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SEROPREVALENCE OF BRUCELLOSIS IN CATTLE OF ARAPAI SUB-COUNTY OF SOROTI, UGANDA

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ABSTRACT

Brucellosis is a worldwide contagious and zoonotic bacterial infectious disease caused by *Brucella.* The aim of present study was therefore to establish the seroprevalence of brucellosis in Arapai, Soroti district, Uganda. A structured questionnaire administered to 72 farmers captured farmer characteristics, breed of animals reared, occurrence of abortion, risk of brucellosis infection to herd owners and family members. The Rose Bengal plate test was used to screen 227 cattle investigated for the presence of *Brucella*. A combination of communal grazing and tethering management system was mainly used by 77.8% respondents. The other systems of management included communal grazing used by only 13.9%, tethering only 5.6%, tethering and zero grazing 2.8%. Similarly, 55.6% of farmer respondents from the study area were experiencing incidences of abortion in their cattle herds. A significant proportion of respondents (30.6%) used raw milk daily immediately after milking while (61.1%) of the farmers used raw milk occasionally, and only 8.3% did not take raw milk. About 80% of respondents who had ever come in contact with aborted materials did not use protective materials. Among the total 72 surveyed farmers, only 33.3% of respondents had their animals vaccinated against brucellosis. Out of the total 227 screened cattle for brucellosis by using RBPT, 35 were positive for *Brucellosis* antigens giving an overall prevalence of 15.4% at confident level of 95% (C.I, 11% - 20%). The results showed that younger cattle were less infected than adults. Prevalence of *Brucellosis* was higher in females compared to males.

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1 Introduction

Brucellosis is a worldwide contagious and zoonotic bacterial infectious disease caused by *Brucella abortus* and spread through food and grass contaminated by bacteria, aerosol, broken skin and mucus membrane contact with contaminated environment, aborted tissue, fetal fluids, fetal placenta, (Rijpens et al., 1996; Garin-Bastuji et al., 1998; Corbel, 2006; Olsen and Tatum, 2010). The disease also spreads by affected animals that shed *Brucella* through vaginal discharge, milk, semen from males, Artificial Insemination (Olsen & Tatum, 2010). According to Crawford et al. (1990), some calves are born with disease but not showing serological evidence and then they will shed the *Brucella* organisms after their first parturition and this spreads through suckling instead of utero-infection. The chances of infection is comparatively higher in the persons like veterinarians, dairy farmers, ranchers, slaughter house workers, hunters, microbiologist who are directly in contact with the cattle than the others (Garin-Bustuji et al., 1998; Corbel, 2006; Greene and Carmichael, 2006; Olsen & Tatu, 2010).

Globally today, developed countries have managed to eradicate Brucellosis (Geering et al., 1995) but it is still exists in developing countries such as in Africa, Middle East, Asia, The Mediterranean and Latin America. In Africa particularly in Sub-Saharan Africa, the seroprevalence of Brucellosis is estimated to be ranging from 10.2% to 25.7% (Mangen et al., 2002). Some countries in Africa where seroprevalence of Brucellosis had been reported to be less than 10% were Benin 4.3%, Ethiopia 4.2%, and Ghana 6.6% (Akakpo et al., 1984; Kubuafor et al., 2000; Megersa et al., 2011) while in some African countries like Uganda, Senegal and Mali, it was reported as 19.6%, 14.4% and 19.7% respectively (Newton et al., 1974; Doutre and Sagna, 1977; Maiga et al., 1995), Senegal and Mali, it was reported 19.6%, 14.4% and 19.7% respectively (Newton et al., 1974; Doutre and Sagna, 1977; Maiga et al., 1995). Still there are some African countries where the occurrence of Brucellosis was reported to be higher than 20% and these are Rwanda and Togo with 25.7 and 22.5 % respectively (Akakpo et al., 1984; Kabagambe et al., 1988). Recently in Uganda, a seroprevalence of 10% has been reported in livestock by Mwebe et al. (2011).

