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RESEARCH ARTICLE

Contagious Bovine Pleuropneumonia-Associated Fetal Wastage and Meat Quality Compromise in Slaughtered Cattle at Dr Abubakar Saraki Memorial Abattoir, Kwara State, Nigeria

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Abstract

Contagious bovine pleuropneumonia (CBPP) is still endemic in Nigeria. The Mycoplasma Unit of the Department of Veterinary Microbiology, University of Ilorin, Kwara State, Nigeria, has completed an 18-month investigation of CBPP cases encountered at the main city abattoir. Investigation was with special emphasis on fetal wastes, physical and health conditions of cattle presented for slaughter at the abattoir. Blood and tissue samples were obtained during ante-mortem and postmortem examinations for laboratory investigations, and diagnosis of CBPP, which were based on classical pathological lesions and culture of *Mycoplasma* organism identified serologically as *M. mycoides s*ubsp. *mycoides* from lung lesions and pleural fluids obtained from the cattle. From a total of 41,069 cattle slaughtered, 40,075 (97.6%) were cows from which 6,699 fetuses were encountered, and 963 (2.3%) were bulls. Thus, an average of 372 fetuses were wasted each month at the abattoir. Of the 40,075 cows slaughtered, 913 (2.3%) were CBPP-positive and carried 153 fetuses. Most cows carried twin fetuses. We estimate that each fetal wastage is equivalent to 50,000 Naira losses to the farmer, and each emaciated animal slaughtered is a loss of approximately 200,000 Naira. Studies are warranted to determine annual national economic losses resulting from slaughtering emaciated cattle that are often discovered to be pregnant and propose strategies to address the avoidable revenue loss.

Keywords: *Abattoir, Cattle, CBPP, Fetal wastes, Meat quality*

1.0 Introduction

Contagious bovine pleuropneumonia (CBPP), otherwise known as lung plague or cattle plaque, is caused by *Mycoplasma mycoides* subsp. *mycoides* (Dudek*et al*., 2021). It has been reported that contagious bovine pleuropneumonia (CBPP) in Africa causes greater losses in cattle than any other disease, including rinderpest (Alhaji*et al*., 2020).

Mycoplasma mycoides subsp. *mycoides* (Mmm), and a member of the "*Mycoplasma mycoides* cluster" (Wagner*et al*., 2024). Mycoplasmas are groups of pathogens belonging to the class mollicutes. These organisms are extremely diverse in terms of ubiquity, host range, and pathogen city (Zhang*et al*., 2024).

Even though they (*Mycoplasma*) are bacterial, resembling fungi and viruses, they are unique in structure, shape, culture, size, staining, and pathogenicity (Razin, 2006). The disease was first documented in Nigeria in 1924 and has since then become endemic in Nigeria (Ahmad*et al*., 2021) and other African countries (Semango& Buza, 2024).

The disease spreads by contact between infected and healthy animals and presents in multiple forms (Nyokabi*et al*., 2024). CBPP mainly affects the lungs and the membranes that line the thoracic cavity (the pleurae), resulting in fever and respiratory distress, which is manifested as labored or rapid breathing, moist cough and nasal discharge, exercise intolerance, reluctance to move, stance with neck extended (Di Teodoro*et al*., 2020), open mouth with protruding tongue, abducted forelimbs and grunting or groaning. Frothy oral discharge, emaciation, and swollen and painful joints (calves) are also observed (Danbirni*et al*., 2020).

With such clinical manifestations, CBPP is readily recognized by the indigenous cattle owners who preferentially cull such animals for sale to contractors who sell them to butchers at the abattoirs. At the time when disease reporting was strictly monitored, herdsmen would often move their herd away from veterinarians and dispose of them as fast as they could. Invariably, CBPP cases end up in abattoirs. This situation is a major stumbling block to successful CBPP control in areas where the disease remains endemic.

CBPP is the most economically important cattle disease in Africa (Alhaji*et al*., 2020). Direct losses result from mortality, reduced milk yield, vaccination campaign costs, disease surveillance and research programmes. The indirect losses are mainly due to the chronic nature of the disease and include loss of weight and working ability, delayed marketing, reduced fertility, losses due to quarantine and consequent reduced cattle trade (Admassu*et al*., 2015).

In this paper, we highlight two major indirect economic losses associated with abattoir practice in which slaughtered animals often include CBPP-positive animals. First, is potential financial losses due to the slaughtering of emaciated cattle and distribution of unwholesome meats to the populace. Second, is the fact that a large proportion of slaughtered cows are often pregnant, usually with twin fetuses, resulting in avoidable fetal wastages.

