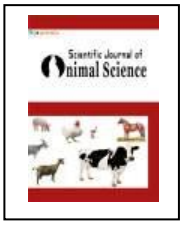
Sjournals
Scientific Journals
Scientific Journal of Animal Science (2014) 3(2) 64-69
ISSN 2322-1704
doi: 10.14196/sjas.v3i3.1205

Contents lists available at Sjournals
Scientific Journal of Animal Science
Journal homepage: www.Sjournals.com



Original article

Prevalence and seasonal variation of mallophagan species (phthiraptera) in free-range chickens from rural localities of oran, Algeria

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ARTICLE INFO

Article history,
Received 19 February 2014
Accepted 06 March 2014
Available online 15 March 2014

Keywords,
Mallophaga
Lice
Chickens
Traditional
Oran

ABSTRACT

A total of 192 free-range chickens was randomly collected from rural localities in the region of Oran (Algeria) and examined to detect the presence of *Mallophagan species* and their prevalence, mean intensity and seasonal variation. Eight species were recorded, Chelopistes meleagridis, Cuclotogaster heterographus, Goniocotes gallinae, Goniodes dissimilis, Goniodes gigas, Lipeurus caponis, Menacanthus cornutus and Menopon gallinae. Goniocotes gallinae was the most prevalent lice identified (95,31%). The infection rate was higher in males compared to female chickens with a significant difference (P<0,05). The total number of Mallophagan species encountered was higher in winter season than in the other seasons.

1. Introduction

Traditional poultry production is an important activity in rural localities of Algeria. It's also a vital element in diversifying farming production and growing household food security (Kitalyi, 1998). In this type of extensive farming, free-range chickens are in permanent contact with parasites. Among parasites, chewing lice are ectoparasites of increasing interest in veterinary medicine (Price and Graham, 1997). Twelve Mallophagan species have been noted in domestic chickens (Price et al., 2003). These comprise, Cuclotogaster heterographus (Nitzsch, 1866), Goniocotes gallinae (De Geer, 1778), Goniodes dissimilis (Denny, 1842), Goniodes gigas (Taschenberg,

1879), Lagopoecus sinensis (Sugimoto, 1930), Lipeurus caponis (Linnaeus, 1758), Lipeurus tropicalis (Peters, 1931) Menacanthus cornutus, Menacanthus pallidulus, Menacanthus stramineus (Neumann, 1912), Menopon gallinae (Linnaeus, 1758) and Oxylipeurus dentatus (Sugimoto, 1934). A strong infestations cause serious economic consequences with weight loss, decrease in egg production and deficits in weight gain in young birds (Ferrero et al., 2004).

In the region of Oran, *lice* have been surveyed out in the present study. The prevalence, mean intensity and the seasonal variations of Mallophagan species present in chickens in different traditional farming are determined.

2. Materials and methods

2.1. Study areas

The area of Oran is located in the North-West of Algeria (Figure 1), characterized by a Mediterranean climate with dry summer, warm winter and long hot.

The annual average temperature is 18°C. January is the coldest month (12° C on average), and August is the hottest month (32° C on average).

The annual rainfall is of about 326 mm.

2.2. Study animals

A total of 192 free range adult chickens of mixed sex (96 males, 96 females) chosen at random, at a frequency of 16 chickens per month were deloused between December 2010 and November 2011 to obtain the data regarding the population composition of different *chewing lice*.

2.3. Chewing lice collection and identification

The chicken was sprinkled with an insecticide then put in a small place on a sampling surface during 60 minutes. During this period, most of parasites die and fall. Then, feathers were ruffled while the chicken was kept over the sampling surface in order to salvage the remaining parasites (Clayton and Walther, 2007).

Those parasites were collected and kept in flasks containing 70% ethanol.

The lice were placed in lacto-phenol for clarification before identification. Species determination was based on microscopic examination to study their morphological characteristics for identification. The identity of the lice species was established using identification guides by Emerson (1956).

2.4. Data Analysis

Pearson chi-square test was used to compare the prevalence, mean intensity, sex and seasonal distribution with the statistical software SPSS v19. Statistically significant differences were considered when $P<0.05$.

3. Results and discussion

3.1. Mallophaga species and prevalence

The study carried out in the area of Oran has shown 192 chickens were affected by parasites on the 192 chickens with one or more species of lice, i.e. an infestation rate of 100%. Eight species were recovered during the present study (Table 1). They include Chelopistes meleagridis, Cuclotogaster heterographus, Goniocotes gallinae, Goniodes dissimilis, Goniodes gigas, Lipeurus caponis, Menacanthus cornutus and Menopon gallinae.

Nevertheless, it is important to notice that other species were not observed in the area of Oran. Sychra et al (2008) of whom works were made in the east of the Czech Republic, had put seven species in an obvious place, among them Menacanthus stramineus and Goniocotes microthorax were not found in the area of Oran.

Works of Trivedi et al (1992) in India, mention eight Mallophagan, among them Lipeurus lawrensis tropicalis was not identified in this study.

