
POSTMORTEM PREVALENCE OF FASCIOSIS AND CONTAGIOUS BOVINE PLEUROPNEUMONIA (CBP) AND ECONOMIC LOSSES IN CATTLE AT NSUKKA ABATTOIR, NIGERIA

NWANKWO, Innocent Okwundu, ONUNKWO, Joseph Ikechukwu and ONYEMA, Chinedu Victor

Department of Veterinary Public Health and Preventive Medicine, Faculty of Veterinary Medicine, University of Nigeria, Nsukka, Enugu State, Nigeria.

Corresponding Author: Nwankwo, I. O. Department of Veterinary Public Health and Preventive Medicine, Faculty of Veterinary Medicine, University of Nigeria, Nsukka, Enugu State, Nigeria. **Email:** innocent.nwankwo@unn.edu.ng **Phone:** +234 8036202116

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ABSTRACTS

Fasciolosis and Contagious Bovine Pleuropneumonia (CBP) are characterized by gross pathognomonic lesions in organ/offal of slaughtered cattle which result in condemnation of unsafe meat. Both are the major causes of bovine organ/offal condemnation in Nigeria. Postmortem detection with focus on Fasciola and CBP infections were made in cattle slaughtered at Ikpa market abattoir, Nsukka between May – July 2018. In addition, the economic losses associated with the disease conditions were assessed. Out of 474 cattle examined, 114(24 %) and 200(42.2 %), had gross lesions of fasciolosis and CBP respectively, while 66(13.9 %) were positive for the both conditions. Both lesions were observed in the three breeds of slaughtered cattle (White Fulani, Sokoto gudali and Ndama) irrespective of sex and age. The disease lesions were not significantly associated ($p < 0.05$) with sex, age and breed of cattle. However, there was a significant relationship ($p > 0.05$) between the prevalence of CBP and fasciolosis lesions in the slaughtered cattle. The economic loss due to condemnation of affected organs was estimated at ₦ 1, 716,900.00 (US\$ 4,769) in 24 days, approximately equivalent to ₦ 71, 537.50 (US\$ 198.8) on daily basis. The findings have revealed the high level of organ damages and financial losses due to fasciolosis and CBP in the study area. This portends dangers not limited to livestock production and the economy, but zoonosis and other public health issues. Public awareness campaign, appropriate surveillance and disease control programmes should be implemented in addition to adequate meat inspection and compensation for farmers.

Keywords: Postmortem, Prevalence, Fasciolosis, Contagious bovine pleuropneumonia, Cattle, Nigeria

INTRODUCTION

Fasciolosis and contagious bovine pleuropneumonia (CBP) are endemic disease of cattle in Nigeria which are caused by parasite of *Fasciola* species and bacteria, *Mycoplasma varmycoides* species respectively (Manso-Silvan *et al.*, 2009; Aliyu *et al.*, 2000; 2014). The disease conditions are characterized by lesions, enlargement of the bile duct, liver patches and

unilateral marbling appearance of the lungs or thickening or inflammation of lung tissues and capsulated lesions termed as sequestra in the lungs of affected cattle among others (Biu and Adindu, 2004). Fasciolosis and CBP are among the major constrains to cattle health and production in Nigeria and in sub-Saharan Africa (Lorenzon *et al.*, 2003), as they are associated with decreased productivity, high morbidity and mortality rates (Odo, 2003). They are the major

