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Research Article

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Prevalence of bovine fasciolosis and type of common fasciola species in cattle Nedjo municipal abattoir, Western Wollega, West Ethiopia

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Abstract

Fasciolosis is a public and economically important parasitic disease, which is caused by trematodes of the genus Fasciola that migrate in the hepatic parenchyma and establish in the bile ducts. A cross sectional study with the objective of determining the prevalence and type of common Fasciola species in cattle was conducted in and around Nedjo Woreda at Tuesday and Saturday Town Abattoir , west wolega Zone from june 2021 to November 2021. The study was based on post –mortem inspection of liver collected from slaughtered animals at Tuesday and Saturday municipality Abattoir. SPSS statistical software was used to analyze the data and the association between fasciolosis and study variables was determined by person's chi-square(X^2) test. The liver were thoroughly inspected and palpated followed by incision. Out of 384 liver inspected, 179 (46.6%) were positive for fasciola species .F.gigantica (fasciola gigantic) was found to be the most prevalent species in the study area(69.8%) followed by F.hepatica (fasciola hepatica) (26.8%) and mixed infections (3.4%) which was significantly different ($p<0.05$). There was a significance difference on the prevalence of infections and locality ($p<0.05$). However, sex, age and body condition didn't showed a significant difference ($p<0.05$). In the current study, fasciolosis was considered as a major problem in NedjoWoreda and surrounding areas as the ecological factors and management conditions are suitable both for implemented host and parasite to maintain. Strategic control need to be implemented with the aim of reducing worm burden from infected animal and preclude pasture contamination in study area.

Keywords: Abattoir, Cattle, Fasciola, NedjoWoreda , Postmortem , prevalence

1. Introduction

Ethiopian livestock productivity, despite its huge population size, remains marginal due to various disease, malnutrition and management constraints. Parasitism represents a major obstacle to the development of sub-score (FAO, 2000). Bovine fasciolosis is one of the most important parasitic diseases of cattle causing mortality and production loses in various parts of Ethiopia. The disease is the significance in highland as well as in low land of Ethiopian (Solomon and Abebe, 2007). The members of this genus are commonly known as liver flukes. They are responsible for widespread mortality and morbidity in cattle characterized by weight loss, anemia and hypoproteinemia. The two most important species includes *F.hepatica* (*Fasciola hepatica*) found in the temperate cooler areas of highland, in the tropics and subtropics and F.gigantica (*Fasciola gigantica*) which predominates in tropical areas (smith, 2004). Parasitic F. hepatica infects cattle and other mammalian species and is endemic in many parts of the world (Rapsech et al., 2006) and *F.gigantica* is the most common species found in Africa and Asia. It is recognized as major source of losses of production in domestic ruminants (woman et al., 1998). In Ethiopia, the prevalence of Bovine Fasciolosis has shown to range from 11.5% to 87% (Malone et al., 1998). *F.hepatica* was shown to be the most important flucke species in Ethiopia livestock with distribution over three quarter of the nation except in the arid north east and east of the country. The distribution of F. gigantic was mainly localized in the western humid zone of the country that encompasses approximately one fourth of the nations (Fikirtemariam *et al.*, 2013). The disease is found in vast water lodged and marsh grassing field condition anticipated to be ideal for the propagation and maintenance of high prevalence of fasciolosis. In Ethiopian the highlands contain pockets of water logged marsh areas. These provide suitable habitats year round for the snail intermediate hosts (Solomon and Abebe, 2007). Even though, it is impossible to detect fasciola in live animal, liver examination at slaughter or necropsy was found to be the most direct, reliable cost effective technique for the diagnosis of fasciolosis (Urquhart *et al.*, 1996).

The distribution of *F.gigantica* was mainly localized in the western humid zone of the country that en compasses approximately one fourth of the nation (Malone *at al.*, 1998). Moreover that study also showed that fasciolosis has higher economic importance on animal production and productivity.

