International Journal of Veterinary Medicine and Animal Health Vol. 11 (2), pp. 001-005, February, 2020.
Available online at www.internationalscholarsjournals.org © International Scholars Journals

Full Length Research Paper

Studies on farmer awareness on caprine abortion and the presence of *Brucella abortus* and *Brucella melitensis* in selected flocks in an arid zone of Nigeria

M. Adamu[3,4]*, G. D. Mshelia[2], N. Elelu[1], L. Ouda[1] and G. O. Egwu[1]

[1]Department of Veterinary Public Health and Preventive Medicine, Faculty of Veterinary Medicine, University of Ilorin, Nigeria.
[2]Department of Veterinary Surgery and Reproduction, Faculty of Veterinary Medicine, University of Maiduguri, Nigeria.
[3]Department of Veterinary Parasitology and Entomology, College of Veterinary Medicine, University of Agriculture Makurdi, Nigeria.
[4]Faculty of Veterinary Science, University of Pretoria, South Africa Bag X04 0110 Onderstepoort, South Africa.

Accepted 13 October, 2019

A survey was conducted to evaluate farmer's awareness on caprine abortion and the occurrence of *Brucella abortus* and *Brucella melitensis* in flocks in the arid zone of Nigeria. The survey revealed that 80% of the flocks studied had a mean kidding rate of 3 per 2 years, while 19% had a rate of 1 per year. The result also showed that 47% of the farmers use deep burial, 11% discards aborted materials freely, only 3% of farmers burn the foetuses and 15% do not bother at all. The survey further revealed that 42% of farmers seek veterinary assistance, 30% employ the use of local remedies, while 10% were not aware of the availability of veterinary care. Of the 250 blood samples screened, the result showed that 3.2 and 5.6% of the samples were positive for antibodies against *B. melitensis* antigen using Rose Bengal plate test (RBPT) and complement fixation test (CFT), respectively. Whereas, 1.6 and 3.2% tested positive for antibodies against *B. abortus* antigen with RBPT and CFT respectively at a titre level ≥10. The results also demonstrate the superiority of the CFT over the RBPT. Sex predisposition was particularly not significant (P< 0.05) in this study. There was a moderate level of awareness among farmers in this area and considerable low reproductive efficiency in goats as a consequence of poor kidding rates. The study identified farmer education as a possible risk factor for caprine abortion and lowered fertility. It was concluded that caprine brucellosis is still endemic in Nigeria and that *B. abortus* antibodies exist in goats, thus underscoring the need to separate goats from cattle during grazing or housing.

Key words: Abortion, *Brucella abortus, Brucella melitensis,* goats, Nigeria.

INTRODUCTION

Nigeria has a large population of domestic ruminants with goats estimated at 25.5 million being the most numerous, followed by sheep and cattle with 14.5 and 12.5 million respectively (FAO/OIE/WHO, 1995). This may be due to the prolific nature of goats and their ability to subsist on land unusable to farmers. Goats are prized in arid areas for their ability to survive drought and as a stabilizing factor during periods when sheep and cattle production is low due to prolonged drought or epidemic of diseases such as rinderpest.

In terms of acceptability, goat meat is free from religious taboos such as observed in beef and pork by the Hindus and Moslems, respectively. In Nigeria, certain cultures like the 'Igbo' rarely use sheep, thus making goat more important in meat production due to the wide acceptability of goat meat by the people (Mathewman, 1977; Omeke, 1988).

*Corresponding author. E-mail: admatto30@yahoo.co.uk. Tel: +277 35196064. Fax: +27 12 529 8525.

Table 1. The mean kidding rate in goat flocks examined in the arid zone of Nigeria.

Kidding pattern of doe's examined	Number of respondents	% Number of respondents
Three times in 2 years	120	80.0
Yearly kidding	28	18.7
Repeat breeders/infertility	2	1.3
Total	**150**	**100**

