



## ASSESSMENT OF ARTHROPOD ECTOPARASITES ASSOCIATED WITH POULTRY AT ZOOLOGICAL GARDEN, OWERRI, SOUTH-EAST, NIGERIA

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### Abstract

The characterization of arthropod ectoparasites infesting poultry at the Nekede Zoological Garden (NZG) in Owerri was conducted from May to July, 2017. Arthropod sampling was done weekly by picking them from the bodies of their hosts after parting the feathers and/or by blowing of same. Lice and fleas were collected by applying concentrated ethyl alcohol-soaked cotton wool to anaesthetize the parasites. Mites were collected by scrapping the skin around their feet gently in order not to injure the bird. All the parasites collected were sorted and labeled based on sex, age and breed before they were transferred to the Laboratory of the Department of Zoology and Environmental Biology, Michael Okpara University of Agriculture, Umudike. Specimens were observed under a stereo-microscope, using x10 magnification power. Identification to generic and specific levels was done with the aid of pictures and taxonomic keys. Data were analyzed using descriptive statistics such as frequency and percentages. A total of 165 ectoparasites were collected belonging to five genera and five species. Irrespective of sex, age, breed, species or/and management level, lice infestation was highest (84.24%), followed by fleas (10.30%) and the least was mites (5.45%). Prevalence of the ectoparasites infestation was higher in females (89.10%) than males (74.44%), adults (93.98%) than young (62.50%), and local (86.96%) than exotic (80.15%) breed. No ostrich was infested with lice and no female exotic poultry was infested with flea.

**Keywords:** Arthropod, ectoparasite, poultry, garden, infestation, prevalence

### Introduction

Domestic birds such as chickens, turkeys, ducks, guinea fowl, pigeons and more recently ostriches are referred to as poultry. They are kept for meat and/or egg production (Muazu *et al.*, 2008; Ugwu, 2009; Getu, 2014), and as employment and revenue source (Eduvie, 2002; Nnadi and George, 2010). Those that are of economic importance are chicken, guinea fowls and turkeys, with the chickens dominating (Adene and Oguntade, 2006; Ugwu, 2009; Kamani *et al.*, 2010; Omodele and Okere, 2014). According to studies in South-east Nigeria by Nnadi and George (2010), chicken represented 28% of the world total meat consumption compared to 26.5% for beef. It was also estimated that poultry provides 12kg of protein needs per inhabitant per year, whereas, cattle provides 5.3kg (Nnadi and George, 2010; Roy, 2013; Nghonjuyi *et al.*, 2014). Studies had concentrated on the prevalence of endoparasites and diseases of poultry in Nigeria; namely coccidiosis in Benue (Agishi *et al.*, 2016) and Niger (Eke *et al.*, 2016) States. *Mycoplasma gallisepticum* (Adesiyun and Abdu, 1985) and Helminths and coccidiosis are common in the South-east (Nnadi and George, 2010).

Arthropod ectoparasites are parasites found on external parts of the poultry and other animals. These parasites has been noted to be responsible for restlessness, skin damage, restricted growth, loss of weight in chickens, as a result of their bites (Fabiya, 2008). These parasites show morphological and physiological adaptations to enhance their living and existence on their host. They have on their piercing and sucking mouth parts, characteristic stylets enclosed in a sac beneath the head, as found in lice, their mouth parts are also armed with barbs which may not allow their forceful withdrawal from their host flesh as found in ticks. Lice also possess longer jaw constructed for biting and fleas are laterally compressed, possessing comb that helps to retain them amongst the fur of their host (Ikeme, 2002). Most ectoparasites also possess claws at tips of their legs that enable them to hold grip on their hosts hairs and feathers. The shape and size of ectoparasites are also modified. They are mostly small, some so small that they require microscopic observation like mites. Others can however, be seen with naked eyes since they are large enough like ticks and lice (Agbede, 2010).

Several studies have highlighted the importance of

ectoparasites in small animals (Nnadi and George, 2010; Scanes and Toukhsati, 2018). However, there are differences in respect to their frequency and geographical locations (Nithikathkul *et al.*, 2005; Shimada *et al.*, 2003; Abdu *et al.*, 2005; Tolossa *et al.*, 2009). Ectoparasitic infestations associated with the fur conditions and the colour shades of the chickens are scanty, particularly in the Southeast region of Nigeria. The objectives of this study were therefore to identify and characterize arthropod ectoparasites associated with poultry at Nekede Zoological garden (NZG) Owerri, Imo State. This information will provide baseline data to the zoo managers and information on how to combat arthropod ectoparasites infestation on their poultry. Furthermore, it will serve as a guide to researchers.

