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PREVALENCE OF BOVINE FASCIOLOSIS IN SELECTED DAIRY FARMS OF ADDIS ABABA, ETHIOPIA

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ABSTRACT

A cross sectional study on the prevalence of bovine Fasciolosis was carried out in selected dairy farms of in and around Addis Abeba of Ethiopia, aiming at determining the prevalence of fasciolosis. The farms are found in four sub-cities, locally called *Kifile Ketemas*. The dairy farms were under intensive and semi-intensive management systems. A total of 384 cattle were randomly selected and sampled which accounts for 95% (N=365) and 5% (N=19) of the samples for intensive and semi-intensive dairy farms, respectively. Fecal samples were examined using the direct fecal microscopic examination and Benedict's sedimentation tests. Out of the total (N=384) samples examined, 57 samples were found to be positive using both tests, giving a prevalence of 14.84% (N=57). Other parameters such as management, sex, age and body condition score were also taken into consideration. The results indicated a moderate percentage of prevalence for fasciolosis in those selected sites of Addis Abeba. The prevalence of fasciolosis between study areas (kifeleketemas) was 52.63% (N=30) in Yeka, 33.33% (N=19) in Bole, 10.35% (N=6) in Gullele and 3.51 (N=2) in Kality area. The prevalence of bovine fasciolosis in Yeka was significantly ($P<0.05$) higher than the prevalence of the other three sub-cities. Statistically significant deference ($P<0.05$) was observed among sexes, 44.44% (N=4) being in males, semi-intensively managed cattle 63% (N=12) and the overall infection prevalence was higher 20.37% (N=33)) in animals categorized under body condition score 2 (thin) than animals categorized under body condition score 3, 4, and 5 in which BCS 2 accounts 20.37% (N=33) of the total positive animals, BCS 3 accounts 7.19% (N=11), BCS 4 accounts 17.77% (N=8) and BCS 5 accounts 20.83% (N=5) of the total animals sampled. No statistically significant difference ($P>0.05$) was observed between age groups.

INTRODUCTION

Bovine Fasciolosis is one of the most prevalent parasitic diseases in Ethiopia (manyazewal *et al*., 2014). Fasciolosis is a disease of sheep, goat, and cattle (Andrews, 1999) and occasionally affects humans, thus considered as a zoonotic infection (Okewole, *et al.,* 2000; WHO, 1995). It is one of the causes for productivity loss as well as mortality of cattle, especially in rural areas. There are also many determinant factors for the survival of metacercaria and the intermediate host, the snail. The common determinant factors are favorable temperature, humidity and slowly moving water which are ubiquitous in developing countries, like Ethiopia. Most studies show that ineffective use of anthelmintic, poor management system and health awareness of the society has a great impact on the prevalence of bovine. According to Dunn (1978) and Soulsby (1982), the adult parasite *F.hepatica* has a flat leaf like body, typical of flukes, and measures 20 to 30 mm long by 8-15 mm wide Hence, understanding the prevalence of bovine fasciolosis and its determinant factors is critical both at individual animal as well as at herd level. This would help in identifying and designing strategies for decreasing the prevalence, control and prevention of fasciolosis and its consequences. The main objective of the study was, therefore, to determine the prevalence of bovine fasciolosis and its association with different socio-economic factors

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MATERIALS AND METHODS

Description of the study area

The present study was conducted in Addis Abeba city veterinary laboratory center of Ethiopia. Addis Abeba is located at latitude of 9^{O} 2''N and longitude of 38^{O} 42''E with 640 M^2 area with an elevation of 2500 m.a.s.l. The study area receives an average annual rainfall of about 1164 millimeters. The annual mean minimum and maximum temperature during

the study period were 6^0C and 24^0C, respectively. Livestock population in the area during the study time is estimated about 65,568 cattle (CSA, 2015). The study population consisted of bovines which were found in four Kifele Ketemas: Yeka, Gullele, Kaliti and Bole. The sample size for estimating the prevalence of bovine fasciolosis was obtained by simple random sampling without replacement of the variation coefficient at 10% (Cochran, 1963). From each herd, 20% of the animals were selected randomly until the required sample size was reached.

Study population and type of study

A total of 384 animals, consisting of male and female were sampled from farms in the four sub-cities of Addis Ababa. A cross-sectional approach was chosen for the purpose of this study.

Coprological examination

Fecal samples were collected using simple random sampling technique for coprological examination. In addition, secondary data were collected from commercial dairy farm owners and also small scale farmers using pre-tested semi-structured questionnaire for information regarding production/economic loss due to parasitic diseases, particularly fasciolosis and consequently due to veterinary services.

