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Prevalence of Major Bovine Trematodes (Fasciola and Paramphistomum) in Cattle Slaughtered at Nekemte Municipal Abattoir, East Wollega, Oromia Regional State, Ethiopia

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Abstract
A cross-sectional study was conducted from November, 2015 to April, 2016 to determine the prevalence of major trematodes (*fasciolosis and paramphistomosis)* and the associated risk factors in cattle slaughtered at Nekemte municipal abattoir, East Wollega Zone, Oromia, Ethiopia. From a total of 400 animals selected by systemic random sampling at postmortem, prevalence of fasciolosis and paramphistomosis was 19% and 41.5%, respectively.The prevalence of fasciolosis was 19.02% and 18.87%, and paramphistomosis was42.07% and 37.74% in male and female animals, respectively.There was no statistically significant association of bovine fasciolosis and paramphistomosis between sexes ($p>0.05$).Fasciolosis was higher in old age(19.02%) than adult age (18.84%). Infection rate of fasciolosis and paramphistomosis for cattle with poor body condition was (29.27% and 53.66%) with medium (18.46% and 40.77%) and good body condition (14.89% and 36.70%), respectively. This result also showed that difference of the prevalence among the different body condition was statistically significant ($P<0.05$). The prevalence of,*F. gigantica,* mixed and immature ones was, 40.8%, 22.4%, 19.7%, and 17.1%, respectively with highest prevalence observed in *F. hepatica*. In view of current result, trematodes are major obstacles for livestock production and productivity by remarkable direct and indirect losses. Hence,control strategies targeted on the parasite and the intermediate host as well as management system in the study area is warranted.
Keywords: abattoir, bovine, fasciolosis, paramphistomosis, prevalence
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1. INTRODUCTION

Ethiopian livestock productivity, despite its huge population size, remains low due to various diseases, malnutrition and management constraints (Malone *et al*., 1982). Parasitism is the major problems that affect the productivity of livestock worldwide. Among many parasitic problems of domestic animals, Fasciolosis and Paramphistomosis are the most important parasitic diseases in domestic ruminants throughout the world (Radostits *et al.*, 2007).

The geographical distribution of Trematode species is depending on the distribution of suitable species of snails. The genus *Lymnaea* in genera and water snail *planorbis* was reported to have a worldwide distribution (Urquhart *et al*., 1996). *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 northeast 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 nations (Tolossa and Tigre, 2006). The incidence of the disease in bovines has increased worldwide in recent years as a possible consequence of global climate changes (Fairweather, 2011).

There are two types of Trematodes: digenes and monogenes. Monogenetic trematodes have direct life cycle and are primary ectoparasite of aquatic vertebrate. Digenetic trematode have indirect life cycle and are endoparasite of a wide verity of vertebrate (Ballweber, 2001). The body of trematodes or flukes is dorsoventerally flattened and is un segmented and leaf like. All the organs of trematodes embedded in a parenchyma, no body cavity being present. Suckers, hooks or clamps attach those species to the exterior or the internal organs of their hosts. A mouth and an alimentary canal are present, but usually there is no anus. The mouth leads into a muscular pharynx, succeeding which may themselves branch. The branched excretory system has flame cell and it discharges in to an excretory bladder which usually has a posterior opening. The reproductive system is hermaphrodite, except in the family Schistosomatidae, the species of which are unisexual (Johannes, 1996).

The life cycle of these Trematodes involves snail as an intermediate host The complex nature of the lifecycle and epidemiology of snail-borne disease presents challenges for predictive mapping at the herd-level, as well as disease management and animal husbandry at the individual-level (Walker *et al.,* 2008).

The adult Paramphistomum in for stomach are essentially nonpathogenic even though large numbers may

present. At most there may be a localized loss of rumen papillae. The immature worms attach to the duodenal mucosa by means of posterior suckers and causes severe enteritis possibly necrosis and hemorrhage. In heavy infestation a frank hemorrhage, duodenits, hypoproteinemia and edema may be produced with immature flukes deeply embedded in the mucosa. Severely affected animals exhibit unthriftness and diarrhea (Radostits *et al*., 2007.

Diagnosis is established based on prior knowledge of the epidemiology of the disease in a given environment; observation of clinical signs, information on grazing history, seasonal occurrence and standard examination of feces in the laboratory (Khan, 2005). More rational prophylactic programs based on local epidemiological information are needed for sound Fasciolosis and Paramphistomosis control strategies in Ethiopia (Yilma and Malone, 1998).

Therefore, the objectives of this study were:

- ✓ To determine the prevalence of bovine fasciolosis and paramphistomosis in cattle slaughtered at Nekemte municipal abattoir.
- ✓ To identify the associated risk factors for bovine fasciolosis and paramphistomosis in the study area.

