

ISSN 1682-8356
ansinet.org/ijps



INTERNATIONAL JOURNAL OF
POULTRY SCIENCE

ANSI*net*

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Prevalence and Distribution of Chewing Lice (Phthiraptera) in Free Range Chickens from the Traditional Rearing System in the Algerian North East, Area of El-Tarf

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Abstract: A study was carried out on 144 local chickens (*Gallus gallus domesticus*), from rural area of El-Tarf to determine the prevalence of chewing lice (Phthiraptera). The overall prevalence rate was 100% in the El-Tarf poultry. Nine different species of chewing lice were identified during this study: *Menopon gallinae*, *Goniocotes gallinae*, *Lipeurus caponis*, *Goniodes dissimilis*, *Goniodes gigas*, *Menacanthus stramineus*, *Cuculogaster heterographus*, *Menacanthus cornutus* and *Menacanthus pallidulus*. *Menopon gallinae* (97.2%) was the most prevalent lice identified. The mean intensity of lice in the area of El-Tarf was 172.5 per chicken. *Menopon gallinae* was the species which has the highest mean intensity of infestation (83.2%). The distribution of nine chewing lice on poultry and their most preferred sites was determined.

Key words: Chewing lice, phthiraptera, chickens, rural, Algeria

INTRODUCTION

The traditional poultry production is an extensive farming method, practiced especially in rural areas. This method of farming can play a major role in the fight against poverty, as far as income, animal proteins availability and means of strengthening social links are concerned (Sychra *et al.*, 2008).

The promotion of this farming, already marginalized in Algeria (since the implementation of development programme of the poultry sector, based on the intensive farming at the beginnings of the 1980) (Moula *et al.*, 2009), involves control of feeding as well as some pathologies which sometimes puts a strain, very heavily, on farming return (Salifou *et al.*, 2003).

Among these pathologies, there are parasitic diseases, more precisely parasitological dermatosis caused by chewing lice. The lack of comfort caused by pruritus and the pathogenic power of lice, lead to various lesions (feather loss, scabs, grazes) and a bird agitation with serious economic consequences during strong infestations. Chewing lice of the family Menoponidae are more pathogenic compared with those of the family Philopterae, because they have an abrasive power on the integument, much greater; *Menacanthus stramineus* and *Menacanthus cornutus* fit in the blood flowing from stitching sores, causing anaemia and the death of the chicken (Brugere-Picoux and Silim, 1992; Banda, 2011; Trivedi *et al.*, 1990). According to many authors, some chewing lice (*Menacanthus stramineus* and *Menopon gallinae*) can transmit germs like *Pasteurella multocida*, *Salmonella gallinarum*, *Escherichia coli* and *Streptococcus sp.*, (Trivedi *et al.*, 1990).

Although this importance, few parasitological studies were carried out specifically of chickens lice in Algeria.

This article describes the results of a parasitological survey carried out in order to determine the prevalence and the different species of lice present in chickens in different traditional farming in the area of El-Tarf in Algeria.

MATERIALS AND METHODS

Study areas: The area of El-Tarf is on the far north-east of the county. It is open to all midfield:

- The Mediterranean sea in the north
- The sub-littoral plains of Annaba in the west continuously with Bounamoussa palins
- Bouchegouf upper reaches and from the north-east of the county of Guelma
- The mountainous region of the south (county of Souk-Ahras)
- The Tunisian frontiers in the east, a land place of international exchanges

It has a Mediterranean climate, characterized by a great pluviometry, a hot summer and a mild wintry temperature. It is one of the most watering areas in the north of Africa.

The annual average temperature is 18°C. January and February are the coldest months (10°C on average). July and August are the hottest months (30°C on average). Because it is so close to the sea, this one plays the role of the condenser of tropical air masses and humid areas (Tonga Lake, Oubeira Lake, Mallah Lake) undergo

an evaporation, which is sometimes intense because of getting sunshine, they are the origin of high atmospheric humidity.