In peri urban and urban areas of Kampala, seroprevalence of brucellosis was 12.6% and 10% (Makita et al., 2011). Ocaido et al, (2005) reported brucellosis prevalence of 16% from the study area. Economically, Brucellosis causes a big negative impact to livestock keepers e.g. lowers calving rate, abortion, reduced milk production, quite high replacement cost of dead animal, and low value of sold cow(Nuru & Schnurrenberger, 1975) and also infects the other peoples (Mangen et al, 2002). The information about the seroprevalence of Brucellosis in cattle of Arapai sub district of Soroti, Uganda was in scarcity therefore the present study has been undertaken for finding out this information.

2 Materials and Methods

2.1Study area and sampling strategies

The study was conducted in Arapai sub-county of Soroti district, Eastern Uganda. The geographical location of Soroti district is on latitudes 1033 and 2023 north of the equator; 300 01 and 34018 east of the prime meridian and is over 2500 feet above sea level with rocks in most areas. The district borders Serere, Lake Kyoga, Kumi, Ngora, in the South, Kaberamaido in the west and Amuria from the north and Katakwi district in the north east.

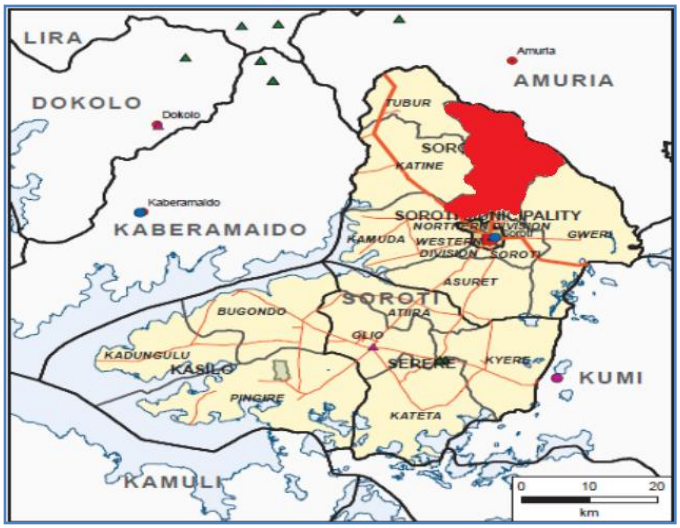

Figure 1 Map of Soroti district showing the location of the study area.

District covers approximately 2662.5km^2 areas, of which 2256.5km^2 is land and 406km^2 is water. The sub district has four (04) parishes and 27 villages. Using a two-stage sampling procedure, 72 farmers and 227 cattle were randomly sampled from all the four parishes of Aloet, Arapai, Odudui, Dakabela of the Sub district. In the first step of study, three villages were randomly selected from Arapai, Odudui and Dakabela parishes and four were from the parishes Aloet by using the ''Random Village'' program of Survey Toolbox (Cameron, 2010). This was followed by selection of owners or herds of cattle and then animals were selected from the individual herds.

2.2 Data collection and statistical analysis

A structured questionnaire was administered to all the 72 randomly selected farmers to obtain information about the herds of cattle. This was intended to capture information on sex, age, breed, cases of abortion, risk of infection by Brucellosis to herd owners and family members. The questionnaire was also used to find out knowledge of brucellosis and its impacts and control methods, whether they used any protective gears while handling aborted materials and consumed raw milk or not**.** Average 3mls of blood was collected from jugular vein from the selected cattle with sterile adapter needles inserted in vacutainers. Collected blood was allowed to stand overnight to clot in refrigerator to obtain serum. Thereafter serum was separated from blood and collected into serum tubes and stored at -20^{o}C until use.

Collected serum samples were screened for the presence of Brucellosis by using RBPT (Rose Bengal Plate Test). During RBPT test, antigen was mixed with equal volumes of serum sample and put on a glass white plate and rocked gently for 2-4 minutes, any agglutination was considered positive and sample without agglutination was considered negative for *Brucella* pathogen (Alton et al., 1988). Collected data from the questionnaire were coded and analysed by using statistical package of social science (SPSS version 16) for windows and Chi- square values were used to obtain the p-values to get the significance of variables and *Brucellosis*. The laboratory results were entered in MS excel version 2007 and later exported to Epidemiological package for information (Epi - Info soft ware version 3.4.2) for analysis.