2. MATERIALS AND METHODS

2.1. Study area

The study was conducted in Nekemte Municipal abattoir found at Nekemte town, East Wollega Zone of Oromia regional state, Ethiopia. Nekemte town is located at 331 Km West of Addis Ababa, capital city of Ethiopia. It is found at latitude and longitude of 90° 5' N and 360° 33' E, respectively with an elevation of 2,088 meters above sea level. The minimum and maximum annual rain fall and daily temperature ranges are between 1450 to 2150 mm and 15 to 27°C, respectively. The area receives bimodal rainfalls that were long rain season and short rain season (EWARDO, 2007).

2.2. Study animals

The study animals were all cattle brought to Nekemte municipal abattoir for slaughter. Both sexes and age groups of cattle are included in study population.

2.3. Study design

A cross sectional study was conducted to determine prevalence of Fasciolosis and Paramphistomosis in cattle slaughtered at Nekemte municipal abattoir using post mortem examination of liver, rumen and reticulum of each selected animals.

2.4. Sampling techniques and sample size determination

The number of cattle required for the study was calculated based on the formula given by (Thrusfield, 2005). The sample size was determined based on expected prevalence of 50%, confidence interval of 95% and desired level of precision of 5%.

$$n=\frac{1.96^2 Pexp\ (1-Pexp)}{d^2}$$

n = required sample size

Pexp = expected prevalence

d = desired absolute precision

$$\text{Hence: } N = \frac{(1.96)^2\ 0.5\ (1-0.5)}{(0.05)^2}$$

Therefore based on the above formula 384 samples were resulted but to increase precision the sample size was increased to 400.

2.5. Study methodology

Each animal selected for the study was further identified by providing a unique identification that could be used for both ant and postmortem identification of the animal. Age, body condition and sex were recorded. The age of the animal was estimated by means of their dentition as described by (Dehalunta and Hable, 1986).

Examination of livers for the presence of Fasciolawas 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 Fasciolaand inspection of paramphistomum by incising the fore stomach (rumen and reticulum). The adult fasciola was taken to the laboratory in plastic container with 10% formalin. Then 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, 1982).

3. RESULTS

3.1. Distribution of trematodes based on sex, age and body condition

Out of 400 cattle examined at necropsy, 76 (19%) were positive for fasciola and 166 (41.5%) were positive for paramphistomum. The prevalence of fasciolosis was high in males (19.02%) than females (18.87%) and also paramphistomosis was high in males (42.07%) than females (37.74%), but there was no statistically significance difference between sexes in both trematodes ($P>0.05$).

The result also shown that the prevalence of fasciolosis and paramphistomosis were high in poor body condition with 29.27% and 54.66%, respectively. There was statistically significance difference of fasciolosis in relation to body condition ($P<0.05$) but there no statistically difference in paramphistomosis in relation to body condition ($P>0.05$) (Table 1).

Table 1. Prevalence of fasciola and paramphistomum with sex, age and in relation to body condition

Risk factors	**Fasiolosis**					**Paramphistomosis**			
	Sample size	positive	prevalence	x2	P value	Positive	Prevalence	X^2	P value
Age groups									
69	13	18.84%	0.001	0.97	29	42.02%			
Old	331	63	19.03%			137	41.39%	0.01	0.922
Sex									
Male	347	66	19.02%	0.001	0.979	146	42.07%	0.357	0.55
Female	53	10	18.87%			20	37.74%		
Body condition									
Good	188	28	14.89%	7.702	0.021	69	36.70%	6.804	0.33
Medium	130	24	18.46%			53	40.77%		
Poor	82	24	29.27%			44	53.66%		
Total	**400**	**76**	**19%**			**166**	**41.5%**		

3.2. Distribution of fasciola species in infected liver

The liver was mostly infected with F. hepatica (40.8%) followed by F. gigantica (22.4%) and also infected with both and immature ones (table 2).

Table 2. The distribution of Fasciolaspecies in infected livers (n=76) in slaughtered cattle

Species	**Organs affected**	**No of positive**	**prevalence**
F.hepatica	liver	31	40.8%
F.gigantica	liver	17	22.4%
Mixed fasciola	liver	15	19.7%
Immature fasciola	liver	13	17.1%

3.3. Distribution of trematodes

Post mortem examination shows that high prevalence was observed by paramphistomum infection (41.5%) followed by fasciola infection (19%) and lowest infection was observed by both, paramphistomum and fasciola (6.75% (Table 3).

Table 3. Prevalence of single and mixed infection of trematodes at postmortem (n=400) with over all prevalence of 53.75% (215/400).

Trematodes	N_o of positive	prevalence
Fasciola	76	19%
Paramphistomum	166	41.5%
Fasciola and paramphistomum	27	6.75%

4. DISCUSSION

In the present study, 400 samples originated from cattle of different age and sex were examined. The examination results proved the presence of thefasciola species and paramphistomumsamples originated from cattle in the study area.

