Research Paper

Prevalence and Economic Significance of Ectoparasites Infestation in Village Chickens (Gallus gallus domesticus) in Gombe, Northeastern Nigeria

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A cross sectional study was conducted from August 2014 to January 2015 to identify the prevalence of ectoparasites of village chickens and its associated economic significance in Gombe, Northeastern Nigeria. A total of 1025 village chickens were examined out of which 90.7% were infested with one or more ectoparasites species. Four types of ectoparasites genera were encountered in this study, 17.0% of the total chickens examined were infested with only one genera while 73.9% were infested with two or more different genera. Among the ectoparasites encountered, lice infestation (85.8%) was the most prevalent followed by mite (70.4%), Flea (27.3%) and tick (6.2%) in descending order of prevalent. Ten different species of ectoparasites, namely Menopon gallinae, Lipeurus caponis, Goniodes gigas, Cnemidocoptes mutans, Dermanyssus gallinae, Epidermoptes species, Laminosiopites cisticola, Megninia species, Echidnophaga gallinacean and Argas persicus were identified in the study. Menopon gallinae (5.0%) was most frequently encountered while Megninia species (2.7%) was least prevalent. The findings of this study showed that ectoparasites infestations are highly prevalent among village chicken flocks, which may likely affect their optimum productivity. This may be associated with inadequate husbandry systems, poor hygiene practice, inadequate control and preventive measures among others. Therefore, routine prevention and control of ectoparasites should be encouraged in the study area. Moreover, campaigns to create awareness and educate poultry farmers on the economic significance of ectoparasitism in village chickens productivity should be organized in Gombe State.

Key words: Prevalence, Ectoparasites Infestation, Economic significance, Gombe, Northeastern Nigeria, Village chicken.
INTRODUCTION

Village poultry production is an integral part of a balanced farming system; it has a unique position in the rural household economy supplying high quality protein to the family (Alders and Spradbrow 2001; Copland and Alders, 2005; Alders et al., 2009; Angyioreyi et al., 2015). It also serves as a source of easily disposable petty income for the rural dwellers (Alders et al., 2009). They require little labor intensity, affordable inputs and low initial investment compared to other livestock production activities (Alders and Spradbrow, 2001; Alders, 2004). It is also reported that village poultry play a significant role through their contribution to the cultural and social life of rural dwellers (Alders, 2004; Copland and Alders, 2005; Mwale and Masika, 2009). Among the village poultry species, village chicken in Nigeria represents a significant part of the national economy in general and the rural economy in particular (Lawal et al., 2015). Unfortunately, the majority of these chickens are maintained under traditional system with little or no inputs for housing, feeding or veterinary health care (Geidam et al., 2011; Hagos and Esthet, 2005; Belihu et al., 2010; Bala et al., 2011). These birds can easily be exposed to harsh environmental conditions or be infected with several types of diseases of bacterial, viral, fungal and parasitic pathogens (Mungube et al., 2006; Musa et al., 2008; Nyoni and Masika, 2012; Lawal et al., 2015). Among various parasitic diseases, ectoparasites infestations are of great economic importance in village chicken production systems (Belihu et al., 2010; Natala et al., 2009; Nnadi and George, 2010; Firaol et al., 2014). They 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; Permin et al., 2002; Mungube et al., 2006; and Nyoni and Masika, 2012).

