

## Sero Prevalence of Brucellosis in Goat in Sokoto, Nigeria

<sup>1</sup>A.U. Junaidu, <sup>2</sup>A.I. Daneji, <sup>1</sup>M.D. Salihu, <sup>1</sup>A.A. Magaji, <sup>3</sup>F.M. Tambuwal,  
<sup>3</sup>M.B. Abubakar and <sup>1</sup>H. Nawawi

<sup>1</sup>Department of Veterinary Public Health and Animal Production,

<sup>2</sup>Department of Veterinary Medicine, Surgery and Theriogenology

<sup>3</sup>Department of Veterinary Microbiology and Pathology

Usmanu Danfodiyo University, Sokoto, Nigeria

**Abstract:** Serum samples were collected from goats slaughtered at the Sokoto metropolis abattoir and were screened using Rose Bengal Plate Test (RBPT), the Serum Agglutination Test (SAT) and the Competitive Elisa (complisa) for brucellosis. A seroprevalence of 22.93% was recorded. The female had more prevalence (28.35%) than the male while the age band of 13-24 months had the highest prevalence of 22.46% Sokoto red was the breed with the highest prevalence of 34.12% while the hot season had the highest prevalence of 28.57%. Due to the zoonotic implications of the disease, there is the urgent need to consider the vaccination of small ruminants against brucellosis in addition to other recommendations suggested.

**Keywords:** Antibodies, brucellosis, ELISA, goats, Nigeria, prevalence

### INTRODUCTION

Domesticated goats are found in all parts of Nigeria and goat meat is a good source of animal protein. Nigeria also derives a handsome sum of money in foreign exchange from exporting goat skin.

Brucellosis in goats has been reported in various parts of Nigeria (Falade, 1974, 1980; Bale, 1980; Ogundipe *et al.*, 1994). Apart from the grave zoonotic consequences, the economic losses associated with the disease are enormous (Esuruoso, 1974, 1977; Oko 1980; Chukwu 1987). Seroprevalence studies estimating small ruminant brucellosis in Nigeria have been conducted by some workers in Sokoto State of Nigeria and Northern Nigeria. However, there is little or no information on brucellosis in goats from Sokoto State. This serological survey work was conducted in Sokoto State of Nigeria to assess the current situation of brucellosis in this northern part of Nigeria.

### MATERIALS AND METHODS

This study was conducted between December 2008 and November 2009 in Sokoto, Sokoto state of Nigeria.

Sokoto State is situated in the Northwester part of Nigeria. It is located between longitude 11°30' to 13°50' East and latitude 4 to 6° North. It has a land area of 26,648 48 square kilometers. In terms of vegetation, the State falls within the Savannah zone. It is the second

largest producer of livestock in Nigeria. It also has the famous Sokoto red goat whose skin is used in the production of Moroccan leather.

Blood samples (10 mls) were aseptically collected from goats at the Sokoto metropolitan abattoir. A total of 532 samples were collected during the period of the study. Out of this number 264 were male while 268 were females. Similarly 119 were below one year of age, 138 were within 1-2 years of age while 275 were above 2 year of age. On breed distribution 338 were Sokoto red, 103 Sahel while 91 were crosses of Sokoto red and Sahel breeds.

The Rose Bengal Plate Test (RBPT) and the serum Agglutination test (SAT) as well as the Competitive Elisa (compelisa) were used in this study.

**The Rose Bengal plate test:** This was carried out using standard Rose Bengal Plate Test antigen obtained from Central Veterinary Laboratory, Weybridge U.K., according to the method of Alton *et al.*, (1975). Equal volumes (0.03 ml) of antigen and test serum were mixed thoroughly on the glass plate of the test box using a tooth pick and the box was hand rocked for 4 min. Samples that showed signs of agglutination were recorded as positive while those with no sign of agglutination were recorded negative.

**Serum agglutination Test:** This test was carried out as described by Alton *et al.*, (1975). For each of the samples

Table 1a: Sex Distribution of brucella infection in goats (*Brucella abortus*)

| Sex    | Total No. | RBPT        | SAT         | SAT, Titire                         | Compelisa   |
|--------|-----------|-------------|-------------|-------------------------------------|-------------|
| Male   | 264       | 27 (42.81%) | 29 (45.31%) | 1:40 = 7<br>1:80 = 12<br>1:160 = 10 | 27 (42.18%) |
| Female | 268       | 37 (57.8%)  | 34 (53.12%) | 1:40 = 9<br>1:80 = 8<br>1:160 = 7   | 37 (57.8%)  |
| Total  | 532       | 64          | 63          |                                     | 64          |

