

# The Prevalence and Economic Significance of Bovine Fasciolosis at Jimma, Abattoir, Ethiopia

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## Abstract

A study was conducted to determine the prevalence rate and the economic significance of bovine Fasciolosis in Jimma municipality abattoir by using post-mortem examination of liver of each slaughtered animal in particular and secondary data analysis. The objectives of the study were to determine the overall prevalence rate and economic significance of bovine fasciolosis in Jimma municipality abattoir and to determine the most prevalent species of liver fluke in indigenous adult cattle slaughtered in the abattoir and thus, in the localities from where these food animals were provided for slaughtering. From the total number of cattle slaughtered (468) during the study period 46.58% (218) of them were found to be positive for Fasciolosis. *F. hepatica* was found to be the most liver fluke species affecting cattle slaughtered in the study area. 63.89 % of the total livers found to be positive for bovine Fasciolosis were infected by *F. hepatica* whereas *F. gigantica* and unidentified or immature forms of fasciola species recovered were 24.07 % and 12.04 % respectively. In line to the economic importance of bovine Fasciolosis in the study area, the problem caused loss of an average of 148.12 and 54,063.34 Ethiopian birr per day and annum, respectively and thus found to have significant economic importance.

## INTRODUCTION

Bovine fasciolosis is an economically important parasitic disease of cattle caused by Fasciolidae trematodes of the genus *Fasciola*. The two most important species of this genus, *F. hepatica* and *F. gigantica*, are commonly known as liver flukes.

Generally, the distribution of fasciolosis is worldwide, however, the distribution of *F. hepatica*, is limited to temperate areas and highlands of tropical and sub-tropical regions (Soulsby 1986). The definitive hosts for *F. hepatica* are most mammals among which sheep and cattle are the most important once. The geographic distribution of trematode species is dependent on the distribution of suitable species of snails. The genus *Lymnaea* in general and *L. truncatula* in particular is the most common intermediate hosts for *F. hepatica*. This species of snail was reported to have a worldwide distribution (Urquhart et al 1996).

The presence of fasciolosis due to *F. hepatica* and *F. gigantica* in Ethiopia has long been known and its prevalence and economic significance has been reported by several workers; different works so far conducted in Ethiopia reported variable prevalence rates of bovine fasciolosis in different localities of the country (Getu 1987; Abebe 1988;

Mulugeta 1993; Dagne 1994; Wondwosen 1990; Yosef 1993; Adem 1994; Mezgebu 1995). In Ethiopia, the prevalence of bovine fasciolosis has shown to range from 11.5% to 87% (Malone et al 1998). The study conducted at Dire Dawa revealed that out of 2224 cattle slaughtered in the abattoir, the prevalence of fasciolosis has been found to be 14.4% in which *Fasciola hepatica* was observed to be the most commonly recovered fluke species (Daniel 1995). *F. hepatica* was shown to be the most important fluke species in Ethiopian livestock with distribution over three quarter of the nation except in the arid north-east and east of the country. The distribution of *F. gigantica* was mainly localized in the western humid zone of the country that encompasses approximately one fourth of the nation (Malone et al 1998). Moreover, the studies also showed that fasciolosis has higher economic significance on animal production and productivity. The economic losses due to fasciolosis throughout the world are enormous and these losses are associated with mortality, morbidity, reduced growth rate, condemnation of fluky, liver, increased susceptibility to secondary infections and expense due to control measures (Malone et al 1998). A rough estimate of the economic loss due to decreased productivity caused by bovine fasciolosis is about 350 million birr per annum (Bahiru and Ephrem 1979). According to the study conducted by Abdul (1992) and

Daniel (1995) a total economic loss of about154, 188 and 215,000 Ethiopian birr per annum in cattle were reported due to fasciolosis at Ziway and Dire Dawa municipal slaughterhouses, respectively.

Diagnosis is based primarily on clinical signs, seasonal occurrence, previous history of fasciolosis on the farm or the identification of snail habitats; postmortem examination, haematological tests and examination of faeces for fluke eggs. Even though, it is impossible to detect fasciola in live animals, liver examination at slaughter or necropsy was found to be the most direct, reliable, and cost effective technique for the diagnosis of fasciolosis (Urquhart et al 1996).

Therefore, the objectives of this study were to determine the prevalence and the economic significance of bovine fasciolosis due to organ condemnation in Jimma municipality abattoir.

