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Address the Public Health and Food security Concerns of Babesiosis Through Molecular Detection of *Babesia bovis* in Suspected Carrier Cattle of Selected Localities in Sri Lanka

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Abstract

Emergence of babesiosis in both public health and food security concern in global perspectives cannot be ignored. The dairy farming plays an important role in food industry that, fulfilling the protein requirement through producing both milk and meat. The farming operations may get hampered due to non-infectious and infectious diseases. Infectious diseases also cause huge production losses in all farming operations in time to time. Babesiosis becomes a major concern in public health and animal production specialists in recent years both locally and internationally due to severity of out breaks, carrier animals and zoonotic nature. Babesiosis as an emerging zoonotic disease and also causing heavy production losses due to the both clinical diseases and carrier animals. Babesia parasites, mainly *Babesia bovis* and *B. bigemina*, are tick-borne hemoparasites inducing bovine babesiosis in cattle globally. Babesiosis is known to occur in tropical and subtropical regions of the world and it is one of the major constraints to the livestock industry which adversely affects economic return and food security by reducing milk, meat production and if not treated leads to the death of the animal. Babesia parasites are considered to be endemic in central Sri Lanka and the prevalence of babesiosis is high in other areas. Carrier cattle infected with babesiosis have low number of parasites in circulation. Babesiosis is difficult to detect and is a challenge to conventional diagnostic methods. However, diagnosis of carrier animals in herd is important for preventing outbreaks by transmission through vector ticks to healthy animals and for obtaining epidemiological data of the disease. Here, we have conducted nested PCR detection of *Babesia bovis* in carrier cattle (Jersey crosses, Friesian crosses and Australian milking zebu) of selected localities of Sri Lanka. For this study, 30 blood samples were collected from suspected carrier cattle and analyzed using light microscopy and nested PCR. Screening by light microscope indicated that 47% of the samples to be positive. PCR analysis of samples

diagnosed 80% as positive. Hence, 33% of the animals appeared to be healthy through routine light microscope diagnosis were in fact carriers posing a threat for the healthy herd population. The high prevalence of babesiosis in carrier cattle in Sri Lanka emphasized that island-wide control and prevention programs against bovine babesiosis are needed to minimize the financial burden caused by the parasites to reduce to production losses. This preliminary study on molecular detection of *Babesia bovis* in selected localities offers a rapid and efficient screening method for suspected carrier herds while providing new avenues to minimize losses incurred in milk production due to unidentified carrier animals.

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Keywords: *Babesia bovis*; PCR; bovine babesiosis; carrier animal; ticks

Introduction

The dairy farming plays an important role in food industry that, fulfilling the protein requirement through producing both milk and meat. The farming operations may get hampered due to non-infectious and infectious diseases. Among the non-infectious causes metabolic disorders are often associated with the low productivity of cattle. Infectious diseases also cause huge production losses in all farming operations in time to time. Bovine babesiosis is caused by microscopic parasites that infect red blood cells and are spread by certain ticks. Bovine babesiosis and other tick borne diseases are responsible for more than 50% losses in the crossbred cattle (Chaudhry *et al.*, 2010). Babesiosis creating public health issues being zoonotic and plays a vital role in food security by impacting on milk and meat production (The Center for Food security and Public Health, 2008, Bovine Babesiosis, College of Veterinary Medicine, Iowa State University). Bovine babesiosis is caused by *Babesia bovis* and *Babesia bigemina*. They are widely distributed and of major importance in Africa, Asia, Australia, and Central and South America. *Babesia divergens* is economically important in some parts of Europe.

B. bovis infection lasts for at least four years in *Bos taurus* cattle and *B. bigemina* usually less than 6 months. Immunity to both parasites remains for at least four years regardless of the status of the infection (de Vos AJ *et al.*, 2004). Most cattle with a significant *Bos indicus* blood lose *B. bovis* infection within 2 years, but immunity to *B. bovis* lasts at least for 3 years (Johnston LA *et al.*, 1978). No apparent clinical signs were noticed during this carrier state. Diagnosing this carrier cattle population with Babesiosis is a challenge to the conventional diagnostic procedures due to low number of parasites in peripheral blood. For instance *in vitro* culture methods have been used to demonstrate the presence of carrier infections of *Babesia spp.* (Holman *et al.*, 1993). However, the minimum parasitaemia detectable by this method will depend, to a large extent, on the facilities available and the skills of the operator (Bose *et al.*, 1995). On the other hand animal inoculation for confirmation of infection in a suspected carrier animal is also possible. But this method is cumbersome, expensive, and obviously not suitable for routine diagnostic use because of its' complexity. Although serological tests have been described that detect the reactive antibodies with *Babesia spp.*, they do not consistently detect the infections in carrier animals, and their specificity is limited by the cross-reactivity of the antigens of other *Babesia spp.*

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