causes of bovine organ/offal condemnation in Nigeria as the affected organs/offals appear unwholesome and unsafe for consumption (Cadmus and Adesokan, 2009). The diseases are zoonotic and have been associated with great economic losses due to rejection and condemnation of affected organs (Tembo and Nonga, 2015). More than 300 million cattle have been affected worldwide with losses estimated at over US\$ 3 billion and US\$ 1.5 million annually for fasciolosis and CBP respectively (Egwu *et al.*, 1996; Spithill *et al.*, 1999). Free movement of trade cattle, seasonal migration and trans-humane nomadism as practiced in Nigeria are among the predisposing factors, moreover, 80 % of the cattle population in the country are still in the hands of Fulani herdsmen who travels with their cattle from the northern part of the country to the south with no veterinary services (Ashrafi *et al.*, 2006; Radostits *et al.*, 2007). Furthermore, there is no policy for the control of most livestock diseases and quite a lot of livestock are imported into the country without regard to quarantine rules (Ashrafi *et al.*, 2006; Radostits *et al.*, 2007). With the high demand of the organs/ offal which are used in the preparation of soup and food in the study area and poor knowledge on zoonosis, some of the butchers often manipulate and resist inspection and condemnation of the affected organs/offal in the abattoirs in order to avoid the associated financial losses (Swai *et al.*, 2010). This study would add to the available data on livestock diseases, associated public health and economic losses in the study area.

MATERIALS AND METHODS

The study was carried out at Ikpa market abattoir, Nsukka, Enugu State, Nigeria. Nsukka lies in Udi hill at an elevation of 1,300 feet (396 m) with an estimated population of 309,633 (NPC, 2006). The climate is tropical with an average temperature of 24.9°C and annual rainfall of 1579 mm. Traditionally, Muturu is the breed of cattle reared in the area (Blench, 1999). However, most of the animals slaughtered in the abattoir are sourced from northern part of Nigeria and neighboring

countries (Blench, 1999). Nsukka is the home of the prestigious university (University of Nigeria) and the major occupation is civil service and farming.

Study Design: The study was a cross sectional survey whereby samples were collected from different breeds, sex and ages of cattle slaughtered in Ikpa market abattoir, Nsukka.

Study Population: Ikpa market abattoir has a daily slaughter rate of about 20 cattle. Visits to the abattoir were made twice in a week (Wednesdays and Saturdays) from May to July, 2018, during which all cattle were examined at slaughter.

Postmortem Inspection: Postmortem inspection was conducted between the hours of 5.30 – 7.00 am on visit days. Visceral organs especially lungs and livers from slaughtered cattle were inspected after evisceration using the standard meat inspection procedures (FAO, 1994). Gross pathognomonic lesions of fasciolosis (enlargement of the bile duct, presence of *Fasciola* parasite in the bile duct and liver patches) and CBP lesions (unilateral marbling appearance of the lungs, lungs substance consolidation and distensions of interlobular septum with serofibrinous exudates oozing out of cut surface) were looked out for and recorded as positive or negative in the presence or absence of the lesions for both conditions respectively (Figures 1 and 2).



Figure 1: Marbling appearance of the lung

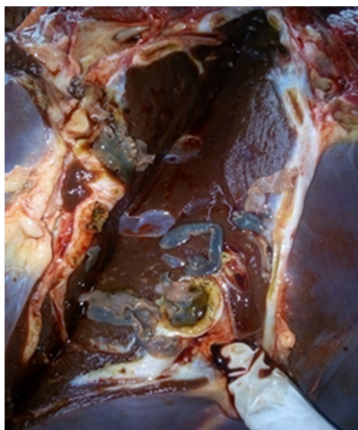


Figure 2: Presence of *Fasciola* spp. in the bile duct

Breed, Sex and Age: Ndama breed of cattle were identified by their broad muzzle and head, thick short neck and legs, small dew lap and moderate horn. The White Fulani breed was identified by their characteristic long and curved horn with black apex, black inner ear and moderate dew lap. They are usually white in colour while the Sokoto gudali which is usually brown in colour has large dew lap, big horn and gait (Kubkomawa, 2017). The cattle were group into two groups of age, those of 3 years and below and those that were more than 3 years old using the presence of four or six permanent incisors on the their lower front jaw respectively (FSIS, 2013). On the other hand, the females (cows) among them were identified by the presence of prominent vulva at the perineal area and udder located at the inguinal area. The presence of the male organ (scrotal sac) located at the inguinal area was used in the identification of the males (bull).