Animals of the study: The study was carried out on 144 adult chickens; aged of more than 6 months of a local breed, the average weight is of 1020 ± 230 g for chickens and of 1550 ± 340 g for cocks. These chickens come from 70 farming area of a size between 04 and 30.

Chewing lice collection: Lice were collected on chickens chosen at random, at a frequency of 12 chickens per month between March 2008 and April 2009. For each chicken, the following manipulations were done.

In order to determine the location of different species of lice, different parts of the body were searched with meticulous care: the head and the neck feather, the feet, the skin, the wing feathers, the belly feathers, the rump and tail feathers.

For lice hard to be captured, 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, 1997).

Those parasites species were collected, using a slim line-rimmed pair of pliers and kept in flasks containing alcohol at 70°C.

Chewing lice identification: In the laboratory, identification of species was carried out under an optical microscope after a clarification made with lacto-phenol according to Emerson (1956), Tuff (1977), Furman and Catts (1982), on the basis of morpho-anatomic differences, specifying the stage of development and the sex.

Data analysis: Collected data were analyzed using SPSS software v19 statistics. Pearson chi-square test was used in order to compare the prevalence and the parasitological charges of lice on chickens in the area of El-Tarf. The influence of the sex, the localisations and the poly-infestations of lice were estimated.

RESULTS AND DISCUSSION

Identification of collected chewing lice: The study carried out in the area of El-Tarf has shown 144 chickens were affected by parasites on the 144 chickens put under study by at least one species of lice, i.e., an infestation rate of 100%.

During the 12 months, we had collected 24852 lice.

The test under optical microscope of lice, allowed identifying nine species of lice belonging to the suborders Amblycera and Ischnocera.

Amblycera: Four species:

Menopon gallinae
Menacanthus stramineus
Menacanthus cornutus
Menacanthus pallidulus

Ischnocera: Five species:

Lipeurus caponis
Goniocotes gallinae
Cuclotogaster heterographus
Goniodes dissimilis
Goniodes gigas

The chewing lice found on the chickens of our study were already described in the literature (Tuff, 1977; Furman and Catts, 1982; Zumpt and Schimitschek, 1968). No documented or published providing list on chickens' lice is yet available for Algeria.

The number of species noted in this study, exceeds largely the number noticed by Aldryhim (1991) in Saudi Arabia, by Köroglu *et al.* (1999) in the area of Elazig in Turkey, Gabaj *et al.* (1993) in Libya, Permin *et al.* (2002) in Zimbabwe and Sychra *et al.* (2008) in the Czech Republic.

Probably, the environment, the thermal regulation and the high humidity in the area of El-Tarf, are the origin of this diversity in species.

Tchedre (1998) in Gambia had shown that the environmental conditions in poultry in traditional environments are favourable for the survival and the multiplication of ectoparasites specially lice of the genus *Menopon* (Salifou *et al.*, 2009).

Prevalence of different species of lice: Assessment of louse prevalence in chickens according to the species (Fig. 1), shows a strong predominance of *Menopon gallinae* (97.2%), followed by *Goniocotes gallinae* (46.5%), *Lipeurus caponis* (41.6%), *Goniodes dissimilis* (34.7%), *Goniodes gigas* (31.9%), *Menacanthus*

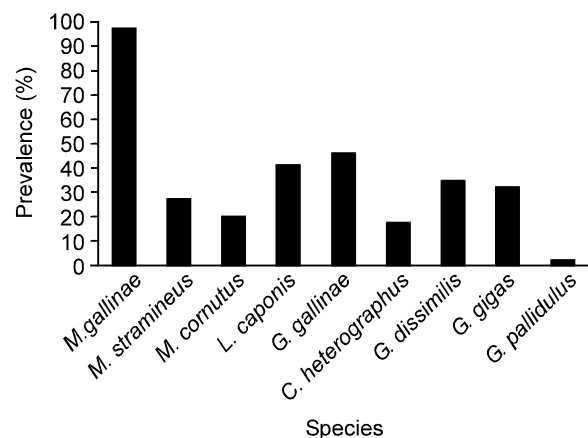


Fig. 1: Prevalence of different of species

stramineus (28.5%), *Cuclotogaster heterographus* (18.75%), *Menacanthus cornutus* (20%) and *Menacanthus pallidulus* (2%).

