

The background of the cover is a photograph of three sheep grazing in a lush green field. The sheep are seen from behind, with their heads down as they eat grass. The field is filled with green grass and some white wildflowers. The top of the cover has a rounded rectangular shape.

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ARTICLES

Research Articles

Awareness, knowledge and practices of pastoralists towards contagious bovine pleuro pneumonia in Kaduna State, Nigeria 296

I. L. Billy, A. G. Balami, A. K. B. Sackey, L. B. Tekdek, S. N. A. Sa'idu and S.O. Okaiyeto

Full Length Research Paper

Awareness, knowledge and practices of pastoralists towards contagious bovine pleuro pneumonia in Kaduna State, Nigeria

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This study was conducted to determine the awareness, knowledge and practices of pastoralists on contagious bovine pleuropneumonia (CBPP) in cattle in 3 selected Local Government Areas (LGAs) (Ikara, Chikun and Kuru) of Kaduna State. A cattle population of a minimum of 20 heads was considered as a herd in this study and a total of 90 open and close ended structured questionnaires were designed and administered to all the 90 herdsmen that gave their consent for this study. The study revealed that, the level of awareness of CBPP by the pastoralists was 80 (88.9%) and formal education of 11 (12.2%), while knowledge of CBPP in the communities showed 66 (73.3%). Those that experienced outbreaks, as well as lost animals to CBPP, were 25 (27.8%) and 17 (18.9%), respectively. Of the respondents, 67 (74.4%) admitted vaccinating their cattle at various times, which is not regular, thereby achieving a low vaccination coverage of 36.7%, while, 23 (25.5%) do not vaccinate at all. Forty-six (51.1%) acquired the CBPP vaccines from the National Veterinary Research Institute (NVRI), Vom, Plateau State, while, 21 (23.3%) from the open market. Personnel used in the administration of vaccine were; Veterinarians 14 (15.6%), animal health workers 18(20%), drug vendors 18 (20%) and herdsmen 40 (44.4%). The study has shown that most pastoralists within the study area are aware of CBPP and have good knowledge of the disease. However, unethical practices such as sourcing and indiscriminate administering of vaccines as well as irregular vaccination schedule may hamper successful disease control. Pastoralists should be encouraged to intensify the pursuit for formal education.

Key words: *Mycoplasma mycoides* subsp. *mycoides*, awareness, knowledge, practices, pastoralists.

INTRODUCTION

Contagious bovine pleuropneumonia (CBPP) is a highly contagious disease of cattle that is caused by

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Mycoplasma mycoides subsp. *mycoides* small colony (*MmmSC*) (Mbulu et al., 2004; Yaya et al., 2008). The disease is usually spread by movement of animals across international boundaries with devastating consequences on cattle, particularly in severe outbreaks (Egwu et al., 1996; Huebschle et al., 2004; Tambi et al., 2006; Thiaucourt et al., 2011; Tambuwal et al., 2011b). Transmission occurs mainly by aerosol through close contact with infected animals within herds and from herd to herd through direct contact and repeated contact between sick and healthy animals, and occasionally from latent carriers intermittently shedding *Mycoplasma* organisms from sequestered lung lesions (Radostits et al., 2003).

Contagious bovine pleuropneumonia is now the most important amongst the The World Organisation for Animal Health (OIE) list A diseases after Rinderpest (OIE, 2008). This is due to its potential for rapid transboundary spread and associated economic impacts. For similar reasons, CBPP is included in the list of 6 priority diseases for The Food and Agriculture Organization (FAO's) EMPRES–Livestock programme (FAO/OIE, 1995). In addition, the second priority vaccine for the Pan African Veterinary Vaccine Centre (PANVAC) is that of CBPP (PANVAC, 1991; OIE, 1996). Since the first incidence of CBPP in Nigeria in 1924 (Foluso, 2004), the disease has become endemic with pockets of outbreaks occurring particularly in the Northern part of the country, where most of the cattle populations are located (Osiyemi, 1981; Fayomi and Aliyu, 1992; FAO/OIE, 1995; Ameh et al., 1998). The disease has been reported in Kano, Katsina, Borno, Sokoto and Kaduna States of Nigeria (Nawathe, 1992).

