

An Abattoir Survey on the Prevalence and Monetary Loss of Fasciolosis in Cattle in Jimma Town, Ethiopia

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Abstract: A cross sectional study was carried out between January, 2011 and June, 2011 with the aims of determining the abattoir prevalence and monetary loss associated with fasciolosis in cattle at Jimma municipal abattoir, Jimma, Ethiopia. From the total 382 examined cattle, 54.5% (208/382) were found to be positive for fasciolosis by postmortem liver inspection. From 208 infected livers with *Fasciola* species, *Fasciola hepatica* was found to be the most prevalent species (65.4%) in the study. *Fasciola gigantica*, mixed infection and immature *Fasciola* species were proved to be 36.0%, 11.5% and 10.1%, respectively. Highest prevalence of fasciolosis was observed in poor body condition cattle (85.9%) followed by medium (55.1%) and good body condition cattle (34.5%), respectively. Statistical analysis of the data showed the presence of statistical significant difference ($P < 0.05$) on the prevalence of fasciolosis among the different body conditions. Analysis of the abattoir data indicated a total annual liver condemnation which resulted in 87,577 Ethiopian birr (5152 USD) loss. Similarly, the average carcass weight loss was confirmed to be 2,482,819 Ethiopian birr (146,048 USD) due to fasciolosis in cattle. The overall total annual monetary loss due to fasciolosis in cattle at Jimma municipal abattoir was proved to be 2,570,396 Ethiopian birr (151,200 USD). The results of the present survey showed that the prevalence and monetary loss of fasciolosis in cattle slaughtered at Jimma municipal abattoir was very high and warrants immediate need for prevention and control of the parasite in the study area in particular and in the country at large.

Key words: Abattoir • Prevalence • Monetary loss • Fasciolosis • Cattle • Jimma

INTRODUCTION

Fasciolosis is an economically important parasitic disease of animals caused by trematodes of the genus *Fasciola*. The two most important species of this genus, *F. hepatica* and *F. gigantica* are commonly known as liver flukes. These parasites are recognized since long back as one of the most harmful parasite to the host and great economic constraint in the livestock industry as a result of significance loss of production and mortality [1, 2].

Fasciola hepatica was shown to be the most important fluke's species in Ethiopian livestock with distribution over three quarters 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 zone of the country that encompasses approximately one fourth of the nation [2, 3].

The economic losses due to fasciolosis throughout the world are enormous and these losses are associated with mortality, morbidity, reduced growth rate, condemnations of fluky liver, increased susceptibility to secondary infection and expense due to control measure [2].

In spite of the aforementioned prevailing situation and the presence of a number of problems due to fasciolosis there is paucity of well-documented information on the occurrence of fasciolosis in cattle in Ethiopia. Therefore, this study was designed with the aims of determining the prevalence of fasciolosis in cattle

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and the magnitude of direct monetary loss due to liver condemnation and indirect carcass loss at Jimma municipal abattoir, Jimma town, Ethiopia.

MATERIALS AND METHODS

Study Area: The study was conducted from January, 2011 to June, 2011 in Jimma municipal abattoir. Jimma is located in South West part of Ethiopia 352 km far from Addis Ababa at latitude of about 7°13'-8°56'N and longitude of about 35°52'-37°37'E and an elevation ranging from 880 m to 3360 m above sea level. The study area receives a mean annual rain fall of about 1530mm. The annual mean minimum and maximum temperature is 14.4°C and 26.7°C, respectively. The natural grass lands in the regions are traditionally used as grazing fields for livestock. The main grazing land is separated from cultivated lands to reduce the possible chance of damage to crops by livestock. The main grazing lands in the area includes swampy area forest margin, water lodged lands mountainsides and road sides. The areas are marked by the presence of numerous mountains, rivers and streams. The farming system often is a mixed type. The most important crops grown in the study area include maize, teff, sorghum, wheat and chickpea. In the study area the majority of animals kept by rural farmers are cattle and sheep and there are also some goats and horses [4].

Study Population: Indigenous male zebu cattle brought for slaughter at Jimma municipal abattoir were our study population.

Sampling Method and Sample Size: Systematic random sampling method was employed for determining the prevalence of fasciolosis in cattle and the magnitude of direct monetary loss due to liver condemnation and indirect carcass loss at Jimma municipal abattoir, Ethiopia. To calculate the total sample size, the following parameters were used: 95% level of confidence (CL), 5% desired level of precision and with the prevalence of 46.58% fasciolosis in cattle in Jimma municipal abattoir [3], the sample size was determined using the formula given in Thrusfield [5].

