Global Veterinaria 8 (2): 115-118, 2012
ISSN 1992-6197

Fasciolosis in Slaughtered Cattle in Addis Ababa Abattoir, Ethiopia

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Abstract: A cross-sectional study to estimate the prevalence of fasciolosis in slaughtered cattle was conducted between November 2010 and April 2011 in Addis Ababa abattoir, Ethiopia. A total of 600 livers from cattle selected with systematic random sampling were examined for presence and burden of liver fluke. Of 600 examined cattle, 122 (20.3%) were infected with *Fasciola*. Both species of *Fasciola* were identified during the study. *Fasciola hepatica* was recovered from the livers of 91 (15.2%) cattle while *F. gigantica* was collected from 19 (3.2%) livers. Mixed infection with both species was observed in 7 (1.2 %) animals and 19 (3.2%) cattle were infected with unidentified immature liver flukes. Worm count on the 122 infected livers revealed a mean fluke count of 73.5 per liver, with maximum and minimum fluke count of 152 and 2 respectively. *Fasciola* infection was highly associated (P <0.001) with body condition. Animals with lean body condition were 6.9 (95%CI=3.60 - 13.15) times more likely to be infected as compared to fat cattle. It is concluded that fasciolosis, due to *F. hepatica* and *F. gigantica*, is prevalent in cattle in Ethiopia.

Key words: Abattoir · Cattle · Ethiopia · *Fasciola* · Prevalence

INTRODUCTION

Fasciolosis is an economically important disease of domestic livestock, in particular cattle and sheep. The disease is caused by digenean trematodes of the genus *Fasciola*, commonly referred to as liver flukes. The two species most commonly implicated as the etiological agents of fasciolosis are *F. hepatica* and *F. gigantica*. *F. hepatica* has a worldwide distribution but predominates in temperate zones while *F. gigantica* is found on most continents, primarily in tropical regions [1].

Several abattoir surveys conducted in various parts of Ethiopia have demonstrated the presence of fasciolosis, due to *F. hepatica* and *F. gigantica*, in ruminants. Some studies tried to demonstrate the economic losses associated with liver condemnation [2-5]. Because epidemiology of fasciolosis is dynamic and may change with years [6], it is important to monitor its development to determine trends in prevalence. The present study was, therefore, aimed at estimating the prevalence of fasciolosis in cattle brought from different parts of the country and slaughtered in Addis Ababa abattoir.

MATERIALS AND METHODS

Study Area and Animals: The study was conducted on 600 adult cattle slaughtered in Addis Ababa abattoir between November 2010 and April 2011. Addis Ababa is the capital city of Ethiopia located in the central highlands of the country at an altitude of 2500 m.a.s.l. The cattle slaughtered in the abattoir were collected from different parts of the country which is characterized by widely varying climato-ecological conditions mainly due to altitudinal differences. It is often difficult to trace the origin of the animals as they usually pass a chain of markets. Some animals come directly to the abattoir from grazing while others pass through feedlots where they are routinely de-wormed and fed straw/hay based concentrate. All cattle included in the study, except seven, were male and the majority, except only 16, was local indigenous cattle.

Study Design and Sampling Procedure: The study was cross-sectional study whereby the study animals were selected from the slaughter line using systematic random sampling in such a way that 10 animals are examined a day from a group of varying number of cattle slaughtered in

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one day. List of the animals to be slaughtered, from which study animals were selected, was prepared while the animals were kept in lairage. Information regarding sex, age, breed and body condition of the study animals was recorded during ante-mortem examination. Body condition was scored following the guidelines set by Nicholson and Butterworth [7]. Accordingly, animals were classified into lean (score 2 and 3), medium (score 4, 5 and 6) and fat (score 7, 8 and 9) categories. There was no animal with score 1.

Liver Examination: The liver of each study animal was carefully examined for presence of lesions suggestive of *Fasciola* infection externally and sliced for confirmation. Liver flukes were recovered for differential count by cutting the infected liver into fine, approximately 1cm, slices with a sharp knife according to Hansen and Perry [8]. Each mature fluke was identified to species level according to its shape and size [9]. All intact immature and mature flukes and only fluke heads-when a portion of fluke was found- were counted.

Data Management and Analysis: Data were stored in a Microsoft Excel spread sheet and analyzed with Stata version 9 (Stata Corp. College Station, TX) statistical software. Prevalence was calculated as percentage value. Statistical association of *Fasciola* prevalence with body condition of the animals was analyzed using logistic regression analysis. Breed, sex and age were not included in the analysis because of the very low number of observations; there were only 7 females and 16 exotic cattle while all animals included in this study were adults.

