

Ixodidae fauna of domestic dogs in Parana, southern Brazil

Fauna ixodídica em cães domésticos no Paraná, Sul do Brasil

Bianca Ressetti da Silva¹; Marcos Valério Garcia^{2,3}; Vinicius da Silva Rodrigues^{2,4}; Renato Andreotti⁵; Rosângela Locatelli Dittrich^{1*}

¹ Programa de Pós-graduação em Ciências Veterinárias, Universidade Federal do Paraná – UFPR, Curitiba, PR, Brasil

² Laboratório de Biologia do Carrapato, Empresa Brasileira de Pesquisa Agropecuária – Embrapa Gado de Corte, Campo Grande, MS, Brasil

³ Fundação de Apoio ao Desenvolvimento do Ensino, Ciência e Tecnologia do Estado de Mato Grosso do Sul – FUNDECT, Governo do Estado de Mato Grosso do Sul, Campo Grande, MS, Brasil

⁴ Programa de Pós-graduação em Doenças Infecciosas e Parasitárias, Universidade Federal de Mato Grosso do Sul – UFMS, Campo Grande, MS, Brasil

⁵ Empresa Brasileira de Pesquisa Agropecuária – Embrapa Gado de Corte, Campo Grande, MS, Brasil

Received January 10, 2017

Accepted March 22, 2017

Abstract

The present study aimed to contribute towards identification and registration of tick species that parasitize dogs in rural and urban areas of three mesoregions of Paraná, southern Brazil, and to estimate the rate of occurrence of each species. Fifty-six dogs with ticks living in three mesoregions: Metropolitana de Curitiba (MC), Centro Oriental (COP) and Centro Sul Paranaense (CSP), were used in the study. From these 56 dogs, 253 ticks were collected and were identified and morphologically characterized according to the species. Among all the ticks, 69.6% were identified as belonging to the species *Rhipicephalus sanguineus sensu lato* (*s. l.*); 28.1% as *Amblyomma aureolatum* and 2.4% as *Amblyomma ovale*. Among the dogs in MC that were evaluated, 57.7% were parasitized by *R. sanguineus s. l.*, 38.5% by *A. aureolatum* and 3.8% by *A. ovale*; while in COP, 72.4% of the dogs were parasitized by *A. aureolatum* and 27.6% by *R. sanguineus s. l.*. In CSP, one tick was obtained, which was identified as *A. aureolatum*.

Keywords: *Amblyomma aureolatum*, *Amblyomma ovale*, ectoparasite, *Rhipicephalus sanguineus sensu lato*, vector.

Resumo

O presente estudo objetivou contribuir com a identificação e o registro das espécies de carrapatos que parasitam cães de áreas rurais e urbanas de três mesorregiões do Paraná, Sul do Brasil, e estimar a taxa de ocorrência de cada espécie. Cinquenta e seis cães com carrapatos, provenientes das mesorregiões: Metropolitana de Curitiba (MC), Centro Oriental (COP) e Centro Sul Paranaense (CSP) foram utilizados no estudo. Dos 56 cães, foram coletados 253 carrapatos que foram identificados e caracterizados morfológicamente de acordo com a espécie. Do total de carrapatos, 69,6% foram identificadas como pertencentes à espécie *Rhipicephalus sanguineus s. l.*; 28,1% como *Amblyomma aureolatum* e 2,4% como *Amblyomma ovale*. Dentre os animais avaliados, provenientes da MC, 57,7% estavam parasitados por *R. sanguineus s. l.*, 38,5% por *A. aureolatum* e 3,8% por *A. ovale*; enquanto na COP 72,4% dos cães foram parasitados por *A. aureolatum* e 27,6% por *R. sanguineus s. l.*. Na CSP foi obtido um carrapato, identificado como *A. aureolatum*.

Palavras-chave: *Amblyomma aureolatum*, *Amblyomma ovale*, ectoparasitos, *Rhipicephalus sanguineus sensu lato*, vetor.

