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Full Length Research Paper

Study on the prevalence of *Ovine fasciolosis* in and around Dawa-Cheffa, Kemissie

Molalegne Bitew*, Nuradis Ibrahim and Nahili Abdela

College of Agriculture and Veterinary Medicine, Jimma University, Jimma, P.O. Box, 307, Jimma, Ethiopia.

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A cross sectional study was conducted to determine prevalence and risk factors associated with Fasciolosis in three selected areas of Dawa Cheffa district of Amhara regional state from October 2009 to March 2010. Faecal samples from a total of 384 sheep were subjected to coprological investigation. Based on the coprological investigation the overall prevalence of fasciolosis was 188 (49%). High prevalence was recorded in poor body conditioned sheep 84 (73.7%). Statistical significant differences (P < 0.05) were observed in prevalence among the body condition, deworming history and age of animals using coproscopy. Differences of prevalence in districts and sexes were shown to have no statistical significant (P > 0.05). Age, body condition and deworming activity were known to be among important risk factors associated with Fasciolosis. The present study revealed that infection of sheep by Fasciolosis was attributed to the presence of favorable environment for the abundance of intermediate host and the parasite, hence requiring immediate strategic intervention against the disease.

Key words: Coproscopy, fasciolosis, prevalence, sheep, Dawa Cheffa.

INTRODUCTION

Ethiopia has the largest livestock inventories in Africa, including more than 38,749,320 cattle, 18,075,580 sheep, 14, 858,650 goats, 456,910 camels, 5,765,170 equines and 30,868,540 chickens with livestock ownership currently contributing to the livelihoods of an estimated 80% of the rural population (CSA, 2009). In the arid and semi-arid extensive grazing areas in the Northeastern, Eastern, Western as well as Southern lowlands cattle, sheep, goats, and camels are managed under migratory pastoral production systems. However, the full exploitation of these huge resources was hindered due to a combination of factors such as drought, poor genetic potential of animals, traditional system of husbandry and management as well as the presence of numerous diseases (Mtenga et al., 1994).

In Ethiopia, sheep are the dominant livestock providing up to 63% of cash income and 23% of food substance value obtained from livestock production. Despite the animal and the contribution of this sub-sector to the nation's economy is relatively low. Endo-parasitic 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 (Ahmed et al., 2007).

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 which are the natural hosts for Fasciola. Infestation is highest in cattle and sheep (Urquhart et al., 1996). Fasciolosis is an economically important disease of domestic livestock, in particular cattle and sheep and occasionally man. The disease is caused by digenean 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*. In Ethiopia, the annual losses due to *Ovine fasciolosis* were estimated to be 48.4 million Ethiopian Birr (1 US$ = 2.07 ETB) per year, of which 46.5, 48.8, and 4.7% were due to mortality, productivity (weight loss and reproductive Wastage) and liver condemnation,

*Corresponding author. E-mail: molalegn.bitew@ju.edu.et, molalegne23@yahoo.com. Tel: +251911735280. Fax: +251471110934.

respectively (Ahmed et al., 2007).

Generally due to such and other serious problems, research should be conducted to overcome the impact of the disease. Many researchers have reported the prevalence of Fasciolosis in sheep as 86.78% Yilma (1985); 77.8% Abera (1990) and 88.57% Dagne (1994) in different places of Ethiopia. But studies on the epidemiology of Fasciolosis in sheep were not so far conducted in Dawa Cheffa District of Amhara regional state and it was the rationale that initiated this research project. Therefore, the objectives of this study were to determine the prevalence of *Ovine fasciolosis* in the study area and to assess major risk factors associated with the disease.

MATERIALS AND METHODS

Study area

The study was conducted in Dawa Cheffa district of the Amhara Region**,** Northeastern Ethiopia. It is located at 325 km North of Addis Ababa. The approximate geographical location of the area is between 10°01' to 11° 25' N and 39° 41' to 40° 24' E. The altitude is from 1000 to 2500 m above see level and the maximum temperature is 33°C and the minimum temperature of the area is about 12°C. The mean annual rainfall of the area ranges from 600 to 900 mm. The area receives long heavy rainy season from June to September and short rainy season from March to May (OZARD, 2006).

Study animal

The study was conducted in indigenous sheep managed under extensive system in the study area. The study population comprises of sheep at different age and sex category found under the extensive grazing system. According to the current document of Oromia Zone and Dawa Cheffa woreda agricultural and rural development offices the population of in the area comprises 199, 399 sheep (OZARD, 2006).

Study design

A crossectional survey was conducted selecting 3 peasant associations (PAs) randomly from Dawa Cheffa district of Amhara regional state. These include Cheffa, Kemissie and Bedeno. The sampling method used was simple random sampling to select the PAs and individual sheep in the PAs. To determine the sample size an expected prevalence of 50 % was taken in to consideration since there was no previous study conducted in the area. The desire sample size for the study was calculated using the formula given by Thrusfield (2005) with 95% confidential interval and 5% absolute precision and it was 384.

