PREVALENCE AND HOST RELATED RISK FACTORS OF ECTOPARASITES ON DOMESTIC CHICKEN IN DUTSINMA LOCAL GOVERNMENT AREA KATSINA STATE

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Abstract

A snapshot study was conducted for 6 months to demonstrate association of relationship between hosts related factors and ectoparasite burden in domestic chicken in Dutsinma Local Government Area of Katsina State. Ectoparasite samples were randomly taken from domestic chickens. Morphological examination was carried out with the aid of light microscope and magnifying hand lens. A predesigned form was used to generate data on host related risk factors to ectoparasites of domestic chicken. Effect of host related risk factors to the prevalence of ectoparasite infestation did not show any difference (P>0.05) between sex, age group, coat colour and systems of production. The observed results of this study suggest that ectoparasites infestation is dominant in the study area. Therefore, effective preventive and control measures need to be instituted to mitigate the menace of ectoparasites in Dutsinma LGA.

Keywords: Chicken, Ectoparasite, Host, Infestation, Prevalence

INTRODUCTION

Ectoparasites play an important role in reducing the total poultry production potential of the country. Parasites are common in tropics, where the standard of poor husbandry practices and climatic conditions are favorable for the development of the parasites (Abebe et al., 1997). Ectoparasitism negatively affects the productivity potential of the local free-range chickens since they either compete for feed or cause distress to the chickens (Sabuni et al., 2010). Moyer et al (2002) noted that a parasite’s potential effect, or “pressure”, can influence the life history strategy of its host. In environments with high parasite pressure, hosts invest more in anti-parasite defense, which may limit their investment in other life history components, such as survival (Moyer et al., 2002) and production. Most ectoparasites (for example, lice), stay close to the host during their entire life cycle while others move from one host to the next quite frequently as ticks and mites (Yacob et al., 2009). Ectoparasites cause intense pain, irritation, slow weight gain, decreased egg production, and general poor and ill health (Urquhart et al., 1996, Kaufman, 1996). Lice are the most common ectoparasites of poultry, causing major economic loss to the productivity of animals (Fabiyi, 1980; Alamargot et al., 1985). Ectoparasites usually consume dead cells of the skin and tissue fluids, cause heavy morbidity by sucking blood, while other causes irritation to the birds, which adversely affects their economical productivity (Mullen and Durden, 2002; Perminet al., 2002; Mungube et al., 2006; and Nyoni and Masika, 2012). Reports have shown that mortality due to parasitic diseases is higher than those attributed to some poultry viral infectious diseases such Newcastle disease and fowl pox disease (Nnadi and George, 2010; Opara et al., 2014). The presence of fleas is generally associated with skin disorders (dermatitis), pruritus, severe itching and allergic reactions in infested hosts (Koutinas et al., 1995). Ectoparasites damage feathers and cause skin lesions, resulting in reduced performance of adult chickens and direct harm to young chicks (Arends, 2003). Despite their devastating effects, ectoparasites have received little attention in almost all the production systems. Hence, this study is seeking to determining the magnitudes of such parasites and identifying their types with view to proffer appropriate control methods. The study aims to determine the prevalence of ectoparasites in local chicken and to access the relationship between hosts’ related risk factors (age group, sex and coat colour) and ectoparasite prevalence in local chicken in the study area.
MATERIALS AND METHOD

Study Area

The study was carried out in Dutsinma Local Government Area, Katsina State, Nigeria. Dutsinma LGA lies on latitude 12°26’18"N and longitude 07°29’29"E. It is bounded by Kurfi and Charanchi LGAs to the north, Kankia LGA to the east, Safana and Dan-Musa LGAs to the west, and Matazu LGA to the southeast. Dutsinma LGA. The LGA has a land size of about 552.323 km² (203sqm) with a population of 169 829 as at 2006 national census (Federal Republic of Nigeria, 2012). The people are predominantly farmers, cattle reearers and traders. The climate of Katsina State is the tropical wet and dry type (tropical continental climate). Rainfall is between May and September with a peak in August. The average annual rainfall is about 700 mm. The pattern of rainfall in the area is highly variable. The mean annual temperature ranges from 29 °C – 31 °C. The highest air temperature normally occurs in April/May and the lowest in December through February. Evapo-transpiration is generally high throughout the year. The highest amount of evaporation occurs during the dry season. The vegetation of the area is the Sudan Savanna type which combines the characteristics and species of both the Guinea and Sahel Savanna (Abaje, 2007; Tukur et al., 2013).

