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Short communication

Chewing lice (Phthiraptera) on chickens (*Gallus gallus*) from small backyard flocks in the eastern part of the Czech Republic

O. Sychra *, P. Harmat, I. Literák

Department of Biology and Wildlife Diseases, Faculty of Veterinary Hygiene and Ecology, University of Veterinary and Pharmaceutical Sciences, Palackého 1-3, 61242 Brno, Czech Republic

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Abstract

One hundred and sixty chickens (*Gallus gallus*) from 31 small, private backyard flocks in the eastern part of the Czech Republic were examined for chewing lice (Phthiraptera: Amblycera, Ischnocera). At least one species of chewing lice was found on every bird examined. Seven species of chewing lice were identified in all; they had the following prevalences and mean intensities: *Goniocotes gallinae* (100%; 110 lice), *Menopon gallinae* (88%; 50), *Menacanthus stramineus* (48%; 17), *Lipeurus caponis* (35%; 12), *Menacanthus cornutus* (12%; 9), *Cuclotogaster heterographus* (1%; 4) and *Goniocotes microthorax* (1%; 3). Just two birds from a single flock were heavily infested with the ischnoceran species *G. gallinae*.

Keywords: Menoponidae; Philopteridae; Poultry; *Gallus gallus*

1. Introduction

Chewing lice (Phthiraptera: Amblycera, Ischnocera) are important poultry ectoparasites. Living mainly on the skin, amblyceran lice may cause irritation of the skin, restlessness, overall weakening, cessation of feeding, loss of weight, inferior laying capacity, and skin lesions that may become sites of secondary infection (Mullen and Durden, 2002; Wall and Shearer, 2001). The most pathogenic are hematophagous species—*Menacanthus stramineus* (Nitzsch, 1818) and *Menacanthus cornutus* (Schömmer, 1913). They may cause anaemia, heavy multi-focal skin lesions or even death of infested birds (Derylo, 1974; Njunga, 2003; Prelezov et al., 2006). Chewing lice living on feathers, such as ischnocerans, although causing damage to feathers, affect their hosts much less than do amblycerans (Mullen and Durden, 2002; Price et al., 2003). With regard to the economic importance of chewing lice on poultry, various aspects of their biology have been studied, such as distribution on the host body, population dynamics, geographical distribution or economic harmfulness (Derylo, 1974; Fabiyi, 1996; Njunga, 2003; Trivedi et al., 1991; Zlotorzycka, 1981).

Twelve valid species of chewing lice have been recognised in domestic chickens (*Gallus gallus*) (Price et al., 2003). These include four amblyceran species—*Menacanthus. cornutus*, *M. stramineus*, *M. pallidulus* (Neumann, 1912), and *Menopon gallinae* (Linnaeus, 1758) and eight ischnoceran species—*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), *L. tropicalis* (Peters, 1931), and *Oxylipeurus dentatus* (Sugimoto, 1934). Most of these are

* Corresponding author. Tel.: +420 541 562 634.
E-mail address: sychrao@vfu.cz (O. Sychra).

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cosmopolitan and, apparently, highly adaptive for various geographic regions and climatic conditions (Emerson, 1956; Fabiyi, 1996; Njunga, 2003; Prelezov and Koinarski, 2006; Trivedi et al., 1991, 1992).

Nine of the 12 aforementioned species of chewing lice had been found previously in the Czech Republic (Bajerová, 1965; Balát, 1977; Černý, 1969). There is only scarce recent information from Europe on the prevalence or infestation intensity in chickens of chewing lice. To date no such survey has been made from the Czech Republic. The aim of this study was to examine the current occurrence of chewing lice on chickens in the Czech Republic, as well as to determine the prevalence, infestation intensity and abundance of individual lice species especially with a view to the most pathogenic hematophagous species.

2. Materials and methods

The study comprised 30 small, private backyard flocks of about 9–12 birds each, and one flock of 20 birds kept in the area of a pheasant farm. Five chickens from each flock (10 chickens from latter) were examined for lice. The breeders were from 17 different settlements in the eastern part of the Czech Republic. Birds ranging in ages from 10 to 24 months, from both genders, and belonging to locally reared breeds (mostly Leghorn and Rhode Island Red) were included in this research. Except for the flock which was kept in the area of a pheasant farm, the chickens had been kept separately without direct contact with other gallinaceous birds. Chickens were examined for lice during the period between April and November 2005. This period accords with population dynamics of the most important species of lice from chickens. It comprises main peak of mean intensity in the April–August period and second peak in October reported by Zlotorzycka (1981).