3 Results

Seventy two farmers were randomly sampled from the parishes of Odudui (30.6%), Aloet 27.8%), Dakabela (27.8%) and Arapai (13.9%) respectively. Maximum interviewed respondents were consisted of those aged between 30-50 years (58.3%) while 36.1%, 5.6% represented those aged 50+ years and below30 years respectively. Among studied respondents majority of the farmers were males (77.8%). In the study area Zebu cattle was reported as a dominated cattle species (83.7%), while crossbreeds (7%), Ankole (7%) and Friesians (2.3%) available in less number. A combination of communal grazing and tethering was most common management system (77.8%). The other system of management used by responds were only communal grazing (13.9%), only tethering (5.6%) and tethering & zero grazing (2.8%). On incidence of abortion, 55.6% of farmers from study area had experienced incidences of abortion in their cattle herds. It was found that 85.7% of total abortion was because of *Brucella* pathogen infection. The results showed that 86.1% of farmers were aware about the brucellosis disease; among these 67.7% farmers got information about the disease from neighbourhood while 32.3% of these got information from their families. About the consumption of raw products, most of the respondents (61.1%) used raw milk usually while 30.6% used raw milk daily immediately after milking and only 8.3% did not take raw milk. About 80% of respondents who had ever come in contact with aborted materials did not use protective materials. Only 33.3% of respondents had had their animals vaccinated against brucellosis. But still respondents that said their animals were vaccinated against disease had varied past period experiences when vaccination took place that is to say vaccination within past 1year was 2.8%, 2 years with 8% and 3years with 3%.

From total 227 sampled for the occurrence of brucellosis by using RBPT, 69.6% were female while 30.4% animals. The results showed that 35 cattle were positive for Brucellosis antigens giving an overall prevalence of 15.4% at confident level of 95% (C.I, 11% - 20%). The results of the study showed that younger cattle were less infected than adults. Prevalence of Brucellosis was higher in females as compared to males. Of the 40 cross breeds sampled, 4 were positive giving a prevalence of 10% (95% C.I 2.8%-23.7%). The pure Friesian sampled was positive while one Ankole breed animal was got and was negative. Arapai and Aloet parishes recorded the highest prevalence. Detailed results were shown in Table1.

4 Discussion and conclusions

The prevalence of brucellosis in the cattle herds of Arapai in Soroti was found to be 15.4%. This is a high prevalence and could have resulted into financial losses to farmers, reduced cattle herd multiplication, low calving rate and high risk of spread to other species of animals and human (Mangen et al., 2002). The results of the present study concur with a study conducted by Ocaido et al. (2005) who reported a prevalence of 16% in Serere, Soroti district and are close to national average 10 % (Mwebe et al., 2011). This high prevalence at Arapai could be attributed to co-mingling in communal grazing areas and at watering points, particularly during the dry season. During times of extreme weather cattle usually concentrate on scarce pastures and around watering points, which may become contaminated with aborted foetal materials or fluids from infected normal calvings (Musa et al., 1990; Mai et al., 2012).

Table 1 The relationship between the seroprevalence of brucellosis obtained using RBPT with age, sex, and location in Arapai Sub County, Soroti district.

Factors		Infected	Un infected	Total	Prevalence (%)	p-value	C.I %
Age of cattle	1 month-2years	14	80	94	14.9	χ^2=3.789	8.4 -23.7
	>2years	21	112	133	15.8	P=0.854	10-23.1
Total		**35**	**192**	**227**	**15.4**		
Sex of cattle	Male	9	60	69	13.0	χ^2=0.429	6.1-23.3
	Female	26	132	158	16.5	P=0.513	11-23.2
Total		**35**	**192**	**227**	**15.4**		
Parish	Aloet	17	74	91	18.7		11.3-28.2
	Arapai	10	13	23	43.5	χ^2=20.907	23.2-65.5
	Odudui	5	52	57	8.8	P=0.000	2.9-19.3
	Dakabela	3	53	56	5.7		1.1-14.9
Total		35	192	227	15.4		
Breed	Zebu	30	155	185	16.2		11.2-22.3
	Crosses	4	36	40	10	χ^2=6.659	2.8-23.7
	Friesian	1	0	1	100	P=0.084	100-100
	Ankole	1	0	1	00		0.00-0.00
Total		**35**	**192**	**227**	**15.4**		

