ASSESSMENT OF CONTAGIOUS BOVINE PLEUROPNEUMONIA ANTIBODY TITRES AT THE TEACHING AND RESEARCH FARM FEDERAL UNIVERSITY OF TECHNOLOGY MINNA

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ABSTRACT

This study aimed to determine the seroprevalence and antibody titres of Contagious Bovine Pleuropneumonia (CBPP) in cattle at the Teaching and Research Farm, Department of Animal Production, Federal University of Technology, Minna, Niger State, Nigeria. A total of 75 blood samples were collected from 15 cattle over a 5-week period and analyzed using the Slide Agglutination Test (SAT). The degree of agglutination was quantified based on a percentage, with results recorded as a ratio (e.g., 1:65, 1:56, 1:125), where ratios ranging from 1:01 to 1:65 were considered negative, and those exceeding 1:66 were deemed positive. The results showed a low overall seroprevalence of 2.67% with a significant difference between male and female cattle (p-value = 0.02). Female cattle had higher antibody titres than male cattle (p-value = 0.03), indicating a better immune response. The study attributes the low seroprevalence to good veterinary services, access to quality vaccines, strict quarantine, and effective herd movement control. The study confirms the absence of CBPP at the farm, highlighting the importance of effective management practices in controlling the disease.

Keywords: Animal Health, Contagious Bovine Pleuropneumonia (CBPP), Slide Agglutination Test, Sero prevalence, Antibdy titres.

INTRODUCTION

Nigeria, home to the largest cattle population in West Africa, with approximately 16.3 million heads (Ikhatua 2011), faces significant economic losses due to Contagious Bovine Pleuropneumonia (CBPP), a disease identified by the World Organization for Animal Health (OIE) as a major constraint to cattle productivity and economic value in northern Nigeria (Alhaji and Babalobi 2015). Globally, control measures focus on epidemic detection, livestock movement management, and stamping-out strategies. However, in Africa, management efforts primarily rely on vaccination programmes and antibacterial use (OIE 2008). CBPP persists in Nigeria, with frequent outbreaks in the northern region, facilitated by the nomadic Fulani herders' extensive migrations in search of grazing (Aliyu *et al.*, 2000). Niger State is an endemic area, and the Federal University of Technology, Minna Teaching and Research Farm is at risk of outbreaks; hence, this study. aimed to ascertain the seroprevalence and antibody titres of cattle at the Teaching and Research Farm, and identify potential strategies to mitigate the prevalence of CBPP in the environment

MATERIALS AND METHODS

Study Location

The experiment was carried out at the Teaching and Research Farm, Department of Animal Production, Federal University of Technology, Minna, Gidan Kwano campus, Niger state. Geographically, Minna is located within latitude 09°31' 18.2''N, and longitude 6° 27' 40 'E with an elevation ranging from 230-250 m. The study area lies within the Southern Guinea savanna of Nigeria. The location's climate is sub-humid having a mean annual rainfall of 1338 mm, a dry season of about 5 months, and a mean temperature of about 30° C (FUT 2012).

Study Population

A total of 105 cattle were found in the Teaching and Research Farm. Blood samples were collected aseptically from 15 cattle once a week, at random, and for 5 weeks, resulting in a total of 75 samples that were used for this study.

Duration of the Study

The study lasted for 7 weeks (from March to April), encompassing both the blood sample collection and analysis stages.

Experimental Method and Design Data Collection

Blood samples were collected weekly from 15 cattle for a period of five (5) weeks. The animals were retrained by the use of crush, and 5 mL blood was aseptically collected from the jugular vein into well-labelled Ethylene Diamine Tetra Acetate (EDTA) anticoagulant bottles using an 18 g needle and 10 mL syringe, following standard veterinary protocols. The blood samples were then stored in a cooler containing ice packs at 4° C to maintain sample integrity. The samples were transported to the Ministry of Livestock and Fisheries Development, Minna Niger State Veterinary Hospital, for subsequent analysis.

Sampling Procedures

Samples collected from the cattle were taken to the laboratory for further analysis, where Slide Agglutination Test (SAT) was used to determine the levels of antibody titres among the samples collected. Prevalence rate was obtained using the formula below; Prevalence rate formula =

Number of positive sampled Total number of animals sampled

Sera Collection from Sampled Blood Procedures

The serology method employed involved centrifuging the blood samples at 4000 revolutions per minute (r/min) for 5 minutes to separate the serum from the blood cells. This process yielded the sera, which was then used for further analysis.

Titre Detection of Sera

Serum samples were placed on an open slide, followed by addition of the CBPP vaccine reagent, which had been previously diluted. The mixture was then thoroughly combined using an applicator stick. The slide was subsequently agitated by rotating it sideways (vice versa), facilitating the occurrence of agglutination between the antigen and antibody. The degree of agglutination was quantified based on a percentage, with results recorded as a ratio (e.g., 1:65, 1:125), where ratios ranging from 1:01 to 1:65 were considered negative, while those exceeding 1:66 were deemed positive.

