Avian Ectoparasitism in Makurdi, Nigeria: Do Wild Birds Serve as Reservior for Domestic Birds?

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Abstract

This study highlights the possible exchange of parasites between domestic and wild birds. Ectoparasites were collected from domestic birds in three residential areas (Wurukum, North Bank and Logo II) and from wild birds in the zoological garden and Mu forest from August – November 2013. A total of 500 domestic birds (chicken, ducks, turkeys and pigeons) were randomly sampled from thirty (30) households while a total of 127 wild birds were sampled from the Zoological Garden and Mu Forest. The dust-ruffling method was used to pick ectoparasites from birds. A total of 394 (78.8%) of the 500 domestic birds were infested with 689 ectoparasites. Lice had the highest prevalence of 84.6%, while ticks, mites and fleas had prevalence of 3.3%, 7.7% and 4.4 % respectively. For the wild birds, a total of 80 (63.0%) out of the 127 birds were infested with 674 ectoparasites. Lice also had the highest prevalence of 66.0%, while ticks, mites and fleas had prevalence of 4.2%, 13.1% and 16.8% respectively. Out of the 17 ectoparasite species encountered, six (6) were found in both wild birds and domestic birds. Predominant species of ectoparasites infesting both domestic and wild birds are lice *(Lipeurus caponis),* mites *(Dermanyssus gallinea)* fleas *(Echidnophaga* species) and ticks *(Argas persicus).* Integration between ecology and veterinary medicine will allow a better understanding of population dynamics of ticks and other ectoparasites as they constantly co-infest avian populations. As long as the role of wild birds acting as reservoirs for infestation of domestic birds is underestimated, efforts at preventing and controlling ectoparasites of domestic birds and poultry diseases may be a futile venture.

Introduction

Most ectoparasites of birds are disease vectors and they can be direct causes of illness and death. Just a few adult ticks feeding on a small bird can cause anaemia, reduced growth, weight loss and contribute in other ways to a depressed state of health (Hill 1994). Birds have also, been reported to suffer tick paralysis, which is a motor paralysis or paralysis of the voluntary muscles from bites of *Argas* species. Tick paralysis in songbirds has been associated with the bite of the hard-bodied tick *Ixodes brunneus*. Ectoparasites, including chewing lice, can impact upon body condition, fitness, ability to fly or even long-term survival of their hosts. The impact of ectoparasites on energetic may also be responsible for significant drop in the rate of male courtship display, and thus in the ability of heavily infested males to attract mates (Sychra *et al*., 2011). Several studies on ectoparasites of domestic birds revealed that a wide variety of ticks, lice and fleas infest domestic birds in Nigeria (Biu, *et al.* 2007, Al-Saffar and Al-Mawla 2008, Nnadi and George 2010). A lot of research efforts have been dedicated to preventing and controlling infestation of ectoparasites of domestic birds. These control efforts seem not to yielding significant positive results.

Our studies on ectoparasites infestation on wild birds in Benue State, Nigeria indicate an intriguing dynamics of infestation between domestic and wild birds. Morshed *et al* (2005)

reported that migratory birds play an important role in the dispersal of Ixodid ticks, including ticks infected with Lyme disease. Omudu *et al.* (2011) reported similar ectoparasites species in birds kept in the Makurdi Zoological garden and domestic birds in communities in the niegbourhood of the zoological garden. Could wild birds be acting as reservoirs of medically important ectoparasites of domestic animals? Considering the dynamics of foraging and interaction between pigeons, free-ranging chickens and wild birds in many rural and urban communities, the emerging pattern of ectoparasites infestation could improve the understanding of persisting infestation profile of domestic birds. In this current study, we report striking similarities in infestation pattern of wild and domestic birds.