Study methodology

Coproscopy was used to determine positivity of the animals for the disease. Faecal samples for parasitological examination were collected directly from the rectum of each animal, using disposable plastic gloves and placed in clean screw capped universal bottle and each sample was clearly labeled with animal identification, place of collection, body condition score, deworming history, sex and age. Faecal samples were presented with 10% formalin solution to avoid the eggs developing and hatching. In the laboratory, coprological examinations were performed to detect the presence of Fasciola eggs using the standard sedimentation techniques. To differentiate between eggs of *Paramphistomum* species and *Fasciola* species a drop of methylene blue solution was added to the sediment. Eggs of *Fasciola* species show yellowish color while eggs of *Paramphistomum* species stain by methylene blue (Hansen and Perry, 1994).

Data analysis

All raw data generated from this study were coded and entered in MS Excel database system. Using SPSS version 16.0 computer program, data were analyzed. Chi-square (χ^2) test was used to determine the variation in infection, prevalence between sex, age, body condition score and deworming history. Statistical significance was set at $P < 0.05$ to determine whether there are significant differences between the parameters measured between the groups.

RESULTS

Out of 384 faecal samples examined an overall prevalence of 188 (49.0%) were found positive for Faciolosis in the study area. The prevalence of Faciolosis not varied significantly among the three areas. But the highest prevalence of Fasciolosis was recorded in Cheffa (50.7%) followed by Kemissie (49 %) and the lowest is in Bedno (47.3%). Statistical analysis revealed that there was no significant difference ($P < 0.05$) in infections among areas. Prevalence of Fasciolosis in female and male animals was 49.4 and 47.8% respectively. However, no significant difference ($P > 0.05$) was observed between sex (Table 1).

Prevalence of fasciolosis on poor body condition animals was 73.7%. However, animals with good body condition showed prevalence of 38.5%. Significant difference ($P < 0.05$) in prevalence was observed among body condition of the study animals (Table 2).

Prevalence of fasciolosis varied among age groups. Highest prevalence was in sheep aged > 3 years (56.4%) and 1 to 3 years (50.0%). Meanwhile, low prevalence was observed in less than 1 year with value (29.3%). Significant difference ($P < 0.05$) was observed among age groups in the study animals (Table 3).

An attempt was also made to analyze the prevalence with respect to deworming history of the animals. The prevalence of the disease in animals that were not dewormed (57.7%) was highest, followed by dewormed occasionally (47.7%) and dewormed regularly (30%). The result of statistical analysis revealed significant difference ($P < 0.05$) in each group (Table 4).

DISCUSSIONS

The present study was designed to determine prevalence and assess risk factors associated with *Ovine fasciolosis*. It revealed that an overall prevalence of Fasciolosis

Table 1. Prevalence of ovine fasciolosis as compared with sex and three PAs of Dawa Cheffa district.

PA	No of sheep observed	No of sheep positive	X^2(P-value)	df
Cheffa	134	50.7% (68)	0.335(0.85)	2
Kemissie	102	49.0% (50)		
Bedno	148	47.3% (70)		
Total	384	49.0% (188)		
Female	271	49.4% (134)	0.88(0.77)	1
Male	113	47.8% (54)		
Total	384	49.0% (188)		

Table 2. Prevalence of ovine fasciolosis based on body condition score.

Body score	No of sheep observed	No of sheep positive	X^2(P-value)	df
Good	270	38.5% (104)	39.7(0.000)	1
Poor	114	73.7% (84)		
Total	384	49.0% (188)		

Table 3. Prevalence of *Ovine fascioliosis* based on age.

Age group	No of sheep observed	No of sheep positive	X^2(P-value)	df
> 3 year	181	56.4% (102)	15.6(0.000)	2
1 - 3 year	128	50.0% (64)		
< 1 year	75	29.3% (22)		
Total	384	49.0% (188)		

Table 4. Prevalence of ovine fasciolosis based on deworming history.

Deworming history	No of sheep observed	No of positive	X^2(P-value)	df
No deworming	208	57.7% (120)	19.4 (0.000)	2
Regularly deworming	90	30% (27)		
Occasionally deworming	86	47.7% (41)		
Total	384	49.0% (188)		

based on coprological investigation of *Ovine fasciolosis* was 49%. The prevalence of the disease in the study area may be attributed to the favorable ecological factors for the snail intermediate host and the parasite. The area is water lodged swampy and marshy area which is suitable for the intermediate host (snail) to continue the lifecycle (Urquhart et al., 1996).

Our finding agrees with previous studies observed at different regions by Michael (2003) who reported the prevalence as 51% in Zeit and Yilma (1985) 49% in Holeta. This may be due to the similarity of the climatic conditions and geographical regions such as rain fall, temperature and humidity.

