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Prevalence of Ectoparasites in Free-ranging Backyard Chickens of Sabzevar City, Iran

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ABSTRACT

Introduction: One of the most important food sources of humans are poultry products. Poultries are irritated and losing blood by blood-sucking ectoparasites, which affect the quality and quantity of meat and egg production. **Methods:** This study was conducted on 120 free-ranging backyard chickens from December 2017 to November 2018 to determine ectoparasites' prevalence in Sabzevar city, northeastern Iran. Different parts of the birds' bodies were examined, and ectoparasites were collected. The specimens were identified based on morphological features using diagnostic keys. **Results:** Of the 120 (30 males and 90 females) free-ranging backyard chickens examined, 75 (62.5%) showed infestation with three lice and one mite species. The prevalence of infestation was higher in females (66.67%) than males (50%); however, the difference was not significant (P>0.05). The louse *Menopon gallinae* was the most prevalent species (57.33%), followed by *Menacanthus stramineus* (37.33%), *Lipeurus caponis* (13.33%), and *Dermanyssus gallinae* (4%). **Conclusion:** This is the first survey on determining the prevalence and multiplicity of ectoparasites among free-ranging backyard chickens in Sabzevar city, Iran. The high prevalence rate of ectoparasites among chickens shows that parasitic infection is prevalent in this area.

INTRODUCTION

In rural areas, free-ranging chickens are a fundamental source of meat and eggs for rural areas [1, 2]. Poultries are the most essential reared domesticated species [3]. Various factors can impact poultry health and cause a reduction in production. A major problem in poultry farming is parasitic diseases, which can lead to economic loss. Parasitic agents, especially ectoparasites, are a severe menace to the poultry industry, by interfering with poltries' health and productivity [4]. The common poultry ectoparasites, including lice, fleas, mites, and ticks, can quickly spread from one bird to another due to overcrowding and poor hygiene [5, 6].

Parasitism causes reduced egg production and growth, low weight gain, emaciation, anemia, and sometimes death [7, 8]. Bird health can be affected directly due to irritation, discomfort, tissue damage, blood loss, toxicosis, allergies, and dermatitis [9]. Some ectoparasites, especially mites and ticks, are vectors of other poultry diseases such as pasteurellosis, Newcastle disease, fowlpox, and possibly chlamydia [9]. Native fowls are sources of infection for industrial poultries, wild birds, and humans because their parasitic infections cause health and economic problems [10]. Therefore, poor management of these parasites can increase disease outbreaks and prevent efficient poultry production [11, 12].

Few studies are available on the ectoparasites of free-ranging chickens from Iran. It is essential to identify the prevalence of chicken parasites to adopt appropriate strategies to control them and increase productivity. Considering that there is little information about ectoparasites of the poultry in northeastern Iran, this study aimed to estimate the ectoparasites infestation rates in the free-ranging chickens of Sabzevar city, Iran.

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MATERIALS AND METHODS

Study area. The present study was performed in Sabzevar city located in the west of Khorasan Razavi province, northeast of Iran (between longitudes 36.21 ̊N, 57.68 ̊E) (Fig. 1). The eastern and northern regions of this mountainous city are temperate and warm in the lowlands. The climate plays a vital role in pasture development and rearing of domestic animals such as poultries.



Fig 1. The location of Sabzevar city in the west of Khorasan Razavi province, Iran

Source of animals. In rural areas, free-ranging chickens are fed outdoors on various food sources like arthropods, grass seeds, and waste products. In the present study, from Dec. 2017 to Nov. 2018, we selected 120 chickens, including 30 males and 90 females, by the stratified random sampling technique.

Animal examination and identification of ectoparasites. The head, combs, eyelids, wattles, neck, feathers, breast, back, wings, shafts, legs, and other external surfaces of the chickens were examined for ectoparasites. The feathers of the head, neck, wings, body, legs, and cloaca were raised and thoroughly examined with a hand lens for ectoparasites. The chewing lice were collected from the hosts with a fine soft brush. For ectoparasites such as mites, deep scrapings were collected using a scalpel or knife blade and transferred to acetic glycerine (1% glacial acetic acid in glycerine). All the collected parasites were transferred to 70% ethanol in bottles with labels indicating the chickens' age and sex [2]. The samples were mounted on microscope slides under a dissecting microscope and a light microscope. After mounting, the ectoparasites were counted, and identified based on morphological features using the diagnostic keys of Wall and Shearer (2012) and Soulsby (1982) [13, 14].