Table 1b: Sex Distribution of brucella infection in goats (*Brucella melitensis*)

| Sex    | Total No. | RBPT        | SAT         | SAT, Titire                         | Compelisa   |
|--------|-----------|-------------|-------------|-------------------------------------|-------------|
| Male   | 264       | 27 (42.81%) | 29 (45.31%) | 1:40 = 7<br>1:80 = 12<br>1:160 = 10 | 27 (42.18%) |
| Female | 268       | 37 (57.8%)  | 34 (53.12%) | 1:40 = 9<br>1:80 = 8<br>1:160 = 7   | 37 (57.8%)  |
| Total  | 532       | 64          | 63          |                                     | 64          |

Table 2a: Age Distribution of brucella infection in goats (*Brucella abortus*)

| Age (months) | Total No. | RBPT        | SAT         | Compelisa   |
|--------------|-----------|-------------|-------------|-------------|
| 0-12         | 119       | 17 (14.28%) | 17 (14.28%) | 17 (14.28%) |
| 13-24        | 138       | 18 (13.04%) | 18 (13.04%) | 18 (13.04%) |
| Above 24     | 2754      | 49 (17.81%) | 29 (10.84%) | 49 (17.81%) |
| Total        | 532       |             |             |             |

Table 2b: Age Distribution of brucella infection in goats (*Brucella melitensis*)

| Age (months) | Total number | RBPT       | SAT         | Compelisa  |
|--------------|--------------|------------|-------------|------------|
| 0-12         | 119          | 25 (21%)   | 22 (18.45%) | 25 (21%)   |
| 13-24        | 138          | 13 (9.42%) | 9 (6.52%)   | 13 (9.42%) |
| Above 24     | 275          | 20 (7.27%) | 27 (9.81%)  | 20 (7.27%) |
| Total        | 532          | 58         | 58          | 58         |

Table 3: Breed Distribution of Brucella infection in goats (*Brucella abortus*)

| Age(months) | TotalNumber | RBPT        | SAT         | Compelisa   |
|-------------|-------------|-------------|-------------|-------------|
| Sokoto Red  | 338         | 43 (12.72%) | 40 (11.83%) | 43 (12.72%) |
| Sahel       | 103         | 16 (15.5%)  | 12 (11.65%) | 16 (15.50%) |
| Cross       | 91          | 5 (5.49%)   | 11 (12.08)  | 5 (5.49%)   |
| Total       | 532         | 58          | 58          | 58          |

that was positive in the RBPT two fold dilution of test sera from 1:10 (0.05 ml serum mixed with 0.45 ml phenolized saline) to 1:1280 was made. To each 0.5ml tube of phenolized saline serum mixture was added an equal volume (0.5 ml) of the diluted (1:10) antigen resulting in a double (two-fold) dilution. The tubes containing the antigen-serum mixture were covered, shaken and incubated at 37°C for 24 h. A positive reaction was one in which the serum-antigen mixture was clear with precipitate at the bottom not disrupted by gentle agitation. While a negative reaction is one in which the serum antigen mixture was turbid and gentle shaking revealed no precipitate at the bottom (Anonymous, 1981; Brisibe *et al.*, 1993). Any serum with agglutination at a dilution of 1:40 (titre of 40) 50 international units) (Alton *et al.*, 1975) and above was recorded as positive sample.

**Competitive elisa:** (compelisa). The competitive Elisa kit was obtained from Veterinary Laboratory Agency, Weybridge, United Kingdom. The reagents in the kit

were reconstituted as directed by the manufacturers. These included diluting buffer, washing solution, stopping solution, conjugate and control sera. The test procedure was carried out as per the manufacturer's protocol.

## RESULTS

Out of the 1,327 slaughtered goats during the period of study, 532 goats were screened, out of the 532 screened samples all together a total of 122 samples were positive for brucella (*Abortus* and *melitensis*). 64(12.03%) were positive for *Brucella abortus* while 58 samples (10.90%) were positive for *Brucella melitensis*. Results of the SAT indicated that 29 samples had a titre of 1:160, 21 samples had a titre of 1:80 while 13 sample had a titre of 1:40. Table for the titres indicating *B. abortus* and *B. melitensis*.

On sex distribution, 46 male samples (17.92%) out of 264 samples screened were positive while 76 (28.35%) female samples were positive out of the 268 screened. There was a significant association between brucella infection and sex (Table 1a, b).

