



## Unusual parasitism site of *Dermacentor nitens* (Acari: Ixodidae) on a horse

Gracielle Teles Pádua<sup>1</sup>  Luiza Gabriella Ferreira de Paula<sup>1</sup>  Ana Carolina Borsanelli<sup>1</sup>   
 Marcelo Bahia Labruna<sup>2</sup>  Felipe da Silva Krawczak<sup>1\*</sup> 

<sup>1</sup>Programa de Pós-graduação em Ciência Animal, Universidade Federal de Goiás (UFG), 74690-900, Goiânia, GO, Brasil. E-mail: felipekvet@ufg.br

\*Corresponding author.

<sup>2</sup>Departamento de Medicina Veterinária Preventiva e Saúde Animal, Faculdade de Medicina Veterinária e Zootecnia, Universidade de São Paulo (USP), São Paulo, SP, Brasil.

**ABSTRACT:** *Dermacentor nitens* Neumann is the most common tick species infesting horses in the main Brazilian biomes. It has a predilection to attach to horse the ears, the nasal diverticulum, perineal and perianal regions. The infestations can generate severe damage in the ears, anemia, and the tick also acts as vector of *Babesia caballi* (Nuttall and Strickland), the causative agent of equine babesiosis. Our study describes unusual parasitism site of *D. nitens* on a female cross breed horse, approximately ten years old that presented high parasitism by ticks on the perineal and perianal region, ears, and the left eye orbit region, where an enucleation process had been performed a few years earlier. To our knowledge this is the first report of *D. nitens* parasitism on a formerly enucleated eye orbit.

**Key words:** eye orbit, parasitism, tick, enucleation site, Brazil.

## Parasitismo em local incomum de *Dermacentor nitens* (Acari: Ixodidae) em um cavalo

**RESUMO:** *Dermacentor nitens* Neumann é a espécie de carrapato mais comum infestando equinos nos principais biomas brasileiros. Tem predileção por se fixar ao cavalo nas orelhas, divertículo nasal, e nas regiões perineal e perianal. As infestações podem gerar danos severos nas orelhas, anemia, e o carrapato também atua como vetor de *Babesia caballi* (Nuttall and Strickland), agente causador da babesiose equina. Nosso estudo descreve um local de parasitismo incomum de *D. nitens* em uma égua mestiça de aproximadamente dez anos de idade, que apresentou alto parasitismo por carrapatos nas regiões perineal e perianal, orelhas e região da órbita do olho esquerdo, onde havia sido realizado processo de enucleação alguns anos anteriores. Para o nosso conhecimento, este é o primeiro relato de parasitismo de *D. nitens* em uma órbita ocular anteriormente enucleada.

**Palavras-chave:** órbita ocular, parasitismo, carrapato, sítio de enucleação, Brasil.

*Dermacentor nitens* Neumann is the most common tick found parasitizing horses in the main Brazilian biomes, such as Amazon, Atlantic Forest, Cerrado (savannah), semiarid Caatinga, Pantanal (wetlands) (LABRUNA & FACCINI, 2020). This ixodid species became widely distributed in South America during the 20<sup>th</sup> century through the movement and distribution of domestic equids (NAVA et al., 2017) and *D. nitens* has never been reported from a site without the presence of equids (LABRUNA & FACCINI, 2020).

*Dermacentor nitens* is a one-host ixodid tick, its parasitic phase on horses has an average duration of 25 days, the pre-oviposition period an average of 5 days and the average incubation

period near 26 days, totaling a mean of 56 days of life cycle (RODRIGUES et al., 2017). Also, it presents a predilection for attaching to the ears of the hosts; however, depending on the degree of infestation, it can be found anywhere on the body, including the nasal diverticulum, the mane, tail, groin, and perineum region (LABRUNA et al., 2001, LABRUNA et al., 2002, RODRIGUES et al., 2017). *D. nitens* parasitism can result in health issues such as drop in hematological values for packed cell volume, lesions in the ears, resulting in permanent damage to cartilage, irritation, lower productivity, predisposition to secondary bacterial infections and screw-worm [*Cochliomyia hominivorax* (Coquerel)] infestations (LABRUNA & AMAKU, 2006). In addition, it has

been implicated in the transmission of pathogenic agents to horses, being the confirmed vector of *Babesia caballi* (Nuttall and Strickland), one of the causative agents of equine piroplasmosis (ROBY & ANTHONY, 1963). The present study reported the presence of infestation by *D. nitens* in the formerly enucleated eye orbit of a horse from Goiás state, midwestern Brazil.

