



NIGERIAN VETERINARY JOURNAL

ISSN 0331-3026

Nig. Vet. J., March. 2026

Vol 47(1):15-23

<https://dx.doi.org/10.4314/nvj.v47i1.2>

ORIGINAL ARTICLE

A Twelve-year Retrospective Study on the Prevalence of Contagious Bovine Pleuro-Pneumonia in Jos: A Case of Disease Under-reporting

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ABSTRACT

Contagious bovine pleuro-pneumonia (CBPP) is an infectious and highly contagious transboundary animal disease of cattle and buffaloes caused by *Mycoplasma mycoides* subspecies *mycoides* (Mmm) small colony type. The disease causes enormous economic losses in endemic countries due to reduced animal productivity. A twelve-year retrospective study was conducted to determine the prevalence of CBPP in Jos, Plateau State, Nigeria. Data was obtained from the monthly meat inspection records at the Jos Main Abattoir only. During this period 77,763 cattle were slaughtered and examined at post-mortem, out of which 229 had lesions suggestive of CBPP giving an overall prevalence of 0.29%. The highest prevalence was recorded in the year 2020 with 103 (1.25%) cases while year 2019 recorded the lowest with 5 (0.05%) out of 8,221 and 10,613 slaughtered cattle, respectively. Across the years, the month with the highest prevalence was April 2012 (2.93%) while the lowest were recorded in August 2019 (0.1%) and October 2022 (0.1%). The drier months of the year recorded the highest prevalence, with 37 (0.61%) cases occurring in April, which was closely followed by November with 33 (0.45%) cases out of 6,061 and 7,289 slaughtered cattle, respectively, while the lowest cases occurred during the peak of the rainy season. Years 2013-2018 had no record of CBPP cases in the abattoir. Jos, the Plateau State capital, has several unregistered slaughter slabs that have no slaughter or disease records. This study has shown setbacks in the animal diseases record system of the state.

Keywords: Abattoir, Cattle, Contagious bovine pleuropneumonia, Lesion, Prevalence

INTRODUCTION

Contagious bovine pleuro-pneumonia (CBPP) is an infectious and highly contagious disease of cattle and water buffaloes caused by *Mycoplasma mycoides* subspecies *mycoides* (Mmm) (OIE, 2021), it is a World Organization for Animal Health (WOAH) notifiable disease and has been reported in different parts of Africa (Muuka *et al.*, 2012; FAO, 2002), including Nigeria (Aliyu *et al.*, 2000; Ogbaje *et al.*, 2012; Jarikre *et al.*, 2013; Suleiman *et al.*, 2015; Billy *et al.*, 2017; Francis *et al.*, 2018). The first incidence of the disease in Nigeria was recorded in 1924, from then till 1960, an average of 200 outbreaks occurred each year, mainly in Borno and Kano Provinces of the then Northern Nigeria (Fansami, 2004). The distribution of CBPP in Nigeria was categorized broadly into three zones with the North being enzootic, the Middle/Central belt States exposed, while the Southern States were regarded as free of the disease from the beginning of 1960 to mid-70's. The North-Western States were the most affected. During the 1970s up to the 1990s, the socio-economic and cultural settings of the herdsmen changed with mass settlements of herdsmen within the South-Western and the South-Eastern States. These changes impacted tremendously on the CBPP disease profile in the country. The disease therefore had a gradual spread beyond the traditional far North to the Southern States. Presently, the whole country is considered endemic (Fansami, 2004; Danbirin *et al.*, 2010).

Susceptible herds may show up to 70% morbidity in some localities, but much lower infection rates associated with clinical signs are more common. The mortality rate is

variable but most likely around 50% in herds experiencing the disease for the first time (Muuka *et al.*, 2012; AU-IBAR, 2015). Twenty-five percent (25%) of the recovered animals may become carriers with chronic lung lesions in the form of sequestra of variable sizes while cattle of all ages are susceptible. Generally, it is accompanied by pleurisy, with the affected animals having difficulty in breathing and a wide range of clinical manifestation, including fever and depression, dilatation of the nostrils, frothy saliva, grunting when exhaling, coughing, labored and painful breathing, nasal discharge, panting and standing with head and neck extended, younger animals develop joint swellings rather than lung infections (FAO, 2002).