A difference significantly more increased was noticed concerning the prevalence of *Menopon gallinae* (photo 1) compared with the other species found ($p < 0.05$).

The dominance of *Menopon gallinae* was cited in works of Deepali *et al.* (2005) in his study in the area of Himachal Pradesh in India, of Prelezov and Koinarski (2006) in the area of Stara Zagora in Bulgaria, but also of Marin-Gomez and Benavides-Montano (2007) in Columbia. These two late authors had found a predominance of *Menopon gallinae*, followed by *Goniocotes gallinae* and *Lipeurus caponis*. This increased importance of these three species is also noticed in our work.

While Sychra *et al.* (2008), had noted that *Goniocotes gallinae* is the species with the higher prevalence (100%) in the east of the Czech Republic.

Intensity of infestation: Chewing lice infested chickens with an average parasitical charge of 172.54 lice/chicken (Table 1). This density is higher than the one noticed by Koroglu *et al.* (1999) in the area of Elazig in Turkey (4.4 to 14.29).

This importance of chewing lice infestation on chickens in the area of El-Tarf, could be explained by the absence of handling of these parasites and the lack of hygiene in farming places. In Algeria, traditional farming on a family scale is lead by small farmers and other breeders without skills (Moula *et al.*, 2009) and without specific knowledge of these parasites and means of fighting against them.

Menopon gallinae is the species presenting the higher infestation intensity (83.2 lice/chicken) i.e., dominance 48.20 compared with other chewing lice found with a significant statistical difference ($p < 0.05$). The intense humidity in the area of El-Tarf could explain, for the most, the difference between these values, for it plays a major role in the survival of this species. Fabiyi (1996), in his works on chickens' lice in Niger, pointed out that the *Menopon gallinae* shows a high level of infestation especially in the most humid period of the year. He also pointed out that *Menacanthus cornutus*, *Cuclotogaster heterographus*, *Goniodes gigas* show a weak infestation during the very humid period of the year.

In the 9 species identified, the number of adult lice is higher than the number of nymphs and female lice (66.2%) were predominant compared with males (33.8%).

However, this difference is not significant in statistical terms.

The effect of lice sex on the infestation intensity overlaps the one noticed by Prelezov and Koinarski (2006). According to the same authors, number of female and male individuals is well-balanced for most living organisms, with a moderate domination of females and this should also be valid for ectoparasites (Prelezov and Koinarski, 2006).

Association and distribution of chewing lice: The poly-infestation seems being customary on studied chickens where associations of chewing lice are common. 131 chickens (91%) were infested with at least two species of lice, with *Menopon gallinae* which is the most associated species compared with other chewing lice.

Table 1: Intensity of infestation of different species of chewing lice identified on chickens in the area of El-Tarf, Algeria

Species	No. lice					No. of lice/chicken
	Female	Male	Nymph	Total		
<i>Menopon gallinae</i>	6534	3010	2434	11978		83.18
<i>Goniocotes gallinae</i>	3077	2009	558	5644		39.19
<i>Lipeurus caponis</i>	2376	961	224	3561		24.72
<i>Goniodes dissimilis</i>	802	475	212	1489		10.34
<i>Goniodes gigas</i>	733	418	71	1222		8.48
<i>Menacanthus stramineus</i>	201	113	100	414		2.87
<i>Cuclotogaster heterographus</i>	197	130	66	393		2.72
<i>Menacanthus cornutus</i>	78	36	7	121		0.84
<i>Menacanthus pallidulus</i>	21	6	3	30		0.2
Total	14019	7158	3675	24852		172.54