Statistical analysis. A Chi-square test was performed using SPSS Statistics v21to determine the association between the ectoparasite infestation prevalence and gender in the birds. A *P*-value of less than 0.05 was considered significant statistically.

RESULTS

Overall, of the 120 chickens examined, 75 (62.5%) showed infestation with one or more ectoparasite species, including three lice and one mite. The prevalence of infestation was higher in females (66.67%) than males (50%); however, the difference was not significant ($P>0.05$). Besides, 45 (42.22%) young chickens were compared with 75 adult ones (74.66%) (Table 1). Among the lice, *M. gallinae* was the most prevalent species (57.33%), followed by *M. stramineus* (37.33%) and *L. caponis* (13.33%). *D. gallinae* was the only identified mite species with a 4% prevalence (Fig. 2).

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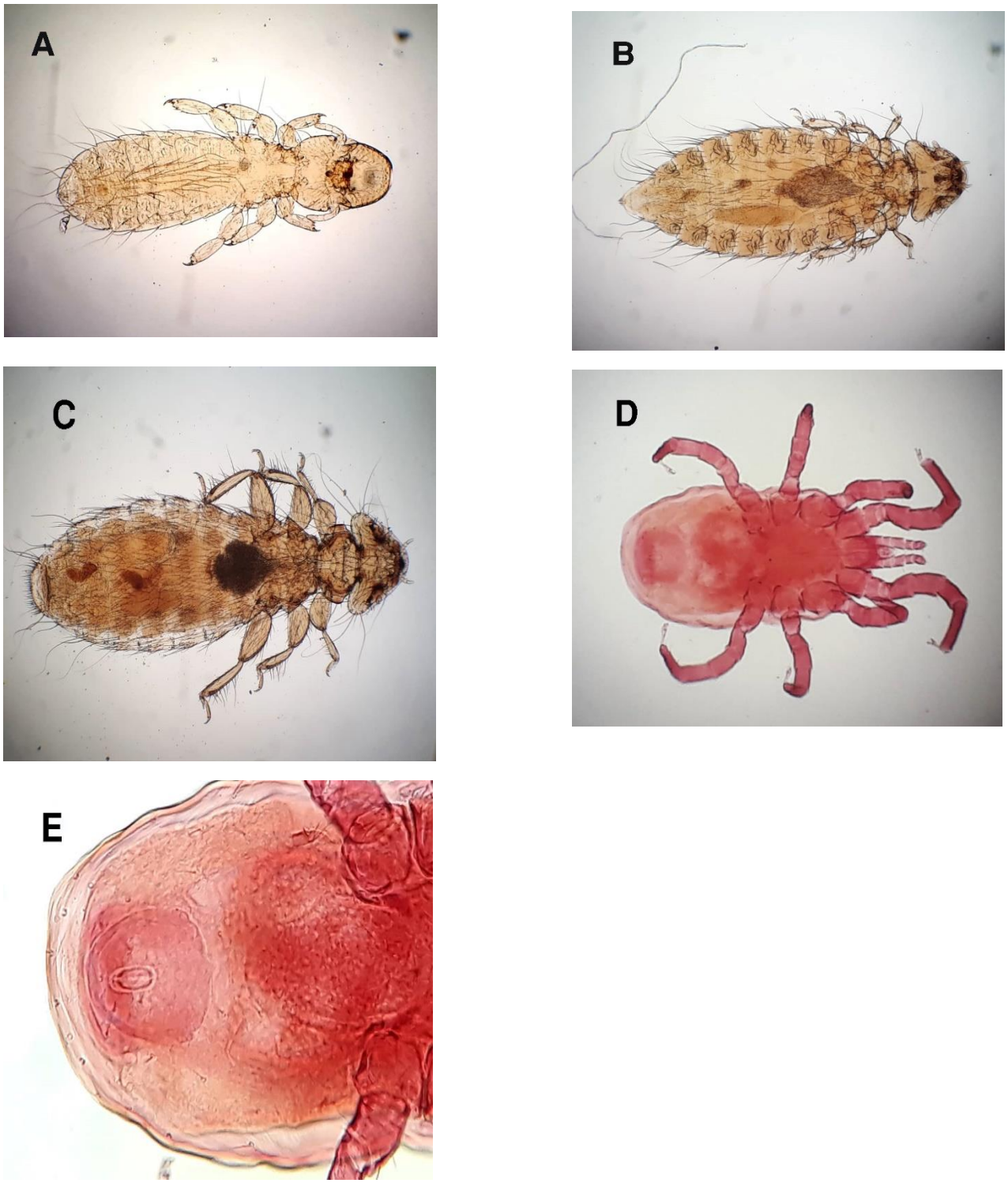


