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**Original Article**

**Identification of ectoparasites in indigenous poultry in southern areas of West Azerbaijan, Iran: A study on the prevalence and importance of these parasites**

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**ABSTRACT**

Poultry products are considered as one of the most important sources of food for humans, worldwide. Indigenous poultry production has grown in popularity among villagers and some urbanites due to simple maintenance conditions, adequate adaption of poultry to different climatic conditions, and acceptable product yield. Parasites are among the main pathogenic agents, threatening the health of poultry and poultry products. The present study was carried out in northwest of Iran between March 2013 and December 2015 to determine the prevalence of ectoparasite species, infesting local chickens. Different parts of the bird's body were inspected for ectoparasites. The parasites were collected from the birds by displaying the feathers horizontally against the anatomical orientation for the purpose of exposure. Then, the separated parasites were identified according to the diagnostic guidelines. Based on the findings, of 160 chickens examined, 110 (68.7%) samples had one or more types of ectoparasites. The prevalence of infestation was higher in females (74.5%) than males (56%), although the difference was not statistically significant ( $P>0.05$ ). *Menopon gallinae* was the most frequent species (65.4%), followed by *Menacanthus stramineus* (37.2%), *Lipeurus caponis* (10.9%), and *Dermanyssus gallinae* (9.1%). The present study indicated that ectoparasitic infestation was highly prevalent among chickens in the studied areas. However, further detailed studies are recommended with a focus on ectoparasites infestations and their impacts.

**Keywords:** Ectoparasite, Local chickens, Iran

**Identification d'ectoparasites chez les volailles indigènes des régions du sud de l'ouest-Azerbaïdjan iranien : une étude sur la prévalence et l'importance de ces parasites**

**Résumé:** Les produits à base de volailles sont considérés comme l'une des sources alimentaires les plus importantes pour l'homme à travers le monde. La production de volailles indigènes gagne en popularité chez les populations rurales et urbaines en raison de la simplicité de leur maintenance, d'une adaptation adéquate aux différentes conditions climatiques et d'un rendement en produits acceptable. Les parasites figurent parmi les principaux agents pathogènes affectant la santé des volailles et la qualité de leurs produits dérivés. Cette étude a été menée dans le nord-ouest de l'Iran entre mars 2013 et décembre 2015 afin de déterminer la prévalence des différentes espèces d'ectoparasites qui infestent les poulets locaux. L'inspection d'ectoparasites a été effectuée sur différentes parties du corps des volailles. Les parasites ont été collectés en disposant le plumage des volatiles horizontalement, dans le sens contraire de son orientation anatomique. Les parasites prélevés ont été ensuite identifiés selon les lignes directrices relatives au diagnostic publiées par Soulsby et Wall. D'après nos résultats, parmi les 160 poulets examinés, 110 (68,7%) étaient contaminés par un ou plusieurs types d'ectoparasites. La prévalence des infections s'est avérée être plus importante chez les femelles (74,5%) que chez les mâles (56%), cependant sans différence statistiquement significative ( $P>0.05$ ). *Menopongallinae* était l'espèce la plus fréquente (65.4%),

suivie par *Menacanthustramineus* (37,2%), *Lipeuruscaponis* (10,9%) et *Dermanyssusgallinae* (9,1%). Ce travail montre qu'il existe une forte prévalence des infections ectoparasitaires chez les poulets de la région étudiée. Cependant, la tenue d'autres études plus approfondies sur les ectoparasites et leurs impacts est recommandée.