The gross lesions of CBPP are characterized by the presence of Sero-fibrinous interlobular oedema and hepatization of the lungs, giving a marbled appearance to the organ in acute to sub-acute cases. However, the chronically infected cattle may present sequestra in the lungs (FAO, 2002; CABI, 2008). Carriers may not be detectable clinically or serologically and they usually constitute a serious problem in control programs (FAO-OIE-AU/IBAR-IAEA, 2004; Muuka *et al.*, 2012).

Movement control, serological testing, surveillance, test and slaughter method, and vaccination are important in limiting the introduction and spread of CBPP (AU-IBAR, 2015). In Nigeria as well as in many African countries, Government funded mass vaccination programs have not been sustainable leading to poor control due to the many practical challenges in terms of the need for near absolute movement control,

continuous annual re-vaccination and surveillance (Jores *et al.*, 2013).

Slaughter house monitoring is a powerful tool to use in detecting the introduction and spread of the disease because the gross pathological lung lesions of CBPP are characteristic. The purpose of this study was to evaluate the prevalence of CBPP in cattle slaughtered in Jos, Plateau State between years 2012 to 2023.

MATERIALS AND METHODS

Study Area

The study was carried out in Jos, Plateau State, which is located in the North-Central geo-political zone of Nigeria. It is comprised of three Local Government Areas: Jos East (LGA), Jos North (LGA) and Jos South (LGA), with coordinates between latitude 9°56' North and longitude 8°53' East, having a total land area of 1,821km². The State shares geographic boundaries with Bauchi, Kaduna, Nasarawa and Taraba States at its North-Eastern, North-Western, South-Western and South-Eastern boundaries respectively. Plateau State is the 12th largest State in Nigeria, West Africa with a population of about three million people.

The State capital has only one registered abattoir which is the Jos Main Abattoir, established in 1975. The abattoir is situated along Abattoir Road in Giring, Plateau State. Different species of animals are slaughtered in separate sections of the abattoir. Species of animals regularly slaughtered include cattle, goats and pigs, with occasional camels and sheep. The average daily slaughter figures in 2019 were 20 cattle, 37 goats and 5 pigs.

Some unregistered slaughter slabs are also situated at different locations within the State capital which include Fillin ball, Yan-Yanka, near COCIN Headquarters, Bukuru, Yan-Ganda, Yan-Shanu, Bulbula, Layin Majema, Rikkos, Gyel among others (Alao and Sadiq, 2014; Personal communication). The average daily slaughter figures among two of these slaughter slabs (Yan-shanu and Bukuru) on weekdays are 94 cattle, 115 goats and 155 sheep while on weekends are 267, 180 and 245 respectively.

Study Design

A descriptive study using retrospective data on recorded cases of CBPP in Jos was carried out from 2012 to 2023. Available data of the meat inspection records were obtained from only the Jos Main Abattoir daily and monthly reports. The data was re-organized according to the number of animals infected and the total number of animals slaughtered. Slaughtered cattle were examined at post-mortem and identification of cases was based on the criteria for diagnosing the diseases as presented in meat inspection records.

Data Analysis

The data were statistically analyzed using Microsoft Excel 2016. The data were presented using descriptive statistics in the form of tables and Microsoft graph charts. The monthly prevalence of the disease was calculated as the total number of CBPP cases detected in a month divided by the total number of cattle slaughtered that month while the annual prevalence was calculated as the total number of CBPP detected in a year divided by the total number of cattle slaughtered that year and expressed in percentages. The overall prevalence was

calculated as the total number of cases detected over the twelve-year period under study divided by the total number of cattle slaughtered for all the years and presented in percentage.

