

Knowledge, Attitude and Practice of Fascioliasis In Abattoirs: Implication For Public Health In Osun State, Nigeria

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ABSTRACT

Fascioliasis is a livestock parasite causing significant economic and public health concerns. A cross-sectional survey of 225 butchers and meat sellers in Osun State assessed livestock sources, inspection practices, treatment methods, snail control, and disease perceptions. Most respondents were male (97.3%), aged 30–60 (68.9%), and educated to at least secondary level (68.4%). Cattle, the sole livestock slaughtered, originated from neighboring states (43.6%) or combined neighboring and imported sources (33.8%). Veterinary pre-slaughter inspection was reported by 98.7%, and post-slaughter liver inspection by 96.9%. Fascioliasis was observed occasionally (57.3%) or rarely (41.3%), causing liver condemnation in up to 30% of cases. Detection relied on visual signs: enlarged/damaged livers, poor body condition, and anemia. While 73.8% of livestock received pre-slaughter deworming, schedules were irregular. Snail control measures were uncommon on farms and at abattoirs. All respondents recognized the economic impacts of fascioliasis, including liver condemnation, reduced meat quality, and lower market value. Public health risks were acknowledged, with organ condemnation acting as the primary preventive measure. Most workers (90.2%) had received training, and 90.2% were willing to undergo further training. The study demonstrates good awareness and positive attitudes toward fascioliasis, but preventive practices remain inadequate. To reduce disease burden and associated losses, the study recommends strengthened education, regular deworming programs, and targeted snail control strategies.

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INTRODUCTION

Fascioliasis, caused by liver flukes of the genus *Fasciola* (*Fasciola hepatica* and *Fasciola gigantica*), is a significant zoonotic disease that affects both humans and livestock particularly in tropical and subtropical regions. Globally, fascioliasis is recognized as an important Neglected Tropical Diseases (NTD) with millions of people at risk of infection, particularly in areas where there is a close interaction between humans, livestock, and snail habitat (WHO, 2020). The disease is endemic in 61 countries and has become a food-borne infection of public health importance in several parts of the world such as the Ecuador, Peru, the Nile Delta of Egypt, Africa, America, Asia, Australia, Europe and others.

The severity of animal fascioliasis affects animals to different extents, depending on the host and parasitic burden. The clinical signs vary from asymptomatic to a devastating disease including death, and causes heavy economic losses (Mazeri,

2017). Similarly, the infection results in substantial health and economic burdens, particularly in developing countries where livestock farming is a critical source of livelihood (Mas-Coma *et al.*, 2009; Walker *et al.*, 2011). It is a disease that affects the liver and other associated organs.

Fascioliasis is endemic in Nigeria and one of the most common causes of abattoir liver condemnation. The entire cost of cattle losses in Nigeria due to *Fasciola* infection is estimated to be N18.3 billion (Elelu and Eisler, 2018). According to a review of Nigerian abattoirs, fascioliasis was responsible for roughly 70% of organ condemnation, primarily livers (Elelu and Eisler, 2018). Nigeria is threatened by food insecurity and poverty because of its rapidly rising population, which may be addressed by a better-developed animal production industry, as well as other areas (Fasoyiro and Taiwo, 2012).

Additionally, the prevalence of Fascioliasis in cattle has been reported from different parts of Nigeria. There are also several reports on the prevalence and seasonal variations for fascioliasis in cattle across the country. These reports are majorly concentrated in the northern part of the country including Maiduguri, Sokoto, Adamawa, Sokoto and others. However, in the southwest, including Osun State, there is still a paucity of reports despite the widespread of abattoir and livestock consumption.

Additionally, there is currently no epidemiological data on fascioliasis in Osun State despite the multiplicity of abattoir and consumption of livestock, an important risk factor in the disease transmission. Therefore, the present study seeks to know the knowledge, attitude and practices of the butchers and meat seller to fascioliasis in Osun State.