**Mots clés:** Ectoparasite, Poulets locaux, Iran

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## Introduction

Poultry are one of the most reared domesticated species. Poultry products are considered as the most consumed and profitable animal productions (Phiri et al., 2007). Besides providing a valuable source of protein, these products can generate income, particularly for rural women who are the principal beneficiaries and supervisors of poultry production. In fact, the role of indigenous poultry production in improving the nutritional status and income of many small farmers and land owners (or landless workers) has been recognized by various scholars and rural development agencies (Van De Weerd et al., 2009). Different factors can affect poultry health and cause a diminution in poultry production and development. Parasitic diseases, as a major problem in poultry farming, can lead to economic loss, whether in large commercial operations or small native flocks. Among parasitic agents, ectoparasites are a serious threat to poultry, causing significant loss for this industry. Arthropod ectoparasites have a major impact on the husbandry, productivity, and welfare of domestic animals (Colebrook and Wall, 2004). As a result of inappropriate housing and paucity of pest control efforts, these parasites are common in rural areas with free-range poultry systems. On the other hand, these parasites in birds are usually controlled in areas with commercial systems. External parasites can be easily spread from one bird to another. These parasites are often a consequence of overcrowding and poor hygiene (Tolossa et al., 2009). Chewing lice (Mallophaga) are among the most serious ectoparasites in poultry, which cause major morbidity and irritation in birds and lead to adverse economical impacts on the production of

poultry (Sychra et al., 2008). Mallophaga causes weight loss at a rate of about 711 g per bird and decreases the egg yield at a rate of about 66 eggs per bird over a year; also, lameness is associated with heavy lice infestation. Poultry mites, which are considered as a main problem in the poultry system, can cause anemia, weakness, irritation, weight loss, and decrease in poultry production. Also, infested birds are more susceptible to diseases, and death may occur in severe infestation (Sparagano et al., 2014). Ectoparasites may constitute a clinical problem for humans, transmit a number of infectious diseases, and act as a transport/intermediate host for a range of helminthic parasites. Native fowl parasitic infections, which can cause health and economic problems in poultry production, are regarded as a source of infection in industrial poultry, wild birds, and humans. Currently, there is a paucity of information regarding the prevalence of ectoparasites in local chickens in northwest of Iran. In addition, knowledge of the prevalence of ectoparasites, as cofactors in different poultry diseases, is essential in understanding the epidemiology of such diseases and designing appropriate control measures. With this background in mind, regarding the scarcity of information about different poultry infections in northwest of Iran, the present study was designed to investigate the prevalence of ectoparasites in indigenous chickens in the mild climate of this region.

## MATERIALS AND METHODS

**Study setting.** The present study was carried out in the southern areas of West Azerbaijan province, situated in northwest of Iran (between longitudes 36.45° N and 45.9° E). This area is situated on the border of Iran and Iraq. The weather of this region is

influenced by the Zagros Mountains. The climate in northern and southern areas is relatively cold and mountain temperate, respectively. Due to the high rate of annual rainfalls (600mm), this area is considered among the greenest and most beautiful regions across the country. It should be noted that weather conditions play a determinant role in soil decomposition, plant growth, pasture development, and rearing of domestic animals.

**Study animals.** The study animals were reared in a traditional poultry production system, and the chickens were allowed free access to the outdoor environment. Therefore, their main food included arthropods, grass seeds, and waste products. Also, other poultry species, such as goose, duck and turkey surrounded the study birds. The samples were randomly collected from 160 chickens (110 females and 50 males) in the study area between March 2013 and December 2015.

**Screening and sample collection.** A total of 160 chickens were examined for ectoparasites. The parasites were accurately collected from the birds by displaying the feathers horizontally against the anatomical direction of alignment for the purpose of exposure. The chewing lice were isolated from the hosts by parting the hairs or feathers and gently brushing the base of the feathers with a fine soft brush to prevent injuries. Due to high infestation with *Dermanyssus gallinae* in some of the birds, this parasite was simply collected from poultry with entomology forceps. In order to search for *Cnemidocoptes mutans*, the skin surface was scraped with the edge of a slide. All the parasites were collected and placed in sampling bottles, containing 70% ethanol (Permin et al., 2002).

