

## Study on the Prevalence and Risk Factors of Fasciolosis in Small Ruminants in and Around Hirna Town, Ethiopia

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**Abstract:** A cross sectional study was conducted with the objectives of determining the prevalence and risk factors associated with fasciolosis in three selected areas of Hirna district of Oromia regional state, Ethiopia. This study was conducted from October 2010 to March 2011. Faecal samples from a total of 768 small ruminants (sheep and goats) were subjected to coprological investigation. Based on the coprological investigation the overall prevalence of fasciolosis in the study was 89 (11.6%). High prevalence was recorded in poor body conditioned small ruminants (16.4%). Statistical significant differences ( $P < 0.05$ ) were observed in prevalence among the species, body condition and age of animals during coproscopic examination. Differences of prevalence in sexes were shown to have no statistical significant ( $P > 0.05$ ). Age, body condition and species were known to be among important risk factors associated with fasciolosis. The present study revealed that infection of small ruminants by fasciolosis was attributed to the presence of favorable environment for the abundance of intermediate host and the parasite, hence requiring immediate strategic intervention against the disease.

**Key words:** Coproscopy · Ethiopia · Fasciolosis · Hirna · Prevalence · Small ruminants

### INTRODUCTION

Fasciolosis is an economically important disease of domestic livestock, in particular cattle, sheep, goat and occasionally man. The disease is caused by digenetic trematodes of the genus *Fasciola* commonly referred to as liver flukes. The two species most commonly implicated as the etiological agents of fasciolosis are *F. hepatica* and *F. gigantica*. In Europe, the Americas and Oceania only *F. hepatica* is a concern, but the distributions of both species overlap in many areas of Africa and Asia [1].

Infection of domestic ruminants with *F. hepatica* (temperate liver fluke) and *F. gigantica* (tropical liver fluke) causes significant economic loss. Recently worldwide losses in animal productivity due to fasciolosis were conservatively estimated at over US\$3.2 billion per annum [2]. In addition fasciolosis is now recognized as an emerging human disease. The World Health Organization (WHO) has estimated that 2.4 million people are infected with *Fasciola* and 180 million are at risk of infection [3].

High prevalence of human fasciolosis has been reported in Bolivia, Peru and Ecuador, where fasciolosis is regarded as an important human health problem [4].

Therefore to increase the potential of small ruminant production and to get the maximum benefit from them prevention and control of fasciolosis is very important. Therefore, this study was designed:

- ▶ To determine the prevalence of fasciolosis in small ruminants
- ▶ To assess risk factors of *Fasciola* infection in small ruminants
- ▶ To generate valuable base line data for further studies that will be conducted in the study area

### MATERIALS AND METHODS

**Study Area:** Hirna is located 371 km east of Addis Ababa. The area has an average altitudinal range of 1600-3100 meters above sea level, average annual rain fall of 250-900

ml and average annual temperature of 16-28°C. The area is mainly covered by an irregular topography with depressions, numerous chain mountains, flat lands, gorges, scattered trees and dense shrubs of vegetation. The total live stock population of the woreda is estimated to constitute, 117,070 cattle, 12,918 sheep, 37,226 goats, 329 horses, 267 mules, 5733 donkeys and 168,120 poultry (Office of Agriculture and Rural Development of Tullo Woreda).

**Study Animals:** The study animals were indigenous local breeds of shoats (sheep and goats) of different age, sex and body condition category found under extensive grazing system. Samples were collected from three different peasant associations which were found in and around Hirna, namely lubukekeb, kerakufis and Cheffa. Coproscopic examination for the identification of *Fasciola* eggs were undertaken in Hirna regional veterinary laboratory.

**Study Type and Sample Size Determination:**

A cross-sectional study was conducted from October 2010 to March 2011. A total of 768 samples (363 ovine and 405 caprine) were randomly collected from the selected peasant associations to determine the prevalence of small ruminants fasciolosis in the area. To calculate the total sample size, the following parameters were used: 95% confidence interval (CI), 5% desired level of precision and with the assumption of 50% expected prevalence of small ruminant fasciolosis, the sample sizes were determined using the formula given in Thrusfield [5].

$$n = \frac{1.96^2 * P_{exp} (1-P_{exp})}{d^2}$$

n = required sample size, P<sub>exp</sub> = expected prevalence, d = desired absolute precision

Therefore, based on the formula the total sample size calculated was 384. But for the sake of higher precision the total sample was increased to 768.

