

## Ectoparasitic profile of apparently healthy chicken in Agbani, Enugu State, Nigeria

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### Abstract

Parasites constitute a major obstacle to poultry production, leading to significant losses in many poultry farms. The study examined the prevalence of ectoparasites on healthy poultry chickens in eight selected poultry farms in Agbani, Enugu State between the months of February and March 2023. A total of 300 chickens were examined from local and commercial farms. The farms comprised of 5 free-breed local farms (115 birds) and 3 commercial farms (185 birds). Each of the sampled bird was placed on a white sheet of paper and examined for ectoparasite by ruffling the feathers with fine blunt toothed brush. Different parts of the body were thoroughly examined and in some cases with the aid of hand lens. Ectoparasites that fell on the paper were collected for further identification. The results showed that out of the 300 chickens sampled 130(43.3%) were found positive with ectoparasites. Two group of ectoparasites were identified from the sampled farms which were lice and mite. Lice occurred more in prevalence at 125(41.6%) in local farms than in commercial farms. Four species of lice identified were *Liperus caponis* (wing lice at 54(41.5%), *Goniodes gigas* (large chicken lies) at 33(25.3%), *Menopon gallinae* (shaft lice) at 31(23.8%) and *Goniocotes gallinae* (fluff lice) at 7(5.3%) while the two species of mite identified were *Dermanyssus gallinae* (red mite) at 4(3%) and *Knemidocoptes mutans* (scaly leg mite) at 1(0.7%). Multiple infestations of lice and mites were encountered only in local farms L2: 20(90%) lice, 2(9%) mite; L4: 18(90%) lice, 2(10%) mite and L5: 17(94%) lice, 1(5%) mite. The study indicated that ectoparasites were highly prevalent in free-breed local chicken and may be associated with poor hygienic practices. Therefore, application of integrated control strategy, good management practices and high level of proper hygiene practices are recommended.

**Keywords:** Ectoparasites; Infestation; Poultry; Hygiene; Prevalence

### 1. Introduction

Livestock parasitism is a global problem, especially at low-elevation regions with a humid, tropical climate where temperature almost always favors hatching and larval development [9] and [18]. A parasite is an organism that lives within or on a host and often harms it. It depends on its host for survival. Without a host, a parasite cannot live, grow and multiply. For this reason, it rarely kills the host, but it can spread diseases, and some of these can be fatal. Parasites are a major cause of disease and production loss in livestock, frequently causing significant economic loss and impacting on animal welfare. Each livestock species is vulnerable to different parasites.

Poultry production occupies an important position in providing animal proteins to the population and largely serves a significant part in the nation economy [22]. Poultry is one of the most intensively reared of the domesticated species and one of the most developed and profitable animal production enterprise.

The productions of poultry in parts of Asia and Africa are broadly separated into commercial and village enterprise sectors, each of them having its distinctiveness [22]. The former comprises of strains specifically developed on the basis of primary products into parent stocks, layers, and broilers each with its specialized equipment and management

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approach. Village chicken (*Gallus gallus domesticus*) is the major species in the rural poultry sub-sector in Africa [16] and [10]. The traditional method of keeping village chicken has been the backyard method in which the birds are allowed to scavenge for food during the day time, with housing provided during the night for the semi-intensive and free-range system. Village chicken productions are faced with several limiting factors which include poor management, malnutrition and the lack of bio-security among others. Losses have also been ascribed to poor housing or no housing and little or no veterinary services.

Parasitism ranks high among factors that threaten chicken production. Chicken production is hampered by ectoparasites. Commonly, poultry ectoparasites are mites, fleas, lice and sometime ticks. parasites can affect poultry productivity by compromising its health. Parasitic infestations manifest in late maturity, reduced egg output, emaciation, anemia and death [4],[5],[14] and [15]. In addition, ectoparasites like mites and ticks are vectors of some diseases that can infect poultry, such as fowl pox, pastuerellosis, Newcastle disease, and perhaps Chlamydia [6] and [22]. This has been known to result in immunosuppression especially in response to vaccines against some poultry disease. In addition, some species are blood suckers while others burrow into the skin or live in the feather and other parts of the chicken depending on their predilection sites e.g. lice (*Liperus spp*, *Menopon spp*), Soft ticks (*Argas spp*), Mites (*Dermanyssus spp*, *Ornithonyssus spp*), Fleas (*Echinophaga spp*) are mostly found on poultry chicken. Mites have been recognized as the cause of the dermatitis and skin damage on all classes of poultry while lice has been reported to be the most common and widely spread ectoparasites of chicken. Risk factors that contribute to the spread of these parasites into the layer chickens include poultry transports, neighborhood infection, unhygienic practices of farms, and the introduction of infected foreign birds. There has been a significant decrease in the prevalence of most of the parasitic diseases in commercial poultry production systems through refined housing, hygiene, and administration. The growth of the poultry industry denotes a continuing need to improve the prevention of chicken parasitic infections for a continuous distribution of quality and safe products. Furthermore, there is a constant need to assess the status of the layer chicken production and the risk factors affecting it. The present study was conducted to further identify the species of ectoparasites on chickens as well as assess their economic impact. The result will enable the stake holders in the poultry industry fully appreciate the importance of ectoparasites and be motivated to implement feasible control programme in order to reduce the associated economic losses.