Chewing lice were collected using the fumigation chamber method (Clayton and Drown, 2001) specifically adapted for gallinaceous birds (Sychra, 2005). Paint plastic buckets were used and their depth was adjusted with pads to allow the bird examined to stand on the bottom. Bird was placed in these buckets for 20 min with a head taken out. Chewing lice were killed with chloroform. While the bird was suspended over chloroform, its head was examined and any lice found removed with forceps. Chewing lice were fixed in 70% ethanol, and subsequently slide-mounted in Canada balsam as permanent slides. The nomenclature for the lice follows Price et al. (2003).

The following parasitological parameters are evaluated in this paper: (1) prevalence is the proportion of the members of a taxon infested with ectoparasites; (2) mean intensity is number of individuals of a particular ectoparasite species on infested hosts; (3) mean abundance is number of individuals of a particular ectoparasite species on examined birds (Bush et al., 1997). We used the following categories to designate the rates of infestation: very light infestation, 1–25 lice; light infestation, 26–100 lice; medium infestation, 101–1000 lice; heavy infestation, 1001–2500 lice; very heavy infestation, more than 2500 lice. These categories can be considered analogous to those used by Harshbarger and Raffensperger (1961) and modified by Derylo (1974).

3. Results

Chickens were found to be infested with seven species of chewing lice: three amblyceran species—*Menacanthus. cornutus*, *M. stramineus* and *Menopon. gallinae*; and four ischnoceran species—*C. heterographus*, *G. gallinae*, *Goniocotes microthorax* (Stephens, 1829) and *L. caponis*. Chewing lice were found on all the birds examined, with individual birds hosting from one to six species. The dominant species was *G. gallinae*, with 65% occurrence. In second place stood *M. gallinae* (25%), followed by *M. stramineus* (5%), *M. cornutus* (3%), and *L. caponis* (2%). The least frequent were *C. heterographus* and *G. microthorax*. Both these last species were represented by a few individuals from chickens in one flock.

A total 30% of chickens ($n = 160$) were infested with three species of lice. One, two and four species of lice were found on 12%, 27% and 25% of chickens, respectively. Infestations of five and six species of chewing lice (3% in each case) were the least frequent. Infestation by *G. gallinae* and *M. gallinae* was the most common combination on birds carrying two species. Total prevalence, intensity and mean abundances are given in Table 1. Hematophagous species, *M. stramineus* and *M. cornutus* were found only in 9 and 2 flocks ($n = 31$), respectively. Except one bird with medium infestation of *M. stramineus*, hematophagous species were found only in low number (Table 1).

Medium infestation was the most common rate of infestation (in 61% of chickens, $n = 160$). Light or very light infestations were found in 22% and 16% of chickens, respectively. Only two birds (1%) from a single flock were heavily infested. Heavy infestations were caused by *G. gallinae*. Most of the medium-infested birds carried *G. gallinae* and *M. gallinae*.

Table 1
Prevalence, mean intensity (±S.E.), intensity range and mean abundance (±S.E.) of chewing lice on chickens from the Czech Republic

	Prevalence (%)		Mean intensity ± S.E.	Intensity	Mean abundance ± S.E.
	Farms[a]	Birds			
Goniocotes gallinae	100	100	110.1 ± 11.5	2–1086	110.1 ± 11.5
Menopon gallinae	87	85	50.0 ± 7.5	1–235	42.5 ± 4.5
Menacanthus stramineus	29	48	17.0 ± 4.1	1–110	8.2 ± 3.1
Lipeurus caponis	42	35	11.9 ± 3.1	1–44	4.2 ± 1.1
Menacanthus cornutus	6	12	9.4 ± 6.3	7–22	3.5 ± 1.1
Cuclotogaster heterographus	3	1	3.5 ± 2.3	2–5	0.04 ± 0.04
Goniocotes microthorax	3	1	3.0 ± 2.1	1–5	0.03 ± 0.03
All species combined	100	100	168.5 ± 14.6	2–1086	168.5 ± 14.6

[a] In addition to common prevalence defined as the proportion of the birds infested with lice ($n = 160$), we show also prevalence defined as the proportion of the farms where lice occurred ($n = 31$).

