

Diagnostic Ectoparasites in Pigeons (*Columba livia*) during the 2008-2017 Period in the Havana Cuba Province.

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Abstract

Infestations by external parasites are very frequent in ornamental birds. They cause intense pruritus, affecting the nutrition and rest of the birds. The present experiment was carried out in the Department of Parasitology of the Avian Research and Diagnostic Laboratory (LIDA), belonging to the Poultry Research Institute, Havana, Cuba. We investigated 65 pigeons (*Columba livia*) that were referred to this laboratory during the 2008-2017 period, with the objective of determining the prevalence of external parasite species that affect pigeons, as well as the most prevalent levels of infestation.

For the sampling of the birds, 3 to 5 feathers were extracted from the following body regions: head, back, wings, cloaca area, anterior aspect of the thigh and chest area. The arachnoentomological diagnosis was made and the samples were observed in the stereoscope. The species of mites diagnosed were *Diplaegidia columbae* (32.3%), *Falculifer rostratus* (23%), *Pterophagus strictus* (6.2%) and *Ornithonyssus sylviarum* (1.5%). The first three species are plumicolous, but *O. sylviarum* is hematophagous and therefore of greater pathogenicity. The degree of infestation that predominated by *Diplaegidia columbae* was very slight. While the insects identified were: *Columbicola columbae* (33.8%), *Neocolpocephalum turbinatum* (16.9%), *Campanulotes bidentatus compar* (6.2%), *Hohorstiella lata* (1.5%) and *Pseudolynchia canariensis* (1.5%). The first four species are malophagous lice, while *P. canariensis* is a hematophagous fly. The degree of infestation that predominated by *C. columbae* was very slight and slight.

Keywords: Pigeons; Mites; Lice; Ectoparasites

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Introduction

The domestic pigeon (*Columba livia*) is a bird that used to live in captivity and in the course of 5000 years has been manipulated by man to obtain various breeds ranging from small birds for flight and exhibition, to older animals used in other parts of the world for the production of meat from their chicks; It is native to the Eurasian continent and North Africa. In Cuba it is a city bird, of appreciable value for breeders who develop their specimens to participate in flight competitions, or exhibitions of various kinds, and to a lesser extent providing a protein source for those who consume them (Larramendy, et al. 2007).

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Work has been done to study its parasitic fauna and the main diseases that affect it (Méndez et al., 1998; Larramendy, et al. 2006). Within the Phylum Artropoda a considerable number of parasites are grouped that can affect it, highlighting the lice, mites and hematophagous flies. There have been several species of parasites that have been reported for the first time in the country in the first decade of this century: *Falculifer rostratus* and *Campanulotes bidentatus* compar (Larramendy, et al. 2006); *Neocolpocephalum turbinatum* (Larramendy, et al. 2009). However, since then it is unknown how arthropods is behave in the domestic pigeon. For these reasons, we set ourselves the objective of determining the prevalence of mite and insect species that affect pigeons during the 2008-2017 period, as well as the most prevalent levels of infestation.

Materials and Methods

The present experiment was carried out in the Department of Parasitology of the Avian Research and Diagnostic Laboratory (LIDA), belonging to the Poultry Research Institute, Havana, Cuba. We investigated 65 adult pigeons (*Columba livia*) that were referred to LIDA during the period 2009-2017. The sampling of the birds and the arachnoentomological diagnosis was carried out according to what was referred by Rodríguez, et al. (2015); 3 to 5 feathers were extracted from the following regions of the body: head, back, wings, cloaca area, anterior aspect of the thigh and chest area. Later they were observed to the stereoscope. The species of Ectoparasites were diagnosed taking into account the basic structures of the same according to keys described in the literature (Martín Mateo, 2002, Kranntz and Walter, 2009).

The prevalence in% of each parasite was calculated according to the formula:

$$\text{Prevalence} = \text{sick animals/susceptible animals} * 100.$$

For the classification of the level or degree of infestation of the different ectoparasites diagnosed (Table 1 and 2), the parameters referred by Rodríguez, et al. (2015). The results were analyzed by a comparison of proportions and Duncan’s test to determine if there were significant differences between the Prevalence of the different species of Ectoparasites diagnosed; as well as between levels of infestation, using the statistical package COMPROP 1.

Mites/Feathers	Classification
0 Mites/Feathers	Negative
1-5	Very slight
6-25	Mild
26-50	Half
51-100	Serious
> 100	Very serious

Table 1: Classification of the level or degree of mite infestation.

Insects/Feathers	Classification
0 insects/Feathers	Negative
1-5	Very slight
6-25	Mild
26-50	Half
51-100	Serious
>100	Very serious

Table 2: Classification of the level or degree of infestation by insects.

Results and Discussion

The results showed that of the 65 birds studied, 48 (73.8%) were positive for the presence of Ectoparasites, coinciding with Piralí-Kheirabadi, *et al.* (2016) who affirm that infestations by external parasites are very frequent in pigeons.

Table 3 shows that the species of mites diagnosed were *D. columbae*, *F. rostratus*, *P. strictus* and *O. Sylvania* rum, the first three are plumicolous species however, *O. Sylvania* rum is a hematophagous mite. According to Rodríguez, *et al.* (2015) plumicolous mites are little pathogens in mild infestations, but in intense parasitism they produce irritability, decreased appetite, plumage destruction and pruritus. Larramendy, *et al.* (2014) explain that in a study on the behavior of plumicolous mites in ornamental birds, they observed that in many cases of intense parasitism the birds showed marked emaciation.

Mites diagnosed	Positive Birds	Prevalence (%)
<i>Diplaegidia columbae</i>	21	32,3 ^a
<i>Falculifer rostratus</i>	15	23 ^a
<i>Pterophagus strictus</i>	4	6,2 ^b
<i>Ornithonyssus sylviarum</i>	1	1,5 ^b

Table 3: Prevalence of mites diagnosed in pigeons referred to the LIDA, during the period 2008-2017.

