

## Research Article

# A Cross Sectional Study on the Coprological Prevalence of Ovine Fasciolosis in Amhara Sayint District, Ethiopia

Kiflu Belete\*

*Department of Animal Health, Amhara Sayint District Livestock Resources Development Office, Ethiopia*

## \*Corresponding author

Kiflu Belete, Department of Animal Health, Amhara Sayint District Livestock Resources Development Office, South Wollo, Sayint Adjibar, Amhara Regional State, Ethiopia, Tel: 251943261358; E-mail: kiflubelete25@gmail.com

Submitted: 12 June 2017

Accepted: 28 June 2017

Published: 29 June 2017

ISSN: 2378-931X

Copyright

© 2017 Belete

OPEN ACCESS

## Keywords

- Fasciolosis
- Amhara sayint
- Ovine
- Prevalence

## Abstract

A cross-sectional study was conducted to determine the prevalence of fasciolosis in local breeds of sheep in Amhara Sayint district from November 2016 to April 2017. Fecal samples from 383 sheep, 164 from males and 219 from females, were collected and examined by standard sedimentation technique. The overall prevalence rate of fasciolosis was found to be 41.3%. The prevalence was compared among different risk factors. Additionally, month specific prevalence was recorded for comparison. The highest prevalence was recorded on November and March being 58.4 and 61.2 respectively. There was no statistical difference ( $p > 0.05$ ) between sexes of animals. However, there was a statistically significant difference ( $p < 0.05$ ) according to age, body condition, origin and the history of deworming. The results revealed that the infection was significantly higher in adult animals than in the young ones. The infection rate in poor body conditioned animals was highest and lowest in good body conditioned animals. Animals originated from high land were most affected by the infection than those from low land. In a similar way, dewormed animals were found to be less challenged by the infection than the non-dewormed ones. The present investigation indicated that fasciolosis is a prevalent disease of sheep in the study area. Hence, it demands further studies on its economic significance. Fasciolosis is the important disease in the study area. Therefore, strategic and tactical control measures need to be implemented.

## ABBREVIATIONS

CSA: Central Statistical Agency; MOA: Ministry of Agriculture; TLU: Total Livestock Unit; SPSS: Statistical Procedures for Social Sciences

## INTRODUCTION

Ethiopia hosts a 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 and 21,884,222 goats [1].

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, and lack of genetic selection for good performance coupled with under and malnutrition and absence of well-developed market infrastructure [2].

The livestock population in the eastern Amhara region is estimated at around 5.2 million tropical livestock units (TLU)

which include 3.994 million heads of cattle, 5.276 million sheep and goats, 0.793 million equines, 18.398 thousand camels and over 4 million chicken. Although the production of livestock is practiced in most of the agro-ecological zone of the region, its contribution either at the household or at national level has so far been limited compared to its large size [3].

Among the numerous factors responsible for poor production and productivity of livestock in the region, animal diseases are considered as the major problem next to problems related to animals feed and nutrition. Diseases of livestock produce devastating effects both on the livestock owners and to the national economy as a whole beside losses inflicted due to high mortality, infertility, reduced milk, egg and wool production, degraded quality of animal products and by-products, condemned carcass and organs [3].

Fasciola species are the most important trematodes of domestic ruminants. Fasciolosis is the most common liver fluke disease in the temperate zone of the world. Fasciola belongs to the phylum plathyhelminthes, class trematoda and order digenea. The members of this order undergo indirect development with sexual and asexual generations parasitizing alternative hosts [4].

The life cycle of these trematodes involves snails of the genus *Lymnae* as an intermediate host [5,6]. Infection with *Fasciola* species is usually associated with grazing in wet land and drinking from the snail infested watering places. *Fasciola hepatica* and *Fasciola gigantica* are the two liver flukes commonly reported in ruminants [6].

Fasciolosis is the major health problem among the livestock diseases which reduce the productivity of this sector. Its chronic form in infected ewes can reduce fertility, growth rate, and wool production. Food intake is reduced and this leads to a reduction in efficiency of utilization of metabolizable energy and a reduction in calcium and protein deposition in the carcass. It causes condemnation of liver from slaughtered sheep and death to untreated sheep [7].

