

SHORT COMMUNICATION

SEROPREVALENCE OF CAPRINE BRUCELLOSIS IN CHIFRA WOREDA, AFAR REGIONAL STATE, ETHIOPIA

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ABSTRACT: A cross sectional study was carried out from December 2005 to June 2006 to investigate seroprevalence of caprine brucellosis in Afar Regional State of Chifra Woreda, Ethiopia. Of 294 serum samples screened by RBPT, 62 (21%) were positive. When the RBPT positive (n=62) sera were retested with Complement Fixation Test (CFT), only 54 (18.4%) became positive. There was significant difference in seroprevalence among the three age groups ($P<0.05$). Although there was no statistically significant difference ($P>0.05$) in seroprevalence between the two sexes, high prevalence (19.6%) was observed in male goats. The present study also demonstrates a statistically significant association between abortion ($P<0.05$) and seropositivity. The results found in this study appear to be related with management system practiced in the area.

Key words/phrases: Afar; Brucellosis; Goat; Seroprevalence.

INTRODUCTION

In spite of large population of goats in Ethiopia, the comparative huge resource that the country possesses and the economic return gained from this sub-sector do not seem to coincide. The reasons that are attributed to this are under nutrition, malnutrition, low productivity, age-old traditional management and diseases. Brucellosis is one of infectious diseases, considered as a major constraint for animal productivity (Tamirat Haileyesus, 1985).

Brucellosis is a widespread disease of livestock and humans. The disease in animals is characterized by abortion in the last trimester of pregnancy or birth of unthrifty newborn, orchitis and epididymitis with frequent sterility in the male (Radostits *et al.*, 2000).

Brucellosis is common in cattle but less well studied in small ruminants, particularly in goats in Africa. But a prevalence rate of 6.01% reported by Waghela (1976) in Kenya, 5.29% in Somalia (Falade and Hussein, 1979),

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3.8% in Eastern lowlands of Eritrea (Omer *et al.*, 2002), 4% in Eastern Sudan (El-ansary *et al.*, 2001) and 4.75% in Nigeria (Shehu *et al.*, 1999), show the significance of caprine brucellosis in some African countries.

Moreover, a couple of studies were made concerning the situation of caprine brucellosis in Ethiopia with prevalence rate of 16.5% in Afar and 1.7% in Somali region (Yibeltal Muhie, 2005) and 1.3% in central Ethiopia (Tekeleye Bekele and Kasali, 1990). However, only a single information is available on the status of caprine brucellosis in lowland pastoral areas of Ethiopia like Afar, where there is a large goat population reared under traditional husbandry system. The aim of this study was to investigate the seroprevalence of caprine brucellosis in Afar Chifra woreda, Ethiopia.

MATERIALS AND METHODS

Study area

This cross-sectional study was conducted in Afar Regional State of Chifra Woreda, Ethiopia, from December 2005 to June 2006. The altitude of Afar Regional State varies from 150 meters below sea level to 1000 meters above sea level. The maximum and minimum annual temperature of the area is 18°C and 35°C, respectively. The area has an annual rainfall of 561 mm on western edge of the escarpment and 225 mm on the lava plain and volcanic ash, where only camels and goats are reared (NMSA, 2000).

Study population and sampling methods

A total of 294 sera were collected from goats of both sexes, which were six months of age and above, from three peasant associations in Afar Chifra Woreda, Ethiopia. In addition, information concerning management and risk factors influencing the spread and maintenance of brucellosis was collected for each sampled animals by interviewing the owner. The sample size was determined by the formula used for simple random sampling method and the study considers 95% level of significance (Thrusfield, 1995), based on a prevalence rate of 16.5% (Yibeltal Muhie, 2005).

Serological tests

All serum samples were screened for the presence of *Brucella* agglutinins using RBPT according to Nielsen and Dunkan (1990) with the *Brucella abortus* 1 strain S99 as antigen. The test was performed at the Ethiopian Health and Nutrition Research Institute, Addis Ababa, Ethiopia. Sera found positive to RBPT were subjected to Complement Fixation Test. The CFT was done at the National Veterinary Institute, Debre zeit, Ethiopia, and all

sera that produced 75% fixation of the complement at a dilution of 1:5 and above were taken as positive (Dohoo *et al.*, 1985).

Data analysis

Data obtained from both serological tests and questionnaire survey were stored in Microsoft Excel® before the data were transferred to Stata /SE Windows version 10.0 (Stata Corp. College Station, TX) for further analysis. Descriptive statistics was employed to determine the percentage of positives and negatives. P values of <0.05 were taken as statistically significant.

