

# Ectoparasite infestation on rural dogs in the municipality of São Vicente Férrer, Pernambuco, Northeastern Brazil

Infestação por ectoparasitos em cães rurais no município de São Vicente Férrer, Pernambuco, Nordeste do Brasil

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## Abstract

This article presents the results of a study on ectoparasites infesting rural dogs in Pernambuco, northeastern Brazil. Forty-one dogs from a rural community of Pernambuco were examined and 70.7% were infested by ectoparasites. The prevalence rates of infestation by ticks, fleas, and lice were 58.5, 43.9 and 22%, respectively. Of 24 dogs parasitized by ticks, 15 were exclusively infested by *Rhipicephalus sanguineus* (Latreille) (32 females, 66 males, 9 nymphs; prevalence, 48.8%; mean intensity, 5.4), four by *Amblyomma ovale* Koch (33 females, 19 males; prevalence, 22%; mean intensity, 5.8), and five were coinfested by both species. *Ctenocephalides felis felis* (Bouché) (25 females, 8 males; prevalence, 43.9%; mean intensity, 1.9) and *Heterodoxus spiniger* (Enderlein) (16 females, 11 males, 10 nymphs; prevalence, 22%; mean intensity, 4.1) were the only species of flea and louse identified. Tick infestation was more frequent than flea or lice infestations ( $p < 0.05$ ). No statistical difference was found by sex and age group of the dogs studied and prevalence of infestation. Overall, 48.8% (20/41) of the dogs were infested by more than one ectoparasite species.

**Keywords:** Ixodida, Siphonaptera, Phthiraptera, Brazil, dog.

## Resumo

O presente artigo apresenta os resultados de um estudo sobre os ectoparasitos que infestam cães rurais em Pernambuco, Nordeste do Brasil. Quarenta e um cães de uma comunidade rural de Pernambuco foram examinados e 70,7% estavam infestados por ectoparasitos. As taxas de prevalência de infestação por carrapatos, pulgas e piolhos foram 58,5, 43,9 e 22%, respectivamente. Dos 24 cães parasitados por carrapatos, 15 estavam exclusivamente infestados por *Rhipicephalus sanguineus* (Latreille) (32 fêmeas, 66 machos, 9 ninfas; prevalência, 48,8%; intensidade média, 5,4), quatro por *Amblyomma ovale* Koch (33 fêmeas, 19 machos; prevalência, 22%; intensidade média, 5,8), e cinco estavam co-infestados por ambas as espécies. *Ctenocephalides felis felis* (Bouché) (25 fêmeas, 8 machos; prevalência, 43,9%; intensidade média, 1,9) e *Heterodoxus spiniger* (Enderlein) (16 fêmeas, 11 machos, 10 ninfas; prevalência, 22%; intensidade média, 4,1) foram as únicas espécies de pulga e piolho identificadas. A infestação por carrapatos foi mais frequente que as infestações por pulgas ou piolhos ( $p < 0.05$ ). Não houve diferença estatística em relação ao sexo e grupo etário dos cães e a prevalência de infestação. No geral, 48,8% (20/41) dos cães estavam infestados por mais de uma espécie de ectoparasito.

**Palavras-chave:** Ixodida, Siphonaptera, Phthiraptera, Brasil, cão.

Ectoparasites are known to infest dogs worldwide. Among ectoparasites infesting dogs (e.g., ticks, fleas, and lice), ticks are the most important in terms of disease transmission. They are also notable due to their adaptability to live in a great variety of environmental conditions and their capability to survive for long periods of time without feeding (DANTAS-TORRES, 2008a). For

example, *Rhipicephalus sanguineus* (Latreille) is a known vector of several pathogens, including *Babesia canis vogeli* Reichenow, *Ehrlichia canis* (Donatien & Lestoquard), and *Rickettsia rickettsii* (Wolbach) (DANTAS-TORRES; FIGUEREDO 2006; DANTAS-TORRES, 2007, 2008a). Moreover, cases of human parasitism by *R. sanguineus* have been reported in Brazil (DANTAS-TORRES et al., 2006). Due to their significance, ectoparasites infesting dogs have been investigated in several studies in Brazil (RODRIGUES et al., 2001; BELLATO et al., 2003; DANTAS-TORRES et al., 2004). Despite that, knowledge about ectoparasites infesting dogs from

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rural areas in some Brazilian regions is limited. The present article describes the results of a community-based study on ectoparasites infesting rural dogs in Pernambuco, northeastern Brazil.