**Identification of ectoparasites.** The ectoparasites were transferred to 10% KOH (clearing agent) 2-3 days before identification. Then, they were mounted on a slide for final identification, using a light microscope. The ectoparasites were identified according to their

morphological characteristics, using the entomological diagnostic guidelines by Wall and Shearer (2012).

**Statistical analysis.** The data collected from each bird were stored in a Microsoft Excel spread sheet. For statistical analysis, Chi-square test was performed, using SPSS version 19 to determine the association between the prevalence of infestation and sex of the poultry. P-value less than 0.05 was considered statistically significant.

## RESULTS

Overall, among 160 chickens examined, 110 (68.7%) samples had one or more types of ectoparasites. In this study, three lice species and one mite species were found. The prevalence of infestation was higher in females (74.5%) than males (56%), although the difference was not statistically significant ( $P>0.05$ ) (Table 1).

**Table 1.** The prevalence and abundance of ectoparasites based on the sex of indigenous chickens in southern areas of West Azerbaijan, Iran

Sex	Examined (No.)	Infested (No.)	Prevalence (%)	Range (mean)
Female	110	82	74.5	8-70 (19.4)
Male	50	28	56	4-35 (13.1)

Parasites including lice (100/160, 62.5%) and mites (10/160, 6.2%) were collected from the poultry. The shaft louse, *Menopon gallinae*, was the most frequently found ectoparasite (65.4%), followed by the chicken louse, *Menacanthus stramineus* (37.2%), wing louse, *Lipeurus caponis* (10.9%), and poultry red mite, *D. gallinae* (9.1%). The prevalence, abundance, and range of ectoparasite species are presented in Table 2. Also, among 110 infested chickens, 77.3% and 22.7% showed single and mixed infestations with ectoparasites, respectively (Table 3).

## DISCUSSION

**Table 2.** The prevalence (%), abundance (mean±SD), and range of ectoparasite species among local chickens in southern areas of West Azerbaijan, Iran

Species	Female	Male	Prevalence among ectoparasite species, m/n (%)	Prevalence in the population, m/N (%)	Mean±SD	Range
<i>M. gallinae</i>	56	16	72/110 (65.4)	72/160 (45)	13.3±3.6	5-43
<i>M. stramineus</i>	31	10	41/110 (37.2)	41/160 (25.6)	9.2±2.9	5-35
<i>L. caponis</i>	9	3	12/110 (10.9)	12/160 (7.5)	4.7±1.6	2-7
<i>D. gallinae</i>	8	2	10/110 (9.1)	10/160 (6.2)	Innumerable	Innumerable

N: Number of samples    n: Total number of infested birds    m: Number of birds infested with individual ectoparasites

In the present study, the prevalence of infestation with ectoparasites was high (68.7%). This finding was in close agreement with previous reports from Iran (Hashemzade-farhang et al., 2008; Eslami et al., 2009; Radfar et al., 2012; Ebrahimi et al., 2013). The high prevalence of ectoparasites in indigenous poultry of Iran may be attributed to the maintenance conditions of poultry, such as lack of health conditions, high population density of birds, uncontrolled feeding, inattention to treatment and control measures, and animals' free access to the outdoor environment during the day.

**Table 3.** The prevalence of ectoparasites based on the type of infestation among local chickens in southern areas of West Azerbaijan, Iran

Type of infestation and ectoparasite	Prevalence (%)
<b>Single</b>	<b>85 (77.3)</b>
<i>M. gallinae</i>	47 (42.7)
<i>M. stramineus</i>	
<i>D. gallinae</i>	10 (9.1)
<i>L. caponis</i>	4 (3.6)
<b>Mixed</b>	<b>25 (22.7)</b>
<i>M. gallinae</i> + <i>M. stramineus</i>	17 (15.4)
<i>M. gallinae</i> + <i>L. caponis</i>	8 (7.3)