MATERIALS AND METHODS

The Study Area

The study was conducted within the three senatorial district (Osun West, Osun East and Osun Central) in Osun State Nigeria. Two local governments (LGs) from each of the senatorial district were purposively selected to include a rural and an urban LG in addition to the presence of abattoir. Osun State is located in southwestern Nigeria, occupying a land area of approximately 9,251 square kilometers. Bordered

by Kwara State to the north, Ekiti and Ondo States to the east, Ogun State to the south, and Oyo State to the west, Osun is centrally positioned within the Yoruba cultural region, which has shaped much of its demographic and socio-cultural landscape (National Population Commission, 2006; Akinyemi and Olaniyan, 2017).

The terrain in Osun is predominantly undulating, with elevations generally ranging between 300 and 600 meters above sea level, punctuated by hills and inselbergs, particularly in the northeastern parts around the Ilesa and Osogbo areas. The climate is tropical, characterized by a distinct wet season (March to October) and dry season (November to February), with average annual rainfall between 1,000 mm and 1,500 mm, supporting rich vegetation and diverse wildlife, primarily in forest and savannah ecosystems (Ojo et al., 2019).

Osun State is traversed by rivers and streams, with the Osun River being a significant watercourse, flowing southwestward and giving its name to the state. These water bodies provide resources for agriculture and rural livelihoods, especially for communities engaged in farming, fishing, and small-scale trade (Olaniran, 1983). The agricultural sector is central to the state’s economy, contributing to both food security and income generation, particularly in rural areas.

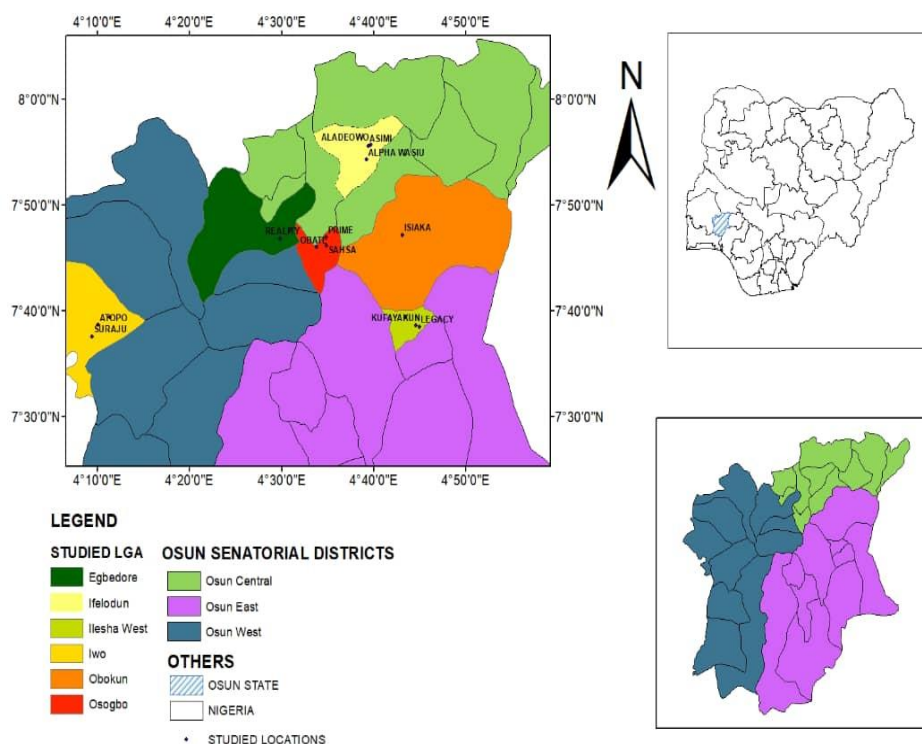


Figure 1: Map showing the Fifteen (15) Abattoirs Location in their Respective Local Government Areas in Osun State

Sampling Technique

A descriptive cross sectional study design was employed for this study where fifteen abattoirs were used, three abattoirs were selected in each local government but fifteen consented in total, six local governments areas were chosen on purposive sampling of one rural and one urban in other to make a compare between the two regions.

