

## Ovine Fasciolosis and Associated Risk Factors in Haramaya District, Eastern Hararghe, Oromia, Ethiopia

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**Abstract:** A cross-sectional study was conducted in Haramaya district from November 2014 to June 2015 with the objective of determining the prevalence and associated risk factor of ovine fasciolosis. A total of 384 faecal samples were randomly collected directly from the rectum of individual animals. From a total of 384 coprologically examined sheep 166 sheep were found positive for fasciolosis with an overall prevalence of 43.23%. Adelle Waltawa, Tuji Gabisa, Finkile and Damota Peasant Associations (PAs) accounted for 39.78%, 46.02%, 43.21% and 42.27% respectively. The difference in the prevalence in the four PAs was not statistically significant ( $p>0.05$ ). The prevalence of ovine fasciolosis was computed for the different sex, age and body condition categories. The prevalence of fasciolosis in two sex groups in the present study was 39.25 % and 44.77% in male and female respectively. The difference in the prevalence in sex was not statically significant ( $p>0.05$ ). The prevalence rate of fasciolosis in young sheep 38.55% was less than in adults sheep 46.79 % and the difference in age was not statistically significant ( $P>0.05$ ). In the study area, the prevalence of fasciolosis was found to be higher in sheep with poor body condition than those with medium and good body condition ones with an overall prevalence of 60.66 %, 54.62% and 31.40%, respectively and the difference was statically significant ( $p<0.05$ ) between three groups of body condition scoring. It was concluded that ovine fasciolosis was prevalent, thus causing major economic loss in the study area. Hence, control strategies targeted on the parasite and the intermediate hosts as well as implementation of appropriate grazing management in the study area are warranted.

**Key words:** Haramaya · Ovine fasciolosis · Prevalence

### INTRODUCTION

Sheep play a significant role in maintaining household stability by providing meat, skin and wool, generate cash income and play traditional social and religious roles [1]. Despite the large population of goats and sheep, their productivity is very low due to poor nutrition, poor husbandry system and prevailing animal diseases [2].

Endoparasitic infection and management problems are known to be the main factors that affect productivity. The various species of gastrointestinal and pulmonary nematodes, trematodes and cestodes are known to be prevalent in Ethiopia. Among these the genus *fasciola* is the most prevalent [3, 4].

In Ethiopia, the annual losses due to ovine fasciolosis were estimated to be 48.4 million Birr (1 US\$=18.03 ETB) per year, of which 46.5, 48.8 are 4.7% were due to mortality, low productivity (loss and productive wastage) and liver condemnation respectively. The overall economic loss to the Ethiopian meat industry due to parasitic diseases (including fasciolosis) is estimated as US \$400 annually [5].

The principal definitive hosts of these parasites are cattle, sheep and goat. However, certain other mammals, including humans, may be infected as an accidental host [6]. *Fasciola* species has an indirect life cycle involving domestic and wild herbivorous mammals and humans as definitive hosts and freshwater gastropods of the family Lymnaeidae as intermediate host [7]. Temperature, rainfall

and soil moisture influence the activity and abundance of the intermediate hosts of *Fasciola hepatica* and *Fasciola gigantica*. Consequently, current climatic conditions can be influential in the development of Fasciolosis [8].

Due to the increasing number of human cases, the liver flukes should be considered as an emerging public health concern [9]. On the other hand, Fasciolosis can have a serious financial impact on a sheep farm with immediate losses up to 10 percent caused by acute/sub-acute disease they cause major diseases of livestock that produce important economic losses due to mortality, liver condemnation, reduced production of meat, milk and wool and expenditures of anthelmintic [10].

Considerable work has been done on the prevalence and associated risk factor of ovine fasciolosis in many parts of Ethiopia [11]. However, no report so far has been published on the level of fasciolosis in the present study area, where sheep are important assets to the local farmers. Therefore, the objective of the current study is to determine the prevalence and associated risk factors of ovine fasciolosis in Haramaya district, eastern Hararghe, Oromia regional state, Ethiopia.

## MATERIALS AND METHODS

**Study Area:** The study was conducted in Oromia regional state, Eastern Hararghe zone, Haramaya district which is located about 500km far from capital city of Ethiopia (Addis Ababa) to the east direction. This Woreda is sub divided to into 34 peasant associations (PAs) for its administrative propose. Haramaya is capital city town of the Woreda located 14 km away from zonal city Harar.

Geographically, Haramaya district is situated at 41°51'58" N latitude and 90°24' 10" Slongitude (Figure 1). The study area is located at an altitude 200 m above sea level. The temperature of the area varies between 24 °C and 9°C with average 18°C and the annual rainfall range 118-866 mm with average a of 492 mm. The area has subtropical (weyndega), tropical (kola) and temperate (dega) type of climate division.

Agriculture is the main occupation of the population of the area. The agricultural activity of this woreda is mainly chat production. The other production in this area mixed cattle, sheep, goat, rearing and crop production under taken side by side with chat production. Also the majorvegetation types in this district include medium height grassland and open acacia shrub land. According to the information obtained from the veterinary section, the total livestock population of this district was estimated at 360098 cattle, 19973 goat, 6067 sheep, 6487 equines and 34525 poultry. The major annually crop production; including sorghum and maize.

