

Coprological Study on the Prevalence of Ovine Fasciolosis in Debre Birhan Agricultural Research Center, Ethiopia

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Abstract: A cross-sectional study was conducted from November, 2010 to April, 2011 to determine the prevalence of bovine fasciolosis in Debre Birhan agricultural research center, Ethiopia. A total of 390 fecal samples were examined and 198 (50.8%) were found to be positive for fasciolosis. The prevalence of ovine fasciolosis between age, sex and breeds were significantly varied ($P < 0.05$). Sex, age and breed were taken into consideration where 41.3% (52), 68.6% (127) and 24.1% (19) prevalence was recorded for young, adult and old animals, respectively. Similarly 35.7% (41) and 57.1% (157) prevalence was recorded for male and female ovine, respectively. The prevalence of the disease significantly varied ($P < 0.05$) between breeds and the highest prevalence was recorded in Horro (89.6%) and the lowest in Dorper x Menz (22.2%) breed.

Key words: Fasciolosis • Sheep • Prevalence • Coprology

INTRODUCTION

Africa has a population of 205 million sheep and 174 million goats representing approximately 17 and 31%, respectively, of the world total population. The estimated number of Ethiopian sheep population is about 25.9 million, out of which about 73.1% are females and about 26.9% are males [1].

In Ethiopia sheep are the dominant livestock, providing up to 63% of cash income and 23% of food subsistence value obtained from livestock production [2]. Production of sheep for meat, milk, wool, hair, skin and manure are attractive agricultural enterprises for Ethiopian farmers because the relative low cost of breeding stock, the high productive rate of sheep and source of cash income [3].

Despite the large size of the population, the productivity per animal and the contribution of this sub sector to the national economy is relatively low. Endoparasitic infections, malnutrition and management problem are known to be the main factor that affect productivity. The various species of gastrointestinal, as well as pulmonary nematods, trematods and cestodes are known to be prevalent in Ethiopia [4-6]. Among the many parasitic problems of the domestic animals fasciolosis is

a major disease which imposes direct and indirect economic impact on livestock production in ruminants [7].

Fasciolosis is caused by *Fasciola* spp., commonly referred to as liver fluke which is a wide spread parasitic disease of sheep. *Fasciola hepatica* and *Fasciola gigantica* are the two common species of *Fasciola*. *Fasciola hepatica* has a worldwide distribution predominating in the temperate zones and highland areas of tropics and sub tropics [8]; whereas *Fasciola gigantica* is mostly located in tropics. The geographical distribution of *Fasciola hepatica* and *Fasciola gigantica* is determined mainly by the distribution patterns of snail population that have a role as intermediate hosts [9]. The two primary requirements for the establishment of liver fluke are snail (the intermediate host) and environment that suits the development and multiplication of liver fluke eggs [10].

In Ethiopia both species coexist at different altitudes of marshy areas. The two common important intermediate hosts for liver flukes are *Lymnaea truncatula* and *lymnaea natalensis* [11, 12]. *Lymnaea truncatula* and *lymnaea natalensis* are the most common intermediate host of *Fasciola hepatica* and *Fasciola gigantica*, respectively, in different part of the world [13]. The prevalence and distribution of fasciolosis varies from 11% in rift valley to 100% in central high lands of Ethiopia [14].

The losses due to ovine fasciolosis is estimated at 48.4 million in Ethiopian birr per year, of which 46.5%, 48.8% and 4.75% are due to mortality, productivity (weight loss and reproductive wastage) and liver condemnation at slaughter respectively [15]. sheep are an important asset to the local farmer particularly and the country in general. The present study was therefore, carried out to determine the prevalence of ovine fasciolosis in Debre Birhan Agricultural Research Center and to assess the risk factors associated with age, sex and breed in the study area.

MATERIALS AND METHODS

Study Area: The study was conducted at the Debre Birhan Agricultural Research Center, which is located in the Amhara National Regional State of Ethiopian at latitude of 9°36'N and longitude 39°38'E; 120 km North East of Addis Ababa. It is situated at an altitude of 2828 meter above sea level. The climate is characterized by bimodal rainfall consisting of a long rainy season (June-September), short rainy season (February/March-April/May) and a dry season (October-January). The mean annual rainfall of the area ranges from 781 to 1279 mm and the maximum, minimum and mean range temperature were 24°C, 6.1°C and 2.21-28.3°C respectively. It has sub moist humidity (62.3) [16].

Study Population: A total of 390 sheep were randomly selected and subjected to qualitative coprological examination. The selected animals were from six different breeds (pure Menz, Awassi-Menz, Horro, Bonga-Menz, Washera-Menz and Dorper-Menz) of different age and sex groups. A cross-sectional study was conducted to determine the prevalence of the disease in the study area. The animals were managed under a semi-intensive management system and depend mostly on grazing with little supplementations and health care. Out of 390 Sheep, 275 were females and 115 were males. The study animals were classified as young, adult and old age in which the sample was taking at six months age and above.

Study Design and Methodology

Sampling Methods and Sample Size Determination: The animals were selected by using simple random sampling method based on species, breed, sex and age. To determine the sample size, an expected prevalence of 50% was taken into consideration. The desired sample size for the study was calculated using the formula given by Thursfield [17] with 95% confidence interval and 5% absolute precision.

