

# Prevalence of Ovine Fasciolosis in Jimma and Selected Rural Kebeles Near Jimma, Southwest Ethiopia

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## Abstract

A cross-sectional study was conducted to determine the prevalence of ovine Fasciolosis in Jimma and nine selected rural kebeles near Jimma from November 2011 to April 2012 by coprological examination. A total of 384 samples were collected from different kebeles near Jimma. Out of the total sampled 164 (42.71%) were positive for Fasciolosis. According to coprological examination, variation in prevalence among the localities was not statistically significant ( $p > 0.05$ ). The result also revealed no statistically significant difference between sexes and ages ( $p > 0.05$ ). Infection rate in poor body condition animals (74.80%) was significantly higher ( $p < 0.05$ ) than good body condition animals (12.20%) and this indicates that the importance of Fasciolosis in causing weight loss and weakness, a characteristic sign of chronic Fasciolosis. Results obtained in this area were discussed in comparisons with the finding of other research works. Appropriate strategies for the control of ovine Fasciolosis are recommended by considering the limiting local factors of the study area.

**Keywords:** Coprological examination; Fasciolosis; Jimma; Ovine; Prevalence

## Introduction

Ethiopia has the largest livestock population in Africa including more than 38,749,320 cattle, 18,075,580 sheep, 14,858,650 goats, 456,910 camels, 5,765,710 Equines and 30,868,540 chickens with ownership currently contributing to live hoods of an estimated 80% of rural population (CSA, 2009). In Ethiopia sheep are among the dominant livestock species providing up to 63% of cash income and 23% of food subsistence value obtained from livestock production. Despite the animal and the contribution of this sub sector to the nation's economy is relatively low.

Endoparasitic infection and management problems are known to be the main factors that affect productivity. Among endoparasitic infection Fasciolosis is one of the difficult problems in helminthology [1]. Fasciolosis is caused by Fasciolidae trematodes of the genus *Fasciola*; *Fasciola hepatica* and *Fasciola gigantica* which migrate in the hepatic parenchyma and establish themselves and develop in the bile ducts. It causes significant morbidity and mortality [2,3]. The clinical features of fasciolosis can have acute, sub-acute and chronic forms [4].

In Ethiopia *F. gigantica* is found at altitude below 1800 masl. While *F. hepatica* is found at altitude between 1200-2560 masl [5]. Mixed infection by both species of *Fasciola* may occur where the ecology is conducive for replication of both intermediate hosts [1].

The snails of genus *Lymnaea* are mainly involved as an intermediate host in the life cycle of *Fasciola* [6]. *Lymnaea truncatula* is the most common intermediate host for *F. hepatica* in different parts of the world [7]. The most important intermediate host for *F. gigantica* is *L. natalensis* and *L. auriallaria* [8].

The economic impact of Fasciolosis may vary greatly from year to year depending on the climate, management, level of infection, host immunity status and the age of animals [9]. Ovine Fasciolosis losses were estimated at 48.4 million Ethiopian birr per year of which 46.5%, 48.8% and 4.7% were due to mortality, productivity (weight loss and

reproductive wastage) and liver condemnation respectively [10]. In Ethiopia, Fasciolosis is mainly an animal disease, causing a great economic burden in the highland areas of the country [11].

Several control methods against ruminant Fasciolosis such as avoiding the predisposing risk factors like marshy areas, grazing the animals in the irrigation points and drained water bodies. Other methods include a reduction in the number of intermediate snail host by chemical or biological means and strategic application of antihelmintics [12].

Therefore the objective of this study is to know the prevalence of ovine Fasciolosis in Jimma and selected rural kebeles near Jimma so as to generate base line data for future research and recommend control strategies applicable to the study area.

## Materials and Methods

### Study area

The study was conducted from November 2011 to April 2012 in Jimma and selected rural kebeles near Jimma to study the prevalence of ovine fasciolosis. Geographically the area is found in Jimma zone, Oromia regional state, southwestern Ethiopia. It is located about 346 km southwest of Addis Ababa, the Capital city of Ethiopia at 7°36'-8°56' N latitude and 35°52'-37°37' E longitude. Jimma area poses highland and lowland areas. In Jimma and its surrounding elevation ranges from

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880-3360 meter above sea level. The study area receives a mean annual rainfall of about 1530 mm which from long and short rainy season. The average minimum and maximum annual temperature ranges between 14.4 and 26.7°C, respectively [13]. Mixed agriculture is the main occupation of the population of the area. The major livestock reared in the area are sheep, goat, cattle and equine. According to statistical data, Jimma zone has livestock population of 2,016,823 cattle, 288,411 goats, 942,908 sheep, 74,574 horses, 49,489 donkeys, 28,371 mules and 1,139,735 poultry [14].

