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REGULAR ARTICLES

Prevalence of bovine tuberculosis in slaughtered cattle identified by nested-PCR in abattoirs from two dairy areas of Ecuador

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Abstract Bovine tuberculosis (bTB) is a chronic granulomatous disease that primarily affects lung tissue and lymph nodes (LN) in cattle, with economic impact on their productivity. Furthermore, it is potential zoonoses that may cause public health hazard. In this study, we evaluated the presence of bTB in two abattoirs: Cayambe and Pelileo countries located in the Ecuadorian provinces of Pichincha and Tungurahua, respectively. In total, 578 cattle were sampled (Cayambe 271 and Pelileo 307): 1,156 LN and 578 lung tissue samples were collected to apply in vitro culture and nested-PCR, respectively. The results determined a total apparent prevalence of 4.33 %, with 4.06 % at Cayambe's abattoir and 4.56 % at Pelileo's abattoir. Additionally, the Bayesian analysis showed a total true prevalence of 2.51 %, with 89.7 % of sensitivity and 97.6 % of specificity. The risk factors were evaluated by the use of simple logistic regressions with and without the random effect of places of origin. Associations of the origin of cattle in the selected slaughterhouses were found. The results showed an efficient method for the detection of bTB, which could identify a large number of infected animals, and the usefulness of lung tissue samples for early diagnosis of the disease was demonstrated in this study.

Keywords Nested-PCR · *Mycobacterium bovis* · Bayesian analysis · Slaughterhouse

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Introduction

Veterinary inspection (VI) at slaughterhouses is an important tool used in the control and eradication of bovine tuberculosis (bTB). It is based on detailed observation of the carcasses, which include sampling of compatible lesions with the disease to apply culture and finally confirm the presence of *Mycobacterium bovis* by bacterial growth; a process which can take several weeks. However, PCR used directly in biological samples, i.e., lung tissue and lymph node (LN), from suspected cattle offers another alternative of diagnostic with more efficiency compared to in vitro culture (Zumárraga et al. 2005). In general, DNA extraction from tissue samples is crucial to improve the success of the test, as well as employing magnetic beads for getting better DNA from clinical tissues samples of people and animals (Shiyang et al. 2013). PCR advantages include speed, high specificity, moderate confirmation of the presence of the bacillus in samples with no visible lesions negative to culture (Parra et al. 2008), and discard of the susceptibility due to the elimination of inhibitors reaction (Taylor et al. 2001). Nevertheless, it is not a perfect test because it has difficulty obtaining DNA in samples with low number of microorganisms (Zarden et al. 2013).

In Ecuador, the total national prevalence of bTB is still unknown. The cases of the disease are not well documented, published, or quantified for several reasons, i.e., limited animal carrier records, scarce diagnostic testing, and lack of reporting of the disease when suitable (Proaño-Pérez et al. 2011b).

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