On examination of the remainder of the flock, affected animals are weak with pale mucous membrane and dyspnoea; in some instances they will have palpably enlarged liver associated with abdominal pain and ascites. Submandibular oedema ('bottle jaw') is seen. Diagnosis of ovine fasciolosis should present few problems, especially when post mortem examination is possible. Routine examination of feces for flukes' eggs by sedimentation procedures is a useful diagnostic method.

Although, some studies had been conducted on the prevalence of ovine fasciolosis in and around Kombolcha, the rate has been varying with season and environmental change. The objective of the current study therefore is to determine the current prevalence of the parasite and to assess potential risk factors.

## MATERIALS AND METHODS

### Study area

The study was conducted from November, 2016 to April, 2017 in Amhara Sayint district, South Wollo zone of Amhara region. The area is located at the Northeast part of Ethiopia at a distance of 390 km away from Addis Ababa. The altitude of this district ranges from 500 metres (1,600 ft) above sea level at the bottom of the canyon of the Abay to 3,700 metres (12,100 ft); the highest point in this district, as well as in the South Wollo Zone, is Mount Amba Ferit, which lies on the border with Legambo. The topography of the area is generally marked by the presence of numerous mountains, plateaus, hilly and sloppy areas, rivers with topographic category including mid altitude (woynadega) and low altitude (kola).

### Study design

A cross-sectional study design was implemented. Fecal samples were taken once from each animal.

### Study population

The study was conducted on local breeds of sheep which were managed under traditional extensive farming system. Both sexes were included in the study. They were further grouped based on their age, body condition, origin and history of deworming. On the basis of their origin, the study animals were grouped into highland, mid-altitude and lowland.

### Sample size determination

Sample size was determined according to 2005) by

considering 50% expected prevalence from the previous work of Mohammed (2010), absolute precision of 5% and 95% confidence level. Hence, the sample size was calculated as per the following formula:

$$n = z_{\alpha/2}^2 \frac{p(1-P)}{d^2}$$

Where,

n= number of animals sampled

d=desired absolute precision

P= expected prevalence

$Z_{\alpha/2} = 1.96$

Hence, the total number of animals that have been included in the present study was 383.

### Sampling procedure and laboratory examination

The study population was sampled by using systemic random sampling procedure according to [8] Toma *et al.* (1999) and then fecal sample were taken once from each animal for laboratory procedures.

A total of 383 faecal samples were collected directly from the rectum and were placed in clean screw capped sampling bottles. Each sample was clearly labeled with date, place of collection, sex, age, body condition and history of deworming and immediately transported to the regional laboratory. Samples that were not processed on the day of collection were stored in a refrigerator at 4°C [9,10].

Laboratory examination was conducted using standard laboratory examination procedures [11]. Fresh fecal samples were collected directly from the rectum, then three grams of feces were crushed using pestle and mortar; 40ml of water was added and then let to sediment. The supernatant was discarded and the sediment part was observed under a microscope of 10x magnification power, to identify the egg of fasciola [12].

### 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. Summary statistics were calculated for the various variables. Chi-square test was used to determine the association between prevalence of infection and the sex, age, body condition, origin and history of deworming. Statistical significance was set at  $p < 0.05$  to determine whether there were significant differences between the groups according to the parameters measured. The total prevalence was calculated by dividing the number of *Fasciola* positive animals by the total number of animals examined X 100.

## RESULTS

Fecal samples from 383 local breed sheep, managed under extensive farming system were examined using standard sedimentation technique. Among the studied animals, 158 were found to be positive for *Fasciola* eggs. The overall prevalence in this study was therefore 41.3%.

Specific prevalence for the parasite was also determined on the basis of sex, age, body condition, origin, history of deworming and months of the study period.

Prevalence rates of 39.6% (65/164) and 42.5% (93/219) were recorded in male and female animals, respectively. Similarly, the recorded prevalence rates in young and adult animals were 27.0% (50/185) and 54.5% (108/198), respectively.