During the management and clinical evaluation of horses in the herd of Veterinary Teaching Hospital of the School of Veterinary and Animal Science of the Federal University of Goiás (UFG), located in Goiânia city (16° 40' S, 49° 15' W), Goiás State, midwestern Brazil, high parasitism by ticks was identified in the perineal and perianal regions, ears, and the left eye orbit, of an adult female cross breed horse of approximately ten years old, where an enucleation process had been performed two years earlier (Figure 1).

Sixteen specimens of ticks from the previously enucleated site, the left eye orbit, were collected with the aid of toothless anatomical tweezers. The collected ticks were preserved in absolute alcohol until taxonomic identification in the Laboratory of Parasitic Diseases (LADOPAR). Adult ticks, four males and 10 engorged females of *Dermacentor nitens* were identified following BARROS-BATTESTI et al. (2006). Two nymphs of

the genus *Dermacentor* were also identified, which, despite not having an identification key available to date, is likely to be *Dermacentor nitens* as this is the only species of the genus in the country (DANTAS-TORRES et al., 2009). All these ticks were deposited in the tick collection 'Coleção Nacional de Carrapatos do Cerrado' (CNCC) at the Veterinary and Animal Science School at the Federal University of Goiás under accession number (CNCC 032).

In Brazil, one of the tick species to which horses are frequently exposed is *D. nitens* (LABRUNA et al., 2001). In the animal of the present study, a high parasitic load was verified, and the only identified species was *D. nitens*, which is considered as potential vector of pathogens to horses, such as *B. caballi* (ROBY & ANTHONY, 1963). Unfortunately, samples of this animal were not collected and tested for the presence of any pathogens.

Aiming to reduce the risks of health issues and other losses associated with *D. nitens* parasitism, as mentioned previously, control strategies are necessary. The use of acaricides is still the predominant method in tick control; however, the indiscriminate use of these products combined with improper technical criteria contributes to the selection of resistant tick strains. The administration of these chemicals can also result in human and animal intoxication, as well as soil and water contamination

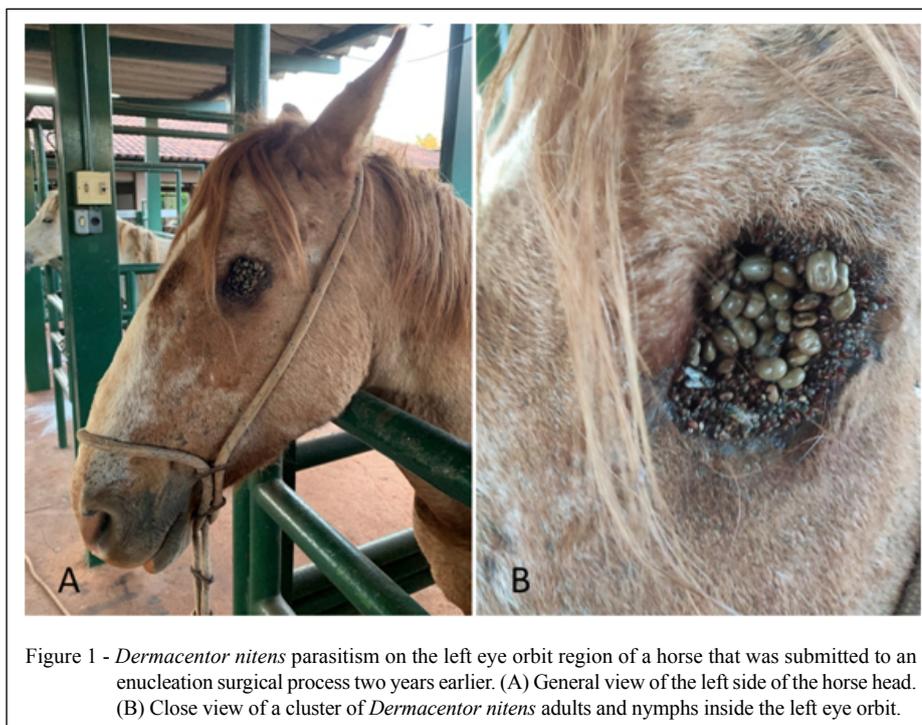


Figure 1 - *Dermacentor nitens* parasitism on the left eye orbit region of a horse that was submitted to an enucleation surgical process two years earlier. (A) General view of the left side of the horse head. (B) Close view of a cluster of *Dermacentor nitens* adults and nymphs inside the left eye orbit.