The economic losses due to fasciolosis via the world are enormous and this losses are associated with mortality, morbidity, reduced growth rate, condemnation of liver, liver increased susceptibility to secondary infections and expenses due to control measure .Diagnosis is based on clinical sign primarily , seasonal occurrence and previous history of fasciolosis on the farm or the identification of snail habitat, post mortem examination, hematological test and examination of feces for fluke egg (Radostitis *et al* ., 2007 ; Taylor *et al.*, 2007). More rationally prophylactic programs based on locally epidemiological information are needed for sound fasciolosis control strategies in Ethiopia (Yilma *et al.*, 1998). Though the problem due to fasciolosis reported from different parts of the country, information on the current status from different locations need to be attained. Therefore, the objectives of this study were to determine the prevalence of fasciolosis in cattle and around Nedjo and to identify the common fasciola species in the area.

2. Materials and Methods

1.1. Description of the study Area

The study was conducted in Western Ethiopia, Oromia Regional state, West Wolega Zone, at Nedjo district. Nedjo is located at about 515km from west of Addis Abeba and bounded by Benishangul Gumuz region in the north, Jarso woreda in the south, Boji Dirmeji in the east and Leta sibu woreda in the west direction. The altitude of the area ranges from 1600-1800 meters above the sea level. The mean annual rain fall of

the area ranges from 1400-1500 milimeter and the mean annual minimum and maximum temperatures are 16 c^0 and 28 c^0 respectively. The main farming system in the area is mixed farming and cattle are the man abundant animal species kept in the area. The cattle in the area are indigenous East African zebu breeds and are kept under traditional husbandry system (NWAO, 2021).

2.2. Study population

During the study period, the total slaughtered 384 adult indigenous cattle were determined and taken as a representative sample from different localities that brought to market from different districts and markets of its vicinity. The management system from all cattle was extensive in which animals kept under free grazing. Examination and evaluation of body condition were accomplished during ante mortem examination. They were classified as medium and good by observing the body condition of the animal according to the method described by Nicholson and Butterworth, 1996. The ages of animals were also estimated by the dentition method (Gatenby, 1991).

2.3. Sample size determination

The number of animals required for the study was determined using the formula given by thru field, 2005 for simple random sampling, by using 95 % level of confidence, 50% expected prevalence and 0.05 desired absolute

$$\frac{4}{d^2}$$

Where; n= required sample size
Exp= Expected prevalence
d=desired absolute precision
Thus, 384 animals were sampled during the study.

2.4. Study design, Sampling Method and Sample Analysis

A cross sectional study at a point was conducted and systematic sample technique was the sampling strategy used to collect liver of each slaughtered animal from the abattoir. The liver was carefully examined by visualization palpation followed by transverse incision of organ across the thin left lob in order to confirm the case. Species identification of the recovered fasciola was preformed based on the morphological feature of the agent and classified in to F. gigantic.

2.5. Data analysis

The data from the abattoir survey was entered in to Microsoft excel data base system and statistical analysis was done. SPSS statistical software was used to analyze the data. The association between fasciolosis and study variables was determined by person'schi-square(X^2) test. A statically significant association between variables exists when p=0.05 and at 95% confidence level (CI).

3. Results

Out of the total 384 adult indigenous cattle slaughtered and examined from May 2020 to November 2020 at the study area, 179 (46.6%)were found to be positive for fasciolosis .The result indicated that there was no statistically significant variation between male and female animals as well as between age groups (p=0.05) (Table 1 and Table 2).

Table 1: Prevalence of fasciolosis in slaughtered cattle based on the sex of cattle

Sex	Number examined	Positive (%)	X2	P-value
Female	19	12 (3.1)		
Male	365	167 (43.5)	2.19	0.14
Total	384	179 (46.6)		

Table 2: Prevalence of fasciolosis based on Age groups

Age group	Number examined	Positive (%)	X2	P-value
Young	42	22 (5.7)		
Adult	342	157 (40.9)	0.63	0.43
Total	384	179 (46.6)		

There was statistically significant differences between the peasant association and prevalence rate of the fasciolosis ($p<0.05$) (Table 3)

Table 3:- Prevalence of Fasciolosis Based on Locality

PA (Peasant association)	Number Examined	Positive (%)	x2	p-value
Sombo guta	29	8 (2.1)		
Gaba kamisa	67	20 (5.2)		
Walitate Gida	103	56 (14.6)	15.94	0.001
Nedjo town	185	95 (24.7)		
Total	384	179 (46.6)		

