 50% of the

Food and Agricultural Organization's recommended standards and 30% of the British Medical Association requirements for developing countries (FAO, 1985). This potential is thought of from the facts that these birds are prolific, easy to raise, and their meat is a delicacy.

As in many parts of the world (Arends, 2003), little is known about ectoparasites of turkeys in Nigeria, and the scanty information available is almost entirely limited to small-scale studies in Ibadan (Akinboade and Dipeolu, 1980) and Zaria (Sai'du et al., 1994). Here is reported a study of ectoparasites of these birds in Sokoto, similar to the one carried out on chickens and guinea fowls on Jos Plateau (Fabiyi, 1980a). As in that example, the study was designed to determine the fauna, prevalence and seasonal patterns of infestations of these parasites on birds. These aspects are particularly lacking in previous studies in Nigeria, although their knowledge is necessary to plan efficient control strategies.

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MATERIALS AND METHODS

Study area

The study area, Sokoto metropolis and its environs, is located at 12°51'–13°12' N and 05°51'–05°25' E in the semiarid area of North-western Nigeria. The climate is tropical, being marked by a hot dry season (March-June) followed by a pronounced warm wet season (July-October) and a cool dry harmattan season (November-February). Both the hot dry season and the cool dry harmattan season experience very low relative humidity with monthly means dropping at noon at about 10%. The warm wet season is associated with a mean monthly relative humidity around 60%.

Procedure

The study was carried out for two consecutive years, from August 2009 to July 2011. A total of 265 birds of both sexes, aged from five months to three years, were examined at the rate of about 9–14 birds per month. The birds were from 80 different backyard flocks, from well-scattered areas of Sokoto and its environs. From each flock comprising about 1020 birds, two or three birds were randomly selected. Samples were not taken more than once from any flock.

To recover the ectoparasites, each bird was dusted with sevin powder (1-naphthyl-N-methyl carbamate), placed on a large sheet of white paper and vigorously rubbed and ruffled. All the materials falling on the paper were then preserved in 70% ethanol with 5% glycerin in bijou bottles until examination of parasites. Prior to this, different parts of the body were examined separately to enable determination of the predilection sites of each species. Also, the legs of the birds were scraped for microscopic examination for scaly leg mites.

To permit the detection and isolation of parasites invisible to the naked eye, the preserved materials were examined under stereomicroscope at 7x–42x magnification with specimens being isolated with a paintbrush or a pair of fine forceps. Using the light microscope, these and other parasites were subsequently identified at 40x–100x magnification. Using the keys, descriptions and illustrations of various authors, identification of lice was made according to Emerson (1956; 1962), that of mites and fleas according to Arends (2003), and that of ticks according to Hoogstraal (1956) and Walker et al. (2003) following clearing in lactophenol on slides.

Birds were included in the study if they had not received any pesticide treatment during the last six months. The prevalence of ectoparasites of all birds was recorded.

Statistical analysis

Data were analyzed with SPSS (version 10) Statistical Package. Chi-square was used to test for significant differences between seasons. Differences were considered significant at a probability level of $p < 0.05$.

RESULTS

Table I shows data on the species encountered together with their prevalences. By far the most prevalent species was the tropical head louse, *Lipeurus tropicalis*, occurring on as high as 78% of birds. This was followed by the fowl tick, *Argas persicus* (50%), the body louse, *Menacanthus stramineus* (48%), and the tropical fowl mite, *Bdellonyssus bursa* (45%). The bont-legged tick, *Hyalomma impressum*,

and the scaly leg mite, *Cnemidocoptes mutans*, were the least prevalent species, being each present on 10% of birds.

Cursory estimations showed that the levels of infestations attained by *L. tropicalis* were generally heavy, frequently reaching several thousands per bird. In contrast, infestations with *A. persicus*, *M. stramineus*, *B. bursa*, as well as the stick tight flea, *Echidnophaga gallinacea*, and the fluff louse, *Goniocotes gallinae*, were usually light, generally never exceeding 50 parasites, although heavy infestations did occur occasionally, reaching several thousands per bird in the case of *B. bursa*, or several hundreds in the case of *A. persicus*, *E. gallinacea*, *M. stramineus* and *G. gallinae*. The remaining six species recorded included the large turkey louse, *Chelopistes meleagridis*, the feather mites, *Megninia cubitalis* and *Freyana chanayi*, the skin mite, *Epidermoptes bilobatus*, as well as *H. impressum* and *C. mutans*. They all occurred in small numbers, never exceeding 50 and were usually less than 20 per bird.

Table II shows the prevalence of ectoparasites according to seasons. Statistical analyses revealed that the season greatly influenced the prevalence, with infestations being more often found in the hot dry season ($p < 0.01$) and in the warm wet season ($p < 0.05$) than in the cool harmattan season.