Bull sharing which may result in venereal transmission is also common (Bercovich, 1998). The high incidence of abortion due to disease (87.7%) is likely a manifestation of the devastating effects of brucellosis. The results also revealed that cattle were not vaccinated against brucellosis and this is a great chance for spread of the disease. Among farmers interviewed, 66.7% agreed on the matter of non vaccination condition of their cattle and so their immunity was not boosted to fight brucellosis (Corbel, 2006; Blasco & Molina-Flores, 2011).

Among the surveyed parishes of Arapai, the results showed that Arapai parish had the highest prevalence (43.5%). Aloet parish had seroprevalence of 18.7%, making it second. Arapai and Aloet are located proximal to Arapai cattle market, one of the biggest cattle markets in Eastern Uganda which could be aiding in the transmission of brucellosis (Bale & Kumi-Diaka, 1981; Cadmus et al., 2010). They also share a border and hence may be sharing same water points and grazing land and yet brucellosis spreads well in this kind of areas and cattle can get infected through aerosols, aborted foetuses in case an animal had aborted in the pastures during grazing that contaminated the environment (Crawford et al., 1990; Corbel, 2006; Olsen & Tatum, 2010).

The study further established the commonest cattle management system as a combination of communal grazing and tethering (77.8%). This means that most animals are communally grazed and this enhances the spread of brucellosis easily through sharing grazing pastures, water points and infections during mating from various herds since they mix up. Brucellosis spreads a lot through grass contaminated by bacteria, aerosol, broken skin and mucus membrane, aborted tissue, fetal fluids, disposed fetus placenta (Ocaido et al., 2005; Corbel, 2006; Olsen & Tatum, 2010; Mai 2012). Zebu is the breed that was kept in the study area representing 83.7% of all the cattle at risk. Cross breeds and exotic breeds are few because this area is harboured with so many ticks and climate is harsh since the area is next to the semi desert area of Karamoja region.

Seroprevalence of Brucellosis based on sex revealed higher prevalence in females than in males but the results were not statistically significant. This is in agreement with Cadmus et al. (2013). Although more prevalence was got in female cattle, but there can be equal chance of infection because both sexes share same common grazing pastures, mix in their herds, and both have equal chance of mating among each other. Based upon age, results of this study revealed that adult cattle of more than 2 years of age had the highest prevalence of 15.8%. Ordinarily, cattle of less than 2 years of age were less susceptible to *B. abortus* than older ones (Cadmus et al., 2013). Age is one of the intrinsic factors which can influence susceptibility of *B. abortus* infection. So seroprevalence may increase with age because of prolonged duration of response of antibodies in the infected cattle and due to prolonged exposure. There was no significant relationship between breed and brucella infection in this study.

This is not in agreement with Junaidu et al. (2011) who found a strong significant relationship between breed and brucella infection. Humans, cattle and other species of animals are at high risk of acquiring brucellosis and even re-infection (Mangene et al., 2002). A significant proportion of respondents (30.6%) took raw milk daily and another 67.7% took raw milk occasionally. This exposed this population of people to the disease because brucella microbes can be obtained in milk easily than any other source. Worse still, 80% of respondents who had ever come in contact with aborted materials did not use protective materials. Much as 86.1% of farmers had heard about the disease, they did not know that Brucellosis existed in some of their herds and this can accelerate the spread of the

disease but the study has helped them because results where left in their Sub-county headquarters for farmers to know their herd status. In conclusion, the seroprevalence of brucellosis in Arapai Sub-county, Soroti district is still high. It is recommended that humans around the study area should be screened for brucellosis as they could have acquired infection from the cattle. Besides, control strategies should be instituted so as to avoid further cross transmission.

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