Table 2: Distribution and infestation levels of lice identified on chickens

Species	Region of body (%)						
	Neck	Wishbone	Back	Belly	Wings	Rump	Tail
<i>Menopon gallinae</i>	6	26	28.5	30.2	1	5.3	3
<i>Goniocotes gallinae</i>	0	25	30.6	33.4	0	11	0
<i>Lipeurus caponis</i>	0	3	2	0	65	0	30
<i>Goniodes dissimilis</i>	0	22.1	53.3	24.6	0	0	0
<i>Goniodes gigas</i>	0	0	9	70.1	0	11.9	0
<i>Menacanthus stramineus</i>	0	7	43.1	46.7	0	3.2	0
<i>Cuclotogaster heterographus</i>	98.9	1.1	0	0	0	0	0
<i>Menacanthus cornutus</i>	2	17.5	45.5	35	0	0	0
<i>Menacanthus pallidulus</i>	0	0	0	100	0	0	0

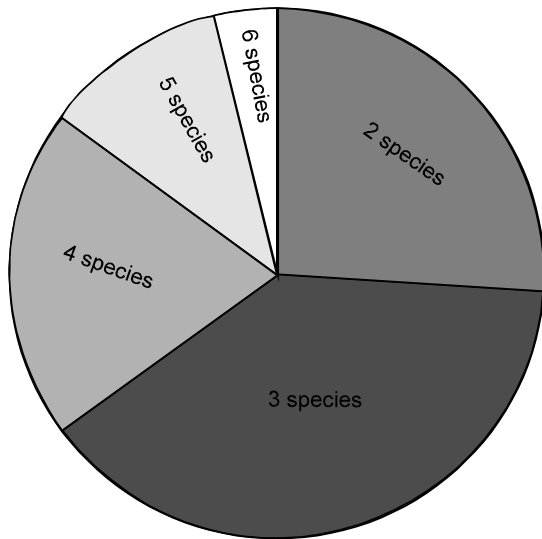


Fig. 2: Percentage of the association of chewing lice

Altogether, 26% of chickens were infested with two species of lice (Fig. 2). The association of three species of lice was noticed in 39% of chickens, while the association of four, five and six species of lice was noticed in 20, 11 and 4% of species, respectively.

The infestation with *Menopon gallinae* and *Goniocotes gallinae* was the most common association in chickens infested with two species. The dominance of this association was cited by Sychra *et al.* (2008) in their study on chickens in the Czech Republic.

The nine species of lice were found in different places of the body, especially in the neck, the wings, the back, the wishbone, the belly, the rump and the tail feathers (Table 2).

The *Menopon gallinae* is spread over all the chicken body with a slight dominance over the belly feathers (30.2%), while the other species were noticed on six locations.

Over the neck feathers it was the *Cuclotogaster heterographus* which stands out (98.9%).

The majority of *Goniodes dissimilis* was located above all on the back feathers.

On the belly feathers, it was above all *Goniodes gigas* and *Goniocotes gallinae* which were noticed.

On the wings feathers, this is the *Lipeurus caponis* which stands out.

Menacanthus stramineus, *Menacanthus cornutus* prefers above all the belly and the back feathers.

Except for *Menopon gallinae*, a significant connection between the louse species and its location was noticed on the body of the chicken ($p < 0.05$).

Our results are compared with those of Trivedi *et al.* (1991), who had carried out a similar study in India.

Santos-Prezoto *et al.* (2003) had also noticed that *Menopon gallinae*, *Goniocotes gallinae* and *Goniodes*

gigas are, for the most part, located in the belly feathers, with respective percentages of: (52.1%), (60.7%) and (76.3%). Our results are akin to these authors results.

According to Clay (1957), lice with a round body prefer the short neck feathers where they could not be squashed during the night; whereas those who have a flat body prefer the back and the wings.

Conclusion: Our study is the first work being interested in the chickens' lice, which are high according to the extensive farming in Algeria.

The chewing lice are sharply present in the area of El-Tarf, among which the *Menopon gallinae* is the predominant species. Two other hematophagous species, *Menacanthus stramineus* and *Menacanthus cornutus*, responsible of economic losses, are also present.

This situation is closely linked to the traditional farming method practiced in the area of El-Tarf and needs an immediate intervention which aims to minimize the damage and ensure the promotion of the traditional poultry farming.

Therefore, fighting measures associating the anti-interference handling to the hygiene of places are proving to be necessary.

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