

Coprological Detection of Bovine Fasciolosis in Federal Capital Territory, Abuja, Nigeria

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Abstract

Bovine Fasciolosis is a vector – borne zoonosis and one of the most neglected tropical diseases that cause huge economic losses and poor animal conditions in Nigeria. The prevalence of Fasciolosis in Cattle slaughtered in the Federal Capital Territory, Abuja was investigated. Faecal samples were collected from the cattle antemortem and analysed using copro ELISA test-kits and gross lesions were inspected at postmortem. Out of one hundred and eighty six (186) faecal samples analysed, over-all prevalence was 98(52.7%). From each abattoir was 38 (38.8%), 36 (36.7%) and 24 (24.5%) at Karu, Dei-Dei and Gwagwalada abattoirs respectively. Based on body condition scoring, infection rates were 39 (58.2%), 45 (58.4%) and 20 (47.6%) from cattle with poor, moderate and good body conditions accordingly. Males had a higher prevalence rate of 48 (50%) than females with 40 (44.4%). Based on the breed of cattle, infection rate of the diseases was 41 (66.1%), 39 (62.9%) and 20 (32.3%) in White fulani, Sokotogudali and Red bororo accordingly. Out of 186 cattle inspected at postmortem, 47 livers were condemned totally due to the presence of liver flukes (*Fasciola species*) in the hepatic parenchyma, fluke tracts, livers were friable and chirotic. This led to an estimated loss of about three million, one hundred and two thousand naira (3,102,000.00). There was no statistically significant association between the infection and breed, sex and body condition score ($p>0.05$). Treatment of all cattle with an effective flukicides, vector control, enlightening of cattle farmers for proper intervention against fasciolosis are recommended.

Keywords: Fasciolosis, CoproELISA, Cattle breed, Body condition score, Economical losses, Federal Capital Territory

Introduction

Parasitic diseases are the major obstacles in the growth and development of any animal health (Raza *et al.*, 2010). Helminthosis has long been recognized and still are problems resulting in losses in ruminant production in almost all regions of the world including Nigeria. (Alawa *et al.*, 2010). Fasciolosis is recognized as one of the most important disease in cattle (Lesser *et al.*, 2000). It is an emerging parasitic disease having significant impact on both veterinary and human health throughout the world (Lazara *et al.*, 2010). It is an economically important parasitic disease as it causes huge economic losses in terms of reduction of milk, meat, high mortality and morbidity in all ages of animals (Saleha, 1991). It is caused by trematodes usually *Fasciola gigantica* and rarely *Fasciola hepatica* in the tropics; these two fasciolid species often overlap in many African and Asian countries and sometimes in the same country, although in such cases, the ecological requirements of the flukes and their snail intermediate host are distinct (Ashrafi *et al.*, 2015). Complication of the disease is the fact that adult *Fasciola* species can exist concurrently in the same host either because of local overlap or because of livestock movement and the species can interbreed (Mascoma *et al.*, 2009). The disease is one of the most neglected tropical diseases that cause huge economic losses and poor animal conditions in Nigeria (Aliyu *et al.*, 2014). It has been estimated that in each of the 36 states, including Federal Capital Territory (FCT) recorded losses in at least one abattoir per state, this translate to huge loss of resources of US\$5762,010 for the country (World Bank, 2006) The endemicity is due to availability of viable metacercaria attributed to poor management systems, availability of stagnant waters and fadama which are breeding sites for the intermediate hosts, host immune status, breed, age variation among others (Yabe *et al.*, 2008). The objective of this study therefore, is to detect *Fasciola* species antibodies in faeces of cattle, risk factors and economic losses associated with the disease as well as suggesting suitable control measures that

will lead to maximum production and profitability.