Materials and Methods

Study Site

The study was carried out in Makurdi the capital of Benue state, Nigeria. This area is fast becoming a metropolitan centre with attendant health, social, housing and environmental problems (Omudu and Amuta, 2007). The town lies between latitude 7^0 15' and 7^0 45' North and longitude 8^0 15' and 8^0 42' East. The town lies in the guinea savanna vegetative belt and on the bank of the second largest River in Nigeria, River Benue. The River divides the town into North and South Banks and covers an area of $16km^{2.}$ The town is made up of five high densely residential areas namely: Wadata, Wurukum, High Level, Modern Market and North Bank. Two of these areas and a sub-urban settlement called Logo II were selected together with two natural habitats (Makurdi Zoological Garden and Mu Gallery Forest) for this study.

Sample Collection

Ectoparasites were collected from domestic birds in three residential areas (Wurukum, North Bank and Logo II) and from wild birds in the zoological garden and Mu forest from August – November 2013. A total of 500 domestic birds (chicken, ducks, turkeys and pigeons) were randomly sampled from thirty (30) households while a total of 127 wild birds were sampled from the Zoological Garden and Mu Forest. The dust-ruffling method as described by Clayton and Walther (1997) was used to pick ectoparasites from birds. The method involved dusting of birds with insecticide powder, after which a toothbrush dipped in alcohol was used to brush the body of the bird in order to dislodge parasites onto the surface of a white cardboard paper. Parasites were then picked with forceps into sample bottles containing 70% alcohol and taken to the laboratory for identification with the use of identification keys and charts (Clayton *et al.,* 2010, Walker 2003). Data was analyzed using simple percentage and frequency of ectoparasites occurrence.

Results

A total of 394 (78.8%) of the 500 domestic birds were infested with 689 ectoparasites. Lice had the highest prevalence of 84.6%, while ticks, mites and fleas had prevalence of 3.3%, 7.7% and 4.4 % respectively (Table 1). For the wild birds, a total of 80 (63.0%) out of the 127 birds were infested with 674 ectoparasites. Lice also had the highest prevalence of 66.0%, while ticks, mites and fleas had prevalence of 4.2%, 13.1% and 16.8% respectively (Table 2). A total of 17 different ectoparasites species were encountered namely *Argas persicus, Banomiella columbae, Chelopistes meleagridis, Columbicola columbae, Cuclugaster heterophagus, Dermanyssus gallinea, Echidnophaga gallinacea, Goniodes dissimilis, Goniocotes gallinae, Goniodes gigas, Holomenopon leucoxanthum, Heterodoxus spininger, Lipeurus caponis, Menacanthus stramineus, Menopon gallinae, Mesonyssus melloi, Echidnophaga* species. Out of these 17 ectoparasites, six (6) were found in both wild birds and domestic birds (Fig.1). The species abundance of the wild birds captured during the study is represented in Fig. 2.

Table 1: *Predominant species of ectoparasites collected from domestic birds*

Location	No. Examined	No. Infested	Lice (%) *Lipeurus caponis*	Mites (%) *Dermanyssus gallinea*	Fleas (%) *Echidnophaga gallinacea*	Tick (%) *Argas persicus*
Wurukum	200	158	245 (75.2)	29(8.9)	29(8.9)	23(7.1)
Logo II	110	96	192 (88.9)	24(11.1)	-	-
North Bank	190	140	146 (99.3)	-	1(0.7)	-
Total	500	394	583(84.6)	53(7.7)	30(4.4)	23(3.3)

Table 2: *Predominant species of ectoparasites collected from wild birds*

Area	No. Examined	No. Infested	Lice (%) *Lipeurus caponis*	Mites (%) *Dermanyssus gallinea*	Fleas (%) *Echidnophaga species*	Ticks (%) *Argas persicus*
Zoo	92	65	354 (81.9)	6 (1.4)	64 (14.8)	8 (1.9)
MU	35	15	91 (37.6)	82 (33.9)	49 (20.2)	20 (8.3)
Total	127	80	445 (66.0)	88 (13.1)	113 (16.8)	28 (4.2)