Table I

Prevalence of ectoparasites in 265 turkeys in Sokoto and its environs, Northwestern Nigeria

Group and common name	Parasite	Turkeys infested (%)
Overall		85
Lice		
Tropical head louse	<i>Lipeurus lawrensis tropicalis</i>	78
Chicken body louse	<i>Menacanthus stramineus</i>	48
Large turkey louse	<i>Chelopistes meleagridis</i>	33
Chicken fluffy louse	<i>Goniocotes gallinae</i>	35
Ticks		
Fowl tick	<i>Argas persicus</i>	50
Bont-legged tick	<i>Hyalomma impressum</i>	10
Mites		
Tropical fowl mite	<i>Bdellonyssus bursa</i>	45
Feather mite	<i>Megninia cubitalis</i>	32
Feather mite	<i>Freyana chanayi</i>	12
Scaly leg mite	<i>Cnemidocoptes mutans</i>	10
Scaly skin mite	<i>Epidermoptes bilobatus</i>	20
Fleas		
Sticktight flea	<i>Echidnophaga gallinacea</i>	35

Table II

Prevalence of ectoparasites in relation to the season in 265 turkeys in Sokoto and its environs, Northwestern Nigeria

Season	Num. Examined	Num. positive	Positive (%)
Cool dry	106	21	20
Warm wet	70	49	70
Hot dry	89	84	94

■ DISCUSSION

This study is the first published report from any large study on turkey ectoparasites in Northwestern Nigeria, where there has been, as in many other parts of Nigeria and the tropics as a whole, a general lack of concrete knowledge on the prevalence and abundance of these parasites. Whereas in many infestations parasites were a few to a dozen per bird, in heavy infestations, observed occasionally, they were numbered in thousands, especially *L. tropicalis* and *B. bursa*, and in hundreds, especially *A. persicus* and *E. gallinacea*. The scale of importance of such heavy infestations is, however, beyond the scope of this study as it did not include an assessment of other disease-causing agents that may also be present. Determination of the true significance of ectoparasite infestations would thus make a valuable and interesting area of research in future studies.

Although *Menacanthus stramineus* has been commonly ranked as the commonest and most prevalent louse of turkeys (Lancaster and Meisch, 1986; Wall and Shearer, 2001), the present results have revealed that, in Sokoto area, *L. tropicalis*, hitherto known to parasitize only chickens and guinea fowls (Peters, 1931; Emerson, 1956; Price et al., 2003), is by far the most abundant and commonest louse found on turkeys. It is possible that this trend is widespread, occurring in all tropical regions of the world if, and this seems likely, the geographical distribution of *L. tropicalis* on turkeys is the same as that which has been described for chickens (Emerson, 1956).

This striking finding clearly emphasizes the need to assess the status of louse species of turkeys under local environments, as it has been done for louse species of chickens. Thus, whereas *Menacanthus cornutus* is the most abundant louse species in some areas of the world, such as the savanna regions of Nigeria (Fabiyyi, 1988), Malawi (Njunga, 2003), Turkey (Mimioglu, 1952), especially Kars Province (Aldermir, 2004), and Sudan (Yagi and Razig, 1972), *M. stramineus* is the most abundant one in others as in the United States (De Vaney, 1976; Lancaster and Meisch, 1986).

Another interesting finding was that infestations of *L. tropicalis* were found not only on the head and neck but also under the wings, on the breast, rump, vent, back, shoulder, thighs and around the cloaca, unlike on chickens and guinea fowls, where they are restricted to the neck and head (Peters, 1931). It is possible that the entity found on turkeys may not be exactly the same species as that found on chickens and guinea fowls and may be isolated as a different species in the future.

In each of the two years of this study, turkeys were consistently more often infested in the hot season and the warm wet season than in the cool dry harmattan season. This finding parallels that on Jos Plateau on chickens and guinea fowls (Fabiyyi, 1980a; Fabiyyi, 1980b), the high temperature presumably causing rapid multiplication of ectoparasites during these periods (Reid, 1956; Arends, 2003).

■ CONCLUSION

The present high prevalence and abundance of ectoparasites and the fact that turkey rearing will probably continue to increase in popularity have highlighted the need to develop effective preventive and control options. Therefore, there is a need for more information regarding bionomics of little-known parasites such as *L. tropicalis*, which are abundant in the area but for which almost practically nothing seems to be known at present.

