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The Prevalence Study of Ovine Fasciolosis in Jima Rare District, Horo Guduru Wollega Zone, Oromia Regional State, Western Ethiopia

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Abstract

A cross-sectional study on the prevalence of ovine fasciolosis was conducted in Jima Rare District from January 2013 to June 2014. A total of 384 faecal samples were randomly collected directly from the rectum of individual animals. Parasitological investigation was performed using sedimentation technique. From a total of 384 coprologically examined sheep 214 animals were found positive for fasciolosis with an overall prevalence of 55.7%. Gemeda, Shumbo, kalo Guracha, Burka Hobo and Bekela Erer Peasant Associations (PAs) accounted for 47.36%, 50.6%, 64.47%, 58.97% and 57.14% respectively. The difference in the prevalence in the five PAs was not statistically significant (p>0.05). The prevalence of ovine fasciolosis was computed for the different age, sex and body condition categories. The prevalence rate of fasciolosis in young sheep 50.8% was less than in adults sheep 59.8% and the difference were not statistically significant (P>0.05). The prevalence of fasciolosis in two sex groups in the present study was 55.89%, 55.5% in female and male respectively. The difference in the prevalence was not significantly significant (p>0.05) .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 67.8%, 51.8% and 43.68% respectively. There is no statically deference (p>0.05) between three types of BCS. 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.

Keywords: Ovine fasciolosis; Jima rare; Prevalence

Introduction

Ethiopia hosts large number of small ruminants that are raised under external pastoral production system or in adjunct to crop production. The estimated small ruminant population of Ethiopia is about 25, 017, 218 sheep's and 21, 884, 222 goats. However this huge potential of wealth is untapped to the livelihood of village farmers and the contribution to national economy at large is minimal. The reason being predominance of infectious and parasitic disease, age-old traditional management system, lack of genetic selection for good performance coupled with under and malnutrition and absence of well-developed market infrastructure. Both infectious and parasitic diseases are common traits that affect productivity. Parasitic disease possesses a serious health trait and limits the productivity of livestock due to the associated morbidity and mortality.

There is many in numbers of parasitic disease are incriminated to play a detrimental role in hampering small ruminant production. GIT helmenthosis is considered as one of the major parasitic problem that constrained livestock improvement programs in Ethiopia. One of the helmenthosis that cause direct or indirect losses especially in domestic ruminants is fasciolosis. Fasciola species is the most important Trematode of domestic ruminants. Fascioliasis is the commonest of liver fluke disease in the temperate of the world. The complete life cycle of Fasciola is realized by the presence of suitable intermediate host under favorable condition. Snail is the essential intermediate host for the development of Miracidium through Metacercariae which is an infective stage for the final host. There are three main factors influencing the production of the large numbers of Metacercariae necessary for outbreaks of Fasciolosis. Those factors are availability of snail habitat (i.e., Lymnaea truncatula prefers mud to free water), temperature (10°C and above) and moisture for the breeding of snail and for the development of fasciola [1].

Fasciolosis can be caused by the F. hepatica, which is widely distributed in temperate and cooler areas of high altitude in tropics and subtropics areas and F. gigantica which is widely distributed in tropical areas.

Fasciolosis, caused by F.hepatica and F.gigantica, is one of the most prevalent helminthes infections of ruminants in different parts of the world. It causes significant morbidity and mortality [2,3].

Since Fasciolosis is major parasitic disease of small ruminants, an estimate of economic loss due to ovine fasciolosis in the Ethiopia highlands was made based on available data on mortality, weight loss, reduced reproduction efficiency, and liver condemnation at slaughter. The economic effects of fasciolosis where identified and models for estimating the financial loss presented. Ovine fasciolosis losses were estimated at 48.4 mills. Birr per/yr of which 46.5, 48.8 and 4.7%were due to mortality, productivity or weight loss and reproductive wastage and liver condemnation respectively. These losses can be reduced substantially by fasciolosis control programs that may be including the use of antihelmentics, grazing management and nutritional supplementation [4].

Considerable work has been done on the prevalence of ovine Fasciolosis in many parts of the Ethiopia. However no report so far has been published on the level of ovine fasciolosis in the present study

area, where small ruminants are important assets to the local farmers. Hence, this research was conducted to meet the following objectives:

To determine the prevalence of Ovine fasciolosis in the Jimma Rare District, Horo Guduru Wollega, Ethiopia.

To identify major risk factors of the disease.

Materials and Methods

Study area

These theses has been conducted in Oromo region, Horo Guduru Wollega zone, Jimma Rare District (Woreda), which is locted 245 km far from capital city of Ethiopia (Addis Abeba) to the west direction. Jimma Rare woreda is the district located to the east part of the zone. It is formed as woreda administration during 1984. Today this woreda is sub divided to into 18 peasant associations (PAs) for its administrative propose. Wayu is capital city town of the woreda located 96 km away from zonal city Shambu. The Jimma Rare woreda is laying on 34,375.375 hector of land. From this about 3305.047 hector of land is used for grazing, 20,625hector is used for crop production,5800 hector land is covered by muddy (marsh land), 329.14 hector is used for construction and about 329.14 hector land is used for social purpose.

