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Economic impact of high burden of fascioliassis in FCT, caused by damage to liver

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ABSTRACT

Fascioliasis disease is economically significant to domestic farm animals and causes substantial economic losses in the livestock business via liver condemnation, livestock death, and reduced meat production. Lower growth rate and feed conversion rates in fattening cows are the causes of losses. The aim of this study was to determine the economic impact of high burden of fascioliasis due to damaged livers in FCT Abattoirs, Nigeria. A total of 1,654 slaughtered cattles were examined and the feacal samples microscopically examined using sedimentation technique for identification of ova of fasciola. Infected livers were incised and adult parasite expressed, counted and preserved in 70% ethanol. The study found a 30.00% prevalence of fascioliasis in cattle, with 291 cases (59.00%) of trimmed, damaged livers, 129 (27.41%) partially condemned livers, and 70 (14.25%) totally condemned livers. Economic losses due to liver damage were significant, totaling N1, 050,000 (\$2,409.12), including N 340,000 from partial and N 710,000 from total condemnations. In total, 200 cattle had condemned livers. These results highlight the financial burden of fascioliasis on livestock production and emphasize the need for effective control measures. The study on Fasciola gigantica infections in cattle reported a 63.00% prevalence (308 cases) of adult parasites in livers and 37.00% (182 cases) of ova in fecal samples. Mixed infections were found in 20.25% (335 cases) of cattle from January to December. Chi-square analysis showed no significant monthly variation (p<0.05), regardless of season. The findings underscore notable economic losses from liver condemnation. To address this, the study suggests regular deworming, improved husbandry, and awareness campaigns, especially in the Federal Capital Territory (FCT), Abuja.

INTRODUCTION

Fascioliasis stands out as a major parasitic disease worldwide, exacerbated by the growing demand for meat to satisfy protein needs (Odigie and Odogie, 2013). This disease is a critical helminthic infection impacting livestock, including domestic and wild ruminants like cattle, sheep, swine, and occasionally humans (WHO, 2001). Cattle have a pivotal role in agriculture, offering essential food products such as milk and meat, as well as industrial materials like horn and hide. Yet, they only account for 30-40% of global beef supplies, largely because of parasitic diseases. Helminthic infections by the genus Fasciola are notably common and reduce livestock productivity (Omoleye et al., 2012). *Keywords:* Fascioliasis, Prevalence, cattle, abattoirs, FCT

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Tackling these parasitic issues is crucial for boosting livestock health and agricultural productivity. Fascioliasis significantly impacts the livestock industry, causing losses cattle economic through deaths. liver condemnations at slaughter, decreased milk and meat yields, secondary infections, and high anti-helminthic treatment costs (Hossain et al., 2011). This parasitic disease undermines livestock productivity and poses considerable economic and public health challenges, adding strain on farming communities and agricultural systems (Raza et al., 2010).

Northern Nigeria always has their fair share of economic loss as a result of fascioliasis and this is often because

stationary water and fadamas ranches are constantly employed as watering and grazing locations during the dry period, giving room for heavy infections (Magaji et-al., 2014). About 32.5 million had been estimated as total cattle losses from fasciola infection in Nigeria (Elelu and Eisler 2018). Based on retrospective abattoir meat inspection records and a perspective meat inspection survey amid 1994 and 2004 for bovine facioliasis, it was discovered that out of 1,640, 095 Slaughtered cattle over eleven year period, 37,828 livers were condemned owing to fascioliasis disease with 2.31% prevalence (CDC, 2018 and Magaji et-al., 2014). Fascioliasis is one of the foremost neglected tropical disease (NTD) economically important to domestic farm animals in precise sheep and cattle and has been found to bring substantial economic liver condemned. Hence, the need for efforts to increase investigation and inspection for adequate mechanism and promising eradication of fascioliasis. This study was, therefore, necessary to establish the degree of economic loss from condemned liver of cattle slaughtered in the six area council of FCT.

MATERIALS AND METHOD

Study area

The study was conducted in the six Area council central abattoirs of Abuja FCT, Nigeria. It is located within latitude 9,072264 and the longitude 7,491302, the GSP coordinates of 9^o 4' 20, 1504 N and 7^o 29' 28 68, 72" E, Abuja is the capital city of Nigeria, it is located in the Centre of Nigeria.

Sample collection and study design

The study design involve observational data from cross sectional survey of slaughtered cows from six area council abattoir of Abuja FCT. The abattoir was visited twice every week for a period of twelve months January to December. The cattle are usually slaughtered between hours 6.30am and 10am before the animals were slaughtered, the sexes of the cattle and age were noted. The liver was examined by making lengthwise incision of the ventral side of the livers in such a way that the bile duct is cut open. Piece of cut fresh infected liver was packed in a jar with 70% ethanol for gross pathology examination. The specimen from each cattle was fully labelled including: sex, age, sampling locations. The specimens obtained was immediately taken to the laboratory of Biological Science Department, university of Abuja. Samples are placed in the refrigerator before analysis.