### Materials and Methods

The study was carried out at NZG, Owerri in Imo State. The Garden was commissioned on 23<sup>rd</sup> February, 1977 for recreational, aesthetic and wild-life education of the people of Imo State, Southeast, Nigeria. The climate of the area is tropical and the vegetation cover is typical of the rain forest type with two seasons (wet and dry). The mean annual rainfall is 250mm, while the temperature and humidity range from 25°C to 35°C and 70% to 80%, respectively.

**Consent for the Study and Sample Collection:** Prior to sample collection, consent for the study was sought from the management of the NZG Owerri. The collection of samples were done weekly by thorough examination of the birds and parasites picked from the body of the host by parting the feathers or/and by blowing of same. Lice and fleas were collected using a soaked cotton wool in concentrated ethyl alcohol which help to anaesthetize the parasites to make them immobile, and also to facilitate the forceful withdrawal of their mouth parts from their host. Mites were collected through scrapping the skin around the feet using slide edge gently in order not to injure the bird. All the parasites collected were labelled based on sex, age, breed, species and management of their hosts and then transferred to Department of Zoology and Environmental Biology laboratory, MOUAU. The specimens were warmed in 27% potassium hydroxide solution in a test tube for 2 minutes followed by rinsing with ionized water to clear the excess water in the tissues, thereafter, the specimens were dehydrated by passing them through graded series of ethanol (59%, 69%, 79%, 89%, 100%) following Malann *et al.*, (2008).

**Identification of the Ectoparasites:** Samples were viewed under stereo microscope, using x10 magnification power. These were done by placing each specimen on to a clean grease free slide with the aid of a pair of forceps. The samples were then identified by means of their taxonomic structures using the taxonomic keys. All the samples were treated in this manner, taking note of the location of the host's body they were extracted from. The record of birds infested

and ectoparasite species involved were determined.

**Data Analysis:** Data were analyzed using descriptive statistic such as frequency and percentages and the local and exotic breeds were compared using *t*-test.

### Results and Discussion

Localization of different ectoparasites on various parts of the poultry in NZG, Owerri are presented in Table 1. Results on the prevalence of *Menacanthus stramineus* (lice) collected from the body, trunk (51-65%), wings/feathers (36 -50%), perineum (26-35%), on the neck and thigh (11-25%), and none from the head and feet. *Echidnophaga gallinacean* (flea) were only found on the wings/under feathers (5-10%). *Knemidocopte smutans* (mite) were found on the feet (51-64%) only. Fig. 1, 2 and 3 presents the prevalence of ectoparasites on poultry in the NZG, Owerri. Lice and mite infestation were higher in female poultry compared with the males. Chicken were most infested, followed by pigeon, then guinea fowl. Ostriches had no lice infestation (Figs. 1 and 2). Similarly, mites were more preponderant on female birds than on their male counterparts. Higher numbers of mites were collected from exotic birds than the local breeds (Fig. 2). Flea infestation was visibly absent in female exotic poultry, but present on all local male and female breeds. It was also observed in male ostriches and chicken of the exotic breed (Figs 3). Table 2 shows the prevalence of arthropod ectoparasites infesting poultry at NZG Owerri. The prevalence rate of arthropod ectoparasites was 84.24%. This is similar to the findings of Malann *et al.* (2016) with 81.33%. This result is similar to 100% prevalence rate reported in Sokoto by Bala *et al.* (2011), but significantly higher than 6.67% reported in Bangladesh. This high prevalence rate could be attributed to poor management system adopted at the Owerri Garden where the birds are clustered resulting in cross infestation from one bird to another. Table 3 presents the arthropod ectoparasites infesting poultry at NZG, Owerri. The results show a higher infestation in female birds (89.10%) than male (74.44%); adult birds (93.98%) than young (62.50%) and local (86.96%) than exotic breed (80.15%). This finding is consistent with the results obtained in the report of Mekuria and Gezahegn (2010) and Bala *et al.* (2011). A similar report of higher prevalence of ectoparasites in local compared with exotic breeds was recorded in Ethiopia (Firaol *et al.*, 2014). Mites (*Knemidocopte smutans*), fleas and lice were preponderant at NZG Owerri. Lice had 84.24% infestation. This rate supports earlier report from Awka, Nigeria (Ifeoma *et al.*, 2008) and Thailand (Tanasak *et al.*, 2009). *Knemidocopte smutans* had a prevalence of 10.30% and fleas (5.45%) which contradicts results from others studies in different part of Nigeria. In contrast to earlier studies, ticks were not encountered in this present study. The percentage infestation of ectoparasites in NZG Owerri is high (82.50%), especially amongst the female birds. The poultry in the garden are more infested with lice. Lice, fleas and mites were the most common ectoparasites infesting both local and exotic poultry in Owerri Garden.