RESULTS

The twelve-year data collected from the Jos Main Abattoir showed that a total of 77,763 cattle were slaughtered after ante-mortem inspection and post-mortem examination during the study period. Out of this number, 229 presented with gross lesions attributable to CBPP (Fig. 1) giving an overall prevalence of 0.29% (Appendix I).

Years 2012, 2019, 2020, 2021, 2022 and 2023 had all the recorded CBPP cases. The years with the highest and lowest number of cases were 2020 with 103 (1.25%) and 2019 which recorded 5 (0.05%) CBPP cases from a total of 8,221 and 10,613 cattle slaughtered in the abattoir respectively (Figure 2). Monthly records showed that the highest number of CBPP cases was recorded in November, 2020 with 18 (2.10%) cases out of 858 cattle slaughtered. This was followed by 15 cases each for the months of April, 2012 (2.93%), September 2020 (1.94%) and December 2020 (1.80%) out of 512, 773 and 833 cattle slaughtered. The lowest cases of CBPP were recorded in September 2012, August and September 2019, July and October 2021, January, July, August, October and December 2022 and August 2023 which all recorded 1 (0.19%, 0.10%, 0.13%, 0.2%, 0.11%, 0.11%, 0.1%, 0.11% and 0.12% respectively) case each from a total of 535, 966, 782, 877, 855, 496, 881, 922, 962, 905 and 856 slaughtered

cattle. Years 2013-2018 had no record of CBPP cases in the abattoir.

Over the study period, the month-wise distribution of cases showed that the highest number of cases occurred in April which recorded 37 (0.61%) CBPP cases from a total of 6,061 cattle slaughtered, followed by November with 33 (0.45%) cases out of 7,289 slaughtered cattle while July recorded the least number of 6 (0.09%) CBPP cases from a total of 5,206 slaughtered cattle followed closely by the months of June and August with 8 (0.13% and 0.11%) cases out of 5,988 and 7,182 slaughtered cattle.

DISCUSSION

Jos, the Plateau State capital had in the recent past suffered severe ethnic and religious crises that brought about the relocation of a majority of the Muslim slaughter men to different parts of the State capital, where they operate unregistered slaughter slabs independent of the supervision by State Ministry of Agriculture (Alao and Sadiq, 2014; Dr. D. Bitrus [the then Director of Veterinary Services, Plateau State]). Previous records revealed a higher annual cattle slaughter figure of 12,872 in 2006 (Oragwa *et al.*, 2017) as compared to the much lower figures observed in this study period where 5,153 cattle were slaughtered in 2012, 2,926 in 2017 while year 2019 showed a much higher slaughter record of 10,315.

Year 2012 recorded 28 (0.54%) CBPP cases, this could be due to an outbreak of the disease in 2012 as reported by Jarikre *et al.* (2013) in Ibarapa, Oyo State-South West Nigeria. CBPP, a trans- boundary animal disease (TAD) was also reported in some African

countries such as the Republic of The Gambia, West Africa following an outbreak in 2012 after the last Nation's reported cases in 1971 (Secka *et al.*, 2015), after the Country was declared free of CBPP over 40 years ago in 1982 (Adewuyi *et al.*, 2024). The disease was also confirmed in the areas of Shan'gombo district of Western Province of the Republic of Zambia, Southern Africa following reports of cattle mortality between the months of March and April, 2012 (Muuka *et al.*, 2013). This outbreak coincided also with the months that the disease was recorded at the Jos Main abattoir. Year 2019 recorded 5 (0.05%) CBPP cases, this finding is consistent with the report by Miyetti Allah Cattle Breeders Association of Nigeria (MACBAN), who claimed an outbreak of CBPP in Nigeria that claimed at least two thousand cattle in two neighboring States that is Bauchi and the Federal Capital Territory (FCT), Abuja, Nigeria (NAN, 2019).