### Study animals

The study was conducted on local breeds of sheep which were selected by simple random sampling technique in the study area. A total of 384 sheep were randomly examined following coproscopic procedures. All these animals were privately owned by smallholder farmers. The management system was traditional extensive system with minimum or no supplementary feed and veterinary care.

### Sample size determination

To determine the sample size, a prevalence rate of 50% was taken into consideration since there was no published research work on ovine fasciolosis done in the area. The desired sample size for the study was calculated by using the formula given by Thrusfield [15] with 95% Confidence interval and 5% absolute precision.

$$N = \frac{(1.96)^2 \times P_{exp} (1 - P_{exp})}{D^2}$$

Where, N=Sample size;  $P_{exp}$ =Expected prevalence;  $D^2$ =Absolute precision;

Then,

$$N = \frac{(1.96)^2 \times 0.5(1-0.5)}{(0.05)^2} = 384$$

Accordingly the estimated sample size was 384 animals.

### Study design

A cross sectional study was conducted from November 2011-April 2012. Animals were selected by simple random sampling.

### Coproscopic examination

Fecal samples from a total of 384 sheep were collected directly from the rectum of each animals using disposable plastic gloves with strict sanitation and placed in clean screw capped universal bottles. Each sample was clearly labeled with animal identification, place of collection, body condition score, deworming history, sex and age. Based on their dental eruption formula the age of the animal was determined and they were classified as young (less than two years) and adult (greater than two years) [16]. Then the sample was transported to Jimma University, College of Agriculture and Veterinary Medicine, parasitology laboratory, for detailed coproscopic examination. To detect fasciola eggs, sedimentation technique was as described by Hanson and Perry [17]. To detect fasciola eggs, sedimentation technique was employed as described earlier [18,19].

### Data analysis

The result obtained were recorded and this data were entered in to Microsoft excel spread sheet. The data fed in to excel sheet were analyzed by JMP 5 statistical software. Descriptive statistics like percentage, Pearsons Chi<sup>2</sup> ( $\chi^2$ ) test and p-value were used.

Site	Number of examined animals	Prevalence n (%)
Bosakito	60	27 (45.00)
Babala Kara	33	12 (36.36)
Jiren	48	24 (50.00)
Garuke Furdisa	39	16 (41.03)
Gudata Bula	40	15 (37.50)
Sumudo	44	20 (45.45)
Kochi	41	17 (41.46)
Umuganole	50	22 (44.00)
Setosamaro	29	11 (37.93)
Total/Overall prevalence	384	164 (42.71)

Pearson chi<sup>2</sup> (8)=2.6695; p=0.953

Table 1: Prevalence of ovine fasciolosis at selected kebeles near Jimma.

### Results

Fecal examination conducted from November 2011 to April 2012 shows that from a total of 384 fecal samples examined, 164 (42.71%) was found to be positive for fasciola eggs (mean 0.4271, standard error 0.0253, 95% CI 37.74-47.68%). The prevalence variation between study kebeles (Table 1) shows the highest at 50% in Jiren and the lowest at 36.36% in Babala Kara. The differences were not statistically significant. Infections between sexes of animals were compared. The statistical indicated that 39.68% of males and 45.64% of females were positive for the infection (Tables 2-4). This difference was not statistically significant (p=0.238).

The prevalence among different age groups were adult (44.67%) and young (39.29%) and also showed no significant difference (p=0.304). On subjective evaluation of body condition to see the effect on prevalence of fasciolosis animals in poor (74.80%), medium (40.30%) and good (12.20%) body condition showed statistically significant difference (p=0.0001).

### Discussion

Fasciolosis caused by *F. hepatica* and *F. Gigantica* is one of the most prevalent helimenths infectious of ruminants in the different part of the world it causes significant morbidity and mortality [2]. Ovine Fasciolosis exist in almost all regions of Ethiopia [19]. However, the prevalence rate, epidemiology and *Fasciola* species involved vary with locality. This is mainly attributed to the variation in the climatic and ecological conditions such as altitude, rainfall, humidity, temperature and management system of livestock.