RESULTS

Out of 294 sera samples tested by RBPT, 62 (21%) were found to be positive; when RBPT positive (n=62) sera were retested with CFT, only 54 (18.4%) became positive. The prevalence rate in male goats was 19.6% and 18.1% in females, using both RBPT and CFT (Table 1). Nevertheless, these rates revealed no statistically significant difference ($\chi^2=0.0633$, $P>0.05$) in the infection rates between the two sexes. The animals tested were also categorized into three age groups and the seroprevalence rate of brucellosis in the three age groups were 8.9%, 18.2% and 27.7%, with age groups of 0.5-1 years, 2-3 years and >3 years, respectively, with statistically significant difference among them ($\chi^2=7.452$, $P<0.05$).

Table 1 Seroprevalence of brucellosis in relation to age and sex in goats of Afar Regional State of Chifra Woreda , Ethiopia

	No. of serum tested	Positive	Prevalence rate (%)
<i>Sex</i>			
Male	51	10	19.6
Female	243	44	18.1
Total	294	54	18.4
$\chi^2(1) = 0.0633, P = 0.801; OR = 0.679, 95\% CI = [0.308 - 1.500]$			
<i>Age groups (years)</i>			
0.5 -1	79	7	8.9
2 - 3	132	24	18.2
> 3	83	23	27.7
Total	294	54	18.4
$\chi^2(2) = 7.452, P = 0.023; OR = 2.187, 95\% CI = [0.942 - 4.351]$			

During the study period, a total of 33 reproductive disorders were recorded in goats from the three peasant associations and of these, 25 cases had abortion and 8 cases developed retained fetal membranes. In this study, a highly significant difference was observed between animals that had previous history of abortion ($\chi^2=12.5997$, $P<0.05$) and retained fetal

membranes ($\chi^2 = 5.4862$, $P < 0.05$) compared to those without history of abortion and retained fetal membranes in seropositivity (Table 2).

Table 2 Brucellosis seroprevalence and the occurrence of goat reproductive disorders in Afar Regional State of Chifra Woreda, Ethiopia.

<i>Reproductive disorders</i>	No. of serum tested	Positive	Prevalence rate (%)
<i>Abortion</i>			
Present	25	11	44
Absent	218	33	15
Total	243	44	18.41
$\chi^2 = 12.5997$ $P = 0.000$; $OR = 4.74$, 95% $CI = [1.968 - 11.419]$			
<i>Retained fetal membranes</i>			
Present	8	4	50
Absent	235	40	16.95
Total	243	44	18.1
$\chi^2 (1) = 5.4862$, $P = 0.019$; $OR = 4.527$, 95% $CI = [0.964 - 21.234]$			

DISCUSSION

The present study revealed that caprine brucellosis is widespread in Afar Chifra Woreda, Ethiopia, with an overall prevalence of 18.4% which is in agreement with results of Yibeltal Muhie (2005). However, the prevalence of caprine brucellosis recorded in this study is higher than that of Waghela (1976), Falade and Hussein (1979), Shehu *et al.* (1999), Omer *et al.* (2000) and El-ansary *et al.* (2001). The higher prevalence in the current study could be due to husbandry system practiced in the study area, and absence of disease monitoring and control policy. The nomadic pastoralist mode of animal husbandry prevailing in the study area contributes a lot to the spread and transmission of brucellosis during mass movement of flocks, communal grazing and watering points. Moreover, the observation made by Richard (1997) and Silva *et al.* (2002) indicated that the prevalence of brucellosis was higher in communally grazed herd.

Pastoralists keep large number of female goats than males whereby most of the male goats are sold at young age. The prevalence could have been higher in females than males. However, the current study showed similar prevalence, which is in agreement with Yibeltal Muhie (2005). The reason could be that those male goats which are not sold at young age are kept for long duration of time for breeding purpose, and thus give equal chance of exposure to males.

Statistically significant difference was observed among three age groups in goat brucellosis infection rate. The increase in infection rate with age of the

animals was also reported by Silva *et al.* (2002). It has been reported that susceptibility of animals to *brucella* infection is influenced by age of the animal (Radostits *et al.*, 2000). Younger animals tend to be more resistant to infection and frequently clear infections, although latent infections could occur (Walker, 1999). On the other hand, sexually mature and pregnant animals are more susceptible to infection with the organism than sexually immature animals of either sexes, which may be due to the fact that sex hormones and erythritol, stimulate the growth and multiplication of *Brucella* organisms which tend to increase in concentration with age and sexual maturity (Radostits *et al.*, 2000).

In this study, statistically significant association was observed between abortion and brucellosis seropositivity. Animals with a history of abortion were also found to have a higher chance of being seropositive compared to those without history of abortion and /or retention of fetal membranes. This indicates that brucellosis was the major cause of abortion and retention of fetal membranes in the area. It has been reported that the primary manifestations of brucellosis are related to reproductive tract and brucellosis is frequently associated with abortion, retention of fetal membranes and metritis (Chukwu, 1985). The findings of this study revealed that caprine brucellosis is prevalent in Chifra Woreda Afar region. The results found in this study appear to be related with management system practiced in the area.

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