This study was carried out in a rural community (Mundo Novo) located in the municipality of São Vicente Férrer (07° 35' 28" S and 35° 29' 29" W). This municipality is located in the agreste region of Pernambuco but its environmental features are similar to those seen in the Atlantic rain forest region (CARVALHO et al., 2007). From 2 to 6 June 2008, all but two dogs living in the aforementioned rural community were physically examined for the presence of ectoparasites. The two dogs that were not included in this study ran away before immobilization and examination. There were no control measures against canine ectoparasites in place in the community at the time of the study. After manual collection, ectoparasites were kept in vials (individualized per animal) containing 70% ethanol. Ectoparasite identification was carried out using a stereomicroscope and proper taxonomic keys (WERNECK, 1936; ARAGÃO; FONSECA, 1961a; LINARDI; GUIMARÃES, 2000). Fleas and lice were cleared in 10% potassium hydroxide, dehydrated in a series of ethanol washes, and then slide-mounted in Canada balsam as needed. Abbreviations of tick genera are according to Dantas-Torres (2008b). Voucher specimens have been deposited in the National Tick Collection, University of São Paulo (accession numbers 1317, 1318), and in the Instituto Butantã (accession numbers 9980, 9981). Statistical analyses were performed using Epi Info software, version 6.04d (Centers for Disease Control and Prevention, Atlanta, USA, 2001). The chi-square test ( $\chi^2$ ) was used to compare the prevalence of infestation by the dog's sex and age. A 5% significance level was set. Sex ratio, prevalence, mean intensity, and mean abundance were calculated as described elsewhere (BUSH et al., 1997).

A total of 41 dogs (29 males and 12 females) were examined in the study. The dogs had no defined breed and were semi-domiciled. Their mean age was 29.2 months (standard deviation [SD], 31.5; range 1-120). Of 41 dogs examined, 29 were infested by ectoparasites, with an overall infestation prevalence rate of 70.7% (95% CI: 54.5-83.9). Of those infested dogs, the proportion of males was significantly higher than that of females ( $\chi^2 = 15.52$ ,  $p = 0.000$ ). Comparing the whole study population, the prevalence of ectoparasite infestation was also higher among males (75.9; 95% CI: 56.6-89.7) than females (58.3; 95% CI: 27.7-84.7), but this difference was not statistically significant (Yates' corrected  $\chi^2 = 0.56$ ,  $p = 0.456$ ). Mean age of the infested dogs (mean age, 28.2 months; SD, 32.6) was lower than that of non-infested dogs (mean age, 31.7, SD 29.8). The prevalence of ectoparasite infestation was higher among dogs  $\leq 1$  year (82.4; 95% CI: 56.6-96.2) when

compared to dogs  $> 1$  year (62.5; 95% CI: 40.6-81.2). However, there was no significant difference by age among both infested ( $\chi^2 = 0.07$ ,  $p = 0.792$ ) and non-infested dogs (Yates' corrected  $\chi^2 = 1.06$ ,  $p = 0.303$ ).

The prevalence of tick infestation was 58.5% (95% CI: 42.1-73.7). Of 24 dogs parasitized by ticks, 62.5% (95% CI: 40.6-81.2) were infested by *R. sanguineus*, 16.7% (95% CI: 4.7-37.4) by *Amblyomma ovale* Koch, and 20.8% (95% CI: 7.1-42.1) were coinfecting by both species. *Ctenocephalides felis felis* (Bouché) and *Heterodoxus spiniger* (Enderlein) were the only species of flea and louse identified. Number of examined specimens, sex ratio, prevalence, mean intensity, and mean abundance for each ectoparasite species is shown in Table 1. Of 29 infested dogs, 20 (68.9%; 95% CI: 49.2-84.7) were infested by more than one ectoparasite species, which corresponds to a coinfection prevalence rate of 48.8% (95% CI: 32.9-64.9). Nine dogs were coinfecting by fleas and ticks, five by fleas and lice and ticks, three by two species of ticks, two by fleas and lice, and one by lice and ticks. There were found the following ectoparasite associations (number of observations within brackets): *R. sanguineus* + *C. felis felis* (7); *R. sanguineus* + *A. ovale* (3); *R. sanguineus* + *C. felis felis* + *H. spiniger* (3); *C. felis felis* + *H. spiniger* (2); *C. felis felis* + *A. ovale* (1); *R. sanguineus* + *H. spiniger* (1); *C. felis felis* + *H. spiniger* + *A. ovale* (1); *R. sanguineus* + *C. felis felis* + *A. ovale* (1); *R. sanguineus* + *C. felis felis* + *H. spiniger* + *A. ovale* (1).

The present study provides new data about ectoparasites infesting rural dogs in northeastern Brazil. Among infested dogs, the proportion of males was much higher than that of females but this difference was not significant. It can be attributed to characteristics of the population studied, which predominately comprised males. Similarly, most young dogs living in the rural community studied were infested by ectoparasites, suggesting that they are more susceptible and/or more exposed to ectoparasites, but no significant difference was found by age.