Ectoparasitism has been identified as one of the major factors that threaten scavenging village chicken production systems in developing countries (Zumani, 2011). 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). Common ectoparasites of village chickens range from lice, mites, fleas and ticks (Nnadi and George, 2010). They may constitute a clinical problem and transmit a number of infectious diseases and can also act as transport/ intermediate hosts of a range of helminth parasites (Arends 2003; Marques et al., 2007; Firaol et al., 2014). Some of the ectoparasites, especially tick and mites acts as vectors of poultry diseases such as Pasteurellosis, Fowl Pox, Newcastle disease and possibly chlamydia (Nnadi and George 2010; Moyo et al., 2015). Parasitic infection or their concurrent infections has been known to result in immunosuppression, especially in response to vaccines against some poultry diseases (Horning et al., 2003; Nnadi and George, 2010). These parasites are common in rural settlements that usually practices extensive poultry husbandry systems where in most cases there is inappropriate housing and lack of appreciable pest control efforts (Mungube et al., 2006), whereas these facilities are usually provided in commercial exotic poultry production systems. High losses of village chickens due to diseases pose a serious threat to food security and livelihood of many rural families (Musa et al., 2008). It is believed that understanding the nature of parasitic diseases of birds will assist in devising the appropriate measures to improve the health and utility of these birds (Msoffe et al., 2010; Amede et al., 2011).

Ectoparasites may be a considerable constraint to Nigerians efforts to achieve increased production of village chickens and chicken products to enhance food security, alleviation of poverty and improvement of job creation among youth so as to meet the demand of the fast growing populace of the country. Information available on the distribution of ectoparasites in village chickens in some parts of Nigeria are those of Bunza et al. (2008), Bala et al. (2011) and Usman et al. (2012) in Sokoto State northwestern Nigeria, George et al. (2004) in Zaria North Western Nigeria, Ekpo et al. (2010) in Abeokuta Ogun State, Audi and Asmau, (2014) in Kano State, Sadiq et al. (2003) in Ibadan, Eneanya et al. (2008) in Akwa – Anambra and Biu et al. (2007; 2012) in Maiduguri North Eastern Nigeria.

At present, no routine government policy and activity is in place for routine control and prevention of village chicken ectoparasitism in Nigeria. Adequate control practice of ectoparasites in rural areas is not carried out. Research on ectoparasitism of livestock has mostly been concentrated on ticks and biting flies in ruminants (Cattle, sheep and goats) because of economic significance of ectoparasite borne diseases (Omudu and Amuta, 2007; Onojafe, 2008; Ohaeri and Ugwu, 2013; Obi et al., 2014; Adang et al., 2015).

However, no studies were conducted on village chickens ectoparasites in Gombe, Northeastern Nigeria, where the village chickens serves as source of petty income generation and food. Thus, the current study was undertaken to determine the prevalence of ectoparasites in village chickens, identifies species of ectoparasites infesting village chickens and evaluate the economic significance of ectoparasites infestation in Gombe, Northeastern Nigeria.

MATERIALS AND METHODS

Study area

The study was carried out within Gombe metropolis. Gombe township lies between Latitude 10º08’N and 11º24’ E and longitude 11º 02’ N and 11º 18’E of the
Greenwich Meridian (Figure 1). The size of the town is 20,265 km², with a population of about 200,000 inhabitants. Gombe town is between 400-450 feet, above sea level. The occupation of most of the inhabitants is agriculture which includes village poultry, cattle, sheep and goat rearing under the extensive and semi-intensive
animal husbandry management systems. The annual rainfall ranges between 850-1000 mm, with two distinct seasons. The rainy season which starts from May to October and dry season, from November-April. Average daily temperatures are 34ºC in April and 27ºC in August. The relative humidity ranges from 70-80% in August and decreases to about 15-20% in December. The natural vegetation is typically that of the Sudano-Sahelian Savannah, which is composed of shrubs, herbs, grasses and sparsely distributed trees. Cereals such as ground nut, maize, guinea corn, millet and cowpea are predominantly grown in the area and provide enough fodder for the animals (Anonymous, 2003).

