

Prevalence and Risk Factors Associated With Bovine Brucellosis in Mogadishu, Somalia

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Abstract: This study was carried out to assess the prevalence and risk factors associated with bovine Brucellosis in Mogadishu, Somalia. For this, 150 bovines were selected from five different districts of Banadir region based on the sex, age, breed and reproductive status and some question through the risk factors. The overall prevalence of bovine brucellosis of this study were 1(5.3%) out of 19 for male and 14(10.7%) out of 131 for female. The prevalence of age group between (6 month to 2 years) 2(6.7%) out of 30 were positive, >2-6 years of (13.6%) out of 66 were positive and 6 above 4(7.4%) out of 54, were positive, in type of breed the seropositive of enzootic breed were 11(10.1%) while cross breed were 4(9.8%) positive and also breed could be classified into three kinds based on reproductive status such as: Lactation, pregnancy and Nan pregnant the seropositive of the lactation were 7(12.3%), whereas pregnancy were 2(9.5%) were positive and non-pregnancy 5(9.4%) were positive ultimately the study was suggested to use of artificial insemination as opposed to bulls to control venereal transmission of brucellosis, to improve good management practice, hygiene and health, quarantine methods are important in all dairy farms, and their introduction to farms without knowledge of their history and testing.

Keywords: Risk factors, prevalence, brucellosis, bovine

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I. Introduction

The main livestock comprise camel, cattle, sheep and goats, which estimated at 7.1 million for camel, 4.9 million for cattle, 12.3 million for sheep, and 11.6 million for goat (FAOSTAT, 2012). Generally, the productivity of livestock in Somalia is low, however, it is possible to increase the situation through improved management practices (Knips, 2004; ADB, 2010). Cattles in Somalia are mainly the East African Zebu type among which Somali Boran, Gasara, Dauara and Surqo types are recognized. The Somali Boran are believed to be a descendant of the first introduction of zebu into Africa from West Asia and are thought to have evolved following the migration of Ethiopian cattle into Somalia and along the Somalia-Ethiopia border, the Surqo breed is a zenga breed, the zengabreeds are breeds that resulted from zebu-sanga crosses that came about following the introduction of zebu cattle into Africa from Asia. The Surqo breed is a crossbred of the Boran of Somalia or Ethiopia with an unknown sangapopulation. (Muigai, et al., 2016). Brucella is a Gram-negative facultative intracellular organism responsible for a variety of disease conditions and having zoonotic significance. Brucellosis is caused by bacteria of the genus Brucella and is reported worldwide causing abortion, infertility, retained placenta, endometritis in females and to a smaller extent, orchitis, and infection of the accessory sex glands in males (Mustafa et al., 2011). Brucellosis is a worldwide bacterial zoonotic disease affecting both animals and humans. It causes heavy economic losses to the livestock industry and also poses serious human health hazards. It has a major impact on animal production especially in dairy cattle. It affects the health of the animal and reduces performance of reproduction through retained placenta, anestrus, repeat breeder, dystocia, still birth, uterine prolapsed and vaginal prolapsed. It reduces the calving due to abortion, and reduces in weight loss and milk production. It also affects the production (ADB, 2010).

There is a little information of animal and human brucellosis in Somalia. The serological investigations and bacteriological isolations of Brucella carried on the country are very scarce. The first report on the isolation of Brucella strains in the country were recorded by Andreaniet al. (1982). In spite the disease is reported in all domestic animals of the country, Somali people lack awareness about the zoonotic potential of the disease with their existing habit of raw milk consumption and close contact with domestic animals (ADB, 2010). Therefore, the researchers choose this topic to assess the prevalence and risk factors of bovine brucellosis at five selected districts in Mogadishu, Somalia since it causes heavy economic losses to the livestock industry and also poses serious human health hazards.