**MATERIALS AND METHODS**

**DESCRIPTION OF THE STUDY AREA**

The study was conducted in Jimma zone, Southwestern part of Ethiopia at Jimma municipality abattoir. Jimma town, the capital of Jimma zone is located in Oromia Regional Administration, 346 km Southwest of Addis Ababa at latitude of about 7013'-8056' N and longitude of about 35052'-37037' E, and at an elevation ranging from 880 m to 3360 m above sea level. The study area receives a mean annual rainfall of about 1530 millimeters which comes from the long and short rainy seasons. The annual mean minimum and maximum temperature during the study period were 14.4 and 26.7 degree Celsius respectively .

**STUDY POPULATION**

In the study 468 adult male indigenous cattle provided for slaughter from different localities in the southwestern part of Ethiopia were included. Cattle slaughtered in the abattoir were brought from different markets which in turn are provided from different livestock markets in their vicinity.

**STUDY DESIGN**

A cross sectional study type was conducted to determine the prevalence rate and the economic significance of bovine Fasciolosis by using post-mortem examination of different organs in general and liver of each slaughtered animal in particular and also secondary data analysis. During the study special attention was given to the livers of the animals and liver of each slaughtered was carefully examined by

visualization and palpation of the entire organ that was followed by transverse incision of the organ across the thin left lob in order to confirm the case or the problem (Urquhart 1996; Soulsby 1986,). Species identification of the recovered fasciola was also performed (based on the morphological features of the agents) and classified in to F. hepatica, F. gigantica and unidentified or immature forms of liver fluke. (Urquhart 1996; Soulsby 1986.)

**DATA COLLECTION**

Appropriate data were collected by using post-mortem examination of the organs so far claimed to be infected by fasciolosis and secondary data analysis. An interview was made with retailers of offal produced at Jimma municipality abattoir to obtain information on the average price of a liver in the study area during the study time. According to the response of the retailers the price of a liver was found to be ten Ethiopian birr on average.

**STATISTICAL ANALYSIS**

Prevalence of fasciolosis was calculated as the number of cattle found to be infected with Fasciola, expressed as a percentage of the total number of cattle slaughtered (Thrusfield 1995). The economic significance of the problem was analyzed based on the information obtained during interview and calculated on daily and annual basis.

**RESULTS**

Postmortem examination inspection

A total of 468 adult indigenous cattle were slaughtered at Jimma abattoir and examined for fasciolosis. Of the total cattle slaughtered and examined (N=468), 46.15% (n= 216) of them were found to be positive for lesion of fasciolosis (Table 1).

**Figure 1**

Table 1: Prevalence of bovine fasciolosis and the different fasciola species recovered during the study period.

No of cattle examined	No. of Positive livers (%)	Prevalence of F.hepatica (%)	Prevalence of F.gigantica (%)	Prevalence of Unidentified or Immature (%)
468	216 (46.15)	138 (29.49)	52 (11.11)	26 (5.55)

**FASCIOLA SPECIES IDENTIFICATION**

From a total of 216 livers found positive for fluke infection during post mortem inspection of slaughtered animals, 138 livers (63.89 %) harboured F. hepatica , 52 livers (24.07 %) F. gigantica and 26 livers (12.04 %) infected with un identified species due to immature fluke (Table 2).

**Figure 2**

Table 2: species of fasciola encountered in affected livers during post mort examination of slaughtered animals

Species of Fasciola	No. of livers	percentage
F.hepatica	138	63.89
F.gigantica	52	24.07
Unidentified or Immature	26	12.04
<b>Total</b>	<b>216</b>	<b>100</b>

From the result of the study, the economic loss due to liver condemnation was estimated to be an amount of 145.33 Ethiopian birr daily and 53,046.67 Ethiopian birr annually.

## ANALYSIS OF ABATTOIR DATA

Analyses were made on one year meat inspection records obtained from Jimma municipality abattoir. A total of 11349 adult male indigenous cattle were slaughtered by the time from June 2005 to May 2006 in the aforementioned slaughter house. Of the total livers (N= 11,349) inspected for liver fluke, 48.53% (n=5,508) of them were found to be positive for fasciola and this resulted an average daily and annual economic loss of about 150.90 and 55,080.00 Ethiopian birr, respectively. An overall prevalence of 48.53% of bovine fasciolosis was recorded from data obtained in which the highest value (5.29%) and the lowest 2.13% prevalence were seen during October and March, 2005/2006, respectively (Table 3).

