

## Prevalence of Ovine Fasciolosis in and Around Motta Town, North-West Ethiopia

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**Abstract:** A cross-sectional study was conducted from November, 2013 to April, 2014 to determine the prevalence and risk factors associated with ovine fasciolosis in four randomly selected kebelles in and around Motta town, East Gojjam Zone of Amhara Region. A total of 384 rectal faecal samples were collected from sheep and examined using the standard sedimentation technique to detect *Fasciola* eggs. Out of which, 179 (46.6 %) were positive for fasciolosis. A statistical significant variation ( $P < 0.05$ ) in prevalence was observed among age groups where higher prevalence was recorded in adults (55.3 %) than young animals (32.9 %). Likewise, there was a statistical significant difference ( $P < 0.05$ ) in infection rate among different body condition scores was observed in which higher prevalence was recorded in poor (78.9 %) than in good (39.3 %) body conditioned animals. This study confirmed that the prevalence of fasciolosis in sheep was high, which could be attributed to the presence of favorable environment for the abundance of intermediate host and the parasite. Considering the huge negative effect of the parasite on health and productivity of the livestock sector, strategic parasite control method with an integrated approach should be implemented to improve the health and productivity of sheep in the area.

**Key words:** Fasciolosis • Prevalence • Ovine • Sedimentation • Motta town • Ethiopia

### INTRODUCTION

Ethiopia has an enormous livestock resource with a total contribution of 15% gross domestic product and 33% agricultural output [1]. Ethiopia hosts large number of small ruminants that are raised under external pastoral production system or in adjunct to crop production. The small ruminant population of Ethiopia was estimated about 26.2million sheep and 21.7 million goats[2].

However, this huge potential of wealth is untapped to the livelihood of village farmers and the contribution to national economy at large is minimal. The reason being predominance of infectious and parasitic disease, age-old traditional management system, lack of genetic selection

for good performance coupled with under and malnutrition and absence of well-developed market infrastructure [3]. From various constraints, livestock diseases are the most important factor that has a consequence on morbidity and mortality of animals in the country [4]. Parasitism represents a major obstacle to the development of sub-sectors of livestock [5].

Fasciolosis is an economically important parasitic disease of sheep, cattle, goat and occasionally human beings [6]. Recently worldwide losses in animal productivity due to fasciolosis were, conservatively, estimated at over US\$3.2billion per annum. In addition, fasciolosis is now recognized as an emerging human disease. The World Health Organization (WHO) has

estimated that 2.4million people are infected with *Fasciola* and 180million are at risk of infection in 1995 [7]. Apart from its great veterinary importance throughout the world, *F. hepatica* has recently been shown to be a re-emerging and wide spread zoonosis affecting numerous human populations in the world [8].

Fasciolosis is caused by two liver fluke species, which are: *Fasciola hepatica* and *Fasciola gigantica*. *Fasciola hepatica* has cosmopolitan distribution, mainly in temperate zones, while *F. gigantica* is found in tropical regions of Africa and Asia. Thus, the two *Fasciolid* species overlap in many Africa and Asian countries [9]. The fluke lifecycle requires intermediate host (snail) to complete transmission to a new ruminant host. The liver is damaged and condemned and the subclinical and chronic disease usually results in decrease production of meat, milk and wool, second's bacterial infection, fertility problems and great expenses with antihelminthics [10].

There is no vaccine against the disease and hence chemotherapy is the only viable control method available today. Triclabendazole being the drug most commonly used due to its effectiveness against both mature and immature forms of the parasite [11].

Ovine fasciolosis in Ethiopia is very frequent and cause a significant economic loss in production, decrease productivity and loss of body condition and the annual losses were estimated at 48.4 million Ethiopian birr per year, of which 46.5%, 48.8% and 4.7% were due to mortality, productivity (weight loss and reproductive wastage) and liver condemnation at slaughter, respectively [12].

Many researchers have reported the presence of fasciolosis in sheep as 42.44% [13], 43.3% [14] and 39.5% [15] in different parts of Ethiopia. But studies on the prevalence of fasciolosis in sheep were not, so far, conducted in and around Motta town, East Gojjam Zone of Amhara Regional state and it was this rationale that initiated this study.

Therefore, the objectives of this study were:

- to determine the prevalence of ovine fasciolosis and;
- to assess the various risk factors associated with fasciolosis

## MATERIALS AND METHODS

**Description of Study Area:** Study was conducted in and around Motta. Motta is a town of Hulet Eju Enese Woreda in North West Ethiopia, located in the East Gojjam Zone of the Amhara Region. This town has a

latitude and longitude of 11°5'North 37°52'East/ 11.083°North 37.867°East with an elevation of 2,487 meters above sea level and with average annual temperature between 7.5°C to 25°C. The annual rain fall also ranges between 1200-1400 mm. According to the current document of Hulet Eju Enese Woreda Agricultural and Rural development office, the small ruminant population of the area shows 92,069 sheep and 50,405 goats [16].

