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# ECTOPARASITES OF POULTRY BIRDS (*Gallus gallus domesticus*) FROM TWO SMALLHOLDER FARMS, RIVERS STATE, NIGERIA

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**Abstract:**

Ectoparasites play significant economic roles in the management of poultry birds, especially in smallholder farms in the tropics. Their impact can range from mild irritation to transmission of pathogenic organisms to the birds. In this study, we examined nineteen birds maintained at two smallholder farms in Rivers State, Nigeria, namely, the Rivers State University farm and a family poultry farm at Rukpokwu in August and September, 2023. The birds were examined using appropriate methods; the parasites were isolated and identified using standard keys. Prevalence of ectoparasites was generally low. Four ecto-parasites were isolated: two from the birds at Rukpokwu (a Psoroptidae mite and larval *Strongyloides stercoralis*, both at a prevalence of 11% and mean intensity of one parasite per infested host); and three from RSU farm (Psoroptidae mites, the fluff louse [*Goniocotes gallinae*] and the tropical fowl mite [*Ornithonyssus bursa*]), prevalence of infestation was 20%, 10% and 40%, respectively in August, 2023. By September, none of the Rukpokwu birds was infested and only two from the RSU farm were infested with *O. bursa*. Higher occurrence of parasites at RSU farm is related to the presence of other farm animals. Regular cleaning of the birds and their surroundings can reduce their incidence of infestation thereby maintaining healthy birds.

**Keywords:** Domestic birds, smallholder farm, Psoroptidae mites, lice, *Strongyloides*



## INTRODUCTION

Smallholder farms contribute significantly to the agricultural productivity of developing countries (Kamara *et al*., 2019). They may incorporate both crop and animal production either as the main source of funds or as a cultural requirement for families. In several rural communities in Nigeria, for instance, it is required of every family to practice some form of agricultural activity or the other (Amuzie, 2023). This subsistence farming is the main source of food for dwellers of urbanized cities (Giller *et al*., 2021). However, due to insufficient availability of funds to these farmers, they utilize the cheaper, extensive system of farming. Hence, their farms, especially animal farms, readily suffer from parasite invasion.

Ectoparasites include several species of parasitic arthropods (Amuzie, 2023) that cause irritation, injuries, and transmit pathogenic organisms to farm animals (Riwidiharso *et al.*, 2020). Some locations have cultural control practices against these arthropods (Jamil *et al*., 2022), while others apply chemical compounds including carbamates (Stich, 2022), ivermectin (Murillo, 2022), etc.

In this study, poultry birds maintained at two smallholder farms were examined for ectoparasites. This was to assess the impact of the characteristic environmental conditions of the farms to the occurrence of these parasites.

## MATERIALS AND METHODS

Sampling protocol: Two smallholder farms in Rivers State, Nigeria, were visited in August and September, 2023. The first location was the agricultural demonstration farm of Rivers State University (RSU), Port Harcourt (4°48.16’ Latitude, 6°58.36’ Longitude), while the second was located at Rukpokwu Town (4º54.4’ Latitude, 7º0.5’ Longitude). Ten birds were kept at the RSU farm. In addition to the birds, west African dwarf goats (*Capra hircus*) and Black Headed Dorper sheep (*Ovis aries*) were also reared at the RSU farm. There were nine birds at the Rukpokwu farm; however, the birds were kept by a family in an enclosed compound.

Both farms were visited once in each month. The feathers of each bird were gently brushed unto a paper towel using soft brushes. Care was taken to ensure that one brush was used for only one bird to prevent transfer of parasites. After this was done, the contents of the paper towel were transferred into universal specimen bottles containing 70% ethanol, properly labeled and transported to the Laboratory of Entomology and Parasitology, Department of Animal and Environmental Biology, Rivers State University, Port Harcourt.

The content of each universal bottle was transferred into a Petri dish and viewed under a light microscope, directly and by applying drops of the content unto glass slides, covered with a cover slip and viewed at x10 and x40 objective lens. Parasites seen were identified using appropriate identification keys (Soulsby, 1982; and an online mite identification key [https://shire.science.uq.edu.au/bb/parasitology/mites/mite.html]). The parasite quantification measures of prevalence and mean intensity were computed after Bush *et al*. (1997).

## RESULTS

The domestic birds examined in this study were mildly infested with ectoparasites which were comprised of mites, a louse and the larval stage of a parasitic helminth.

**Ectoparasites Isolated from Infested Birds**

The occurrence of ectoparasites on the birds was very low. Only two birds from Rukpokwu were infested, one with a Psoroptidae mite while on the other was found larval *Strongyloides stercoralis* (Table 1; Plates 1 & 2). Both infestations were recorded in August, 2023. By September, 2023, none of the birds was infested.

Among the birds at RSU Farm, parasites were isolated from seven birds; five in August and two in September, 2023. They included Psoroptidae mites, the fluff louse (*Goniocotes gallinae*) and the tropical fowl mite (*Ornithonyssus bursa*). The two hosts infested in September had one individual of *O. bursa* each (Table 1).