The prevalence rates recorded in poor, medium and good conditioned animals were 55.2% (48/87), 46.8% (73/156) and 26.4% (37/140), respectively. In animals originated from high land, mid altitude and low land areas, prevalence rates of 47.2% (58/123), 43.8% (67/153) and 28.1% (33/153) were recorded respectively. Prevalence rates of 28.1% (43/153) and 50.0 (115/230) were observed in dewormed and non-dewormed animals respectively. Month specific prevalence was 56.25 (November), 28.00 (December), 21.73 (January), 36.84 (February) and 58.33 (March) (Table 1).

## DISCUSSION

Fasciolosis is among the most prevailing ruminant health problems which hinder the benefit gained from the livestock sector. The present study revealed an overall prevalence rate of 41.3%. The observed prevalence agrees with previous works. A study conducted by [13] Basaznew *et al.* (2011) reported a prevalence rate of 42.44% in Yilmana–Densa district, Amhara region. Similar work done by [14] Gebreyohannes *et al.* (2010) revealed an overall prevalence of 40.9% in Menz Gera Midir woreda which is in line with the finding of this study.

As reported by [15] Eyerusalem *et al.* (2010), there was an

overall prevalence of 39.5% in Adigrat that agrees with the current study. Another study conducted by [16] Mastewal and Malede (2011) in North Gondar zone documented an overall prevalence rate of 42.4% which similarly is in line with the present work. This close similarity among different sites of the country might be due to the presence of similar favorable ecological factors for the development of snail intermediate hosts and the life cycle of the parasite. One of the most important factors that influence the occurrence of fasciolosis is favorable snail habitat as stated by [11] Urquhart *et al.* (1996)

Unlike the present study, a prevalence rate of fasciolosis as high as 70.2% was reported by [17] Chanie and Begashaw (2010) in Menz Lalo Midir District. There were also other previous works that reported lower fasciolosis prevalence such as 13.2% in the middle Awash River Basin by [18] Ahmed *et al.* (2007) and 28.7% in Debre Zeit town by [19] Yemisrach and Mekonnen (2011). The variations in the prevalence of the parasite might be due to the differences in temperature, moisture, humidity and soil that might favor or hinder multiplication of snails, as reported by [13] Basaznew *et al.* (2011).

The prevalence rate of fasciolosis in the current study is 39.6% (65/164) in males and 42.5% (93/219) in females. This shows that there is no significant difference ( $p > 0.05$ ) of prevalence between the two sexes. This is probably due to equal exposure of both sexes to grazing areas. This finding is in contrast with the reports of [17] Chanie and Begashaw (2011) in Menz Lalo Midir woreda, where the prevalence of fasciolosis was much higher in males (50.6%) than in females (19.6%).

There was significant difference ( $p < 0.05$ ) between age

Factors	No. Examined	No. Positive	Prevalence	$\chi^2$	p value
<b>Sex</b>					
Male	164	65	39.6	0.31	0.600
Female	219	93	42.5		
<b>Age</b>					
Young	185	50	27	29.88	0.000
Adult	198	108	54.5		
<b>Body condition</b>					
Poor	87	48	55.2	21.63	0.000
Medium	165	73	46.8		
Good	140	37	26.4		
<b>Origin</b>					
Highland	123	58	47.2	6.96	0.030
Mid altitude	153	67	43.8		
Lowland	107	33	30.8		
<b>Deworming History</b>					
Dewormed	153	43	28.1	18.58	0.000
Non dewormed	230	115	50.0		
<b>Month</b>					
November	80	45	56.25	21.47	0.000
December	75	21	28.00		
January	69	15	21.73		
February	76	28	36.84		
March	84	48	58.33		

groups since a higher infection rate was recorded in adults (54.5%, 108/198) than in young animals (27.0%, 50/185). This might be due to the fact that young animals are not allowed to go far with adult animals for grazing, lowering the chance of getting the infective metacercaria as explained by [13] Basaznew (2011). In contrast to this, higher prevalence rate of fasciolosis was reported in young animals by [15] Eyerusalem *et al.* (2010) and, according to these researchers, the reason was thought to be the development of a certain level of immunity by repeated exposure in adult animals.

