A Survey into the Prevalence of Ectoparasites of Free-Range Chickens and Pigeons in Qom Province

Parhizkari,M. S[1];Olyaei, A[2*].

[1]Student in veterinary Medicine, School of Veterinary Medicine, Kazerun Branch, Islamic Azad University, Kazerun, Iran;
[2]Department of parasitology, Faculty of Veterinary Medicin, Kazerun Branch, Islamic Azad University, Kazerun, Iran.
Corresponding Author: A. Olyaei, Department of parasitology, Faculty of Veterinary Medicin, Kazerun Branch, Islamic Azad University, Kazerun, Iran, *E-mail: ahadoliaee97@gmail.com*

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Abstract

In order to investigate the incidence of macroscopic Ectoparasites of free-range domestic chickens and pigeons in Qom province, 300 free-range domestic chickens and 300 pigeons from Central district, Salafchegan, Jafariyeh, Kahak, and Khalajastan were randomly selected and studied from December 2016 to September 2017. 200 poultry were selected from Central district, and 100 ones from each of the other districts under study were put under careful investigation. Of the 300 domestic chickens, 202 (67.33%) were infected and 98 (32.67%) were free of external parasites. Moreover, out of 300 pigeons, 218 (72.66%) were found to be infected, while 82 (27.34%) were free of external parasite infection. The highest infection percentage of domestic chickens and pigeons in Salafchegan district were 90% and 84%, respectively, and the lowest percentage of domestic chickens infection was observed in Central district as 43% and the lowest infection rate was reported in Jafariye as 66% . As the findings revealed, in each district, the highest contamination was observed in Salafchegan (87%) and the lowest was related to the Central district (44%). The genus and species of parasites isolated from domestic chickens were *Menopon gallinae, Menacanthus stramineus, Goniodes dissimilis, Lipeurus caponis, and Cuclotogaster heterographus*. *Argas persicus,* a fowl tick, was also isolated from domestic chickens. The fly larvae were also found and isolated in several nests. The highest contamination was related to *Menopon gallinae* (69%), and the least was *Goniodes dissimilis* (5%). In addition, *Menopon gallinae*, *Lipeurus caponis*, and *Menacanthus stramineus* and *Argas persicus* (a small soft-bodied tick), were isolated from the pigeons under study. The highest infection was found to be *Menopen* (53%) and the lowest was related to *Menacanthus* (14%).

Keywords: *Ectoparasite , Chickens , Pigeons,Qom*

Introduction

The parasitic infection control and its removal from the nature cycle, especially in the livestock industry, may be far more complex than the control of some bacterial and even viral infections. It is due to the fact that most of the parasites have a specific multi-stage evolution,

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and that the prevention of and fight against them, adequately covering this cycle of life is both necessary and, of course, difficult (Rafiee and Rak, 1975; Modarres-Aval, 1993).

Concerning parasites that have lesions in poultry and pigeons, in many cases, intermediate hosts play an important role and as a matter of fact, it will be much more difficult to recognize, fight, and treat these parasites (Modarres-Aval, 1993).

Despite the ever-increasing advances in poultry farming, indigenous poultry health is also of particular importance, especially since indigenous poultry are one of the most important nutritional sources in the country. Due to the fact that the rural villagers and even some urban residents have traditionally maintained and raised poultry in Iran, the identification of pathogens in this category of poultry is important and contributes to fight and prevent their diseases. (Ebrahimi *et al.*, 2013; Arshi, 2002).

External parasites found in indigenous poultry come from different arthropods, such as cock, lice, bug, tick, mite, and others. Causing irritation, itching, anemia and restlessness, they impose their complications as the reduction of the conversion coefficient, weight loss, and the reduction in the meat and egg production (Rafiee and Rak, 1975; Arshi, 2002; Kufmann, 1996).

Free-range domestic chickens and pigeons (squabs) in Qom province have not been carefully studied yet. It is clear that there are a lot of domestic chickens and pigeons in Qom and the surrounding districts. This research was conducted particularly due to inadequate survey and identification of external parasites species of domestic chickens and pigeons in Qom province.