Examination of traumatized liver samples or Gross pathology examination of liver

Post mortem investigation was carried out in the six area council central abattoir of Abuja FCT. Livers of all the cattle

slaughtered was inspected for the presence of liver flukes and to determine monthly prevalence of fascioliasis at the abattoir. Assessment of the severity of liver lesions was carried out according to Shinggu *et al* (2019), the fasciola fluke recovery was done by cutting the liver into slices to allow mature flukes lodged in the bile ducts to escape out and pressed into sample or specimen bottle containing 70% ethanol for preservation. The flukes from each infected cattle was examined morphologically on the basis of size and shape the affected livers was categorized based on the approached of (14) Talukder *et al* (2010) as follows:

I.Severely infected (totally condemned liver).

- II. Moderately infected (Trimmed)
- III. Partially condemned liver.

Only livers from which more than 20 flukes were isolated / traumatized (damaged) and considered within the scope of this research, were examined and recorded. Those with low infections (1-10 flukes) are moderate infections (11-20) as categorized by Bunza et al (2010) were also examined and recorded separately. Samples of those traumatized livers were also collected in separate specimen bottles also containing 70% ethanol and taken to the refrigerator in the biological science department laboratory for analysis.

Data analysis

Overall prevalence and intensity of parasite damage on the livers were done using descriptive statistics. Statistical comparison of liver damage by fasciola was done to determine the economic loss as a result of traumatic hepatitis due to fascioliasis. Confidence interval at 95% and P-value of<0.05 considered to be significant for every analysis.

RESULTS

In (Table 1), the economic loss from 1 year period of survey was-A 340,000 for partially condemned liver and #700,000 for totally condemned liver respectively. A total of 129 livers were partially condemned while total of 70 livers were totally condemned. In (Figure 1), the economic impact of high burden of fascioliasis is seen from the prevalence of totally condemned liver. partially condemned and trimmed livers. The prevalence for trimmed livers was 75.00%, partially condemned 40.00% and totally condemned is 25.00% respectively. The overall prevalence recorded for fasciola infection over the period of twelve months was 30.00%. The highest prevalence of 40.00% was recorded in the month of May, followed by the month of April with a prevalence of 36.00% respectively. All the high prevalence were recorded in months of dry season as shown in (Table 2). The prevalence of fascioliasis with respect to gender revealed a prevalence of 28.00% among 923 males examined and (31.73%)

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Table 1: The Economic loss for one year period (January – December 202	22)
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Months	Number of cattle examined	Price /kg of Liver N	Number of partially condemned liver. Average weight =2kg	Monetary loss ₩	Number of totally condemned liver. Average weight = 4kg	Monetry Loss ₦
January	120	2,500	5	12,000	3	30,000
February	134	2,500	12	30,000	2	20,000
March	143	2,500	10	25,000	5	50,000
April	154	2,500	15	37,000	6	60,000
May	135	2,500	17	42,000	8	80,000
June	153	2,500	8	20,000	3	30,000
July	141	2,500	10	25,000	7	70,000
August	136	2,500	7	17,000	5	50,000
September	120	2,500	10	20,000	7	70,000
October	135	2,500	12	30,000	6	60,000
November	130	2,500	12	30,000	8	80,000
December	153	2,500	11	27,000	10	100,000
Total	1,654		129	340,000	71	700,000



Figure 1: The degree of damage to the liver of slaughtered cattle over period of 12 months.

Table 2: Prevalence of Fascioliasis in slaughtered cattle of the FCT abattoir over period of one year (January to December 2022).

Months	Male No.		Female No.		Total No.	
2022	Examined	No. infected	Examined	No. Infected	Examined	No. Infected
JANUARY	70	21(30.00%)	50	12(24.00%)	120	33(27.50%)
FEBRUARY	80	22(27.50%)	54	12(22.00%)	134	34(25.37%)
MARCH	77	25(32.47%)	66	23(35.00%)	143	48(33.60%)
APRIL	90	30(33.00%)	64	26(40.60%)	154	56(36.00%)
MAY	75	30(40.00%)	60	26(43.00%)	135	55(40.74%)
JUNE	80	22(27.50%)	73	21(28.77%)	153	43(28.10%)
JULY	74	18(24.32%)	67	19(28.30%)	141	37(26.24%)
AUGUST	76	11(14.47%)	60	16(26.67%)	136	27(19.85%)
SEPTEMBER	66	20(30.30%)	54	14(26.00%)	120	34(28.00%)
OCTOBER	70	17(24.30%)	65	15(23.00%)	135	32(24.00%)
NOVEMBER	75	18(24.00%)	55	20(36.36%)	130	38(29.00%)
DECEMBER	90	25(27.77%)	63	28(44.44%)	153	53(34.64%)
TOTAL	923	259(28.00%)	731	231(31.73%)	1,654	490(30.00%)

infection among 731 females examined in the period of study as shown in (Table 2). The male cows has highest prevalence of 40.00% in the month of May while 44.00% highest prevalence was found amongst female cows in the

month of December (Figure 2).In Figure 3, prevalence of recovered adult fasciola gigantic showed 63.00% prevalence rate while presence of the parasite ova found in the stools gave prevalence of 37.00%.