Study Design

A cross sectional study was conducted for a period of six months. The study was carried out between January and June 2017 to estimate the prevalence of poultry ectoparasite infestation in Dutsinma. Two livestock markets (weekly market and Hayin-gada poultry market), five villages (Kagara, Ruwangamji, Shanga, Sabongari and Farinkasa), twenty-eight households and five commercial farms (Kofa, Banu, Federal University Livestock Farm, Garhi and Badole farms) were visited for sample collection of ectoparasites.

Sampling Method

A purposive sampling was used based on the consent of the owners of the chickens. A total of 944 chickens were selected and examined irrespective of the sex, age, groups and species of the chicken for the presence or absence of ectoparasites.

Examination and Screening of Ectoparasites

Screening for ectoparasites involved a thorough examination of the body of the birds including the head, cloaca brachial, ventral, and femoral areas as was carried out by Nwangu (2002). Those with parasites were identified and recorded. Similarly, those without ectoparasites were recorded. Samples taken from birds were examined by close inspection with naked eyes and magnifying lens (Nwangu, 2002). Ectoparasites found on the body of the birds were collected in sample bottles containing 70% alcohol. Collected samples were transported to Entomology laboratory, Faculty of Veterinary Medicine, Ahmadu Bello University, Zaria, Kaduna State for identification. The ectoparasites were dehydrated in a series of alcohol dilution of 80%, 90% and 100% before being cleared in xylene and mounted on a slide. Finally, the parasites were identified according to their morphological characteristics using entomological keys using light microscope (Nwangu, 2002).

Data Analysis

Ectoparasite prevalence was calculated with the formula:

\[ \text{Prevalence} \ (\%) = \frac{\text{Number of birds that were identified with a particular ectoparasite}}{\text{Total number of birds sampled during the study period}} \times 100 \]

Raw data and results of parasitological examination were analyzed using SPSS version 20®. Pearson’s Chi square ($\chi^2$) was used to determine the statistical strength of association between categorical variables, host related risk factors and prevalence of ectoparasites infestation. Values with P<0.05 were considered significant at 95% Confidence Interval (CI).

RESULTS AND DISCUSSION

Out of the total 944 chickens sampled in Dutsinma L.G.A, Katsina State, the following species of ectoparasites were identified: Echidnophaga gallinacea(Flea), Menacanthus stramineus (lice) and Argas persicus (tick)(Table 1)
Table 1: Prevalence of Ectoparasites in Domestic Chickens

<table>
<thead>
<tr>
<th>Type of Ectoparasite</th>
<th>Number of positive samples N=944</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ticks</td>
<td>40</td>
<td>4.24</td>
</tr>
<tr>
<td>Lice</td>
<td>8</td>
<td>0.85</td>
</tr>
<tr>
<td>Fleas</td>
<td>10</td>
<td>1.06</td>
</tr>
<tr>
<td>Total</td>
<td>58</td>
<td>6.15</td>
</tr>
</tbody>
</table>

N= Number of chickens Sampled

According to age group, this study showed that adult chicken with a prevalence of 5.30 were more infested by ectoparasites than growers with a prevalence of 0.85 (Table 2). The higher prevalence in adult chicken was associated with the fact that most of the chickens sampled were layer birds kept for egg production. The most prevalent ectoparasite found were ticks (*Argas persicus*).