Table 4a: Season Distribution of Brucella infection in goats. (*Brucella abortus*)

| Season | Total number | RBPT        | SAT         | Compelisa   |
|--------|--------------|-------------|-------------|-------------|
| Dry    | 211          | 24 (11.37%) | 24 (11.37%) | 24 (11.37%) |
| Hot    | 126          | 14 (11.11%) | 14 (11.11%) | 14 (11.11%) |
| Wet    | 195          | 26 (13.35%) | 26 (13.35%) | 26 (13.35%) |
| Total  | 532          | 64          | 64          | 64          |

Table 4b: Season Distribution of Brucella infection in goats. (*Brucella melitensis*)

| Season | Total number | RBPT        | SAT         | Compelisa   |
|--------|--------------|-------------|-------------|-------------|
| Dry    | 211          | 21 (9.95%)  | 21 (9.95%)  | 21 (9.95%)  |
| Hot    | 126          | 15 (11.90%) | 15 (11.90%) | 15 (11.90%) |
| Wet    | 195          | 22 (11.29%) | 22 (11.29%) | 22 (11.29%) |
| Total  | 532          | 58          | 58          | 58          |

On age, 42 (21.10%) out of 119 screened samples were positive in the age band of 0-12 months. In the age band of 13-24 months 31 (22.46%) out of 138-screened samples were positive while 49 (17.81%) out of 275 samples were positive in the age band of goats above 24 months of age. There was no association between brucella infection and age (Table 2a, b).

On breed distribution, Sokoto red recorded the highest prevalence with 86 positive (34.12%) out of 338 samples. This was followed by Sahel with 26 positive samples (25.24%) out of 103 screened. Crossbreed recorded 10 positive (10.98%) out of 91 screened samples. There was no association between brucella infection and breed (Table 3).

On seasonal variation, samples screened during hot season recorded the highest prevalence of 28.57% with 34 out of 126 screened samples testing positive, in the wet season a prevalence of 24.61% was recorded while in the dry season a prevalence of 21.32% was observed. There was no association between brucella infection and season (Table 4a, b).

## DISCUSSION

The prevalence of *Brucella abortus* in goats obtained in this study may be attributed to the grazing habit in this part of the country where cattle graze with sheep and goats and are housed together. This close contact may likely aid in the transmission of *Brucella abortus*.

The detection of higher antibody titres in does than in bucks suggests that female animals are generally more susceptible to brucella infection than the males (Keppie *et al.*, 1965).

The economic loss resulting from bovine brucellosis in Nigeria as at 1979 was put at \$223.2 million (Esuruoso, 1977). With the prevalence of brucellosis in goats and other small ruminants, the high economic loss and public health implications could be enormous. This therefore calls for the introduction of mass vaccination for small ruminants. Large-scale sero monitoring exercise of ruminants and human beings at risk should also be done to assess the level of infection and diseases in both animals and humans in Nigeria.

## REFERENCES

- Alton, G.G., L.M. Jones and D.E. Pietz, 1975. Laboratory Techniques in Brucellosis, World Health Organisation monograph series No. 454, Geneva.
- Anonymous, 1981. Procedure for incubating observing and reading the tube agglutination test (1981) NADL Diagnostic Reagents Manual No. 65D. US Department of Agriculture, Ames, Iowa.
- Bale, J.O., 1980. Serological and bacteriological studies of ovine and caprine brucellosis in Northern Nigeria. M.Sc. Thesis, Ahmadu Bello University, Zaria.
- Brisibe, F., D.R. Nawathe and C.J. Bot, 1993. Serological prevalence of Brucellosis in sheep, Goats and human beings in Maiduguri metropolis. *Trop. Vet.*, 11: 27-33.
- Chukwu, C.C., 1987. Studies on seroprevalence of bovine brucellosis. *Zariya Vet.*, 1: 251-252.
- Esuruoso, G.O., 1974. Bovine brucellosis in Nigeria. *Vet. Record.*, 95: 54-58.
- Esuruoso, G.O., 1977. Control of Brucellosis in Nigeria. Paper presented at the 2nd International symposium on Veterinary Epidemiology and Economic canberva, Australia.
- Falade, S., 1974. Brucella agglutinating antibodies in the sera of persons dwelling in Ibadan and the surrounding districts. *J. Nigerian Vet. Med. Assoc.*, 3: 21-24.
- Falade, S., 1980. A comparison of three serological tests in the diagnosis of Caprine brucellosis. *Res. Vet. Sci.*, 24: 376-377.
- Keppie, J.W., A.E. Will and H. Smith, 1965. The role of erythritol in the tissue localization of the brucella. *Br. J. Exp. Pathol.*, 46: 104-108.
- Ogundipe, G.A.T., H.N. Hwaichi and F.O. Ayanwale, 1994. A serological survey for the prevalence of brucella antibodies in slaughter goats in Ibadan, Nigeria. *Bull. Anim. Health Prod. Africa*, 42: 14-118.
- Oko, A.E.J., 1980. Abortion from brucellosis in sheep in Kano, Nigeria. *Trop. Anim. Health Prod.*, 11: 213-214.