The mallophagan species noted in this study exceeds largely the species noticed by Mukaratirwa and Khumalo (2012) in South Africa, Banda (2011) in Malawi and Kumar et al (2004) in India.

The recording of high prevalence of lice and the large spectrum in the present study could be related to the traditional breeding, the thermal regulation and the humidity in the area of Oran.

The most prevalent species was Goniocotes gallinae with a mean prevalence of 95,31%. Menopon gallinae had the second highest prevalence (89,06%), followed by Lipeurus caponis (58,33%) Goniodes gigas (30,2%) and Goniodes dissimilis (28,64%). Other species, Cuclotogaster heterographus (18,22%) and Menacanthus cornutus (15,62%). Chelopistes meleagridis (3,12%) was the least frequently recorded.

Table 1
Different species and prevalence of Mallophagan lice identified on chickens in the area of Oran.

Sex / Species	Number examined		Number of positive		Prevalence (%)		
	Males	Females	Males	Females	Males	Females	Average
Chelopistes meleagridis	96	96	4	2	4.16	2.08	3.12
Cuclotogaster heterographus	96	96	20	15	20.83	15.62	18.22
Goniocotes gallinae	96	96	94	89	97.91	92.70	95.31
Goniodes dissimilis	96	96	31	24	32.29	25	28.64
Goniodes gigas	96	96	37	21	38.54	21.87	30.2
Lipeurus caponis	96	96	60	52	62.5	54.16	58.33
Menacanthus cornutus	96	96	17	13	17.7	13.54	15.62
Menopon gallinae	96	96	90	81	93.75	84.37	89.06

Sychra et al (2008) also reported that Goniocotes gallinae was the most prevalent among mallophagan species in the east of the Czech Republic. Many other investigations have found Goniocotes gallinae to occur with high prevalence (Mukaratirwa and Khumalo, 2012; Morariu et al, 2008).

While Bala et al (2011) had noted that Goniocotes gallinae is the species with the lower prevalence in the areas of Sokoto metropolis in Nigeria.

This could probably be attributed to the fact that the species is highly adapted and prevalent in humid areas of Oran.

3.2. Prevalence according to host sex

The infection rate was higher in males compared to female backyard chickens (Table 1). The analysis showed that lice were significantly ($P<0,05$) more prevalent in males than in the females.

Several studies have shown that males are often more heavily infected by parasites (Poulin, 1996; Schalk and Forbes, 1997). This difference can be attributed to physiological differences, nutrition and behavior (Zuk and McKean, 1996).

According to studies of Grossman (1985), Hillgarth and Wingfield (1997), steroid hormones, including testosterone, progesterone and oestrogens have direct or indirect effects on the immune system and parasite development.

Body size may also explain this difference in infection by sex. In chickens, males are generally bigger than females and there is good suggestion that parasite load correlates with host size.

Also males are more expected to engage in behaviors, such as aggression and dispersal that increase the likely-hood of contact with ecto and endoparasites (Zuk and McKean, 1996)..

Mean intensity and Seasonal Distribution

The mean intensity of Mallophagan species recovered during the present investigation is mentioned in (Figure 2).

A total of 31776 Mallophagan species was collected, with an average of 165,5 lice/chicken. The parasite load and mean intensity studies also revealed significantly high infection rates for Goniocotes gallinae (63,83 lice/chicken) and Menopon gallinae (56,25 lice/chicken) compared with the other species found ($p< 0,05$).

Goniocotes gallinae was shown to be an important Mallophagan species of chickens. Although this is generally considered to be a relatively harmless parasite, a high infestation can cause a bird agitation with serious economic consequences.

The lower parasite intensity of Lipeurus caponis (27 lice/chicken), Goniodes gigas (8,58 lice/chicken), Goniodes dissimilis (5,81 lice/chicken), Cuclotogaster heterographus (2,49 lice/chicken) and Menacanthus cornutus (1,5 lice/chicken) may be due to the large size of these lice which are easily removed by preening and dusting applied by the hosts.

The very low mean intensity of Chelopistes meleagridis (0,08 lice/chicken) is the fact that chicken is not host specific of this specie, more commonly known as the large turkey louse; this can be explained by the direct contact between chicken and turkey in mixed farms.

Fig. 1. Location of Study Area.

The total number of Mallophagan species encountered was higher in winter season than in the other seasons. Significant ($p < 0.05$) seasonal differences were observed in mean numbers of Goniocotes gallinae, Menopon gallinae, Cuclotogaster heterographus and Menacanthus cornutus (Figure 2).

Which had high mean intensity per bird during the winter (422,17lice/chicken) compared to the summer (64,8 lice/chicken).

Chickens have a very heavy infestation by Goniocotes gallinae and Menopon gallinae from January to March with a peak in February (200 and 160 lice/chicken respectively). Then the parasite load decreases from April to Septembre.

Cuclotogaster heterographus and Menacanthus cornutus disappear in July but are reappearing in the month of November when few parasites were collected from chickens (2 and 1 lice/chicken respectively).