Dogs can be parasitized by various species of ticks (FLECHTMANN, 1990). The environmental characteristics and diversity of host species in each region are the fundamental points regarding the existence of certain species of ticks in dogs (LABRUNA et al., 2001). In Brazil dogs raised in urban environments are mostly parasitized by ticks of the *Rhipicephalus sanguineus sensu lato*

(*s. l.*). In contrast, dogs in rural or suburban areas can be exposed to infestation by several species of ticks that were originally native to wild mammals of the Brazilian fauna, belonging to the genus *Amblyomma* spp., and also to infestation by *R. (Boophilus) microplus* (LABRUNA & PEREIRA, 2001; LABRUNA et al., 2001). In Paraná, studies on identification of tick species in dogs have so far been limited to the northern region of the state, where ticks of the species *R. sanguineus s. l.* (LABRUNA et al., 2001; OYAFUSO et al., 2002; VIEIRA et al., 2013), *R. (B.) microplus*, *A. aureolatum* (LABRUNA et al., 2001), *A. ovale* (LABRUNA et al.,

*Corresponding author: Rosângela Locatelli Dittrich. Programa de Pós-graduação em Ciências Veterinárias, Universidade Federal do Paraná – UFPR, Rua dos Funcionários, 1540, Bairro Cabral, CEP 80035-050, Curitiba, PR, Brasil. e-mail: roslocdi@ufpr.br

2001; VIEIRA et al., 2013) and *A. sculptum* parasitizing dogs (OYAFUSO et al., 2002; VIEIRA et al., 2013) have been reported.

Knowledge of the species of Ixodidae fauna in a region is important for determining the possible diseases transmitted by these vectors and their risk of occurrence (OYAFUSO et al., 2002). The objectives of the present study were to identify tick species that parasitize dogs in urban and rural areas of three mesoregions: Metropolitana de Curitiba (MC), Centro Oriental (COP) and Centro Sul Paranaense (CSP), and to determine the rate of occurrence of each species, according to the mesoregion.

This study was approved by the Ethics Committee of the Federal University of Paraná (UFPR) (approval no. 035/2015) and was conducted on dogs in three geographical mesoregions: MC (comprising the municipalities of Antonina, Campina Grande do Sul, Campo Largo, Curitiba, Matinhos, Paranaguá and São José dos Pinhais), COP (Carambeí, Castro and Ponta Grossa) and CSP (Guarapuava). Ticks were collected from dogs at their owners' homes, at the UFPR Veterinary Hospital and at private veterinary clinics in these mesoregions.

According to Köppen's classification, the three mesoregions studied present a predominantly temperate climate (cfb), with average temperatures in the colder months below 18 °C and fresh summers with average temperatures in the warmer months below 22 °C. However, the cities of Antonina, Matinhos and Paranaguá (MC), which are located on the coast, have a subtropical climate (cfa). This is characterized by average temperatures in the colder months below 18 °C and in the warmer months above 22 °C, with hot summers (IAPAR, 1994).

The sampling design used was one of convenience, according to the routine of the UFPR Veterinary Hospital and the collaborating veterinary clinics. Fifty-six dogs were evaluated, and the inclusion criterion for the study was the presence of a tick on the animal. In the MC and COP mesoregions, the collections were carried out from June 2015 to March 2016; in CSP, the collection was carried out in August 2015. Information was obtained on how the dogs had been raised (urban or rural area).

The animals were inspected and ticks present were removed from the dogs' skin using tweezers, were placed in tubes

containing isopropyl alcohol, capped and identified. The ticks were classified in accordance with published dichotomous keys (BARROS-BATTESTI et al., 2006; ONOFRIO, 2007; MARTINS et al., 2010), using a stereomicroscope at the Tick Biology Laboratory of Embrapa Beef Cattle.

In total, 253 ticks were collected from dogs, of which 178 were obtained in the MC mesoregion, 74 in COP and one in CSP. From species identification, the following results were obtained: 176 (69.6%) specimens of *R. sanguineus s. l.*, of which 173 were adults (120 females and 53 males) and three were nymphs; 71 (28.1%) of *A. aureolatum*, of which 67 were adults (49 females and 18 males) and four were nymphs; and six (2.4%) of *A. ovale*, which were all adults (three males and three females). The occurrences of each species are shown in Table 1.