N = 65 (Uncommon letters differ for $p \leq 0.01$).

On the other hand, the pathogenicity of hematophagous mites is much greater, causing deterioration in the growth and development of chicks, increased mortality, increase in nesting intervals, increase in the cost of reproduction, decrease in the size of the nest and abandonment of nests. Severe infestations cause anemia, with a 4% decrease in the hematocrit (Morishita and Schaul, 2007). It also highlights the vector action of these arthropods, they have recovered from these mites *Borrelia anserina*, *Pasteurella* spp. and Newcastle, smallpox and various encephalitis viruses, but there is no evidence that they effectively transmit these infections in nature (Arrabal, *et al.* 2012). Another very significant aspect of the genus *Ornithonyssus* is that it can attack man producing intense itching and painful dermatitis (Bohrer, *et al.* 2015).

Table 3 also shows that the predominant mites were: *D. columbae* (33.8%) and *F. rostratus* (23%), partially coinciding with Larramendy, *et al.* (2007) who report that the mites that are most widespread in pigeons are *D. columbae* (93.3%) and *P. strictus* (83.3%). However, in the present study the infestation rates are lower, and the presence of *P. strictus* was evidenced in only 4 birds.

Table 4 shows the species of insects diagnosed, where the first four are lice, while the last one constitutes a hematophagous fly, which causes important damage to its hosts, since it feeds approximately 20 to 80 minutes twice a day, in addition of having an important vector action when transmitting to the *Haemoproteus columbae* blood protozoon (Piralí-Kheirabadi, *et al.* 2016). The species of lice diagnosed in pigeons in Cuba are: *N. turbinatum*, *C. bidentatus* compar, *C. columbae* (Larramendy, *et al.* 2007) and *H. lata* (Larramendy, *et al.* 2011 search bibliography of this congress). In a study conducted by Larramendy, *et al.* (2007) the insect species that predominated was *C. bidentatus* compar (46%), followed by *N. turbinatum* (30%) and *C. columbae* (23.3%). These results do not coincide with the present investigation, since the infestation by *C. columbae* (33.8%) predominated, followed by *N. turbinatum* (16.9%), *C. bidentatus* compar (12.3%) and *H. lata* (1.5%).

Larramendy, *et al.* (2015) point out that the effect of lice is usually a function of their density. High infestations of lice can cause pruritus, falling feathers, excoriations and/or infected wounds. Severe infestations are associated with young animals or with old animals in poor health, or those maintained in unsanitary conditions. These pathogenic actions are increased for the case of *H. lata*, because in spite of being a malophagous species it has been shown that it also manifests hematophagous habits, being able to cause anemia and possible vector action (Larramendy, *et al.* 2011).

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Insects diagnosed	Positive Birds	Prevalence (%)
<i>Columbicola columbae</i>	22	33,8 ^a
<i>Neocolpocephalum turbinatum</i>	11	16,9 ^b
<i>Campanulotes bidentatus compar</i>	8	12,3 ^c
<i>Hohorstiella lata</i>	1	1,5 ^c
<i>Pseudolynchia canariensis</i>	1	1,5 ^c

Table 4: Prevalence of insects diagnosed in pigeons referred to LIDA during the period 2008-2017.

N = 65 (Uncommon letters differ for p ≤ 0.01).

Tables 5 and 6 reflect the level of infestation by mites and insects respectively, and their corresponding comparison of proportions. In these tables it is evident that the degree of infestation that predominated by *D. columbae* was very slight, while in the parasitism by *C. columbae*, the infestation of very mild to mild prevailed. These results coincide with what was indicated by Rodríguez, *et al.* (2015), since they refer that in unconfined birds the level of parasitism is lower than that in confined birds without the possibility of grooming.

Mites diagnosed	Level or Degree of Infestation									
	Very slight	Prop.	Mild	Prop.	Half	Prop.	Serious	Prop.	Sign.	E.S
<i>D. columbae</i>	11	0,52 ^a	5	0,24 ^b	4	0,19 ^b	1	0,05 ^b	**	0,09
<i>F. rostratus</i>	7	0,47	4	0,27	3	0,20	1	0,07	N.S	0,11
<i>O. bursa</i>	1	1,00								
<i>P. strictus</i>	1	0,25			3	0,75			N.S	0,25

Table 5: Level or degree of infestation of mite species diagnosed in pigeons referred to LIDA during the period 2008-2017.

N = 65 (Non-common letters in the same row, differ statistically).

Insects diagnosed	Nivel o Grado de Infestación									
	Very slight	Prop.	Mild	Prop.	Half	Prop.	Serious	Prop.	Sign.	E.S
<i>C. columbae</i>	10	0,45 ^a	9	0,41 ^a	2	0,09 ^b	1	0,05 ^b	**	0,09
<i>N. turbinatum</i>	4	0,36	3	0,27	2	0,18	2	0,16	N.S	0,13
<i>C. bidentatus comprar</i>	2	0,25	5	0,63	1	0,13			N.S	0,17
<i>H. lata</i>					1	1,00				
<i>P. canariensis</i>	1	1,00								

Table 6: Level or degree of infestation of insect species diagnosed in pigeons referred to LIDA during the period 2008-2017.

Conclusions

- The most prevalent mites found in pigeons were *Diplaegidia columbae* and *Falculifer rostratus*, while *Columbicola columbae* was the insect that prevailed.
- The level of infestation that predominated by *Diplaegidia columbae* was very slight, while in the parasitism by *Columbicola columbae*, the infestation of very mild and slight prevailed.

Conflict of interest

There are not conflict of interest exists.

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