Economic Loss: The parameters used for assessing the financial loss were the average estimated weight of condemned organs in kilograms and average prices per kilogram of organs in Naira(₦) and converted to US dollars(\$) using the prevailing exchange rate (₦360/US\$). Financial loss for the 24 days period of meat inspection was established by multiplication of the average weight of organs with the average price (per kg) and the total number of condemned organs (Mwabonimana *et al.*, 2009).

The cost of condemned liver or lungs was ₦ 1,000.00 per/kg.

Statistical Analysis: Descriptive statistics involving percentages of occurrence of disease lesions in organs were used. Chi-square statistics was used to determine the level of association between the breeds, sex, age and the occurrence of lesions. Significance was accepted at $p < 0.05$.

RESULTS

A total of 474 slaughtered cattle were sampled during the postmortem inspection. Out of which 114(24 %) and 200(42.2 %) were positive for fasciolosis and CBP lesions respectively, while 66(13.9 %) were equally affected with both disease lesions (Table 1).

Out of 474 slaughtered cattle, 400, 50 and 24 were White Fulani, Sokoto gudali and Ndama breeds respectively. Out of 400 white Fulani breed, 106(22.6 %), 170(35.8 %) and 55(11.6 %) had lesions of fasciolosis, CBP and both conditions respectively. Furthermore, out of the 50 Sokoto gudali breed, 5(1.1 %), 20(4.2 %) and 8(1.6 %) had the lesions of fasciolosis, CBP and both lesions respectively, while 3(0.06 %), 10(2.1 %) and 3(0.63 %) of the Ndama breed had lesions of fasciolosis, CBP and both conditions respectively (Table 2).

Out of 474 cattle slaughtered, 100 were young, out of which 30(30 %), 41(41 %) and 16(16 %) had fasciolosis, CBP and both lesions respectively. On the other hand, out of 374 adult cattle, 84(22.5 %), 159(42.5 %) and 50(13.4 %) were positive for fasciolosis, CBP and both condition respectively (Table 3).

Out of 474 cattle slaughtered, 394 and 80 were male and female respectively, the males had 100(21 %), 150(31.6 %) and 55(11.6 %) with fasciolosis, CBP and both diseased conditions respectively, while 14(2.9 %), 50(10.5 %) and 11(2.35 %) had lesions of fasciolosis, CBP and both conditions respectively out of the 80 females cattle (Table 4). At the Ikpa market abattoir, meat or organs/offal are not sold based on weight but the wholesomeness and buyers bargaining power/butchers disposition.

Table 1: Detection of bovine fasciolosis and CBP lesion in cattle at Ikpa market abattoir, Nsukka

Number of cattle slaughtered	Number negative for both fasciolosis and CBP lesions (%)	Number positive for fasciolosis lesions (%)	Number positive for CBP lesions (%)	Number positive for both fasciolosis and CBP lesions (%)
474	94(19.8)	114(24)	200(42.2)	66(13.9)

Table 2: Breed distribution of bovine fasciolosis and CBP lesion in cattle at Ikpa market abattoir, Nsukka

Breed	Number sampled	Number negative for fasciolosis and CBP lesions (%)	Number positive for fasciolosis lesions (%)	Number positive for CBP lesions (%)	Number positive for CBP and fasciolosis lesions (%)
White Fulani	400	69(17.3)	106(22.6)	170(35.8)	55(11.6)
Sokoto Gudali	50	22(44)	5(1.1)	20(4.2)	8(1.6)
Ndama	24	8(33.3)	3(0.6)	10(2.1)	3(0.63)
Total	474	94(19.8)	114(24)	200(42.2)	66(13.9)

Table 3: Age distribution of bovine fasciolosis and CBP lesion in cattle at Ikpa market abattoir, Nsukka

Age	Number sampled	Number negative for both fasciolosis and CBP lesions (%)	Number positive for fasciolosis lesion (%)	Number positive for CBP lesions (%)	Number positive for both lesions (%)
Young cattle (<3 years)	100	9(9)	30(30)	41(41)	16(16)
Old cattle (>3 years)	374	81(21.7)	84(22.5)	159(42.5)	50(13.4)
Total	474	94(19.8)	114(24)	200(42.2)	66(13.9)