**Sampling procedure**

One thousand and twenty five village chickens which comprises of both sexes and various ages were sampled from localities within the Gombe metropolis. Household with moderately large numbers of village chickens population and that are willing to voluntarily cooperate with the sampling procedures were randomly selected and included in the study, while some of the selected farmers were tipped with incentives before allowing the use of their birds for the sampling procedures of ectoparasites infestations. Sampling was carried out for a period of six months on weekly basis. Ectoparasites were collected from the body of the birds using the forceps-picking and feather-brushing methods described by Angyireyiri et al. (2015). The entire body of the bird was thoroughly inspected and gently brushed with a fine soft brush; special attention was paid to under the wings as recommended by Angyireyiri et al. (2015). In the case of strong attachment and embedded ticks, the ticks were removed using chloroform by dabbing the ticks and the skin. Lice, fleas and mites were collected by dipping a brush in ethanol before combing and brushing the feather/skin of the bird onto a white blotting paper (Wall and Shearer, 2001). The parasites collected were preserved in 70% ethanol in well labeled glass vials and other data were recorded accordingly.

**Parasitological procedures**

Investigation for ectoparasites infestation in birds was performed by carefully parting feathers horizontally against the anatomical direction of alignment so as to expose parasites and allow visual inspection of the skin and other parts of the birds’ body (Yacob et al., 2009).

<table>
<thead>
<tr>
<th>Study location</th>
<th>Number of chickens examined n = 1025</th>
<th>Number of chickens affected</th>
<th>Relative Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jakadafari</td>
<td>96</td>
<td>91</td>
<td>94.8</td>
</tr>
<tr>
<td>Bolari</td>
<td>105</td>
<td>93</td>
<td>88.6</td>
</tr>
<tr>
<td>Harwagana</td>
<td>101</td>
<td>95</td>
<td>94.1</td>
</tr>
<tr>
<td>Tudunwada</td>
<td>99</td>
<td>89</td>
<td>89.9</td>
</tr>
<tr>
<td>Pantami</td>
<td>114</td>
<td>106</td>
<td>93.0</td>
</tr>
<tr>
<td>State Lowcost</td>
<td>96</td>
<td>83</td>
<td>86.5</td>
</tr>
<tr>
<td>GRA</td>
<td>89</td>
<td>72</td>
<td>80.9</td>
</tr>
<tr>
<td>Gabukka</td>
<td>108</td>
<td>105</td>
<td>97.2</td>
</tr>
<tr>
<td>AngwanDawaki/ Ajiya</td>
<td>117</td>
<td>107</td>
<td>91.5</td>
</tr>
<tr>
<td>MallamKuri</td>
<td>100</td>
<td>89</td>
<td>89.0</td>
</tr>
<tr>
<td>Total</td>
<td>1025</td>
<td>930</td>
<td>90.7</td>
</tr>
</tbody>
</table>

**RESULTS**

Table 1 shows the results of the prevalence ectoparasites
Table 2. Ectoparasites encountered according to parasitic infestation (single or mixed infestations) in Gombe, Nigeria.

<table>
<thead>
<tr>
<th>Parasitic infestation</th>
<th>Type of ectoparasite encountered</th>
<th>Number of chickens affected (y)</th>
<th>Relative Prevalence (%) (y/1025) x 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single infestation</td>
<td>Lice</td>
<td>136</td>
<td>13.3</td>
</tr>
<tr>
<td></td>
<td>Fleas</td>
<td>12</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>Mites</td>
<td>17</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>Ticks</td>
<td>8</td>
<td>0.8</td>
</tr>
<tr>
<td></td>
<td>Lice and Fleas</td>
<td>52</td>
<td>5.1</td>
</tr>
<tr>
<td></td>
<td>Lice and Mites</td>
<td>461</td>
<td>45.0</td>
</tr>
<tr>
<td></td>
<td>Fleas and Mites</td>
<td>14</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>Lice, Fleas and Mites</td>
<td>174</td>
<td>17.0</td>
</tr>
<tr>
<td></td>
<td>Lice, Mites and Ticks</td>
<td>28</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>Lice, Fleas, Ticks and Mites</td>
<td>28</td>
<td>2.7</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>930</td>
<td>90.7</td>
</tr>
</tbody>
</table>

Single ectoparasites infestation sum up into 17.0% while the mixed ectoparasitic infestation sum up into 73.9% of the total prevalent rate in the study areas.