A total of 400 cattle were brought to Nekemte municipal abattoir for the examination of the occurrence of fasciolosis and paramphistomosis of which,76 were found to be infected with fasciola, resulting in the prevalence of 19% and 116 were infected by paramphistomum resulting with a prevalence of 41.5%. The overall prevalence of bovine fasciolosis (19%) in the present study is almostagree with the earlier findings that was 20.3% reported by Aragaw *et al.* (2012)in Addis Abeba abattoir;22.14% reported by Alamu and Mekonnen (2013) in Dangila municipal abattoir and 24.32% by Gabretsadik *et al.* (2009) in mekelle municipal abattoir. However, the overall prevalence of bovine fasciolosis in this study was much lower than the previous findings of

50.98% by Dejene (2008) at Arsi; 90.65% reported by Yilma and Mesfin (2000) at Gondar abattoir and 46.58% by Tadele and Worku (2007 at Jimma municipal abattoir. The present study also shows that, it is relatively higher than 14.8% reported by Daniel (1995) at Dire dawa municipal abattoir.

The overall prevalence of bovine paramphistomum in the present study 41.5% was almost nearest to the previous findings reported 40.1% by Sintayo Melaku (2012) at Debre zeit and38.92%reported by Mogdey *et al*. (2009) in Egypt but it is much higher than the finding of Ozdal (2010) 8.95% in turkey. This great variability shown in both case is probably due to the ecological and climatic differences between different locations throughout the country. The other most important factors that influence the occurrence of trematodes in an area is availability of the suitable snail habitat (Soulsby, 1982; Urquhart *et al*., 1996).

In the current study all samples were collected from both sexes. From those, a prevalence of 19.02% and 18.87% was recorded in male and female animals for fasciola and a prevalence of 42.02% and37.74%was recorded in male and female animals for paramphistomum, respectively. There was no statistically significant difference ($P > 0.05$) in infection rates between the sexes. This finding was well agrees with the works of Solomon Woldemariam and Abebe Wossene (2007). This insignificancy shows that sex has no any impact on the infection rate and both male and female animals were equally susceptible. But the different result may be due to management difference or the principle of short exposure of female animal during pregnancy.

The prevalence of fasciola and paramphistomum infection was highest in cattle with poor body condition score than in cattle with medium and good body condition. More over there exist significant variation ($p<0.05$) among the groups for both infections (table1) in a similar study. Aragaw *et al*. (2012) reported high prevalence of fasciolosis in cattle with poor body condition compared to cattle in medium and good body condition. The difference of result may be due to the difference in immunity of the host and the fact that cattle with good body condition expected to be de-wormed.

The present study was also conducted in age wise to observe prevalence of bovine fasciolosis and the result indicated the difference in prevalence between the two age groups were relatively high in old (19.03%) than the adult (18.84%) age groups with statistically insignificant variation ($P>0.05$) This study result was in agreement with Tagesse, G. Mariam *et al*. (2014). means age has no effect on the prevalence of fasciolosis. But the different result may be due to long time of exposure. As the age of the animal increases, the possibility of being exposed to Fasciolaincreases and hence high prevalence of fasciolosis was observed.But in the case of paramphistomum the result was the reverse means the adult (42.02%) greater than the old (41.39%) this result may be due to the reason of immunity of the host(i.e. older animals can develop resistance to re infection).Amphistomiasis of cattle is largely a disease of young animals, as successive small infections produce an almost complete immunity.

In this study the highest prevalence was recorded from paramphistomosis (41.5%) followed by fasciolosis 19%. The deference among prevalence of fluke infections might be attributed due to wide distribution and numerous number of intermediate hosts, the absence of effective drugs to treat it and partly due to the fact that the adult parasite be considered non-pathogenic and highly prolific egg layer.

Of the total liver infected 40.8% of them were found to be positive for *F. hepatica*. Whereas *F. gigantica*, mixed and immature form of fasciola recorded was 22.4%, 19.7%, 17.1% respectively. The present study collaborate with findings of Tadele and Worku (2007) and Wakuma (2009) who demonstrated that the predominant species of bovine fasciolosis in Jimma and Bedele municipal abattoir was*F.hepatica* (63.89%,64.5%),followed by *F. gigantica* (24.07%, 24.8%), mixed and immature flukes (12.04%,10.7%) respectively. The high proportion rate of *F.hepatica* may be associated with the existence of favorable ecological biotypes for *L.truncatula* relatively small proportion of *F.gigantica* may due to the fact that most animal came for slaughter was from high land area.

5. CONCLUSSION AND RECOMMENDATIONS

In general trematodes were found prevalent in the study areas. This will be a hindrance to the livestock production by causing remarkable direct or indirect losses in the study areas. Moreover, the study area is suitable for the survival of the snail which worsened the situation for the future. Therefore based on the current findings the following recommendations are forwarded.

- ✓ Strategic application of fluckicide and avoiding animals grazing from marshy land plays considerable success for the control of trematodes in these study areas.
- ✓ Control of intermediate host snails through drainage of their habitats should be practiced.
- ✓ Awareness creation for farmers should be advocated about the economic importance of the disease and its control programs.

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