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Prevalence of Ovine Fasciolosis in Adigrat, North East Ethiopia

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Abstract: A cross-sectional survey was conducted from November 2009 up to March 2010 to determine the prevalence of ovine fasciolosis in Adigrat, Tigray regional state, northeast Ethiopia. Two villages namely Sasun and Betehawariat were purposively selected considering the number of sheep population of the area. Parasitological examination of fecal samples randomly collected from 384 sheep revealed an overall fasciolosis prevalence of 39.5% (95% CI; 34.7-44.5%). The prevalence was higher in Betehawariat than in Sasun, in male animals than in females and in younger animals than adult ones; nevertheless, the differences were not statistically significant ($P>0.05$). With regard to the body condition of the animals, the prevalence was significantly higher ($P<0.05$) in those animals with poor body conditions than in those with good body conditions. Considering the huge negative effect of the parasite on health and productivity of the livestock sector, the results of our study suggests that the prevalence of fasciolosis in sheep in the current study was high. Hence, strategic parasite control method with an integrated approach is required to be implemented to improve the health and productivity of sheep in the area.

Key words: Adigrat · Ethiopia · Liver Fluke · Sheep · Parasite · Survey

INTRODUCTION

In Ethiopia, more than 80% of the human population depends on agriculture for their livelihoods and usually keep livestock as mixed crop livestock systems or as pastoralists [1]. The country has the largest livestock population in Africa, particularly with the number of sheep currently estimated at 33 million [2, 3]. However, the country's rich potential from the livestock sector is not efficiently exploited due to several constraints including suboptimal nutrition, traditional management and most importantly high prevalence of diseases [4, 5].

Among the myriads of diseases affecting livestock in this country, parasitic infestations take a lion share. In connection, fasciolosis is one of the major parasitic problems that impose direct and indirect economic loss on livestock production, particularly of sheep [6, 7]. To this end, understanding the magnitude of infection is imperative towards the various efforts undertaken to control the parasite [8].

Although number of studies have been undertaken with regard to the prevalence of ovine fasciolosis in different parts of Ethiopia [9- 13], very little has been done in northern parts of the country particularly Adigrat area. This study therefore aimed at determining the prevalence of ovine fasciolosis at Adigrat, Tigray regional state, northeast Ethiopia.

MATERIALS AND METHODS

Study Area: The study was conducted in Adigrat, Tigray regional state, northeast Ethiopia which is located at about 893 km far away from the capital city; Addis Ababa. Topographically, Adigrat is found at an altitude of 2000-3600 m.a.s.l, with mean annual rain fall of 350 -550mm and the mean annual temperature of 4-25°C. The maximum rain fall occurs from June to September and the weather condition is hot and humid.

Study Population: The study animals comprised of indigenous sheep of local breeds belonging to the two purposively selected villages of Adigrat namely Sasun and Betehawariat and consisting of various ages, sexes and body conditions.

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Study Design: A cross-sectional survey was conducted from November 2009 up to March 2010 to determine the prevalence of ovine fasciolosis in Adigrat, Tigray regional state, northeast Ethiopia.

Sample Size Determination: The sample size was determined according to the formula given by Thrusfield [14] as follows:

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

Where:

n = Required sample size
p_{exp} = Expected prevalence
d^2 = Desired absolute precision

With a 50% expected prevalence (considering no previous study was undertaken), 95% confidence level and 5% precision, sample size was calculated to be 384.

Sampling technique: Two villages namely Sasun and Betehawariat were purposively selected from Adigrat considering the number of sheep population of the area. The households and individual animals were selected using simple random sampling technique. Accordingly, 233 sheep from Betehawariat and 151 sheep from Sasun were sampled for the study. During sampling, age, sex and body conditions of the animals were recorded.

Body Condition Scoring: Body condition of each animal was determined based on the criteria set by Thompson and Meyer [15] using the 5 point scale (1=very thin to 5=obese). Animals were visually assessed followed by palpation of the area around the lumbar vertebrae between the back of the ribs and the front of the pelvic bones. However, for convenience, the animals were categorized in to poor and good body conditions.

Determination of Age: Since most smallholder farmers do not usually keep records, it was difficult to obtain information on the age of animals from the owners; hence, age of every sampled sheep was determined based on dentition as indicated by Vatta *et al.* [16] and were conveniently categorized as young and adults.

Sample Collection and Laboratory Diagnosis: Fresh fecal samples were collected from the rectum of animals in crew cupped glass bottles containing 10% formalin as preservative. Microscopic examination was performed using sedimentation technique [17].