2.0 Materials and Methods

research team at the University of Ilorin and their support staff arrived early at the Dr Abubakar Saraki Memorial Abattoir, abattoir in Kwara State on each day. With the cooperation of the Director of the abattoir, the research team carried out ante-mortem inspection when they could easily identify animals with clinical symptoms of CBPP highlighted above. They are authorized to take appropriate specimens from any animal they wish to follow up. There are no specific requirements for pregnancy testing yet.

2.1 Blood sampling and serum preparation

Five milliliters of blood were collected aseptically from the jugular vein of cattle exhibiting clinical symptoms of CBPP into a vacutainer tubes. The tubes were then slanted and allowed to clot. The sera were decanted into labelled Ependoff tubes. The tubes were stored on ice packs for transportation to the *Mycoplasma* Diagnostic and Research Laboratory, Department of Veterinary Microbiology, University of Ilorin, (the laboratory) for analysis. The BoviLAT latex agglutination test (APHA Scientific, Addlestone, UK) was performed per the manufacturer's instructions. Approximately 0.02 ml of undiluted serum was dropped onto a clean white tile, followed by one volume of stained *Mycoplasma mycoides*subsp*mycoides* strain antigen. The mixture was stirred with a stirring rod, and the tile was rocked for 2 minutes. Agglutination was indicated by flocculation of the antigen within 2 minutes. A known positive and negative control sample is included in the kit (Figure 1). Test sera samples that agglutinated were inactivated by heating at 56°C for 30 minutes, and serial dilutions of such sera were tested for agglutination. Samples that still reacted strongly at a dilution of 1/4 were considered to be positive.

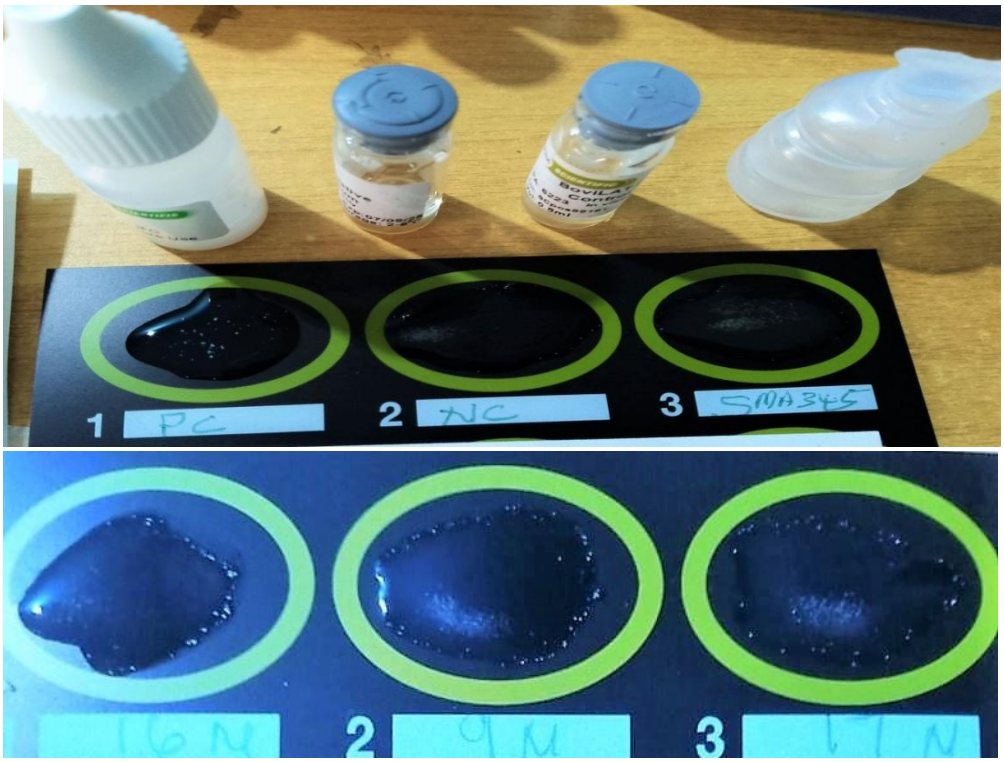

Figure 1. Latex agglutination test for CBPP. From the left upper lane (card is showing positive and negative controls and negative sample results) while the lower lane (card is showing positive agglutination).