CBPP is considered to be a disease of economic significance due to its ability to compromise food security through loss of protein, increased production costs due to costs of disease control and inhibition of sustained investment in livestock production (Ikede and Taiwo, 1987). Egwu et al. (1996) reported an economic cost of CBPP in northern Nigeria to be US \$1.5 million (1.1 million Euros), which is similar to the cost obtained for Côte d'Ivoire, Niger and Uganda while Tambi et al. (1999) put an average of 12 euro per head of cattle as the cost of CBPP control by vaccination in ten African countries including Nigeria. In 2003, the Nigeria Animal Diseases Information System (NADIS) classified Nigeria as an endangered zone based on her CBPP status (PACE, 2003). The monetary value of these losses was assessed nationally and across the four agro-ecological zones of Nigeria to be NGN 1.307 billion (US \$8.7 million) (Alleweldt et al., 2009).

In Nigeria, pastoralists have adequate knowledge/experience, about common health problems affecting their livestock including disease treatment and prevention (Adekunle et al., 2002). This knowledge is,

however, based on oral transmission, shared information and life experience of individual herders on their livestock over the years (Catley and Mariner, 2002).

Nigeria has the highest cattle population of about 16.3 million in West Africa (Ikhatua, 2011), but is constantly threatened with CBPP (Ajuwape et al., 2004; Tambuwal, 2009), and “a live with the disease” attitude has always prevailed in the last few years among pastoralist and farmers who hardly report cases of CBPP but rather resort to treatment with antibiotics like any other bacterial disease (Chima et al., 1999). So therefore, this research was designed to determine the level of awareness, knowledge and practices of pastoralists on CBPP using structured questionnaire, in three selected Local Government Area of Kaduna State, Nigeria.

MATERIALS AND METHODS

Study area

The research was carried out in 3 selected Local Government Areas (LGAs) of Kaduna State, which is located in the North-West geo-political zone of Nigeria. Kaduna state lies between Longitude 30° and 0900 East of the Greenwich Meridian and has a Latitude of 0910 and 11°30" North of the Equator (KDSG, 2011) (Figure 1). The State has 3 Senatorial Districts, 23 Local Government Areas (LGAs), and a human population of 6.07 million (National Population Commission of Nigeria (NPC), 2006). The state is an agrarian state and also has potentials for livestock industry, with about 70 to 75% of the population engaging in farming activities (The National Aerospace Laboratory (NLR), 1992).

Data collection

The data collected comprised of information concerning sex, age, and breed, awareness of the existence of CBPP and its associated clinical signs, as well as records of previous and recent suspected outbreaks of the disease in the herds. The questionnaire also assessed the source(s) of vaccines and the vaccination programmes practiced and personnel involved in administering of vaccines. Information was also obtained on the use of antibiotics for the treatment of CBPP. Risk factors which included the use of cattle route(s) and tendency of mixing during grazing and watering, introduction of new animals and quarantine procedures were obtained. One hundred herdsman/livestock-owners in the 3 LGAs were initially marked for the exercise but only ninety of them responded. One questionnaire was used in each household where animals are kept in one enclosure or a herd. On arrival at the relevant household, the team was always introduced by the Chief investigator who outlined the project objectives to the household head before requesting for permission to interview, which was one on one.

Questionnaire administration

Open and close ended structured questionnaire was designed and administered to pastoralists that gave their consent. In order to test the methodology and the reaction of the respondents to the procedure, a pilot study was carried out to validate and standardize

