



concern for the dairy cattle industry, given the potential for production losses in both sectors. Thus, epidemiological monitoring, vector control, and good sanitary practices are essential to limit parasite spread and reduce its impact on Brazil's growing buffalo industry.

### **Molecular Detection of Vector-Borne Pathogens in Llamas (*Lama glama*): Overcoming Diagnostic Challenges**

*Nícolás Colácio (Federal University of Minas Gerais, Brazil), Markus Vinícius Vieira de Araújo (Federal University of Minas Gerais, Brazil), Enzo Freire Santana do Amaral (Federal University of Minas Gerais, Brazil), Elias Jorge Facury-Filho (Federal University of Minas Gerais, Brazil), Júlia Angélica Gonçalves da Silveira (Federal University of Minas Gerais, Brazil)*

South American camelids hold great cultural and economic significance for Indigenous and rural communities throughout South America, being used for transport, wool, meat, and leather production. However, information regarding health and issues related to parasitic diseases in camelid farming is scarce. Therefore, this study aimed to investigate the presence of vector-borne pathogens in llamas admitted to the Veterinary Hospital of the Federal University of Minas Gerais, Brazil. The farm of origin for these llamas had reported issues related to anaplasmosis, diagnosed through blood smear examination on-farm, which resulted in the death of some animals. A total of 10 blood samples from llamas were collected and screened for bacteria of the Anaplasmataceae family, hemotropic *Mycoplasma* spp., piroplasmids, and *Trypanosoma* spp., using molecular methods. Due to the suspicion of anaplasmosis, the sam-

ples were tested for *Anaplasma marginale*, but all were negative. On the other hand, 50% (5/10) tested positive for hemotropic *Mycoplasma* sp., with sequencing revealing similarity to '*Candidatus Mycoplasma haemolamae*', 60% (6/10) for piroplasmids, with sequencing showing similarity to *Babesia bovis*, and 10% (1/10) for *Ehrlichia* sp., with sequencing revealing similarity to '*Candidatus Ehrlichia regneryi*'. However, no samples tested positive for *Anaplasma* sp., *T. vivax*, *T. evansi*, and *T. cruzi*. The genetic characterization of the detected pathogens will be conducted later. Given the farm's history of anaplasmosis and the absence of *A. marginale*, associated with the identification of '*Ca. M. haemolamae*', a probable diagnostic error is suggested, possibly due to the morphological similarity between these bacteria. This highlights the need for enhanced staff training to improve diagnostic accuracy. The observed clinical signs and mortality may have been associated with hemoplasma infection, which, when combined with other pathogens, can lead to severe disease outcomes.

### **Special topic - Tick resistance**

#### **Scanning Electron Microscopy and Energy-Dispersive X-ray Spectroscopy (SEM/EDS) of *Rhipicephalus microplus* cuticle suggest structural marker associated with cypermethrin resistance**

*Juliana Rivas Figueredo Pereira (Federal University of Maranhão, Brazil), Clarisse Neres Ferreira Barbosa (Federal University of Maranhão, Brazil), Caio Pavão Tavares (Federal University of Maranhão, Brazil), Patricia Silva Golo (Federal Rural University of Rio de Janeiro, Brazil), Hermes Ribeiro Luz (Federal University of Maranhão, Brazil), Marcia Cris-*



*tina de Azevedo Prata (Brazilian Agricultural Research Corporation (EMBRAPA), Brazil), José Reck Júnior (Desidério Finamor Veterinary Research Institute, Brazil), Guilherme Marcondes Klafke (Desidério Finamor Veterinary Research Institute, Brazil), Caio Marcio de Oliveira Monteiro (Federal University of Goiás, Brazil), Lívio Martins Costa Junior (Federal University of Maranhão, Department of Pathology, Brazil)*

This study aimed to characterize the elemental composition of the larval cuticle in *Rhipicephalus microplus* populations from various regions of Brazil and to investigate its association with susceptibility to commonly used synthetic acaricides. Larvae from 13 populations were analyzed, including a susceptible reference strain (POA) and a resistant strain (MGI). Susceptibility to cypermethrin, chlorpyrifos, fipronil, doramectin, and moxidectin was evaluated in the remaining 11 populations using the larval packet test (LPT). Elemental analysis of the dorsal and ventral cuticle regions at 7, 14, and 21 days of age was performed to references tick strains using Scanning Electron Microscopy coupled with Energy-Dispersive X-ray Spectroscopy (SEM/EDS). The tick populations exhibited varying resistance profiles, particularly to cypermethrin, chlorpyrifos, and fipronil, while showing universal susceptibility to doramectin and moxidectin. SEM/EDS revealed a predominance of carbon in the cuticle, with significant differences among populations and between dorsal and ventral regions. In 9 out of 11 populations, the dorsal region exhibited higher carbon content than the ventral. A strong, statistically significant positive correlation was found between dorsal carbon content and cypermethrin resistance ( $r = 0.7728$ ,  $p = 0.0081$ ). Although positive, correlations with chlorpyrifos and fi-

pronil were not statistically significant. No relevant correlation was observed between ventral carbon content and acaricide resistance. Doramectin and moxidectin were excluded from the correlation analysis due to the consistent susceptibility observed across populations. This is the first study to investigate the elemental composition of the larval cuticle in *R. microplus* and its potential association with resistance to synthetic acaricides.

### **Effect of metabolic synergists on the reduction of *Rhipicephalus microplus* resistance to ivermectin**

*Jordania Oliveira Silva (Federal Institute of Education, Science and Technology, Brazil), Ana Maria dos Santos Lima (Federal Institute of Education, Science and Technology, Brazil), Larissa Claudino Ferreira (Federal University of Campina Grande, Brazil), Guilherme Marcondes Klafke (Instituto de Pesquisas Veterinárias Desidério Finamor, Brazil), Thais Ferreira Feitosa (Federal University of Campina Grande, Brazil and Federal Institute of Education, Science and Technology, Brazil), Vinicius Longo Ribeiro Vilela (Federal University of Campina Grande, Brazil and Federal Institute of Education, Science and Technology, Brazil)*

Infestation by the tick *Rhipicephalus microplus* represents a major challenge for livestock production in Brazil due to climatic conditions favorable to its reproduction. This compromises herd productivity and facilitates the transmission of pathogenic agents such as *Babesia spp.* and *Anaplasma spp.* Parasite control is primarily carried out using chemical products such as ivermectin. However, the continuous and widespread use of this drug has favored the emergence of resistant populations. Resistan-