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

n = required sample size,
 P_{exp} = expected prevalence,
 d = desired absolute precision

Therefore, based on the above formula, the total sample size of cattle was calculated to be 382.

Study Design and Study Methodology: Cattle which were brought to the abattoir for slaughtering were classified as good, medium and poor body condition according to Glenn [6] during ante mortem examination.

A cross sectional study was conducted to determine the prevalence and the monetary loss of fasciolosis in cattle using post mortem examination of liver of each slaughtered animals. Examination of livers for the presence of *Fasciola* was done with the removal of liver from the abdominal cavity soon after slaughter. The livers of all slaughter animals were examined by inspection, palpation and systematic incision to recover immature and adult *Fasciola*. Those livers condemned as unfit for human consumption due to fasciolosis during post mortem examination were registered. Identification of *Fasciola* species was carried out based on the morphological features of the fluke and classified as *F. hepatica*, *F. gigantica*, mixed and immature forms of liver fluke according to the guide lines given by Soulsby [1] and Urquhart *et al.* [7].

Monetary Loss Analysis: The total monetary loss due to fasciolosis at Jimma municipal abattoir was estimated from the summation of annual liver condemnation and indirect annual carcass weight loss. Partial condemnations of liver were not a common practice in the abattoir. Obtained information was then subjected to mathematical computation using the formula set by Ogunirade [8].

Total annual liver condemnation (ALC)=MCS×MLC×Prev

Where:

ALC = Annual liver condemnation

MCS = Mean annual cattle slaughtered per year at Jimma municipal abattoir

MLC = Mean cost of one liver in Jimma town

Prev = Prevalence of totally condemned liver due to fasciolosis in the abattoir.

Carcass weight loss due to fasciolosis = 10% carcass weight loss due to fasciolosis in cattle. An average carcass weight of local zebu is estimated to be 126kg. Then an average carcass weight loss due to cattle fasciolosis was assessed using the formula:

$$IACW = CSR \times CI \times BC \times Perv$$

Where:

IACW = Indirect annual carcass weight loss

CRS = Average number of cattle slaughtered per year at Jimma abattoir.

CL = Carcass weight loss in individual cattle due to fasciolosis

BC = Average price 1 kg beef in Jimma town

Prev = Prevalence rate of fasciolosis at Jimma domestic abattoir.

Data Management and Analysis: The data which were recorded during the study period were entered into Microsoft excel sheet. Data were summarized and analyzed using SPSS version 16 computer program. The Pearsons chi-square (χ^2) test at a significance level of 5% and 95% CI was used to determine the differences in the prevalence of fasciolosis among body conditions of cattle. A 5 % significant level was used to determine the differences in the prevalence of fasciolosis among body conditions. The difference was considered as statistically significant if the p- value was less than 0.05. The monetary loss of the problem was analyzed and calculated using the formula set by Organirade [8].

RESULTS

Postmortem Examination: Three hundred eighty two liver samples were examined in the study. One or more *Fasciola* species were detected by routine postmortem examination of the liver. The identification results proved an overall prevalence of 54.5 % (208/382) fasciolosis. All the parasites identified as *Fasciola* were tested for species assignment using standard guidelines. The specific prevalence of *Fasciola* species were proved to be 65.4% (136/208) *F. hepatica*, 36.0% (75/208) *F. gigantica*, 11.5% (24/208) mixed (both *F. hepatica* and *F. gigantica* species) and 10.1% (21/208) unidentified immature flukes. (Table 1).

Body condition score was considered as potential risk factor for the occurrence of fasciolosis in the study animals. Highest infection rate of fasciolosis was observed in poor body condition animals (85.9%) followed by medium body condition animals (55.1%). The lowest prevalence of fasciolosis was known to occur in good body condition animals (34.5%). Statistical analysis of the data showed the presence of statistical

Table 1: The distribution *Fasciola* species among infected livers

Species	Positive	Prevalence (%)
<i>F. hepatica</i>	136	65.4%
<i>F. gigantica</i>	75	36.0%
Mixed infection	24	11.5%
Unidentified (immature flukes)	21	10.1%
Total	208	54.5%

Table 2: Prevalence of fasciolosis among different body conditioned cattle

Body Condition	Examined	Positive	Prevalence	χ^2 -Value	P-Value
Good	139	48	34.5%	8.48	0.000
Medium	158	87	55.1%		
Poor	85	73	85.9%		
Total	382	208	54.5%		

significant difference ($P < 0.05$) on the infection rate of cattle with fasciolosis among the three different body conditioned examined animals (Table 2).

