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# Prevalence of Fascioliasis and Dicrocoeliasis in Cattle Slaughtered in Some Abattoirs in Akure Metropolis, Ondo State, Nigeria

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***Authors' contributions***

*This work was carried out in collaboration between both authors. Author EOD designed the study, wrote the protocol and wrote the first draft of the manuscript. Author SOJ managed the analyses of the study, literature searches and statistical analyses. Both authors read and approved the final manuscript.*

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## ABSTRACT

The study was carried out in March-May 2019 to investigate the prevalence of fascioliasis and dicrocoeliasis in cattle slaughtered in parts of Akure abattoir, Ondo State, Nigeria. Two hundred (200) bile samples from cattle were collected from both male and female cattle. The parasitological analysis of the bile sample was carried out by sedimentation technique. Prevalence of *Fasciola gigantica* was (50.5%) for *Dicrocoelium hospes* was 16.0% and double infections accounted for (5.5%). Prevalence of *Fasciola gigantica* infections was high in female cattle (57.7%) compared to their male counterparts (38.9%). For *Dicrocoelium hospes*, the infection was higher in male (18.2%) than in the female (14.6%) while the prevalence of double infections was higher in males (7.8%) than in the females (4.07). The high infection rate for *Fasciola gigantica* (84.0%) and *Dicrocoelium hospes* (62.0%) was found to be high at Busa abattoir. Double infection was observed to be high at Oke-Odu abattoir (10%) than in other abattoirs while no infection was observed at Bola meat abattoir. Overall age prevalence of fascioliasis and dicrocoeliasis (82.8%) was within the age bracket of 9-10yrs while the least infection (54.2%) fall within the age bracket of 7-8yrs. Prevalence of fascioliasis and dicrocoeliasis in Sannia breed was 90.2% followed by the

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Ambala breed (84.0%) while the least was 31.2% in the White Fulani breed. This study which revealed a high prevalence of fascioliasis and dicrocoeliasis among cattle slaughtered in the studied abattoir possesses a threat to healthy livestock productions and it is significant public health importance. Adequate measures to improving the veterinary services are needed to put in place to reduce the economic losses accruing to these infections.

*Keywords: Fascioliasis; dicrocoeliasis; prevalence; cattle; bile examinations.*

## 1. INTRODUCTION

Fasciolosis is an important parasitic snail borne disease responsible for significant public health problems and substantial economic losses to the livestock industry. Fasciolosis gained attention not only due to its prevalence and economic significance to animal stock in all continents but also due to its zoonotic importance [1]. Fascioliasis in livestock has been reported in different parts of the world including Nigeria [2]. Human fascioliasis has been reported from countries in Europe, America, Asia, Africa and Oceania and its incidence said to have been increasing [3].

According to Biu *et al*. [4], researchers have attempted to provide data on economic and public health aspects of fascioliasis in Nigeria. Estimates of economic losses due to fascioliasis had been mainly derived from records of organ and carcass condemnation. Biu *et al.* [4] also observed that in Maiduguri abattoir, 41.7% of condemned organs consisted mainly of livers, were due to fascioliasis. Meat derived from cattle, sheep and goats provides major sources of animal protein for the populace of Nigeria [5]. At the abattoir in Isheri-olofin in Ogun State, [6] reported 45.16% prevalence among slaughtered cattle at the abattoir. Likewise, [7] reported 27.68% prevalence of infections due to *Fasciola gigantica* in slaughtered cattle at Sokoto abattoir.

Dicrocoeliasis is one of many health threats that cause a reduction of dairy and meat production and many financial losses by threatening public health [8]. The disease is spread by ants infected by metacercariae wondering on fodder and vegetable. Dicrocoeliasis are caused by *Dicrocoelium dendriticum* which have been reported in countries like Germany, Spain, Morocco and Egypt and *Dicrocoelium hospes* which was reported in countries like Kenya, Nigeria, Zimbabwe and Egypt. Livestock infection has been reported in Nigeria and Iranian provinces [8]. The study conducted by Ahmadi *et al*., [9] showed that the outbreak of dicrocoeliasis in cow, sheep and goat in Gilan province was 88%, 66%, and 23.25% respectively. Omowaye *et al.,* [10] reported the prevalence of *Dicroceolium hospes* in cattle slaughtered in Jos abattoir in Plateau State, Nigeria.