Data Analysis

All the data collected were imputed into a Microsoft Office Excel worksheet. The data were transformed and SPSS V16 was used to conduct a statistical analysis using descriptive statistics (means) and independent T-tests. The results underwent further analysis to determine the level of significance between male and female cattle in the herd, with the effect size being calculated using the Eta squared (η 2) value (Cohen, 1998).

RESULTS

Table 1 shows the seroprevalence of CBPP in the Teaching and Research Farm Federal, University of Technology Minna; out of the total of 75 animals sampled, 30 bulls were tested for CBPP antibodies, and none (0 %) were found to be positive. In contrast, 45 cows were tested, and 4.4 % of the total sampled were found to be positive for CBPP antibodies with a P-value (0.02). This indicates that there is a significant difference between the CPBB titre of male and female cattle in the herd.

Sex	Number sampled	Number of positive	Prevalence Rate	P-value
male	30	0	0%	
fem <mark>ale</mark>	45	2	4.44%	
total	75	2	2.67%	0.02

Table 1: Seroprevalence of CBPP in male and female cattle at the teaching and research farm

SAT=slide agglutinin test

Table 2 shows the CBPP antibody titres of male and female cattle in the Teaching and Research Farm. The results show that there is a significant difference based on antibody titres (p<0.05) of male and female cattle, with the p-value at (0.03); female cattle had higher scoring body titres than male antibody titres. The observed female antibody titre at (F=0.7666, SD=0.1095), and male at (M=0.0301, SD=0.0279) with an eta value of (0.81), and partial eta square (0.65) was considered to be large (eta squared =0.05).

Table 2: Antibody titres for male and female cattle in Teaching and Research Farm (Eta value)

Parameter	Treatment	Mean	p-value	Eta value.	Partial eta sqaure
CBPP antibody Titter	Male	0.7666	0.030	0.81	0.65

Female 0.0301 - -

DISCUSSION

The overall seroprevalence of CBPP antibody using the SAT test in the study area was low at 2.61 % and this correlated with the findings of (Ansambou et al., 2018) who recorded similar low seroprevalence for CBPP in Angola, but is not in agreement with the findings of (Hussien et al., 2024) who reported high prevalence for CBPP in Sudan. The low seroprevalence observed in this study could be attributed to good veterinary services and management by workers at the Teaching and Research Farm. This observation agrees with (Ayinka 2020) who reported a correlation between higher healthcare and low incidence of CBPP outbreaks, implying that a higher prevalence is often due to healthcare breakdown. Furthermore, quick access to quality and wellpreserved CBPP vaccines by the Ministry of Livestock and Fisheries Development, Minna, Niger State Veterinary Hospital, may also account for the low prevalence recorded in this study. This observation aligns with (Ayinka 2020) who reported a correlation between higher prevalence and vaccine source, as most CBPP vaccines were purchased from the open markets rather than the national veterinary research institute outstations within the region. The lower seroprevalence of CBPP may also be due to the strict quarantine and isolation programme carried out by skilled personnel at the Teaching and Research Farm (personal observation). Another reason may be the herd movement control, as animals are not allowed to graze with other animals which may predispose them to CBPP infection, making an outbreak unlikely in the Teaching and Research Farm. Although these observations contradict some researchers who reported higher prevalence of the disease in northern Nigeria, the reported higher prevalence reported by other authors may be due to breakdowns in management and wrong practices, such as indiscriminate antibiotic use, leading to chronic carriers of the disease and facilitating its spread to susceptible animals within the herd. In contrast, this study agrees with Olabode et al., 2013) and (Jasini et al., 2015) who reported lower CBPP prevalence rates in Kwara and Borno states, respectively.

The higher antibody titres observed in cows compared to bulls in this study, agrees with the findings of (Nwankpa *et al.*, 2004: Billy 2014: Ayinka 2020), who reported that antibody titres in cows is higher than in bulls. This may be due to fewer bulls being kept in the herd; another reason could be due to female mothering and an indication of better immune response in contrast to bulls. Further analysis based on Eta value of 0.81 observed in this study, indicates a positive association for female cattle and thus, justifies that female possess better immune response to CBPP. This is in tandem with (Fink and Klein 2018) who reported better immune response for female cattle. (Klein and Flanagan 2016) also reported similar better immune responses in female cattle when compared to males. This study affirms that there is no presence of CBPP in the Teaching and Research Farm, Gidan Kwano, Minna, Niger State, Nigeria.

CONCLUSION

This study found a low overall seroprevalence of CBPP at the Department of Animal Production Teaching and Research Farm, Gidan Kwano, Minna, Niger State, Nigeria. This was attributed to good veterinary services and management, access to quality CBPP vaccines, strict quarantine and isolation programmes, and effective herd movement control. The study also observed higher antibody titres in cows compared to bulls, and a positive association between female cattle and

better immune response to CBPP. Overall, the study confirms the absence of CBPP at the farm, highlighting the importance of effective management practices in controlling the disease.

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