Materials and Method

Study Area

Federal Capital Territory (FCT), Abuja is the capital city of Nigeria located in the centre of the country. It lies within latitude of $8^{\circ} 2^1$ and $9^{\circ} 26^1$ north of the equator and longitude $6^{\circ} 45^1$ and $7^{\circ} 3^1$ east of Greenwich meridian (World Bank, 2006). The territory is located just north of the confluence of River Niger and River Benue. It is bordered by Kaduna State in the Northeast, Nasarawa State both to the east and South and Kogi State to the Southwest. It has a land mass of approximately 7325mm region. It experiences tropical wet and dry climate. The rainy season begins in March and ends in November, with the peak in September during which abundant rainfall is recorded. Mean annual rainfall ranges from 1000mm to 1600mm. Mean monthly temperature ranges between 25.8°C and 30.2° (Aoadoakaa, 2012).

Study Design

A cross – sectional study of the cattle in three abattoirs was conducted during antemortem and postmortem inspection. The study was carried out in cattle slaughtered at Karu, Dei – dei and Gwagwalada abattoirs which are under Municipal and Gwagwalada Area Councils respectively. During the antemortem inspection, risk factors which include sex, breed and body condition scores were considered to assess association with fasciolosis. The study animals were categorized into three classes based on breed namely; Sokotogudali, White Fulani and Red bororo. Based on sex, they were classified into two groups; Bulls and cows. Body condition scores were obtained as described by Herd and Sprott (1986).

Sample Collection

The sampling procedure was carried out using simple random sampling method. The sample size was determined at 90% confidence interval and 5% margin of error and expected prevalence of 25% using the formula as given by

Thursfield (1999). One hundred and eighty six (186) faecal samples were collected from the same number of cattle. Based on sex, sixty two (62) Sokotogudali, sixty two (62) White Fulani and sixty two (62) Red bororo were obtained.

During the antemortem inspection, faecal samples were collected per rectum using sterile nylon gloves. The faecal samples were then stored in the universal sample containers and labeled with unique identification numbers which include sex, breed, date and sample number of each cattle before storing them in an ice packed cool box. The samples were then transported to National Veterinary Research Institute, Vom, Plateau State for Copro ELISA analysis.

During the postmortem investigation, livers from the one hundred and eighty six (186) cattle slaughtered were inspected for presence of flukes and lesions by cutting open the major bile ducts into the liver parenchyma. The presence of adult flukes was recorded so as to relate the result with that of coprology.

CoproELISA procedures to detect of Fasciolosis

A sandwich ELISA Bio – X Bovine *Fasciola hepatica* Antigen ELISA Kit (Bio K 201) was performed on all faecal samples based on the manufacturer’s instructions.

Interpreting the Result

The net optical density of each sample was calculated by subtracting from the reading

for each sample well (A, C, E, G) the optical density of the corresponding negative control (B,D,F,H). Proceeded in the same manner was for the positive control antigen.

The signal read for each sample well was divided by the corresponding positive control signal and the result was multiplied by 100 in which the value obtained was expressed as a percentage.

$$\text{Value} = \frac{\text{Delta OD sample} \times 100}{\text{Delta OD positive}}$$

Using the table in the quality control procedure, each sample’s status was determined (Positive or Negative).

Statistical Analysis

Data obtained were subjected to Chi square statistical analysis using SPSS version 20.0 for windows. The difference among variables was evaluated by Pearson’s Chi-square Test and values of P<0.05 were considered statistically significant

Results

The percentage of cattle infected with liver fluke was (38.8% and 35.3%), (36.7% and 31.0%) and (24.5% and 33.6%) for Karu, Dei – dei and Gwagwalada during antemortem (Coprology) and postmortem inspection respectively. The rate of infection was highest in Karu than Dei – dei and Gwagwalada abattoirs.

Table 1: Prevalence of bovine fasciolosis from abattoirs in three locations in Abuja

| Location | No Examined | No (%) Positive | P-value | χ^2 |
|------------|-------------|-----------------|---------|----------|
| Karu | 63 | 38 (38.8) | 0.9401 | 0.1235 |
| Dei-dei | 63 | 36 (36.7) | | |
| Gwagwalada | 60 | 24 (24.5) | | |
| Total | 186 | 98(52.7) | | |

Bovine fasciolosis was found in all the three locations of the one hundred and eighty six (186) cattle inspected for fasciolosis, ninety eight 98(52.7) were positive.