Materials and methods

Geographical setting of the study

Qom Province covers a land area of about 11, 340 km2 (0.6% of total area of Iran), it is located between latitudes 34°-35°N and longitudes 50°-52°E. The region is bordered to the north by Tehran Province, to the south by Isfahan Province, to the east by Central (Markazi) Province, and to the west by Semnan Province. It is 930 meters above sea level; and the elevation range in the Qom province extends from 800 m in the eastern parts to about 3330 m in the southern parts (Velija Mountain).

During the sampling period, ever month, 50 birds (25 domestic chickens and 25 domestic pigeons) each month were studied. For the complete collection of external parasites, all parts of the birds' skin were examined using a magnifying glass. All tested samples were transferred to a

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tray and the samples with the mite were isolated and collected with pins and cotton wool. The contents of the tray were transferred into plastic containers containing solutions of 70% alcohol, with a record of samples features on each container. In order to identify the parasites, the slides were individually prepared from each single sample and the parasites species were recognized using optical microscope. Here are some images of birds' infection:

Figure 1: Lice infestation in domestic chickens

Figure 2: Lice infestation in domestic chickens (optical microscopic image)

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Results

In the present study, in general, 300 domestic chickens and 300 pigeons were examined. Of the 300 domestic chickens, 202 (67.33%) were revealed to be infected and 98 birds (32.67%) were free from infection.

Out of 300 pigeons, 218 (72.66%) were infected and 82 (27.34%) had no parasites. The domestic chickens studied in the Qom province revealed that the genus and species of isolated parasites were *Menopon gallinae* (69%), *Menacanthus stramineus* (21%), *Goniodes dissimilis* (5%), *Lipeurus caponis* (21%), *Cuclotogaster heterographus* (9%), *Argas persicus* (28%), and fly (11%) larvae in the bird's nests.

In addition, the tested pigeons of Qom province showed the parasites species as *Menopon* (53%), *Menacanthus stramineus* (14%), *Lipeurus* sp.(29%), and the soft-bodied tick, *Argas persicus*, (26%). The highest infection rate among domestic chickens was found in Salafchegan (90%). Moreover, the highest infection among pigeons in the Qom province was observed in Salafchegan (83%). Concerning the domestic chickens, the least infection was found in the Central district (43%), and the least infection among the pigeons under study was in Jafariyeh (66%). Comparing the whole samples, the highest infection was observed in Salafchegan (87%), while the least infection belonged to the Central district (44%).

It is worth mentioning that in both indigenous chickens and pigeons, multi-infections were observed in some cases.

In the following, tables and charts demonstrate infections in different districts of the Qom province:

Table 1: The percentage of infection in the Central district

Pigeon		Chicken	
Percentage	**Number**	**Percentage**	**Number**
70%	(Infected) 70	43%	(Infected) 43
30%	(Non-infected) 30	57%	(Non-infected) 57

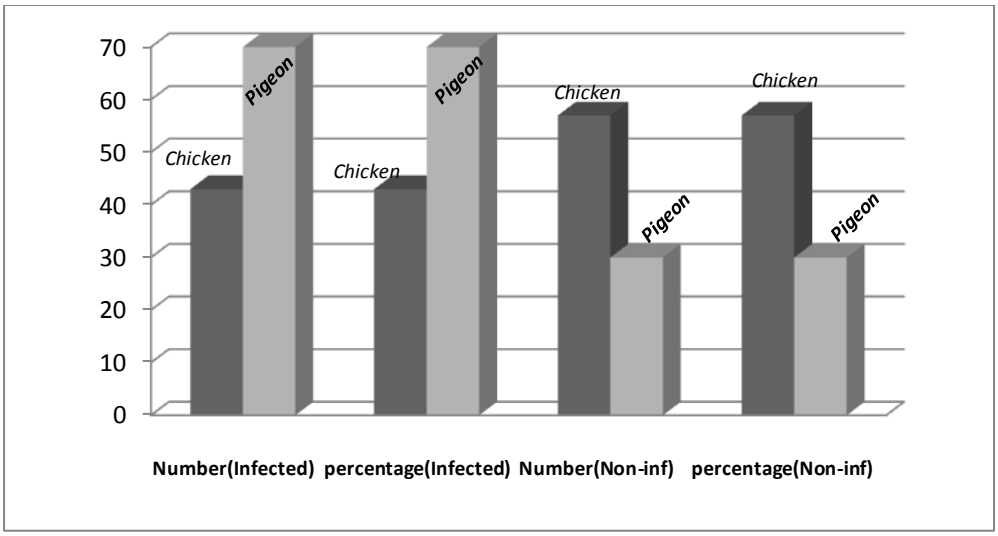

Diagram 1: The percentage of infection in the Central district

Table 2: The percentage of infection in Jafariyeh

Pigeon		Chicken	
Percentage	**Number**	**Percentage**	**Number**
66%	(Infected) 33	84%	(Infected)42
34%	(Non-infected) 17	16%	(Non-infected) 8

