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FIRST RECORD OF BOVINE TUBERCULOSIS IN THE STATE OF ACRE, BRAZIL

(*Primeiro registro da tuberculose bovina no Estado do Acre, Brasil*)

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ABSTRACT

Bovine tuberculosis is an infectious disease caused by the bacterium *Mycobacterium bovis*. It has great health and economic relevance for dairy herds, in addition to being a zoonosis. Therefore, the aim of this study was to check the frequency of bovine tuberculosis in dairy herds in the microregion of Rio Branco, Acre. For diagnosis, the tuberculin skin test was used through the comparative technique. Of 527 cattle subjected to testing, one animal (0.2%) tested positive for the reagent. According to the results of this preliminary study, which reports the first record of bovine tuberculosis in Acre, it can be seen that the frequency of this disease in the microregion of Rio Branco indicates a low spread of *M. bovis* in dairy herds. This condition can assist with elimination of possible outbreaks without incurring high costs to producers and, subsequently, help Acre achieve a tuberculosis-free status through the process of eradication.

Key words: Cattle, *Mycobacterium bovis*, tuberculin test, West Amazon region.

RESUMO

A tuberculose bovina é uma doença infectocontagiosa ocasionada pelo *Mycobacterium bovis*, a qual possui grande relevância sanitária e econômica para rebanhos leiteiros, além de ser uma zoonose. Objetivou-se verificar a freqüência da tuberculose bovina em rebanhos leiteiros da microrregião de Rio Branco, Acre. Para o diagnóstico, foi utilizado o teste tuberculínico pela técnica comparativa. Dos 527 bovinos submetidos ao teste, um animal (0,2%) foi reagente positivo. Conforme os resultados deste estudo preliminar, que se configura o primeiro registro da tuberculose bovina no Acre, observa-se que a frequência da enfermidade na microrregião de Rio Branco denota uma baixa propagação do *M. bovis* nos rebanhos leiteiros. Esta condição é favorável para eliminar possíveis focos sem elevados custos ao produtor e, posteriormente, alcançar o status de estado livre pelo processo de erradicação.

Palavras-Chave: Bovinos, *Mycobacterium bovis*, teste da tuberculina, Amazônia Ocidental.

Bovine tuberculosis (bTB) is a notifiable infectious disease caused by the bacterium *Mycobacterium bovis*, which has great health and economic relevance to the dairy herds, in addition to having zoonotic potential. This disease is considered to be re-

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emerging and has a worldwide distribution, especially in developing countries (NUGENT, 2011; THAKUR *et al*., 2011). In Brazil, according to the Ministério da Agricultura, Pecuária e Abastecimento (MAPA), mean prevalence was 1.3% between 1989 to 1998 (BRASIL, 2006). With the exception of the state of Rondônia (VENDRAME, 2013), the epidemiological situation of bTB in the northern region of the country is still unknown.

Given the importance of the disease and the scarcity of data in northern Brazil, the aim of the present study was to check the frequency of bTB in dairy herds in the microregion of Rio Branco, Acre, in the period from June 2016 to July 2017. This study was approved by the Institutional Animal Care and Use Committee of the Universidade Federal do Acre (UFAC), Campus Rio Branco, under license nº. 84/2015.

According to the Brazilian Institute of Geography and Statistics, Acre is divided into five microregions: Rio Branco, Sena Madureira, Brasiléia, Cruzeiro do Sul and Tarauacá, and it has approximately 82,070 dairy cattle. The microregion of Rio Branco accounts for approximately 60% of all milk production, hence it was chosen to be the study area. This microregion is composed of the municipalities Acrelândia, Bujari, Capixaba, Plácido de Castro, Porto Acre, Rio Branco and Senador Guiomard (Fig. 01) (IBGE, 2016).

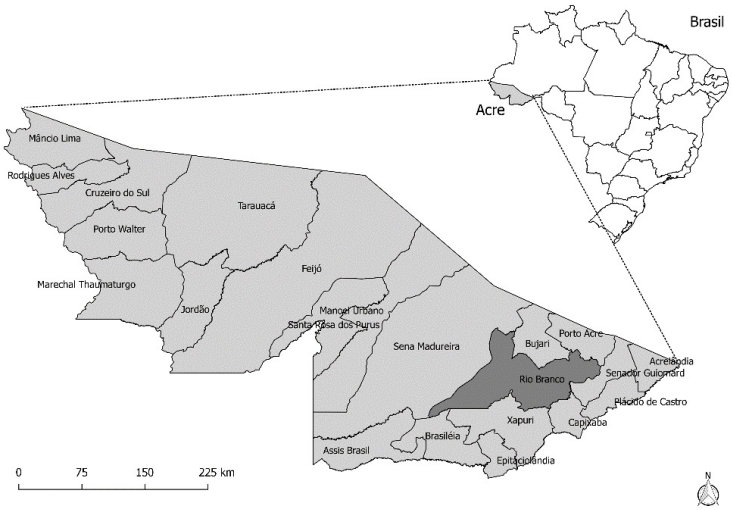

Figure 01: Geographical distribution in the state of Acre by municipalities.