In the present study, highly significant difference was observed among different body conditions in animals. The highest prevalence rate was recorded in animals with poor body condition (55.2%, 48/87) and the lowest in animals with good body condition (26.4%, 37/140). In agreement with the finding of the present study, [20] Molalegne *et al.* (2010) and [19] Yemisrach and Mekonnen (2011) also reported significantly higher ( $p < 0.05$ ) prevalence of fasciolosis in sheep with poor body condition. This is thought to be caused by the importance of fasciolosis in weight loss or, alternatively, it might be due to the fact that animals with poor body condition are usually less resistant and are therefore more susceptible to diseases, as stated by [21] Radostitis *et al.* (2000).

A highly significant difference ( $p < 0.05$ ) among animals from different origins was observed in the present study. The highest prevalence rate was recorded in Dessie which is highland (47.2%, 58/123) and the lowest in Harbu which is lowland (30.8%, 33/107). This finding agrees with the results reported by [22] Michael (2004). According to this author, this variation in prevalence rate strongly suggests that the climatic factors in highland areas are more favorable for the propagation and activity of the snail intermediate hosts and progression of the parasite life cycle for most part of the year.

There was a significant difference ( $p < 0.05$ ) between dewormed and non-dewormed animals in the current study, where a higher prevalence was recorded in non-dewormed animals and a lower prevalence in dewormed animals. This indicates that effective deworming of animals reduces the burden of parasites as indicated by [11] Urquhart *et al.* (1996).

High prevalence rate of fasciolosis was observed during months of November and March. This is because of the availability of favorable environmental conditions for the snail host. In the study area, these two months are marked with high moisture and formation of marshy areas. Moreover, there is no feed available elsewhere and sheep are forced to graze in these marshy areas, where in they can access the metacercaria (infective stage of the parasite) and result in heavy infections.

## CONCLUSION

Ethiopia owns large number of small ruminants. Sheep are integral parts of the livestock sector and sources of treasure for livelihood of the majority of population. Despite the huge number and potential of these animals, their contribution to the national economy remains diminished due to prevailing diseases. Among the diseases that affect the productivity and survival of the sheep, parasitic infections take the lion's share. Fasciolosis is one of the parasite infections that pose a significant economic burden to

sheep. This parasitic disease is distributed in every corner of the country, even the rate is different and considered as one of the major setbacks to sheep product utilization causing direct and indirect losses. The findings of the current study revealed that fasciolosis is still a health problem in the study area. Presence of favorable conditions like swampy area, stagnant water bodies, scarcity of feed, poor management practices and other concurrent diseases can facilitate the infectivity of the parasite in the area.

In line with the above conclusion, the following points are recommended:

There should be strategic and tactical deworming of animals with the appropriate anthelmintic

Training and awareness-raising campaigns about the importance of deworming and environmental management should be created for sheepherders

Expansion of veterinary services has to be considered

Further studies should be conducted to assess the economic significance of fasciolosis in sheep.

## ACKNOWLEDGEMENTS

I am so much thankful to those who helped me to achieve this work. The support offered to me by staff members of Amhara Sayint District Livestock Development Office, department of animal Health was invaluable and I would like to thank all of them, from the bottom of my heart.

## REFERENCES

1. CSA. Federal Democratic Republic of Ethiopia, center for statistical agency, agricultural sample survey 2008/09, statistical bulletin 446. 2008.
2. MOA. The role of village dairy cooperatives in dairy development prospect for improving dairy in Ethiopia. In proceeding of a workshop organized by SDDP. 1988; 22-24
3. Dereje T. Preliminary survey of livestock production system. In: Zikualla Woreda, Waghimra zone of Amhara regional state; a partial fulfillment of the requirements of the degree of masters of science in agriculture. Alemaya, Ethiopia. 2004
4. Georgi. Parasitology for Veterinarians. 3<sup>rd</sup> edn. Philadelphia: Saunders Company WB. 1980; 68.
5. Walker SM, Makundi AE, Namuba FV, Kassuku AA, Keyyu J, Hoey EM, et al. The distribution of *Fasciola hepatica* and *Fasciola gigantica* within Southern Tanzania-constraints associated with the intermediate host. Parasitology. 2008; 135: 495-503.
6. Payne WJ. An introduction to animal husbandry in tropics. 4<sup>th</sup> edn. London: Blackwell science. 1990; 47-74.
7. Radostitis OM, Gray CC, Hinchcliff KW, Constable PD. Veterinary medicine: A text book of the disease of cattle, horse, sheep, pigs and goats. 10<sup>th</sup> edn. Elsevier. 2007; 1571-1579.
8. Toma B, Dufour B, Sanna M, Benet J, Elis P, Moutou F. Applied veterinary epidemiology and the control of disease in populations. 1<sup>st</sup> edn. France: Alfort. 1999; 105.
9. Henok M, Mekonnen A. Study on the Prevalence and Risk Factors of Ovine Fasciolosis in Small Ruminants in and Around Hirna Town, Ethiopia. Global Veterinaria. 2011; 7: 497-501.
10. Hansen J, B Perry. The Epidemiology, Diagnosis and Control of

