

## Prevalence of Fasciolosis in Cattle Slaughtered at Hirna Municipal Abattoir and the Surrounding Peasant Associations, Eastern Ethiopia

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**Abstract:** A cross sectional study was conducted from November, 2011 to April, 2012 to estimate the prevalence of fasciolosis in cattle slaughtered at Hirna municipal abattoir and the surrounding peasant associations (PAs). In this study 203 livers from cattle slaughtered at Hirna municipal abattoir were examined at postmortem and 181 faecal samples collected from the surrounding PAs were subjected to sedimentation technique to detect *Fasciola*egg. From the total of 203 livers inspected at postmortem 28 (13.79%) were positive for *Fasciola*species. *Fasciolahepatica* was found to be the only prevalent species in the study area. The result of abattoir survey indicated variation in prevalence of fasciolosis among different sources of cattle being higher in cattle purchased from Debesso area. This variation was statistically significant ( $p < 0.05$ ). However, there was no variation in prevalence between cattle with good and medium body condition. Out of 181 fecal samples examined 45 (24.86%) were positive for *Fasciola*egg. Coprological examination revealed statistically significant difference ( $p < 0.05$ ) in animals with poor, medium and good body conditions. Prevalence of 20%, 21.98% and 43.33% were recorded for cattle with good, medium and poor body conditions respectively. However, there was no statistically significant difference in prevalence among different PAs. The result of this study also showed an estimated economic loss of 7,943.04 ETB per annum as a result of condemnation of liver from cattle slaughtered at Hirna municipal abattoir. From this study it was concluded that fasciolosis is the most important parasitic disease exerting economic loss in farming industry. Hence, this disease deserves serious attention and strategic intervention by various concerned stake holders in order to prevent losses and promote cattle productivity in the area in particular and the country in general.

**Key words:** Abattoir • Bovine • Coprological • Fasciolosis • Hirna

### INTRODUCTION

Ethiopia has an enormous livestock resource with a total contribution of 15% of Gross Domestic Product and 33% of the agricultural output [1]. Bovines are widely distributed throughout Ethiopia with an estimated population of 40.9 million heads of cattle [2]. Among livestock, cattle are the primary resource for the people and government of Ethiopia [3].

Cattle suffer from a variety of infectious and non infectious disease and number of other problems. They may harbor several helminthes parasites. Among helminth parasitic diseases fasciolosis is the one that

causes economic loss by decreasing body condition and latter death of animal [4]. According to Urquhart *et al.* [5] bovine fasciolosis is an economically important parasitic disease of cattle caused by Fasciolidaetrematodes of the genus *Fasciola*. Fasciolosis, caused by *Fasciolahepatica* and *F. gigantica*, is one of the most prevalent helminth infections of ruminants in different parts of the world. It causes significant morbidity and mortality [6, 7].

The definitive hosts for *F.hepatica* are most mammals among which sheep and cattle are the most important. The geographic distribution of trematode species is dependent on the distribution of suitable species of snails. The genus *Lymnaea* in general and

*Lymnaea truncatula* in particular is a common intermediate host for *F. hepatica*. This species of snail was reported to have a worldwide distribution. In Ethiopia, the prevalence of bovine fasciolosis has been shown to range from 11.5% to 87.0% [8].

The economic significance of fasciolosis in the highlands of Ethiopia has been reported by several workers [9-12]. Although the lowland areas of the country have been known to use some irrigation, information on the impact of fasciolosis in such environments is scanty. In recent years, expansions of small-scale traditional irrigation schemes are practiced in many parts of Ethiopia. It is predicted that these recent move towards irrigated agriculture will influence the life cycle progression and increase the occurrence of fasciolosis. The economic loss due to fasciolosis are caused by mortality, morbidity and reduced growth rate, condemnation of liver, increased susceptibility to secondary infection and the expense of control measure [8]. Accordingly to the study conducted by Fufa *et al.* [13] fasciolosis caused an average loss of 4000 USD per annum at Sodo Municipal abattoir.

Diagnosis of fasciolosis is based primarily on clinical signs and seasonal occurrence in endemic areas. Previous history of fasciolosis on the farm or identification of snail habitats; postmortem examination, hematological test and examination of feces for fluke egg are useful. Coprological analysis is still commonly employed to diagnose bovine fasciolosis, despite the fact that the egg can't be detected until the flukes mature, when much of liver damage has already occurred [14]. The aim of the study is to estimate the prevalence of fasciolosis in cattle slaughtered at Hirna municipal abattoir and the surrounding peasant associations (Pas).