Recently, emphasis on the importance of goat milk and its wholesomeness has received attention in the arid tropics (Egwu et al., 1995). Goat milk has a reputation for being easily digestible due to its smaller fat globules. Humans, allergic to cow milk can easily use it. In this region, they are raised in large herds with milk being the most valued output. Milk is produced almost throughout the year since there is little or no photoperiod effect on conceptions. However, diseases have been reported as the major limiting factor in goat production in the tropics (Omeke, 1988) as is the case in the arid zone of Nigeria. Goat's production has suffered enormous losses from diseases such as parasitic gastroenteritis (PGE*),* mycoplasmosis, bluetongue, pasteurellosis, *Peste des Petits ruminants* (PPR) and *Scrapie.* Abortifacient diseases such as brucellosis, campylobacteriosis, salmonellosis and listerosis are known to occur in Nigeria (Amin and Silsmore, 1993). These may routinely occur in goat flocks as detected by seroprevalence study, microbiological culture during outbreaks or following observations by farmers (Baxendell, 1990; Hilbink and Penrose, 1989; Hellstrom, 1991; Amin and Silsmore, 1993). Caprine brucellosis is endemic in Nigeria and is important not only as a hindrance to increase production but also as a zoonotic disease (Macdiarmid, 1994).

In this paper, questionnaires were used to evaluate farmer's awareness on the occurrence of caprine abortion and other reproductive indices in small holder goat flocks. The paper also aims to describe the current status of caprine brucellosis in the arid zone of Nigeria using the Rose Bengal plate test (RBPT) and compliment fixation test (CFT).

MATERIALS AND METHODS

This study was carried out via questionnaire and serological surveys on some selected flocks of goats in an arid zone of Nigeria.

Questionnaire survey

One hundred and fifty close ended questionnaires were administered on the spot to goat farmers within Maiduguri in the Sahelian zone of Nigeria, to generate data on the awareness of farmers on the occurrence of caprine abortion in their flocks. Data on trends such as kidding pattern, breed preference, sex, age, veterinary service awareness, occurrence of abortion/stillbirths and method of foetal disposal captured in the questionnaire, were collated and analysed.

Serological survey

The flocks investigated were of varying sizes ranging from seven (7) to twenty (20) goats per flock; one sample each was collected randomly from all the flocks with sizes between 7 to 13 and two samples from flocks with 14 to 20 goats respectively without any sex bias. By this way, a total of 250 blood samples were collected from the 150 flocks investigated. All the blood samples were collected aseptically from the jugular vein using a 5 ml syringe, and neatly transferred into storage tubes and slanted immediately. The samples were then transported to the laboratory on ice and then centrifuged at 3500 rpm for 5 min to separate serum. The separated serum samples were then stored in cryo-tubes at -20°C until assayed.

The antigens used were then inactivated using standard Rose Bengal test (RBT, RA0060) and complement fixation test (CFT, RA0066) for smooth brucella (*Brucella abortus, Brucella melitensis* and *Brucella suis)* with their control sera, sourced from the Veterinary Laboratory Agency (VLA), Weybridge, UK. The RBT was performed according to Alton et al. (1975), while the CFT was done according to standard protocol (OIE, 1992).

Statistical analysis

All data generated from this study were analysed using the chi square test with p value of 0.05 considered as the level of significance.

RESULTS

The results of the questionnaire survey showed 120/150 (80%) of the does had a mean kidding rate of 3 times per 2 years, while 28/150 (19.7%) of them had a kidding rate of 1 per year and 2/150 (1.3%) of the flocks were repeat breeders (Table 1). Concerning the awareness of farmers on the occurrence of caprine abortion, the result showed that 8/150 (5%) of farmers observed foetal death in-utero, 19 and 23% of them observed abortion in the first trimester and late trimester respectively; while 34% of the farmers never observed abortion in their flock. Of the 150 farmers interviewed, 28 (19%) were not keen to observe their animals and so were not sure if abortion had occurred or not in their flocks (Table 2).

The study also examined the awareness of farmers on the problems associated with caprine abortion and infertility and the remedies sought after by such farmers. One hundred and two of the 150 farmers responded, out of which 43 (42%) seek veterinary assistance, 31(30%) use local remedies, 18(18%) did not bother, while 10% of them claim not to be aware of the availability of any

Table 2. Occurrence of abortion and/or stillbirth within each trimester of pregnancy in flocks of goats in an arid zone of Nigeria.

Occurrence of abortion and/or stillbirth within each trimester of pregnancy	Number of respondents	% Number of respondents
Able to observe death in uterus	8	5.3
Abortion at first trimester	29	19.3
Abortion at third trimester	34	22.7
No observable abortion	51	34.0
Do not bother to observe	28	18.7
Total	**150**	**100**

Table 3. Farmer awareness and remedies employed in cases of caprine abortion in flocks in an arid zone of Nigeria.