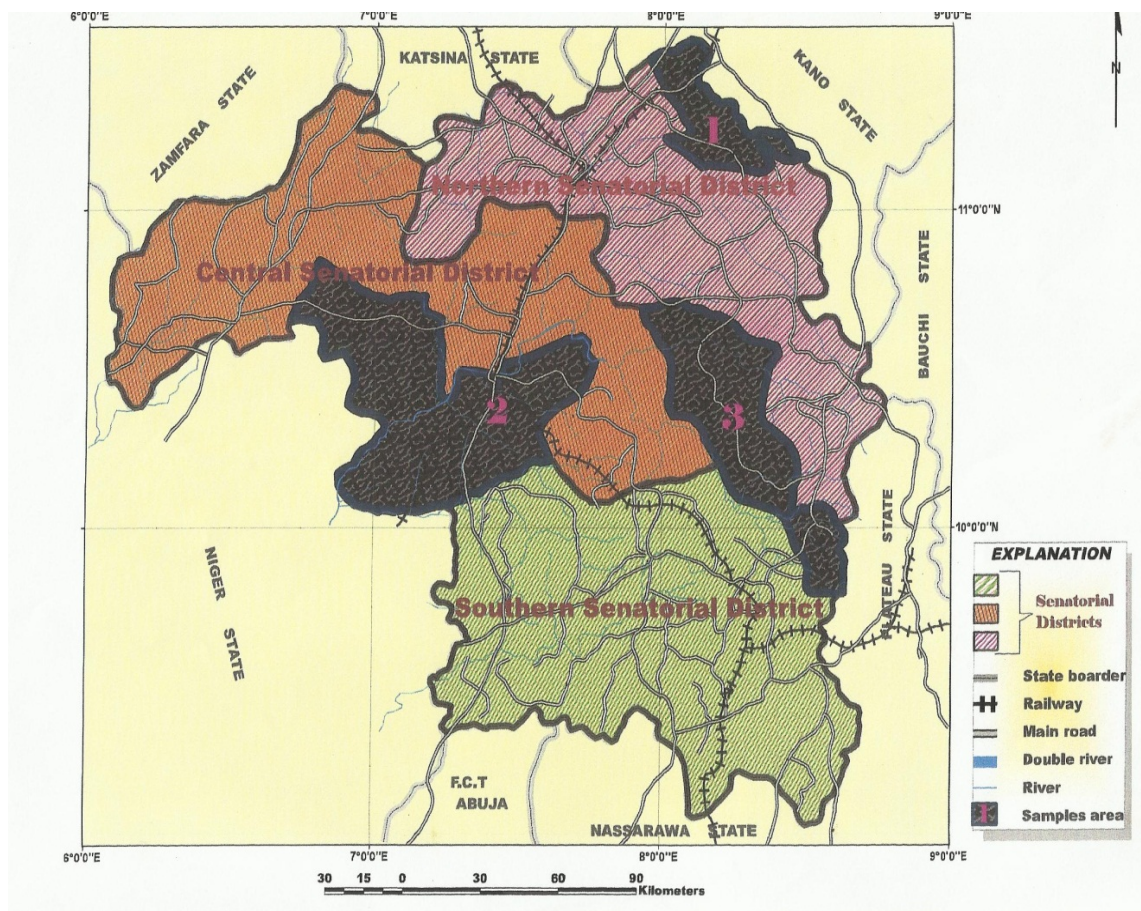


Figure 1. Map of Kaduna State showing the three Senatorial Districts with Sampled areas. **1** = Ikara Local Government Area -representing the Northern Senatorial District, **2** = Chikun Local Government Area -representing the Central Senatorial District, **3** = Kauru Local Government Area -representing the Southern Senatorial District. **Source:** Department of Cartography; National Geoscience, Kaduna Zonal Office, Barnawa, Kaduna, Kaduna State, Nigeria (Production map from KADP, 2012).

the questionnaire and procedures. The questionnaire was interpreted in Hausa language as most of the respondents understood and spoke in Hausa being the common language of communication in the study location.

Data analysis

The data obtained were presented in Tables and analyzed using Microsoft Excel 2007, Graph Pad Prism version 4.0 for Windows and Chi-square (χ^2).

