

Prevalence of Paratuberculosis in Dairy Cattle in Ecuador

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Abstract

Background: *Mycobacterium avium* subsp. *paratuberculosis* (MAP) is the causal agent of paratuberculosis, a chronic infectious contagious disease of the intestinal tract of ruminants that are also associated with Crohn's disease in humans. The existence of paratuberculosis in Ecuador is virtually unknown; hence, the present study was performed to gain insight into the prevalence of this disease. **Methods:** Three dairy cattle farms in different geographic regions in Ecuador were investigated for the infection with MAP, and 600 blood samples, 200 of each cattle herd, were processed with an indirect enzyme-linked immunosorbent assay. Fecal samples of the seropositive cows were processed for culture on modified Löwenstein–Jensen medium. **Results:** One hundred and fifty bovines (25%) resulted seropositive and we confirmed with culture the presence of MAP in 4.7% (7/150) of the seropositive cows. Approximately 20% of the fecal samples of seropositive cows yielded nontuberculous mycobacteria (NTM) species including *M. avium* subsp. *avium*, a NTM species closely related to MAP. **Conclusions:** The seroprevalence of paratuberculosis in this first study for Ecuador is high (25%). We discuss a possible interference of NTM species, isolated from fecal samples, with the diagnosis of paratuberculosis. With this report, a baseline study, we confirm for the first time the presence of paratuberculosis in Ecuador, and we provide the necessary information for future studies and control of this disease.

Keywords: Ecuador, indirect enzyme-linked immunosorbent assay, *Mycobacterium avium* subsp. *paratuberculosis*, nontuberculous mycobacteria, paratuberculosis or John's disease, polymerase chain reaction-insertion sequence 900

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INTRODUCTION

Paratuberculosis or Johne's disease is a chronic infectious disease that primarily affects the small intestine tract of ruminants, produced by *Mycobacterium avium* subsp. *paratuberculosis* (MAP), responsible for considerable economic losses for the livestock (decreased milk production and slaughter value).^[1] MAP affects domestic and wild ruminants, mainly sheep, goats, and cattle. The main symptomatology is the development of a granulomatous enteritis, weakening, diarrhea, and death due to cachexia.^[2-4] It also has been suggested that paratuberculosis is a zoonotic disease, and there may be an association between Crohn's disease (CD) and Johne's disease,^[5] and MAP has been cultured from the intestinal tissues and the blood of CD patients.^[6]

MAP is a Gram-positive obligate intracellular pathogen that needs mycobactin (a siderophore used to shuttle free extracellular

iron ions into the cytoplasm of mycobacterial cells) for “*in vitro*” growth, and therefore, is incapable to grow outside of its host.^[7] Fecal cultures and specific antibody detection have been the most common diagnostic methods used for the diagnosis of the pathogen.^[1] Enzyme-linked immunosorbent assay (ELISA) is recommended in dairy cattle with high prevalence (>5%) and pooled or individual fecal culture or polymerase chain reaction (PCR) for dairy cattle with low prevalence (<5%).^[8] In

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