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# PREVALENCE OF FASCIOLOSIS IN SMALL RUMINANTS: A CASE STUDY AT SOKOTO MAIN ABATTOIR

***Shehu, Z[a1]., Dinawa, A.J. [a], Mungadi, H.U.,[a], Ahmad, U.S.,[b], Bodinga, A.H,[b]., Dalijan, K.[c] and Zaharaddeen, M.M. [d]**

[a]Department of Veterinary Medicine, Faculty of Veterinary Medicine, Usmanu Danfodiyo University, Sokoto, Nigeria
[b]Department of Veterinary Surgery and Radiology, Faculty of Veterinary Medicine, Usmanu Danfodiyo University, Sokoto, Nigeria
[c]Department of Veterinary Parasitology and Entomology, Faculty of Veterinary Medicine, Usmanu Danfodiyo University, Sokoto, Nigeria
[d]Ministry of Animal Health and Fisheries Development, Sokoto state.
Corresponding author: Department of Veterinary Medicine, Faculty of Veterinary Medicine, Usmanu Danfodiyo University, Sokoto, Nigeria Phone: 08034652090,
Email: shehu.zaid@udusok.edu.ng , zyd024@gmail.com

## ABSTRACT

Fasciolosis, caused by the liver fluke *Fasciola spp*., is a significant parasitic disease affecting small ruminants worldwide. This study aimed to determine the prevalence of fasciolosis in small ruminants slaughtered at the Sokoto Main Abattoir using a Fluke Finder Kit. A cross-sectional study design was employed, and 308 small ruminants (sheep and goats) were randomly selected for examination. The Fluke Finder Kit was utilized to identify the presence of *Fasciola gigantica* eggs in the faeces of the slaughtered animals. The overall prevalence of fasciolosis was 0.97% in the sampled small ruminants. Of the positive cases, the specific prevalence rates were 0.33% in sheep and 0.64% in goats. A statistically significant association was found between age and the infection in sheep. The use of the Fluke Finder Kit proved to be an effective method for detecting the presence of *F. gigantica* eggs in the faeces of the animals. Further research is recommended to investigate the seasonal variation in the prevalence of fasciolosis. In addition, studies focusing on the economic impact of fasciolosis and the effectiveness of different control strategies would provide valuable insights into the management and prevention of this parasitic infection in small ruminants.

Keywords: Fasciolosis; *F. gigantica*; Fluke finder kit; ruminants; Prevalence.

## INTRODUCTION

Fasciolosis is one of the main parasite diseases that affect farm animals; it has a direct and indirect financial impact on the production of livestock, especially sheep and cattle (Keyyu *et al.*, 2005; Menkir et al., 2007). One of the main reasons for significant financial losses resulting from liver condemnation in the big ruminant (Soulsby, 1982) and small ruminant industries (Kamani *et al.*, 2007) sectors is fascioliosis. The majority of the findings relied on information obtained covertly from abattoir records, indicating that fasciolosis is prevalent among sheep in Maiduguri, Nigeria (Kamani *et al.*, 2007) and Enugu, Nigeria (Okoli *et al.*, 2000). Animals of diverse ages and nutritional levels can exhibit the clinical characteristics of the acute and subacute forms (Soulsby, 1982). Nonetheless, the chronic type, which is most prevalent in humans and ruminants, is brought on by ingesting a small number of metacercaria over an extended period (Soulsby, 1982).

The illness often progresses for two to three months before killing the patient; the less fortunate ones are sold for meat (Ibrahim *et al.*, 2001). Two subtypes of fasciolosis pathology exist: hyperplasia colangitis and hepatic fibrosis (Rushton and Murray, 1977). As a result of immature flukes migrating through the liver, migratory tracts are created. Within these tracts, the liver parenchyma is traumatised, resulting in bleeding and necrosis (Soulsby, 1982). The parasite reproduces via the redia, sporocyst, and cercarial stages in a tropical environment where there is a relative abundance of Lymnia spp., the mollusc intermediate host (Peter, 1997). Ruminant fasciolosis is often associated with two liver flukes, namely Fasciola hepatica and Fasciola gigantica. Snails serve as an intermediate host in the life cycle of these trematodes (Walker *et al.*, 2008). Furthermore, fasciolosis is currently acknowledged as a newly discovered human illness. According to estimates from the World Health Organisation (WHO), 180 million individuals are at

risk of contracting fasciolosis and 2.4 million people currently have the infection (Anon, 1995).