The result of the present study conducted from November 2011 to April 2012 in Jimma and in nine selected rural kebeles near Jimma indicated that ovine fasciolosis is a wide spread with over all prevalence rate of 42.71%. High prevalence rate of ovine fasciolosis has been reported by other workers such as 56.3% in upper Awash river region [20], 49% in Dawa Cheffa district of Amhara regional state [21], 56.8% in Ziway [22], 70.2% in Lalo Midir district [23], 84.6% at Addis Ababa [24], 84% in Western Shoa [25], and 68% in and around Kombolcha [26]. When compared with the present result there is great difference. This great difference may be due to awareness of the people about the disease, expansion of veterinary clinics at different parts of the country, establishment of private veterinary drug shop at different parts of the country and some ecological change which cause the destruction of suitable environment which is used for the multiplication of intermediate host. The present study was higher as compared with the previous study where 14.5% were reported by Daniel [27] at Dire Dawa municipal Abattoir, 15.97% reported by Wassie at Nekemte and 31.8% reported by [28] at Assela. This difference may be due to ecological,

Sex	Number of examined animals	Prevalence n (%)
Male	189	75 (36.68)
Female	195	89 (45.64)
Total / overall prevalence	384	164 (42.71)

Pearson Chi<sup>2</sup> (1)=1.3926; p=0.238

**Table 2:** Prevalence of ovine fasciolosis on sex basis.

Age	Number of examined animals	Prevalence n (%)
Adult	244	109 (44.67)
Young	140	55 (39.29)
Total /overall prevalence	384	164 (42.71)

Pearson Chi<sup>2</sup> (1)=1.0548; p=0.304

**Table 3:** Prevalence of ovine fasciolosis on age basis.

Body condition	Number of examined animals	Prevalence n (%)
Poor	127	95 (74.80)
Medium	134	54 (40.30)
Good	123	15 (12.20)
Total/Overall prevalence	384	164 (42.71)

Pearson Chi<sup>2</sup>(2)=100.57; p=0.0001

**Table 4:** Prevalence of ovine fasciolosis on body condition basis.

climatic differences and altitude among the localities.

Infection rate of ovine fasciolosis in the present study in Jimma (50%) was relatively higher than the other eight studied sites. This may be attributed to the existence of more favorable environment for both the snail intermediate host and the parasite which has small irrigation points and marshy area for long periods during the dry season. There is also small stagnant water in this area near the pasture where samples were collected from animals (personal observation).

Prevalence rate of 45.64% and 39.68% was recorded in female and male animals respectively. There was no statistically significant difference ( $p=0.238$ ) between the two sexes. This signifies that sex has no impact on the infection rate and both female and male animals are equally susceptible and exposed to the disease. Similar results that support the present finding were reported by Dinka [29] and Molalegn et al. [21]. This might be due to grazing of both sexes in contaminated grazing pastures and both male and females stay out door due to the reason of no feed supplied at home.

However, some workers found higher prevalence rate in the male than female and their justification were related to management system with longer exposure of males outdoors when females are kept indoors at the end of pregnancy and at the beginning of lactation [29]. The prevalence between different age groups of animals were found to be statistically not significant ( $p=0.304$ ). This might be due to grazing of young animals with the adults early after some days of parturition. However the results of Dinka [28] were contradictory to the present study. The highest prevalence was seen in the adults and relatively lowers in the young animals. Their justification was associated with the fact that young animals are not usually allowed to go far with adults for grazing. So the chance of exposure to infective metacercaria was very low as compared with adult animals.

The infection rate of ovine Fasciolosis was statistically analyzed on the basis of body condition to study the impact of disease on infected animals. The results of the study indicated that infection rates in poor body condition animals were significantly higher ( $p<0.0001$ ) than that of good body condition animals, similar to the study done by Molalign et al. [21]. This signifies the importance of fasciolosis in causing weight

loss and is the characteristic sign of the disease. Chronic fasciolosis is the commonest form of the disease in ruminants and one of the characteristics sign is weight loss (poor body condition) [30-32].

## Conclusion and Recommendations

The present prevalence rate is 42.71% (overall prevalence) and conclude that fasciolosis is a widespread parasitic disease affecting the health and productivity of sheep. This is supported by the markedly higher prevalence among animals in poor body condition. The present study showed that the control program in the region may be ineffective. Therefore, proper attention should be paid to this parasitic problem and control strategies should advice at least to reduce the infection rate to economically tolerable level.

Based on the above conclusions the following recommendations are forwarded:

- Awareness creation to livestock owners to avoid risk factors, drain water bodies and proper deworming.
- Since the area is endowed with a lot of watery points feeding management should be implemented at their shades together with forage production.
- Strategic control of Intermediate host should be implemented in various methods according to feasibility.

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## Conflict of Interest

The authors declare that they have no conflict of interest.

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