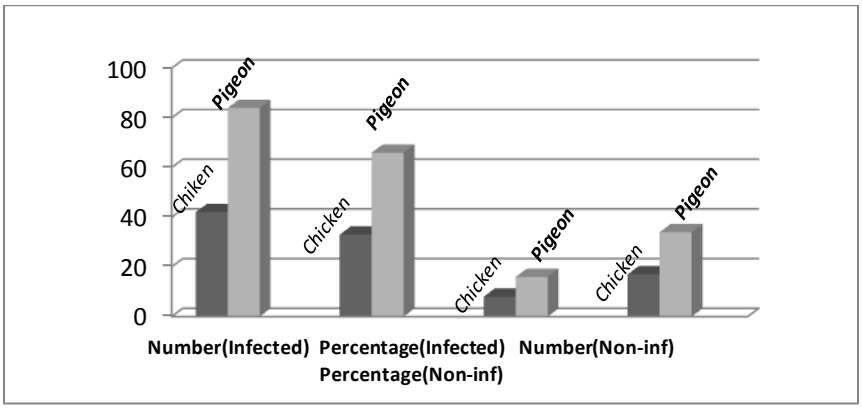

Diagram 2: The percentage of infection in Jafariyeh

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Table 3: The percentage of infection in Khalajastan

Pigeon		Chicken	
Percentage	**Number**	**Percentage**	**Number**
70%	(Infected) 36	86%	(Infected) 43
30%	(Non-infected) 15	14%	(Non-infected) 7

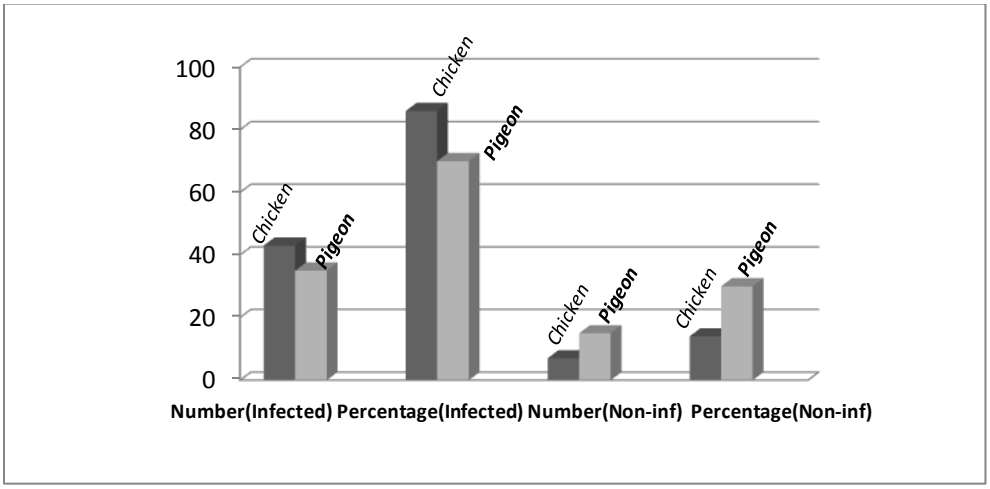

Diagram 3:The percentage of infection in Khalajastan

Table 4: The percentage of infection in Kahak

Pigeon		Chicken	
Percentage	**Number**	**Percentage**	**Number**
76%	(Infected)38	58%	(Infected)29
24%	(Non-infected)12	42%	(Non-infected)21

[DOR: 20.1001.1.2717378.2018.2.4.3.2]