Farmer awareness of problems of caprine abortion and the remedies employed	Number of respondents	% Respondents
Constant consultation with Veterinarians	43	42.2
Local remedies	31	30.4
Do not bother	18	17.6
Not aware of Veterinary Services	10	9.8
Total	**102**	**100**

Table 4. Disposal of aborted foetuses and foetal contents.

Method of foetal disposal	Number of respondents	% Respondents
Deep burial	71	47.3
Discard freely	17	11.3
Burning	5	3.3
Do not bother	22	14.7
None observable abortion	35	23.3
Total	**150**	**100**

Table 5A. Detection of antibodies against *B. melitensis* antigen in serum from goats in the arid zone of Nigeria using RBPT and CFT grouped according to sex.

Sex	Number of samples examined		Number positive
	RBPT (%)	CFT (%)	
Male	94	3 (3.2)	8 (8.5)
Female	156	5 (3.2)	6 (3.8)
Total	**250**	**8(3.2)**	**14(5.6)**

RBPT, Rose Bengal plate test; CFT, complement fixation test.

veterinary services (Table 3). On the method of disposal of aborted foetuses and foetal contents in the flocks investigated, the result showed that 71/150 (47%) of the farmers use deep burial, 17(11%) discard freely, 5(3%) burn the foetuses, 22(15%) do not bother and 35(23%) have not observed any abortion in their flock (Table 4).

Of the 250 samples (from 94 males and 156 females) screened for antibodies against *B. melitensis,* 3 (3.2%) and 8 (8.5%) of the male samples tested were positive with RBPT and CFT respectively, while 5 (3.2%) and 6 (3.8%) of the females samples tested positive with RBPT and CFT, respectively (Table 5A). Overall, the result

Table 5B. Detection of antibodies against *B. abortus* antigen in serum from goats in the arid zone of Nigeria using RBPT and CFT grouped according to sex.

Sex	Number of samples examined		Number positive
	RBPT (%)	CFT (%)	
Male	94	0 (0	4 (4.3)
Female	156	4 (2.6)	4 (2.6)
Total	**250**	**4 (1.6)**	**8 (3.2)**

RBPT, Rose Bengal plate test; CFT, complement fixation test.

showed that 8 (3.2%) and 14 (5.6%) of the samples tested for antibodies against *B. melitensis* were positive with RBPT and CFT, respectively.

Table 5B shows the results of the detection of antibodies against *B. abortus.* Of the 250 caprine serum samples screened for this purpose, only 4/94 (4.3%) of the male sera screened were positive with CFT and none were detected with RBT. Whereas for the female sera, the positive detection rate was 4/156 (2.6%) each by both RBT and CFT, giving an overall detection rate of 1.6 and 3.2% with RBT and CFT, respectively.

DISCUSSION

Brucellosis is a major constraint to ruminant production systems in most parts of the world. This disease has been eradicated in most industrialized nations, but its occurrence is still on the increase in developing countries such as in Africa where it remains a serious zoonotic risk (Falade et al., 1975; Brisibe et al., 1996; Seifert, 1996; FAO, 2004). The disease is endemic in Nigeria (Ocholi et al., 2005), causing severe economic losses to livestock farmers with enormous implications to human health (Alausa, 1983; WHO, 1986; Rikin, 1988; Ocholi et al., 2005). It is characterized by abortion, retained placenta, orchitis and epididymitis (Adams, 2002).

In Nigeria, field reports have shown that abortion and brucellosis are common in cattle, sheep and goats (Esuruosu and Hill, 1972; Esuruosu and Van Blake, 1972; Esuruosu, 1974a, b; Okoh, 1980, Bale and Kumi-Diaka, 1981; Bale et al., 1982; Okewole et al., 1988; Ocholi et al., 2005). The prevalence of the disease in cattle has been shown to range between 0.4 and 49% (Esuruosu, 1974a, b; Nuru and Dennis, 1975; Bale and Kumi-Diaka, 1981; Ocholi et al., 1996). In sheep, the prevalence of brucella abortion has remained relatively stable for twenty five years from 14.5 (Okoh, 1980) to 14.3% (Ocholi et al., 2005). Although caprine brucellosis has been reported in this country (Falade, 1980; Bale et al., 1982; Brisibe et al., 1996), there is little information on the epidemiology of the disease in this species.

