

## Research Article

# Ectoparasitic Burden of Lice Infestations in Local and Exotic Breeds of Chickens in Maiduguri, Nigeria

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## Abstract

**Introduction:** This research was designed in order to determine the ectoparasitic burden of lice infestation in local and exotic breed of chickens and the relationships between age, sex, and management status of the infested and uninfested birds.

**Methodology:** A total of 515 chickens were examined at 12 different locations of Maiduguri and environs for the presence of lice in which the prevalence were obtained from each location; in order to determine the ectoparasitic burden of lice infestation in local and exotic breed of chickens and the relationships between age, sex, and management status of the infested and uninfested birds between April, 2018 and June, 2019.

**Result:** The overall prevalence of ectoparasitic burden of lice infestation in chickens from Maiduguri and its' environments examined between April, 2018 and June, 2019 was 17.5% (90 infested) while 82.5% (425) were non-infested. In order of abundance, it was found that *Menacanthus stramineus*, *Menopon gallinae*, *Lipeurus caponis*, *Goniodes gigas* and *Goniocotes gallinae*, were the most commonly infesting lice of poultry in the study area. Female chickens were more infested 66 (22.2%) than their male counterparts 24 (11.0%) ( $P < 0.05$ ). Adult chickens were more infested 82 (27.3%) than the younger ones 8 (3.7%) ( $P < 0.005$ ). Exotic chickens were more exposed to lice infestation 66 (21.3%) than local chickens 24 (11.7%) ( $P < 0.05$ ). Additionally, intensive managed chickens were more infested 69 (18.0%) than extensive managed chickens 21 (15.9%) ( $P > 0.05$ ). The thigh and breast muscle predominate by harbouring 51 (98.1%) of the biting lice, the vent recorded 23 (95.8%); while 14 (93.3%) was found under the wings.

**Conclusion:** It is highly imperative to investigate the presence of some hemoparasites associated with these lice species found on chickens in the study area in order to come-up with a comprehensive control and management of lousiness and lice associated parasites on chickens in the area.

## INTRODUCTION

'Poultry' is the common name given to domesticated birds which includes chickens, turkeys, pigeons, guinea fowls, quails, ducks and geese; that are reared by humans for various purposes among which include production of meat and meat products, for economic purpose, kept as pets and for companionship; used for games purposes as seen in cock fights and for security reasons as seen in Geese. Among the poultry birds, chicken are the most populated with regard to population and species composition [1-3]. Chickens are considered to be the most widely used poultry products in most rural areas in most developed and developing nations a like [4-6, 3]. They typically belong to the members of the super order *Gallanserae* (fowl), especially the order *Galliformes* which includes chickens, quails and turkeys [7]. Poultry meat has been reported to be the second most widely eaten meat

in the world, accounting for about 30% of meat production worldwide after pork 38% [8]. The Nigerian poultry population was estimated to be about 140 million with the backyard poultry type constituting about 60%, and thus, regarded as the most important form of poultry production due to its ease of management; with a flock sizes ranging from 5-50 [9]. Chicken is one of the most intensively reared species of poultry and one of the most established and lucrative animal products enterprises [10]. The economic significance of poultry production to the development of Gross Domestic Products (GDP), income and revenue generation and above all its impact on improving the nutritional status of many small holder farmers, women and other individuals of young, middle and old age bracket have been recognized by various government agencies and other non-governmental organizations as contained in the bulletin of F.A.O [11].

Poultry diseases are major source of impediments to their productivity in Nigeria [12, 5, 3]. These diseases include microbial and parasitic infections. The occurrence of microbial infection is due to the presence of several microbes that have the tendency to cause adverse effects in the gastrointestinal tract of poultry. Similarly, parasitic infections affect the productivity of chickens reared in the urban/rural areas [13-14, 3]. Ectoparasites such as lice, mites, ticks, fleas all have the capacities to parasitize some free range chickens [15-16]. These ectoparasites can lead to varying degrees of discomforts on the infected chicken, including dermatitis, irritation, and loss of blood thereby predisposing them to anaemia [17]. Additionally, some of these parasites may have zoonotic potentials in humans [15, 18-19].

Poultry lice are obligate parasites that spend their whole life on their host [20]. They are flightless and oviparous in nature; they all have chewing mouthparts and feed on dry skin scales, scab tissues, and feather parts. They also feed on blood when the bird's skin and feather quills are punctured. These parasites are highly abundant in rural areas practicing free-range poultry systems due to the inappropriate housing and lack of adequate pest control strategies [21]. During high parasitic burden, the host usually invests more in anti-parasite defense than on improving health and production [17]. Although, a lot have been done on the ecto-parasitic and endo-parasitic infestations of lice on poultry in Southern part of Nigeria, there is paucity of information on the ectoparasitic burden if lice infestation in Northern part of the country; more especially the north eastern part of Nigeria. Hence, this present study was embarked to determine the ectoparasitic burden if lice infestation and their risk factors in both local and exotic breeds of chicken in Maiduguri, North-eastern Nigeria.

