



Sero-prevalence of Bovine Brucellosis and associated risk factors in Mbeya region, Southern highlands of Tanzania

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ABSTRACT

A cross-sectional study was conducted to establish the seroprevalence of brucellosis and associated risk factors in indigenous and exotic breeds of cattle from 178 farms in Mbeya region. A total of 1211 cattle (929 exotic cattle from 108 commercial farms and 282 indigenous cattle from 70 traditional farms) were tested for *Brucella* antibodies using the Rose Bengal Plate Test (RBPT) and competitive Enzyme Linked Immunosorbent Assay (c-ELISA) as screening and confirmatory tests, respectively. The overall animal-level seroprevalence was 9.3%; 11.3% (95% CI: 9.4–13.5) in indigenous cattle and 2.8% (95% CI: 1.4–5.6) in exotic cattle. Further, the overall herd level seroprevalence was 32.0%; 50.5% (95% CI: 40.9–59.9) in indigenous cattle and 4.2% (95% CI: 1.3–12.4) in exotic cattle. Infections were higher in cattle aged 6–10 years old, (39.8%; 95% CI: 31.2–49.1) followed by those aged 1–5 years (5.8%; 95% CI: 4.8–6.6) and 11–15 years old (2.7%; 95% CI: 0.8–8). When compared to cattle sampled from herds size of 1–50, those sampled from the herd sizes of 51–100 and 101–150 had higher odds of brucellosis seropositivity [(OR = 3.6, CI: 1.76–7.16, $p < 0.001$) and (OR = 3.0, CI: 1.09–8.04, $p = 0.033$). The odds of seropositivity in animals which calved on pasture was 3.0 (CI: 1.1–7.8, $p = 0.028$) compared to those that calved at home. *Brucella* seroprevalence was also observed to vary according to districts, with Mbarari district recording the highest (45.4%). It is evident from the study that Brucellosis is present in Mbarari, Mbeya and Momba districts of Mbeya Region. The findings of this study provide some baseline data that could contribute to the design and implementation of brucellosis control measures in the study areas.

1. Introduction

Brucellosis is an infectious bacterial zoonotic disease commonly caused by members of genus *Brucella* (World Health Organisation (WHO), 2006). To date, the genus *Brucella* consists of eleven species (Smirnova et al., 2013). It is usually caused by *Brucella abortus* in cattle, *B. melitensis* in goats and sheep, *B. ovis* in sheep, *B. suis* in pigs and *B. canis* in dogs. The disease is also caused by *Brucella neonate* in desert wood rat, *B. ceti* in cetaceans, *B. pinnipedialis* in pinnipeds, *B. microti* in common vole (*Microtus arvalis*) and *B. inopinata* isolated in human but not in animal. *Brucella papionis*, isolated from baboons (*Papio* species) (Whatmore et al., 2014). However, *B. abortus*, *B. melitensis* and *B. suis* remains the important causes of *Brucella* associated morbidity and mortality worldwide (Ciocchinia et al., 2014). Some *Brucella* species are also maintained in wildlife populations such as zebra (*Equus burchelli*), buffalo (*Syncerus caffer*), wildebeest (*Conchaetes vardonii*) and eland

antelope (*Taurotragus oryx*) (Godfroid, 2002) and pose a risk of transmission between domestic and wild animals, especially when they share grazing grounds and watering points (Pandey et al., 1999).

In many developed countries, the disease has been brought under control with associated decrease in economic losses attributable to it (Muma et al., 2006). The disease in animals causes abortions, infertility, reduced milk production, neonatal mortality, hygroma, epididymitis and orchitis. The disease may hinder international trade due to restrictions imposed by international veterinary regulations on animal movement. *B. abortus*, *B. melitensis*, *B. suis* and *B. canis* are usually transmitted between animals by contact with the placenta, foetus, fetal fluids and vaginal discharges from an infected animal (Maurin, 2005). Although ruminants are usually asymptomatic after their first abortion, they can become chronic carriers, and continue to shed *Brucellae* in milk and uterine discharges during subsequent pregnancies (The Center for Food Security and Public Health (CFSPH), 2009).