Table 1: Total sampled animals at Debre-Birhan Agricultural Research Center (DBRC)

Breed	Total population	Total sample
Pure Menz	550	207
Awassi x Menz	246	98
Horro	200	48
Bonga x Menz	52	15
Washera x Menz	44	13
Dorper x Menz	12	9
Total	1104	390

$$n = 1.962P_{exp} (1 - P_{exp} d^2)$$

Where P_{exp} = expected prevalence; d = absolute precision; n = sample size. The estimated sample size was 384 animals

Cross Sectional Study: The study was conducted from November 2010 to April 2011 with simple random sampling technique; the desired sample size for the study was as shown in Table 1.

Sample Collection: Fecal samples were collected directly from the rectum in to laboratory-sampling bottles and immediately transported by ice box to the parasitology laboratory of the Debre Birhan Agricultural Research Center for coprological examinations. Samples that were not processed within 24 hours from collection were stored in a refrigerator at 4°C. During every sampling, information on breed, sex and age of animal were recorded.

Coprological Examination: Coprological examination was performed to detect *Fasciola* eggs in the faces by using standard sedimentation technique. It was used to assess the presence of fluke infections through repeated dilution of the faecal suspension and sedimentation of the eggs [18].

Data Analysis: The data were entered in to Microsoft excel spread sheet. The chi square test was used to evaluate the association between breed, sex and age analyzed by using SPSS software (version 15.0). $P < 0.05$ was considered significant.

RESULTS

Prevalence of Ovine Fasciolosis: Out of 390 fecal samples examined an overall prevalence of 198 (50.8%) were positive for fluke eggs. The highest prevalence rate was recorded in Horro (89.6%) while the lowest was Dorper x Menz (22.2%) breeds (Table 2).

Table 2: Prevalence of ovine fasciolosis based on breed

Breed	No. of sheep sampled	No. of sheep positive	X ² (P-value)
Menz	207	54.1%(112)	54.076(.000)
Awassi x Menz	98	27.6%(27)	
Horro	48	89.6%(43)	
Bonga x Menz	15	53.3%(8)	
Washera x Menz	13	46.2%(6)	
Dorper x Menz	9	22.2%(2)	
Total	390	50.8%(198)	

Table 3: Prevalence of ovine fasciolosis based on sex group

Sex	No. of sheep sampled	No. of positive	X ² (P-value)
Male	115	35.7%(41)	14.912(.000)
Female	275	57.1%(157)	
Total	390	50.8%(198)	

The prevalence of fasciolosis was significantly higher in females than in males.

Table 4: Prevalence of ovine fasciolosis based on age group

Age group	No. of sheep sampled	No. of sheep positive	X ² (P-value)
young	126	41.3%(52)	50.755(.000)
adult	185	68.6%(127)	
old	79	24.1%(19)	
Total	390	50.8%(198)	

A higher prevalence was recorded in sheep adult (68.6%) and the lowest in old Sheep (24.1%).

DISCUSSION

Fecal examination showed that from a total of 390 fecal samples examined, 198 were found to be positive with an overall prevalence 50.8%. Similar studies were conducted in the same area by Ngategize *et al.* [19] and Zerihun [20] with the overall prevalence of 54.2% and 56.2% respectively. This study was also in agreement with Bitew *et al.* [21] in Dawa Cheffa and Yilma [22] in Holeta with the prevalence of 49% and 51% respectively. The high prevalence of the disease in the study area might be due to the favorable ecological factors for snail intermediate host and the parasite.

In Ethiopia, ovine fasciolosis existed in almost all regions [21-23]. However the prevalence rate, epidemiology and *Fasciola* spp involved varied with locality. This was attributed mainly to the variation in the climatic and ecological conditions such as altitude, rainfall and temperature and management system [24]. Reports

indicated that in Ethiopia, *Fasciola hepatica* and *Fasciola gigantica* infections occurred in areas above 1800 m.a.s.l and below 1200 m.a.s.l respectively by Michael [23] who suggested that, the climatic factors in highland areas were more favorable for the propagation and activities of snail intermediate hosts and progression of parasitic life cycle for most part of the year, as compared with the scenario in mid- altitude and lowland areas.

The highest prevalence of ovine fasciolosis was recorded in Horro breed (89.6%) followed by Menz (54.1%), Bonga x Menz (53.3%), Washera x Menz (46.2%), Awassi x Menz (27.6%) and Dorper x Menz (22.2%). Generally the prevalence strongly associated with adaptation and management system. Exotic crossed breeds (Awassi x Menz and Dorper x Menz) had significantly lower prevalence than indigenous breeds. This might be due to exotic crossed breeds were supplemented by concentrate feeds and grazed at the dry land with water access [25, 26]. This found significant breed differences in susceptibility to helminthes infection and suggested that this might be due to difference in resistance to parasitic infection.

There was significant difference (P<0.05) between sexes on the prevalence of ovine fasciolosis. Females have higher infection rate than males that might be due to gestation, lambing and lactation stress in females [27].

There was significant difference (P<0.05) between age groups where highest prevalence (68.6%) were recorded in adult group and the lowest (24.1%) was recorded in old age group. Similar studies were reported by Zerihun [20] and Ahmed *et al.* [28]. In the present finding the possible suggestion in lower prevalence of old age group was due to self-cure phenomenon and acquired immunity which increased with age and might be high grazing activity in adult sheep [29].

CONCLUSION

Fasciolosis is a major obstacle for sheep development by inflicting remarkable direct and indirect losses at different parts of the country. In the present coprological study high prevalence of ovine fasciolosis was recorded in Horro breed and followed by Menz and Awassi crossed breeds in the study area. Therefore, significantly higher prevalence of ovine fasciolosis was obtained in the highland of Debre Berhan agro-postural zone. This is due to more favorable conditions for the propagation and activity of the snail population and the progression of *Fasciola* life cycle for most months of the year.

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