## METHODOLOGY

### Study area and Sampling technique

This study was conducted in Maiduguri, the capital of Borno State, and the largest urban centre in the North-eastern part of Nigeria. The State lies within the arid and semi arid region of north eastern Nigeria, characterized by a rainy season of about four months duration, June-September and long period of dry season from October to May [22].

Stratified random sampling technique was employed for this work in which animals to be sampled were stratified into sex, age, breed and management. The study site includes; Maiduguri Monday market, Hausari, Gwange, Ngomari custin, Pompomari bypass, Ngomari airport, Senator (Dr.) Ali Modu Sheriff Veterinary Hospital, House of assembly estate, Budum, 202 housing estate, Bulunkutu, and Gamboru liberty ward. Each of these sites were visited once weekly during the sampling period.

### Collection of the lice

All lice found on the body of chickens under investigation were collected with help of a pen brush and or by hand picking them and transferred into a sample bottle containing 5% formalin and labeled properly. The louse was detached carefully to avoid decapitation and bottled with a label denoting the identity of the host, centre of collection, site of infestation, number collected at that site, date of collection and sample number. The specimens were brought to the Veterinary Parasitology Laboratory of

University of Maiduguri for identification. The specimens from each bottle were processed systematically for preparation of permanent mounts as described by [23].

### Processing and Identification of lice

The lice collected in 5% formalin were further washed in 10% potassium hydroxide then dehydrated using ascending grades of alcohols starting from 50%, 70%, 99% absolute alcohol. In each grade of alcohol the specimen was kept for 1 hour, followed by clearing with lactophenol for 24 hours. After clearing, each specimen was carefully taken on a glass slide and mounted with the help of DPX. The slide was allowed to dry which took approximately 48 hours for further reading. The lice were then identified under a light microscope using the identification of keys as described by [23-24].

## RESULTS

The results of this investigation as seen in Figures 1a to 1f shows the parasites identified in order of abundance from *Menacanthus stramineus*, *Menopon gallinae*, *Goniocotes gallinae*, *Goniodes gigas* and the least one *Liperus caponis*. (Figure 1a to 1f)

Figure 2 shows the overall prevalence of ectoparasitic burden of lice infestation in chickens from Maiduguri and its' environments. Out of the total 515 chickens examined from this study, 90 (17.5%) were infected with lice and 425 (82.5%) were non-lice infected. (Figure 2 & 3).

Prevalence of ectoparasitic burden of lice infestation on chickens based on location and predilection sites. A total of 515 chickens were examined at the 12 difference locations for the



Figure 1a *Goniodes gigas*.



Figure 1B *Goniodes gigas*.



Figure 1C *Liperus caponis*.

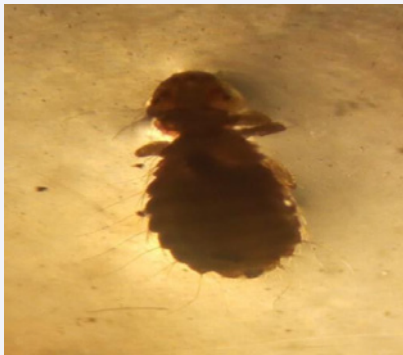


Figure 1D *Menacanthus stramineus*.



Figure 1E *Goniocotes gallinae*.

presence of lice in which the prevalence were obtained from each location (Table 1).

The ectoparasitic burden of lice infestation based on age, sex, breed, and management status of the chickens examined revealed that female chickens were more infested 66 (22.2%) than male 24 (11.0%) ( $P < 0.05$ ). Adult chickens are more infested 82 (27.3%) than young 8 (3.7%) ( $P < 0.005$ ). Exotic chickens are more exposed to lice infestation 66 (21.3%) than local chickens 24

(11.7%) ( $P = 0.005$ ). Also intensive management system chickens are more infested 69 (18.0%) than extensive management system chickens 21 (15.9%) ( $P > 0.005$ ) as seen in table 2.

### DISCUSSION

This study revealed that the lice *Menacanthus stramineus*, *Menopon gallinae*, *Goniodes gigas*, *Goniocotes gallinae*, and *Liperus caponis* are the most important lice of poultry in the semi-arid and arid region of the Northeastern Nigeria. The finding in this

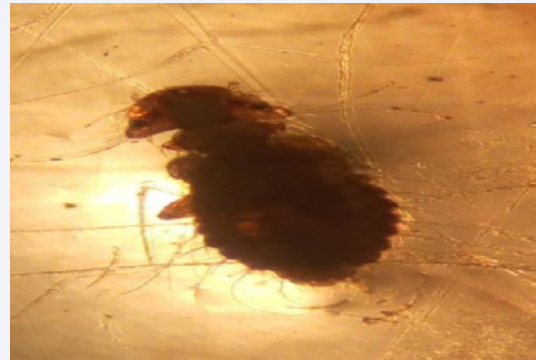


Figure 1F *Menopon gallinae*.

