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Study on Prevalence of Bovine Fasciolosis at Nekemte Veterinary Clinic, East Wollega Zone, Oromia, Ethiopia

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Abstract: A cross-sectional study was carried out from November, 2013 to March, 2014 at Nekemte veterinary clinic in Western Ethiopia, to determine the prevalence of bovine fasciolosis. Fecal samples were collected from a total of 780 cattle, local breed (n=725) and cross breed (n=55) of all age groups and sex. Sedimentation technique was employed for recovery of *Fasciola* eggs from freshly collected fecal samples. Out of 780 cattle examined during the study period; 124(15.90%) were found to be positive for *Fasciola* eggs. Based on origins of animals, prevalence rates of 19.44, 12.00, 12.12, 14.86, 8.70, 14.52, 12.84, 15.50, 22.06 and 21.57% were recorded in Nekemte 01, Nekemte 02, Nekemte 03, Nekemte 04, Nekemte 05, Nekemte 07, Dalo, Gari, Jiregna and Negassa kebele, respectively. There was no statistically significant difference ($p>0.05$) between the above mentioned areas. The prevalence of bovine fasciolosis was higher in young age group animals 67(19.36%) than adult animals 57(13.13%), with no statistically significant difference ($p>0.05$) between them. Prevalence of 19.26, 16.13 and 12.45% were observed in animals of poor, medium and good body conditions, respectively. The difference between the prevalence of bovine fasciolosis in animal of different body conditions was statistically significant ($p<0.05$). While, no significant association was found between prevalence of bovine fasciolosis in local breed (16.13%) and cross breed (12.73%). The Prevalence of fasciolosis was 15.95% in females and 15.79% in males, with no statistically significant difference ($p>0.05$) between the sex groups.

Keys words: Bovine Fasciolosis · Nekemte Veterinary Clinic · Prevalence

INTRODUCTION

In the varied agro climatic zone of Ethiopia, ruminant livestock are important sources of income for rural and urban communities and are one of the nation major sources of foreign currency from export. Current estimate shows that there are 47.6 million heads of cattle, 47.6 million small ruminants [1]. Estimates indicate that ruminants contribute 80% of total food production from live stock in tropical Africa and it has been estimated that ruminants supply 3.2 million tones of meat per year representing 72% of the total meat production [2].

Ethiopia is believed to have the largest livestock population in Africa, yet it produces insufficient animal protein and other livestock products to meet the demand of fast growing human population. The contribution of livestock industry to the national economy is considerably less than its tremendous potential. Among many constraints that made the livestock sector marginal is due to prevalent of different diseases, malnutrition and management constraints [3].

Parasites inflict harm to animals due to their pathogenesis sharing nutrients and by predisposing them to other diseases. Of the prevailing disease of the country trematodes are one of the main parasitic problems of cattle and other ruminants with potentially zoometric effect [4]. *Fasciola* is commonly recognized as liver flukes and they are responsible for wide spread of morbidity and mortality in cattle characterized by weight loss, anemia and hyoproteinemia. The most important species, *Fasciola hepatica* found in temperate area and in cooler areas of high altitude in tropics and sub tropics and *Fasciola gigantica,* which predominates in tropical area [5].

Fasciolosis is more apparent in young cattle and is usually chronic in nature. Adult flukes in the bile ducts cause inflammation, bilary obstruction, destruction of liver

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tissue and anemia. In this regard the immature and adult flukes greatly affect the growth rate and feed conversion of young animals. In cows there may be drop in milk production and reduction in conception and pregnancy rate [6].

Diagnosis is based primarily on clinical signs and seasonal occurrence in endemic areas and previous examination, examination of eggs and post mortem inspection of liver flukes are useful. Coprogical analysis is commonly employed to diagnose bovine fasciolosis despite the fact that egg cannot be detected until after the latent period of infection when much of the liver damage has already occurred [7].

Prevalence of fasciolosis in many part of Africa including Ethiopia has been determined mainly at slaughter, but at the veterinary clinic in the live animals there is scarcity of information on its prevalence. Therefore, the objective of the study was to determine the prevalence of bovine fasciolosis in Nekemte veterinary clinic.

MATERIALS AND METHODS

Description of the Study Area: The study was conducted at Nekemte Veterinary clinic. The study was covered ten peasants Association namely: Nekemte 01, Nekemte 02, Nekemte 03, Nekemte 04, Nekemte 05, Nekemte 07, Gari, Dalo Comto, Jiregna and Negassa. Nekemte is found in East wollega zone, Oromia regional state, Ethiopia. It is located at 331 km west of Addis Ababa at a latitude and longitude of 95°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 2150mm and 15 to 27c°, respectively [1].

Study Population: It comprised of cattle coming to Nekemte veterinary clinic. Both sexes, all age groups, local and cross breeds were included in the study population.

Study Design: A cross sectional study was conducted to determine the prevalence of bovine fasciolosis at Nekemte veterinary clinic.

