African Journal of Basic & Applied Sciences 6 (2): 37-42, 2014
ISSN 2079-2034

DOI: 10.5829/idosi.ajbas.2014.6.2.85186

Study on the Prevalence of Bovine Fasciolosis at Aira and Gulliso District, Western Wollega Zone, Oromia Regional State, Western Ethiopia

[1]Debela Abdeta, [1]Tadesse Birhanu, [1]Mezene Woyessa and [2]Chali Deressa

[1]Wollega University, School of Veterinary Medicine, P.O. Box: 395, Nekemte, Ethiopia
[2]Aira District Animal Health Expert, Aira, Ethiopia

Abstract: A cross-sectional study was conducted from April to September 2013 to determine the prevalence of bovine fasciolosis and assess the risk factors associated with the disease at Aira and Gullisso districts. Out of 384 randomly selected local cattle breed examined by fecal examination, 48(12.5%) animals were found to be positive for fasciolosis. The prevalence of fasciolosis in different age groups showed that 16.98%(n=106) for <2 years, 11.85%(n=135) for 2-4 years and 9.8%(n=143) for >4 years, respectively, while prevalence based on sex revealed 13.7%(n=211) for female and 10.98%(n=173) for male, respectively. Origin wise prevalence indicated that 13.02 % (n=192) for Aira and 11.98 % (n=192) for Gullisso, whereas body condition score revealed that 6.4% (n=140) for good, 14.65 % (n=116) for medium and 17.2 % (n=128) for poor body condition, respectively. The prevalence of bovine fasciolosis among the assessed risk factors was statistically significant ($P<0.05$). The disease was prevalent in the area and thus, effective prevention and control strategies should be designed and applied.

Key words: Bovine · Fasciolosis · Prevalence

INTRODUCTION

Ethiopia, located in the horn of Africa between latitude 30° North to 15° North of the equator and the longitude from 33° East and 48° East is agrarian country with a total land area of 1,101,000 km^2 the proportion of a total population in agriculture sector is 82.4% [1]. The agricultural sector is characterized largely by mixed farming system in which livestock play the vital role in the farming system of the country by giving draft power supply for crop production, as a source of meat, milk and cash income [2]. According to Central Statistical Authority (CSA) [3] estimate, the livestock population was about 30 million heads of cattle, 24 million sheep, 18 million goats, 7 million equines, 1.25 million swine and 55.6 million poultry. Upon this, the livestock contributed 15% of the Gross Domestic Product.

The cattle constitute the major proportion of Ethiopian livestock resources. They provide more than 30% of local meat consumption and generate cash in come from export of meat and live animals. They also contribute to the self sufficiency of resources for poor farmers by providing milk, meat, manure and direct cash income [4]. Large animal production of Ethiopia however is constrained by a number of factors including malnutrition, disease, improper health care and other managerial problem [5]. Among the disease constraints parasitic disease is the major problem in livestock industry. Of these, fasciolosis is a major disease, which imposes direct and indirect economic impact on livestock production particularly of sheep and cattle. It also causes public health significance [6, 7]. In general, infection of domestic ruminants with *Fasciola hepatica* and *Fasciola gigantica* causes significant economic loss estimated of over USD 200 million per annum to the agricultural sector worldwide, with over 600 million animals infected. More recently, Tolasa and Tigre [8] and Fufa *et al.* [9] have reported financial losses of 6300 USD and 4000 USD per annum, respectively, due to liver condemnation at slaughter houses.

Generally, the distribution of fasciolosis is worldwide. However, the distribution of *Fasciola hepatica* is limited to temperate areas and high lands of tropical and subtropical regions [8] whereas *Fasciola gigantica* is

Corresponding Author: Debela Abdeta, Wollega University, School of Veterinary Medicine, P.O. Box: 395, Nekemte, Ethiopia. Tel: +251913125925.

found primarily in tropical regions [10]. In Ethiopia, bovine fasciolosis exists in almost all regions [11, 12] and its prevalence has shown to range from 11.5% to 87% [13]. The economic losses due to fasciolosis are attributed to mortality, morbidity, reduced growth rate, condemnation of liver, increased susceptibility to secondary infection and the expenses of control measures [13]. Different researchers so far conducted and reported variable prevalence rate of bovine fasciolosis in different localities of the country [14]. Even though the disease is highly prevalent in the western Ethiopia, there was lack of well documented information on this regard in the study area. Thus, the study was designed to determine the prevalence and assess associated potential risk factors.

MATERIALS AND METHODS

Description of the Study Area: The present study was conducted at Aira and Gulliso districts that located west of Addis Ababa in west Wollega zone, Oromia regional sate, Ethiopia.

The two woreda's are formerly named as a single woreda ayira gulliso. Agro ecologically the Woreda's are categorized as 85% mid land and 15% low land, with high 28°C and low 10°C temperature. The mean annual rain fall of the woreda's are 1000mm- 2000mm and the altitude is range from 1500-1750 masl. The agricultural system of the study area is characterized by mixed farming system with extensive livestock production system. The major species of livestock reared in the area are cattle, sheep, Goat, mule, horse, donkey and poultry. The total livestock population of the Aira woreda is 103,767; among 56,553 bovines, 7829 sheep, 2135 goats, 3338 equines and 33912 chickens, where as that of the Gulliso is 225,791 and includes 52,482 cattle, 82,950 sheep, 15,431 goats, 79 horses, 9,416 donkey, 1,333 mules, 47,265 poultry and 16,835 bee hives. The total human population of Aira woreda is 61,069 in which 26,468 are males and 34,601 are females where as that of Gulliso woreda is 51,738 [15].