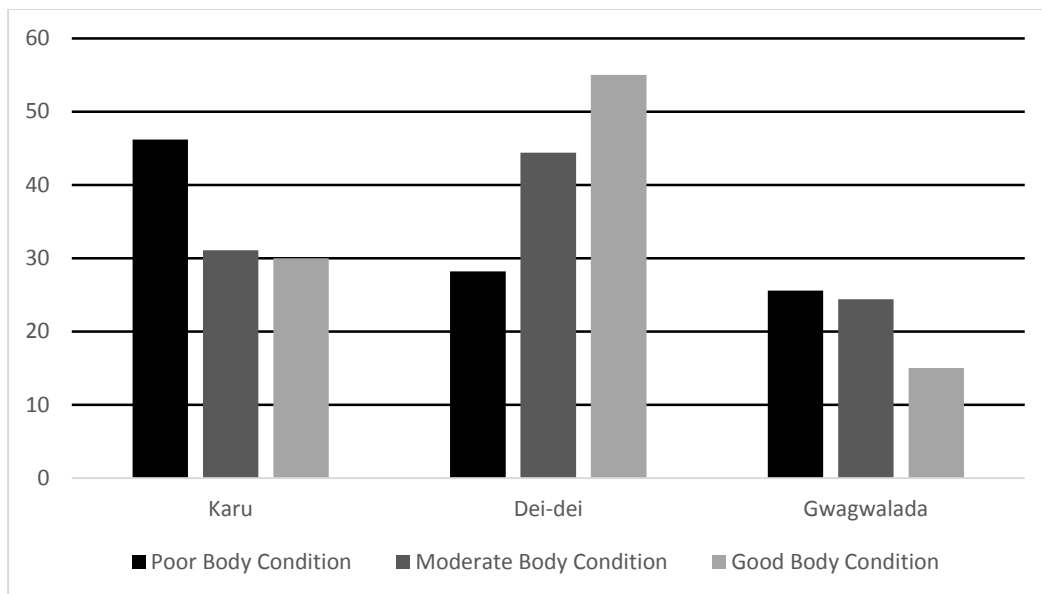


Fig.1: Percentage prevalence of bovine fasciolosis in relation to body condition scores in the three abattoirs.

Table 2: Prevalence of bovine fasciolosis in relation to sex of animals

| Location | Sex | | | | P-value | x ² |
|--------------|-------------|----------------|-------------|------------------|---------|----------------|
| | Male | | Female | | | |
| | No examined | No positive(%) | No examined | No positive(%) | | |
| Karu | 32 | 18(37.5) | 31 | 20(40) | 0.983 | 0.0645 |
| Dei-Dei | 33 | 18(37.5) | 30 | 18(36) | | |
| Gwagwalada | 31 | 12(25) | 29 | 12(24) | | |
| Total | 96 | 48(50%) | 90 | 40(44.4%) | | |

Based on sex, both male and female in Gwagwalada abattoir have the least percentage of infection. The female in Karu abattoir had the highest infection rate of 40%.