2.3 Culture procedure

The veterinarians carefully opened the thoracic cavity of any cattle suspected of CBPP, and 5 ml pleural fluid, if any, was aseptically drawn into a sterile syringe, labelled, and placed on ice in a cooler. Pieces of lung tissue with typical CBPP lesions (hepatization, marbling, or sequestrum (Figure 4, figure 5 and Figure 6), if present, were also aseptically cut and transferred into screw capped bijou bottle containing 2ml of mycoplasma broth medium and packed in a cold flask for transportation to the laboratory. Tissue samples and pleural fluids were processed for *Mycoplasma* species isolation in accordance with standard procedures using Oxoid® *Mycoplasma* broth and agar that has been supplemented with 10% yeast extract,

20% horse serum and 200,000IU of penicillin. Inoculated agar plates were incubated at 37ºC under 5% CO_2microaerobic condition. Plates were examined for mycoplasma growth under stereomicroscopes at a total magnification of X40 every other day for a maximum of 10 days. Positive samples showed a typical "fried egg appearance" with nipple-like raised centers.

3.0 RESULTS

Of a total 41,069 cattle slaughtered during the 18 months, 40,075 (97.6%) were cows, from which 6,699 fetuses were recovered as wastages, giving an average of 372 wasted fetuses per month. Of the slaughtered cattle, 936 (2.3%) were confirmed to be positive for CBPP, based on classical pathological lesions and culture of *Mycoplasma* organism identified serologically as *M. mycoides s*ubsp. *mycoides* from lung lesions and pleural fluids.

Compared with the cows, 936 bulls were slaughtered. Of a total 40,075 cows slaughtered, 913 (2.3%) were positive for CBPP. The total fetuses recovered from the CBPP-positive cows in the 18 months were 153. The approximate age of the fetuses was 1 to 7 months, and most cows carried twins. Table 1 presents monthly abattoir records from January 2023 to June 2024 with emphasis on monthly fetal wastages and Table 2 presents the record of monthly fetal wastage in CBPP-positive slaughtered cows from January 2023 to June 2024. Figure 2, 3, 4 and 5 present samples of gross pathology findings in CBPP-positive animals, while Figure 7 present examples of the fetal wastes at the abattoir.

Table 1: Fetal Wastage in Slaughtered Cattle from January 2023 to June 2024.

Year	Month	Cattle slaughtered	Male	Female	Fetal wastage
2023	January	2497	53	2444	322
	February	2705	57	2648	390
	March	2232	50	2182	328
	April	2393	51	2342	321
	May	2393	54	2339	396
	June	2219	50	2169	346
	July	2519	56	2463	391
	August	2409	54	2355	288
	September	2259	50	2207	390
	October	2454	59	2396	400
	November	2178	52	2127	417
	December	2590	59	2530	420
	Subtotal	28,848	645	28,202	4,409
2024	January	2486	58	2428	430
	February	2105	50	2055	384
	March	1872	54	1818	399
	April	1694	47	1627	354
	May	1937	54	1873	397
	June	2127	55	2072	326
	Subtotal	12,221	318	11,873	2,290
	TOTAL	**41,069**	**963**	**40,075**	**6,699**

Table 2: Monthly fetal wastage in CBPP-positive slaughtered cows from January 2023 to June 2024

Year	Month	Cows slaughtered	Positive for CBPP	Fetuses lost from CBPP-positive cows
2023	January	2444	84	11
	February	2648	101	15
	March	2182	60	9
	April	2342	70	10
	May	2339	71	12
	June	2169	68	11
	July	2463	74	12
	August	2355	42	5
	September	2207	46	8
	October	2396	36	6
	November	2127	44	9
	December	2530	36	6
	Subtotal	28,202	732	114
2024	January	2428	36	7
	February	2055	34	7
	March	1818	37	8
	April	1627	24	6
	May	1873	23	5
	June	2072	27	6
	Subtotal	11,873	181	39
TOTAL		**40,075**	**913**	**153**

4.0 Discussion

The current study revealed that for the 18 months period of abattoir investigation, 41,069 cattle were slaughtered, and of this, 40,075, approximately 98%, were cows from which 6,699 fetuses were recovered as wastages. This amounts to approximately 372 fetuses wasted per month. The total number of fetuses recovered from CBPP-positive cows in the 18-month period was 153. Mohammed*et al*. (2022), reported fetal wastage and disease prevalence due to CBPP among slaughtered livestock in Maiduguri abattoir. Alawa (2011), in a report on a 6-year survey of pathological conditions of slaughtered animals at Zango abattoir in Zaria, Kaduna State, noted the prevalence of fetal wastage but not due to CBPP. These variations in causative agents of fetal wastage show that it can be due to other factors outside CBPP.

In a study by Dauda *et al*. (2025) at FCT, Nigeria, on the economic impact of fetal wastage and common diseases, CBPP was reported as one of the leading causes of fetal wastage.