Mean intensity of parasite infestation was low, occurring as one parasite per infested host (Table 1). However, multiple infestations were recorded in two hosts. One of the birds from the RSU farm was infested with three parasites, namely, *O. bursa*, *G. gallinae* and a Psoroptidae mite; while another from same location was infested with two, *O. bursa* and a Psoroptidae mite, both in August, 2023 (Plates 1 – 4).

## DISCUSSION

Two species of mite (Psoroptidae mites and *Ornithonyssus bursa*), a louse (*Goniocotes gallinae*) and a larval nematode parasite (*Strongyloides stercoralis*) were recovered from infested birds. The environment of smallholder poultry farms contribute to the prevalence of parasites, whether they be ecto- or endo-parasites (Lopez-Perez *et al*., 2022). More ectoparasites (three species) were isolated from the birds kept at RSU farm whereas two species were isolated from the farm at Rukpokwu. This is expected owing to the fact that at the RSU farm, other farm animals (including goats, dorper sheep) were kept within the same vicinity as the poultry birds. There is, therefore, opportunity for parasites, especially the Psoroptidae mites to cross-infest the poultry birds from the other farm animals since they commonly infect cattle, sheep and goats (Mullen and OConnor, 2019). Although these Psoroptidae mites were also isolated from the birds at Rukpokwu, the prevalence of infestation of birds at RSU (30%) was higher than on Rukpokwu birds (11%).

*Ornithonyssus bursa* and *Goniocotes gallinae* have been reported from poultry birds in Nigeria (Luka *et al*., 2022), but there has not been a report on the recovery of parasitic nematodes from them. The occurrence of larval *Strongyloides stercoralis* is associated with human dwellings where there is possibility of faecal contamination of the soil or grasses (Robert *et al*., 2022).

In this study, it was observed that after the first sampling in August 2023, the occurrence of ectoparasites reduced. Two hosts were infested at RSU farm in September against five in August; none was infested at Rukpokwu against two in August. This shows that simple mechanical removal of ectoparasites (which should be followed by burning of the paper towel holding them) can be effective in controlling ectoparasites in smallholder farms. However, other methods including use of medicinal plants and chemicals should be adopted by farmers (Jamil *et al*., 2022; Murillo, 2022; Stich, 2022).

## CONCLUSION

The smallholder farms examined in this study were infested with two mites (Psoroptidae mites and *Ornithonyssus bursa*), a louse (*Goniocotes gallinae*) and larval nematodes (*Strongyloides stercoralis*). More ectoparasites were isolated from birds kept close to other farm animals at the RSU farm than those kept within a confined family dwelling place at Rukpokwu. However, the geohelminth (*S. stercoralis*) isolated from the farm at Rukpokwu indicates the impact of environmental factors on the occurrence of parasites.

Mechanical removal of ectoparasites followed by the burning off of the paper towels on which they were removed can be helpful in controlling ectoparasites among poor farmers, where other alternatives are not available.

**Table 1: Prevalence of Ectoparasites isolated from Domestic Birds (*Gallus gallus domesticus*) at RSU Agric Farm and Rukpokwu Farm, Rivers State, Nigeria**

| | Parasite | RSU Agric Farm | | Rukpokwu | |
|---|---|---|---|---|---|
| | | Number of infected hosts (Prevalence %) | Number of parasites isolated (mean intensity) | Number of infected hosts (Prevalence %) | Number of parasites isolated (mean intensity) |
| August, 2023 | Psoroptidae mites (mite) | 3 (30.0%) | 3 (1.0 parasite/infected host) | 1 (11.11%) | 1 (1.0 parasite/infected host) |
| | *Strongyloides stercoralis* (Nematode) | 0 | 0 | 1 (11.11%) | 1 (1.0 parasite/infected host) |
| | *Goniocotes gallinae* (Fluff louse) | 1 (10.0%) | 1 (1.0 parasite/infected host) | 0 | 0 |
| | *Ornithonyssus bursa* (Mite) | 4 (40.0%) | 4 (1.0 parasite/infected host) | 0 | 0 |
| September, 2023 | *Ornithonyssus bursa* (Mite) | 2 (20.0%) | 2 (1.0 parasite/infected host) | 0 | 0 |

Plate 1: Psoroptidae mites isolated from domestic birds (*Gallus gallus domesticus*), RSU Farm and Rukpowku, Rivers State, Nigeria.

Plate 2: *Strongyloides stercoralis* larva isolated from domestic birds (*Gallus gallus domesticus*), Rukpokwu, Rivers State, Nigeria. (Scale = 0.01mm)

Plate 3: Tropical fowl mite, *Ornithonyssus bursa* isolated from domestic birds (*Gallus gallus domesticus*), RSU Farm, Rivers State, Nigeria. (Scale = 0.05mm)

Plate 4: *Goniocotes gallinae* isolated from domestic birds (*Gallus gallus domesticus*), RSU Farm, Rivers State, Nigeria. (Scale = 0.05mm)

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