**Study Population:** The study has been done on Indigenous sheep those known by name “*Hararghe highland and ogaden breeds*”, which have been kept under traditional extensive management system. The populations of the sheep’s live in the District are estimated to 26, 037 in number. The study has been done on 384 sheep’s selected from the four (4) Peasant Associations, namely Adellewaltawa, Tujigabisa, Finkile and Damota. The study site and individual animals have been selected by simple random sampling method. The fecal sample collected directly from the rectum of the animals.

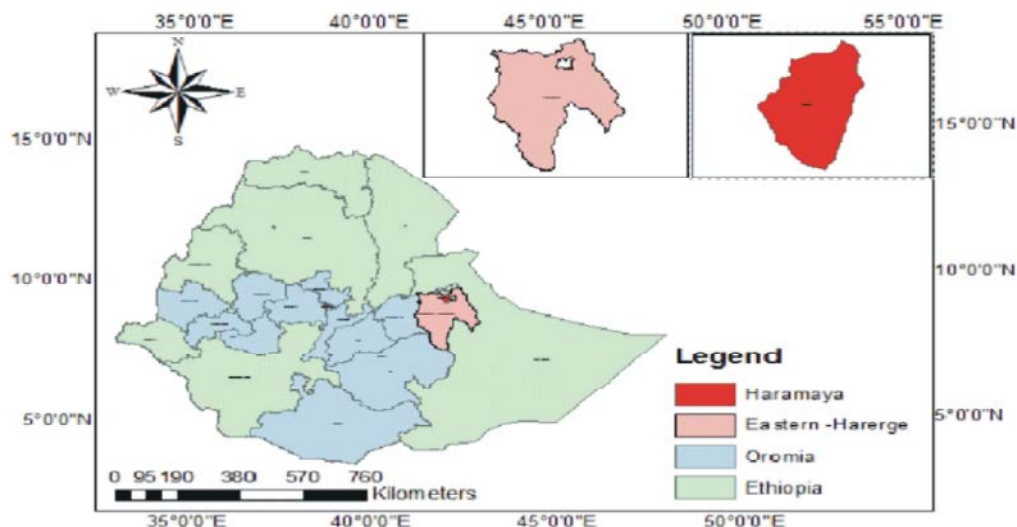


Fig. 1: Map showing the location of study area

**Study Design:** A cross-sectional study was conducted from November 2014-june 2015 to determine primarily the prevalence and associated risk factor of ovine fasciolosis based on data collected from different peasant association in Haramaya district

**Data Collection:** During the study, the individual place of origin, breeds, sex, type of animals were recorded. Age category ( $\leq 1$  young) and ( $> 1$  adult) was estimated by using the eruption of incisor teeth that described Gatenby [12].

### Study Methodology

**Sample Collection and Coprological Examination:** The fecal sample was collected randomly from the selected four peasant association (PAs). Namely; AdelleWaltawa, TujiGabisia, Finkile and Damota PAs. A total 384 samples are collected and all the samples are taken directly from the rectum of the sheep by using glove and putting in sampling bottle. The collected sample was immediately taken to Haramaya University Parasitology Laboratory for examination. In the laboratory, the fecal samples were screened for the presence of *Fasciola* egg by using sedimentation technique. During sampling age, sex, date of sampling, BCs and origin of the animals were properly recorded on well prepared data sheet.

Examination of the *Fasciola* egg has been done by using different laboratory equipment and tools such as Beaker, Strainer, Measuring Cylinder, Mortar and Pestle, Test Tube, Test Tube Rack, Microscope Slide, Cover Slip, Microscope and manual Centrifuge. The investigation procedure for the examination of *Fasciola* egg (sedimentation technique) was as follows: 3gram of feces was weighted and placed in mortar. The fecal sample was crushed with mortar and pestle and 45ml of tap water was added and mixed thoroughly and filtered the fecal suspension through a tea strainer into a beaker, the filtered material should be poured into  $\frac{3}{4}$  part of test tube. After balance the centrifuge tubes, centrifuged the sample at about 1500 rpm for three minutes the supernatant fluid was discarded carefully, transferred a small amount of the sediment was placed on microscope slide, drop of methylene blue was dropped on the slide and covered with cover slip, Then examined under 10x magnification power of microscope.

**Data Analysis:** Data collected from laboratory result was stored on Microsoft (Ms) excel spread sheet program and analysis was done by using SPSS Version 20 software program. The total prevalence was calculated by dividing the number of *fasciola* positive animals by the total number of animals tested or sampled. Pearson's

chi-square ( $\chi^2$ ) was used to evaluate the association of different variables with the prevalence of fasciolosis. P-value less than 0.05 (at 5% level of significance in all analysis).

## RESULTS

From a total of 384 examined sheep fecal samples, 166 samples were positive for fasciolosis eggs with an overall prevalence 43.23%. The prevalence of Ovine fasciolosis recorded in the four Peasant Associations (PAs) were 39.78%, 46.02%, 43.21% and 42.27% in Adellewaltawa, Tujigabisia, Finkile and Damota, respectively. This difference in prevalence was not statically significance ( $P > 0.05$ ) (Table 1).