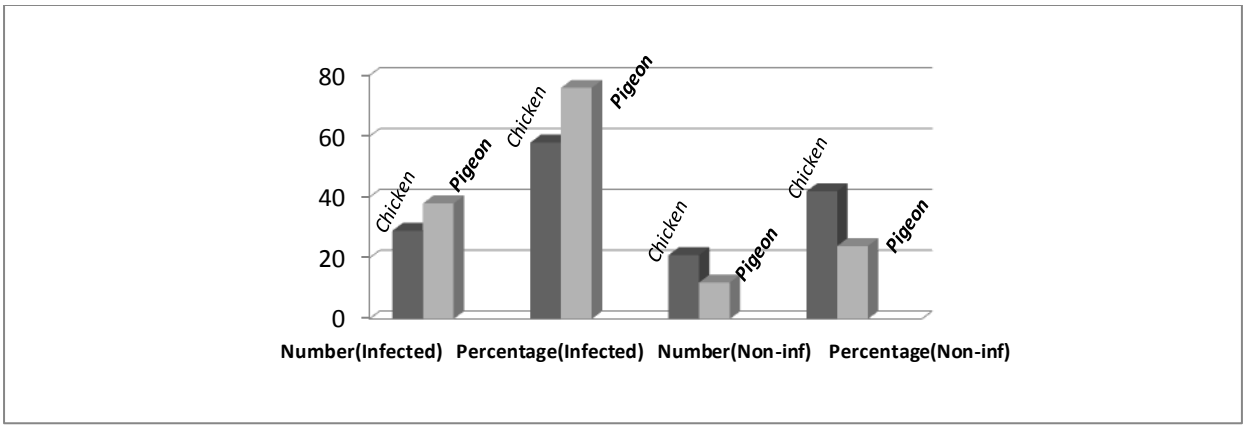

Diagram 4: The percentage of infection in Kahak

Table 5: The percentage of infection in Salafchegan

Pigeon		Chicken	
Percentage	**Number**	**Percentage**	**Number**
86%	(Infected) 42	90%	(Infected) 45
14%	(Non-infected) 8	10%	(Non-infected) 5

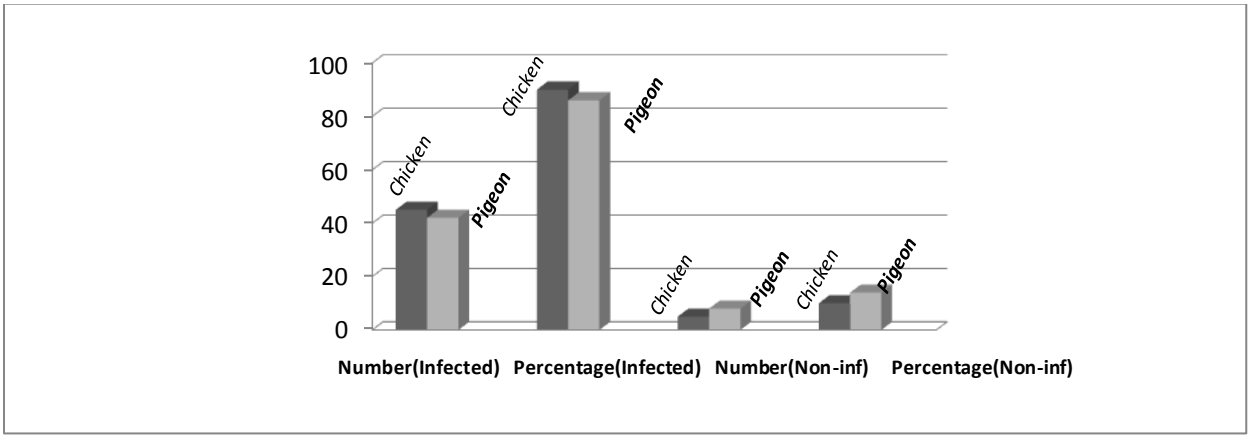

Diagram 5: The percentage of infection in Salafchegan

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Table 6: The percentage of total infection in districts under study

Infection in Salafchegan		Infection in Kahak		infection in Khalajastan		infection in Jafariyeh		Infection in the Central District	
Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number
87%	(Infected) 87	67%	(Infected) 67	78%	(Infected)78	75%	(Infected)75	56%	(Infected)113
13%	Non-) 13 (infected	33%	Non-)33 (infected	22%	Non-)22 (infected	25%	Non-)22 (infected	44%	(Non-infected)87