Table 2: Ectoparasites Prevalence by Age Group of Chickens

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Number of chickens sampled</th>
<th>Number of positive sample</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young</td>
<td>12</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Grower</td>
<td>119</td>
<td>8</td>
<td>0.85</td>
</tr>
<tr>
<td>Adult</td>
<td>813</td>
<td>50</td>
<td>5.30</td>
</tr>
<tr>
<td>Total</td>
<td>944</td>
<td>58</td>
<td>6.15</td>
</tr>
</tbody>
</table>

P = 0.4 at 95% CI

This finding was in agreement with the works of Biu et al., 2007 in Nigeria and that of Permin et al. 2002 in Zimbabwe, who reported that Adult chickens were more infested as compared to younger chickens. Adult chickens may have had higher prevalence due their gregariousness relative to growers and chicks thus making them more susceptible. Also, growers and chicks have limited knowledge of their environments and as a result shuttle less distances (Nnadi and George 2010). We cannot advance reasons as to the variation in the prevalence of the various ectoparasites beyond the fact that this may be habitat related.
Table 3: Ectoparasite Prevalence by Coat Colour of the Chickens Sampled

<table>
<thead>
<tr>
<th>Coat Colour</th>
<th>Number of chickens sampled</th>
<th>Number of positive sample</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>55</td>
<td>1</td>
<td>0.11</td>
</tr>
<tr>
<td>Black</td>
<td>13</td>
<td>3</td>
<td>0.32</td>
</tr>
<tr>
<td>Brown</td>
<td>746</td>
<td>49</td>
<td>5.19</td>
</tr>
<tr>
<td>Mixed</td>
<td>130</td>
<td>5</td>
<td>0.53</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>944</strong></td>
<td><strong>58</strong></td>
<td><strong>6.15</strong></td>
</tr>
</tbody>
</table>

P = 0.5 @ 95% CI

Mixed coloured chickens (1.80) harbored more ectoparasites than single coloured chickens (white = 0.64, black = 1.06). The high infestation of ectoparasites in mixed coloured chickens may be due to the ability of the parasites to burrow and camouflage more in mixed colour than black and white colours. This camouflage may have enabled the parasites to live and multiply in mix coloured chickens. This agrees with Bala *et al.*, 2011 who reported that mixed coloured chickens were more infested than single coloured chickens.

Table 4: Ectoparasite Prevalence by Sex of the Chickens Sampled

<table>
<thead>
<tr>
<th>Sex</th>
<th>Number of chickens sampled</th>
<th>Number of positive sample</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>56</td>
<td>5</td>
<td>0.54</td>
</tr>
<tr>
<td>Female</td>
<td>888</td>
<td>53</td>
<td>5.61</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>944</strong></td>
<td><strong>58</strong></td>
<td><strong>6.15</strong></td>
</tr>
</tbody>
</table>

P = 0.4 at 95% CI

With regards to sex as a risk factor, there was a significant difference in the rate of infestation; female chickens (21.40) were more infested than male chickens (1.70). This finding is at tandem with that of Bala *et al.*, 2011 who reported that female chickens were more infested than male chickens. However, significant difference was reported between male and female by Belihu *et al.*, 2009 and Tolossa *et al.*, 2009 who reported that cocks were more infested than hens. The higher prevalence of ectoparasites in the female chickens may be as a result of the stationary state of the females during incubation which allows the female chickens to be more susceptible to ectoparasite infestations. In addition, the female chickens may emit some smell which may attract the parasites during incubation period (Bala *et al.*, 2011).

Table 5: Ectoparasite Prevalence in Relation to Management System

<table>
<thead>
<tr>
<th>System of production</th>
<th>Number of chickens sampled</th>
<th>Number of positive sample</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensive</td>
<td>780</td>
<td>46</td>
<td>4.87</td>
</tr>
<tr>
<td>Semi-intensive</td>
<td>78</td>
<td>6</td>
<td>0.64</td>
</tr>
<tr>
<td>Extensive</td>
<td>86</td>
<td>6</td>
<td>0.64</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>944</strong></td>
<td><strong>58</strong></td>
<td><strong>6.15</strong></td>
</tr>
</tbody>
</table>

P =0.5 @ 95% CI

In this study, ectoparasite infestation (mites, fleas, lice and ticks) were not associated with the intensively reared chickens but was found with the semi-intensively and the extensively reared chickens. Arend, 1997 noted that management could be a contributing factor to the type of ectoparasites that are...
predominating in chicken houses. Parasites are worrisome to the birds which bring about decrease in egg production especially in laying birds.