The prevalence of fasciolosis in male and female sheep was 39.25% (42/107) and 44.77% (124/277) respectively. However; the difference were not statically significance between the sexes ( $P > 0.05$ ). (Table 2).

The infestation rate between young ( $< 1$ yr) and adult ( $> 1$ yr) sheep were compared. It was observed that the prevalence of fasciolosis was relatively higher in adult than younger with 59.8% and 50.8% which is statically not significant ( $P > 0.05$ ). (Table 3).

Table 1: The prevalence of ovine fasciolosis in different Pas

Pas	No examined	No positive	Prevalence (%)
Adellewaltawa	93	37	39.78
Tujigabisia	113	52	46.02
Finkile	81	35	43.21
Damota	97	42	42.27
Total	384	166	43.23

$\chi^2 = 0.808$   $P = 0.848$

Table 2: The prevalence of ovine fasciolosis in different sex

Sex	No examined	No positive	Prevalence (%)
Male	107	42	39.25
Female	277	124	44.77
Total	384	166	43.23

$\chi^2 = 0.494$   $P = 0.494$

Table 3: Prevalence of ovine fasciolosis on the age bases

Age groups	No examined	No positive	Prevalence (%)
Young's ( $< 1$ yr)	166	64	38.55
Adults ( $> 1$ yr)	218	102	46.79
Total	384	166	43.23

$\chi^2 = 2.604$   $P = 0.107$

Table 4: The prevalence of ovine fasciolosis on the bases of body condition score

Body condition score	No examined	No positive	Prevalence (%)
Poor	61	37	60.66
Medium	119	65	54.62
Good	204	64	31.40
Total	384	166	43.23

$\chi^2 = 25.527$   $P < 0.001$

On the other hand in present study area the prevalence of fasciolosis was found to be higher in sheep with poor body condition than those with medium and good body condition ones with an overall prevalence of 60.66% (37/61), 54.62% (65/119) and 31.40% (64/204) respectively. There is not statically deference ( $p>0.05$ ) between three types of BCS. (Table 4).

## DISCUSSION

Fasciolosis is among the major constraints to ruminants' production causing significant economic losses in Ethiopia. The overall prevalence of ovine fasciolosis in the present study was 43.23%. The results concurred with Tesfaheywet [13], who have reported the prevalence with 45.6% in Oda Bultum district. This could be attributed to the close similarity in agroecology between the two studied areas. However, this result was higher than that of the study conducted by Henok and Mekonnen [3] in Hirna, with the prevalence of 14.6%.

But it is lower compared to the study conducted by Yadeta [14] and Chanie and Begashaw [15], having a prevalence of 73% and 70.2% in western Shoa and Menz, respectively. This might be due to the differences in temperature, moisture, humidity, soil and other ecological factors of the study areas that could favor or disfavor the snail intermediate host and the parasites as well as the effort exerted towards the control of the parasites.

The prevalence of the ovine fasciolosis in the present study area in deferent Peasant Associations (PAs) were 39.78% (37/93), 46.02% (52/113), 43.21% (35/81) and 42.27% (42/97) in Adelle Waltawa, Tuji Gabisa, Finkile and Damota, respectively has been observed. The variation is not statistically significant ( $p<0.05$ ). These variation might result from the presence of wide part of land covered by muds or swampy lands especially in peasant associations with high rate of prevalence. Similar findings were previously reported [16].

The prevalence of the parasites in male and female sheep showed that 39.25 and 44.77%, respectively. The prevalence of fasciolosis between male and female are not statically significant ( $p > 0.05$ ). This might be indicates that sex of sheep has not impact on the prevalence of fasciolosis. They exposed to grazing lands and fasciola infections with equal rates. This result is similar to the observation done by Tesfayhiwot [13] which is 45.6%.

The prevalence of the parasites in adult and young sheep was 46.79 % and 38.55 %, respectively. The prevalence of *Fasciola* spp of adult was higher than young. Even though such variation of the prevalence was

exist it is not statistically significant ( $P>0.05$ ). This finding was consistent with other reports which indicate there were no significant association between age group in fasciola infections and it was not surprising because kids have maternal immunity. The higher exposure risk of adults may be due to physiological differences, such as stress, pregnancy, lambing, inadequate nutrition and infectious diseases [9].

## CONCLUSION

In general the present study revealed a higher prevalence of ovine fasciolosis indicating that fasciolosis is an important disease that could potentially hinder the productivity of sheep in the study area and tremendously affect the rural economy at large. Hence, strategic application of anthelmintic, eliminating the parasites from the host at the most appropriate time for effective prevention of pasture contamination, coupled with reduction of the number of intermediate host, snails by chemicals, drainage and other management practices or biological control measures should be employed. Furthermore, reduction in the risk of infection by planned grazing management especially during high outbreak months, by the application of zero grazing (cut and carry) and tethering of animals should be practiced in the study area.

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