In the COP mesoregion, among the 29 parasitized dogs, 72.4% presented *A. aureolatum* and 27.6% *R. sanguineus s. l.*. In CSP, one sample was obtained, which was identified as *A. aureolatum*. Among the 26 dogs in the MC mesoregion, 57.7% were parasitized by *R. sanguineus s. l.*, 38.5% by *A. aureolatum* and 3.8% by *A. ovale*. In the catalogue of the tick collection of the Capão da Imbuia Natural History Museum (located in Curitiba, Paraná) (ARZUA et al., 2005), specimens obtained from animals during fieldwork and through donations from researchers are cited, stating the species, locality and host. Ticks of the following species are registered in the catalogue: *R. sanguineus s. l.* parasitizing dogs in the municipalities of Curitiba, Pontal do Paraná, Londrina and Maringá; *A. aureolatum* in dogs in the MC mesoregion; and *A. ovale* in dogs in the municipalities of Guaqueçaba and Morretes, while in the present study this species was obtained in the municipality of Antonina.

In the present study, none of the dogs presented infestation with more than one species of tick. It was found that the 23 dogs parasitized by *R. sanguineus s. l.* were raised in an urban environment. This tick is the one that is most prevalent in dogs in these areas (SZABÓ et al., 2001, 2010) and infestations usually occur more intensely (SZABÓ et al., 2001; VIEIRA et al., 2013). In the northern region of Paraná, a similar distribution of ticks was found among dogs in a hospital population, which also originated

Table 1. Occurrence of species of tick found in dogs, during 2016 year, in Paraná Brazil.

	Mesoregion	Ticks		
		<i>R. sanguineus</i>	<i>A. aureolatum</i>	<i>A. ovale</i>
Number of ticks collected		176 (69.6%)	71 (28.1%)	6 (2.4%)
Number of parasitized dogs	MC	15 (57.7%)	10 (38.5%)	1 (3.8%)
	COP	8 (27.6%)	21 (72.4%)	0
	CSP	0	1 (100%)	0
Location (city)		Curitiba	Curitiba	Antonina
		Ponta Grossa	Ponta Grossa	
		Paranaguá	Guarapuava	
		Matinhos	Castro	
			Carambeí	
			Campo Largo	
			Campina Grande do Sul	
			São José dos Pinhais	

MC: Metropolitana de Curitiba mesoregion; COP: Centro Oriental Paranaense mesoregion; CSP: Centro Sul Paranaense mesoregion.

from urban areas (OYAFUSO et al., 2002). However, previous studies have verified ticks of this species in dogs from the rural area of the northern region of the state (LABRUNA et al., 2001; VIEIRA et al., 2013).

Among the 32 dogs parasitized by *A. aureolatum*, 19 were living in rural areas and 13 in urban areas, but all of them had access to forest areas. One possible explanation for this result is that this species of tick is regularly found in wild animals, especially canids and felids; and that it is one of the species that is best adapted to dogs in southern Brazil (ARAGÃO & FONSECA, 1961). *A. ovale* ticks were obtained in only one dog in a rural area, with access to forest areas, in MC mesoregion. According to Flechtmann (1990), *A. ovale* is commonly found in wild animals in Brazil and has, over time, adapted to domestic dogs in rural areas, such that today it is one of the most common ticks to be found in these animals.

Regarding the degree of infestation, the mean numbers of ticks per dog were 6.8 in the MC mesoregion and 2.5 in COP. In the CSP mesoregion, only one tick was obtained from one dog. However, 82.1% of the dogs had 1 to 5 ticks. The dogs in rural areas of the northern region of Paraná presented an average infestation of 2.5 ticks per dog (LABRUNA et al., 2001). However, dogs from the municipality of Paranaguá (MC mesoregion) showed a higher degree of infestation, with an average of 17 ticks per dog, and the most infested dog had 42 ticks. These dogs were bred in the urban area and were infested by *R. sanguineus s. l.*. It is important to note that Paranaguá has a subtropical climate, with hot summers, unlike the other municipalities studied, which have a temperate climate (with the exceptions of Antonina and Matinhos) (IAPAR, 1994) and the tick collections were carried out in the summer.