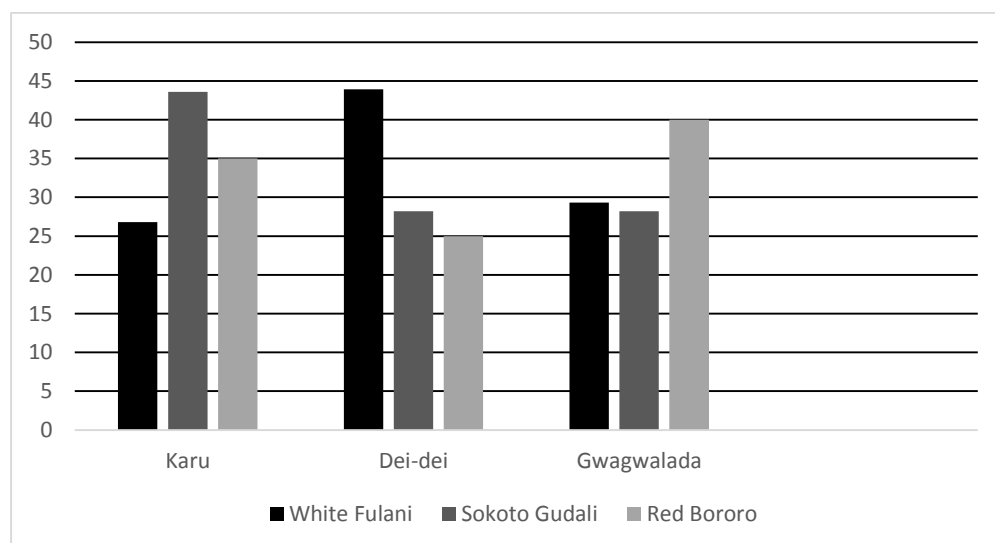


Fig. 2: Percentage prevalence of bovine fasciolosis among the three breeds of cattle.

Table 3. Economic losses associated with bovine fasciolosis in cattle slaughtered in FCT, Abuja.

| Location | No Examined | No positive | No of condemned liver in 30 days | Estimated annual losses | 30days financial losses in naira | Estimated annual financial losses in naira |
|------------|-------------|-------------|----------------------------------|-------------------------|----------------------------------|--|
| Karu | 62 | 41(35.3) | 18(38.3) | 216 | 99,000 | 1,188,000 |
| Dei –dei | 62 | 36(31.0) | 13(27.7) | 156 | 71,500 | 858,000 |
| Gwagwalada | 62 | 39(33.6) | 16(34.0) | 192 | 88,000 | 1,056,000 |

Average price of livers N 5500.00

Economic losses associated with bovine fasciolosis in cattle slaughtered at the three abattoirs recorded highest rate of condemned liver in Karu (38.29%) followed by Gwagwalada (34.04%) and the least was Dei – dei (27.66%).

Postmortem lesions observed were perforations and subcapsular haemorrhages, fluke tracts in the damaged tissue filled with adult flukes (diagnostic), enlarged and thickened bile ducts which protruded in some cases. Also, some livers were friable while some were fibrotic.

Statistical analysis of the data revealed no statistically significant association ($P > 0.05$) between infection with the parasite and breed, sex and body condition score of the sampled animals.

Discussion

Fasciolosis is a disease of veterinary, medical and economic importance worldwide. This showed that this neglected tropical disease is prevalent in FCT, Abuja, Nigeria. Cattle processed at these abattoirs represent to some extent, a valid cross – section of the livestock disease information source. Considering the endemic nature of liver fluke in most tropical and sub – tropical countries and its negative impact on animal production, the use of abattoir slaughter data coupled with coprology provide an insight into the epidemiology of the disease .

The current study showed a proportion of liver condemnation of between 13(27.66%) to 18(38.21%). The prevalence of the disease among cattle slaughtered at Minna modern abattoir which is a bordering state to Abuja revealed similar figure of 42% (Iboyi, *et al.*, 2017). This may be attributed to the same

climatic conditions and origins of cattle since most are from the northwestern states of Nigeria. Another factor to consider during this study is the rainfall which is at its peak (September/October). This is mostly responsible for displacing the snail intermediate hosts (*Lymnaea uricularis*; *Lymnaea natalensis* and *Lymnaea truncatula*) from flowing streams to other water bodies. (Fabiyyi, J.P. and Adeleye, G.A. (1982).