Table 3. Prevalence of different species of ectoparasites according to the infested anatomic site on village chickens in Gombe, Nigeria.

<table>
<thead>
<tr>
<th>Type of ectoparasites</th>
<th>Species of Ectoparasite encountered</th>
<th>Predilection site</th>
<th>Total Number of birds affected (y)</th>
<th>Relative Prevalence (%) (y/1025) x 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lice</td>
<td>Menopon gallinae</td>
<td>Feather shafts and all over the body</td>
<td>513</td>
<td>50.0</td>
</tr>
<tr>
<td></td>
<td>Lipeurus caponis</td>
<td>Under the large wing feathers</td>
<td>227</td>
<td>22.1</td>
</tr>
<tr>
<td></td>
<td>Goniodes gigas</td>
<td>Within body feathers</td>
<td>139</td>
<td>13.6</td>
</tr>
<tr>
<td></td>
<td>Cnemidocoptes mutans</td>
<td>Lower limbs (non-feathered areas)</td>
<td>347</td>
<td>33.9</td>
</tr>
<tr>
<td>Mites</td>
<td>Dermanyssus gallinae</td>
<td>Entire body</td>
<td>142</td>
<td>13.9</td>
</tr>
<tr>
<td></td>
<td>Epidermoptes species</td>
<td>On the body</td>
<td>173</td>
<td>16.9</td>
</tr>
<tr>
<td></td>
<td>Laminosioptes cysticina</td>
<td>On subcutaneous tissue</td>
<td>32</td>
<td>3.1</td>
</tr>
<tr>
<td></td>
<td>Megninia species</td>
<td>On feathers (quills)</td>
<td>28</td>
<td>2.7</td>
</tr>
<tr>
<td>Flea</td>
<td>Echidnophaga gallinacea</td>
<td>Around the Comb, wattles, eyes and ears</td>
<td>280</td>
<td>27.3</td>
</tr>
<tr>
<td>Tick</td>
<td>Argas persicus</td>
<td>Ventral abdominal area and beneath the wings</td>
<td>64</td>
<td>6.2</td>
</tr>
</tbody>
</table>

infestation in Gombe metropolis according to study location. Out of the ten different study location visited for village chicken examination in Gombe, the following prevalent rates were encountered in descending order: Gabukka (97.2%), Jakadafari (94.8%), Harwagana (94.1%), Pantami (93.0%), AngwanDawaki/Ajiya (91.5%), MallamKuri (89.0%), Tudunwada (89.9%), Bolari (88.6%), State Lowcost (86.5%), GRA (80.9%).

Table 2 shows the results of the ectoparasites infestation in Gombe, Nigeria. Out of the total one thousand and twenty five village chickens examined, nine hundred and thirty (90.7%) were infected with one or more types of ectoparasites, namely; lice, fleas, mites and ticks. In single infestation, 33.3% birds had lice, 1.2% fleas, 1.7% mites and 0.8% had ticks. Of the 930 infested birds, 17.0% had single, while 73.9% had mixed infestations. Mixed infestations of ectoparasites was encountered as follows: lice and fleas (5.1%); lice and mites (45.0%), fleas and mites (1.4%); Lice, Fleas and Mites (17.0%), Lice, Mites and Ticks (2.7%), Lice, Fleas, Ticks and Mites (2.7%). Table 3 shows the results of the prevalence of different species of ectoparasites according to the infested anatomic site on village chickens in Gombe, Nigeria. Lice (85.8%) were the most prevalent ectoparasite encountered, while mites (70.4%), flea (27.3%) and ticks (6.2%) were also encountered in this study. In species specific prevalence, the prevalent rates encountered was as follows in descending order: Menopon gallinae (50.0%) which were seen on the feather shafts and all over the body of examined birds, Cnemidocoptes mutans (33.9%) found around the lower limbs (non-feathered areas), Echidnophaga gallinacea (27.3%) around the Comb, wattles, eyes and ears, Lipeurus caponis (22.1%) found under the large wing feathers, Epidermoptes species (16.9%) found on some parts of the body Dermanyssus gallinae (13.9%)
found on entire body, *Goniodes giga* (13.6%) found within body feathers, *Argas persicus* (6.2%) found around the ventral abdominal area and beneath the wings, *Laminosioptes cysticola* (3.1%) on subcutaneous tissue and *Megninia species* (2.7%) found on the on feathers (quills).