References

- Aragão H, Fonseca F. Notas de Ixodologia: IX. O Complexo ovale do gênero *Amblyomma*. *Mem Inst Oswaldo Cruz* 1961; 59(2): 131-148. PMID:13861961. <http://dx.doi.org/10.1590/S0074-02761961000200002>.
- Arzua M, Onofrio VC, Barros-Battesti DM. Catalogue of the tick collection (Acari, Ixodida) of the Museu de História Natural Capão da Imbuia, Curitiba, Paraná, Brazil. *Rev Bras Zool* 2005; 22(3): 623-632. <http://dx.doi.org/10.1590/S0101-81752005000300015>.
- Barros-Battesti DM, Arzua M, Bechara GH. *Carrapatos de importância médico-veterinária da região neotropical: um guia ilustrado para identificação de espécies*. São Paulo: VOX/ICTTD-3/ Butantan; 2006.
- Flechtmann CAW. *Ácaros de importância médico-veterinária*. 3rd ed. São Paulo: Nobel; 1990.
- Instituto Agrônomo do Estado do Paraná – IAPAR. *Cartas climáticas do Estado do Paraná*. Londrina: IAPAR; 1994. 49 p. [cited 2016 Dec 15]. Available from: <http://www.iapar.br/modules/conteudo/conteudo.php?conteudo=597>
- Labruna MB, Pereira MC. Carrapato em cães no Brasil. *Clin Vet* 2001; 6(30): 24-32.
- Labruna MB, Souza SLP, Guimarães JS Jr, Pacheco RC, Pinter A, Gennari SM. Prevalência de carrapatos em cães de áreas rurais da região norte do Estado do Paraná. *Arq Bras Med Vet Zootec* 2001; 53(5): 553-556. <http://dx.doi.org/10.1590/S0102-09352001000500007>.
- Martins TF, Onofrio VC, Barros-Battesti DM, Labruna MB. Nymphs of the genus *Amblyomma* (Acari: Ixodidae) of Brazil: descriptions, redescription, and identification key. *Ticks Tick Borne Dis* 2010; 1(2): 75-99. PMID:21771514. <http://dx.doi.org/10.1016/j.ttbdis.2010.03.002>.
- Onofrio VC. *Revisão do gênero Amblyomma Koch, 1844 (Acari: Ixodidae) no Brasil* [Thesis]. Seropédica: Universidade Federal Rural do Rio de Janeiro; 2007.
- Oyafuso MK, Dagnone AS, Vidotto O, Morais HSA. Caracterização de carrapatos parasitas de cães em uma população hospitalar no Norte do Paraná. *Semina: Cienc Agrár* 2002; 23(1): 71-74.
- Szabó MPJ, Cunha M, Santos AP, Vicentini F. Ticks (Acari: Ixodidae) associated with domestic dogs in Franca region, São Paulo, Brazil. *Exp Appl Acarol* 2001; 25(10-11): 909-916. PMID:12455880. <http://dx.doi.org/10.1023/A:1020433003028>.
- Szabó MPJ, Souza LGA, Olegário MMM, Ferreira FA, Pajuaba Neto AA. Ticks (Acari: Ixodidae) on Dogs from Uberlândia, Minas Gerais, Brazil. *Transbound Emerg Dis* 2010; 57(1-2): 72-74. PMID:20537111. <http://dx.doi.org/10.1111/j.1865-1682.2010.01111.x>.
- Vieira TSWJ, Vieira RFC, Nascimento DAG, Tamekuni K, Toledo RS, Chandrashekar R, et al. Serosurvey of tick-borne pathogens in dogs from urban and rural areas from Parana State, Brazil. *Rev Bras Parasitol Vet* 2013; 22(1): 104-109. PMID:24252955. <http://dx.doi.org/10.1590/S1984-29612013000100019>.