### 1.1. Statement of problem

Poultry farming is hampered by frequent outbreak of diseases of which parasitic infections by parasites cause more considerable damage and massive economic losses due to malnutrition, decreased feed conversion, weight loss, lowered egg production and death of the juvenile birds.

The research work is aimed at accessing the ectoparasitic profile of apparently healthy domestic livestock (chicken) in Agbani, Enugu State, Nigeria.

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## 2. Materials and methods

### 2.1. Study Area

The research work was conducted in Agbani in Nkanu West Local Government Area of Enugu state, Nigeria

### 2.2. Study Design

A total of Eight (8) poultry farms in Agbani, Enugu state Nigeria both commercial and local household farms were visited for the purpose of the research work. A cross-sectional survey was conducted in the different categories of chicken ranging from chicks to cock. A total of three hundred (300) chicken was involved in the survey, the sampling was done between the months of February and March 2023. The chicken are classified as adults (cock or hen), broilers, cockerel, pullets, chicks male and female).

### 2.3. Selection of Poultry Chicken

The chickens were randomly selected from poultry farms using convenience sampling method. In each of the selected farms a total of 80, 50, 55, 20, 22, 35, 20, 18 chickens of different categories, age, and sex were sampled respectively. However, birds of the same weight were all included for the study. The samples were examined twice in a week for two months. A total of three hundred chickens were involved in the survey, the sampling was done between the months of February and March 2022.

**2.4. Examination and Identification of Parasites**

The procession and examination of the birds for ectoparasites assessments followed standard techniques of (Angyireyiri et al., 2015). Each of the sampled bird was placed on a white sheet of paper. The bird was examined for ectoparasite by ruffling the feathers with fine blunt toothed brush. The essence of the white sheet of paper was to easily differentiate the ectoparasites from dirt. The head, comb, eyelids, wattle, neck, feathers, back wings, breast, shaft, vent and legs were thoroughly examined and in some cases with the aid of hand lens. Sufficient care was taken while pulling out ectoparasites from the chicken to prevent damage of the morphological features needed for subsequent identification. Ectoparasites that fell on the paper were collected for further identification.

**2.5. Data Analysis**

Data were analyzed using percentages (%) and tabulations. Parasite infestation was determined by parasite counts and mean numbers of parasites calculated. These were compared between farms, and specie composition.

**3. Results**

**3.1. Prevalence of Ectoparasites on Chicken in Selected Farms**

Table 1 shows that out of the 300 chickens examined, 130 chickens were found positive with ectoparasites at prevalence rates of (43.3%) while 170 (56.6%) chickens were found negative with ectoparasites.

**Table 1** Prevalence of Ectoparasities on Chicken in Selected Farms

Farms (n=8)	No of chickens examined	No of chickens positive with ectoparasities	No of chicken negatice with ectoparasities (%)
Commercial farm (C1)	80	20(15.4%)	60 (35%)
Commercial farm (2)	50	-	59 (29%)
Commercial farm (3)	55	-	55 (32%)
Local farm (L1)	20	15 (11.5%)	5(2.9%)
Local farm (L2)	22	22(16.9%)	-
Local farm (L3)	35	35(26.9%)	-
Local farm (L4)	20	20(15.4%)	-
Local farm (L5)	18	18(13.8%)	-
Total	300	130(43.3%)	170 (56.6%)

Keyword: C= Commercial farms; L= Local farms

**3.2. Comparison of Parasitic Infestation in Local Farms and Commercial Farms**

Table 2 shows that local farm had higher prevalence with ectoparasites at 110(84.6%) that the commercial farms at 20(15%)

**Table 2** Comparison of Parasitic Infection in Local Farms and Commercial Farms

Farms (n=8)	No Tested	Total no of Ectoparasites Identified
Commercial farm	3	20(15%)
Local farms	5	110(84.6%)