**Study Methodology:** Faecal samples for parasitological examination were collected directly from the rectum of each animal, using disposable plastic gloves and placed in clean screw capped universal bottle and each sample was clearly labeled with animal identification, place of collection, species, sex, age and body condition. Samples were presented with 10% formalin solution to avoid the eggs development and hatching. In the laboratory, coproscopic examinations were performed to

detect the presence of *Fasciola* eggs using the standard sedimentation techniques recommended by Hansen and Perry [6].

**Data Analysis:** All raw data that were recorded from this study were entered in to Microsoft excel data base system and using SPSS computer program, data were summarized and analyzed. Chi-square (x<sup>2</sup>) test was used to determine the variation in infection prevalence between different peasant associations, species, sexes, ages and body conditions. A 5 % significant level was used to determine whether there are significant differences between the measured parameters between groups.

## RESULTS

**Prevalence of Fasciolosis:** Out of 768 faecal samples taken from shoats the identification result showed an overall prevalence of 11.6% (89/768). The specific prevalence of fasciolosis in this study was 14.6% and 8.8% in sheep and goats respectively.

**Risk Factors Affecting Prevalence of Small Ruminant**

**Fasciolosis:** Peasant association, species, sex, age and body condition score were considered as potential risk factors for the occurrence of fasciolosis in the study animals. The highest prevalence of fasciolosis was observed in Lubukekeb (16.5%) followed by Kerakufis (10.6%) while the lowest was in Cheffa (7.4%). There was a significant difference (p<0.05) on the prevalence of ovine and caprine fasciolosis in different sites of the study area. Table 1.

The highest prevalence of fasciolosis was seen in ovine (14.6%) while the lowest prevalence was investigated in caprine (8.8%). Statistical analysis showed significant difference on the prevalence of small ruminant fasciolosis in the two different species Table 2.

Results revealed 12.5% fasciolosis for female animals and 10.1% for males but there was no significant difference on the prevalence of fasciolosis between sexes. Table 3.

The present research showed that as the age of the animal increases the prevalence of the disease also increases. There was a significant difference on the prevalence of small ruminant fasciolosis in two different age groups Table 4.

High infection rates of fasciolosis were observed in poor body condition animals. In this work statistically significant difference was observed on small ruminant fasciolosis between the two different body conditions of the examined animals Table 5.

Table 1: Prevalence of small ruminant fasciolosis in the three selected peasant associations

PA	Examined	Prevalence (%)	$\chi^2$ -value	p-value
Kerakufis	246	10.6		
Lubukekeb	266	16.5	10.956	0.004
Cheffa	256	7.4		
Total	768	11.6		

Table 2: Prevalence of fasciolosis in small ruminant species

Species	Examined	Prevalence (%)	$\chi^2$ -value	p-value
Ovine	363	14.6	6.095	0.014
Caprine	405	8.8		
Total	768	11.6		

Table 3: Prevalence of fasciolosis in small ruminant with different sexes

Species	Examined	Prevalence (%)	$\chi^2$ -value	p-value
Female	470	12.5	1.10	0.294
Male	298	10.1		
Total	768	11.6		

Table 4: Prevalence of small ruminant fasciolosis in the two age groups

Age	Examined	Prevalence (%)	$\chi^2$ -value	p-value
<2	340	9.1	3.636	0.036
>2	428	13.5		
Total	768	11.6%		

Table 5: Prevalence of fasciolosis in small ruminants with different body conditions

Body condition	Examined	Prevalence (%)	$\chi^2$ -value	p-value
Poor	506	16.4%	33.565	0.000
Good	262	2.3%		
Total	768	11.6%		

## DISCUSSION

The result of the present study which was conducted based on coprological investigation proved the prevalence of fasciolosis to be 14.6% and 8.8% in sheep and goats, respectively. The prevalence of fasciolosis in the current study was in line with the previous report by Ahmed *et al.* [7] who reported 13.2% prevalence of fasciolosis in the middle Awash river basin, Daniel [8], 14.8% prevalence for sheep at Dire Dawa abattoir, Wassie [9] 12.42% for sheep in Nekemte and its surrounding areas and Adem [10] prevalence of 10.2% for sheep in and around Ziway. This may be due to the similarity of the climatic conditions and geographical regions such as rain fall, temperature and humidity.