Sample Size

The sample size was determined according to the standard technique of sample size determination given by Thursfield (Thursfield, 1995). The sample size for the study was calculated to be 440, using 50% assumed prevalence with 10% additional contingency. 225 participants consented to participate in the study with 15 participant from each location.

$$\frac{1.96^2 [P \exp (1 - p \exp)]}{D^2}$$

Data Collection

Questionnaires were administered to the workers in the abattoirs in order to know their perception, knowledge about Fascioliasis and its treatment. The questionnaire contains the following sections; The demographic information about the abattoir such as abattoir name, location, type and number of animals slaughtered per day as well as the role of respondents in the abattoir. Questions related to the livestock characteristics, fascioliasis prevalence and diagnosis, the knowledge of the respondents about fascioliasis were all included in the questionnaire.

Data Analysis

Data generated from the survey were entered into an excel sheet and descriptive statistics was used to analyze features, such as percentage and frequency distribution, to describe the socioeconomic characteristics of butchers; their level of awareness, attitude, perception; and the quality control measures adopted against Fascioliasis in the selected abattoirs.

Ethical Approval

The ethical approval for the study was obtained from the ministry of Agriculture and Food Security, with the approval number: VD.19/601/42.

RESULTS AND DISCUSSION

Demographic Information of Butchers in the Study Area

The results obtained for the demographic information of butchers in the study area is presented in Table 1 below. The demographic profile of butchers in Osun State showed that the majority were within the 30–60 years age group (68.89%), while 29.33% were aged 30 years and below, and only 1.78% were above 60 years. Butchering was predominantly a male occupation, with 97.33% being male and only 2.67% female. Religious affiliation revealed that most respondents practiced Islam (98.22%) while a small proportion identified as Christians (1.78%). Marital status indicated that the majority were married (82.67%), while 17.33% were single. Educational attainment varied, with most butchers having completed secondary education (68.44%), followed by primary education (22.22%), tertiary education (8.44%), and a very small proportion with no formal education (0.89%). Occupationally, the respondents were primarily butchers (91.11%), with a smaller group identifying as meat sellers (8.89%). None reported being veterinarians. Years of experience in the trade showed that 51.11% had worked for 10 years or less, 34.67% had between 11–20 years of experience, and 14.22% had more than 20 years of experience.

Table 1: Demographic Information of Butchers in Osun State (n = 225)

Variables		Frequency	Percentage
Age	30 years and below	66	29.33
	30-60	155	68.89
	>60years	4	1.78
Total		225	100
Sex	Male	219	97.33
	Female	6	2.67
Total		225	100
Religion	Christianity	4	1.78
	Islam	221	98.22
Total		225	100
Marital Status	Single	39	17.33
	Married	186	82.67
	Widow/Widower	0	
	Separated	0	
Total		225	100
Educational Level	No Formal Education	2	0.89
	Primary Education	50	22.22
	Secondary Education	154	68.44
	Tertiary Education	19	8.44
Total		225	100
Occupation	Veterinary	0	
	Butcher	205	91.11
	Meat Seller	20	8.89
Total		225	100
Years of Experience	10 years and below	115	51.11
	11-20	78	34.67
	>20	32	14.22
Total		225	100

Livestock Characteristics

Table 2 below shows the information about the animals to be slaughtered. At the abattoir studied, the primary livestock slaughtered were cattle (100%), with no reports of sheep, goats, or other species being processed.

Regarding the sources of livestock, the majority were obtained from neighboring states (43.56%), while 33.78% came from a combination of neighboring states and imported sources. A smaller proportion originated from local farms and

neighboring states (21.78%), and only 0.89% were sourced exclusively from local farms.