**Figure 3**

Table 3: Number of cattle slaughtered, positive livers, and prevalence rates of fasciolosis from June 2005 to May 2006.

Month	Jun	Jul	Aug	Sept	Octo	Nov	Dec	Jan	Feb	Mar	Apr	May	Total
Number of cattle slaughtered	965	997	903	957	1062	941	1059	1112	909	462	903	1079	11349
Number of positive livers	352	246	439	505	601	507	580	553	557	242	421	505	5508
Prevalence	3.10	2.17	3.87	4.45	5.29	4.47	5.11	4.87	4.91	2.13	3.71	4.45	48.53

## DISCUSSION

In this study, higher prevalence of bovine fasciolosis (46.58%) was obtained when compared with the prevalence reported by Daniel (1995) (14.4%) at Dire Dawa municipality abattoir. This is probably due to the ecological and climatic difference between the two localities. Moreover, the management systems in practice could also be the probable reason for the variation. The 46.58% prevalence of fasciolosis found in this study is similar with the 47 and 56.6 % prevalence of bovine fasciolosis reported at Sodo and Ziway abattoirs by Abdul (1992) and Adem (1994) respectively. One of the most important factors that

influence the occurrence of fasciolosis in an area is availability of suitable snail habitat (Urquhart et al 1996). In addition, optimal base temperature to levels of 10% and 16°C are necessary for snail vectors of F.hepatica and F.gigantica, respectively. These thermal requirements are also needed for the development of fasciola with in snails. The ideal moisture conditions for snail breeding and development of larval stages with the snails are provided when rainfall exceeds transpiration and filed saturation is attained. Such conditions are also essential for the development of fluke eggs, miracidiae searching for snails and dispersal of cercariae (Urquhart et al 1996).

Of the total livers, 63.30% of them were found to be positive for bovine Fasciolosis infected by F. hepatica, whereas F. gigantica and unidentified forms of fasciola species were recovered to be 23.85 and 11.93% diagnosed as positive for Fasciolosis. Similar study conducted at Zeway abattoir reported 60.3% Of the liver harbored F.hepatica, 10.2% F. gigantica and 29.5% infested by both species (Adem 1994). The prevalence and the species involved vary significantly with locality. This is attributed mainly to the variation in the climatic and ecological conditions such as altitude, rainfall, temperature and livestock management system(Yilma & Malone 1998). Moreover, Garber & Daynes reported that; in Ethiopia F. hepatica and F. gigantica infections occur in areas above 1800 m.a.s.l. and below 1200m.a.s.l. respectively. The high prevalence rate of F. hepatica may be associated with the existence of favourable ecological biotops for L. truncatula. Relatively small proportion of cattle were found infected with F. gigantica alone or mixed infection with both spp. This may be explained by cattle coming for slaughter from highland and middle altitude zone flood prone areas, drainage ditches are favourable habitat to natalensis (Urquhart et al 1996).

The highest prevalence rate was analyzed during October, when the wet-ecological conditions still prevailed. It has been described that the bionomic requirements for breeding of the Lymnaea snails and development of the intramolascan stages of the flukes often reach the optimum threshold during the wet months of the year. During the dry periods, breeding of the snails and development of the larval flukes slow down or stops completely and snails undergo a state of aestivation (Yilma and Malone 1998).

Although a decreasing trend was analyzed along with the advancement of the dry season, relatively high prevalence of fasciola infection was analyzed from the data recorded by the abattoir. This may be attributed to infections acquired

during previous peak snail activity season. In addition, the existence of permanent suitable ecological conditions in areas like slow flowing rivers, streams and low lying marshy areas may contribute to persistent but relatively low grade infection during the dry season.

The total economic loss encountered due to condemnation of infected liver from one year data recorded from abattoir in this study was 55,080.00 birr per annum. There was also similar economic loss due to infected liver condemnation of post mortem inspection result. This finding is by far lower than the results reported by Adem (1994) and Daniel (1995) a total economic loss of about 154, 188 and 215,000 Ethiopian birr per annum in cattle due to fasciolosis at Ziway and Dire Dawa municipal slaughterhouses, respectively. This is probably due to the ecological and climatic difference between the two localities.

## **CONCLUSIONS**

This study demonstrated that bovine fasciolosis prevalent in cattle in the area, it causes great economic losses as a result of condemnation of infected livers and its prevalence is relatively high throughout the year in the study area, due to the fact that the area is very suitable for the intermediate host snails and the parasite.

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