The current finding was found to be lower than that reported by Dinka [11] who reported 32.9% prevalence of fasciolosis in sheep and 15.9% in goats in his study which was conducted in and around Assela, Michael [12] who showed a prevalence of 51 % of fasciolosis in Debre zeit, Yilma [13] who investigated a prevalence of 49%

fasciolosis in Holeta and Molalegn *et al.* [14] who found 49% prevalence in sheep in the study which was carried out in and around Dawa- Cheffa (Kemisse). The reason for these variations might be due to the differences in temperature, moisture, humidity and soil that might favor multiplication of intermediate host; snails. Urquhart *et al.* [2] also suggested that the difference in prevalence and severity of the disease syndrome are evident in various geographical regions depending on the local climatic conditions, availability of permanent water (marshy area) and system of management.

The specific prevalence of the disease in different peasant associations of study areas were 10.6% (kerakufis), 16.5% (Lubukekeb) and 7.4% (Chaffe). Statistical analysis of the prevalence among peasant associations showed the presence of significant difference ( $P < 0.05$ ). This significant difference may be due to an irregular topography of study areas, a wide range of altitude (1600-3100 m.a.s.l), settled marshy area of Lubukekeb and the irrigated land of Cheffa.

The prevalence of the disease in ovine and caprine species was recorded as 14.6% and 8.8% respectively. There was significant difference ( $P < 0.05$ ) between two species indicating that species may have effect on the prevalence of the disease. This may be due to fact that caprines were selective grazers or browser which reduced the chance of exposure to the infective metacercariae of *Fasciola* which are commonly found on grasses around marshy areas. This result agrees with the finding of Dinka [11] who reported prevalence of fasciolosis as 32.9 and 15.9% in sheep and goats respectively.

The prevalence of the disease in female and male animals was recorded as 12.5% and 10.1%, respectively. There was non-significant difference ( $P > 0.05$ ) between the two sexes indicating that sex seems to have no effect on the prevalence of the disease. This could be explained by the fact that there is no difference in the grazing behaviour of animals between sexes.

The prevalence of fasciolosis was found to be 13.5% and 9.1% in adult and young age groups, respectively. The present study indicated that there was significant difference ( $p < 0.05$ ) between age groups, which agrees with reports of Ahmed *et al.* [7]. This study resulted in higher prevalence of fasciolosis in adult shoats and lower rate of infection in young age groups. This could be due to the fact that young animals are not allowed to go far with adult animals for grazing that they have reduced chance of exposure to infective metacercariae as compared to adults.

The prevalence of fasciolosis was found to be 2.3% and 16.4% in good body conditioned and poor body conditioned animals, respectively. The results of this study indicated that infection rates in poor body condition animals were significantly higher ( $P < 0.05$ ) than that of good body condition animals. This proves the importance of fasciolosis in causing weight loss and emaciation to be a characteristic sign of the disease. Besides this, the high prevalence of fasciolosis in poor condition animals could be justified by the fact given by Devendra and Marca [15] who indicated shoat of poor body condition are vulnerable to parasitic diseases.

### CONCLUSION

The current research indicated that infection with *Fasciola* parasites was found to be very common. The study confirmed that there are significant differences in prevalence among the species, body conditions and ages of animals. High prevalence was recorded in poor

body conditioned small ruminants. It is recommended that owners should be trained to improve the management system, especially in terms of the level of nutrition so that the animals can have good body condition that confers some level of resistance against helminthes infection and owners regularly treat their animals with the appropriate anthelmintics and strictly according to its directions.

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