Table 2: Livestock Characteristics (n = 225)

Variables		Frequency	Percentages
What types of livestock are mainly slaughtered at this abattoir	Cattle	225	100
	Sheep	0	
	Goat	0	
	Others	0	
Total		225	100
Where do most of the livestock slaughter here come from	Local farms and Neighboring states	49	21.78
	Neighboring states	98	43.56
	Neighboring states and Imported	76	33.78
	Local farms	2	0.89
Total		225	100

Inspection and Identification of Fascioliasis

Table 3 below shows the information about Inspection and Identification of Fascioliasis and Treatment Practices.

Inspection and Identification of Fascioliasis

Livestock inspection practices at the abattoir showed that 98.67% of animals were examined by a veterinarian prior to slaughter, while only 1.33% were not. Fascioliasis was identified occasionally in 57.33% of cases, rarely in 41.33%, and frequently in 1.33%. Post-slaughter liver inspection was carried out in 96.89% of cases, with 3.11% indicating no such practice. Condemnation of livers due to fluke infections was reported as less than 10% in 60% of cases, 10–20% in 33.33%, and more than 30% in 6.67%, with no reports of condemnation between 20–30%.

All respondents (100%) confirmed that liver fluke presence was determined through visual inspection of the liver. The most common signs of fascioliasis observed included

enlarged or damaged liver with poor body condition and anemia (47.56%), enlarged or damaged liver alone (29.78%), enlarged or damaged liver with anemia (6.67%), poor body condition with deformities (7.11%), and anemia alone (2.22%).

Treatment Practices

Treatment practices indicated that 73.78% of livestock were treated for liver fluke infections before slaughter, while 15.56% were not, and 10.67% were uncertain. Among those treated, the most common method was deworming (51.93%), followed by general treatments (24.86%), antibiotics (8.29%), unspecified drugs (5.52%), injections (1.10%), and a small proportion who did not know (8.29%). Supplier reporting practices showed that 43.66% dewormed occasionally, 38.97% did not know, 13.62% reported never, and only 3.76% indicated regular deworming every 3–6 months.

Table 3: Prevalence of Fascioliasis in Cattle (n = 225)

Variables		Frequency	Percentages
Are livestock inspected by a veterinarian before slaughter	Yes	222	98.67
	No	3	1.33
Total		225	100
If YES, how often is fascioliasis identified in animals	Occasionally	129	57.33
	Rarely	93	41.33
	Frequently	3	1.33
Total		15	100
Are animal livers inspected post-slaughter for evidence of liver flukes	Yes	218	96.89
	No	7	3.11
Total		225	100
If YES, what percentage of animals have their livers condemned due to liver fluke infections	Less than 10%	135	60
	10 – 20%	75	33.33
	20 – 30%	0	
	More than 30%	15	6.67

Variables		Frequency	Percentages
Total		225	100
How do you confirm the presence of liver flukes in slaughtered animals	Visual inspection of liver	225	100
Total		225	100
What are the most common signs of fascioliasis in livestock observed at the abattoir	Enlarged or damaged liver	67	29.78
	Enlarged or damaged liver and Anemia or pale mucous membranes	15	6.67
	Enlarged or damaged liver and Poor body condition, Anemia or pale mucous	107	47.56
	Anemia or pale mucous, liver	5	2.22
	Poor body condition and deformity in other parts of the body	16	7.11
	Enlarged/damaged liver, poor body condition	15	6.67
Total		225	100
Are livestock treated for liver fluke infections before being brought to the abattoir	Yes	166	73.78
	No	35	15.56
	Don't know	24	10.67
Total		225	100
If YES, what treatment is most commonly used	Deworming	94	51.93
	Antibiotics	15	8.29
	Treatment	45	24.86
	Injection and Drugs	15	8.29
	Drug	10	5.52
	Don't know	2	1.10
Total		181	100
How often do livestock suppliers report deworming their animals before sending them for slaughter	Regular (every 3 – 6 months)	8	3.76
	Occasionally	93	43.66
	Never	29	13.62
	Don't know	83	38.97
Total		213	100

Snail Control Measures

Table 4 below shows the snail control measures. Awareness of snail control measures (chemical or biological) on farms supplying livestock to the abattoir was low. Only 13.33% of respondents reported awareness of such practices, while the

majority, 62.22%, indicated that no snail control measures were practiced, and 24.44% were unsure. At the abattoir level, specific snail control measures were even less common, with only 6.67% reporting such practices compared to 93.33% who indicated none.