Based on the coproELISA analysis carried out, the prevalence of the disease is highest in Karu abattoir 38(38.8%) and lowest in Gwagwalada abattoir 24 (24.5%). This may be attributed to high livestock density which make the rearers in the lairage take the cattle for grazing in near – by slow flowing rivers and marshes where the snail intermediate host dominate. Magaji *et al.* (2014) however, discovered similar prevalence of 27.68% detected from cattle faeces. Based on sex predisposition, fasciolosis is not gender specific in all three abattoirs. This might be due to exposure of the animals to contaminated pasture as illustrated in the work of Iboyi *et al.* (2017). The result obtained was not significant ($P > 0.05$). This agrees with the findings of Magaji, *et al.* (2014). Who recorded no significant differences between infection of males and females. Also, Shinggu *et al.* 2019 recorded similar result which revealed 25% and 28.6% *Fasciola* prevalence for male and female respectively. The possible reason could be that fasciolosis is not gender specific since both sexes move along the same grazing path in search of food and water. This is in sharp contrast with the studies earlier reported by (Idris, H.S. and

Madara, A.A (2005), Obadiah, 2010) who reported a higher infection rate among the male cattle than the female cattle from Gwagwalada abattoir, Federal Capital Territory, Abuja and Jalingo Abattoir, Taraba State Nigeria. Fasciolosis in relation to breed of cattle studied, prevalence rate was highest in White Fulani followed by Sokotogudali and the least was in Red bororo. This might be due to differences in origin of the cattle. White Fulani are mostly sourced from the middle belt and Northwest, while Sokotogudali from Northwest and Northeast of Nigeria but Red bororo are mostly from Niger Republic and Northwest which occupies low flat and naturally dry land. (Semiarid area) (Magaji *et al.*, 2014). This probably explain the low percentage of infection with fasciolosis among Red bororo cattle slaughtered at all three abattoirs. The intensity of infection and effect of fasciolosis was greater in cattle of moderate body condition score (58.4%). Many studies on the relationship between body condition score and fasciolosis has shown that there is a positive association between the disease and cattle weight loss Abunna *et al.*(2010). At the subacute chronic stage of infection, inappetance and anorexia related to the activities of Migrating fluke leads to weight loss, weakness and suppressed immunity Woodwoossen *et al.*, (1990). Considering the important role of liver in homeostasis and the overall metabolism of animals, loss of body condition score in infected cattle could be as a result of *Fasciola* infection and likely relate, in part to metabolic perturbation (Alvarez *et al.*, 2015). The average annual loss of three million, one hundred and two thousand naira (N3,102,000.00) resulting from condemnation of 564 liver due to fasciolosis out of 2232 cattle slaughtered yearly is quite enormous. This highlighted the economical upsets imposed by this disease in FCT, Abuja and the country at large. This economical loss can also be referred to as an underestimation of the actual cost suffered as a result of fasciolosis because of the unavailability of cost due to mortality, chronic ill effect and treatment. Butchers and meat traders

resisting inspection of *Fasciola* infested livers is also a contributory factor. This results from the low literacy and awareness levels as well as the increased poverty among abattoir workers coupled the general public perception that fasciolosis infested livers are treated as delicacies in Nigeria. Ogunrinade, (1980) reported an annual economic loss of N5million.

Conclusion

This study demonstrated a high prevalence of bovine fasciolosis and a high intensity of liverflukes in cattle with poor and moderate body conditions in the three abattoirs in Federal Capital Territory, The results suggested that fasciolosis causes a reduction in cattle body weight and may lead to substantial production losses and bovine liver condemnation at slaughter. In this study, it has been established that there is no association between fasciolosis and sex breed and body score of the cattle. The development of nematode and trematode resistance to various groups of anthelmintics is a major problem facing the livestock industry.

Recommendations

- i. An investigation on the use, dosage and storage as well as anthelmintic resistance is recommended.
- ii. There is a need not only to intensify but improve the control methods of fasciolosis in livestock production in Federal Capital Territory, Abuja in order to minimize the economic losses.
- iii. To educate the public so that they are aware of its importance.
- iv. Rigorous and sustained integrated herd health planning to mitigate the prevalence and intensity of fluke infections is required.

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