Parasitic infections impede livestock productivity and detailed data on the epidemiology of infection is useful in designing control programmes that will increase productivity and ultimately, the amount of animal protein available for human consumption. However, there is lack of adequate epidemiological data on the prevalence of fascioliasis and dicrocoeliasis in cattle based on direct bile examinations in Akure, Ondo State, Nigeria. This study was therefore embarked upon to investigate the prevalence of fascioliasis and dicrocoeliasis in abattoirs situated in Akure metropolis to update knowledge on the epidemiology of the infection.

## 2. MATERIALS AND METHODS

### 2.1 Study Area

The study was conducted in Akure, Ondo State, Nigeria. Akure is located on $75^{o}$ 15' North of the equator and $50^{o}$ 15' east of the meridian [11]. Akure is characterized by the hot and humid climate which is influenced by rain-bearing southwest monsoon winds from the ocean and dry North-West winds from the Sahara Desert. The rainy season lasts from April to October with rainfall of about 1524 mm per year. Temperatures vary from 28ºC to 31ºC with a mean annual relative humidity of about 80% [11]. The abattoirs visited were Roadblock, Busa, Oke Odu and Bola meat which are private own organization. These abattoirs are located in Akure South Local Government. Busa abattoir is located at Ondo State industrial park, kilometre 4, Ilesha Owo expressway, Akure. Roadblock abattoir is located behind Chicken Republic Eatery, kilometre 7, Akure Ilesha expressway, Akure, while Bola meat and Oke Odu abattoirs are located at Ijare Road, off Orita Obele, Akure, Ondo State. The breeds of cattle were identified by interviewing the personnel at the abattoirs. The observation was based on the colour of the skin and appearance

of the horn whether it is long or short. The breeds of cattle encountered in these abattoirs are Red Bororo, White Fulani, Adamawa Gudali, Sokoto Gudali, Ambala and Sannia respectively.

### 2.2 Sample Collection

The method of [7] was employed. Visits were paid thrice in a week to each slaughterhouse on a rotational basis to collect bile samples of slaughtered cattle between 6:30 a.m and 9:00 a.m each day. Samples were collected between March and May 2017. A total of two hundred (200) gallbladders of slaughtered cattle were collected from the four abattoirs (fifty) gallbladders were collected from each abattoir. During collection, breed, sex and age of the cattle whose gallbladder were to be collected were noted by examination of external genitalia and dentition respectively [12]. The gallbladders were transported to the Department of Microbiology Department for the parasitological analysis of their contents for fascioliasis and dicrocoeliasis infections.

### 2.3 Parasitological Analysis

Formol-ether sedimentation technique as described by Soulsby [13] was employed to carry out the analysis in the laboratory. Two millilitres **(**2 mL) of the bile was collected from gallbladder using a syringe. The bile sample was then poured into a labelled test tube in a test tube rack. Using a syringe (1mL) of 10% formalin was added into the bile sample followed by the addition of (1mL) of diethyl ether. The test tube containing the solution was stopped and shaken to mix the solution. The solution was then centrifuged at 2000 rpm for 10 minutes. The eggs of the parasites sediment at the bottom of the mixture while diethyl-ether with some fat forms supernatant. The supernatant was decanted leaving few of it with the sediment. Two drops of the sediment were then put on a glass slide and covered with a coverslip and viewed under a light microscope using ×10 and ×40 magnification objective lens.

### 2.4 Data Analysis

Data was presented in the form of frequency distribution Tables and Chi-Square was also used where necessary to show the degree of association using the Statistical Package for Social Sciences (SPSS) version 20.0 and STATA 12. Values of $p<0.05$, where used, were considered to be statistically significant.