## MATERIALS AND METHODS

**Study Area:** The study was conducted from November, 2011 to March, 2012 in Hirna town, Tulo district, West Hararghe zone. Hirna is located in the Eastern part of Ethiopia at 375km from Addis Ababa. It is located in the range of 1600–2400 meters above sea level with the mean minimum and maximum temperature of 15°C and 32°C respectively. The area is located at an altitude of 9013'N longitude and 4106'E latitude. The area receives 600-900mm rainfall in average annually. The district constitutes 43.33% dega and 56.67% woyenadega with the soil type of sandy and black. According to Agricultural development office of Tulodistrict the livestock populations of the district is 129715 cattle, 13177 sheep, 37973 goats, 6517 equine and 171499 poultry.

**Study Population:** A total of 203 cattle presented to the abattoir for slaughter purpose were used as a study population for active abattoir survey. In addition 181 fecal samples were collected from the nearby peasant association around Hirna town to estimate prevalence of fasciolosis based on coprological study.

**Study Type:** The study was a cross-sectional study conducted to estimate the prevalence of fasciolosis on both faecal and abattoir studies.

**Sample Size and Sampling Method:** The total numbers of cattle required for study was calculated based on the formula given by Thrusfield [15] for simple random sampling method. In this study, 14% expected prevalence [16] was used to calculate the sample size using the following formula.

$$N = \frac{1.96^2 (p) (1-p)}{d^2}$$

where,

n = Sample size

P = Expected prevalence

d = Desired level of precision

$$\text{Therefore, } n = \frac{1.96^2(0.14) (1-0.14)}{0.0025} = 185 \text{ cattle}$$

However 203 animals were included in this study for the abattoir survey. Feecal samples were collected from 181 cattle from surrounding PAs of Hirna town for coproscopy to supplement the abattoir study.

**Assessment of Economic Loss:** The economic significance of liver condemnation due to fasciolosis was calculated on daily and annual basis using the current market price of liver in Hirna town obtained through market survey, the prevalence of fasciolosis and average number of animals slaughtered daily and annually at the abattoir. A total annual economic loss due to bovine fasciolosis was calculated according to Terefe *et al.* [18] by using the following formula:

$$\text{Annual cost of condemned liver} = \text{NAL} * \text{CL} * \% \text{ condemned}$$

where:

NAL = Average number of cattle slaughtered Hirna municipal abattoir per annum.

CL = Mean cost of one liver in Hirna town  
 % condemned = percentage of liver condemned due to fasciolosis.

**Study Methodology**

**Postmortem Examination:** During meat inspection, the previously identified animals by the investigator and livers were carefully supervised and examined so as to avoid mixing up of the organs to be inspected. Thus, emphasis was put on examination of the liver to detect the presence of liver flukes. After visual observation and palpation of the liver, sharp incisions were made on the surface through the major bile ducts in to the parenchyma. The exposed bile ducts were squeezed and examined for the presence of mature liver flukes. Then the adult flukes were identified to species level according to Urquhart *et al.* [5].

**Coprological Examination:** During fecal collection the faeces were collected directly from rectum of cattle. The collected samples were taken to Hirna Regional Veterinary Laboratory with tightly closed universal bottles, processed and examined for fluke eggs by sedimentation technique. Samples which were not examined within 24 hours of arrival at laboratory were stored at 4°C and examined the next day early in the morning. Sedimentation technique was done according to standard procedures given by Soulsby [17].

**Data Management and Analysis:** All raw data generated from this study were entered in to Microsoft Excel. The outcome variables were detected fasciolosis during postmortem examination and faecal examination for fasciola egg. Attribute data recorded in to the data base system were: age, sex body conditions and origin. STATA 11 software was used for all statistical analyses. The prevalence of fasciolosis was calculated as the number of cattle infected with *Fasciola* expressed as percentage of the total number of previously selected animals [15]. Moreover, the economic significance of the

problem was estimated from the prevalence of livers condemned due to fasciolosis in study period and average number of cattle slaughtered per year. Chi-square test was used to determine the association between outcome variations.

**RESULTS**

**Postmortem Examination:** From a total of 203 adult indigenous cattle slaughtered at Hirna municipal abattoir 28 (13.79%) were found to be positive for presence of *Fasciola* species during postmortem examination. *F.hepatica* was the only species identified during the study period.

There was a statistically significant association (p<0.05) between origin of animals where the animals come from Debesso market had the highest prevalence of liver flukes. However, there was no significant association (<0.05) between good and medium body conditions (Table 2).

**Faecal Examination:** Out of 181 faecal samples collected from cattle in and around Hirna town for coprological examination, 45 (24.86%) were positive for fasciola egg. Village level prevalence was 22.22%, 28.26%, 17.78% and 31.11% for Ifabasi, Kirakufis, Odanegah and Reketafura respectively (Table 3).