RESULTS AND DISCUSSION

Of the 90 pastoralist/herdsmen that responded, 11 (12.2%) can at least read and write in English language. Eighty (88.9%) of them were aware of the existence of CBPP in cattle while 66 (73.3%) of the respondents

observed that the disease was very much in their communities. Twenty five (27.8%) of the pastoralists experienced the disease in their herds, while 17 (18.9%) suffered losses due to outbreaks (Table 1). Eighty (88.9%) of the pastoralist/herdsmen are aware of CBPP vaccine. Sixty seven (74.4%) of them were in the habit of vaccinating their cattle against the disease, while, 20 (22.2%) do not vaccinate at all. Furthermore, 33 (36.7%) of the respondents believed that vaccinated animals could be protected for 6 to 12 months. Thirty four (37.8%) of the pastoralist/herdsmen did not vaccinate their cattle within the last 12 months; 26 (28.9%) vaccinated their cattle on annual basis; 41 (45.6%) of them reported vaccinating occasionally and 18 (20.1%) of them vaccinated only healthy cattle (Table 2).

Among the 90 pastoralist that responded, 46 (51.1%) usually obtained their CBPP vaccines from the National

Table 1. Literacy and Awareness Levels of Pastoralist/Herdsmen with regard to CBPP in the Three Selected Local Government Areas of Kaduna

LGA	Pastoralist	Literacy (Read/Write English)	Awareness of CBPP	Knowledge of CBPP in the Community	Recent experience of CBPP outbreaks	Reported losses
Ikara	30	3 (10.0%)	27 (90.0%)	25 (83.3%)	5 (16.7%)	4 (13.3%)
Chikun	30	5 (16.7%)	28 (93.3%)	19 (63.3%)	8 (26.7%)	5 (16.7%)
Kauru	30	3 (10.0%)	25 (83.3%)	22 (73.3%)	12 (40.0%)	8 (26.7%)
Total	90	11 (12.2%)	80 (88.9%)	66 (73.3%)	25 (27.8%)	17 (18.9%)

Table 2. CBPP Vaccination Records by Livestock Owners/ Herdsmen (Respondents) in the Three Local Government Areas of Kaduna State, Nigeria.

LGA	Respondent	Do vaccinate their cattle	Do not vaccinate	Vaccinate 6-12 month ago	Vaccinate over 12 month ago	Vaccinate only sick ones	Vaccinate only healthy ones	Vaccinate all in herd	Vaccinate annually	Vaccinate occasionally
Ikara	30	22 (73.3%)	8 (26.7%)	14 (46.7%)	8 (26.7%)	0	5 (16.7%)	17 (56.7%)	9 (30.0%)	13 (43.3%)
Chikun	30	25 (83.3%)	5 (16.7%)	14 (46.7%)	11 (36.7%)	0	6 (20.0%)	19 (63.3%)	9 (30.0%)	16 (53.3%)
Kauru	30	20 (66.7%)	10 (33.3%)	5 (16.7%)	15 (50.0%)	0	7 (23.3%)	13 (43.3%)	8 (26.7%)	12 (40.0%)
Total	90	67 (74.4%)	23 (25.6%)	33 (36.7%)	34 (37.8%)	0	18 (20.0%)	47 (54.4%)	26 (28.9%)	41 (45.5%)

Table 3. Sources and personnel administering CBPP Vaccines in Cattle in the three selected LGAs of Kaduna State, Nigeria.

LGA	Respondents	Sources of vaccines		Personnel administering			
		Veterinary Research Institute No. (%)	Open Market No. (%)	Veterinarians No. (%)	Animals Health Workers No. (%)	Drug vendors No. (%)	Herdsmen No. (%)
Ikara	30	18 (60.0)	4(13.3)	5(16.7)	7(23.3)	6(20.0)	12(40.0)
Chikun	30	16 (53.3)	9(30.0)	6(20.0)	6(20.0)	5(16.7)	13(43.3)
Kauru	30	12 (40.0)	8(26.7)	3(10.0)	5(16.7)	7(23.3)	15(50.0)
Total	90	46(51.1)	21(23.3)	14(15.6)	8(20.0)	18(20.0)	40(44.4)

Veterinary Research Institute (NVRI), Vom, while, 21 (23.3%) obtained it from the open market. However, majority 40 (44.4%) of the pastoralist/herdsmen usually administer the CBPP vaccines by themselves, 18 (20.0%) patronised

services of drug vendors and only a few 14 (15.6%) engage the services of Veterinarians (Table 3).