II. Research Methodology

Study area and sample size

This study was carried out in Benadir region of Somalia and five districts such as Bondheere, Dharkenley, Daynile, Yaqshid and Karan district were selected purposively. The desired sample size for the study was calculated using the formula given by Thrusfield (2007) with 95% confidence interval (CI) and 5% desired absolute precision and there was previous study on prevalence and risk factors associated with bovine brucellosis in Benadir region which was 9.5%. Therefore: $n = (z^2 \cdot (p \cdot exp^{(1-p)})) / d^2$ Where n = the required sample size, P = Expected prevalence 11%, d = Desired absolute precision level (5%) and 95% of confidence level

$$n = (1.96)^2 \cdot (0.11 \cdot (1 - 0.11)) / (0.05)^2 = 150.$$

The representative samples were collected according to the sex, breed, age and reproductive status and some question through the risk factors.

Serum antibody test

The collected serum samples were subjected to Rosa Bengal Plate Test (RBPT) for the antibody against the Brucellosis based on the standard procedure described elsewhere. Briefly, one drop of serum samples and one drop of antigen were mixed test plate slides successively. Immediately, the last drop of antigen was added to the plate and mixed the serum and antigen thoroughly with glass rod or rotary agglutinator, rest for four minutes and read the result immediately. The result may be judged as positive or negative according to the presence or absence of any degree of agglutination based on the following assessment system: (i) 0 - no agglutination, no rim formation, uniform pink colour; (ii) 1 - hardly perceptible agglutination and/or some rim formation; (iii) 2 - fine agglutination with a definitive rim, some clearing; and 3 - coarse dumping, definitive clearing.

Data analysis

Collected data was managed and organized through Microsoft Office Excel and then analyzed using Statistical Package for Social Sciences (SPSS version 22).

III. Results And Discussion

Prevalence of brucellosis based on sex

In this study, 150 blood samples of Bovine were tested, out of 19 were male while 131 were female. Results indicated that 90% samples showed the negative response on the RBPT test while 10% were positive (Table 1). Based on sex, highest prevalence was observed for male bovine which showed 94.7% negative response while it was 89.3% (117 out of 131) for female. In case of positive response, the highest prevalence was observed for female (10.7%, 14 out of 131) while it was 5.3% (1 out of 19) for male. Therefore, non-significant variation was observed based on sex (P=0.404). The result demonstrated that the female was more susceptible to the disease than male. This result is consistent with Gogoi et al. (2017) and they found the prevalence of bovine brucellosis in female and male as 14.06% and 3.07%, respectively. Previous study of Ndazigaruye (2018), De Alencar Mota et al. (2016), and Mangi et al. (2015) also reported that higher prevalence of brucellosis was found in female animals than males.

Table 1. Prevalence of brucellosis based on sex

Sex Parameters	Number of animals tested	Prevalence				Chi-Square
		RBPT Negative		RBPT Positive		
		Frequency	Percentage	Frequency	Percentage	
Male	19	18	94.7	1	5.3	P=0.404 Ns
Female	131	117	89.3	14	10.7	
Total	150	135 (90%)		15 (10%)		

Prevalence of brucellosis based on type of breed

The researcher focused prevalence of bovine brucellosis on the basis of breed types - indigenous and Cross breed and the results obtained were shown in Table 2. It can be seen that 90% (109 out of 150) breeds were shown the negative result on RBPT while 10% were positive. Among the indigenous breeds, about 10.1% and 89.9% bovine showed the positive and negative response, respectively on the RBPT. On the other hand, more than 90% bovine of cross breeds showed the negative response on the RBPT while it was less than 10% responded for positive RBPT. The variation of the bovine brucellosis between the indigenous and cross breeds was insignificant (P=0.610).

