Seroprevalence of Ovine Brucellosis in South Wollo, North Eastern Ethiopia

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Abstract: A cross-sectional study was conducted in south Wollo zone, north east Ethiopia between October, 2008 and March, 2009 aimed at determining the sero-prevalence and to identify potential risk factors of ovine brucellosis. A total of 800 sheep were sampled from two districts, Kalu and Harbu. All sheep above six months of age with no history of previous vaccination against brucellosis were selected. Rose Bengal Plate Test (RBPT) was utilized as a screening test for Brucella agglutinins while Complement Fixation Test (CFT) (Addlestone, United Kingdom) was used to confirm the reactors by RBPT. Over all seroprevalence of 1.5% (12 of 800) ovine brucellosis was observed. Seroprevalence was higher in female sheep compared to male sheep. Seroprevalence was calculated between sexually immature and sexually mature sheep, however, all seropositive sheep were from the sexually mature category. In conclusion, even though the prevalence of brucellosis observed in this study is low, it can be potential hazard for public health in the study area; therefore, the public especially small ruminant producers should be informed about the risk of ovine brucellosis.

Key words: Kombolcha • Ovine • Brucellosis • Prevalence • CFT • RBPT

INTRODUCTION

Brucellosis is an infectious bacterial disease caused by microorganisms of the genus Brucella and affecting a number of animal species [1]. Brucellosis is prevalent in most countries and is an important zoonosis of serious public health problem [2]. In animals, it is a significant cause of reproductive losses usually caused by Br. abortus in cattle, Br. melitensis and Br. ovis in small ruminants, Br. suis in pigs and Br. canis in dogs [3]. Economic losses due to brucellosis are due to abortion, retained fetal membranes and to a lesser extent, orchitis and epididymitis and infection of the accessory sex glands in males [1] as well as inflammation of the joints and bursae. It may cause death as a result of acute metritis following retained fetal membranes [4]. The disease in man, referred to as undulant fever, is transmitted through consumption of raw milk and its products or through contact with afterbirth products from infected animals [3].

Brucellosis is well studied in small ruminants in many regions of the world [5] and the classic principles of prevention and control which are based up on protection of healthy flocks, minimizing transmission by sanitary measures and use of test and slaughter methods are applied [6]. However, ovine brucellosis exists untouched in developing countries whereas such measures are hardly feasible.

In Ethiopia, brucellosis was reported in different animal species by various workers [7-15]. Occurrence of brucellosis in different animal species, traditional management system and custom of consumption of raw or uncooked animal products indicate the need of study of brucellosis in this country. Therefore, this study was designed to find out the seroprevalence of brucellosis and to evaluate significances of possible risk factors on sheep in south Wollo zone of Amhara national regional state, north east Ethiopia, whereas there are large number of sheep populations and no enough studies concerning this specific disease have been conducted.

MATERIALS AND METHODS

Investigated Animals and Sampling Methods: This cross-sectional study of ovine brucellosis was carried out on serum samples collected from 800 sheep (238 female and 562 male) in south Wollo zone of Amhara...
national regional state. The studied animals were kept under extensive farming system mixed with other species. Random blood samples were collected from two districts of south Wollo zone, Kalu and Harbu. The serum was separated and stored at -20°C in Kombolcha regional Veterinary Laboratory until it had been tested for *Brucella*. The species, sex and age of animals as well as the date of sample collection were recorded corresponding to each sera sample.

**Serological Test Procedure:** All the collected sera were subjected to RBPT, screening test for *Brucella* agglutinins [16] according to standard procedures at Kombolcha regional veterinary laboratory. The serum samples were tested, using control serum that gives minimum positive reaction on each day’s tests begun to verify the sensitivity of test conditions. 75µl of serum was taken from each sample and put in one side of each microplate wells. Commercially prepared purified antigen (25µl) (Montpellier, France) was taken and put on the other side of the same well, mixed thoroughly and left for agglutination. After 4 minutes, any visible agglutination reaction was considered positive for the screening test. Sera samples proved positive by the screening test were transported to the National Animal and Health Research Center (NAHRC) laboratory in icebox with ice and kept at -20°C in the laboratory until further tested by CFT (Addlestone, United Kingdom) for confirmation. CFT was performed according to the standard procedures recommended by OIE [16]. When the test showed complete fixation to partial hemolysis the test sera was regarded as positive whereas the sera was considered negative when there was complete hemolysis.