Data Management and Statistical Analysis: Raw data and the results of parasitological examination were entered in to a Microsoft Excel spread sheets program and then were transferred to SPSS version 16 for analysis. The prevalence of fasciolosis was calculated as the number of positive samples divided by the total number of examined samples. Pearson's chi-square (χ^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) were considered significant in all analysis.

RESULTS AND DISCUSSION

Parasitological examination of fecal samples collected from 384 sheep revealed an overall fasciolosis prevalence of 39.5% (95% CI; 34.7-44.5%). The prevalence was higher in Betehawariat than in Sasun (Figure 1), however it was not statistically significant (P>0.05). This could be attributed to the close similarity in agroecology between the two sampled villages. The overall prevalence of fasciolosis in our study area was higher than the previous studies done by Ahmed *et al.* [11] and Henok and Mekonnen [18] who reported the prevalence of 13.2% and 14.6% in Awash and Hirna respectively and it was much higher than the prevalence recorded by Ahmad *et al.* [19] who reported 0.35% prevalence in Iran. On the other hand, our result was lower than the one reported by Molalegne *et al.* [12] in Kemisse (49%) and Chanie and Begashaw [20] in Menz (70.2%). 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 [17].

The prevalence of fasciolosis was higher in male animals than in females (Table 1), nevertheless it was not statistically significant (P>0.05). The absence of significant sex related differences was also reported by Aseged [9]. The possible explanation for this could be owing to the virtually similar exposure status of the animals in grazing areas irrespective of their sexes.

Younger animals showed higher prevalence than adult ones (Table 2), however, the variation was not statistically significant (P>0.05). In contrast to our finding, Ahmed *et al.* [11], Molalegne *et al.* [12] and Henok and Mekonnen [18] reported higher prevalence in older sheep. Alternatively, in support of our finding, Michael [10] also reported higher prevalence in younger animals possibly indicating that repeated exposure to fluke vinfestation

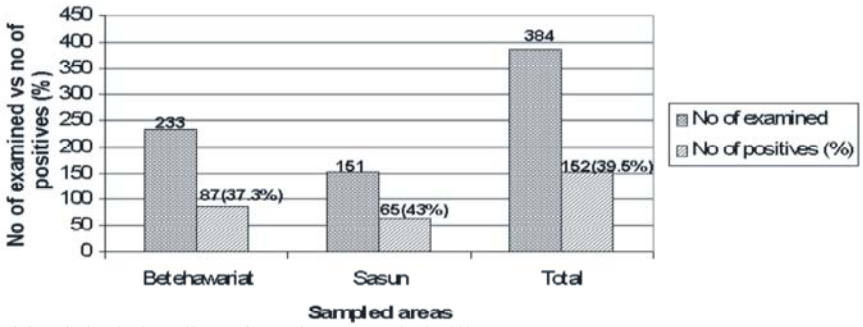

Fig. 1: Prevalence of fasciolosis in adigrat based on sampled village

Table 1: Prevalence of fasciolosis according to sex

Sex	No of examined	No of positives (% out of examined)	[95% confidence interval]	df	χ^2 (p-value)
Male	207	88 (42.5%)	35.8-49.2		
Female	177	64 (36.2%)	29.1-43.2	1	1.513 (0.219)
Total	384	152 (39.5%)	34.7-44.5		

Table 2: Prevalence of fasciolosis based on age

Age	No of examined	No of positives (% out of examined)	[95% confidence interval]	df	χ^2 (p-value)
Young	161	66 (41.0%)	33.4-48.6		
Adults	223	86 (38.6%)	32.2-45.0	1	0.265 (0.607)
Total	384	152 (39.5%)	34.7-44.5		

Table 3: Prevalence of fasciolosis based on body conditions

Body conditions	No of examined	No of positives (% out of examined)	[95% confidence interval]	df	χ^2 (p-value)
Poor	19991	(45.7%)	38.8-52.7		
Good	18561	(32.9%)	26.2-39.7	1	6.312 (0.012)
Total	384152	(39.5%)	34.7-44.5		

might have led to the development of certain level of immunity in the adult animals as compared to younger ones, consequently impeding the establishment of parasitic infection.

With regard to the body condition of the animals, the prevalence was significantly higher ($P<0.05$) in those animals with poor body condition than in those with good body conditions (Table 3). In accord with our finding, Molalegne *et al.* [12] and Yemisirach and Mekonnen [21] also reported significantly higher ($P<0.05$) 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 [22].

CONCLUSION AND RECOMMENDATION

Considering the huge negative effect of the parasite on health and productivity of the livestock sector, the results of our study suggests that the prevalence of fasciolosis in sheep in this study was high. Hence, strategic parasite control method with an integrated approach is required to be implemented to improve the health and productivity of sheep in the area.

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