Animals with the infection may not acquire weight well, and dairy cattle may produce less milk and can develop metabolic disorders (Mason, 2004). In addition to its global economic and veterinary significance, fasciolosis has recently been demonstrated to be a zoonotic disease that is spreading and re-emerging and that affects a large number of people (Esteban *et al.,* 2003). The disease is also considered among the primary reasons for the significant economic losses incurred by the ruminant industries as a result of liver condemnation (Kamani *et al.*, 2007).

**Occurrence and Geographical Distribution**

Fasciolosis is a widespread illness that is highly prevalent in Nigeria. Babalola *et al.* (1976) reported a prevalence of 19.5% in livestock found in north-central Nigeria. Ikeme and Obioha, (1973) reported a prevalence of 39% in sheep and goats found in eastern Nigeria. In a study conducted in Maiduguri, 80% of the cattle were confirmed positive for the infection (Biu *et al.*, 2006). Fascololosis prevalence in cattle in Zaria, Kaduna state, was reported by Schillhorn *et al.* (1980) to be 65.4%. Adedokun *et al.* (2008) found that, among 1000 cattle slaughtered at the Bodinga Municipal Abattoir in Sokoto, the prevalence rate of fasciolosis was 33.5% for faecal examination and 38.9% for bile examination.

The study aims to detect *fasciola gigantica* eggs in small ruminants slaughtered at Sokoto main abattoir and the objectives are:

1. To determine the prevalence of *fasciola gigantica* in sheep and goats slaughtered at the Sokoto main abattoir.
2. To determine the risk factors (spp, breed, sex, and age) if any, associated with the occurrence of *fasciola gigantica* infection in the study.

## MATERIALS AND METHODS

**Study area**

Sokoto is situated in the northernmost region of Nigeria. An estimated 3 million cattle, 3 million sheep, 5 million goats, 4600 camels, and many types of both domestic and foreign poultry inhabit the state (MOCIT, 2002; Mamman, 2005). The study was carried out in the main abattoir in Sokoto, which is situated in the neighborhood known as Kasuwan Daji on the outskirts of the city off the Western By-Pass road. Due to the abattoir's highland location, adjacent farmlands can easily receive the wastewater runoff (Mamman *et al.*, 2000).

**Study Design**

A cross-sectional study and a systematic random sample technique were utilized. Every fifth animal that enters the slaughter hall was chosen for closer examination. All breeds, ages, and species of small ruminants that were scheduled for slaughter were taken into consideration for sampling. Data on the animals sampled, including age and sex, were entered into a data form.

**Sample size determination**

The sample size was estimated using the formula described by (Thrusfield, 2007).

$N = [Z^2 P (1 - P)]/d2$ where

N = Required Sample Size

P = Prevalence rate from an earlier study;

Z = Standard normal deviation at 95% confidence interval (1.96). A previous small ruminant prevalence in Maiduguri, Nigeria of 27% by Mbaya *et al.* (2004) was used.

d= desired absolute precision (0. 05).

A total sample size of 303 was computed. The sample size was raised to 308 for precision.

**Sample collection and Transportation**

As soon as the animals were slaughtered, faeces samples were taken straight from the rectum using clean hand gloves, and the animal data were noted. The samples were delivered to the parasitology laboratory of the Usmanu Danfodiyo University in Sokoto for faecal analysis using a sterile, clearly labeled plain sample bottle. When gathering and transporting the sample, precautions were taken to prevent contamination.

**Test procedure**

Two units of the fluke finder were assembled and positioned upright on top and the screens were moistened by running water through the top by holding the combined pieces at a slight angle with the vent holes facing up.

Thirty milliliters (approximately 1/4 cup) of water were mixed with two grams (about 1/2 teaspoon) of feces in a plastic cup and then poured into the upper section and the column was partially filled under the cold running tap units.