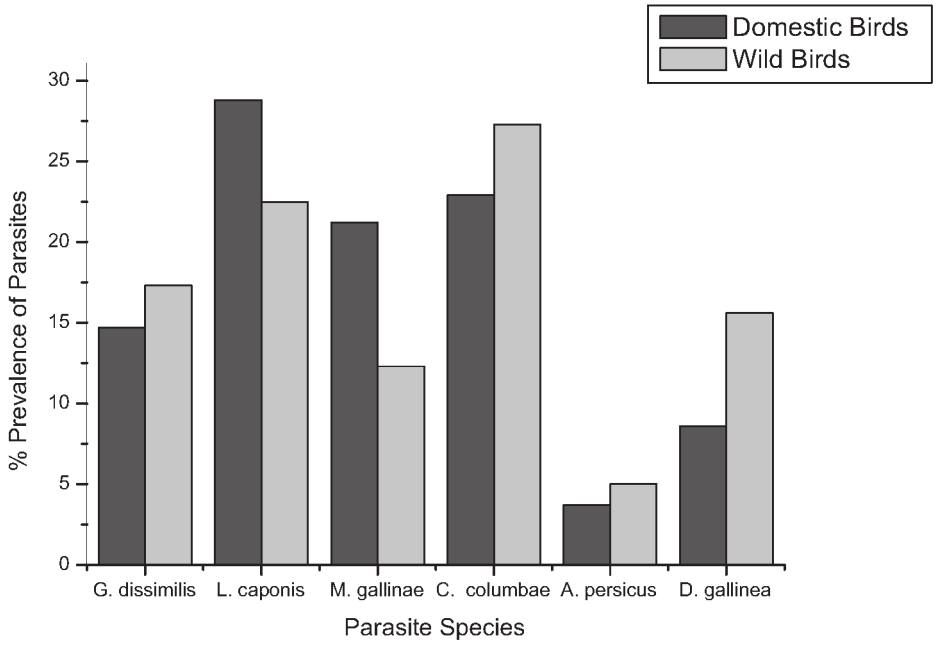

Figure 1: Percentage Prevalence of Parasites Species on Domestic and Wild Birds

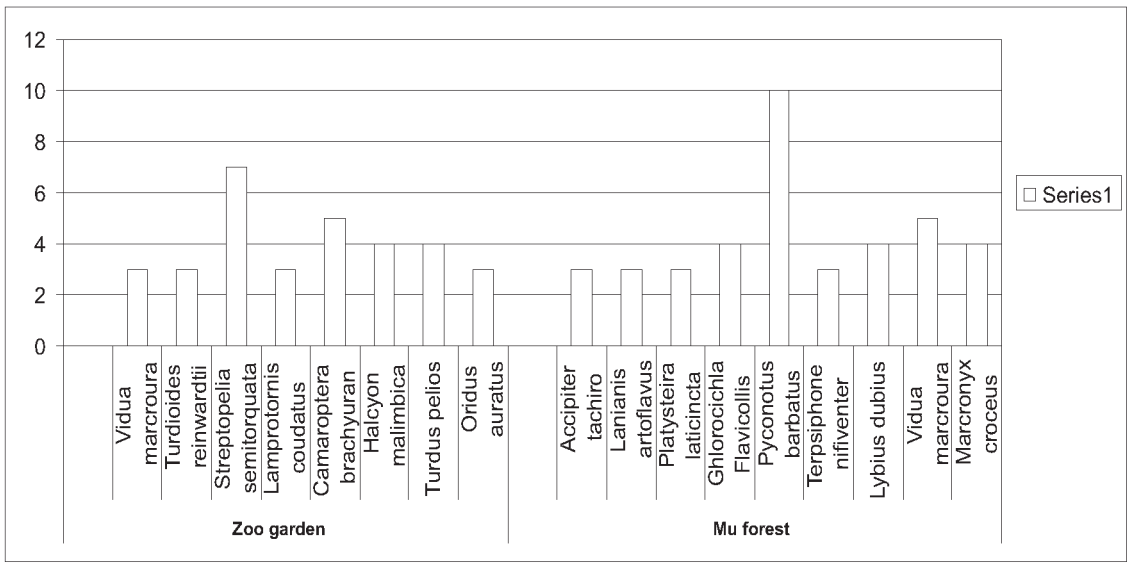

Fig.2: *Wild birds species from which ectoparasites were collected*

Discussion

The result of this study shows that, Wild birds could be acting as parasite reservoirs for domestic birds because six of the most predominant ectoparasites species were found in both domestic and wild birds. These species involved one tick (*A. persicus*), one mite (*D. gallinea*) and four lice species (*L. caponis*, *M. gallinae, C. columbae* and *G. dissimilis*). It was noticed that apart from lice, all the other parasites were higher in Wild birds than domestic birds. Bird lice of the genus *Goniodes, Leperous* and tick (*Ammblyomma hebraeum*) have also been reported on birds in Ogba zoo in Benin City, South Western Nigeria (Edosomwan and Amadasun 2008) and Makurdi zoo (Omudu *et al.,* 2011). Even among the lice species, some that were found in both domestic and wild birds, *C. columbae* and *G. dissimilis* were higher in wild birds than domestic birds. *C. columbae* is a parasite that has been found to parasitise pigeons and reported widely in Pigeon relatives like African Green Pigeon, Black-Billed Wood Dove, Laughing Dove, and Morning Doves (Sychra *et al.,* 2011). This may be because of their feral live style of Pigeons. Even though pigeons are domesticated, they tend to have a lot of contact with the wild and as such can easily serve as vehicles for re-infestation of parasites from the wild.

Findings from this study corroborate those of Adang *et al*. (2007) who investigated ectoparasites of Laughing Dove (*Streptopelia senegalensis*) in Zaria, Nigeria. They encountered five parasite species which were; A. *persicus, M. gallinae, C. columbae G. dissimilis* and *Pseudolynchia canariensis.