Table 4: Snail Control (n = 225)

Variables		Frequency	Percentages
Are you aware of any snail control measure (chemical, biological) being practiced on the farms supplying livestock to the abattoir	Yes	30	13.33
	No	140	62.22
	Not sure	55	24.44
Total		225	100

Economic and Public Health Impacts

Table 5 below shows the Economic and public health impacts of fascioliasis were widely recognized. All respondents (100%) reported observing economic losses related to liver

infections at the abattoir. The types of losses incurred included condemned livers alone (40.89%), condemned livers combined with poor quality meat (27.56%), condemned livers with reduced market value of infected livestock (18.22%), and

condemned livers, poor quality meat, and reduced market value simultaneously (6.67%). Additionally, 6.67% reported losses involving condemned livers and lungs.

Beyond direct economic losses, fascioliasis was reported to have significant public health implications. All respondents (100%) agreed that the presence of fascioliasis negatively affects meat sales and consumer confidence.

Table 5: Economic and Public Health of Fascioliasis (n = 225)

Variables		Frequency	Percentages
Have you observed any economic losses related to liver infections at the abattoir	Yes	225	100
	No	0	0
Total		225	100
If YES, what type of losses have been incurred	Condemned livers	92	40.89
	Poor quality meat		
	Reduced market value of infected livestock		
	Condemned livers and Poor quality meat	62	27.56
	Condemned livers and Reduced market value of infected livestock	41	18.22
	Condemned livers, Poor quality meat and Reduced market value of infected livestock	15	6.67
Total	Condemned livers and lung	15	6.67
		225	100
Does the presence of fascioliasis affect the sale of meat or consumer confidence	Yes	225	100
	No		
Total		225	100

Public Health Concerns and Training for Prevention

Table 6 below shows the public health concerns and training for fascioliasis prevention. All respondents (100%) acknowledged public health concerns regarding the consumption of meat from animals infected with fascioliasis. To ensure meat safety, the universal precaution reported was the condemnation of infected organs (100%).

In terms of government or local interventions, 75.11% of respondents indicated the existence of programs for controlling liver fluke infections in livestock, while 3.11% reported no such programs, and 21.78% were unsure.

When asked about measures that could improve fascioliasis control, the majority suggested treatment (75.11%), followed by drug administration (18.22%) and injections (6.67%).

Training and awareness were also emphasized. Most abattoir staff (90.22%) were reported to be trained to recognize signs of fascioliasis, while 9.78% were not. Additionally, 61.78% of respondents had received training or workshops on the identification and management of liver fluke infections, whereas 38.22% had not. Educational programs for livestock suppliers were reported by 51.11%, with 42.22% indicating none, and 6.67% uncertain.

Finally, there was strong interest in further capacity building, as 90.22% expressed willingness to receive more information or training on fascioliasis management and control, compared to 9.78% who were not interested.

Table 6: Public health concern of Fascioliasis and Training for prevention (n = 225)

Variables		Frequency	Percentage
Are there any public health concerns regarding the consumption of meat from animals	Yes	225	100
	No	0	0
Total		225	100
If YES, what precautions are taken to ensure the meat is safe for consumption	Condemnation of infected organs	225	100
		225	100
Are there any government or local programs for controlling liver fluke infections in livestock in your area	Yes	169	75.11
	No	7	3.11
	Not sure	49	21.78
Total		225	100