Lipeurus caponis is *most abundant* in the spring and summer. The mean intensity recorded for this species amounted to 30 in April, 32 in May and 45 in June with a peak of 54 lice/chicken in July. Then the parasite load decreases from August to March.

There were no significant seasonal differences in the mean intensity for Goniodes gigas and Goniodes dissimilis.

The higher infestation during the winter may be due to the efforts of thermoregulation caused by the host during the cooling season. Thus changing their feeding behavior may increase their vulnerability to infections (Nelson, 2004).

The results of this study are in line with other studies in the world (Al-Iraqi and Hamad-Ameen, **2012;** Al-Nakshabandy, 2002; Wall and Shearer, 1997).

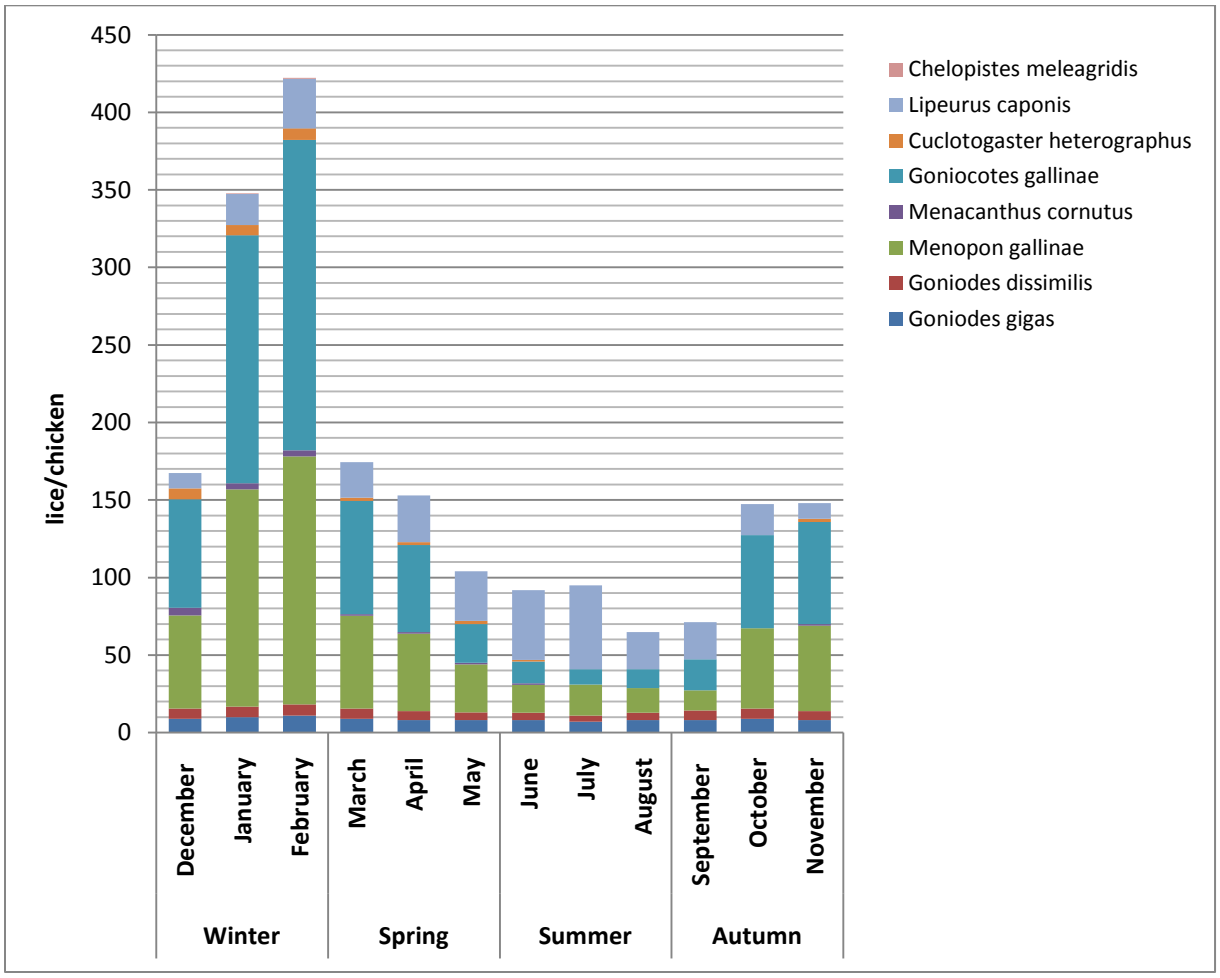

Fig. 2. The mean intensity of Mallophagan lice encountered during the seasonal survey.

4. Concluction

It is concluded that the vast majority of the rural free-range chickens in Oran are infested with lice. The prevalence as well as intensity of Mallophagan species infections, particularly with Goniocotes gallinae, considerably increases in winter. The results indicate that it is essential to adopt control strategies in order to minimize the risks of strong infestations in rural free-range chickens.

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