Sample Size and Sampling Methods: The sampling method applied was simple random sampling. To determine the sample size, an expected prevalence of 50% was taken into consideration. The desired sample size for the study was calculated using the formula given by Thursfield [8] with 95% confidence interval and 5% absolute precision.

$$n = \frac{1.896^2 . Pexp\ (1 - Pexp)}{d^2}$$

Where
n = required sample size
Pexp = expected prevalence = 50%
d = desired absolute precision = 5%
Hence, d = 0.05 and p = 0.5 (50%)

Accordingly 384 animals were supposed to be sampled but in order to increase the precession a total of 780 study animals were used.

Study Methodology

Coprological Examination: Coprological examination was conducted on fecal samples collected directly from the rectum of each animals and freshly defected feces into a universal bottle and then labeled with appropriate code and examined for liver fluke eggs. Sedimentation technique was used to detect the presence or absence of fluke eggs in the fecal sample collected as described by Atonia *et al*. [9]. Samples that were not processed within 24 hours were stored in a refrigerator at 4c°[10]. Based on their body condition score, animals can be classified as good, medium and poor body conditioned animals [11].

Data Analysis: Data collected from the field were coded and entered in to micro soft 2007 excel spread sheet. Descriptive statistics were used to calculate the percentages of the cattle in each kebeles. Data analysis was performed by using STATA version 11.0. Chi-square(x^2) test was used to compare the different risk factors like: sex, age, body condition score, origin of the animal and season. 95% CI and $p<0.05$ was used for its significance.

RESULTS

Prevalence of Bovine Fasciolosis Based on Fecal Sample: The present study showed that from a total of 780 cattle examined, 124 were found positive with an overall prevalence of 15.90 %. There was variation in prevalence of fasciolosis based on origin of animals. However, there was no statistically significant difference ($p>0.05$) among the different localities (peasant association) studied (Table 1).

Table 1: Prevalence of bovine fasciolosis by study sites

Peasant Associations	No.of animal examined	No.of positive animals	Prevalence (%)	95% CI	p-value
Nekemte 01	72	14	19.44	-	-
Nekemte 02	75	9	12	.7134728-4.391628	0.218
Nekemte 03	66	8	12.12	.6823515-4.488156	0.244
Nekemte 04	74	11	14.86	.5812086-3.288242	0.464
Nekemte 05	23	2	8.7	.53076861-2.12045	0.244
Nekemte 07	62	9	14.52	.5684762-3.554304	0.452
Dalo kebele	109	14	12.84	.7289401-3.680437	0.232
Gari kebele	129	20	15.5	.619163-2-2.79504	0.476
Jiregnakebele	68	15	22.06	.03763671-1.93267	0.703
Negesakebele	102	22	21.57	.4144087-1.859113	0.733
Total	780	124	15.90		

Table 2: Prevalence of bovine fasciolosis based on sex

Sex	No.of animal examined	No.of positive animals	Prevalence (%)	95% CI	P-value
Female	514	82	15.95	-	-
Male	266	42	15.79	.6749387-1.518425	0.953
Total	780	124	15.90		

Table 3: Prevalence of bovine fasciolosis based on age groups

Age group	No.of animal examined	Noof positive animals	Prevalence (%)	95% CI	p-value
Young	346	67	19.36	-	-
Adult	434	57	13.13	.9902566-2.182993	0.056
Total	780	124	15.90		

Table 4: Prevalence of bovine fasciolosis based on body condition scores

Body condition	No.of animal examined	No.of animal positive	Prevalence	(%) 95%CI	P-value
Good	57	32	12.45	-	-
Medium	279	45	16.13	.4536266 -1.205711	0.226
Poor	244	47	19.26	.3658539 - 0.9713236	0.038
Total	780	124	15.9		

Table 5: Prevalence of bovine fasciolosis based on the study months

Months	No.of animal examined	No.of positive animals	Prevalence (%)	95%CI	p-value
November	159	25	15.72	-	-
December	153	20	13.07	.6574464-2.34128	0.506
January	169	22	13.02	.671326-2.31486	0.485
February	146	24	16.44	5145569-1.747971	0.865
March	153	33	21.57	.3817135-1.205778	0.186
Total	780	124	15.90		

Table 6: Prevalence of bovine fasciolosis based on breed

Breed	No.of animal examined	No.of positive animals	Prevalence (%)	95% CI	P-value
Local	725	117	16.14	-	-
Cross	55	7	12.73	.3346805-1.716005	0.506
Total	780	124	15.90		

Based on sex; the prevalence of *Fasciola* eggs in female cattle was 82 (15.95%) and in male cattle was 42(15.79%) but, there was no significant difference ($p>0.05$) as indicated in Table 2.

The age of animals with respect to infection was compared and 67(19.36%) of young and 57(13.13%) adult animals were positive for *Fasciola* eggs, respectively. However, there was no significant difference ($p>0.05$) between the two age groups (Table 3).

The prevalence of fasciolosis in relation to the body condition score was 32(12.45%) in good 45(16.13%) in medium and 47(19.26%) in poor body conditions. There was statistically difference ($p<0.05$) between examined animals based on body condition score (Table 4).