**DISCUSSION**

The present study revealed the occurrence of various species of ectoparasites within different external anatomical parts of village chickens following thorough body examination of each randomly sampled bird. It has been established that ectoparasites are important constraints to village chickens production system. This study have revealed varying prevalent rate of ectoparasitism in village chickens with higher prevalent rates of 97.2%, 94.8% and 94.1% encountered in Gabukka, Jakadaifarzi and Harwagana areas respectively while 86.5% and 80.9% prevalent rates were found in Gombe State Lowcost quarters and Government Residential Area (GRA) respectively. Four types of ectoparasites genera were encountered in this present study in all the study areas. The prevalence of ectoparasites infestation encountered in village chicken production system in this study was 85.8% lice, 70.4% mite, 27.3% flea and 6.2% tick of different species. This finding is consistent with the finding of Sabuni et al. (2010).

Ectoparasites were found on different body parts of the examined chickens. Wherever part of the birds' body ectoparasites infest, they cause lot of irritations by their biting and sucking activities. This may distracts the birds from its normal activities such as feeding, incubation of eggs and such parasites also serves as transmitters of blood parasitic diseases (Wall and Shearer, 2001; Shanta et al., 2006; Hobbenaghi et al., 2012). The observed overall prevalence rate of ectoparasites (90.7%) in village chickens from the study areas was considerably high, which indicated that ectoparasite infestation is a common problem among this class of poultry in the study areas. This high prevalence of ectoparasitism may be associated with the provision of poor housing facilities (Figure 2) for village chickens in some of the study areas, which creates conducive environment for the breeding of the diverse parasitic arthropods. It have been well established that ectoparasitic infestation has direct or indirect effects on the productivity of village chickens in developing countries of Africa such as Tanzania (Swal et al., 2009); Ethiopia (Belihu et al., 2010; Tekuria and Gezahegn, 2010; Tolossa and Tafesse, 2013); Kenya (Mungube et al., 2008; Sabuni et al., 2010); Ghana (Angiereyiri et al., 2015); Zimbabwe (Permin et al., 2002; Mukaratirwa et al., 2009); Malawi (Njung a, 2003; Zumani, 2011); Nigeria (Sadiq et al., 2003; Bui et al., 2007; Natala et al., 2009; Nnadi and George, 2010; Ekpo et al., 2010; Bala et al., 2011; Biu et al., 2012). However, varying high prevalence rate of 91.5% (Belihu et al., 2010), 86.67% (Shanta et al., 2006), 83.85% (Mulugeta et al., 2013) and 100% (Ekpo et al., 2010; Bala et al., 2011) have been reported in different study. The difference between our findings and that of the other previous researches may be due to breed or ecotypes of birds, seasonality of infection, management / husbandry systems, agroecological, and implemented methods of the parasitic control (Mungube et al., 2008; Tekuria and Gezahegn, 2010; Bala et al., 2011). Our study was conducted during rainy season towards early dry season of the year (August to January) while others might have conducted ectoparasites samples collection during the dry season of the year (Belihu et al., 2010) or during heavy rainy season (Firaol et al., 2014).