With regards to the risk factors examined, the prevalence of ectoparasite infestation did not show significant variation (P>0.05) between age groups, colour as well as systems of production of chicken while there was significant variation (P<0.05) for sex. The infestation with one or more types and species of ectoparasites observed in our study was in tandem with series of studies done by many researchers such as Abebe et al., 1997, Belihu et al., 2009 in Ethiopia, Swai et al., 2010 in Tanzania, Sabuni et al., 2010 in Kenya and Nnadi and George 2010 in Nigeria. The different species of ectoparasites identified in this study indicated the existence of diverse ectoparasite fauna in the study area.

The different types and species of ectoparasites as recorded in this study were similar to the studies of Permin et al., 2002, Soulsby, 1982, Abebe et al., 1997, Sexena et al., 1995, Korogu et al., 1999.

The overall prevalence of mite infestation was 0% which really contradicts the results of other studies. There were reports from some parts of Africa such as in Nigeria by Nnadi and George 2010, in Kenya by Sabuni et al., 2010, Yeshitila et al., 2011 in Ethiopia and Zumani Banda, 2011 in Malawi where mite infestation occurred in 2.1%, 2.2%, 100% and 1.5% respectively of the studied chickens. The difference observed in the prevalence of mites in these areas might be associated with poor hygiene in the farm and chicken houses as well as lack of control measures towards such parasites. In addition, it might also be due to the type of poultry management systems.

The overall lice infestation in this study (0.32%) was lower than the one reported by Yeshitila et al., 2011 in Ethiopia (35.1%), Belihu et al., 2009 in Ethiopia (84.3%), Nnadi and George, 2010 in Nigeria (62.2%) and Sabuni et al., 2010 in Kenya (14.5%). This could be due to the difference in the practices of ectoparasites control. It could also be due to the time or season of the year when samples were collected. From research (questions), lice infestation is very high at the onset of rainy season but tend to drop drastically when rainfall is fully established. *M. stramineus* was the only prevalent lice species from the study. This finding disagreed with the work of Belihu et al., 2009, Zumani Banda 2011, Yeshitila et al., 2011 and Sychra et al., 2008 who found other species of lice on chickens.

The overall prevalence of flea infestation observed in this study (0.53) was by far less than the report of Belihu et al., 2009 in Ethiopia, Swai et al., 2010 in Tanzania, Sabuni et al., 2010 in Kenya, Yeshitila et al., 2011 in Ethiopia and Nnadi and George 2010 in Nigeria who reported 51.2%, 75.3%, 1.5%, 6% and 35.7% respectively. The difference in hygienic and ectoparasite control practices might have played their role to such variations. Loss of chickens to ectoparasite infestation also, has played a role in the variation as many were already lost before study.

Higher infestation of ticks on chickens (4.24%) may be attributed to their non predatory attitudes towards the parasites as they were known to feed mostly on seeds and even though they feed on insects they do not feed on ticks. Another hypothetical explanation may be due to their indiscriminate roaming about for food the ticks could have easy access to them. This finding tends to agree with previous findings from Oluyemi and Roberts (2002) and Biu et al. (2007).

**CONCLUSION AND RECOMMENDATION**

Based on this study, it was deduced that ectoparasites of chickens are prevalent in Dutsinma Local Government Area, Katsina State. The study was able to establish significant relationship between host related factors of age and sex and high prevalence of ectoparasites in Dutsinma LGA.

The Katsina State government may consider initiating campaign for the control of ectoparasites as majority of its citizenry are livestock owners with majority keeping chickens alongside cattle and small ruminants. The control of these parasites will enhance poultry production and income for the farmers by providing enabling environment for commercial rearing of chickens in the study area.

**ACKNOWLEDGEMENT**

The authors acknowledge and appreciate the support of Parasitology Department, Ahmadu Bello University Zaria, Kaduna State in providing technical support in microscopic identification of the ectoparasites.
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