Data Analysis

Data were recorded on specially designed forms and preliminary analysis was done in Microsoft® Excel (2010). The outcome variables were the positive cases of fasciolosis detected during the fecal examination of the same. Data analysis was made using chi-square statistical analysis technique.

RESULTS

Microscopic Examination

A total of 384 adult cattle faecal samples were examined for the presence of fasciola eggs. From the total of cattle examined (N=384), 14.84% (n=57) of them were found positive for presence of fasciola eggs. Faecal samples of 384 crossbred cattle were examined of which 14.84 % (N=57) were found positive for fasciolosis eggs. The infection prevalence of bovine fasciolosis in four study sites namely Yeka, Bole, Kaliti and Gullele were 52.63% (N=30), 33.33% (N=19), 10.53% (N=6) and 3.51% (N=2), respectively. The finding suggest that the infection prevalence in Yeka is significantly higher ($p<0.05$) than that of the prevalence in the other three sub-cities. The prevalence of fasciolosis in males 44.44% (N=4) was significantly higher ($p<0.05$) than females 14% (N=53), furthermore, semi-intensively managed cattle have

Table 1. Prevalence of bovine fasciolosis during the study period.

Study Area	Management System		Sex		Age		Total Animal	Prevalence in %
	Intensive Total =327	Semi intensive Total=19	Female	Male	Adult	Calf		
Yeka	20	10	28	2	26	4	178	52.63
Bole	17	2	17	2	19	0	103	33.33
Gullele	6	0	5	1	6	0	96	10.53
Kaliti	2	0	2	0	2	0	7	3.51
Total	45	12	52	5	53	4	384	14.84

X^2=10.6 P<0.001 Df=3

Table 2. Sex based prevalence of fasciolosis in the study area

Sex	Total Examined	Positive	Negative	Prevalence in %
Female	375	53	322	14.13
Male	9	4	5	44.44

X^2=6.38 P<0.0115 df=1

Table 3. Comparison of management system of study animals

Management System	Yeka	Bole	Gullele	Kaliti	Total %
Semi-intensive	35	24	0	0	15.34
Intensive	143	79	96	7	84.84
Total	178	103	96	7	14.84

X^2=25.623 P<0.001 Df=1

Rank	Total number of animals under each body condition score	Number of positive animals	% of positive animals
Condition score 2	162	33	20.37
Condition score 3	153	11	7.19
Condition score 4	45	8	17.78
Condition score 5	24	5	20.83

X^2=15.93 P<0.0012 Df=3

A fecal egg examination was conducted to determine the prevalence of bovine fasciolosis by using direct faecal examination, Benedict's (1946) sedimentation test following proper laboratory procedures and supplemented by secondary data.

significantly higher value ($p<0.05$) than cattle 63% (N=12) managed in fully intensive management system 11% (N=36). In other there was no statistically significant difference ($p>0.05$) in infection prevalence between age groups. In addition, the prevalence of fasciolosis in between female and

male study animals varied significantly ($p<0.05$). Management system, climatic conditions and sources of feed, like hay, were found to have significant association with the occurrence of bovine fasciolosis in the study areas (see Table 3 below).

DISCUSSION

Fasciolosis is a widespread ruminant health problem and causes significant economic loss to the livestock owning community in Ethiopia. Water logged and poorly drained areas with acidic soils in the highlands are often endemic for fasciolosis (Brook *et al*.,1985; Mulat *et al*., 2012). In the present study, irrespective of the seasons and topography of the grazing land, the highest prevalence of fasciolosis was recorded in Yeka sub-city. This finding, therefore, strongly suggests that the climatic factors in Yeka is more favorable for the propagation and activity of the snail, an intermediate host of *fasciola* and progression of the parasitic life cycle throughout the year, compared to the sub-cities Bole, Gullale and Kaliti. The overall prevalence was found to be significantly higher ($P<0.05$) in Yeka than in the other three sites. Similarly, the prevalence in male was significantly higher ($p<0.05$) than females.

The difference in prevalence rate between the four study areas more pronounced due to the presence of favorable environmental, Climatic and topography of the land. This indicated maintain optimal wetness required for the development of both the snail intermediate host and intra-mollsucian parasite phases within the snail. Thus the availability of water, which is the most important limiting, was responsible for the increased seasonal prevalence of Fasciolosis in the four study sites. The overall infection prevalence was also higher in animals categorized under body conditions score 2 (thin) than animals categorized under body condition score 3,4 and 5; in which BCS 2,20.37%(N=33) of the total positive animals, BCS 3, accounts 7.19(N=11), BCS 4,accounts 17.77 (N=8) and BCS 5 accounts 20.83 (N=5). However, was statistically significant in ($p<0.05$) in animals categorized under BCS 2. This significance variation was occurred between animals due to the pathogenic changes occurred due to the presence of the disease; which includes anemia due to migrating young fasciola flukes, loss of appetite, and loss of body condition (Terefe *et al*., 2012).