**Study Animals:** The study animals were 384 indigenous sheep, managed under traditional extensive system, owned by smallholders. They were of both sexes and two age groups. The age was estimated and categorized following the description of Aiello and May [17] determined based on dental eruption pattern. Sheep up to the age of 6 months were considered as young and the rest, as adult.

**Study Design:** A cross-sectional study method was employed to determine the prevalence of ovine fasciolosis and identify associated risk factors. The study was carried out from November, 2013 to April, 2014.

**Sampling Method and Sample Size Determination:** The study site, Hulet Eju Enese Woreda and the peasant associations were purposively selected considering the number of sheep population. The study animals were randomly selected. To determine the sample size, the expected prevalence of 50% was taken as there were no previous research findings in the study area. The formula for the sample size determination with 95% confidence interval and 5% absolute precision was calculated following the method described by Thrusfield [18].

$$N = \frac{1.96^2 (Pexp (1 - Pexp))}{d^2}$$

where;  $N$  is required sample size, 1.96 is the value of "Z" at 95% confidence level,  $Pexp$  is expected prevalence,  $d$  = desired absolute precision (5%). Therefore, the sample size was calculated to be 384 sheep.

**Study Methodology:** Sample collection and examination procedure: A total of 384 faecal samples were collected directly from the rectum and were placed in clean screw capped bottles. Each sample were clearly labeled with date, place of collection, body condition, sex and age and immediately transported to the district veterinary clinic laboratory. Specimens were subjected to sedimentation technique to detect *Fasciola* eggs. To differentiate eggs of *Paramphistomum* and *Fasciola*, a drop of 1%

Methylene blue solution was added to the sediment. Eggs of *Fasciola* species show yellowish color while eggs of *Paramphistomum* species stain by Methylene blue [13].

**Data Analysis:** All raw data generated from this study were coded and entered in MS Excel database system and data were analyzed using SPSS version 16.0 computer program. Chi-square test was used to determine the variation in infection prevalence between peasant associations, sex, age and body condition. Statistical significance was set at  $P < 0.05$  to determine the presence of significant differences between occurrence of fasciolosis and risk factors.

The total prevalence was calculated by dividing the number of *Fasciola* positive animals by the total number of animals tested or sampled.

$$\text{Prevalence (\%)} = \frac{\text{total number of infected animals}}{\text{total number of animals examined}}$$

## RESULTS

Of the total 384 faecal samples subjected to examination, 179 (46.6 %) were positive for *Fasciola* infection.

### Prevalence of Fasciolosis Among the Peasant Associations:

The highest prevalence of fasciolosis was recorded in Debre-Mariam (51.5 %), followed by Hbre-Selam (47.4 %) and Ayen-Birhan (44.7 %) and lowest in Motta (42.4 %) (Table: 1), however, the variation was not statistically significant ( $P > 0.05$ ).

The Effects of Body Condition on the Prevalence of Fasciolosis: Highly statistical significant difference ( $P < 0.05$ ) in prevalence of fasciolosis was observed among various body condition scores. The highest prevalence (78.9 %) was recorded in poor body condition and the least (39.3%) was observed in animals with good body condition (Table: 2).

**Prevalence of Ovine Fasciolosis Based on Age:** Statistical analysis of prevalence among sheep of different age groups revealed significant variation ( $P < 0.05$ ) where infection prevalence was higher in adults (55.3 %) than young sheep (32.9 %) (Table: 3).

### Effects of Sex on the Prevalence of Fasciolosis:

The prevalence of *Fasciola* in male sheep was 46.4% and in female was 46.8% which was almost similar (Table 4) and the difference is not statistically significant ( $P > 0.05$ ).