Table 2. Prevalence of brucellosis based on type of breed

Breed Parameters	Number of animals Tested	Prevalence				Chi-Square
		RBPT Negative		RBPT Positive		
		Frequency	Percentage	Frequency	Percentage	
Indigenous	109	98	89.9	11	10.1	P=0.610 Ns
Cross breed	41	37	90.2	4	9.8	
Total	150	135	90.0	15	10.0	

Prevalence of brucellosis based on three aged groups

The results obtained for the prevalence of bovine brucellosis based on three different age groups were presented in **Table 3**. It was observed that the primarily group was between (6 months -2 yrs.) and total number was 30, which reported 2bovines (6.7%)out of 30to positive RBPT whereas28(93.3%) were negative. The second group was between (>2-6 yrs.)and total number was66 of which 9 bovines (13.6%) showed positive RBPT while 57(86.4%) were negative RBPT. The third group was (6 and above) and comprises 54 bovines, which responses 4(7.4%) positive RBPT and 50(92.6%) negative RBPT. Therefore, it was observed that the age group of >2-6 yrs. Were more prone to bovine brucellosis These results are in line with the previous studies (Weidmann, 1991, Walker, 1999), which reported brucellosis was occurred frequently at mature cattle.

Table 3. Prevalence of brucellosis based on aged groups

Aged groups	Number of animals tested	RBPT Positive (%)		Chi-Square
		Frequency	Percentage	
6 month -2 yrs.	30	2	6.7	P=0.418 Ns
>2-6 yrs.	66	9	13.6	
6 above	54	4	7.4	
Total	150 (100%)	15(10%)		

Prevalence of brucellosis based on reproductive status

The results of RBPT based on the reproductive stages (lactation, pregnancy and none-pregnancy) are presented in **Table 4**. It was found that Among 131 tested bovines, more than 97 % were RBPT negative, only 3 % were positive. The prevalence of bovine brucellosis was the highest in the lactation stage (12.3%) while it was 9.5% and 9.4% at pregnancy and non-pregnancy stages.

Table 4. Prevalence of brucellosis based on reproductive status of female animals

Period	Number of animals Tested	Prevalence				Chi-Square
		RBPT Negative		RBPT Positive		
		Frequency	Percentage	Frequency	Percentage	
Lactation	57	50	87.7	7	12.3	P =0.874 Ns
Pregnancy	21	19	90.5	2	9.5	
Non-pregnancy	53	48	90.6	5	9.4	
Total	131	97.0%		14 (3.0%)		

Prevalence of brucellosis based on location

According to the prevalence of brucellosis based on location (**Table 5**), the result revealed that the tested animals atDharkenleywere 30, out of which 3(10%) were positive to RBPT while 27 (90.0%) were negative. In case of Bondheeredistrict 42 cattle were tested among which 3(7.1%) were positive and 39 (92.9) were negative to RBPT. The Daynile prevalence 7(20.6%) whereas 27 (79.4%) were negative among the 34 tested samples.The total number of animals from Yaqshid district was 27, among which only one (3.7%) animal was RBPT positive whereas 26 (96.3%) were negative. In case of Karan district, the number of animal tested were 17 and it was found that only one (5.9%) animal showed positive response to RBPT while16 (94.1%) were negative. Hence, it was observed and found that animals from Daynile districts are more susceptible to the prevalence of brucellosis.

Table 5. Prevalence of brucellosis based on Location

Districts	Number of Animal Tested	Prevalence		Chi-Square
		RBPT Positive		
		Frequency	Percentage	
Dharkenley	30	3	10	P=0.341 Ns
Bondheere	42	3	7.1	
Daynile	34	7	20.6	
Yaqshid	27	1	3.7	
Karan	17	1	5.9	
Total	150	15 (10.0%)		

IV. Conclusion

Brucellosis is one of infectious diseases that are endemic in Somalia that need to be addressed. Therefore, this study was initiated to assess and understand the prevalence and risk factors of bovine brucellosis at 5 selected districts in Mogadishu, Somalia. The study concluded that the prevalence of bovine brucellosis was lower in male than the female indigenous breeds. In addition, the study indicated that prevalence of brucellosis was higher and more susceptible to mature lactation cattle. Therefore, this study would provide valuable information to the cattle farmers.

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