

Prevalence of Ectoparasitic Arthropods on Free Range Domestic Fowls (*G. domesticus*) in Amansea and Ifite Communities (Awka, Nigeria)

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Abstract A survey was carried out to determine the prevalence of ectoparasitic arthropods in free range domestic fowl (*Gallus domesticus*) in Amansea and Ifite communities. A total of 112 *G. domesticus* comprising of 42 adult males, 30 adult females and 40 juveniles with plumage of different colours were examined during a house to house survey for ectoparasitic arthropods. The study was carried out between June and September, 2014. Out of the 12 *G. domesticus* having white plumage, (58.33%) were infested with lice. Fleas were absent on white plumage birds. The 19 *G. domesticus* having black plumage, (47.37%) were infested by lice. Fleas were also absent on black plumage birds. Out of 34 brown coloured *G. Domesticus* examined, lice, fleas and mites were recorded to have the same number of infestation (17.65%) each, while (29.41%) were infested by ticks. Out of 47 *G. domesticus* having mixed colour plumage, (40.42%) were infested by lice. Chi-squared test showed that there was no significant difference between ectoparasites loads on the host and the different plumage colours ($P > 0.05$). Because of the high prevalence of ectoparasitic arthropods revealed in this study, it is recommended that some control measures should be put in place to improve chicken productivity and enhance the livelihood of these domestic fowls in the areas investigated.

Keywords *Gallus domesticus*, Ectoparasites, Prevalence, Plumage, Occurrence, Arthropods, Free-range

1. Introduction

Chicken can be managed using two systems namely, open (free - range) and restricted (confined system). In free-range system, chickens move about freely over a wide area

in search of food. They are always hardy, breeding is natural, which in turn saves hatchery costs and other expenses and their strong nature may partially be expressed in disease resistance [1].

In the rural system of management of poultry, the birds are left to scavenge around the house during the day time to obtain what feed they may be able to get from the environment often as offal, insects and seeds. Owing to the free range and scavenging attitude, traditional village birds are in permanent contact with soil and insects. Soil when humid and warm may serve as an important reservoir transmission site for external larval stages of parasites [2].

Parasitism ranks high among factors that threaten free range chicken production [3]. Arthropod ectoparasites have a major impact on husbandry, productivity and welfare of domestic animals [4]. Due to their numerous activities, ectoparasitic arthropods have two types of effects on their host, which are direct and indirect effects. Direct damages caused according to [5], are blood loss, myiasis, skin inflammation, pruritis and toxic and allergic responses caused by antigens and anticoagulants in the saliva of blood feeding arthropods. Ectoparasitic arthropods such as ticks, suck blood and interfere with the feed consumption by giving continuous irritation. Thus, they are associated with emaciation, anaemia and eventually loss of production. In some cases, severely affected birds may die [6]. The major effects of these parasites on their host are due to the irritation they cause. Ectoparasites found on poultry birds belong to phylum Arthropoda, and of two classes: Arachnida, having the orders Acarina (ticks and mites) and the Insecta which includes orders Phthiraptera (lice), and Siphonaptera (fleas) [7]. Ectoparasitic arthropods carnage feathers, irritate and cause skin lesions, resulting in reduced performance of adult chicken and direct harm to young chicks [8] [9].

Feeding activity of the ectoparasites may result in

significant blood loss, secondary infestations, pruritus, and excoriation and in some cases premature death. Ectoparasites may also cause indirect harm including behavioural disturbances, such as increased frequency of rubbing or scratching, leading to reduced time in feeding [10] [11] [12]. In addition, ectoparasitic infestation as related to the fur conditions and the colour shades of the chickens are lacking. The purpose of this study was to identify ectoparasites found on domestic chickens by plumage in Amansea and Ifite communities in Awka, Anambra state and to ascertain the distribution of the parasites on the body of the chicken. It is hoped that the results could be used in making objective decisions in control strategies.

2. Materials and Methods

2.1. Area of Study

This study was carried out in Amansea and Ifite communities within the Awka Capital Territory. Awka is the Capital city of Anambra state, Nigeria and is situated about 72km away from Enugu and 45km from Onitsha, along Enugu-Onitsha highway. Awka is situated in the rainforest belt of Nigeria and has two clearly demarcated seasons: a wet season from April to October and a dry season from November to March. The people of Awka practice both intensive and extensive poultry management system. Amansea and Ifite are communities within the Awka Capital Territory, and are separated by a small marshy stream. This study was carried out from June to September, 2014.

