

***Mycobacterium bovis* INFECTION IN GOATS FROM THE NORTHEAST REGION OF BRAZIL**

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ABSTRACT

A total of 8,058 male and female mixed-breed goats and 1-4 years of age were slaughtered over a period of 7 months at the public slaughterhouse of Patos city, Paraíba state, in the Northeast region of Brazil; 822 animals were inspected for gross lesions of tuberculosis, and 12 (1.46%) had lesions suggestive of tuberculosis in the mammary gland, lungs, liver and mediastinal, mesenteric, submandibular, parotid and prescapular lymph nodes. Presence of granulomatous lesions was confirmed in the submandibular lymph node of one (8.3%) goat at the histopathological examination and at the mycobacterium culture the same sample was confirmed positive. Isolate was confirmed as belonging to the *M. tuberculosis* complex by PCR restriction enzyme analysis (PRA). Spoligotyping identified the isolate into spoligotype SB0295 on the *M. bovis* Spoligotype Database website (www.mbovis.org), and it was classified as *M. bovis*. The occurrence of *M. bovis* in goats in this study suggests that this species may be a potential source of infection for humans and should be regarded as a possible problem in the advancement of control and eradication program for bovine tuberculosis in Brazil.

Key words: Caprine tuberculosis, mycobacterium culture, PCR restriction enzyme analysis, spoligotyping

Bovine tuberculosis remains an important disease in many countries of the world, causing significant economic losses and proving difficult to control. The causative agent, *Mycobacterium bovis*, is also responsible for tuberculosis in goats and other animals of agricultural importance (6).

Goats are economically important in many countries, including Brazil, where this species is an important source of

meat and milk for humans, particularly in Northeast region, in which 93.7% of the goats are concentrated (2). Livestock owners in Northeast region of Brazil normally graze cattle and goats together, and this practice poses a high risk for transmission of bovine tuberculosis among these animals.

Many new molecular techniques have been developed over recent years, such as deletion typing and spoligotyping,

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and have been used to characterize members of the *M. tuberculosis* complex and to provide information on transmission of mycobacterial diseases between animals and humans (11). However, because of limited resources and lack of expertise, these techniques are not commonly used in most developing countries such as Brazil.

Because slaughterhouses provide excellent opportunities for detecting diseases of economic and public health importance (3), we investigated the presence of mycobacteria in slaughtered goats with lesions suggestive of tuberculosis. The work was conducted at the public slaughterhouse of Patos city, Paraíba state, in the Northeast region of Brazil.

A total of 8,058 male and female mixed-breed goats and 1-4 years of age were slaughtered over a period of 7 months; 822 animals were inspected for gross lesions of tuberculosis.

Of 822 animals screened, 12 (1.46%) had lesions suggestive of tuberculosis in the mammary gland, lungs, liver and mediastinal, mesenteric, submandibular, parotid and prescapular lymph nodes. Presence of granulomatous lesions was confirmed in the submandibular lymph node of one (8.3%) goat at the histopathological examination (1), and at the mycobacterium culture as described (4) the same sample was confirmed positive.

PCR restriction enzyme analysis (PRA) (10) was used as a rapid method for identification of mycobacteria. This method is based on the evaluation of the gene encoding for the 65-kDa heat shock protein by the PCR. The 65-kDa protein contains epitopes that are unique as well as epitopes that are common to various species of mycobacteria (9). The conserved nature of this gene allowed differentiation of mycobacteria within 1 day by restriction enzyme digestion of PCR products obtained by using primers common to all mycobacteria.

Isolate was characterised by spoligotyping as described (7). The amplified product was detected by hybridization of the biotin-labelled PCR product onto spoligotyping membrane (Isogen Bioscience BV, Maarssen, The Netherlands). Purified sterile water and a clinical isolate of *M. tuberculosis* and *M.*

bovis were included as controls in each batch of tests. The patterns were allocated a number in the *M. bovis* spoligotyping database. The results were recorded in SB (spoligotype bovis) code, followed by a field of 4 digits as defined on the *M. bovis* Spoligotype Database website (www.mbovis.org).

Isolate was confirmed as belonging to the *M. tuberculosis* complex by PRA method. Spoligotyping identified the isolate into spoligotype SB0295 on the *M. bovis* Spoligotype Database website (www.mbovis.org), and it was classified as *M. bovis*. The pattern SB0295 has been described in cattle from Brazil (8).

M. bovis, which is naturally found in cattle, was isolated from a slaughtered goat in our work. This finding is consistent with results reported by Crawshaw *et al.* (5) and Cadmus *et al.* (3), and suggests transmission from cattle. Farming of cattle and goats is common practice in the Northeast region of Brazil, as well as close contact of these species sometimes occur during grazing

The occurrence of *M. bovis* in goats in this study suggests that this species may be a potential source of infection for humans and should be regarded as a possible problem in the advancement of control and eradication program for bovine tuberculosis in Brazil. Moreover, the growing market for goat milk in Brazil as an alternative source of high-quality food, consumed mostly by children intolerant to cow's milk, alert to the need to avoid widespread of the infection in dairy goat herds. Prevention of tuberculosis in goats will not only increase productivity and herd health, but also ensure quality of milk and its products and provide security to consumers.

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