*Menacanthus stramineus* was the most prevalent species identified in chicken and pigeon, while *Knemidocopte smutans* and *Echidnophaga gallinacea* were the only species of mites and fleas, respectively recorded on the poultry.

### Conclusion

The present study concluded that lice was the most prevalent arthropod ectoparasite infesting all body parts of poultry at NZG, Owerri, Imo State Nigeria, whereas, mites and flea were localized on the feet and wings, respectively. Data also show that female birds were more infested with lice and mite, except in ostriches.

### Acknowledgement

Authors wish to thank the management and staff of Zoological Garden, Nekede, Owerri, Imo State for their assistance during the period of this study.

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**Table 1: Localization of different ectoparasites on various parts of poultry in Nekede Zoological Garden, Owerri, Imo State**

Ectoparasites	Category	Parts of the body								
		Birds infested	Head	Neck	Trunk	Wings/under feather	Thigh	Body	Feet	Perineum
<i>Menacanthus stramineus</i>	Lice	Chicken, pigeon	-	++	+++	+++	++	++++	-	++
<i>Lipeurus caponis</i>	Lice	Chicken, guinea fowl	-	-	-	++	-	+	-	-
<i>Gonoides meleagridis</i>	Lice	Chicken	-	-	-	++	+	+	-	-
<i>Knemidocopte smutans</i>	Mite	Chicken	-	-	-	-	-	-	++++	-
<i>Echidnophaga gallinacean</i>	Fleas	Chicken, pigeon, guinea fowl, ostrich	-	-	-	+	-	-	-	-