The prevalence rate, sex ratio, mean intensity, and mean abundance for each ectoparasite species identified during the present study may vary widely from region to region and according to characteristics of the study population (e.g., rural versus urban dogs) (RODRIGUES et al., 2001; SOARES et al., 2006). For instance, in a study conducted in rural farms in northern Brazil, *R. sanguineus* was not found and mean intensity of infestation by *A. ovale* was about 1.3 (eight ticks on six dogs) (LABRUNA et al., 2000). In the present study, *R. sanguineus* was the most common ectoparasite found on rural dogs and mean intensity of infestation by *A. ovale* was 5.8 (52 ticks on nine dogs). The comparison between these studies is difficult since they have some differences (e.g., sample

**Table 1.** Ectoparasites (n = 229) found on dogs (n = 29) from a rural community in Pernambuco, northeastern Brazil, on 2-6 June 2008.

Ectoparasite species	♀	♂	Nymphs	Sex ratio (♀ : ♂)	Infested dogs	Prevalence (95% CI)	Mean intensity <sup>a</sup> ± SD	Mean abundance <sup>b</sup> ± SD
<i>Rhipicephalus sanguineus</i>	32	66	9	1:2.1	20	48.8 (32.9-64.9)	5.4 ± 4.5	2.6 ± 4.1
<i>Heterodoxus spiniger</i>	16	11	10	1.5:1	9	22.0 (10.6-37.6)	4.1 ± 3.4	0.9 ± 2.3
<i>Amblyomma ovale</i>	33	19	0	1.7:1	9	22.0 (10.6-37.6)	5.8 ± 5.7	1.3 ± 3.5
<i>Ctenocephalides felis felis</i>	25	8	0	3.1:1	18	43.9 (28.5-60.3)	1.9 ± 1.3	0.8 ± 1.3

<sup>a</sup>Number of ectoparasites per number of infested dogs. <sup>b</sup>Number of ectoparasites per number of examined dogs.

size). In spite of that, it would be expected that *A. ovale* would be more common in eastern Brazilian Amazon rather than in the *agreste* region of Pernambuco. Further studies on the seasonality of *A. ovale* can help provide more data to better understand why no larvae of *R. sanguineus* and *A. ovale* and no nymphs of the latter species were found in the present study.

Similarly to what was found in a previous study conducted in an urban area in Pernambuco (DANTAS-TORRES et al., 2004), *R. sanguineus* was the most common ectoparasite associated with rural dogs. But in contrast to what was found in the urban area, rural dogs were also infested by *A. ovale* which was found to be a common ectoparasite in the area studied. This tick is a common parasite of wild carnivores and rural dogs (ARAGÃO; FONSECA, 1961b; LABRUNA et al., 2000) and has been implicated in the transmission of *Hepatozoon canis* (James) in Brazil (FORLANO et al., 2005). Furthermore, *A. ovale* is known to infest humans (LABRUNA et al., 2005).

The present study showed that the prevalence of *H. spiniger* infestation appears to be much higher on rural dogs when compared to urban ones (DANTAS-TORRES; FIGUEREDO, 2007). It is worth noting that *Trichodectes canis* (Degeer), a common dog louse, was not identified in this study. One of the authors (F.D-T) has found *T. canis* on a dog from a neighboring rural community in the municipality of Vicência. Further collections are needed to confirm whether *T. canis* is present in São Vicente Férrer.

This study also revealed a high prevalence of *C. felis felis* infestation on rural dogs from Pernambuco. In a previous study carried out in the metropolitan region of Recife, the prevalence of *C. felis felis* infestation was around 5% (DANTAS-TORRES et al., 2004). To some extent, the high prevalence of ectoparasite infestation on rural dogs is expected because most people living in rural areas cannot afford the cost of ectoparasite control. Other factors might contribute for this high prevalence, including dogs' lifestyle (e.g., rural dogs are often semi-domiciled and have free access to forested areas, being thus more exposed to ectoparasites). The present results indicate that dogs from São Vicente Férrer are potentially exposed to vector-borne pathogens. Interestingly, canine visceral leishmaniasis is endemic in São Vicente Férrer, but the presence of *Lutzomyia longipalpis* has not been confirmed (CARVALHO et al., 2007). Moreover, *Leishmania*-like forms have been reported in *R. sanguineus* ticks collected from dogs living in this municipality (SILVA et al., 2007). Further studies are recommended to assess the prevalence and diversity of vector-borne pathogens infecting dogs from São Vicente Férrer.

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