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Résumé

Fabiyi J.P., Alayande M.O., Akintule A.O., Lawal M.D., Mahmuda A., Usman M. Prévalence et variations saisonnières des infestations par les ectoparasites des dindons de basse-cour, *Meleagris gallopavo*, à Sokoto, Nigeria

Entre août 2009 et juillet 2011, une étude a été conduite dans la région de Sokoto pour déterminer le taux d'infestation des dindons par les ectoparasites ainsi que l'abondance et les variations saisonnières de ces derniers. Les parasites ont été récoltés par la méthode du « *dust-ruffling* » (déloger les parasites des plumes en les ébouriffant après saupoudrage de pyréthrinol, puis mis dans des flacons d'éthanol à 70 %, avant d'être éclaircis au lactophénol, puis identifiés au microscope. L'examen de 265 oiseaux a révélé de forts taux d'infestation ainsi qu'une grande diversité parasitaires puisque 12 espèces ont été identifiées. Quatre espèces de poux (Phthiraptera : Ischnocera et Amblycera) ont été trouvées : *Lipeurus tropicalis* (chez 78 % des dindons alors que cette espèce n'avait jusqu'alors pas été mentionnée chez cet oiseau), *Menacanthus stramineus* (48 %), *Goniocotes gallinae* (35 %) et *Chelopistes meleagridis* (33 %). Il y avait également deux espèces de tiques (Acari : Metastigmata), *Argas persicus* (chez 50 % des oiseaux) et *Hyalomma impressum* (10 %), et cinq acariens responsables de gales (Acari : Astigmata et Mesostigmata) : *Bdellonyssus bursa* (45 %), *Megninia cubitalis* (32 %), *Epidermoptes bilobatus* (20 %), *Freyana chanayi* (12 %) et *Cnemidocoptes mutans* (10 %). Une seule espèce de puce (Siphonaptera : Ceratophylloidea), *Echidnophaga gallinacea*, a été identifiée. Dans de nombreux cas, les oiseaux n'étaient infestés que par moins d'une douzaine de parasites, mais *L. tropicalis* et *B. bursa* étaient en revanche très abondants sur certains dindons qui pouvaient héberger plusieurs milliers d'individus. D'autres oiseaux étaient infestés par des dizaines voire quelques centaines d'*A. persicus*, de *M. stramineus* ou d'*E. gallinacea*. Les infestations étaient plus fréquentes pendant la saison sèche chaude ($p < 0,01$) et la saison chaude humide ($p < 0,05$) que pendant la saison sèche fraîche. Ces observations suggèrent qu'il serait nécessaire de mettre en place des mesures de prévention et de lutte pour réduire l'importance des ectoparasites dans cette région.

Mots-clés : dindon, ectoparasite, morbidité, Nigeria

Resumen

Fabiyi J.P., Alayande M.O., Akintule A.O., Lawal M.D., Mahmuda A., Usman M. Prevalencia y fluctuaciones estacionales de los ectoparásitos que infestan los pavos de corral, *Meleagris gallopavo*, en Sokoto, Nigeria noroccidental

Se llevó a cabo una encuesta sistemática durante dos años consecutivos, de agosto de 2009 a julio de 2011, para estudiar la prevalencia, abundancia y fluctuaciones estacionales de los ectoparásitos de pavos en Sokoto y sus alrededores. Los ectoparásitos se recuperaron de las aves mediante la técnica de *dust-ruffling*, fijados en alcohol al 70% e identificados microscópicamente después de la limpieza con lactofenol. Los resultados, basados en el examen de 265 aves, revelaron una alta prevalencia y una alta diversidad de parásitos con no menos de 12 especies registradas. En orden decreciente de prevalencia, los ectoparásitos registrados incluían cuatro especies de piojos (Phthiraptera: Ischnocera y Amblycera): *Lipeurus tropicalis* (78%, hasta ahora desconocido en pavos), *Menacanthus stramineus* (48%), *Goniocotes gallinae* (35%) y *Chelopistes meleagridis* (33%). Se encontraron dos especies de garrapatas (Acari: Metastigmata): *Argas persicus* (50%) y *Hyalomma impressum* (10%). Se observaron cinco ácaros parásitos (Acari: Astigmata y Mesostigmata): *Bdellonyssus bursa* (45%), *Megninia cubitalis* (32%), *Epidermoptes bilobatus* (20%), *Freyana chanayi* (12%) y *Cnemidocoptes mutans* (10%). Sólo una especie de pulga (Siphonaptera: Ceratophylloidea), *Echidnophaga gallinacea*, fue encontrada. Muchas infestaciones consistían de unos pocos a una docena de individuos por ave, pero *L. tropicalis* y *B. bursa* eran muy abundantes (de docenas a miles de individuos) en algunas aves, y *A. persicus*, *M. stramineus*, *E. gallinacea* eran abundantes (de docenas a cientos de individuos) en otras. Las infestaciones fluctuaron estacionalmente estando presentes con mayor frecuencia en la estación seca cálida ($p < 0,01$) y en la estación húmeda cálida ($p < 0,05$) que en la estación seca de harmattan. Los resultados sugieren la necesidad de desarrollar opciones efectivas de prevención y control para tratar con los ectoparásitos que florecen en números y diversidad en el área.

Palabras clave : pavo, ectoparásito, morbosidad, Nigeria