2.2. Examination of Chicken for Infestation by Ectoparasitic Arthropods

A total of 112 chicken (*G. domesticus*), 56 from Amansea and Ifite respectively, were used for this study. The chickens were caught at night from their sleeping/roosting sites on trees and cages. The chickens were examined for ectoparasitic arthropod infestation in the morning of the next day. A careful approach was followed to detect and collect the ectoparasites. A hand lens was used to examine the different parts of the chicken for ectoparasites. A white cloth was spread on the ground while examining the chicken and during examination of the fowls, the head of the chicken was examined first, followed by the neck, body sides (using a soft brush for combing of the feathers), vent area and legs as described by [13]. The sample consisted of 42 (forty-two) adult males, 30 (thirty) adult females and 40 (forty) juveniles.

2.3. Collection and Preservation of Ectoparasites

Ectoparasites such as ticks were removed with the aid of a forceps and cotton wool soaked with alcohol to paralyze the ticks, for easy extraction. Lice were collected from hosts by dipping a dissecting forceps in absolute alcohol before extracting the lice. The alcohol instantly paralyzed the lice and thus made collection easier. Mites and fleas were collected by brushing of the head and body of the fowl as described by [14] [15]. All the parasites collected were counted and placed in sampling bottles containing 70% ethanol. Each fowl examined was assigned a serial number on the sampling bottle for ease of identification. All parasites collected were sent to Department of Zoology Laboratory in NnamdiAzikiwe University, Awka for thorough study and identification.

2.4. Identification of Ectoparasites

The ectoparasites were placed on a microscopic slide and viewed with the aid of a dissecting and binocular microscope to study their morphological characteristics for identification. The identity of the ectoparasites was established using identification guides by [16].

2.5. Statistical Analysis

Chi-squared test was used to test for possible significant differences between the parameters investigated, using SPSS statistical software package.

3. Result and Discussion

Table 1 shows that out of the 12 *G. domesticus* having white plumage, (58.33%) were infested with lice. Fleas were absent on white plumage birds. 19 *G. domesticus* having black plumage, (47.37%) were infested by lice. Fleas were absent on black plumage birds. Reasons are unknown, which demands for more research to be conducted. Out of 34 brown coloured *G. Domesticus* examined, lice, fleas and mites were recorded to have the same number of infestation (17.65%) each, while (29.41%) of the 34 *G. domesticus* examined were infested by ticks. Out of 47 *G. domesticus* having mixed colour plumage, (40.42%) were infested by lice. Chi-squared test showed that there was no significant difference between ectoparasites and the different plumage colours of the hosts ($P > 0.05$).

Table 1. Prevalence of ectoparasitic arthropods on free range domestic fowls (*G. domesticus*) with different coloured in Amansea and Ifite communities, in Awka

	Lice	Fleas	Ticks	Mites		Lice	Fleas	Ticks	Mites		Lice	Fleas
Colours	N.E	N.I	Prevalence(%)	N.E	Colours	N.E	N.I	Prevalence(%)	N.E	Colours	N.E	N.I
White	12	7	58.33	12	White	12	7	58.33	12	White	12	7
Black	19	9	47.37	19	Black	19	9	47.37	19	Black	19	9
Brown	34	6	17.65	34	Brown	34	6	17.65	34	Brown	34	6
Mixed	47	19	40.42	47	Mixed	47	19	40.42	47	Mixed	47	19

Keys = N.E - number examined, N.I - number infested.

Table 2. Distribution of Ectoparasitic Arthropods on the body of Free Range Domestic Chicken (*G. domesticus*) in Amansea and Ifite Communities Awka

Ectoparasitic Species	Order	Family	Location on <i>G.domesticus</i>
Menopongallinae	Phthirapteras	Menoponidae	Entire body
Lipeuruscaponis	Phthiraptera	Philopteridae	Head, feathers
Goniocotesgallinae	Phthiraptera	Menoponidae	Feathers
Echidnophagagallinaea	Siphonaptera	Pulicidae	Comb, wattle, eye,
Dermanyssusgallinae	Mesostigmata	Dermanyssidae	Entire body
Argaspersicus	Ixodida	Argasidae	Head, neck

Table 2 above shows that *M. gallinae* and *D. gallinae* occurred on the entire body, *L. caponis* occurred on the head and feathers, *G. gallinae* on the feathers, *E. gallinaean* on the comb, wattle and eyes, *A. persicus* on the head and neck.