C = commercial farm, L=local farm

**3.3. Analysis of Ectoparasites from the Selected farms**

Table 3 shows that out of the 300 chicken sampled lice occurred more at 125(41.6%) than mite at 5(1.6%)

**Table 3** Analysis of Ectoparasites in Selected Farms

Sampled farms	No of chickens sampled	Total no of lice identified	Total no of mite identified
C1	80	20(25%)	-
C2	50	-	-
C3	55	-	-
L1	20	15(75%)	-
L2	22	20(90%)	2(9%)
L3	35	35(100%)	-
L4	20	18(90%)	2(10%)
L5	18	17(94%)	1(5%)
Total	300	125(41.6%)	5(1.6%)

Keyword:C=Commercial farms ; L= Local farms

### 3.4. Occurrence of Multiple Infestation by Parasites

Table 4 shows that multiple infestation by parasites were found only in local farms with varying results.

**Table 4** Occurrence of Multiple Infestation by Parasites

Sample farms	No of chickens sampled	Ectoparasites No of Lice Identified	No of Mite Identified
L2	22	20(90%)	2(9%)
L4	20	18(90%)	2(10%)
L5	18	17(94%)	1(5%)

Keyword: C=Commercial farms; L= Local farms

### 3.5. Prevalence of Ectoparasites Species on Chicken from Sampled Farms

Table 5 shows 6 species of ectoparasites and the most prevalence was found in *Liperuscaponia* (wing lice) with highest species composition of 54(41.5%), followed by *Goniodesgigas* (large chicken lice) 33(25.3%), *Menopongallinae* (shaft lice) 31(23.8%) *Goniocotesgallinae* (fluffice) 7(5.3%) then *Dermanyssusgallinae* (red mite) with prevalence rate of 4(3%) with the least in prevalence being *Knemidocoptesmutans* (scaly leg mite) 1(0.7%).

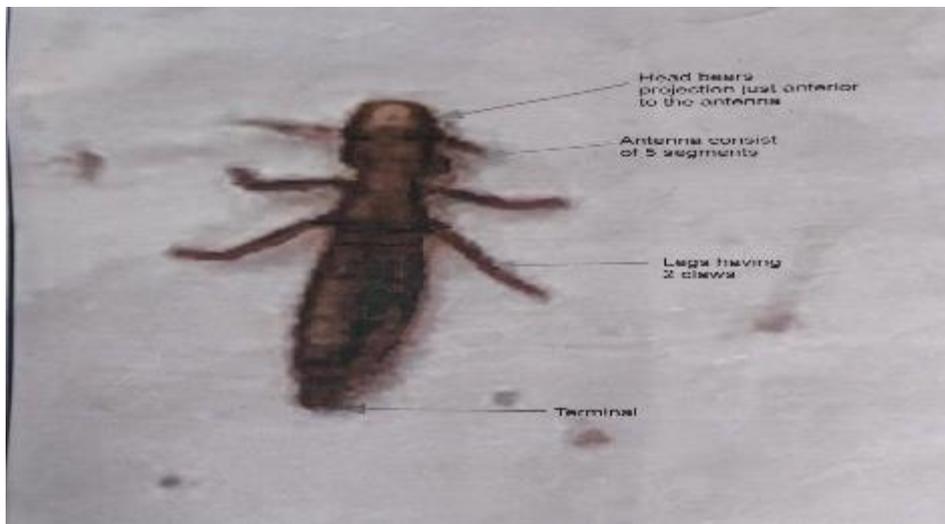
**Table 5** Prevalence of Ectoparasite Species on Chicken from Sampled Farms

Farms	<i>Liperuscap onis</i> (wig lice)	<i>Menopon Gallinae</i> (shaft lice)	<i>Goniodesgigas</i> (large chicken lice)	<i>Goniocotes Gallinae</i> (fluff lice)	<i>Dermanyssus Gallinae</i> (red mite)	<i>Knemidocoptes Mutans</i> (scaly leg mite)	Total
C1 (n=20)	-	20(100%)	-	-	-	-	-
C2(n=0)	-	-	-	-	-	-	-
C3 (n=0)	-	-	-	-	-	-	-
L1 (n=15)	10(66%)	-	5(33%)	-	-	-	15
L2(n=22)	8(36%)	2(9%)	8(36%)	2(9%)	2(9%)	-	22
L3 (n=35)	20(57%)	2(5%)	10(28%)	3(8%)	-	-	35