The study discovered synonyms of CBPP such as; *bazana*, *ottu*, *ciwon-huhu* and *rangaza*. The

high level of illiteracy among the pastoralist/herdsmen in which only 12.2% were literate agrees with the report of Tahir (2001), who stated that pastoralists and their children have little or no access to formal education. Pastoralists

in this study have shown a high (88.9%) level of awareness of CBPP when compared with the work of Tambuwal et al. (2011b) which reported that only 65.0% of pastoralists are aware of CBPP. This increase level of awareness could be attributed to the frequent outbreaks of CBPP that results from the increase in spread of the disease. Increase in the number (38.9%) of suspected outbreaks observed in this study when compared to the 5.8% reported by Tambuwal et al. (2011b) could be as a result of the failure of authorities to institute adequate control measures for the disease. This could be through the provision of adequate vaccine and personnel for the vaccination; controlling cattle movement and transhumance activities. In this study, 76.0% of the pastoralist/herdsmen that experience the outbreak of CBPP in their herds used antibiotics (mostly long acting tetracyclines) to treat the disease. The report of this work however, differ from the work of Huebschle et al. (2004) who reported that 69.0% of the farmers in Ethiopia admitted treating CBPP cases with antibiotics. The increasing use of antibiotics by herdsmen despite the risk of creating a carrier state in an animal is probably an attempt to alleviate the suffering of the affected cattle as reported by Mariner et al. (2006). However, Huebschle et al. (2004), Yaya et al. (2004) and Ayling et al. (2005) stated some beneficial effects on the use of antibiotics in the treatment of CBPP amongst which include limiting the clinical severity of the disease. But however, complete elimination of the causative organism from the affected cattle may not be achieved, thereby creating a potential pool of disease carrier.

Communities in this study have shown a greater knowledge of symptoms of CBPP. This increase in the knowledge of the symptoms of the disease might be due to the endemicity of the disease with new cases being recorded regularly, as a result of frequent outbreaks. However, the knowledge of symptoms of CBPP by the community in this study is higher (73.3%) than the report (22.3%) of Tambuwal et al. (2011a). The vaccination coverage of 36.7% obtained in this study is slightly higher than the 32.5% reported by Tambuwal et al. (2011b) and 14.2% by Aliyu et al. (2000). This higher vaccine coverage is possibly due to the increased awareness of the disease and hence the desire for protection of cattle herds.

The open market purchase of vaccines by some (23.3%) pastoralist/herdsmen may lead to wider spread and endemicity of the disease. This is because, expired and adulterated vaccines may be sold to them without their knowledge. The administration of CBPP vaccines by the herdsmen (44.4%) and drug vendors (20.0%) poses a threat of spread of the disease due to the lack of technical knowledge of vaccination procedures by the herdsmen and drug vendors. Vaccinations by unqualified personnel lead to low vaccination coverage. This may

also contribute to the spread of the disease in the area of study, as clearly observed by Adekunle et al. (2002), Ameh et al. (1998) and Halle et al. (1998).

CONCLUSIONS AND RECOMMENDATIONS

The study has shown that, most pastoralists within the study area are aware of CBPP and have good knowledge of symptoms of the disease. However, unethical practices such as sourcing, administering of vaccines as well as irregular vaccination schedule may hamper successful disease control. Efforts should be made by designated authorities to intensify vaccination of cattle against CBPP and to conduct a more extensive study on the disease with a view to knowing the actual status of the disease in the study area. Unauthorized vaccination by drug vendors and pastoralists against CBPP should be checked. Pastoralists should be encouraged to intensify the pursuit for formal education.

Conflict of interest

The authors of this work have not declared any conflict of interest.