4. Discussion

In chickens reared recently in the Czech Republic, seven species of chewing lice were identified. Six of them belong to common chicken parasites whose presence had been previously demonstrated in the Czech Republic (Bajerová, 1965; Balát, 1977; Černý, 1969). The seventh species, *G. microthorax*, was found only on chickens reared in the pheasant farm. The typical hosts of *G. microthorax* are Grey Partridge (*Perdix perdix*) and Chukar (*Alectoris chukar*) (Price et al., 2003). We presume chickens to be an accidental host for *G. microthorax*.

Contrary to the findings reported by Bajerová (1965) and Balát (1977), the 2005 findings did not include three species, i.e. *Menacanthus. pallidulus*, *Goniodes. gigas* and *G. dispar* (Burmeister, 1838). Price et al. (2003) do not include *G. dispar* among chicken parasites. In chickens reared in Europe, however, that species is mentioned repeatedly (Constantineanu et al., 1961; Fedorenko, 1963; Lyakhova, 2006; Martín Mateo, 1975; Touleshkov, 1955). A question is whether the species can be considered a regular chicken parasite, or whether the chickens serve as an accidental host. Neither can the possibility of confusing it with *G. dissimilis* be ruled out, because only Martín Mateo (1975) and Lyakhova (2006) reported the existence of both species in the study area.

Current methods of poultry rearing tend to significantly restrict the transfer of chewing lice between individual generations of birds. Although chewing lice may appear in small backyard flocks, in large-scale operations the existence of chewing lice is practically ruled out (Abebe et al., 1997; De Vaney, 1986; Njunga, 2003). A marked decrease in the number of chickens reared in small backyard flocks in the Czech Republic over the last 20 years (from about 7 million to about 2.5 million birds; CSO, 2006, 2007) may have influenced the populations of some chewing lice species. If some chewing louse occurs within the host population in low abundance, some of its subpopulations even may disappear completely. Cases of chewing lice's absence from local populations of a specific host species, and particularly birds with a large territorial distribution, have been reported (Paterson et al., 1999). Since chewing lice of the genus *Goniodes* occur on their hosts usually in very low number (Aldemir, 2004; Modrzejewska, 1987; Oliveira et al., 1999; Pinto et al., 2001; Wall and Shearer, 2001), their absence on chickens in the Czech Republic may also be attributed to the phenomena mentioned above. Likewise, the incidence of *M. pallidulus* on chickens is usually sporadic and its intensity of infestation is usually very low (Oliveira et al., 1999). A single finding of *M. pallidulus* has been reported from the western part of the Czech Republic (Balát, 1977). This may explain the absence of this species on the chickens examined.

In Europe today, chewing lice occur practically only in backyard flocks, where their economic impact is small. That is also probably the reason why most studies on chewing lice prevalence in chickens come from territories (e.g. Africa, India, Turkey and South America) where free-range production systems are of economic importance (Abebe et al., 1997; Aldemir, 2004; de Chirinos et al., 2001; Fabiyi, 1980; Njunga, 2003; Pinto et al., 2001; Saxena et al., 2004; Trivedi et al., 1991, 1992). Most of these studies mention *M. gallinae* as the dominant species.

Our study's finding that *G. gallinae* was the most abundant parallels only a few records (Fabiyi, 1980; Njunga, 2003; Saxena et al., 2004; Trivedi et al., 1991, 1992). Although a common parasite, this louse is generally recorded in low numbers and it is of little pathogenic significance in many parts of the world (Wall and Shearer, 2001). The highest prevalence and

infestation rates in chickens with *G. gallinae* have been reported in Nigeria, where the birds were reared in totally different climatic conditions (Fabiyi, 1980, 1996).

Actual numbers of chewing lice obtained were used to assess the rates of infestation. The overall rate of infestation of chickens reared in the Czech Republic was assessed as medium. Compared to the tropics (Fabiyi, 1980; Saxena et al., 2004), markedly fewer chickens with high or very high rates of infestation were found in the Czech Republic. Contrary to the findings of those authors cited above, the overall rate of infestation was mainly affected by the prevalence of *G. gallinae*. Because *G. gallinae* is a low-pathogenicity species, chickens with a high rate of infestation showed none of the pathological symptoms described by Prelezov et al. (2006).

In conclusion, this is the first survey of infestation intensity and prevalence of chewing lice in chickens from the Czech Republic. Seven species of chewing lice, including the most pathogenic species *M. stramineus* and *M. cornutus* were found. However, chicken infestation with these haematophagous species was only low or very low. The data suggest that chewing lice are currently a minor problem for backyard chicken production in the Czech Republic.

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