**Data Analysis:** For the data analysis, seroprevalence was calculated as percentage by dividing the numbers of animals seropositive for brucellosis (positive using CFT) to the total number of sheep sampled. Fisher’s exact test was used from Intercooled Stata version 7 to see the presence of significant differences in seroprevalences of brucellosis among the different categories.

### RESULTS

Of the 800 sera samples 2.5% (n=20) were seropositive for *Brucella* infection by the screening test; however, only 1.5% (n=12) sera were positive by the confirmatory test, CFT. Seroprevalences of 1.68% (4 of 238) and 1.4% (8 of 562) of *Brucella* infection were observed in female and male animals, respectively. However, the difference between the seroprevalences was not statistically significant. All sheep which were seropositive for *Brucella* infection were from the sexually mature category (Table 1).

Sero-prevalence of brucellosis was higher in sheep kept under extensive management (Table 1). When the sero-prevalence was calculated in Chefa and Kombolcha, relatively equal level of sero-prevalence was observed; and there was no statistically significant difference between the sero-prevalence of the two sites.

### DISCUSSION

In this cross-sectional study of ovine brucellosis, overall seroprevalence of 1.5% (12 of 800) was observed. This level of seroprevalence of the current study was in agreement with other previous studies in Ethiopia; Ayele [17] in central high land of Ethiopia, Mengistu [11] in Oromiya and southern nations regional states and Teshale et al. [13] in Somali who reported seroprevalences of 1.5, 1.6 and 1.6% ovine brucellosis, respectively. However, it was lower than the seroprevalence reported by Yibeltal [15] who reported 15% ovine brucellosis in Afar region, Ethiopia. The difference in seroprevalence of ovine brucellosis between the report of Yibeltal [15] and the current study could be due to the difference in animal population and differences in livestock management practices. Afar region is a pastoral region whereas livestock population including sheep is more concentrated compared to the livestock population in south Wollo zone of Amhara region. There is a positive association between population density (number of animals to land area) and disease prevalence, which is attributed to increased contact between susceptible and
infected animals [4]. Therefore, the highest prevalence in Afar compared to the current study area might due to high rate of transmission of Brucella organisms between animals. However, differences in the sensitivity of the tests utilized in the different study areas might also contribute for the variation in Brucella seroprevalence.

Comparison of seroprevalences of ovine brucellosis was carried out for different age and sex groups. When the seroprevalences of ovine brucellosis was compared between sexually mature and immature age groups, seropositivity was observed only in the category of sheep which were sexually mature. In Brucella infection, prevalence increases with age, probably because of greater exposure to infection. Moreover, sexually mature animals are more prone to the infection than sexually immature animals of either sex [4]. This is related to the fact that sex hormones and meso-erythritol (in male testicles and seminal vesicles) and erythritol in female allantoic fluid stimulate the growth and multiplication of Brucella organisms and tend to increase in concentration with age and sexual maturity [2].

Type of management system was a potential risk factor for sero-prevalence of ovine brucellosis; all sero-positive were from the group of sheep kept in the extensive management system. This finding is in agreement with the report of Ibrahim et al. [9] with regard to management system in cattle in jimma zone of Oromia region, south-western Ethiopia. The sero-prevalence was relatively equal in Chefa and Kombolcha, this might be due to similarities of various factors affecting the sero-prevalence of ovine brucellosis in the two study areas.

In conclusion, the sero-prevalence of ovine brucellosis was not high. However, disregarding the level of prevalence, ovine brucellosis is potential hazard both for animals and human in the study area. This suggests the need of screening test during sheep selection especially when they are intended for breeding purpose; the public particularly sheep producers should be informed about the risk of brucellosis.

REFERENCES