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REFERENCES

- Adekunle OA, Oladele OI, Olukaiyega TD (2002). Indigenous Control Methods for Pests and Diseases of cattle in Northern Nigeria. *Livest. Res. Rural Dev.* 14 (2):1-4.
- Ajuwape ATP, Adetosoye AI, Ikheloa JO, Alaka OO, Taiwo O, Talabi OA, Otesile EB, Ojo MO (2004). Pathogenicity of *Mycoplasma capricolum* subsp. *capripneumoniae* for cattle immunosuppressed by *Trypanosoma congolense*. *Trop. Vet.* 22(1):29-36.
- Aliyu MM, Obi TU, Egwu GO (2000). Prevalence of Contagious Bovine Pleuropneumonia (CBPP) in Northern Nigeria. *Prev. Vet. Med. J.* 47:263-266.
- Alleweldt F, Upton M, Kara S, Pflug S, Cuc NTK, Beteille R, Dore MP, Von GP (2009). Cost of National prevention systems for animal diseases and zoonoses in developing and transition countries. *World Organ. Anim. Health (OIE)* p 381.
- Ameh JA, Nawathe DR, Fam IM (1998). Retrospective, microbiological and serological studies of contagious bovine pleuropneumonia (CBPP) in Nigeria. *Trop. Vet.* 16:69-71.
- Ayling RD, Bisgaard-Frantzen S, March JB, Godinho K, Nicholas RAJ (2005). Assessing *in vitro* effectiveness of antimicrobials against *Mycoplasma mycoides* subsp. *mycoides* small colony type to reduce contagious bovine pleuropneumonia infection. *Antimicrob. Agents Chem.* 49:5162-5165.