Table 4: Sex distribution of bovine fasciolosis and CBP lesion in cattle at Ikpa market abattoir, Nsukka

Sex	Number sampled	Number negative for both fasciolosis and CBP (%)	Number positive for CBP lesion (%)	Number positive for fasciolosis (%)	Number positive for both conditions (%)
Male	394	89(22.6)	150(31.6)	100(21)	55(11.6)
Female	80	5(6.3)	50(10.5)	14(2.9)	11(2.3)
Total	474	94(19.8)	200(42.2)	114(24)	66(13.9)

However, estimation of an average weight of 3.85 kg for a mature bovine's normal liver or lung (without pathological lesions) and at a cost of ₦ 1,000.00 per kg was used in the calculation of financial losses. The approximate total weight of condemned liver and lungs due to fasciolosis, CBP and both fasciolosis and CBP were therefore equals to 438.9 kg which is equivalent to ₦ 438,900.00, 770 kg which is equivalent to ₦770,000.00 and 508 kg which is equivalent to

₦ 508,000.00 respectively, totaling ₦ 1,716,900.00 (US\$ 4,769.00) in 24 days at exchange rate of ₦360/US\$ which is equivalent to ₦ 71,537:50 (US\$ 198:80) loss on daily basis.

DISCUSSION

Meat inspection serves as a surveillance tool in the hands of veterinarian and meat inspection officers for the generation of information on

livestock disease situation in the country. The information obtained can be a source of feedback to livestock industry for improves productivity, profitability, prevention and control of animal disease as well as zoonosis (Shima *et al.*, 2015). The detection of gross pathological lesions of fasciolosis and CBP in different breeds of slaughtered cattle in the study is an indication of the general level of poor health condition of animal slaughtered in Ikpa market abattoir, Nsukka. The quest for money and greed have contributed to the level of poor animal quality purchased and slaughtered in the abattoir as some of the butchers purchase lower grade animals at cheap prices, while some indulge in the act of purchasing and slaughtering obviously sick and sometimes dead cattle (Swai *et al.*, 2010; Awosile *et al.*, 2013). Other factors like hostile attitude of the butchers and laxity on the part of inspectors have compromised meat inspection and availability of quality and safe meat for consumers (Ojo, 1994). Furthermore, the poor quarantine system in trade cattle and absence of veterinary service in the pastoral system of cattle breeding may have contributed to the current disease situations in Nigeria (Mbuk *et al.*, 2011). Moreover, the herdsmen who are in control of 90 % of cattle population were poorly equipped with modern knowledge of livestock health management and services (Idowu and Babalobi, 2010). Farmers can suffer lost up to 80 % of their cattle while those that survived the infection may be chronic disease carriers. Death and avoidable economic loses following condemnation of severely affected organs can be very discouraging to butchers and farmers.

The prevalence of 24.0 % fasciolosis lesion in this study was in agreement with 23.11 % but lower than 27.68 % and 28.0 % reported in Zaria, Sokoto and Hadeja (Raji *et al.*, 2010; Magaji *et al.*, 2014; Abubakar *et al.*, 2016). It was also lower than 30.21 % reported in a study conducted at Dangila Municipal Abattoir, Ethiopia (Fetene and Addis, 2014). The highest slaughtered cattle in this study was the Fulani breed as equally recorded in a study from Nigeria (Mbuk *et al.*, 2011). However, the prevalence of fasciolosis lesions in White Fulani breed in the study was in contrast to the zero

prevalence in the same breed in Sokoto, North west Nigeria (Magaji *et al.*, 2014). This suggest that the pastoral system used in rearing of cattle in eastern Nigeria may predispose the Fulani breed to fasciolosis (Racloz *et al.*, 2013).