This process was repeated three times; the top unit was separated from the bottom, allowing the backwashing of debris (waste) from the top section into the sink until it was clean and the bottom unit was inverted over a beaker; the eggs and debris from the screen were backwashed into the beaker using a strong stream from a squirt bottle of water.

The supernatant was transferred into a test tube and allowed to settle for about 3-4 minutes from the beaker and it was then slowly poured from the tube without disturbing the sediment. The tube was then refilled, ensuring that the sediment was well dispersed and allowed to stand for only 2 minutes, and the supernatant from the tube was poured.

After discarding the supernatant, a pipette was used to place 1-2 drops of the sediment on a glass slide with a drop of methylene blue. The slide was cover-slipped, and the presence or absence of eggs was examined under a light compound microscope. The addition of a drop of methylene blue dye significantly enhanced the viewing and the fluke finder was thoroughly rinsed to ensure the accuracy of the next assay.

**Data Analysis**

The data obtained from this study were subjected to descriptive and inferential statistics (Chi-square test) to determine the association of the variables (age, sex, and breed) with the presence of *F. gigantica.* A value of $p<0.05$ was considered significant in the studies, and statistical software 'SPSS' version 22.0 was used for the statistical analysis

**RESULTS**

In this study, a total of 308 fecal samples obtained from the main Sokoto abattoir underwent examination using the fluke finder technique for the detection of Fasciola eggs. Out of the 308 samples examined, only three tested positive, indicating a Fasciola prevalence of 0.97%, as illustrated in Table 1.

Table 2 displays the breed-specific prevalence of fasciolosis in goats. The breakdown reveals that Sahelian goats had a higher prevalence (12.5%) compared to Red Sokoto goats, which showed a prevalence of 1.4%. The Fisher's exact test did not yield significance at the 5% level, as the p-value exceeded 0.05 (2.182).

Table 2 outlines the age-specific prevalence of goat fasciolosis. The findings indicate that young goats had a higher prevalence of 6.6% compared to adults, who displayed a prevalence of 1.5%. The Fisher's exact test did not show significance at the 5% level, with a p-value exceeding 0.05 (1.603).

Regarding sex-specific prevalence in goats, all positive samples were found in females, resulting in a prevalence of 3.1% (Table 2). Fisher's exact test did not reveal significance at the 5% level, with a p-value exceeding 0.05.

Table 3 provides insights into the prevalence of sheep fasciolosis based on breed. Only Balami sheep showed a positive prevalence (0.5%). The Fisher's exact test was significant at the 5% level, as the p-value was less than 0.05 (0.045).

The age-specific prevalence of sheep, as depicted in Table 6, showed that all positive samples were found in adults (0.5%), with no prevalence observed in the young. The Fisher's exact test did not indicate significance at the 5% level, with a p-value slightly exceeding 0.05.

Table 3 also reveals the prevalence of sheep fasciolosis based on sex. The sex-specific prevalence demonstrated that positive samples were solely found in females, with a prevalence of 0.7%. The Fisher's exact test did not yield significance at the 5% level, as the p-value exceeded 0.05 (0.849).

**TABLE 1: Overall prevalence of *F. gigantica* in Small ruminants**

| Species | Number of samples | Number of positive | Number of negative | Prevalence (%) |
|---|---|---|---|---|
| Sheep | 226 | 1 | 225 | 0.33 |
| Goat | 82 | 2 | 80 | 0.64 |
| Total | 308 | 3 | 305 | 0.97 |

**Table 2: Prevalence of *F. gigantica* in goat based on breed, age and sex**

| Variables | Level | Prevalence (%) | *P*- value | OR | 95%CI |
|---|---|---|---|---|---|
| Breed | Sahelian | 1/8(12.5) | 2.182 | 0.140 | 0.005-1.705 |
| | Red sokoto | 1/74(1.4) | Ref | 0.140 | 0.005-1.705 |
| Age | Young | 1/15(6.6) | 1.063 | 0.303 | 0.013-3.559 |
| | Adult | 1/67(1.5) | Ref | 0.303 | 0.013-3.559 |
| Sex | Male | 0/18(0) | Ref | 0.316 | 0.98-1.07 |
| | female | 2/64(3.1) | 1.005 | 0.316 | 0.98-1.07 |