As it was stated earlier, in the study all animals from four selected Kifle-Ketemas were examined by faecal sedimentation tests for the presence of fasciola parasitic egg. There were 384 cattle with the age ranging from 6months to 7 years old. The mean and median age of the study animals was 4 years. The majority of the study animals were females, (97.66%) and the rest 2.44 were males. Majority of the animals (85%) were living in fully intensive system of management and the rest (15%) were living under partial intensive system of management. Of these 57 cattle from the whole population were positive in fecal laboratory test which gave the prevalence of 14.84%. When we compared the prevalence rate expected in each types of managemental system mentioned above it shows such a big difference ($P<0.05$). The difference shown was due to difference in the managemental system of the animals, feed collection sites and regular deworming of the animals. Taking the different study area and sample size in each management system in to consideration. The obtained prevalence rate of bovine Fasciolosis (14.83%) was high compared to the awareness and assumption of the people in the city; who were belive in the world "there is no presence of Fasciolosis in animals which live in capital cities with fully intensive management system". But the result of the prevalence rate shows as due to certain miss use of proper managemental conditions and ineffective use of anthelmintic and areas of feed(hay) collection has playing the major role in occurrence of the disease. The author believes that this prevalence rate will be match higher if the animals were not managed in fully intensive system and if there was no regular deworming of the farm animals and finally if this study were conducted in wet season of the study site. The 14.83% prevalence of Fasciolosis found in this study will be increased if the study were mainly concerned on animals which are managed in extensive system. One of the most important factor that influence the occurrence of Fasciolosis in an area is availability of suitable snail habitat (Urquhart *et al*., 1996). The study animals most of them have the only probability to infect with the disease by feed (hay) which is harvested from localities in which there is presence of snail intermediate host. In addition, optimal base temperature to levels of 10% and 16^0c are necessary for the snail hosts of fasciola hepatica and fasciola gigantic, respectively. Those thermal requirements are also needed for the development of fasciola within snails is available in the study area. The ideal moisture conditions for snail breeding and development of larval stages with the snail are provided when rainfall exceeds transpiration and field 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 number of faecal samples examined 14.83% of them were found to be positive for bovine Fasciolosis. Due to the reason that the bionomic requirements for breeding of the Lymnaea snails and developing of the interamolascan stages of the fluke 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 laboratory examination. 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 man-made water areas may contribute to persistent but relatively low grade infection during the dry season.

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Annex

Annex I Age estimation

Age	Age Categories
Less than 2 years	Young
Greater or equal to 2years	Adult

Adopted from Cringoli, et al., 2002

Annex II Body Condition Score of cattle ***

Rank	Condition score type	Description
Condition score 1	Very Thin	Spine Prominent and sharp
Condition score 2	Thin	Spine Prominent and smooth
Condition score 3	Average	Spine smooth and rounded
Condition score 4	Fat	Spine only detected as a line
Condition score 5	Very Fat	Spine not detectable; fat dimple over spine

*** Adopted from Thompson and Meyer 1994

Annex III infection Prevalence of Bovine Fasciolosis in selected study site of Addis Abeba, Ethiopia (From October 2007-May 2008) (N=384)

Study Area	Management System		Sex		Age		Total Animal	Prevalence in %
	Intensive Total =327	Semi intensive Total=19	Female	Male	Adult	Calf		
Yeka	20	10	28	2	26	4	178	52.63a
Bole	17	2	17	2	19	0	103	33.33b
Gullele	6	0	5	1	6	0	96	10.53a
Kaliti	2	0	2	0	2	0	7	3.51b
Total	45	12	52	5	53	4	384	14.84

Different letter (a,b) along columns signify the presence of significance difference ($p<0.05$).

Annex IV infection prevalence of bovine Fasciolosis in selected study sites of Addis Abeba, Ethiopia (From October 2007-May 2008) (N=384)

Total Animals Examined	Breed	Sex		Age		Management		Total Prevalence
384	Exotic	Female	Male	Adult	Calf	Intensive	Semi-intensive	
	384 +ve 57 100%	375 +ve53 14.13%	9 +ve 4 44.44%	362 +ve 52 14.24%	22 +Ve5 22.72%	327 +ve 45 1.36%	19 +ve 12 63.15	57/384X100% 14.83%

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