**Key:** - = Nil (infested body area)

+ = 5-10%

++ = 11-25%

+++ = 26-35%

++++ = 36-50%

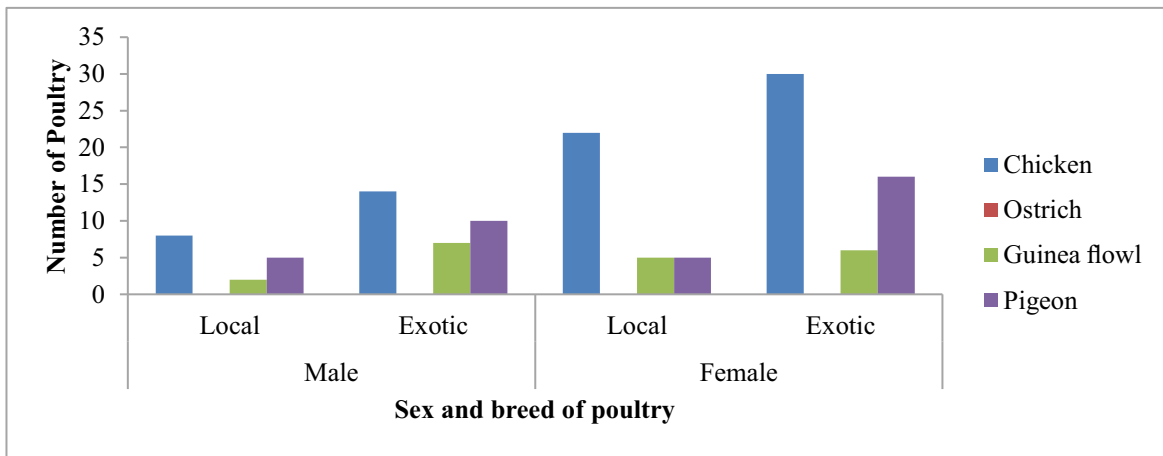
+++++ = 51-65%

**Table 2: Prevalence of ectoparasite at Nekede Zoological Garden Owerri, Imo State, Nigeria**

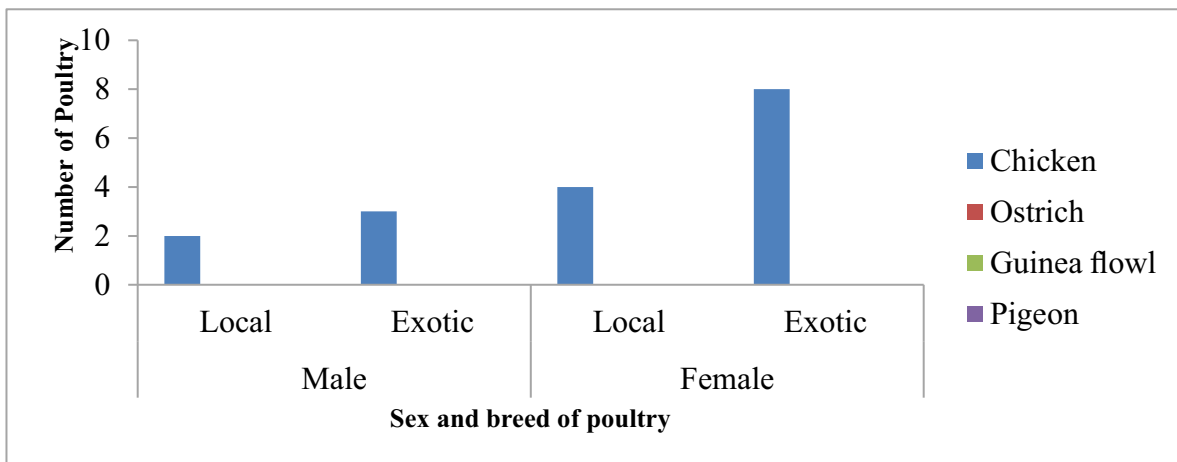
Common name	Ordinal name	Specific name	No. infested	Prevalence Rate (%)
Lice	Phthiraptera	<i>Menacanthus stramineus</i>	139	84.24
Mite	Mesostigmata	<i>Knemidocopte smutans</i>	17	10.30
Fleas	Siphonaptera	<i>Echidnophaga gallinacea</i>	9	5.45
<b>Total</b>			<b>165</b>	<b>100</b>

**Table 3: Arthropod ectoparasites infesting poultry at Nekede Zoological Garden Owerri, Imo State, Nigeria**

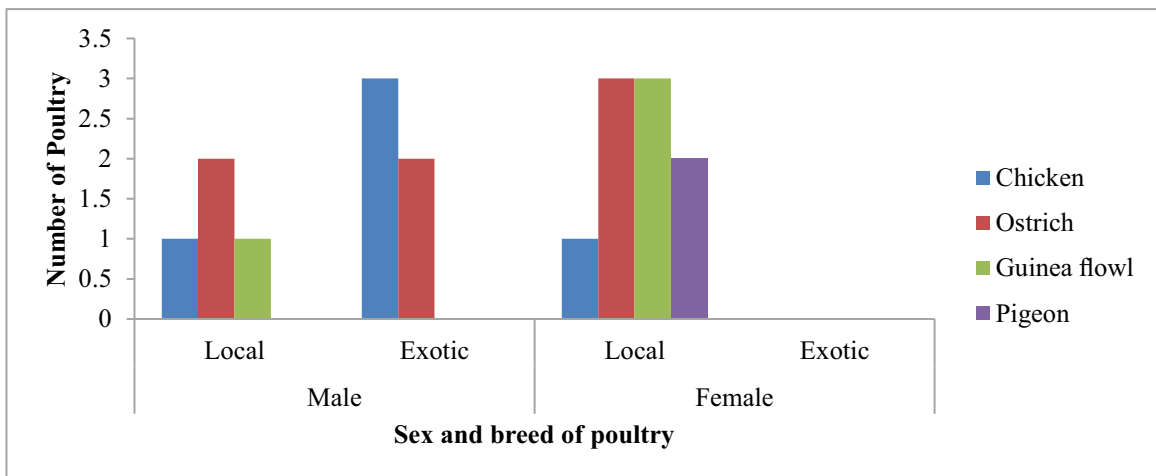
Factors	Categories	No Examined	No Infected	Prevalence Rate (%)
Sex	Female	110	98	89.10
	Male	90	67	74.44
<b>Total</b>		<b>200</b>	<b>165</b>	<b>82.50</b>
Age (Weeks)	5-7	67	40	62.50
	8-14	133	125	93.98
Breed	Local	69	60	86.96
	Exotic	131	105	80.15



**Fig. 1: Distribution of lice on poultry at Zoo Garden, Owerri (July, 2017)**



**Fig. 2: Distribution of mites on poultry at Zoo Garden, Owerri (July, 2017)**



**Fig. 3: Distribution of flea on poultry at Zoo Garden, Owerri (July, 2017)**