The sample was composed of male and female dairy cattle, 24 months of age and older, reared under intensive or semi-intensive systems, regardless of presentation of clinical signs. Sample size calculation was based on descriptive epidemiological studies. Due to the absence of prevalence surveys in the region, the estimated prevalence of 50% was considered, with a 95% confidence interval and a statistical error of 5%, requiring at least 361 samples. However, for non-probabilistic convenience, 527 cattle were selected, which belonged to 20 dairy farms. For each establishment, at least 10% of total of the herd was randomly selected for sample population composition (THRUSFIELD, 2004)

Diagnosis was performed with the tuberculin test, using the comparative cervical tuberculin (CCT) technique, according to the technical regulation of the Programa Nacional de Controle e Erradicação da Brucelose e Tiberculose (PNCEBT/ MAPA), using

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purified protein derivatives (PPD) from *M. bovis* and *M. avium* (TECPAR®, Curitiba-PR, Brazil) for intradermal inoculation into the animals (BRASIL, 2006).

Of 527 cattle subjected to CCT, only one (0.2%) tested positive for the reagent (Fig. 02): a female Girolando with four years of age, asymptomatic and from the municipality of Capixaba. The reaction at the site of application of bovine PPD had intense magnitude (ΔB-ΔA=15.1mm), and painful sensitivity and tissue necrosis also occurred.

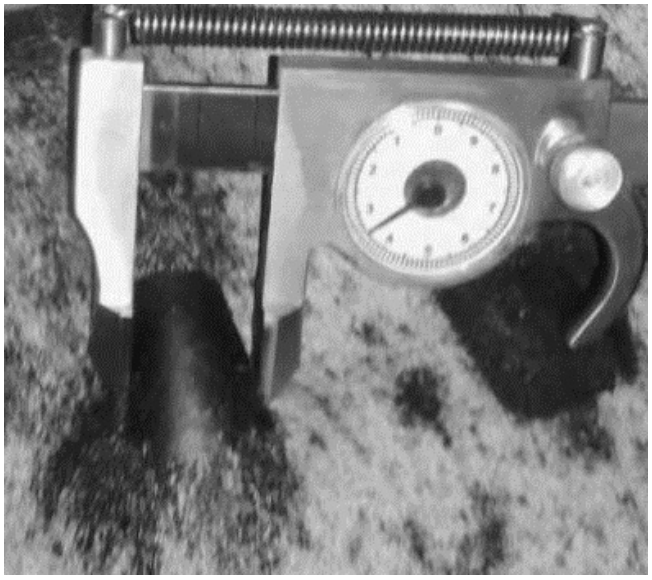

Figure 02: Skin allergy reaction at site of inoculation of bovine PPD tuberculin in cattle.

Several variables, such as the origin of purchased cattle, intensification of production systems, age of animals, genetic and environmental factors, directly affect the occurrence of bTB in a locality (CARVALHO *et al*., 2016). In the target farm, there was a higher degree of technification compared to the others, the adopted system was intensive, which allows greater contact between infected and healthy animals, and most of the animals were introduced in Rio Grande do Sul, a state whose disease prevalence is significant (MARTINS e MAROSO, 2012).

However, the frequency found is below the national prevalence rate (1.3%) (BRASIL, 2006). In the northern region, bTB was recorded only in the state of Rondônia, with a rate of 0.1% (VENDRAME, 2013), a finding similar to that found in the present study.

The reduced size of the dairy herds evaluated in the Rio Branco microregion may have contributed to a lower occurrence of bTB. It should also be considered that the warm climate of the Western Amazon region and the higher incidence of sunrays at certain times of the year may decrease the permanence and viability of the agent in the environment (FIGUEIREDO *et al*., 2010).

Other factors should not be totally discarded. Studies have suggested that the intercurrence with parasitoses, such as hepatic fasciolosis, one of the main causes of bovine condemnation described in Brazil (TESSELE *et al*., 2013), may have an impact on the immunological responses against the intradermal test for bTB, reducing efficacy in the diagnosis (ALLEN *et al*., 2018; BYRNE *et al*., 2019). Moreover, untreated chronic

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infections severely challenge host immunocompetence, as well as anergic conditions in generalized tuberculosis in which there is no immune responsiveness to antigenic hyperstimulation of *M. bovis* (VELOSO *et al*., 2016).

Thus, it is considered that the diagnostic method used, the CCT, although recommended by MAPA as official evidence for its high sensitivity, has certain limitations, which may reflect on an underestimated frequency of bTB. In some countries, it is preferred to invest economically in techniques that are more accurate and complementary to CCT. Are used the interferon-gamma dosage (POIRIER *et al*., 2019; PRAUD *et al*., 2019), the identification of the biomarker CXCL10 (interferon-gamma-10 inducible protein) (COAD *et al*., 2019), or even molecular tests, such as the polymerase chain reaction (LORENTE-LEAL *et al*., 2019), aiming to maximize the detection of the disease. These methodologies were not used as support in the present study.

However, given the results of this preliminary survey, which reports the first bTB registry in Acre, it is believed that the actual frequency of the disease in the Rio Branco microregion indicates a low dispersion of *M. bovis* in dairy herds. This current scenario can help to eradicate possible outbreaks by immediately killing reagents without causing high costs to producers (PAVLIK, 2006), thereby achieving bTB-free status and providing greater food security for dairy products (ACRE, 2016). Of course, the commercial relations of cattle breeding in the state will become more competitive.

It is still possible to focus on health education to raise the awareness of breeders regarding the acquisition of animals with negative certification for bTB, as well as the importance of implementing preventive measures in herds. Surveillance, animal defenses, and frequent epidemiological surveys are also essential to avoid or minimize disease spread (FIGUEIREDO *et al*., 2010; CHUAHAN *et al*., 2019).

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