(CHAGAS, 2004, BORGES et al., 2011). Control strategies of *D. nitens* are often applied jointly with the control of *Amblyomma sculptum* (Berlese) [published as *Amblyomma cajennense* (F.) until 2014], with the latter usually being the main target. However, due to different preferential attachment sites of these two tick species, the control strategy is frequently ineffective for *D. nitens* (BELLO et al., 2008). Furthermore, host-seeking larvae of *D. nitens* can be found in the pasture all year round; although quantities vary according to each season's climatic characteristics (LABRUNA & FACCINI, 2020). Additionally, *D. nitens* presented up to five peaks of infestations on horses per year (LABRUNA et al., 2002) with corresponding peaks of host-seeking larvae in the pastures (LABRUNA & FACCINI, 2020). Thus, the knowledge about this species seasonal dynamics and behavior characteristics, in particular its preference for specific attachments sites is essential information supporting the formulation of an effective control strategy. The host reported in this study was part of a group of horses that had no pre-determined tick control strategies and was only subjected to acaricide application when infestations were notably high. Also, there were no recorded data on which acaricides were used nor the frequency and how they were applied. These factors present as potential contributors to the high load of *D. nitens* parasitism on the animal.

The main attachment sites of *D. nitens* on the horse head are the ears and the nasal diverticulum; although, high parasitism can also be found on the mane, perineal, perianal and groin regions (BORGES et al., 2000, LABRUNA et al., 2001, LABRUNA et al., 2002). Due to the predilection of *D. nitens* for feeding inside the ears, infestations at this location provide favorable conditions for infestations by *C. hominivorax* that commonly lead to permanent damage to the cartilage of the equine ears (LABRUNA et al., 2001, FRIEDHOFF et al., 1990, BORGES et al., 2000), and may also cause secondary infections (LABRUNA et al., 2001). The predilection of *D. nitens* to attach to shaded areas of the horse body have been reported (LABRUNA & AMAKU, 2006). This behavior might explain our usual finding of ticks attached to the left eye orbit of a horse, in which an enucleation process had been carried out, leaving the surface of the eye orbit irregular and concave. This further demonstrates the importance of the correct use of acaricide products, given the opportune presence of *D. nitens* on unusual anatomical areas of the horse body.

In the present study, the high degree of parasitism by *D. nitens* on a body site where the

enucleation process had occurred indicates the need for further studies of the behavior of this species, to better understand its adaptability to the place where it was found. Additionally, this tick ability to adapt to regions of the host body with little to no exposure to sunlight demonstrates the importance of this behavior being considered while formulating and applying control strategies, thus ensuring the correct contact between acaricide and ticks. To our knowledge this is the first record of the presence of *D. nitens* on the eye orbit of a horse previously submitted to an enucleation process.

## ACKNOWLEDGEMENTS

This Project was financed by the Fundação de Amparo à Pesquisa do Estado de Goiás (FAPEG) (202110267000287) and by the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) and also was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), Brasil – Finance code 001.

## DECLARATION OF CONFLICTS OF INTEREST

The authors declared that they have no conflict of interest.

## BIOETHICS AND BIOSSECURITY COMMITTEE APPROVAL

The authors of the article entitled “Unusual parasitism site of *Dermacentor nitens* (Acari: Ixodidae) on a horse” declare, for all due purposes, that the project that gave rise to the same data was not submitted for evaluation to the Ethics Committee of the Universidade Federal de Goiás (UFG), since it is a sample from an animal from the horse troop of the Veterinary Hospital of UFG, it is registered in the extension Project PD017-2019 “Diagnostic action, technical training and consultations on parasitic diseases of animals and zoonoses, for health professionals and society in general”, registered in the SIGAA of the UFG, does not require bioethical approval, but we are aware of the content of the resolutions of the National Council for the Control of Animal Experimentation “<http://www.mct.gov.br/index.php/content/view/310553.html>” if it involves animals. In this way, the authors assume full responsibility for the data presented and are available for possible questions, in case they are required by organs competent.

## AUTHORS' CONTRIBUTIONS

All authors contributed equally for the conception and writing of the manuscript. All authors critically revised the manuscript and approved of the final version.