In the present study, we observed that detection rate of *B. melitensis* antibodies at 3.2 and 5.6% with RBT and CFT, respectively, was almost twice the value for *B. abortus*. This difference should normally be expected as the former *B. melitensis* is the main cause of brucellosis in small ruminants (Ocholi et al., 2005). The detection rates were higher with CFT compared to RBT because of its higher sensitivity. The occurrence of *B. abortus* antibodies in goats may be due to co-herding of goats and cattle by the livestock owners, with the possibility of cross infection between species.

The distribution of infection based on sex has received attention in previous studies (Falade et al., 1975; Ogundipe et al., 1994). In this study, we observed that more males were infected than the females, although a previous report expressed a contrary opinion (Ogundipe et al., 1994). The reason for the high infection rate in male goats may be associated with the extensive husbandry system of management and the high libido associated with male goats which exposes them to infection. Although no human samples were tested, these disease agents have a wide host range particularly the domesticated and semi-domesticated livestock (Hendricks and Meyer, 1975), thus the high risk potential of spread to human population (Schwabe, 1969).

The occurrence of abortion is a major finding in the present study which reveals that most of the farmers interviewed, had at least one abortion occurring at different stages of pregnancy in their flocks. The highest observation (22%) was in the third trimester and Brucella was thought to be the likely culprit. Similar observations have been reported previously (Hendricks and Meyer, 1975; Falade, 1980; Brisibe et al., 1996).

The present study also showed that the mean kidding rate in 80% of the flocks was 3 times per 2 years; and 19% had a rate of one kidding per year. At the present value, the kidding rates were low; a mean kidding rate of 2 kids per year is best desired in any profitable small ruminant production systems. This lowered performance may not be unconnected with the attitude of the farmers, as it has been shown in the present study that only 42% seek conventional veterinary assistance, 30% use local remedies and 28% do not bother or are totally unaware of the availability of such services. This further shows that farmer education is an important risk factor for reduced fertility in goats in this country and it needs urgent redressing.

Conclusions

The findings in this study have shown that there is a moderate level of awareness among farmers and a considerably lowered fertility as a consequence of poor kidding rates. The importance of farmer education as a risk factor for caprine abortion and lowered fertility has been identified. The present study further confirms that caprine brucellosis is still endemic in Nigeria and that *B. abortus* antibody exist in goats, thus underscoring the need to separate goats from cattle during grazing or housing. It is therefore recommended that government agencies saddled with the responsibility of public education, creating farmer awareness and the control and prevention of brucellosis should rise to the challenge to eradicate brucellosis in animals so as to cut-off potential threat of spread to man.

AKNOWLEDGEMENTS

The authors are grateful to the Central Veterinary Laboratory Agency, Weybridge, England for kindly supplying the Brucella antigens used in this study.

REFERENCES

Adams LG (2002). The pathology of brucellosis reflects the outcome of the battle between the host and the genome. Vet. Microbiol., 90, 553-561.

Alausa KO (1983). Brucellosis in Nigeria: epidemiology and practical problems of control. In: Human ecology and infectious diseases. Croll, N.H and Cross, J.A (eds), Academic Press, London, 315 – 332.

Alton GG, Jones LM, Pietz DE (1975). Laboratory techniques in Brucellosis. 2nd Edition WHO monograph series No.454, Geneva.

Amin JD, Silsmore AJ (1993). Serological survey of some abortifacient disease of sheep and goats in the Maiduguri area of Nigeria. Bull. Anim. Health Prod. Afr., 41, 123-128.

Bale JO, Kumi-Diaka J (1981). Serological and bacteriological study of bovine brucellae from livestock investigation and breeding centres (LIBC) in Nigeria. Bri. Vet. J. 137, 256-261.

Bale JO, Nuru S, Addo PB (1982). Serological study of sheep and goat's brucellosis in Northern Nigeria. Bull. Health Prod. Afr., 30, 73-79.

Baxendell SA (1990). Goat Health Problems In: Goat health production refresher course for Veterinarians proceedings No.13.16th June,1990. Post graduate committee Veterinary Science University of Sydney.

Brisibe F, Nawathe DR, Bot CJ (1996). Sheep and goat brucellosis in Borno and Yobe State of Northern Nigeria. Small Rum. Res. 20, 83-88.