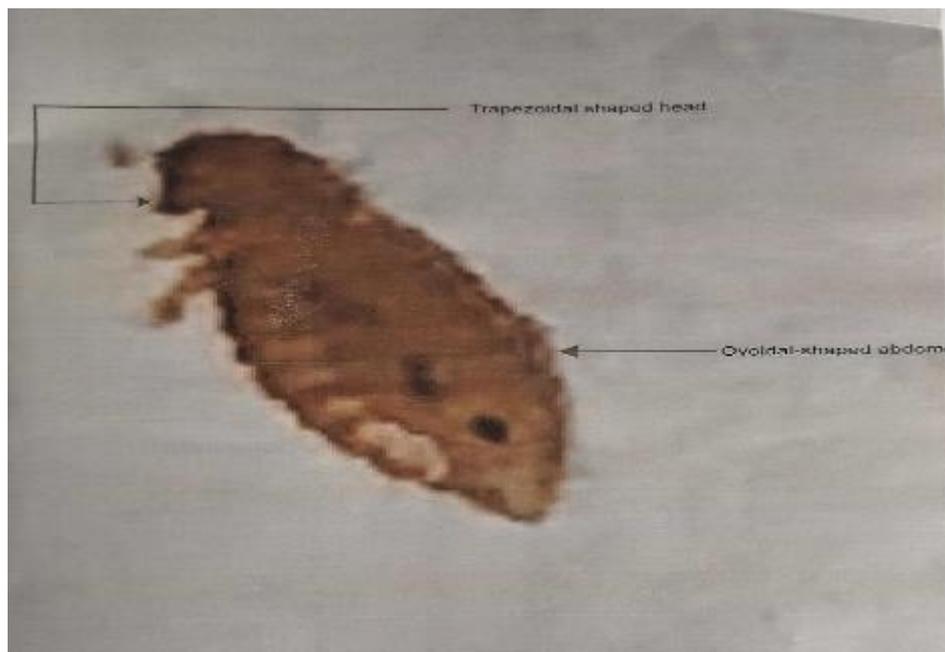
L4 (n=20)	6(30%)	4(20%)	6(30%)	2(10%)	2(10%)	-	20
L5 (n=18)	10(55%)	3(16%)	4(22%)	-	-	1(5%)	18
Total	54(41.5%)	31(23.8%)	33(25.3%)	7(5.3%)	4(3%)	1(0.7%)	130

### 3.6. Morphological Characteristic of Parasitites Identified

The identified parasites comprised of *Liperus caponis*, *Menonpon gallinae*, *Goniodes, gigas*, *Goniocotes gallinae*, *Dermanyssus gallinae*, *knemidocoptes mutans* and showed varied characteristics (figure 1,2,3,4,5 and 6).



**Figure 1** Slender, elongated greyish body characteristic of *liperus caponis*



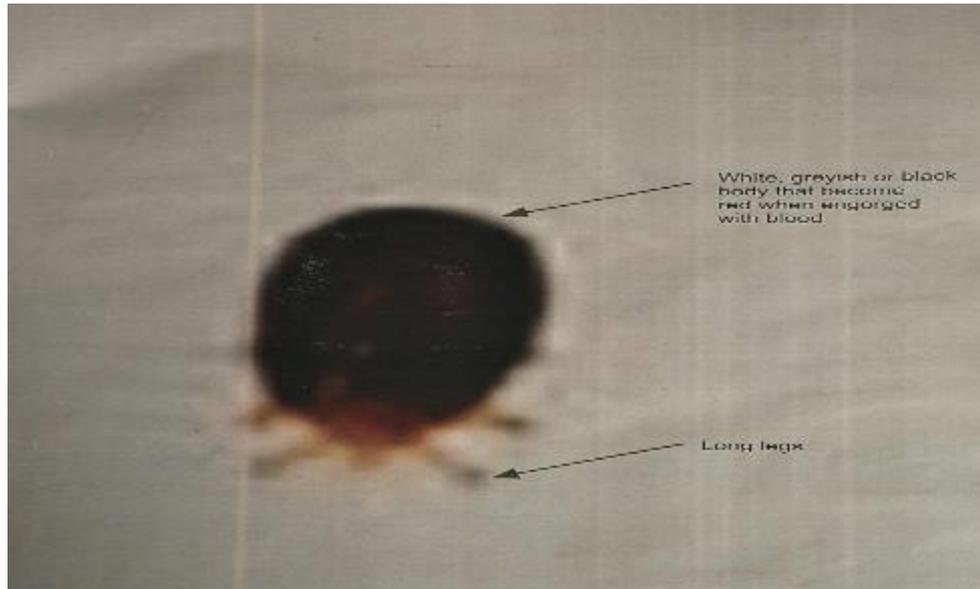
**Figure 2** Very small pale yellowish body, trapezoidal shaped head and ovoidal shaped abdomen characteristics of *Menonpon gallinae*