## REFERENCES

BARROS-BATTESTI, D. M. et al. **Carrapatos de importância médico-veterinária da Região Neotropical: um guia ilustrado para identificação de espécies.** Vox/ICTTD-3/Butantan, São Paulo, 2006. Available from: <<https://repositorio.butantan.gov.br/handle/butantan/3153>> Accessed: Oct. 27, 2022..

- BELLO, A. C. P. P. et al. Controle de *Anocentor nitens* (Neumann, 1897) (Acari: Ixodidae) em equinos. **Revista Brasileira de Parasitologia Veterinária**, v.17, p.59–63, 2008. Available from: <<http://www.redalyc.org/articulo.oa?id=397841469012>>. Accessed: Oct. 24, 2022.
- BORGES, L. M. F. et al. Seasonal dynamics of *Anocentor nitens* on horses in Brazil. **Veterinary Parasitology**, v.89, p.165–171, 2000. Available from: <[https://doi.org/10.1016/S0304-4017\(00\)00204-1](https://doi.org/10.1016/S0304-4017(00)00204-1)>. Accessed: Oct. 26, 2022.
- BORGES, L. M. F. et al. Perspectives for the use of plant extracts to control the cattle tick *Rhipicephalus (Boophilus) microplus*. **Revista Brasileira de Parasitologia Veterinária**, v.20, p.89–96, 2011. Available from: <<https://doi.org/10.1590/S1984-29612011000200001>>. Accessed: Oct. 24, 2022.
- CHAGAS, A. C. S. Controle de parasitas utilizando extratos vegetais. **Revista Brasileira de Parasitologia Veterinária**, v.13, p.156–160, 2004.
- DANTAS-TORRES, F. et al. The ticks (Acari: Ixodida: Argasidae, Ixodidae) of Brazil. **Systematic and Applied Acarology**, v.14, p.30–46, 2009. Available from: <<https://doi.org/10.11158/saa.14.1.4>>. Accessed: Oct. 25, 2022.
- FRIEDHOFF, K. T. et al. Haemoparasites of equines: impact on international trade of horses. **Revue Scientifique et Technique**, v.9, p.1187–1194, 1990.
- LABRUNA, M. B., AMAKU, M. Rhythm of engorgement and detachment of *Anocentor nitens* females feeding on horses. **Veterinary Parasitology**, v.137, p.316–332, 2006. Available from: <<https://doi.org/10.1016/j.vetpar.2006.01.025>>. Accessed: Oct. 27, 2022.
- LABRUNA, M. B., FACCINI J. L. H. The nonparasitic phase of *Dermacentor nitens* under field conditions in southeastern Brazil. **Revista Brasileira de Parasitologia Veterinária**, v.29, p.1–12, 2020. Available from: <<https://doi.org/10.1590/S1984-29612020090>>. Accessed: Oct. 25, 2022.
- LABRUNA, M. B. et al. Risk factors to tick infestations and their occurrence on horses in the state of São Paulo, Brazil. **Veterinary Parasitology**, v.97, p.1–14, 2001. Available from: <[https://doi.org/10.1016/s0304-4017\(01\)00387-9](https://doi.org/10.1016/s0304-4017(01)00387-9)>. Accessed: Oct. 24, 2022.
- LABRUNA, M. B. et al. Seasonal dynamics of ticks (Acari: Ixodidae) on horses in the state of São Paulo, Brazil. **Veterinary Parasitology**, v.105, p.65–77, 2002. Available from: <[https://doi.org/10.1016/s0304-4017\(01\)00649-5](https://doi.org/10.1016/s0304-4017(01)00649-5)>. Accessed: Oct. 24, 2022.
- NAVA, S. et al. Ticks of the Southern Cone of America: Diagnosis, Distribution, and Hosts with Taxonomy, Ecology and Sanitary Importance (Genera and Species of Ixodidae). **Academic Press**, London, 2017.
- ROBY, T. O., ANTHONY D. W. Transmission of equine piroplasmiasis by *Dermacentor nitens* Neumann. **Journal of the American Veterinary Medical Association**, v.142, p.768–769, 1963.
- RODRIGUES, V. S. et al. Life cycle and parasitic competence of *Dermacentor nitens* Neumann, 1897 (Acari: Ixodidae) on different animal species. **Ticks and Tick Borne Diseases**, v.8, p.379–384, 2017. Available from: <<https://doi.org/10.1016/j.ttbdis.2016.12.014>>. Accessed: Oct. 25, 2022.