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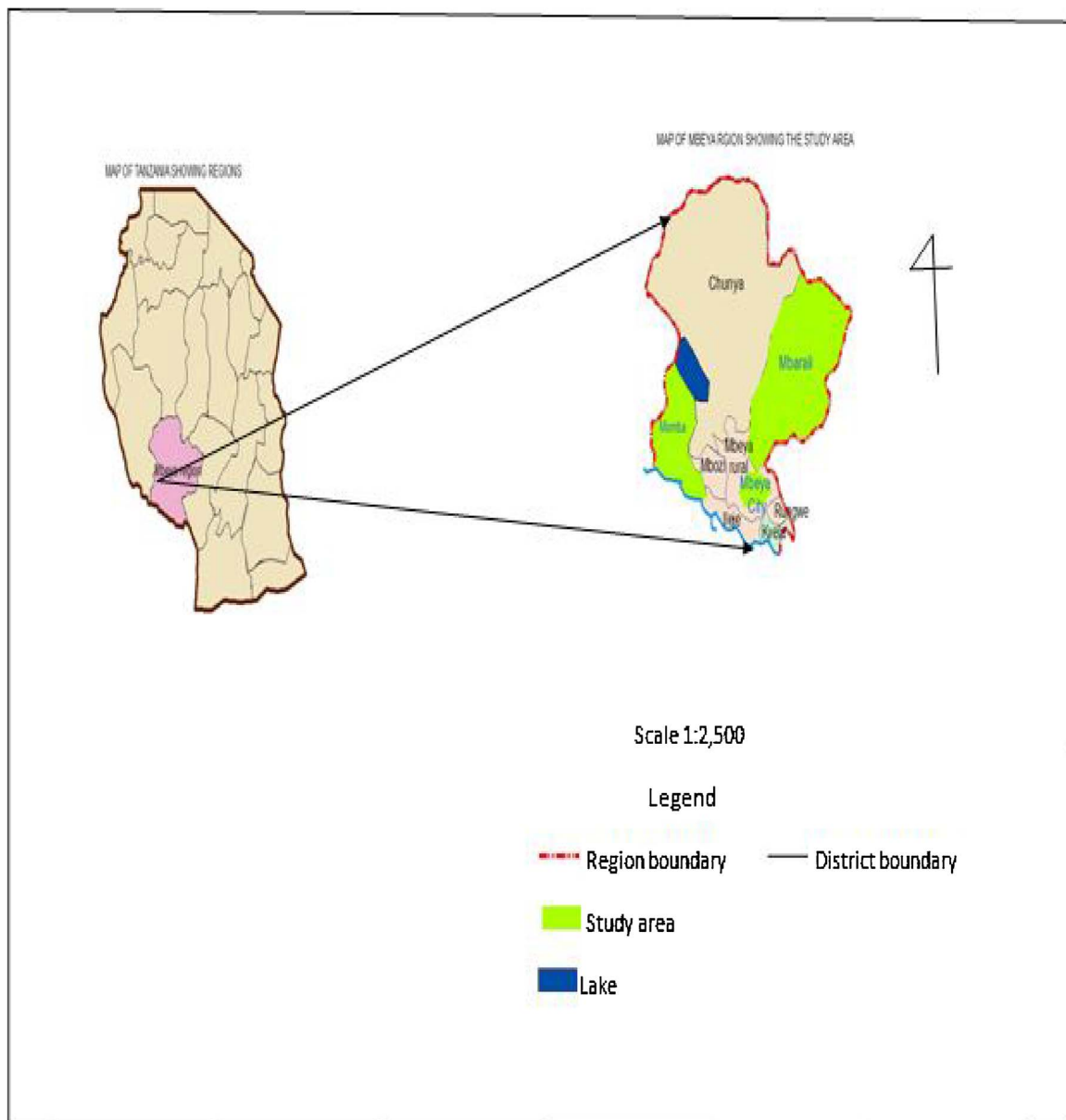


Fig. 1. The insert is the Map of Tanzania showing study districts.

In Tanzania, the extent and factors associated with brucellosis are not well understood although some studies have been done in some parts of the country (Shirima, 2005; Swai et al., 2005; Weinhäupl et al., 2000). It has been reported to occur in livestock at the prevalence of 6.2% in Arusha and Manyara regions (Shirima, 2005), 12.2% in Kilimanjaro (Swai et al., 2005) and 12–14% in Eastern zone (Weinhäupl et al., 2000). The aim of this study was to determine the individual and herd level seroprevalence of *Brucella* infections in cattle reared under traditional (indigenous cattle) and commercial farming (exotic cattle) systems in Mbeya and identify risk factors associated with *Brucella* infections in cattle.

2. Materials and methods

2.1. Study area

A cross-sectional study was carried out in Mbarari, Mbeya and Momba districts in Mbeya Region of Southern highlands of Tanzania (Fig. 1) from August 2015 to January 2016 with the purpose of

determining seroprevalence and risk factors associated with occurrence of brucellosis in cattle. Currently, Momba district is located in the new administrative region of Songwe. The three districts can further be categorized into two settings, namely, rural communities which include Mbarari and Momba districts and urban communities which comprise Mbeya City Council. The former comprises the majority of agropastoralists whereas the latter comprise commercial farmers who are mostly dairy cattle keepers.

The region lies about 5500 feet above sea level and experiences subtropical highland climate with humid summers and dry winters. The temperature ranges between -6°C in the highlands and 29°C on the lowlands. The average rainfall per year is 900 mm. According to the 2012 national census, the region had a human population of about 2,707,410. The main economic activity in the region is crop production followed by livestock keeping. The dominant animal species are cattle (911,889) followed by goats (275,659) (Mbeya regional Commissioner office, 2012). Others include sheep, pigs, guinea fowls, ducks, geese and rabbits. In Mbeya region, cattle rearing is a mainstay of the household economy as they provide draught power for tillage in crop production,

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