A total of six species of ectoparasitic arthropods were recorded in the *G. domesticus* population involved in the study. These included three species of lice namely, *Argas persicus* (Figure 1), *Lipeurus caponis* (Figure 2) and *Menopon gallinae* (Figure 3), One species of flea namely, *Echidnophaga gallinaean* (Figure 4), one species of the mite namely, *Dermanyssus gallinae* (Figure 5) and one species of soft tick namely, *Goniocotes gallinae* (Figure 6).

**Figure 2.** *Lipeurus caponis* isolated from *G.domesticus* in Amansea and Ifite communities**Figure 1.** *Argas persicus* isolated from *G. domesticus* from Amansea and Ifite communities**Figure 3.** *Menopon gallinae* isolated from *G. domesticus* in Amansea and Ifite communities



Figure 4. *Echinophaga gallinacean* isolated from *G.domesticus* in Amansea and Ifite communities



Figure 5. *Dermanyssus gallinae* isolated from *G.domesticus* in Amansea and Ifite communities



Figure 6. *Gonicotes gallinae* isolated from *G.domesticus* in Amansea and Ifite communities

According to the findings of this present study (Table 1), Lice 19 (40.42%), Fleas 6 (12.77%) and ticks 16 (34.04%) were found to occur more on mixed coloured chicken, while Mite 10 (52.63%) was found to occur more on black coloured birds. These findings agree with that of [14], who found that mixed coloured chicken were more infested with the ectoparasites (Lice, ticks and fleas) (50.0%) as against 21% for white coloured and 29% for blacked coloured chicken. In contrast, the findings of the present study differ from those of [17] who recorded that black colour feather chicken had the highest prevalence (66%) than brown-red (56%), white (49%) and mixed coloured (12%). Fleas were absent on white and black plumage birds. The reasons for

this situation are unknown, which demands for more research to be conducted. The findings of these studies suggest that plumage colour could be a factor that influences prevalence of ectoparasitic arthropods in *G. domesticus*.

According to the findings of the present study (Table 2), the different ectoparasites were found in different microhabitats on the body of the chicken. This finding agrees with that of [18], who found *M. gallinae*, *L. caponis*, and *G. gallinae* on the feathers and undersides of the large wings, while *D. gallinae* was found to be on the entire body of the fowl. [19] also reported finding *E. gallinacean* on the head of the affected chicken; the wattles, eyelids and combs, being heavily infested, as found in these present study. [20] reported finding *D. gallinae* moving rapidly throughout the body of the chicken; which corroborates the findings of the present study, where the mite was found on the entire body of the infested chicken.

Although the effects of the ectoparasitic arthropod species on the infested chicken was not evaluated in the present study, it could be significant, given the high prevalence, and the adverse effects which some of the species recorded in the present study are known to have on their hosts. *A. persicus* for instance, is known to harbor different types of bacteria and causes paralysis in chicken [6]. *Echinophaga gallinacea* could cause blindness in birds as they cluster around their eyes as was found in the present study. Further *E. gallinacea* has been reported to infest chicken, humans, turkey, cats and dogs [21]. This makes the species a potential agent of zoonosis. According to [4] arthropod ectoparasites have major impact on husbandry, productivity and welfare of domestic animals. [5] listed blood loss, myiasis, skin inflammation, pruritis and toxic and allergic responses as some of the direct damages, while disturbance, social nuisance and self-wounding are indirect damages which arthropod ectoparasites cause. [6] stated that severely affected birds may die. Thus, there is little doubt that the arthropod ectoparasites recorded in the present study could be causing varying degrees of damage/harm to the infested birds, and hence to poultry business in the two communities of Amansea and Ifite, in Awka Capital territory.

4. Conclusions

In conclusion, the present study has provided information on the various ectoparasitic arthropods of domestic chicken in Amansea and Ifite communities. Therefore, further study is needed to determine the impact of infestation on the health and productivity of these birds, and evaluation of cost benefit of various control strategies need to be investigated. Meanwhile, it would be opined that there is an important need to put a strategy for reducing or eliminating ectoparasitic arthropod parasites of chicken

from the communities in place. Dusting the chicken and their roosting places with appropriate insecticides/acaricides would be an effective strategy.

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