*Fasciola* of fecal egg prevalence was significantly associated (p <0.05) with sex and body condition, where female and poor body condition had the highest prevalence of *fasciola* egg. However, month and origin had no significant association (P<0.05) with fasciola faecal egg prevalence (Table 3).

**Economic Loss Analysis:** The cost analysis was calculated as: 480\*120\*13.79% = 7943.04 ETB which revealed the annual economic loss due to bovine fasciolosis as a result of liver condemnations in Hirna municipal abattoir.

Table 1: Prevalence of fasciolosis at Hirna municipal abattoir with different risk factors (n=203)

Variables	No. of observed	No. of positive	Prevalence (%)	$\chi^2$	P-value
Origin				6.4855	0.039
Debesso	40	9	22.50		
Doba	69	12	17.39		
Hirna	94	7	7.45		
Body condition				0.0795	0.778
Good	92	12	13.04		
Medium	111	16	14.41		
Total	203	28	13.79		

Table 2: Prevalence of fasciolosis in and around Hirna town with different risk factors

Variables	No. of observed	No. of positive	Prevalence (%)	$\chi^2$	P-value
Months				0.7847	0.853
December	30	6	20.00		
January	57	14	24.56		
February	64	18	28.13		
March	30	7	23.33		
Sex				5.6014	0.018
Female	93	30	32.26		
Male	88	15	17.05		
Origin				2.6020	0.457
Ifabasi	45	10	22.22		
Kirakufis	46	13	28.26		
Odanegah	45	8	17.78		
Reketafura	45	14	31.11		
Body condition				6.6437	0.036
Good	60	12	20.00		
Medium	91	20	21.98		
Poor	30	13	43.33		
Total	181	45	24.86		

## DISCUSSION

The prevalence of fasciolosis obtained from the present abattoir study (13.79%) is comparable to the result of Fufa *et al.* [13] and Daniel [16] who recorded 14% at Wolayita Sodo and 14.4% at Dire Dawa municipal abattoirs respectively. Whereas this finding is lower than the result of Tadele and Worku [19] in Jimma municipal abattoir, Garoma and Wakuma [20] in Shambu municipal abattoir and Berhe *et al.* [21] in Mekelle municipal abattoir which is 46.15%, 51.60% and 24.32% respectively. This difference in prevalence of fasciolosis throughout the country may be due to the availability of suitable habitat for the snail. High prevalence of fasciolosis in some area may be due to the source of animals which is mostly from highland areas, where there is ideal environment for snail multiplication [22].

In the present study *F.hepatica* is the only species identified during abattoir survey. This might be due to the intermediate host *Lymnaea truncatula* which is usually encountered in medium altitude (Woyena Dega) and a highland (Dega) of the country [10]. Moreover, according to Malone *et al.* [8], infection by *F.hepatica* and *Fasciolaginata* in Ethiopia occur in areas above 1800 meters above sea level and below 1200 meters above sea level respectively.

The result of abattoir study also showed statistically significant variation in prevalence of fasciolosis among animals brought from different sources. This might be correlated to the topography and the management practice of the area [23].

The coproscopy result of the present study showed 24.86% which is in agreement with that of Zerfu [24] who reported prevalence of 22% in Chilalo. However, it is lower than the report of Yilma [22] in Amhara regional state (33.42%). The coprological examination showed statistically significant difference ( $p < 0.05$ ) between different body conditions. This could be explained by the fact that *fasciola* cause loss of body condition by inhibiting the normal function of liver and its feeding activity, so *fasciolais* more prevalent in poor body condition animal when compared with medium and good body condition animal [21].

The total economic loss due to fasciolosis per annum in the study area was estimated at 7943.04 ETB. Economic loss analysis reported from other parts of the country include that of Fufa *et al.* [13] in Wolaita Sodo where they reported about 4000, Berhe *et al.* [21] in Mekelle municipal abattoir (27,572.64) and Tadele and Worku [19] in Jimma (55,080.00) ETB per annum. The disparity from place to place could be attributed to the variation in the prevalence of infection depending on ecological grounds. These result indicates that fasciolosis causes significant losses in different parts of Ethiopia at large.

## CONCLUSION

Fasciolosis is an important disease of cattle causing major economic loss in Hirna municipal abattoir. *Fasciola hepatica* appeared to be the only species identified from the liver of cattle slaughtered in the area. Annual economic loss due to condemnation of liver in the abattoir is much significant.

Therefore based on this the following recommendations are forwarded:

- ▶ Further study should be conducted on control of the disease and well planned control program should be intended in integration
- ▶ Strategic therapeutic treatment in conjunction with good pasture management should be practiced
- ▶ Avoiding cattle from grazing swampy or water logged area either by fencing or by draining
- ▶ Creating awareness of livestock owners about the characteristics and economic importance of the disease.

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