Prevalence of Fasciolosis was not in agreement with the previous report by (Ahmed et al., 2007) 13.2% in the middle Awash river basin. The reason might be due to the differences in temperature, moisture, humidity and soil that might favor multiplication of intermediate host, snails. Urquhart et al. (1996) also suggested that the difference in prevalence and severity of the disease syndrome are evident in various geographical regions depending on the local climatic conditions, availability of permanent water and system of management. Marshy area by Borkena River in the study area combined with the construction of multiple micro dams from this river might be other important factor for the perpetuation of the

intermediate host. Moreover, most of plain land of the area contains pockets of water logged marshy areas, which provide suitable habitats year round for the snail intermediate hosts (OZARD, 2006). Such ecological conditions are considerable for breeding and survival of the intermediate host snails and the parasite (Graber and Dayns, 1974; Argaw, 1998).

The prevalence of the disease in different PAs of study areas were very closely similar having 50.7% (Cheffa), 49% (Kemissie) and 47.3% (Bedeno) with non-statistical difference ($P > 0.05$). This non significant difference indicates that there is no difference in the prevalence of the disease. They are ecologically similar having 1540-1800 m.a.s.l (OZARD, 2006). Yilma and Malone (1998) suggested that distribution of Faciolosis depends on altitude.

The prevalence of the disease in female and male animals was recorded as 49.4% and 47.8% respectively. There was non-significant difference ($P > 0.05$) between the two sexes indicating that sex seems no effect on the prevalence of the disease. This may be due to the fact that grazing of both sex groups in similar pasture land. Moreover, it might also be that fasciolosis is not a disease directly related to animal reproductive system. Similar results have been reported by Graber and Dans (1974), Argaw (1998).

The present study indicated that there was highly significant difference between age groups, which agrees with reports of (Ahmed et al., 2007). This study revealed that prevalence of fasciolosis was higher in sheep with increase of age. The younger the age the lower the prevalence and the older the age the higher the prevalence is. This could be due to the fact that young animals are not allowed to go far with adult animals for grazing/feeding reducing the chance of exposure to infective metacercaria as compared to adults.

Study was carried out on prevalence of Fasciolosis on the basis of body condition. The results of this study indicated that infection rates in poor body condition animals were significantly higher ($P < 0.05$) than that of good body conditions animals. This signifies that the importance of Fasciolosis in causing weight loss and is a characteristic sign of the disease. Sheep of poor body condition are vulnerable to parasitic diseases (Devendra and Marca, 1983).

The present result indicated that significant difference exists in deworming history ($P < 0.05$). There was 57.7% of prevalence in those which do not dewormed and 47.7% of prevalence rate in those occasionally dewormed sheep. For sheep those regularly dewormed the prevalence was 30%. In the study area almost all sheep are not dewormed and especially strategic treatments not implemented at appropriate timing and with the aim of reducing worm burden from infected animals and preclude pasture contamination. Periodic anthelmintic treatment is the most commonly used means to control the diverse effects of Fasciolosis in ruminants.

It is recommended that twice yearly treatment under smallholder farmer's situation is an effective and affordable regime under tropical conditions (Hansen and Perry, 1994; Yilma and Malone, 1998). The first treatment is recommended to be given during the dry season to eliminate the adult parasite. Such a treatment enables the animals to survive the effects of the dry season, when nutritional condition are generally compressed. It also avoids contamination with fluke eggs of water holes and irrigation channels. On the other hand that late December might be a more appropriate month to administer the treatment to sheep in the study area concerned, where the rainy season sometimes extends into October, since animals treated before mid December are liable to significant re-infection. The second treatment has been given early wet season when the immature flukes migrate through the hepatic parenchyma. Strategic anthelmintic treatment helps to reduce grazing land contamination with fluke eggs and increases productivity (Hansen and Perry, 1994; Yilma and Malone, 1998). But in the study area sheep will not be dewormed according to the aforementioned deworming calendar.

CONCLUSIONS AND RECOMMENDATIONS

The result of the present study indicated that Fasciolosis is 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 water lodgment from Borkena River which increased irrigated land masses and ponds at grazing areas of animals and the tendency of farmers to graze their animals in these areas because of feed scarcity. Based on the aforementioned conclusion the following recommendations are forwarded:

(1) Integrated approach, which is a combination of selective chemotherapy and selective vector control, should be considered more practically and economically feasible.
(2) Supplementation of important nutrient feed in dry season is important to avoid stress conditions that affect the host resistance and susceptibility to parasitic diseases.
(3) Training need to be organized to farmers with economical significance and control methods of this disease in the study area.
(4)Detailed studies should be conducted on the epide-miology of the disease in order to expand and implement disease investigation and control strategy.

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