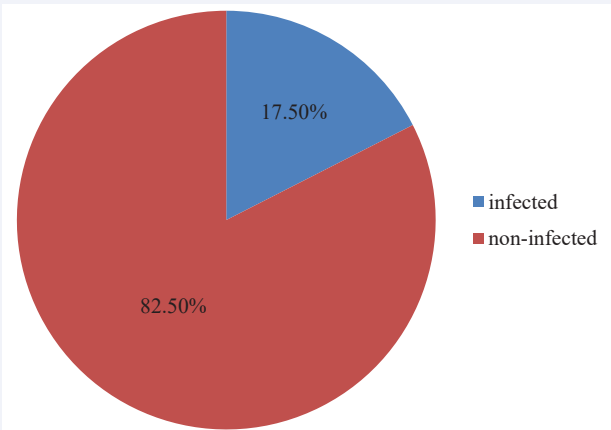


Figure 2 Overall prevalence of ectoparasitic burden of lice infestation in chickens from Maiduguri and environments.

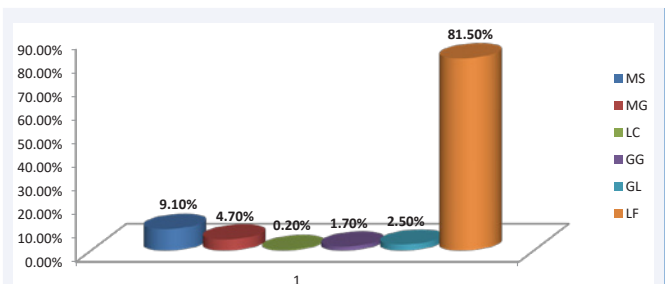


Figure 3 Prevalence of lice species identified on chickens from Maiduguri and environments.

Keys: MS: *Menacanthus stramineus*, MG: *Menopon gallinae*, LC: *Liperus caponis*, GG: *Goniodes gigas*, GL: *Goniocotes gallinae*, LF: Lice free

**Table 1:** Prevalence of ectoparasitic burden of lice infestation on chickens' base on location and predilection sites.

Factor	Category	Frequency	Prevalence (No. infected)
Location	202	4	0 (0)
	Monday market	43	0 (0)
	Ngomari custin	64	0 (0)
	Hausari	17	5.9 (1)
	Pompomari bypass	26	88.5 (23)
	Gwange	29	0 (0)
	Bulunkutu	51	0 (0)
	Ngomari airport	61	0 (0)
	SAS hospital	49	40.8 (20)
	House of assembly	60	50 (30)
	Budum	47	0 (0)
	Custom area	64	25 (16)
Predilection sites	Vent region	24	95.8 (23)
	Under wing	15	93.3 (14)
	Thigh and pectoral muscle	52	98.1 (51)

**Table 2:** Prevalence of ectoparasitic burden of lice infestation based on age, sex, breed, and management status.

Factor	Category	Frequency	Prevalence %(No. infected)	P-value (P<0.005)
Age	Young	215	3.7 (8)	0.0001
	Adult	300	27.3 (82)*	
Sex	Male	218	11.0 (24)	0.001
	Female	297	22.2 (66)*	
Breed	Local	205	11.7 (24)	0.005
	Exotic	310	21.3 (66)*	
Management status	Intensive	383	18.0 (69)	0.583
	Extensive	132	15.9 (21)	

Note: All values with asterisk as superscript are significantly higher than their corresponding opponents.

study corresponds to a similar observation reported in another geographical region of the country [25].

The difference in the ectoparasitic infestations among age in this study revealed the vulnerability of the older birds in scavenging and deplorable production systems and birds that over stayed their laying period harbors more lice with a peak infestation load being observed particularly during the hot humid season which conforms with earlier finding by [26]. This study had also revealed that even among the adult birds, female have higher prevalence than male; and that might be due to the long period they are kept for egg production and male are usually sold before reaching a year. However, even among the female those kept for laying purpose have more prevalence of lice infestation than those meant for meat.

One important finding from this study showed that birds in intensive management system have more prevalence of ectoparasitic burden of lice infestation than those in extensive system. That might be due to poor management and the fear

that introduction of acaricides at the commencement of laying or during active laying period might decreased their egg laying frequency; leaving the birds without acaricidal treatment for regular ectoparasitic control [27-28].

Studies on the various breeds under investigation revealed that revealed that lice infestation among the exotic breed is higher than in local breed. This is mainly due to higher infestation in layers, because there was very less prevalence in exotic male chickens may be due to the short period they stayed and they have less feathers that can comfortably provide a micro habitat for the lice to complete its life cycle.

## CONCLUSION

In conclusion, this study revealed the presence of lice infestation among both local and exotic breeds of chickens in Maiduguri and environs with *Menacanthus stramineus* being the most abundant species out of the six different species identified. Improper hygiene in intensive management systems appeared to



have a profound effect on the prevalence of lice infestation where adult laying chickens are the worst affected. Hence, in addition to sanitary management practices, routine chemotherapy and use of acaricidal preparations are essential for the control of poultry ectoparasites and the prevention of economics loss they caused.

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