Monetary Loss: The average cost of one liver and 1kg beef in Jimma town during the study period was confirmed to be about 20 and 45 Ethiopian birr, respectively. Based on this information the total annual liver condemnation (ALC) was known to resulted in 87,577 Ethiopian birr (5152 USD) loss ($ALC = 8,042 \times 20 \times 54.45\%$). Similarly, the average carcass weight loss was confirmed to be 2,482,819 Ethiopian birr (146,048 USD) due to fasciolosis in cattle ($IACW = 8042 \times (126 \times 10\%) \times 45 \times 54.45\%$). The overall total annual monetary loss due to fasciolosis at Jimma municipal abattoir was proved to be 2,570,396 Ethiopian birr (151,200 USD).

DISCUSSION

The result of the present study which was conducted based on postmortem examination of the liver proved the prevalence of fasciolosis in cattle to be 54.5%. The finding of the present work was found to be in line with that of Mulugeta [9] and Adem [10] who revealed 53.5% and 56.6% fasciolosis in cattle in Kombolcha and Zeway abattoir, respectively. The prevalence of fasciolosis in our study was lower than that reported by Amsalu [11], Fekadu [12] and Yohannis [13] who reported prevalence of 61.38%, 61.97% and 84.7%, respectively. The result of the present study was higher than the findings of Tadele and Worku [3] that showed prevalence 46.58% of fasciolosis in cattle. The reason for these variations might be due to the differences in temperature, moisture, humidity and soil that might favor multiplication of intermediate snail hosts.

From the total livers proved to be infected by *Fasciola*, 65.4% of them were found to be infected by *F. hepatica* whereas *F. gigantica*, mixed and unidentified or immature flukes of *Fasciola* species were recorded to be 36.0%, 11.5% and 10.1%, respectively. Amsalu [11] reported infection rate of cattle with *F. hepatica* (49.78%), *F. gigantica* (29%) and mixed infection (20.98%) at Bahir Dar municipal abattoir. Wakuma [14] showed prevalence of *F. hepatica* (64.5%), *F. gigantica* (24.8%) and mixed (10.7%) at Bedele municipal abattoir. Tadele and Worku [3] at Jimma municipal abattoir recorded prevalence of *F. hepatica* (63.89%), *F. gigantica* (24.07%) and mixed (16.5%). This difference might be attributed due to differences in season of the study and geographical differences of the study areas.

The prevalence of fasciolosis was found to be 85.9%, 55.1% and 34.5% in poor, medium and good body conditioned animals, respectively. The results of the present study indicated that infections in poor body condition animals were significantly higher ($P < 0.05$) than that of medium and good body condition animals. This proves the importance of fasciolosis in causing weight loss and emaciation to be a characteristic sign of the disease. Additionally, this high prevalence of fasciolosis in poor condition animals could be justified by the fact given by Devendra and Marca, [15] who indicated cattle of poor body condition are vulnerable to parasitic diseases. The current finding was seen to be higher than the study of Yohannis [16] who reported 42.4%, 36.8% and 21.8 % for poor, medium and good body condition, respectively. This variation may be attributed to the variations in food availability and management system of the animals between the study areas.

The total annual economic losses due to liver condemnation and carcass weight loss was estimated to be 2,570,396 Ethiopian birr (151,200 USD). The monetary loss in the present study was higher than the results of Tadele and Worku [3] who calculated monetary loss of cattle fasciolosis to be 54,063 Ethiopian birr (3180 USD) in their study conducted in the same abattoir. Yohannes [13] estimated monetary loss of cattle fasciolosis to be about, 200,000 Ethiopian birr (11,764 USD). The difference in the estimated economic losses could be attributed to the increase in the price of liver and meat in the global market in general and in Ethiopia in particular.

CONCLUSION

The present study confirmed that fasciolosis is an important disease causing considerable loss of revenue at Jimma municipal abattoir. The country was known to loss

2,570,396 Ethiopian Birr ((151,200 USD)) annually due to liver condemnation and carcass weight loss caused by fasciolosis. Hence, from this study we can conclude that fasciolosis is one of the important livestock parasitic disease of cattle which has an impact on the country economy beyond its impact on the farmers. Hence, emphasis should be given to the control of its distribution since fasciolosis is one of the striking parasitic diseases that have enormous direct and indirect losses in livestock population.

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