OR=Odd ratio, ref=reference category, NA=not applicable, CI=confidence interval

**TABLE 3: Prevalence of *F. gigantica* in Sheep based on breed, age and sex**

| Variables | Level | Prevalence (%) | *P*- value | OR | 95%CI |
|---|---|---|---|---|---|
| Breed | Balami | 1/221(0.45) | 0.045 | 0.83 | 0.987-1.004 |
| | yankasa | 0/5(0) | Ref | 0.83 | 0.987- 1.004 |
| Age | Young | 0/9(0) | Ref | 0.775 | 0.996-1.014 |
| | Adult | 1/217(0.46) | 0.081 | 0.775 | 0.996-1.014 |
| Sex | Male | 0/78(0) | Ref | 0.357 | 0.994-1.020 |
| | female | 1/147(0.68 | 0.849 | 0.357 | 0.994-1.020 |

OR=Odd ratio, ref=reference category, NA=not applicable, CI=confidence interval

## DISCUSSION

Based on the results of this study, the overall prevalence rate of fascioliasis in small ruminants in Sokoto was found to be 0.97%. The specific prevalence rates were 0.33% in sheep and 0.64% in goats. These relatively low prevalences could be attributed to the smaller number of animals sampled and the dry season during which the study was conducted. However, it is important to note that the infection was predominantly seen in the rainy season. This finding is similar to the prevalence obtained by Mbaya *et al.* (2010) but slightly differs from the work of Aliyara and Ardo (2014), who obtained relatively lower prevalences (0.55%), which could be due to the difference in the number of animals sampled in the different studies.

In terms of breed-specific prevalence, Sahelian goats were found to have a higher prevalence of fasciolosis compared to Red Sokoto goats, although no statistically significant association was found. This higher prevalence was attributed to the predominance of the breed slaughtered during the study period. Additionally, young goats had a higher prevalence of infection compared to adults, which was also attributed to a higher number of goats slaughtered during the study period. No significant statistical association was found in the age-specific prevalence.

In terms of sex-specific prevalence, all the positive samples in goats were obtained from female animals, but no significant statistical association was found. This difference could be attributed to the high number of female goats slaughtered during the study period. Similarly, in sheep, all the positive samples were obtained from female animals, but no significant statistical association was found. Again, the high prevalence obtained was attributed to the high number of female animals slaughtered during the study period.

In terms of breed-specific prevalence in sheep, all the positive samples were obtained from the Balami breed, and a significant statistical association was found (P=0.04). This difference was attributed to the predominance of the breed slaughtered during the study period. Additionally, all the positive samples in sheep were from adult animals, which can be attributed to the fact that mostly adult sheep were slaughtered at the abattoir. However, no statistically significant association was found in this regard. This aligns with the observations made by Mbaya *et al.* (2010) and could be attributed to the reduced grazing proximity of lambs and kids with adults. The variation in infection rates may be linked to differences in immunity levels among age groups, as suggested by Soulsby (1982).

However, there are slight variances with the work of Aliyara and Ardo (2014), who obtained relatively lower prevalences (0.55%), which could be due to the difference in the number of animals sampled in the different studies.

Comparisons with other studies conducted in different regions of Nigeria have shown varying prevalence rates of fascioliasis among small ruminants. A prevalence study in Zaria, Nigeria, reported a total prevalence of 48.0% in cattle and small ruminants (Ieren *et al.*, 2016), which is higher than the prevalence obtained in this study. This difference could be attributed to the higher number of animals sampled in the study and the test procedure used. Another study conducted in northern Bauchi state found a prevalence of 0.55% by post-mortem examination of livers in sheep and goats (Isah, 2019). These variations in prevalence rates suggest that fascioliasis is not uncommon among small ruminants in Nigeria and can lead to significant economic losses. The role of snails in the disease's epidemiology and considering the influence of weather conditions, particularly during the wet season, and regional variations on disease prevalence should be taken into account.

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