The study area is located at an altitude between1650-2650 m with an average 2150 m above sea level. The temperature of the area varies between 18-25, with average 21.5 and the annual average rainfall is around 1150 mm. The area has subtropical (weyndega), tropical (kola) and temperate (dega) type of climate division and accounting for 72%, 0% and 28% respectively. The livestock population of the woreda is estimated at 56,708 cattle, 26,183 sheep's, 9,612 goats, 4,276 horse, 960 mule, 2,623 donkey, 28,037 poultray and 19,396 bee colonies. The number of the dogs and cats are unknown in the district.

Study animals and sampling method

The study has been done on Indigenous sheep those known by name "Horo breed", they have tin tail type and most of the time known by giving twin birth. In the district where this study has been done, they kept under traditional extensive management system. The populations of the sheep's live in the District (woreda) are estimated to 26,037 in number. The study has been done on 384 sheep's selected from the five (5) peasant associations, namely Gameda, Shumbo, Burka hobo, Kalo guracha and Bekela Erer. The study site and individual animals have been selected by simple random sampling method. The fecal sample collected directly from the rectum of the o animals was preserved by formalin before transported to laboratory.

Study Design

A cross sectional study was conducted from January 2014-June 2014 to determine the prevalence of ovine fasciolosis in Jimma Rare District, Oromia Regional State, Western Ethiopia.

Sample size determination

To determine the sample size, the expected prevalence of ovine Fascioliasis in Jima Rare District would be taken into consideration by 50%. According to Thrusfield M [5] the formula for the sample size determination with 95% confidence interval and at 5% absolute precision is calculated as follows:

$$n=\frac{1.96^2 P_{exp}(1-P_{exp})}{d^2}$$ Where:

n=required sample size

Pexp=expected prevalence

d2=Desired absolute precision confidence level =95%

$$n=\frac{1.962\times 0.5(1-0.5)}{(0.05)^2}=384$$ sheepSample collection and coproslogicl examination

Feacal Sample collected randomly for the study from the selected five peasant association (PAs). Namely, Gameda, Shumbo, Kalo guracha, Burka Hobo, and Bekela erer PAs. A total 384 samples are collected and all the samples are taken directly from the rectum of the sheep by using glove and sampling bottle. Samples collected from PAs such as Kalo guracha, Shumbo and Burka hobo those having distance from laboratory are preserved by formalin before they transported for examination. During sampling age, sex and BCs of each animal has been recorded.

Examination of the fasciolosis egg has been done by using different laboratory equipments and tools such as Beaker, Strainer, Measuring Cylinder, Mortar and Pestle, Test Tube, Test Tube Rack, Microscope Slide, Cover Slip, Microscope, Centrifuge and Refrigerator. According to the investigation procedure for the examination of Fasciola egg was as follows: About 3 gram of feces was collected from the rectum of each selected sheep using sample bottle. The fecal sample was crushed with mortar and pestle and 40-50 ml of tap water was added and mixed with fork and filtered the fecal suspension through a tea strainer into a beaker, the filtered material should be poured into a centrifuge tube. After balance the centrifuge tubes, centrifuged the sample at about 1500 rpm for three minutes the supernatant fluid was discarded carefully using a pipette and bulb, transferred a small amount of the top of the layer of the sediment to a microscope slide and covered with cover slip, Then examined under 40 x's magnification power.

Determination of age

Since most small ruminant holder farmers do not usually keep records; it was difficult to obtain information on the age of animals from the owner. Hence age of every sampled sheep was determined based on dentition as indicated by [6] and conveniently categorized as young and adults.

Body condition score

Body condition score of each animal was determined based on criteria set by [7] using the 5 point scale (1=very thin to 5=obes).it can be assessed by palpation around the lumbar vertebrae between the back of the ribs and the front of the pelvic bones. However; for in this study, the animals were categorized in poor, medium and good body condition.

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 (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 in all analysis).

Result

From a total of 384 examined sheep fecal samples, 214 samples were positive for fasciolosis eggs with an overall prevalence 55.7%. The prevalence of Ovine fasciolosis recorded in the five Peasant Associations (PAs) were 47.36%, 50.6%, 64.47%, 58.97% and 57.14% in Gameda, Sumbo, Kalo guracha, Burka hobo, and Bekela Erer respectively. This difference in prevalence was not statically significance (p>0.05) (Table 1).

Pas	No of examined	No of positive	Prevalence (%)
Gameda	76	36	47.36
Shumbo	77	39	50.64
Kalo guracha	76	49	64.47
Burka Hobo	78	46	58.97
Bekela erer	77	44	57.14
Total	384	214	55.72

Table 1: The prevalence of ovine Fasciolosis in different Pas. χ^2=4.695, p=0.320.