- Helminth Parasites of Ruminants. A Hand Book. Food and Agricultural Organization of the United Nations Rome Italy. 1994; 72-89.
11. Urquhart GM, Armour J, Duncan JL, Dunn AM, Jennings FW. *Veterinary Parasitology*. 2<sup>nd</sup> edn. Blackwell Science Ltd. the Faculty of 24. Veterinary Medicine the University of Glasgow. Scot Land. 1996; 103-110.
  12. Kassa B. *Standard Veterinary Diagnostic Manual Volume III: Parasitology*. Ethiopian Agricultural Research Organization and National Animal Health Center. Ethiopia. 2005; 3.
  13. Basaznew B, Abeje M, and Mersha C. Prevalence of Fasciolosis in sheep in Yilmana-Densa District, West Gojjam Zone, Amhara region, North Eastern Ethiopia. *Acta parasitologica Globalis*. 2011; 3: 34-37.
  14. Gebreyohannes M, Demeke Y, and Kebede E. Ovine fasciolosis prevalence and Associated Risk Factors in Menz Gera Midir woreda of North Shoa Zone. *Ethiopia J of Anim Prod Adv*. 2013; 3: 203-207.
  15. Eyerusalem G, Yeshitila A, and Mihreteab B. Prevalence of ovine fasciolosis in Adigrat North East Ethiopia. *Global Veterinaria*. 2012; 9: 92-96.
  16. Mastewal B. and Malede B. Study on the prevalence of ovine fasciolosis: prevalence and associated risk factors in North Gondar Zone, Ethiopia. *J Vet Med Anim Health*. 2012; 4: 105-109.
  17. Chanie M and Begashaw S. Assessment of the economic impact and prevalence of ovine fasciolosis in Menz Lalo Midir District. *Northeast Ethiopia Vet World*. 2012; 5: 261-264.
  18. Ahmed E F, Markvichitr K, Tumwasorns S, Koonawootrittriron S, Choothesa A, and Jittapalpong S. Prevalence of Fasciola Infections of Sheep in the Middle Awash River Basin, Ethiopia. *Southeast Asian J Trop Med Public Health*. 2007; 38: 51.
  19. Yemisrach A and Mekonnen A. An abattoir study on the prevalence of fasciolosis in cattle, sheep, and goats in Debre Zeit town, Ethiopia. *Global veterinaria*. 2011; 8: 308-314.
  20. Molalegn B, Nurgadis I and Nahil A. Study on the prevalence of ovine fasciolosis in and around Dawa-Cheffa, Kemissie, Ethiopia. *Africa J Agricultural Research*. 2010; 5: 2981-2985.
  21. Radostitis OM, Blood DC, Garry CC. *Veterinary medicine: A text book of diseases of cattle, sheep, pigs, goats and horses*. 8<sup>th</sup> edn. 2000; 1230-1235.
  22. Michael A. *Infection Prevalence of Ovine Fasciolosis in Irrigation schemes along the Upper Awash River Basin and Effects of Strategic Anthelmintic Treatment in Selected Upstream Areas*. A thesis presented to the school of Graduate studies of Addis Ababa University in Partial Fulfillment of The Requirements for the Degree of Master of Science in Biology. Ethiopia. 2004.

**Cite this article**

Belete K (2017) A Cross Sectional Study on the Coprological Prevalence of Ovine Fasciolosis in Amhara Sayint District, Ethiopia. *J Vet Med Res* 4(6): 1092.