## 3. RESULTS

### 3.1 Prevalence of Fascioliasis and Dicroceoliasis in Cattle Slaughtered in Parts of Akure Abattoir, Ondo State

Table 1 shows the prevalence of *Fasciola gigantica* and *Dicrocoelium hospes*; Out of 200 bile examined, the prevalence of *Fasciola gigantica* was 50.5% followed by *Dicroceolium hospes* was 16.0% while double infection accounted for 5.5%.

Sex-based revealed that male cattle had 38.9% infection rate of *Fasciola gigantica* and 18.2% had *Dicrocoelium hospes* while 7.8% accounted for double infections. An overall infection in male was 64.9%. Also, in females, cattle examined 57.7% had infections of *Fasciola gigantica*, 14.6% had *Dicrocoelium hospes* while 4.0% had double infections in which the overall prevalence in female cattle was 76.4%. It could be observed from the study that the female had the highest 76.4% rate of infection compared with a male counterpart with the prevalence of 64.9% which shows a significant difference ($P< 0.05$) as shown in Table 2.

Table 3 shows the prevalence of Fascioliasis and Dicroceoliasis by location; High infection rate was recorded in Busa 84.0% than in other abattoirs. The study revealed that Busa abattoir had the highest 56.0% incidence of *Fasciola gigantica* while the least incidence 46.0% was observed in Roadblock abattoir. Incidence of *Dicrocoelium hospes* was high in Busa abattoir compared to other abattoirs. Also, the double infection was high 10.0% in Oke-Odu abattoir while nothing was seen at Bola meat abattoir which shows a significant difference.

Based on age, it could be observed that the high prevalence of infection 82.8% fall between the age bracket of 9-10 years in which 7-8 years had the least infection. From the study, it could be observed that the high prevalence of *Fasciola gigantica* 54.3% fall between the age brackets of 9-10 years while the least infection was seen between the age brackets of 11-12 years. Conversely, *Dicrocoelium hospes* was high in age bracket between 9-10 years while the least infection 8.3% fall between the age brackets of 7-8 years, mixed infection was observed to be high 8.6% in age bracket 9-10 years while no infection was seen between the age group of 11-12 years with no significant difference ($P> 0.05$) (Table 4).

Table 5 shows the breed with the prevalence of fascioliasis and dicroceoliasis; It was observed from the study that Ambala breed of cattle had the highest 70.0% infection rate of *Fasciola gigantica* in which White Fulani breed of cattle 21.9% had the least infection of *Fasciola gigantica*. From the study, it could be observed that Sanni breed of cattle had a high infection of 60.8% of *Dicrocoelium hospes* while low infections were observed in White Fulani breed of cattle. Also, Adamawa breed of cattle had the highest infection of double infection 15.0% in which the least infection 2.0% was seen among Ambala breed of cattle while the overall infection 90.2% was seen between Sannia breed of cattle which is followed by Ambala breed with 84.0% while the least infection 31.2% was seen in White Fulani with no significant difference (P> 0.05).

**Table 1. Prevalence of Fascioliasis and Dicroceoliasis in cattle slaughtered in parts of Akure Abattoir, Ondo State**

| Parasites | Number | Prevalence (%) | Double infection | Prevalence (%) |
|---|---|---|---|---|
| *F. gigantica* | 101 | 50.50 | 11 | 5.5 |
| *D. hospes* | 32 | 16.00 | | |
| Total | 133 | 66.50 | | |

*Number examined = 200*

**Table 2. Sex prevalence of Fascioliasis and Dicroceoliasis in cattle slaughtered in parts of Akure Abattoir, Ondo State**

| Sex | Number examined | Number infected (%) | | Double infection (%) | Total number infected (%) |
|---|---|---|---|---|---|
| | | *F. gigantica* | *D. hospes* | | |
| Male | 77 | 30 (38.9) | 14 (18.2) | 6 (7.8) | 50 (64.9) |
| Female | 123 | 71 (57.7) | 18 (14.6) | 5 (4.0) | 94 (76.4) |
| Total | 200 | 101 (50.5) | 32 (16.0) | 11(5.5) | 144 (72.0) |