* Generally, the infestation rates of birds in this study was high 78.8% for domestic birds and 63.0% for wild birds as compared to the work of Adang *et.al*.,(2008) who had an infestation rate of 30.0% on domestic pigeons and Adang *et.al*.,(2007) who had an infestation rate of 23.0% for Laughing Doves in Zaria, Nigeria. However it agrees with the works of Sabini *et al.,* (2010) in Kenya and Nnadi and George (2010) in Nigeria who had infestation rates of 62.2% and 84% respectively in Chickens. The interaction of pigeons with man and other domestic and wild birds portends it as a potential carrier of zoonotic parasites (Adang *et al*., 2008). They have a role in spreading some zoonoses to people as well as being a reservoir of many parasitic diseases for poultry.

This study highlights the possible exchange of *parasites* between *domestic* and *wild birds*. When habitats are destroyed, fragmented or modified, different potential hosts make contact with each other, allowing the exchange of their associated arthropods. If these ectoparasites are vectors, the exchange of diseases may occur. Epidemics occur easily when diseases move within new host populations which have not been exposed in their natural habitat (Sychra *et al.,* 2011). The movement of domestic species into wild areas associated with habitat fragmentation increases this risk, which could be kept to a minimum if natural communities were kept as intact as possible, and free of domestic animals. This makes it important to know in greater detail the role of wild species, such as birds, as dispersers of these ectoparasites. Evidence was put forward to show that eggs of helminth parasites of both wild and domestic birds are being constantly re-introduced to land and transferred from one pasture to another. In this way land which has not previously carried poultry for years may yet carry viable eggs which can, and do infect chickens when they are introduced to such runs (Clapham 2009).

Integration between ecology and veterinary medicine will allow a better understanding of population dynamics of ticks and other ectoparasites as they constantly co-infest avian populations. As long as the role of wild birds acting as reservoirs for infestation of domestic birds is underestimated, efforts at preventing and controlling ectoparasites of domestic birds and poultry diseases may be a futile venture.

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