RESULTS

Prevalence: Of the total 600 livers examined at the abattoir 20.3% (122/600) were found infested with *Fasciola*. *Fasciola hepatica* was the highest with 15.2% (91/600) prevalence, while *F. gigantica* was 3.2% (19/600). Mixed infestation with the two species was recorded in 1.2% (7/600) livers and immature flukes which were not identified to species level were found in 3.2% (19/600) livers (Table 1).

Fluke Count: Fluke count ranged between 2 and 152 with a mean fluke burden of 73.5 per infected liver. Mean count was highest in animals with mixed infection followed by those infected with *F. hepatica* (Table 2).

Table 1: Prevalence of *Fasciola* species in cattle slaughtered at Addis Ababa abattoir (n=600)

Fasciola species	Nº of infected liver	Prevalence (%)
F. hepatica	84	14.0
F. gigantica	12	2.0
Mixed	7	1.2
Immature	19	3.2
Overall	122	20.3

Table 2: Mean liver fluke count per affected liver in cattle by *Fasciola* species (n=122).

*S*pecies	Mean count
F. hepatica	83.8
F. gigantica	55.3
Mixed	116.7
Immature (Unidentified)	23.8
Overall	73.5

Table 3. Association of *Fasciola* infection with body condition (n=600).

Body condition	No.	No. positive (%)	Odds ratio (95% CI)	*P* value
Fat	212	21 (9.9)	1	0.0000
Medium	316	70 (22.2)	2.6 (1.53 - 4.37)	
Lean	72	31 (43.1)	6.9 (3.60 - 13.15)	

Association with Body Condition: There was a statistically significant association (P <0.001) between *Fasciola* infection and body condition of the animals (Table 3). Lean animals were about 7 times more affected with *Fasciola* as compared to fat animals.

DISCUSSION

Prevalence: The overall prevalence of bovine fasciolosis (20.3%) observed in this study is in agreement with the report of Berhe *et al*. [10] from northern Ethiopia who reported a 24.3% prevalence. However, it is much lower than that of many other reports of similar studies from different abattoirs in the country and elsewhere in Africa. Yilma and Mesfin [2] reported a 90.7% prevalence of fasciolosis in cattle slaughtered at Gondar abattoir, while Tolosa and Tigre [3] recorded a prevalence of 46.2% at Jimma abattoir. Phiri *et al*. [11] from Zambia and Pfukenyi and Mukaratirwa [12] from Zimbabwe reported 53.9% and 31.7% prevalence respectively. On the other hand a lower prevalence of fasciolosis (14.0%) has been observed in slaughter cattle at Wolaita Soddo abattoir [4]. Difference in prevalence among geographical locations is attributed mainly to the variation in the climatic and ecological conditions such as altitude, rainfall and temperature. *Fasciola* prevalence has been reported to vary over the years mainly due to variation in amount and pattern of rainfall [6].

Consistent with our finding, several abattoir studies in different parts of Ethiopia reported the predominance of *F. hepatica* to *F. gigantica* [3, 5, 10]. Abunna and colleagues [4], however, recorded higher prevalence of *F. gigantica* than *F. hepatica* in cattle slaughtered at Wolaita Soddo abattoir in southern Ethiopia. The finding of mixed infection with the two species of *Fasciola* indicates that there are places in the country where the climato-ecological conditions favour the existence of the intermediate snail hosts for both species. Difference among the relative prevalence of the 2 species of *Fasciola* in cattle slaughtered in abattoirs located in different regions of the country may be explained by the variation in the climatic and ecological conditions of the areas feeding the abattoirs. Several studies in other Africa countries, however, showed that *F. gigntica* is the predominant if not the only species prevalent [11- 15].

The current study documented a mean fluke count of 73.5 per infected liver. A previous abattoir survey in northern Ethiopia recorded a comparable mean burden of 66.2 flukes per infected liver [2]. The more flukes an animal has, the more blood it losses and hence the more anemic it becomes [16].

There was a statistically significant association (P <0.001) between *Fasciola* prevalence and body condition of the animals. In a similar study Bekele and associates [17] reported high prevalence of fasciolosis in cattle with poor body condition compared to cattle in medium and good body condition. Chronic fasciolosis is characterized by progressive loss of condition [16]. However, it must be borne in mind that cattle coming from feedlots, which are expected to be in good body condition, are most likely to be de-wormed than cattle coming directly from grazing.

As cattle slaughtered at Addis Ababa abattoir originate from almost every corner of the country it could be concluded that fasciolosis is still prevalent in cattle in the country. The climato-ecological conditions favorable for survival and development of the intermediate snail hosts for the two species of *Fasciola* are also prevalent in the country.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the generous assistance by meat inspection personnel at Addis Ababa abattoir.

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