The low prevalence of this study (0.29%) was similar to the 0.20% reported by Ogbaje *et al.* (2012) in Zaria abattoir and 0.29% in Northern Nigeria as reported by Aliyu *et al.* (2000). Francis *et al.* (2018) however, reported a moderately higher prevalence of 3.49%. This could be because most abattoir diseases are not confirmed by screening or diagnostic test due to their lack of functional laboratories (Olabode *et al.*, 2012) and also, to the possibility of inadequate ante-mortem and post-mortem inspections in many Nigerian abattoirs (Lawan *et al.*, 2013; Bello *et al.*, 2015).

The prevalence (0.29%) of this study is lower than the prevalence of 59.4%, 54.7%, 32.7%, 26.0% and 10.65% reported by Anyika *et al.* (2021) from cattle in Fulani sedentary

settlements in three selected South Eastern States; Suleiman *et al.* (2015) in Agro-pastoral areas; Ahmed *et al.* (2024) in cattle slaughtered from Sokoto and Zamfara States; Billy *et al.* (2017) in Kaduna State and Olabode *et al.* (2013) in Kwara State, Nigeria respectively. The higher prevalence obtained by these researchers was due to their active surveillance as compared with the passive surveillance in this study. Their sero-epidemiological studies detected antibodies to CBPP which clearly demonstrated the endemicity of the disease in Nigeria without differentiating recent from past infections.

Year 2013-2018 had no recorded CBPP cases in Jos Main abattoir, Plateau State, Nigeria. However, outbreaks of CBPP were reported in different parts of Nigeria during the said period, Francis *et al.* (2018) documented 38 CBPP outbreaks in years 2013-2017 in Adamawa State, Nigeria. The Kaduna State Government, Nigeria also confirmed an outbreak of CBPP that started in December, 2018 (Sadiq, 2019). Also, Irefin *et al.* (2023) reported outbreaks of CBPP between July and September 2018 in Kogi State, Nigeria that led to the Government's involvement and a mass vaccination was carried out. Plateau State, from 2001-2012 experienced religious and tribal crises which has dispersed residents from mixed settlements to communities now defined by Faith.

This development has pushed the Hausa-Muslim butchers from the Jos Main Abattoir, on the Northern edge of Jos South, to unhygienic illegal and unregistered slaughter slabs in predominantly Hausa communities of the Jos North LGA, with adverse consequences for the State's economy (Alao and Sadiq, 2014). The result in this study is

therefore not a complete representation of the State capital's slaughter and disease records and it is possible that evidently sick animals are slaughtered at the unregistered slaughter slabs in the State where there are no slaughter disease records, trained meat inspectors and veterinary supervision. Most of the meat sold in markets were slaughtered at such unauthorized places due to their close proximity, rather than at the abattoir where veterinary inspections are carried out.

Furthermore, it was documented that the animal disease reporting system in many parts of Nigeria, were inaccurate and grossly under-reported (Fansami, 2004); Bolajoko and Babalobi, 2011; AU- IBAR,2015). CBPP in endemic African countries is also unreported due to fear of trade bans, civil unrest and lack of proficient veterinary staff and confirmatory laboratories (AU-IBAR, 2015) as observed in this study.

CONCLUSION

The situation in Jos unregistered slaughter slabs resulted in a lot of unreported disease conditions in the States' livestock population. The result of this study will give a false impression for the State status of CBPP; however, the goal of each country is to be disease free. It is recommended that the Plateau State Government should equip the abattoir with state-of-the-art equipment in line with standard international best practices and train staff to be technocrats based on public health and consumer safety. Secondly, the illegal (unregistered) slaughter slabs should be upgraded, licensed with qualified staff and properly monitored or be integrated back into the existing abattoir. Abattoir cases

should be further diagnosed using confirmatory diagnosis in the functional abattoir laboratory or samples be sent to Nigeria Veterinary Research Institute (NVRI) for confirmatory diagnosis.

Conflict of interest statement

The authors declare no conflict of interest.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge Dr. Doris Bitrus, Dr. Ayuba Musa, Dr. Abass Yakubu and the remaining staff of Plateau State Ministry of Agriculture and Rural Development for granting us access to the abattoir records and Prof. S. J. Shuaibu of the Faculty of Veterinary Medicine, University of Jos for the professional contributions.

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