Table 1: Prevalence of ovine fasciolosis in different peasant associations

Peasant associations	Number of examined animals	Number of infected animals	Prevalence (%)	$\chi^2$ (P-value)
Motta	92	39	42.4	1.7889(0.617)
Ayen-Birhan	94	42	44.7	
Hbre-Selam	97	46	47.4	
Debre-Mariam	101	52	51.5	
Total	384	179	46.6	

Table 2: Prevalence of ovine fasciolosis based on body condition scores

Body conditions	Number of examined animals	Number of infected animals	Prevalence (%)	$\chi^2$ (P-value)
Poor	71	56	78.9	36.4245 (<0.001)
Good	313	123	39.3	
Total	384	179	46.61	

Table 3: Prevalence of ovine fasciolosis in different age groups

Category	Number of examined animals	Number of infected animals	Prevalence (%)	$\chi^2$ (P-value)
Age				
Young (<6 months)	149	49	32.9	18.4401 (<0.001)
Adult (>6 months)	235	130	55.3	
Total	384	179	46.61	

Table 4: Prevalence of ovine fasciolosis based on sex category

Category	Number of examined animals	Number of infected animals	Prevalence (%)	$\chi^2$ (P-value)
Sex				
Male	168	78	46.4	0.0042(0.949)
Female	216	101	46.8	
Total	384	179	46.61	

## DISCUSSION

In this study a prevalence of 46.6% reported and this was in line with other works in different region of the country such as Solomon and Abebe [19] with prevalence rate of 38.04% in Mecha Woreda and Molalegn *et al.* [12] reported 49.1% in and around Dawa-Cheffe, Kemissie. The similarity in the prevalence rate of ovine fasciolosis in different region of the country and year may be due to the similarity of the climatic condition such as altitude, rainfall, temperature, humidity and management system. As reported by Heinonen *et al.* [20] water logged and poorly drained areas with acidic soils in the highlands are often endemic areas for fasciolosis.

The overall prevalence of fasciolosis in our study area was higher than the previous studies done by Ahmed *et al.* [21], Musa [22] and Henok and Mekonnen [7] who reported the prevalence of 13.2%, 15.8% and 14.6% in Awash, in and around Bahir Dar and Hirna, respectively. On the other hand, the prevalence of ovine fasciolosis in this study area was lower as compared to the previous report of 82.78% in Holetta [23] and 70.2% in Menz [24]. This wide gap may be due to the variation in sampling time which result higher prevalence in certain months and vice versa, there will also be variation in accessibility of sheep to swampy communal grazing land which is the main factor for the presence of variation in the prevalence and due to the wide expansion of deforestation from day to day resulting in depletion of swampy grazing area.

The prevalence of *Fasciola* was higher in Debre-Mariam followed by Hbre-Selam, Ayen Birhan and Motta, although with no significant difference. This might be due to the fact that the areas have almost similar climatic condition. However, this minor difference might be the presence of many rivers and ponds in Debre-Mariam than in others. Similar differences due to the presence of water bodies were also observed by Yilma and Malone [25].

The prevalence was significantly higher in animals with poor body condition than in those with good body conditions. In accord with our finding, Molalegneet *et al.* [12] and Yemisirach and Mekonnen [26] also reported significantly higher prevalence in sheep with poor body conditions than in those with good body conditions. Obviously, this could be due to the fact that animals with poor body conditions are usually less resistant and are therefore susceptible to infectious diseases [27].

The present study indicated that an infection rate of fasciolosis was significantly higher in adults than young sheep. This finding was in consent with other reports of

Ahmed *et al.* [21] and Molalegn *et al.* [12]. The lower prevalence rate in young sheep might be due to the management system of sheep in the study area where they are not allowed to go far with adults for grazing hence reducing the chance of exposure to the infective larvae of *Fasciola* worm. Moreover Ahmed *et al.* [21] suggested that the higher exposure risk of adults may be due to physiological differences, such as stress, pregnancy, lambing, inadequate nutrition and infectious diseases.

Significant role was not observed in infestation rate between male (46.4 %) and female (46.8 %) which is consistent with the findings of Mohammed (28) and Gebreyohannes *et al.* [29]. Sex did not show significant variation on the prevalence of *Fasciola*, similar finding was shown by Daryani *et al.* [10]. This might also be due to grazing of both sex groups in similar *Fasciola* contaminated pasture land.

## CONCLUSION AND RECOMENDATIONS

The result of the present study indicated that ovine fasciolosis is a widespread disease in the study area which could cause significant economic loss on livestock production of the area. The high prevalence reported in the present study has clearly indicated lack of strategic control measures against the disease as well as poor veterinary services. Our study generally suggests that ovine fasciolosis is an endemic condition in the area and it is an indication of the existence of favorable bionomic and ecological conditions for the survival, multiplication and spread of intermediate snail host and the parasite in that environment.

Based on the given conclusion the following recommendations are foreword:

- Strategic antihelminthics treatment in conjunction with good pasture management practices should be conducted.
- Awareness creations need to be organized to livestock owners in relation to economical significance and control methods of the disease in the study area.
- Swampy areas should be well drained.
- Further studies on the epidemiological conditions and seasonal dynamics of parasites in the study area should be conducted to implement integrated control strategies.

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