Fig2. Ectoparasites identified in free-ranging backyard chickens of Sabzevar city **(A.** *L. caponis*, **B**. *M. gallinae*, **C**. *M. stramineus*. **D**. *D. gallinae*, **E**. Anal plate of *D. gallinae*)

Utilization of pesticides, geographical distribution, climatic situation, management, and hygienic status, especially in rural areas, can be reasons for these differences [18, 25, 26]. The prevalence of ectoparasites was higher in females. However, the difference was not significant statistically (P>0.05). Similar findings are

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available from Nigeria [18, 27] and other parts of Iran, i.e., Kermanshah, West Azerbaijan province, and the Sistan region. [16, 28, 29], while the study done by Mungube et al. (2008) [26] showed that ectoparasite infestation was higher in roosters than hens in the Eastern Province of Kenya.

Table 1. The prevalence and abundance of ectoparasites based on the sex and age of indigenous chickens in Sabzevar city, Iran

Variable		No. of examined chickens	No. of infected chickens	Prevalence (%)
Sex	Female	90	60	66.67
	Male	30	15	50
Age	young	45	19	42.22
	adult	75	56	74.66
	Total	120	75	62.5

Table 2. The prevalence (%), abundance (mean±SD), predilection sites, and range of ectoparasite species among free-ranging backyard chickens in Sabzevar city, Iran

Ectoparasite Species	Female chickens No.	Male chickens No.	Total prevalence	Mean±SD	Range (number of ectoparasites)	Predilection sites
M. gallinae	38	5	43/75 (57.33)	10.3±2.6	4-35	Shaft
M. stramineus	23	5	28/75(37.33)	8.2±2.8	5-28	All parts of the body
L. caponis	2	8	10/75(13.33)	3.8±1.6	1-6	All parts of body
D. gallinae	3	0	3/75 (4)	2.7±1.4	1-8	Base of wing

The variations among the reports may be due to the outdoors rearing of chickens, making them prone to receiving various ectoparasites and transmitting them from male to female and vice versa during mating. Moreover, hens' emission of odors during the incubation period may attract parasites [18, 27].

Among the identified lice species, *M. gallinae* was the most prevalent (57.33 %) species, followed by *M. stramineus* (37.33 %) in backyard chickens. This finding was consistent with previous studies in Iran [16, 17], India [30, 31], and Nigeria [32]. *M. stramineus* may cause multi-focal skin lesions and lead to anemia [33]. In the present study, it was the second parasite found in the chickens, while a similar study by Rezaei *et al*. (2014) reported it as the most prevalent ectoparasite in Kermanshah Province, Western Iran [34].

In our study, the prevalence rate of *L. caponis* was 2.66%, which was similar to the rate (2.9%) reported by Bhat et al. (2014) in Jammu region [30]. Our finding showed that the rate of *L. caponis* was lower than the other study conducted by Ebrahimi et al. (2016) in Iran (10.9%) [17]. Other reports indicated that *L. caponis*, with a 32% prevalence in Iran [10] and 40.25% in Nigeria, was the predominant parasite among native fowls [35]. Infestation with *D. gallinae* causes blood spots in eggs and anemia. This species serves as a vector of numerous bacterial and viral pathogens in birds [36]. This louse showed lowest prevalence (3.75%) among the ectoparasites in the present study, similar to a previous report by Ebrahimi et al. (2016) in Iran [28]. This rate was lower than previous reports from Kermanshah province (26.33%), Dalahu regions (11%), and central (39.3%) and northeastern (43.45%) Iran [29, 34, 37, 38]. Moreover, it was lower than the rates reported from other countries, i.e., Poland (100%) [39], Romania (60%) [40], Sweden (67%) [41], and and northern West Bank, Palestine (30.7%) [42]. These prevalence differences may be due to farm sizes, endemic conditions, and unfavorable hygiene conditions [38]. In contrast to the present study, a study conducted in Ukraine did not report *D. gallinae*, and *M. stramineus* in industrial poultry farms [43].

In conclusion, the high prevalence rate of ectoparasites in the chickens shows that parasitic infection is a problem in this area. Moreover, they act as important

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reservoirs for parasitic infections. Therefore, more studies are needed to determine the prevalence of ectoparasites in the poultry industry and its economic impacts.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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