The prevalence of CBP lesions in 42.2 % of the organs in this study was higher than the overall prevalence of 0.33 % in ten years study in Borno State (Adamu and Aliyu, 2006) and 0.13 %, 2.9 % and 3.49 % reported by Adamu and Aliyu (2006), Gumel *et al.* (2015) and Francis *et al.* (2018) in Maiduguri, Jigawa and Adamawa states abattoirs respectively. Different prevalence rates (4.63 % and 54.88 %) were reported in Tombouctou and in Kidal region of Mali using competitive enzyme linked-immunosorbent test (c-ELISA) (Sery *et al.*, 2015). In Cameroun, Wade *et al.* (2015) had reported 29.7, 1.6 and 3.4 % prevalence rates using gross lesions, isolation and polymerase chain reaction techniques respectively. In this study, isolation and molecular identification of the organism from the affected organs/offals was not done; therefore, our findings may likely differ from the true prevalence. However, it has been established that factors like seasons, geographical location, duration of studies and the expertise of the meat inspector also contributes to the variations in the prevalence of the disease lesion in organs of slaughtered cattle in different parts of the Nigeria and elsewhere (Adedokun *et al.*, 2008; Raji *et al.*, 2010).

The age distribution of the diseased conditions in cattle slaughtered in Ikpa market abattoir, Nsukka showed that cattle below 3 years were less affected compared with those above 3 years for the both diseases. This was in agreement with the findings of earlier workers who recorded high prevalence rates in adult cattle than the young ones (Ardo *et al.*, 2013). This can be attributed to maternal immunity which protect the young cattle from the infection and the fact that young animals are not allowed to graze extensively. Moreover, adult cattle are slaughtered more than the young ones in the study area. The findings support the report that even though all ages of cattle are susceptible, in case of CBP, young cattle develop joints swellings rather than lungs

infections and gross pathology is obviously vivid in chronically infected cattle which are older (Bamaiyi and Wade, 2011). Furthermore, the higher prevalence of the disease lesion among the male than the female cattle for both conditions may be associated with the sample size as more male were presented for slaughter which was in contrast to the finding of higher slaughter rate of female cattle than male in Abeokuta abattoir, located in the western Nigeria (Mshelbwala *et al.*, 2017). However, equally chances of infection among males and females have been reported (Abebe *et al.*, 2009).

The result of the estimation of the economic losses associated with the condemnation of organs as calculated in the study is huge even though the farmers and butchers were not fully aware. This will be more discouraging to farmers and may lead to further resistance during meat inspection. The financial losses due to fasciolosis in the study (US\$ 1,219.00) in 24 days were similar to US\$ 1169.00 reported for Arusha in 30 days (Mwabonimana *et al.*, 2009). However, the calculated loss of US\$ 198.80 on daily basis multiply by 360 days which is equivalent to US\$ 71,568.00 due to fasciolosis and CBP from the study was less than US\$ 110,968.00 and US\$ 118,702.00 previously reported in Nigeria and Tanzania respectively (Cadmus and Adesokan, 2009; Tembo and Nonga, 2015). It was also lower than US\$ 5,429.00 and US\$ 5,631,598.00 per day and annum, respectively in Ethiopia (Tolosa and Tigre, 2007). The above mentioned amounts represent a very significant loss of revenue to the livestock industry and as such urgent measures should be put in place to control the infections and encourage the production of healthy animals for wholesome safe meat. Furthermore, as zoonotic diseases, this call for urgent disease preventive management as the abattoir environment, the butchers, the meat buyers, those slaughtering and those overseeing the slaughtering process are all exposed (Almasri *et al.*, 2019).

Conclusion: The study has revealed the presence of fasciolosis and CBP lesions in organs of cattle slaughtered at the Nsukka

abattoir with 24.0 and 42.2 % prevalence rates respectively. The finding also revealed higher prevalence of CBP than fasciolosis in all the affected breed of cattle. It was suggested that cattle ranching as currently proposed by some states in Nigeria, should be encourage and supported by all stakeholder in the livestock industry as such will encourage increase productivity and availability of veterinary services to the cattle. On the other hand, butchers and livestock traders should be enlightened on health implications associated with buying and slaughter of obviously sick or dead animals for meat. Compensation for condemned organs/offal will equally encourage compliance during meat inspection and promote the provision of safe and wholesome meat for humans.

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