

Ovine Fasciolosis: Episode and Major Determinants in Haru District, Western Ethiopia

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Abstract: A cross-sectional study was undertaken to determine the prevalence of ovine fasciolosis and evaluate the associated risk factors in Haru district, West Wollega Zone, Oromia region, western Ethiopia from October to December 2011. Faecal samples were collected from 384 sheep and examined using the standard sedimentation technique to detect *Fasciola* eggs. The overall prevalence of ovine fasciolosis was 43.75%. Among the different study sites, the animals from the Yukira (54.9%) had higher prevalence of fasciolosis, followed by Jitu (44.68%), Kombolcha (40.56%) and Ganet-Abbo (38.93%). The prevalence of *Fasciola* infection among male and female sheep was 44.9% and 42.5%, respectively. Differences of prevalence in study sites and sexes were shown to have no statistically significant difference ($P > 0.05$). A higher age-wise *Fasciola* infection prevalence was found in sheep of > 3 years old (49.8%) followed by 1-3 years (45.8%) and < 1 year old (23.9%). A statistically significant difference ($P < 0.05$) was recorded between age groups of > 3 years old and < 1 year old. A statistically insignificant difference was observed ($P > 0.05$) in prevalence among the body condition scores. The present study revealed that infection of sheep by fasciolosis was attributed to the presence of a favorable environment for the abundance of intermediate host and the parasite hence, requiring immediate strategic intervention against the disease.

Key words: Episode % Sheep % Haru District % Ethiopia

INTRODUCTION

In Ethiopia, sheep are the dominant livestock providing up to 63% of cash income and 23% of food subsistence value obtained from livestock production. 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 [1-4].

Among many parasitic problems of domestic animals, fasciolosis is an economically important disease, particularly in cattle and sheep 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 *Fasciola hepatica* and *Fasciola gigantica* [5-7]. The geographical distribution of *F. hepatica* and *F. gigantica* is determined mainly by the distribution patterns of the snails that have

a role as intermediate hosts [8-9]. In Ethiopia, both species coexist at different altitudes [10].

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

Although there are numerous reports on the prevalence of small ruminant fasciolosis from different parts of the country [1, 11-12], no concerted efforts have been made to study the prevalence of the disease in Haru district, West Wollega zone, western Ethiopia. Hence, the objectives of the present study were to determine the prevalence of ovine fasciolosis and to assess major risk factors associated with the disease.

MATERIALS AND METHODS

Study Area: The study was conducted in Haru district, West Wollega, Oromia region, western Ethiopia, in selected 4 peasants associations (PAs) (Jitu, Ganat Abbo, Kombolcha and Yukira) from October to December 2011. The study site is located at 464 km from Addis Ababa, the capital city of Ethiopia. Based on agro-ecological conditions the district has midland (83.5%) and lowland (16.5%) areas. The mean annual rainfall is estimated to be 1700mm. The annual average temperature ranges from 20°C to 27°C. The landscape of the area is characterized by steep, slightly steep, plain with an elevation of 1500 to 2050 meter above sea level. The sheep population in the study area is estimated to be 30,247 [13].

Study Animals: The study was conducted in indigenous breeds of sheep reared under extensive management system. Animals were comprised of sheep at different age categories and both sexes. Age groups were classified as lamb (< 1 year old), young (1-3 years old) and adult (>3 years old) based on owners' information and dentition [14]. Body condition scoring of animals was conducted according to the method described by Thompson and Meyer [15] and assigned as poor and good.

Study Design and Sample Size Determination: A cross-sectional survey was conducted to determine the prevalence of ovine fasciolosis. Simple random sampling method was used to select the study sites (PAs) and study animals. The sample size was determined based on an expected prevalence of 50%, since there was no previous study conducted in the area. The desired sample size was calculated using the formula given by Thrusfield [16] with a 95% confidence interval and 5% absolute precision.

Samples Collection and Examination Procedures: Fresh faecal samples were collected from 384 sheep directly from the rectum using two fingers with disposable plastic gloves and placed in sterile sampling bottles. Each sampling bottle was clearly labeled with the date and place of collection, sex, age and body condition score and transported to Haru district veterinary clinic for laboratory examination. The faecal samples were examined for the detection of *Fasciola* eggs by a sedimentation technique [9]. To differentiate eggs of *Paramphistomum* species and *Fasciola* species, a drop of 1% methylene blue solution

was added to the sediment. Eggs of *Fasciola* species show yellowish color, while eggs of *Paramphistomum* species was grey [17].

Data Analysis: All raw data generated from this study were coded and entered in MS Excel database system. Using SPSS version 17.0 computer program, data were analyzed. Chi-square (P^2) test was used to determine the variation in prevalence between sex, age and body condition score. Statistical significance was set at $P < 0.05$ to determine whether there are significant differences between the measured parameters of different groups or not.