The Result indicated that there was no statistically significant variation ($p>0.05$) observed between animals having good and medium body condition with the occurrence of parasite infection (Table 4)

Table 4:- Prevalence of faciolosis based on body condition score

BCS	Total Examined	Positive (%)	X2	P-value
Good	302	146 (38)		
Medium	82	33 (8.6)	1.7	0.19
Total	384	179 (46.6)		

Out of the 179 positive livers for fasciola infection in the study area, 125 (69.8%) liver harboured *F.hepatica*, 48 (26.8%), liver infected with *F. gigantica* and 6 (3.4%) liver harboured mixed infection with *F.hepatica* and *F.gigantica* species wich was statistically significant (Table 5).

Table 5:- Species of Fasciola detected in liver of infected cattle during the study period.

Species fasciola	Of total infected liver	Percentage	x2	p-value
F.hepatica	125	69.80%		
F.gigantica	48	26.80%	384	0.000
Mixed	6	3.40%		
Total	179	46.60%		

4. Discussion

The overall prevalence of bovine fasciolosis (46.6%) observed in this study is nearly agreement with finding of (Tolosa Negasa et al., 2017)recorded prevalence of 40.2%. This result is relatively higher when compared with the prevalence (27.1%) reported by Rahmeto (1992) in Woliso, (20.3%) by (Kasey *et al*., 2011) at Addis Ababa. On the otherhand, it is lower than that of many other studies in the country (Yilma J. Mesfin A., 2000)reported 90.7% prevalence of fasciolosis in cattle slaughtered at Gondar abattoir. Additionally it is much a lower prevalence of fasciollosis (14.0%) has been observed in slaughtered cattle at Wolita Sodo abbotoir (Fufa *et al*.,2010). This variable might be due to the ecological and climatic differences between different locations throughout the country. One of the most important factors those infections the occurrences of fascoilosis in the area are availability of the suitable snail habitat (Soulsby, 1982; Urquhart *et al*., 1996).

This study didn't show statistically significant difference between two sexes of the cattle ($p>0.05$) as well as between age groups. This might be due to common exposure to a similar Fasciola contaminated pasture land by the groups and traditionally animals are driven to pasture regardless of sex and age (Solomon and Abebe, 2007). Similarly in the current work, no significant variation ($p>0.05$) was observed in the prevalence of fascilosis whether the animals slaughtered is in a medium of good body condition . This could be because body condition determination in cattle is manifested when fasciolosis reaches its chronic stage as Jobre and Ali (2000), Fikirtemariam *et al*. 2013).

The study also revealed that there was a significant variation ($p<0.05$) in the prevalence of Fasciola between the localities. Higher prevalence was detected in Maramo (24.7%) followed by Machabara(14.6%), Likiti (5.2%) and Chiri (2.1%) . This finding was in line with the works of Biniam et al. (2012). This difference might be due to the difference snail population due to different ecology between thelocalities.

In the current study, two species of fasciola (*F.hepatica* and *F. gigantica*) were identified. However *F.hepatica* was the most prevalent (69.8%) species compared while the prevalence of *F. gigantica* and mixed infection was 26.8% and 3.4% respectively. This finding is higher when compared with that of Fikirtemariam et al. (2013) at Bahir Dar Abattoir, Kasey *et al*. (2012) at Addis Ababa. In Ethiopia *F.hepatica* and *F.gigantica* infections occur in highland and lowland areas respectively. The high prevalence of *F.gigantica* may be associated with the existence of favorable ecological biotopes for *L.natalensis* (Urquhart *et al*., 1996)

Conclusion and Recommendation

In general fasciolosis was found prevalent in study areas. This will be a hindrance to the livestock production by causing through condemnation of livers, morbidity and mortality rate of the infected cattle, and cost of the treatment and control of the parasite in the study areas. Additionally, the study area is appropriate for the survival of the snail which deteriorated the situation for future. Finally, the abattoir based prevalence recorded in the study area and the loss incurred suggests that a detailed epidemiological study is required to implement systematic disease prevention and control methods.

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