Ectoparasites infected chickens in the present study were found to harbor single or mixed infestation of ectoparasite species. 17.0% of the total examined chickens were found to be infested with single species of ectoparasites while 73.9% were infested with mixed ectoparasitic infestation. The mixed ectoparasitic infestation of chickens found in this study was lower than 81% ectoparasitic infestation reported by Al-Saffar and Al-Mawla (2008) in Iran but higher than 48.21% reported by Firaol et al. (2014) and 67.4% reported by Amede et al. (2011) in Ethiopia. However, the single infestation of 19% reported by Al-Saffar and Al-Mawla (2008) was slightly higher than that of our findings. The observed variation in the proportion of single and mixed infestation in village chickens would be related to difference of implementation of management system and whether or not strategic ectoparasitic control measures were adopted in the various study areas.

In our study, lice infestation (85.8%) was the most prevalent followed by mite (70.4%), Flea (27.3%) while tick infestation (6.2%) was the least prevalent ectoparasites. The finding of this current study is consistent with report of Tekuria and Gezahegn (2010) from Ethiopia and Sabuni et al. (2006) from Kenya in which 88% and 90% of lice was reported respectively. These findings may be related to favourable climatic condition for the successful breeding and development of the parasites in the study areas (Hopla et al., 1994).

Ten species of ectoparasites, namely *Menopon gallinae*, *Lipeurus caponis*, *Goniodes giga* (Lice); *Cnemidocoptes mutans*, *Dermayssus gallinae*, *Eipdermite species*, *Laminosioptes cysticola*, *Megninia species* (Mites); *Echidnophaga gallinaeae* (Flea) and *Argas persicus* (Tick) were identified in the present study. This finds is consistent with those of Bala et al. (2011) and Mukaratirwa and Hove (2009) that reported ten and eleven different ectoparasites respectively in village chickens during a similar study. However, most of these species were also reported from different parts of the African countries such as Zimbabwe (Mukaratirwa and Hove, 2009), Ethiopia (Mulugeta et al., 2013),
Malawi (Zumani, 2011), South Africa (Mukaratiwa and Khumalo, 2012; Moyo et al., 2015) including Nigeria (Ikpeze et al., 2008; Ifeoma et al., 2008; Bala et al., 2011, Usman et al., 2012). This indicates widespread of these ectoparasite species in village chickens in most of the African countries including Nigeria. Although variations in the findings might be due to the numbers of birds examined, type of management system practice, climatic and geographic (altitudinal) difference among the various study areas. Among the identified ectoparasite species found on the examined village chickens, Menopon gallinae was most frequently identified (50%) species while Megninia species (2.7%) was the least encountered ectoparasite species. The dominance of Menopon gallinae over other species of lice was also previous reported by Sabuni et al. (2010), Deepali et al. (2005) and Ilyes et al. (2013). This was attributed to high humidity in their study areas which favours the breeding of the parasites. However, the prevalent rate of Menopon gallinae encountered in this study is consistent with the finding of Saxena et al. (2004) and Radfar et al. (2012) who reported close rate of 51.3% and 55.93% respectively. Our findings is lower than 97.7% and 83.18% reported by Sabuni et al. (2010) and Ilyes et al. (2013) respectively, but higher than 44.95% reported by Mulugeta et al. (2013); 47.4% (Mukaratiwa and Hove, 2009), 34.0% (Zumani, 2011), 8.1% (Bala et al., 2011) and 14.8% (Amede et al., 2011). The prevalence of 22.1% of Lipeurus caponis encountered in this study is higher than 5% reported by Bala et al. (2011) and 0.67% report of Belihu et al. (2010), but lower than 32% and 48% reported by Esliami et al. (2009) and Shanta et al. (2006) respectively. Prevalence of Goniodes gigas (13.6%) is slightly lower than 14.5% reported by Audi and Asmau (2014) but higher than 6.5% reported by Moyo et al. (2015) who carried out similar study. Cnemidocoptes mutans (33.9%) encountered in this study is in line with 34.5% reported by Firaol et al. (2014). Dermanyssus gallinae (13.9%) encountered in this study was lower than 71.2% and 10.1% reported by Zumani (2011) and Moyo et al. (2015). Epidermoptes species (16.9%) encountered in this study is lower than the finding of Sabuni et al. (2010) who reported 83.2% prevalence of the parasite in village chickens in their study area. The finding of Laminosioptes cysticola (3.1%) encountered in this study is higher than 0.4% reported by Mukaratiwa and Hove (2009). Megninia species (2.7%) encountered in this study have rarely been reported in village chickens in Nigeria but have been reported in Kenya by Sabuni et al. (2010).