**Figure 3** Large and brown body characteristics of *Goniodes gigas*



**Figure 4** Small, compact round shaped head, round shaped abdomen and pale yellowish body characteristics of *Goniocotes gallinae*



**Figure 5** Very small, round shaped body characteristics of *Dermanyssus ganllinae*



**Figure 6** Thickened, encrusted and unsightly scaly appearance of chicken leg affected by *Knemidocoptes mutans*

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#### 4. Discussion

From the study, ectoparasites were found in high occurrence in chickens (Table 1). A higher prevalence of ectoparasitic infestations were observed in village chickens in local farms at 110(84.6%) than in other breeds from commercial farms at 20(15%) (Table2). The high rate of infestation in local farms could be attributed to poor hygienic conditions/sanitation, poor management practices related to housing and delayed treatments which could favour propagation and fasten the life cycle of the parasites leading to general mortality [3] and [23].

From the study, two group of ectoparasites were identified which includes the lice and mite and occurrence was further observed in local farms. Lice occurred more at 125(41.6%) than mite 5(1.6%) (Table3). This is in line with other studies which reported higher prevalence of lice when compared to other ectoparasites in village chickens [17] and[13]. Multiple infestation of lice and mite occurred only in local farms, specifically L2, L4 and L5 with prevalence rates of 20(90%) lice; 2(9%) mite, 18(90%) lice; 2(10%) mite, 17(94%) lice; 1(5%) mite respectively (Table 4). The study was similar to the findings of [7] who reported multiple triple infestation with ectoparasites in his work. Most of these local chickens get these parasites from the environment and from wild birds as they are allowed to move around during the

day time scavenging for food [1]. The ectoparasites are modified in their structures to adapt on these chickens which makes it easier for a flock to become infested [12].

Four species of lice of which the *Liperus caponis* (wing lice) 54(41.5%) records the highest, (large chicken lice) 33(25.3%), *Menopon gallinae* (shaft lice) 31(23.8%), *Goniocotes gallinae* (fluff lice) 7(5.3%) and two species of mite; *Dermanyssus gallinae* (red mite) 4(3%) and *Knemidocoptes mutans* (scaly leg mite) 1(0.7%) were identified (Table 5). The fact that lice are highly adapted and abundant in hot and humid areas such as Nigeria [8] could be the reason for the relatively higher prevalence recorded when compared to the other ectoparasites. The least prevalence of mites in the present study agrees with the work of [22] who observed low prevalence of mite than other ectoparasites. It also agrees with [15],[20] and [21] who postulated that mites are considered one of the common ectoparasites of village chicken.

In the study, the scaly leg caused by *Knemidocoptes mutans* was observed on a local breed chicken (picture 6). The scaly leg mite (*Knemidocoptes mutans*) has been reported to burrow into the tissues under the scales of the legs and by its feeding activity leads to thickened, encrusted and unsightly scaly appearance of chicken legs [13]. These mites cause irritation and inflammation, with the result of powdery material formed, the accumulation of which raised the scales on the legs. Scaly leg is highly contagious and accumulation of the crust may interfere with flexion of the joint and cause lameness. Severe infection may cause arthritis or loss of toes.

In all the farms sampled, there were absence of flea and ticks. This is not surprising as many other similar studies also recorded no ticks found in village chicken [11] and [22]. Generally ectoparasites (lice, mites, fleas and ticks) cause discomforts, anemia and loss of feathers in chicken. They also cause immune depression and reduce productivity, these however depend largely on the level of parasites infestation [19] and [22]. High parasites infestation can also lead to death of the chicken as a result of anemia and immune depression which could allow secondary bacterial infection in the affected chicken. The effect of ectoparasites as can be seen in this study revealed the economic significance in village chickens and other birds and invariably in the nation's economy as chicken contribute largely to the economy of the nation in terms of meat and egg production.

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## 5. Conclusion

From the study, local farms had more parasitic infestation than the commercial farms. It was also observed that lice occurred more than mite. There is need for vigorous control measures for ectoparasites on chicken in the study area. Good hygienic practices such as separate chicken houses, early routine treatments and use of insecticidal dust formation such as permethrins in addition to carbaryl for control of lice and mites should be advocated.

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## Compliance with ethical standards

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### Disclosure of conflict of interest

The author has no conflict of interest in this research.

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