RESULTS

Of the total 384 examined sheep, 168 (43.75%) were positive for *Fasciola* infections. Among the 4 different study sites, Yukira (54.9%) had higher prevalence of fasciolosis, followed by Jitu (44.68%), Kombolcha (40.56%) and Ganet-Abbo (38.93%). However, there was no statistical significant difference in prevalence ($P > 0.05$) between study sites (Table 1).

The prevalence of *Fasciola* spp. among male and female sheep was 44.9% and 42.5%, respectively. But this difference was not statistically significant ($P > 0.05$). A higher *Fasciola* infection prevalence was found among sheep of > 3 years (49.8%) followed by 1-3 years (45.8%) when compared with sheep of < 1 year old (23.9%). A significant difference ($P < 0.05$) was recorded among > 3 years and < 1 year old (Table 2). The prevalence of *Fasciola* infection in poor body conditioned animals (51.11%) was higher than good body condition (41.49%). However, there was no statistical significant difference ($P > 0.05$) between them (Table 2).

DISCUSSION

In the present study the overall prevalence of ovine fasciolosis was 43.75%. This finding showed that fasciolosis is prevalent among animals in the study area. This result agrees with previous studies conducted in different parts of the country by Bitew *et al.* [12] in Dawa-Cheffa who reported the prevalence as 49%, Michael [18] 51% in Zeit and Yilma [11] 49% in Holeta. This may be attributed to the presence of similar favorable ecological conditions for breeding of the snail intermediate host and development of the parasite. A lower prevalence of *Fasciola* infection (13.2%) was

Table 1: Prevalence of ovine fasciolosis based on study sites of Haru District

PAs	No. examined animals	No. Positives (%)
Ganet-Abbo	113	44 (38.93)
Kombolcha	106	43 (40.56)
Jitu	94	42 (44.68)
Yukira	71	39 (54.92)
Total	384	43.75(168)

Table 2: Prevalence of ovine fasciolosis based on sex and age categories in the study area

Risk factors	No. of examined animals	No. positives (%)	P ²	P-value
Sex				
Male	196	88 (44.89)	0.024	0.877
Female	188	80 (42.55)		
Age				
Lamb (< 1 year)	71	17 (23.94)	11.281	0.004
Young (1-3 years)	120	55 (45.83)		
Adult (> 3years)	193	96(49.74)		
Body condition Score				
Good	294	122 (41.49)	2.209	0.137
Poor	90	46(51.11)		

reported by Ahmed *et al.* [1] from the Middle Awash River Basin. Michael *et al.* [19] reported a higher prevalence (56.3%) of ovine fasciolosis in the Upper Awash River Basin compared to the present study result. This difference may be due to different agro-ecological conditions and traditional pasture management practices.

The prevalence of the disease in different study sites was very closely similar with no statistical significant difference ($p > 0.05$). This indicates that they have similar ecological conditions equally favorable for intermediate snail hosts and the parasite development. Yilma and Malone [10] suggested that distribution of fasciolosis depends on altitude.

In this study, a higher prevalence of *Fasciola* infection was not associated with sex indicating that sex seems to have no effect on the prevalence of the disease. Solomon [20] has suggested that fasciolosis equally affect both sexes. Similar results have been reported by Graber and Daynes [21] and Argaw [22]. This may be due to the fact that animals of both sexes graze in similar pasture land. Moreover, it might also be that fasciolosis is not a disease directly related to animal reproductive system.

This study revealed that the prevalence of fasciolosis increases with increase age of animals. Higher infection rates were found in adults than other age groups ($p < 0.05$). This could be due to the fact that young animals are not allowed to go far with adult animals for grazing, reducing the chance of exposure to infective

metacercaria as compared to adults. Similar findings were recorded by Bitewet *et al.* [12], Ahmed *et al.* [1], Solomon and Abebe [23] and Woldu [24] in different sites of Ethiopia.

Results of the present study indicated that body conditions of sheep did not show significant association with fasciolosis prevalence ($P > 0.05$). The absence of association between body condition and prevalence agrees with previous reports [25]. This could be due to the fact that bad condition of animals in the study could result from other factors, such as seasonal change of forage resource and the presence of other concurrent disease conditions.

CONCLUSION AND RECOMMENDATIONS

The result of the present study indicated that fasciolosis was a highly prevalent sheep disease in the study area. However, it is increasingly evident that a proper evaluation of the epidemiology of fasciolosis is lacking. The relatively high prevalence reported in this study has clearly indicated lack of strategic control measures against the disease as well as poor veterinary services. This high prevalence found in the study area could be also due to the marshy and water-lodged swampy area which is suitable for the breeding of intermediate host (snail). Based on current conclusion the following recommendations were forwarded:

- C Integrated approach, which is a combination of selective chemotherapy and selective vector control, should be considered more practically and economically feasible.
- C Supplementation of important nutrient feed in dry season is important to avoid stress conditions that affect the host resistance and susceptibility to parasitic diseases.
- C Awareness creation to livestock owners need to be performed with economical significance and control methods of this disease in the study area.
- C Detailed studies should be conducted on the epidemiology of the disease in order to design and implement control strategy.

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