The prevalence of fasciolosis in female and male sheep was 55.89% (109/195) and 55.7% (105/189) respectively. However the difference were not statically significance between the sexes (p>0.05) (Table 2).

Sex	No of examined	No of positive	Prevalence (%)
Female	195	109	55.89
Male	189	105	55.5
Total	384	214	55.7

Table 2: The prevalence of ovine Fasciolosis in different sex. χ^2=0.494, p=0.494.

The infestation rate between young (<2yr) and adult (≥ 2) sheep were compared. It was observed that the prevalence of fasciolosis was relatively higher in adult than younger with 59.8%nd 50.8% which is statically not significant (p>0.05) (Table 3).

Age groups	No of examined	No of positive	Prevalence (%)
young's(<2yr)	181	89	50.8
Adults(≥ 2yr)	203	125	59.8
Total	384	214	55.72

Table 3: prevalence of ovine fasciolosis on the age bases. χ^2=2.154, p=0.142.

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 67.8%(99/146), 51.8%(70/235) and 43.68%(45/103) respectively. There is not statically deference (p>0.05) between three types of BCS (Table 4).

Body condition score	No of examined	No of positive	Prevalence (%)
Poor	146	99	67.8
Medium	135	70	51.8
Good	103	45	43.68
Total	384	214	55.7

Table 4: The prevalence of ovine Fasciolosis on the bases of body condition score. χ^2=3.348 p=0.187.

Discussion

Fasciolosis is a prevailing ruminant health predicament and causes substantial economic losses to the livestock commerce in Ethiopia. The prevalence indicated by fecal examination in the present study was 55.7% .This finding has some similarity with the study by Beyazen [8] 53% reported in Eastern Gojam. But it was lower as compared to the study conducted by [9,10] having a prevalence of 73%, 70.2% respectively. The reason of the deference in the prevalence may be related to the diversity of agro-climate conditions, management system of the animal or altitude of the study area. Accordingly the prevalence of the ovine fasciolosis in present study area in deferent Peasant Associations (PAs) were 47.36% (36/76), 50.6% (39/77), 64.47% (49/76), 58.97(46/78)% and 57.14 % (44/77) in Gameda, Sumbo, Kalo guracha ,Burka hobo, and Bekela erer respectively were has been observed. This variation in result from one another may be from the presence of wide part of land covered by muds or swampy lands especially in PAs to PAs with high rate of prevalence. In another way the swampy areas were important ecologies for the continuity of the lifecycle of fasciolosis. Similar findings were previously reported [1,11,12]. So, it is the reason for the prevalence of fasciolosis at high rate in some PAs of the study area.

Young animals had a lower prevalence of Fasciola spp infections in this study. This finding was consistent with other reports, and it was not surprising because naive kids have maternal immunity. Higher infection rates were found in adults in other age groups. Based on this finding, it can be suggested that the higher exposure risk of adults may be due to physiological differences, such as stress, pregnancy, lambing, inadequate nutrition, and infectious diseases. Similar results were reported by Chanie M [10].

Solomon W has suggested that fascioliasis equally affect both sexes. In this study, a higher prevalence of parasitic infection was not associated with sex (P>0.05) [12]. The fact that prevalence of fasciolosis between male and female are not significantly difference is may indicate that sex of sheep has not impact on the prevalence of fasciolosis. They exposed to graze and parasitic infection with equal rate. This result is Similar to the observation done by [13] which is 49.9%.

In this study the result indicated that higher infection rate of fasciolosis was recorded in sheep with poor body condition than medium and good body condition animals. So it indicates that fasciolosis parasitic disease cause highly reducing of body weight.

Conclusion and Recommendations

In conclusion, this study has investigated the prevalence of ovine fasciolosis in Horo breed sheep reared under extensive farming system in Jimma Rare District of the Oromia Regional state, western Ethiopia. The prevalence of the disease based on faecal sedimentation test in this district was considerably accounted about 55.7%. It was relatively higher in those with poor body condition score than with good BCS. This indicated that ovine fasciolosis disease causes loss of body weight that put the owners or farmers into bankruptcy. These present study suggest that further strategic control of snails is required in order to overcome the problems of ovine fasciolosis at the study area.

Therefore based on the above findings the following recommendations are forwarded:

A further study using alternative techniques such as serology in combination with fecal test surveys need to be conducted in different seasons in order to generate more complete data on the prevalence of ovine fasciolosis.

Appropriate strategic deworming has to be designed and implemented in the study area to minimize the effect of the disease on livestock productivity.

Strategic vectors Control through different techniques should be undertaken so that minimize the risk of fasciolosis in the area in order to improve or boosting the livestock productivity of an area.

Collaboration between different sectors should be done so as to control both disease and vectors of an area.

Policy makers and economy analysts have to be provoked to put their relentless effort in the control of such disease that has serious impact on the country economy.

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