Figure 2: Gender specific prevalence of fascioliasis in slaughtered cattle of the FCT abattoir.



Figure 3: The Prevalence of adult Fasciola compared to prevalence of eggs in the feacal samples of slaughtered cattle in FCT abattoirs.

Table 3: Prevalence of mixed infection (co - infection) observed in faecal sample of slaughtered cow in FCT

Parasites	N= 731	N=923	N= 1654	
	female number	male number	male and female	
	infected/percentage	infected/percentage	number infected	
F.g + T.S	50 (6.84)	45 (5.00)	95 (5.00)	
F.g + A.l	10 (1.37)	17 (1.84)	27 (1.63)	
F.g + P,specie	10 (1.37)	18 (2.00)	28 (2.00)	
F.g + HW	40 (6.00)	35 (4.00)	75 (5.00)	
F.g + T,S + A.I	35 (5.00)	25 (2.7)	60 (4.00)	
F.g + HW + TS	20 (2.74)	30 (2.35)	50 (3.00)	
TOTAL	165 (22.5)	170 (18.62)	335 (20.25)	

Key: T.S - Taenia Solium, A.I – Ascaris lumbricoides, H.w – Hookworm P, specie – Paragonimus specie

Percentage prevalence of adult worms and the eggs

The distribution of parasites ova or eggs observed in the feacal samples showed that out of 456(28.00) infected, 335(20.25%) had co – infections (polyparasitism). The male cows had 22.00% mixed infection while 18.00% of female slaughtered cows had mixed infection (Table 3). In the double co-infection, we observed (5.00%).00% for F. gigantica and Taenia Solium, 1.63% (1.63%) F. gigantica and Ascaris lumbricoides, 2.00% for F. gigantic and Paragonimus species, 5.00% F. gigantic and Hookworm

respectively. The triple co-infection showed 4.00% prevalence for F. gigantica, Teania Solium, Ascaris lumbricoides and 3.00% for F. gigantic, Hookworm and Teania Solium as presented.

DISCUSSION

This study recorded a prevalence of 490(30.00%) among cattle slaughtered in FCT, out of a total of 1,654 cows examined in twelve months (January – December). Aliyu *et-al.*, (2014) reported that the prevalence of fascioliasis in

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the Tropics region is usually between 30-90%, from this study 30.00% is much lower compared to the report of Oyebanji et-al (2020) from the university of Ibadan where prevalence of 56.00% was recorded. According to Ibivi etal 2017, the low prevalence of infection might be due to the low presence of intermediate freshwater snail host of F, gigantic in the locality where cattle are brought from. Studies in Southern Nigeria Onitsha and environs had prevalence of infection to be 10.51%, Ekwunife and Eneaya (2006), which is less value to this study. This might be due to differences in the pasture eaten and the prevailing environmental factors in the country. Another reason might be difference in the resistance to infection because of host breed and grazing style might also cause the varying differences in prevalence rate of Fascioliasis (lyaji et al., 2019). There is great economic loss due to damage done to livers by F. gigantica. According to Oyebamiji et al (2020), 25.00% or above prevalence for liver samples is a signal of the level of infection. The affected animal liver are damaged or condemned rendering them unhealthy for consumption and unfit for sale. From the result in (Table 2), we have 26.00% partially condemned liver and 59.00% trimmed liver and 14.00% of totally condemned livers. This show great level of economic loss due to Fascioliasis. The egg and adult Fasciola gigantica were encountered respectively in the survey period correlating the eggs and adult of F. gigantica when one increases, the other decreases. From the survey period 63.00% of adult flukes were recovered while eggs/ova observed in microscope was 37.00%. This prevalence informs us of potential damage that was done to the liver making it unhealthy for consumption leading to economic loss for the header, marketer and consumers, Iboyi et al 2017. The high incidence of liver damage in cattle is largely due to immature flukes damaging the liver during their migration to the bile ducts (Shinggu et al., 2019). Mixed infections with multiple parasites may result from favorable environmental conditions supporting parasite survival. Poor management practices also heighten cattle's vulnerability to co-infections (Oyemamiji et al., 2020).

Conclusion

The study reports a notable (30.00%) 28% prevalence of Fascioliasis in Abuja's Federal Capital Territory, primarily due to cattle imported from northern states. Extensive liver damage attributable to Fasciola, with adults found in 63% and eggs in 37% of the cattle, results in 14.25% of livers being condemned, causing significant economic loss. If unaddressed, this trend could increase human Fascioliasis risk, posing further economic repercussions. It's crucial for animal and public health professionals to educate herders on regular deworming with suitable anthelmintics. Such proactive efforts are essential for protecting animal and public health while minimizing economic impacts. To manage parasitic infections effectively, treatment should

be administered to animals before and after the rainy season. Controlling snail vectors with molluscicides or biological agents is essential to reduce disease transmission. Properly managing grazing areas and watering sites by preventing contamination and overgrazing is also critical. These practices promote healthier livestock, minimize infections, and support sustainable agriculture.

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