- Catley A, Mariner J (2002). Where there is no data: Participatory approaches to Veterinary Epidemiology in pastoral areas of the Horn of Africa. No. 110 p. 8.
- Chima JC, Mohammed A, Lombin LH, Majiyagbe KA (1999). Field Validation of monoclonal antibody-based competitive ELISA for the detection of antibodies to contagious bovine pleuropneumonia. Proceedings, 2nd RCM of IAEA/FAO CRP on Monitoring of CBPP in Africa using ELISA held in Lusaka, Zambia, 27 September, pp. 11-12.
- Egwu GO, Nicholas RAJ, Ameh JA, Bashiruddin JB (1996). Contagious bovine pleuropneumonia. An update. *Vet. Bull.* 66:875-888.
- FAO/OIE (1995). FAO Animal Health Manual (Livestock Statistics) pp. 173-178.
- Fayomi A, Aliyu ID (1992). A retrospective study of incidence of contagious bovine pleuropneumonia in Kano and Environs. In: Proceedings of the 29th Annual General Meeting of the *Nig Vet Med Ass.* 27-30th October. 1992. Kaduna pp. 124-130.
- Halle DD, Ajogi I, Muzong B, Zaifi MD (1998). A retrospective study on the incidence of Contagious Bovine Pleuropneumonia (CBPP) in Mubi, Adamawa State, Nigeria. *Trop. Vet.* 16:143-147.
- Huebschle O, Godinho K, Nicholas RAJ (2004). Danofloxacin treatment of cattle affected by Contagious Bovine Pleuropneumonia (CBPP). *Vet. Rec.* 155:404.
- Ikede BO, Taiwo VO (1987). Prevalence of Bovine Trypanosomiasis in sedentary Zebu and Trypanotolerant breeds in South-western and the North-western Nigeria. Proceedings of the 18th meeting of the ISCTRC, Harare, Zimbabwe, March 4th– 9th 1988.
- Ikhatua UJ (2011). Nigerian Institute of Animal Science (NIAS) beef cattle production report. Timestamp: 2011-02-18 10: 48: 18. Available at: <http://www.nias.gov.ng/?page=read&id=9th>
- Mariner JC, McDermott J, Heesterbeek JAP, Thomson G, Martin SW (2006). A model of contagious bovine pleuropneumonia transmission dynamics in East Africa. *Prev. Vet. Med.* 73:55-74.
- Mbulu RS, Tjipura-Zaire G, Lelli R, Frey J, Pilo P, Vilei EM, Mettler F, Nicholas RA, Huebschle OJ (2004). Contagious bovine pleuropneumonia (CBPP) caused by vaccine strain T1/44 of *Mycoplasma mycoides* subsp. *mycoides* small colony. *Vet. Microbiol.* 98:229-234.
- National Livestock Reports (NLR) (1992). Nigerian Livestock Resources: State Reports: Kaduna State 3:2-22.
- National Population Commission (NPC) (2006). Census Kaduna State Population.
- Nawathe DR (1992). Resurgence of contagious bovine pleuropneumonia in Nigeria. *Rev. Sci. Tech.* 11:799-804.
- OIE (1996). Manual of standards for diagnostic tests and vaccines. pp. 85-92.
- OIE (2008). Manual of Diagnostic Tests and Vaccines for Terrestrial Animals, 6th Ed.
- Osiyemi TIO (1981). The eradication of CBPP in Nigeria: prospects and problems. *Bull. Anim. Health Prod. Afr.* 29:95-97.
- Pan African Veterinary Vaccine Centre (PANVAC) (1991). Training activities of the Pan-African Veterinary Vaccine Centre. *Vac. Bull.* 1:1.
- Radostits OM, Gay CC, Blood DC, Hinchcliff KW (2003). Diseases caused by bacterial *Mycoplasma mycoides* var *mycoides*. In: *Veterinary Medicine: A text book of diseases of cattle, sheep, pigs, goats and horses* 9th ed. Harcourt Publisher Ltd, London pp. 997-1006.
- Tahir G (2001). Current mandates, Activities, Achievements, Constraints and Recommendations. A position paper presented at National Workshop on the strengthening the Livestock Component of the Unified Agricultural Extension System (UAES). Organized by the National Livestock Projects Division, Department of Livestock and Pest Control Services, Federal Ministry of Agriculture and Natural Resources, held at Arewa House Kaduna, 14th May, 2001.
- Tambi NE, Maina WO, Ndi C (2006). An estimation of the economic impact of contagious bovine pleuropneumonia in Africa. *Vet. Med. Anim. Health.* 25(3):999-1012.
- Tambuwal FM (2009). Epidemiology of *Mycoplasma mycoides* subsp. *mycoides* small colony type (*MmmSC*) and *Mycoplasma bovis* in cattle in two Transboundary states (Sokoto and Kebbi), Nigeria Ph.D Thesis. Usmanu Danfodiyo University, Sokoto, Nigeria pp. 113-117.
- Tambuwal FM, Egwu GO, Sharubutu GH, Junaidu AU, Rambo UG, Ibrahim ML, Aliyu RM (2011a). An Appraisal of Awareness of Contagious Bovine Pleuropneumonia (CBPP) amongst Settled and Semi-Settled Farmers and Pastoralists in the Two Cattle Producing States (Sokoto and Kebbi), Nigeria. *Nig. Med. Vet. J.* 32(3):208-213.
- Tambuwal FM, Egwu GO, Shittu A, Sharubutu GH, Umaru MA, Umar HU, Mshelia PC, Garba S (2011b). Vaccination coverage and prevalence of contagious bovine pleuropneumonia (1999-2008) in two transboundary states of north-western Nigeria. *Nig. Vet. Med. J.* 32:169-173.
- Thiaucourt F, Manso-Silvan L, Salah W, Barbe V, Vacherie B, Jacob D, Breton M, Dupuy V, Lomenech AM, Blanchard A, Sirand-Pugnet P (2011). *Mycoplasma mycoides*, from “*mycoides* small colony” to “*capri*”. A microevolutionary Perspective. *BMC Genomics* 12:114.
- Yaya A, Wesonga H, Thiaucourt F (2004). Use of long acting tetracycline for CBPP: Preliminary results. Proceeding of the third FAO-OIE-AU/IBAR-IAEAC consultative Group meeting on CBPP in Africa, 12th-14th November 2003, Rome pp. 112-113.
- Yaya A, Manso-Silvan L, Blanchard A, Thiaucourt F (2008). Genotyping of *Mycoplasma mycoides* subsp. *mycoides* small colony by multilocus sequence analysis allows molecular epidemiology of contagious bovine pleuropneumonia. *Vet. Res.* 39:14.

A photograph of three sheep grazing in a lush green field. The sheep are seen from behind, with their heads down as they eat grass. The field is vibrant green with some white patches, possibly snow or light-colored soil. The image is framed with rounded corners.

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