*Number examined = 200*
*The number of cases was counted to each mixed infected case*
*P<0.05 (0.157)*

**Table 3. Prevalence of Fascioliasis and Dicroceoliasis in cattle slaughtered in parts of Akure Abattoir, Ondo State according to location**

| Location | Number examined | Number infected (%) | | Double infection (%) | Total number infected (%) |
|---|---|---|---|---|---|
| | | *F. gigantica* | *D. hospes* | | |
| Road block | 50 | 23 (46.0) | 6 (12.0) | 2 (4.0) | 31 (62.0) |
| Busa | 50 | 28 (56.0) | 11 (22.0) | 3 (6.0) | 42 (84.0) |
| Oke-Odu | 50 | 25 (50.0) | 9 (18.0) | 5 (10.0) | 39 (78.0) |
| Bola meat | 50 | 25 (50.0) | 7 (14.0) | 0 | 32 (64.0) |

*Number examined = 200*
*p<0.05 (0.261)*

**Table 4. Shows the prevalence of Fascioliasis and Dicroceoliasis in cattle slaughtered in parts of Akure Abattoir, Ondo State based on age**

| Age (years) | Number examined | Number infected (%) | | Double infection (%) | Total number infected (%) |
|---|---|---|---|---|---|
| | | *F. gigantica* | *D. hospes* | | |
| 7-8 | 72 | 32 (44.4) | 6 (8.3) | 1 (1.4) | 39 (54.2) |
| 9-10 | 116 | 63 (54.3) | 23 (19.8) | 10 (8.6) | 96 (82.8) |
| 11-12 | 12 | 6 (50.0) | 3 (25.0) | 0 | 9 (75.0) |
| Total | 200 | 101 (50.0) | 32 (16.0) | 11 (5.5) | 144 (72.0) |

*p>0.05 (0.199)*

**Table 5. Over all-breed prevalence of Fascioliasis and Dicrocoeliasis in cattle slaughtered in parts of Akure abattoir, Ondo State**

| Breed of cattle | Number examined | Number infected (%) | | Double infection (%) | Total number infected (%) |
|---|---|---|---|---|---|
| | | *F. gigantica* | *D. hospes* | | |
| SokotoGudali | 24 | 10 (41.7) | 5 (20.8) | 1 (20.8) | 16 (66.7) |
| Adamawa Gudali | 20 | 7 (35.0) | 4 (20.6) | 3 (15.0) | 14 (70.0) |
| Red Bororo | 23 | 11 (47.8) | 3 (13.0) | 2 (8.7) | 16 (69.9) |
| Ambala | 50 | 35 (70.0) | 6 (12.0) | 1 (2.0) | 42 (84.0) |
| Sannia | 51 | 31 (60.8) | 12 (23.5) | 3 (5.9) | 46 (90.2) |
| White Fulani | 32 | 7 (21.9) | 2 (6.3) | 1 (3.1) | 10 (31.2) |
| Total | 200 | 101 (50.5) | 32 (16.0) | 11(5.5) | 144 (72.0) |

*p>0.05 (0.242)*

## 4. DISCUSSION

The high prevalence of fascioliasis observed in this study higher than those previously reported in different parts of Nigeria for instance, 37.1% reported by Ulayi *et al.* [14] in cattle slaughtered in Zaria abattoir, 23.3% reported by Njoku [15] from Imo State abattoir, 13.62% reported by Usip *et al*. (2014) from cattle slaughtered in Akwa-Ibom State abattoirs and 27.68% reported by Magaji *et al*. [7] from Sokoto State abattoirs. The reason for the high prevalence may be attributed to the fact that the samples were collected during the rainy season which favours the survival distribution of the snail intermediate host of the parasites. The significantly higher prevalence of fascioliasis could be due to the fact that most of the herds of cattle in the region where they were bought and reared by pastoral system where animals move to different places in search of pasture thereby increasing their chance of exposure to sources of infection which include stagnant water sources and lush pasture that have been identified as containing the infectious forms of the parasites [16].