Egwu GO, Onyeyili PA, Chibuzo GA, Ameh JA (1995). Improved Productivity of goat milk in Nigeria. Small Rum. Res. 16,195-120.

Esuruosu GO, Hill DH (1972). Sero-epidemiological survey of brucellosis in dairy herds in the western states of Nigeria. Nig. Agric. J., 8, 147-154.

Esuruosu GO, Van Blake HE (1972). Bovine brucellosis in two southern states of Nigeria: I. An investigation of selected herds. Bull.Epi. Dis. Afr., 20: 269-274.

Esuruosu GO (1974a), Bovine brucellosis in Nigeria. Vet. Rec., 95: 54-58

Esuruosu GO (1974b), Bovine brucellosis in two southern states of Nigeria: II. The incidence and implications of infection in range cattle. Bull. Epi. Dis. Afr., 22: 35-40.

Falade S (1980), Caprine Brucellosis: Serological Studies and Objectives for Control in Nigeria. Bull. Int. Off. Epi., 92: 111-127.

FAO (2004). Bovine brucellosis. In: Animal health/disease cards. FAO, Rome,6. Website:http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/brucellosi-bo.html (accessed on 4 October 2005).

FAO/OIE/WHO (1995). Animal Production Year Book, No.34 FAO Rome.

Hellstrom JS (1991). New Zealand is free from Bovine Brucellosis. Survey, 18: 14.

Hendricks SL, Meyer ME (1975). Brucellosis In: Diseases transmitted from Animals to Man. Charles Thomas Springfield, pp. 10-32.

Hilbink F, Penrose M (1989). Serological Evidence for *Brucella melitensis* in sheep and goats in New Zealand. Survey, 16, 23.

Macdiarmid SC (1994). Bovine brucellosis eradication in New Zealand. Survey, 21: 18-21

Mathewman RW (1977). A survey of Small ruminant Production at the village level in the derived Savannah and Lowland forest Department of Agriculture and Horticulture, University of Reading PHD thesis.

Nuru S, Dennis S (1975). Serological survey of brucellosis in slaughtered cattle in north central state of Nigeria. J. Nig. Vet. Med. Assoc., 4: 9-13.

Ocholi RA, Ezeokoli CD, Akerejola OO, Saror DI (1996). Use of the enzyme-linked immunosorbent assay for screening cattle for Brucella antibodies in Nigeria. Vet. Quart., 18, 22-24.

Ocholi RA, Kwaga JKP, Ajogi I, Bale JOO (2005). Abortion due to *Brucella abortus* in sheep in Nigeria. Rev. Sci. Int. Off. Epi., 24, 973-979.

Ogundipe GAT, Hwaichi HN, Ayanwale FO (1994). A Serological Survey for the Prevalence of Brucella antibodies in Slaughtered goats in Ibadan, Nigeria. Bull. Anim. Health Prod. Afr., 42: 1-4.

OIE (1992). Manual of standards for diagnostic test and vaccines for List A and B disease of mammals, bird and bees. 2nd edition, 354-361.

Okewole PA, Eze EN, Okoh AEJ, Oyetunde IL, Odeyemi PS (1988). Small ruminant's brucellosis in some parts of northern Nigeria. . Bull.. Anim. Health Prod. Afr., 36, 251-254.

Okoh AEJ (1980). Abortion in sheep near Kano, Nigeria. Trop. Anim. Health Prod., 12, 11-14.

Omeke BCO (1988). Improving goat productivity in the humid zone of the tropics. Bull. Anim. Health Prod. Afr., 36; 126-130

Rikin UM (1988). Brucellosis of cattle in Nigeria: proposals for a control programme under intensive and extensive husbandry systems. Acta Vet. Scand., 84: 95-97

Schwabe CW (1969). Veterinary Medicine and Human Health 2nd edition. The Williams and Wilkins C. Baltimore, p. 713.

Seifert HSH (1996). Diseases caused by aerobic rods. 1. Brucellosis. In: Tropical Animal Health, Bokma BH, Blouin EF, Bechara GH (eds.). Kluwer Academic, Dordrecht, pp. 356-367.

WHO (1986). 6th report of the joint FAO/WHO Expert Committee on brucellosis. WHO technical reports series, 740. WHO, Geneva.