The finding of ectoparasites of unique species in village chickens population may possibly occur where this class
of birds is reared within the same environments or enclosures with other livestock species (cattle, sheep, goats, rabbits) (Asadollahi et al., 2014; Adang et al., 2015), companion animals (cats, dogs) (Karshima et al., 2010; Shitta et al., 2011; Adamu et al., 2012), wild domesticated birds (Ostriches, doves, peacocks or parrots) or other domestic birds species (guinea fowl, turkeys, ducks or pigeon) especially where these animals are reared under unhygienic husbandry systems (Ekpo et al., 2010; Radfar et al., 2012; Audi and Asmau, 2014; Al-Mayali and Abdul-Kadhim, 2015; Angyiereyiri et al., 2015). Prevalence of Echidnophaga gallinaceaun (27.3%) encountered in this study is lower than 50.7%; 71.9%; 44.4% and 51.16% reported by Moyo et al. (2015), Mukaratiirwa and Hove (2009), Firaol et al. (2014) and Belihu et al. (2010) respectively, but higher than 9.4% and 0.89% reported by Bala et al. (2011) and Biu et al. (2012). Argas persicus (6.2%) was the only tick species of birds encountered in this study. This finding was consistent with the findings of Bala et al. (2011), Mulugeta et al. (2013) and Mukaratiirwa and Hove (2009) who recorded 8.8%, 4.97% and 5.2% respectively in a similar study. However, Bunza et al. (2008) reported 62.2% prevalence of Argas persicus in village chickens in a survey to study the ticks in domesticated birds. Considering the respective findings reported in the various works, the difference might be due to the numbers of birds examined during various study, type of management system practice, climatic and geographic (altitudinal) difference among the various study areas.

**Conclusion**

Village poultry production has formed an integral part of livestock production systems in most developing countries including Nigeria. They serve as source of petty cash and high quality protein derived respectively from sales and consumption of poultry products (meat and eggs), yet this potential lucrative enterprise is still the most neglected in terms of management, husbandry practice and particularly veterinary health care, especially in rural communities where majority of the village chickens are reared. Generally, the finding of the present study clearly indicated that ectoparasites infestations are highly prevalent in scavenging village chickens production and management system which is associated with inadequate hygienic system, poor husbandry / management, lack of Strategic ectoparasites control practices. In most villages chicken production system, the economic importance of ectoparasites and the havoc caused by heavy infestation are generally overlooked by farmers. This may be reflected by low productivity and increased loss of the birds especially during period favourable to breeding of the parasites. Poor housing facilities can create hiding places for the parasite and this may jeopardize effort made toward control and treatment. It is assumed that arthropods in poultry houses can generate continuous infestation even following treatment of environment using insecticides.

**Recommendations**

In order to improve village chicken production in Gombe, there should be provision of modern veterinary health centers and competent veterinarians to manage poultry diseases especially diseases caused by menace of ectoparasitic infestation, this might reduce higher distribution and persistence of ectoparasites in birds. Farmers should be educated on the economic importance of ectoparasites infestation in their village chicken flocks and also be trained on how to carry out the strategic control measures. The role of the State Veterinary Services (and veterinarians) is of paramount importance to assist village chicken farmers in using the correct control products and dosing to avoid building even further acaricide resistance. Knowledge transfer between veterinarians, scientists and the farming communities would also avoid misusing control methods which on a long term will bring more problems to the poultry industry.

**AUTHORS’ DECLARATION**

We declare that this study is an original research by our research team and we agree to publish it in the journal.

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