Variables		Frequency	Percentage
Are there any specific snail control measures being practiced at or around the abattoir to reduce the intermediate host of Fasciola	Yes	15	6.67
	No	210	93.33
Total		15	100
What measure do you believe could improve the control of fascioliasis at abattoirs and in livestock farming	Treatment	169	75.11
	Drug Administration	41	18.22
	Injection	15	6.67
Total		225	100
Are the staff at the abattoir trained to recognize signs of fascioliasis	Yes	203	90.22
	No	22	9.78
Total		225	100
Have you received any training or workshops on the identification and management of liver fluke infections	Yes	139	61.78
	No	86	38.22
Total		225	100
Are there educational programs in place for livestock suppliers to learn about the prevention and control of liver flukes	Yes	115	51.11
	No	95	42.22
	Don't know	15	6.67
Total		225	100
Would you be interested in receiving more information or training on fascioliasis management and control?	Yes	203	90.22
	No	22	9.78
Total		225	100

Discussion

The demographic profile of butchers in Osun State revealed that most were men in their productive age group (30–60 years) with at least secondary education. This literacy level is important, as education has been shown to influence meat hygiene practices and disease recognition among butchers and meat sellers in Nigeria (Izunobi *et al.*, 2023). The predominance of Islam as the main religion reflects the sociocultural context of the region, which may also shape attitudes toward meat handling and hygiene practices.

Knowledge of fascioliasis was evident, with butchers able to identify clinical signs such as enlarged or damaged livers, poor body condition, and anemia. Similar findings have been reported in Nsukka and Ilorin, where butchers demonstrated awareness of meat hygiene and disease indicators (Kehinde *et al.*, 2020). However, reliance on visual inspection alone is a limitation, as subclinical infections may go undetected. Studies in Abia and Abuja have highlighted that while visual inspection is practical, it cannot detect early infections, leading to underestimation of disease prevalence (Ogbaje *et al.*, 2025).

Attitudes toward fascioliasis were shaped by its economic and public health consequences. All respondents acknowledged financial losses from liver condemnation, poor meat quality, and reduced market value. This is consistent with reports from Maiduguri and Abuja, where fascioliasis caused substantial economic losses through liver condemnation and reduced productivity (Liba *et al.*, 2017; Ogbaje *et al.*, 2025). The unanimous recognition that fascioliasis undermines consumer confidence reflects a responsible attitude toward meat safety,

aligning with findings that butchers perceive zoonotic diseases as threats to their livelihood and consumer trust (Bello *et al.*, 2023).

Practices, however, revealed gaps. While most butchers reported treating livestock before slaughter, treatment schedules were irregular, and many suppliers were uncertain about deworming. Snail control measures were rarely implemented, despite their importance in breaking the transmission cycle. This weakness mirrors findings from North-central Nigeria, where snail-borne fascioliasis remains endemic due to poor environmental management and limited control measures (Salman, 2025).

Training and education emerged as pivotal. Most abattoir staff had received training, but fewer livestock suppliers had access to educational programs. This discrepancy reflects broader national trends, where abattoir workers often receive informal training while farmers and suppliers remain under-informed (Izunobi *et al.*, 2023). Encouragingly, the majority expressed interest in further training, indicating a positive attitude toward capacity building.

Overall, the study demonstrates that butchers and meat sellers possess strong knowledge and responsible attitudes toward fascioliasis, but their practices remain inadequate. This gap between knowledge and practice underscores the need for integrated interventions that combine education, consistent treatment, and environmental management.

CONCLUSION

Fascioliasis continues to pose significant economic and public health challenges in Osun State. Butchers and meat sellers are

knowledgeable and recognize its impact, but inconsistent treatment and poor snail control practices hinder effective management. Strengthening training, improving diagnostic capacity, and integrating environmental control measures are essential to reduce the burden of fascioliasis.

Authors' Contributions Statement

AAM, SOA and IGO designed the study and wrote the manuscript. IGO, AIO, JGB, IZO, DOG, AOO, and AQO performed the field work. AAM, SOA, BLO, AND ADI reviewed the manuscript. BLO, BAS and IGO analyzed the data. AAM, SOA, FKA, and RAM supervised the project.

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