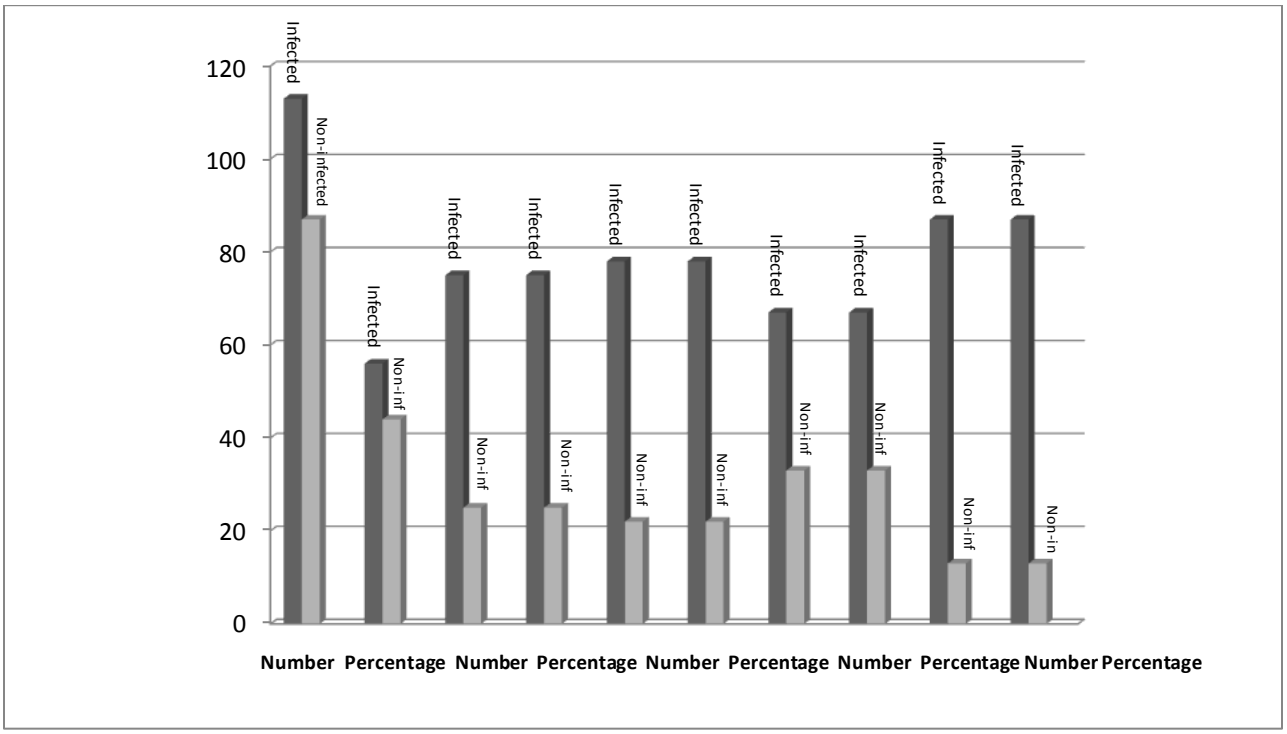

Diagram 6: The percentage of total infection in districts under study

Discussion

In the present study, indigenous chickens and domestic pigeons showed arthropod infections in a significant degree, indicating non-compliance with health or other requirements. In Iran and other parts of the world, studies have been conducted in this field, which will be further examined in two sections.

In a study by Bill Dick and his colleagues in the north of the country, wild birds' infections with lice were investigated. 11 species of lice were identified in birds. 15.2% of the birds had lice

infestation, which were further isolated. Among the isolates of lice, only *Menacanthus* sp was consistent with the results of the present study, and the other isolated louse were not compatible with the present research. Such findings seem to be due to the geographical situation of maintaining and living and also birds breed in these two regions with different climates (Qom province and north of the country) (Bilal and Halajian, 2013).

Investigating the domestic poultry infections with external parasites in Najaf Abad, Ebrahimi and some other researchers found that 75.6% of the samples were infected with external parasites, which was in agreement with some studied districts in the present study. However in terms of species diversity, only two isolated genera as *Menopon* sp. and *Menacanthus* sp. were not consistent with the results of this study. In the present study, the genus diversity and isolated parasite species are higher (Ebrahimi *et al*., 2013).