Also, the present findings are comparable to studies carried out in Nigeria (Nnadi and George, 2010), Ethiopia and Zimbabwe (Permin et al., 2002), that have also reported the high prevalence of ectoparasites among indigenous chickens. In the present study, females (74.5%) in comparison with males (56%) showed more infestation, although the difference was not statistically significant ( $P>0.05$ ). This finding was in agreement with a study by Bui et al. (2007), which showed the higher prevalence of ectoparasites in

female chickens (15.4%) in comparison with male birds (14.7%). On the other hand, Mungube et al. (2008) reported a slightly higher rate of ectoparasites in males, compared to females. In both mentioned studies, no significant difference was reported. The observed discrepancy between the findings might be due to the setting and other factors in the studied areas. The male chicken may introduce more parasites onto the female during mating, as the male is forced upon the female for mating. In addition, female chickens may emit some odors, which may attract the parasites during the incubation period. The high prevalence reported in the present study may be also attributed to free rearing of chickens, which exposes them to various ectoparasites. In the present study, the prevalence of ectoparasites was high, and lice infestation was found to be outstanding. These findings were consistent with the results of previous studies performed in Africa and Asia. Also, in a study on ectoparasites in Najaf-Abad in central Iran, only lice species were isolated from native poultry (Ebrahimi et al., 2013). Ectoparasites damage the feathers, irritate the skin, cause skin lesions, reduce the performance of adult chickens, and cause direct harm to young chickens. In the present study, similar to previous research carried out in Iran (Radfar et al., 2012) and India (Bhat et al., 2014), *M. gallinae* was the most prevalent ectoparasite. Also, in this study, *M. stramineus* was the second most frequent ectoparasite, isolated from the chickens; this finding was in line with previous research (Mungube et al., 2008). According to the literature, infestation with *M. stramineus* decreases egg production and weight gain in chickens. The

intracellular bacterium, *Chlamydia psittaci*, which causes ornithosis (an infection of birds), and the equine encephalomyelitis virus have been isolated from *M. gallinae* and *M. stramineus*, respectively (Tolossa et al., 2009). In the present study, the prevalence rate of *L. caponis* (10.9%) was similar to the rate reported by Tamiru et al. (2014). However, this finding was higher than the results of Bhat et al. (2014)(2.9%) and much lower than data recorded by Eslami et al. (2009) (32%). *D. gallinae* was found in major amounts in seven examined birds. Although the poultry red mite is usually important in egg-laying hen farms, in some studies, infestation of indigenous poultry to this mite has been recorded Buriro and Akbar (1978). In this regard, a high infestation rate with *D. gallinae* (75%) was reported by Kansal and Singh (2014). Overall, red mite infestation may occur in intensive poultry production units, using different rearing and breeding methods. Also, infestation with *D. gallinae*, in the present study, could be attributed to the contact of one of the owners with poultry farms. Since *D. gallinae* may also act as a vector for numerous important medical and veterinary pathogens, spread of the disease is another problem associated with this mite in poultry (Chirico et al., 2003). Ectoparasites can lead to reduced growth, egg production, emaciation, anemia, and even mortality. Moreover, some ectoparasites, especially ticks and mites, are vectors of other poultry diseases such as pasteurellosis, fowl pox, Newcastle disease, and possibly chlamydia (Ruff, 1999). Although the importance of local chickens as an income source is less highlighted than industrial poultry, in our study, these birds played a major role in the livelihood of villagers, and the poultry products had significant acceptability among many people.

In some areas, the transaction market of indigenous poultry is rapidly growing, and in some cases, considerable amounts of money are exchanged. Therefore, many owners are willing to cooperate with the identification of parasitic infestations, which may threaten the health of their poultry. Given the adverse impacts of ectoparasites on poultry production and the

scarcity of protein sources available to humans, more intensive studies are required to determine the prevalence, species, and economic importance of ectoparasites in indigenous poultry of the study area.

### Ethics

I hereby declare all ethical standards have been respected in preparation of the submitted article.

### Conflict of Interest

The authors declare that they have no conflict of interest.

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