Prevalence of dicrocoeliasis infection was low in the study area which is not in agreement with the findings of Ulayi *et al.* [14]. This could be due to the fact the cattle slaughtered in these abattoirs originated from geographical areas which do not support the development of second intermediate hosts which are the snail (*Cionella lubrica*) and an ant (*Formica fusca*).

The occurrence of double infections of dicrocoeliasis and fascioliasis was significantly low in cattle than single infections which disagree with the findings by Olusegun-Joseph *et al*. [17]. The reason may be attributed to the fact that the environmental and climatic condition from where the cattle were bought does not favour the development of the eggs of the parasites [18].

In this study, it could be observed that the female had the most infection of fascioliasis which is in agreement with the findings of Molina *et al*., (2005); Ulayi *et al*., [14]; Bhutto *et al*., [16]; and Teklu *et al*., [19]. compare to male counterpart. The reason may be due to change in physiological conditions during lactation or lack of proper nutrition or long time exposure of female cattle to disease when grazing. Also from this study, females were more sampled than the males counterpart because the nomadic herdsmen could not find the female cattle as productive in which attention was no more given to the female cattle and hence, may be attributed to the prevalence of infection of *Fasciola gigantica* in female than in male cattle [20].

Conversely, *Dicroceolium hospes* could be observed to be slightly high in male cattle to the female which concur with the findings of Omowaye *et al*. [10] who reported on the prevalence of parasitic infections in the bile of cattle slaughtered in Jos abattoir, Plateau State, Nigeria. The slightly high infection recorded in male cattle could be attributed to the fact that the males are often exposed to *Dicrocoelium* infections and other disease entities which usually arises from grazing on pastures contaminated by infective metacercariae before they are transported to the abattoirs [21].

The observed high infection rate between cattle aged 9-10 years old compared to other age groups conform to the findings of Keyyu *et al*. [22]; and Rehman *et al*. (2015). This observation may be due to longtime acquaintance of adult cattle to infective larvae as compared to younger ones. Also, it could be due to self-cure

phenomenon or high acquired immunity which increases with age. It has also been reported that *Fasciola* and *Dicrocoelium* infected hosts may recover from parasitic infection with increasing age and hence become resistant [23, 24, 25].

It was observed that the Sannia breed of cattle had the most infection as compared to another breed of cattle in the study area. It could be because the areas in which these cattle graze are areas like lake borders, low lying marshy areas, slow-flowing rivers and valley all year round. In the study, it could be observed that the Ambala and Sannia breeds of cattle had a high infection rate of dicrocoeliasis and fascioliasis as compared to another breed of cattle. The reason for the high prevalence of *Dicrocoelium hospes* and *Fasciola gigantica* in Ambala and Sannia breed of cattle may be due to the fact the cattle slaughtered were generally older and stayed in the herd longer than other breeds slaughtered [20].

## 5. CONCLUSION

The outcome of this study confirmed that fascioliasis and dicrocoeliasis were prevalent parasitic diseases in the study area. These diseases constitute a major impediment to livestock production owing to the direct and indirect losses. Improving the veterinary service infrastructure in prevalence area and standard regulation and functional meat inspection policies should be adopted.

Based on findings from this study, more enlightenment is needed to enhance the knowledge and practice among cattle herdsmen for better management of trematodes infections. Treatment on grazing and slaughtering locations with molluscicides to reduce the incidence of intermediate host. Control of fascioliasis and dicrocoeliasis should be done which should involve actions such as the detailed study of the epidemiology of the disease in ruminants and snail intermediate hosts and determining well-defined intervals for anthelmintic treatment of infected animals.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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