In a study on external parasites of domestic poultry in Tabriz, Hashemzadeh-Farhang and his colleagues (2005) reported 88% infection which was higher than the results found in some studied districts in the present study. However, there is a consistency concerning the species diversity of external parasites isolated from their study and the results in the present study. In both studies, *Menopon* sp., *Goniodes* sp., *Cuclotogaster* sp., *Argas* sp. and *Lipeurus* sp. were isolated from poultries. It seems that there is a considerable agreement between the results of the study by Hashemzadeh and the findings in the present study in terms of rate, severity of infection, and also species diversity of isolated parasites (Hashemzadeh-Farhang *et al.*, 2009).

In their study on evaluating the parasitic infestation of domestic poultry in Ilam, Nazarbeigi and his colleagues isolated *Menopon* sp. (55%), *Goniodes* sp. (18.3%), *Lipeurus* sp. (81.6%), *Goniocotes* sp. (3/58%), *Menacanthus* sp. (3.53%), demonstrating similarities in terms of species diversity with the results of this study while representing differences in the infection severity. In their study, *Lipeurus* sp. has been identified with a high intensity as compared to the results of the present survey. It can be due to differences for example in storage conditions, weather, and genetic issues of ingenious poultry in each area. (Nazareigi *et al.*, 2013).

In an investigation by Tamiru and others (2014), the prevalence of external parasites in Ethiopian chicks was detected as 67.95%, which is somehow close to the results of the present study. In their study, moreover, *Lipeurus* sp., *Menacanthus* sp., and *Cuclotogaster* sp. were isolated, which was consistent with the present study findings. However, in the present study, *Menopon* sp was detected and isolated that was not reported in their findings. In Tamiro's study,

[DOR: 20.1001.1.2717378.2018.2.4.3.2]

on the other hand, flea was also isolated, which was not identified in the Qom survey (Tamiru *et al.*, 2014).

In a study by Mirzaei and his colleagues (2016), the external parasites of domestic chickens in Kermanshah, Dalahu district, was investigated and the prevalence rate was determined to be 52.80%. Their study is in consistent with the results obtained from some districts in our study while in some other districts it was less prevalent. *Menopon* sp., *Menacanthus* sp. and soft *Argas* sp. were also similarly isolated as the present study (Mirzaei *et al.*, 2016). However, *Echidnophaga gallinae* were isolated from indigenous chickens that were not in agreement with the present study results.

What is evident from the findings obtained in the present study and their comparison with the above studies is that, despite the measures taken in the treatment, control and prevention of external parasites of domestic chickens, this problem is apparently persisting and infections with different percentages are still emerged.

Evaluating the studies on pigeons in Iran and other parts of the world, the results seem to be inadequate. It was revealed that most of the parasite-induced infections in indigenous chickens in certain districts were considered as important. It was found that inadequate similar studies have been carried out in other parts of the world. However, a very significant point is the existence of poultry ticks as they cause complications, illnesses and in extremely severe cases, even death for humans.

In what follows, some studies conducted in Iran and other parts of the world are briefly presented in order to compare their results with those of this present survey.

In a study by Spiewak and his colleagues (2006) in northern Silesia in Poland, given that in many regions humans live near pigeons, they found that the bites of the pigeon tick (*Argas reflexus)* could lead to even lethal anaphylaxis in humans. In their study, a skin prick test (SPT) was performed on an apartment complex attacked by *Argas reflexus*, investigating specific IgE to *A. reflexus.* Of the 15 people tested, 8 were positive SPT to *Argas reflexus*, having the symptoms like *Urticaria* (Hives) as well. In general, due to pigeon's infection to *Argas reflexus*, humans also showed allergic reactions to this pigeon tick (Spiewak *et al*., 2006).

In a study on the Frequency of *Ixodidae* and *Argasidea* Ticks and the evaluation of their sensitivity to *Cypermethrin* in Meshkinshahr, Telmadarehei and others (2009) isolated *Ornithodorus* (97.2%) and *Argas* (2.8%) from the family *Argasidea*. In general, 1074

[DOR: 20.1001.1.2717378.2018.2.4.3.2]

Ornithodorus ticks, 26 *Argas reflexus*, and 12 *Argas persicus* were isolated. All *Argas persicus* and *Argas reflexus* ticks were isolated from poultry and poultry nests (Telmadarehei *et al*., 2009). In addition, in this study soft ticks were found to be abundant in the winter, which was exactly the opposite of hard ticks.