There was also variation in prevalence of fasciolosis between study months. The prevalence identified was 25(15.72%) in November, 20(13.07%) in December, 22(13.02%) in January, 24(16.44%) in February and 33(21.57%) in March. There was no significant difference (p>0.05) between each month of the study periods (Table 5).

The infection rate of bovine fasciolosis on the basis of breed showed no significant difference (p>0.05) (Table 6).

DISCUSSION

The present study showed the overall prevalence of bovine fasciolosis (15.90%) and it was in close agreement with the report of Mulat *et al.* [12] from North West Ethiopia, who reported 19.5% prevalence. However, it was much higher than that of many other studies from different veterinary clinics in the country and elsewhere in Africa. Fufa *et al.* [13] reported 4.9% prevalence of fasciolosis in feces of cattle at soddo and kombolcha clinics while Ibrahim *et al*. [14] recorded a prevalence of 12.4% at kombolcha veterinary clinics. These differences might be come from the techniques used for sample collection, storage and processing of fecal materials.

The result of the present coprological examination was very low from the finding of Haymanot [15], which reported 42.90% in Eastern Hararghe administrative region. High prevalence of bovine fasciolosis had been also reported by other researchers such as Bahru and Ephraim [16] in Kaffa 86%, Yadeta [17] in western showa 82.5%, Dagne [18] in and around Debre Berhan 80%, Fekadu [19] around Bahir Dar 60.2% and Wondwossen [20] in Arsi administrative region 53.72%. However, the present prevalence was lower when compared with the above reports and this might be due to the expansion of animals' health post at peasant association level and the intervention of nearby private veterinary drug shop and pharmacies. These differences within the country were attributed mainly due to different factors like favorable areas for intermediate host (presence of pond), variation in the ecological and climatic conditions such as altitude, rainfall, temperature and differences in the livestock management. This study was conducted in a period known to be dry season in Ethiopia. However, the prevalence observed was considerable and reflected existence of suitable ecological condition in the area of the origin of the study animals for the snail breeding and development of larval stages within the snail intermediate host throughout the year regardless of the season. The present study revealed lesser prevalence that might be due to awareness of cattle owners and wide use of anthelmintics [21].

In the present study area, prevalence of bovine fasciolosis was compared based on the origin of animals. The study revealed prevalence of 14(19.44%) in Nekemte 01, 9(12.00%) in Nekemte 02, 8(12.12%) in Nekemte 03, 11(14.86%) in Nekemte 04, 2(8.70%) in Nekemte 05, 9 (14.52%) in Nekemte 07, 14 (12.84%) in Dalo, 20 (15.50%) in Gari, 15 (22.06%) in Jiregna and 22 (21.57%) in Negasa. This variation mainly attributed to the variation in climatic and ecological conditions such as altitude, rain fall, presence of marshy areas and temperature and management system of livestock [22].

The infection rate was analyzed on the basis of sex and showed little difference between female (15.95%) and male (15.79%). This justifies the fact that cows are less resistant to infection with fasciolosis due to milk yield during lactation time there may be lost that predispose them in to compromization of their immunity and also most people traditionally feed their lactating cows by collecting grasses that are grown around rivers and marshy areas during dry season for the sake of getting high milk yield from cows [23].

The result of the present study revealed that the sex of the animal had no significant effect (p>0.05) on the occurrence of bovine fasciolosis. This agreed with the report of Rahamato *et al.* [24] who concluded that sex had no impact on the infection rate and hence both male and female were equally susceptible and exposed to fasciolosis. But this contradicted with the work of Balock and Arthur [25] who reported that the effect of sex on the prevalence of bovine fasciolosis might be attributed to management system, with longer exposure of male out door when females are kept in door at beginning of lactation.

The prevalence was higher in poor body conditioned animals than that of medium and good body conditioned animals. A significant variation was observed in the prevalence of fasciolosis among body condition scores. This expressed the importance of fasciolosis in causing weight loss and it should be considered a cause of loss of body condition [26].

The monthly variation in the prevalence of fasciolosis had been studied for five months in the study area. It was difficult to indicate the effect of seasonal variation on the prevalence of bovine fasciolosis since the study period was too short without incorporating wet month of the season. In this study high infection rate (21.57%) was encountered in March while lower infection (13.02%) in January and there was no significant difference (p>0.05) between each months/seasons.

CONCLUSION AND RECOMMENDATIONS

The present study conducted on bovine fasciolosis at Nekemte veterinary clinic revealed a prevalence of (15.90%). The levels of infection in this study suggested that there is an existence of favorable climatic conditions throughout the year for the development and survival of the parasites and their intermediate hosts in the area of origin of study animals.

Based on the above conclusion the following recommendations are forwarded:

- Strategic application of fluckicide and avoiding animals grazing from marshy land plays considerable success for the control of fasciolosis in these study areas.
- Detailed studies should be conducted on epidemiology of the disease in order to expand and implement disease investigation and control strategy.
- Integrating control approach using Triclabendazole that is effective against mature and immature parasites control should be conducted to more minimize magnitude of the problem.

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