Also, Mellau*et al*., (2011), reported 6.6% deaths and fetal losses due to CBPP in cattle.

Continued economic losses associated with CBPP in Africa are alarming and of huge concerns because of the fetal wastages and poor meat quality from malnourished, emaciated, and slaughtered cattle. Tweyongyere*et al*., (2024). In a report on seroprevalence of contagious bovine pleuropneumonia (CBPP) in cattle from the Karamoja region, North-eastern Uganda,

also noted the excessive mortality, illness, decreased productivity, and cattle trade restrictions that ar due to CBPP in cattle.

Fetuses are lost not due to abortions emanating from infectious agents but through a preventable abattoir practice. Compared with the cows, 963 (2.3%) bulls were slaughtered in the 18-month study period. Of the 41,069 slaughtered cattle, 936 (2.3%) were confirmed to be positive for CBPP by internationally acceptable criteria. As presented in the summary, each emaciated slaughtered cow carrying twin pregnancy results in an estimated loss of three hundred thousand naira (N300,000) to the cattle owners. This loss is estimated to be equivalent to millions of naira nationwide on a yearly basis.

No significant cattle trade development, such as settlement other Of nomadic grazers, can be accomplished until CBPP is eradicated from Africa. Continued slaughtering of CBPP-positive cattle, as we have confirmed in a major urban abattoir, will continue to negate successful CBPP control. Worthy of note is the fact that more cows are slaughtered daily compared with bulls in all the abattoirs in Nigeria. Fetal wastage in slaughtered cattle has been recognized for a long time in Nigeria, but the condition has not been addressed collectively by the federal government.

The extent of the wastage nationwide is worthy of investigation to make a strong case for government intervention. The government needs to enact policy against such practices and provide financial support to build facilities for holding pregnant cows feeding them and their calves well and re-presenting them for slaughtering at an appropriate stage.

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APPENDIX A: FIGURES

Figure 2 showing Sero-fibrinous fluid in the thoracic cavity and in bottles for an acute case of CBPP.

Figure 3: Classical CBPP lesion in slaughtered cattle at the abattoir: hepatization of the lung and enlarged interlobular septa (marbling).

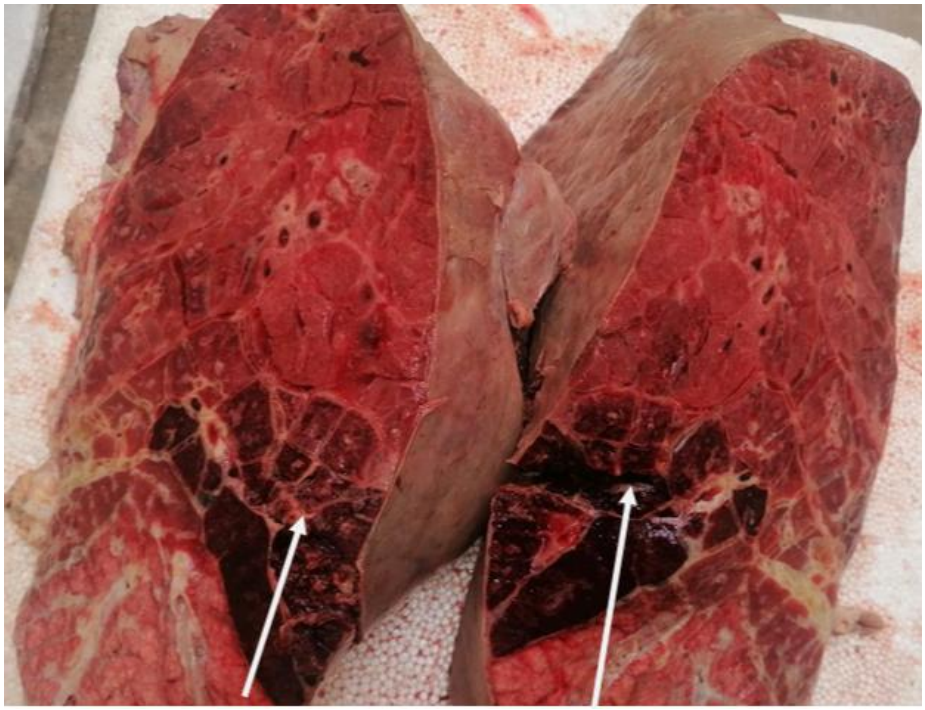

Figure 4: Chronic CBPP lesion, characterized by pockets of encapsulated lung abscesses (sequestra) from another cow at the abattoir (arrow heads).

Figure 5. Fetal wastages: fetuses of different ages from slaughtered cows at the abattoir. An average of 372 fetuses were encountered each month.