In an investigation on the distribution of soft ticks and their infection with *Borrelia* in Hamadan province, studying humans dwellings, poultries, and the whole livestock in Hamadan, Vatandoust and some other researchers (2003) isolated *Argas persicus* (52.3%), *Argas reflexus* (2.6%), *Ornithodorus lahoransis* (41.4%), *Ornithodorus canestrinni* (25), and *Ornithodorus tholezani* (1.77%) (23). In general in their study, they isolated 2512 *Argas persicus*, 125 *Argas reflexus*, 1987 *Ornithodorus lahoransis*, 96 *Ornithodorus canestrinni*, and 85 *Ornithodorustholezani* ticks.

Arshi and his colleagues (2002) investigated the frequency of recurrent fever in Ardebil. Out of 1421 isolated soft ticks that could contribute to the transmission of recurrent fever, 13.8% were *Argas persicus*, 45.9% *Ornithodorus lahoransis*, and 40.3% *Ornithodorus tholezani*.

In a study on the diffusion of *Argasidea* ticks in Hamadan city, determining the dispersal and abundance of soft ticks, Shahraki and Asmar (1997) examined 16 villages and 12 rural districts, their rooms and stables, and detected 1780 soft ticks including *Ornithodorus*, and *Argas*. *A.persicus* was isolated from *Argas*, which was 31.7% of all ticks. Its frequency was 7.04% in every place. *O. lahoransis* was separated from the genus *Ornithodorrus*, representing the highest frequency (66.5%). An average of 14.8 ticks was isolated in each area. *O.canestrin* (1.2%) was also found, demonstrating the incidence as 0.28 cases in each area. *O.tholezani*, comprising 0.6% of the ticks, was isolated with the least abundance as 0.14 cases in each area (Shahraki and Asmar, 1997).

In a study on the seasonal abundance of ticks in West Azarbaijan Province, Salari and his colleagues (2008) isolated A.persicus and *O.lahoransis*. Generally, these samples were isolated from humans, poultries, poultry nests, and animals.

In the comparative study of the present survey with other studies mentioned above, it was revealed that in some investigations *A. reflaxus* was also isolated, which may be related to some other poultries. However, in Qom province, only *A.pesicus* was isolated, that did not show any conformity with some other studies. It could be due to the diversity and differences in host types, as well as climate variations and other efficient conditions.

[DOR: 20.1001.1.2717378.2018.2.4.3.2]

In many studies, in addition to the genus *Argas*, *Ornithodorus*, with a variety of species, has been isolated, which was not isolated in the pigeons in the Qom province. It seems that this soft tick, which is very important, cannot cause any lesion in the pigeons. It is either due to the pigeon's resistance or the physiological conditions and the maintenance of the pigeon are not suitable for this tick.

It is worth mentioning that in the present study, in addition to *Argas persicus*, *Menopon* sp.,
,
Menacanthus sp., and *Lipeurus* sp. were also isolated, which was not discussed and reported in the above mentioned studies. The lice infection is highly significant, posing a risk to pigeons and human community as well.

Infectious parasites in poultries and chickens, and especially external parasites, cause many different lesions. However, what highlight the importance of these parasites are the direct effects and diseases for humans and also the transmission of many pathogens to humans, which in turn can be very dangerous as shock causing death in some cases. It is important to consider poultries and chickens health as well as the relationship between human society and this group of animals with full compliance with health care requirements. In this regard, the public health at the breeding centers and the maintenance of pigeons, disinfection of breeding centers and maintenance with strong insecticides and disinfectants (for a few weeks), sealing all the existing gaps and seams, disinfecting the equipment in the premises, checking the infectious ticks in human dwellings in the area, and performing laboratory tests for those who are in direct contact with the pigeons and pigeon breeding centers, all can play an important role in prevention and control of infectious parasitic diseases.

Conclusion

In the present study on pigeons and chickens, high prevalence was observed. Also a high species diversity of external parasites was observed. These results were well seen in almost all areas studied. This contamination level, It can be a problem for both birds and the human community. It seams, Given the close relationship between humans and birds, Veterinary departments and other relevant organs should pursue more appropriate strategies.

[DOR: 20.1001.1.2717378.2018.2.4.3.2]

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