Study Animals: The study animals were local zebu breed which varied with origin, age, sex and body condition score.

Study Design: A cross sectional study was conducted from April to September 2013 to determine the prevalence and assess associated potential risk factors of the disease.

Sample Size Determination: Simple random sampling was employed to select the study animals. The sample size was calculated based on the formula given by Thrusfield [16] with 95% confidence interval and at 5% absolute precision by using simple random sampling method. The expected 50% prevalence of the study was considered to calculate the sample size using the following formula.

$$n = \frac{1.96^2 x pexp\ (1\text{-}pexp)}{d^2}$$

$$n = \frac{1.96^2 x 0.5\ (1\text{-}05)}{(0.05)^2}$$

n=384

whereas;
P exp = Expected prevalence
d^2 = Desired absolute precision
n = Required sample size

Thus, 384 study animals were included in the study

Study Methodology: During data collection, the animals were classified based on origin, age, sex and body condition score. Accordingly, the animals considered as old age >4 years, adults, age 2-4years and young age <2 years Cringoli *et al*. [17]. While the body condition status of the animals was assessed according to Nicholson and Butterworth [18] which classified it as poor, medium and good body condition.

Coprological Examination: Fecal samples were collected directly from the rectum of each animal in to plastic bottles with gloved hands and preserved in 10% formalin. Afterwards, the samples were taken to Aira and Gulliso Veterinary Clinic's, so that it could be examined through sedimentation technique to detect-*Fasciola* eggs.

Sedimentation Technique: 3gm of Faecal samples were collected in jars of approximately 50 ml capacity; mixed with 30 ml tap water. The soaked faeces were then mixed with stirrer. The contents of the glass were then allowed to sediment for 3 minutes. The supernatant was slowly discarded and an equal volume of water was added and allowed to sediment for 3 minutes. The supernatant was again slowly discarded. The sediment was stained with

2-3 drops of 1 % methylene blue on the slide and the prepared slide was examined under a low power magnification microscope Boray and Pearson [19]. The majority of trematode eggs are too large and heavy to float reliable in the flotation fluids normally used for nematode eggs. They do however sink rapidly to the bottom of a fecal or water suspension Hansen and Perry, [20]. The examined eggs were seen as operculaed and golden yellow in color.

Data Management and Statistical Analysis: The collected data were entered to Microsoft excel program and analysis was made through statistical software SPSS version 16.0. Descriptive statistics was used to assess association of risk factors with the disease occurrence. The association of fasciolosis rates on the bases of age, sex, body condition and origin were compared by using x^2 –square test and P-value <0.05 were considered to be statistically significant [21].

RESULTS

Overall Prevalence: Of the total 384 animals examined, 48 (12.5%) of the cattle were found to be positive for fasciolosis. The result showed that higher prevalence was observed in age less than 2 years (16.98%), where as relatively least prevalence was recorded in age 2-4 years (9.83%). There was statistically significant difference between the age groups and the occurrence of the disease ($p<0.05$) (Table 1).

The result revealed that the prevalence of bovine fasciolosis was 13.7% in females and 9.83% in males, respectively. There was statistically significant difference between the sex and the occurrence of the disease ($p<0.05$) (Table 2).

The result revealed that higher prevalence of bovine fasciolosis was recorded in poor body condition (17.19 %) and lower prevalence was observed in good body condition (6.42 %), respectively, with strong statistical significant difference between body condition score of the animal and occurrence of the disease ($p=0.00$) (Table 3).

The finding was depicted that slightly higher prevalence of bovine fasciolosis was recorded in Wayyu kolli district (13.02%). There was statistically significant difference between the location of the animal and occurrence of the disease ($p<0.05$) (Table 4).

Table 1: Prevalence of bovine fasciolosis based on age categories

Age	No of animals examined	No of animals positive	Prevalence (%)	P-value	x^2-square
< 2 years	106	18	16.98%		
2-4 years	143	14	9.83%	.001	3.871
> 4 years	135	16	11.85%		
Total	384	48	12.5%		

Table 2: Prevalence of bovine fasciolosis based on sex categories

Sex	No of animals examined	No of animals positive	Prevalence (%)	P-value	x^2-square
Female	211	29	13.74%	.001	3.857
Male	173	19	10.98%		
Total	384	48	12.50%		

Table 3: Prevalence of bovine fasciolosis based on body condition score categories

Body condition	No of animals examined	No of positive cases	Prevalence (%)	P-value	x^2-square
Good	140	9	6.42%		
Medium	116	17	14.65%	.000	3.928
Poor	128	22	17.19%		
Total	384	48	12.50%		

Table 4: Prevalence of bovine fasciolosis based on their origin

Origin	No of animals examined	No of animals positive	Prevalence (%)	P-value	x^2-square
Aira	192	25	13.02%		
Gullisso	192	23	11.98%	.002 3.851	
Total	384	48	12.5%		

DISCUSSION

The overall prevalence of bovine fasciolosis was found to be 12.5% at Aira and Gulliso districts, Western Wollega zone of Ethiopia during the study period. The result of the present study conducted on fecal examination proved that, the prevalence of fasciolosis was found to be 13.02% and 11.98% in Aira and Gullisso districts, respectively. This finding was comparable with the prevalence reported by Daniel [22] and Ibrahim *et al.* [23] which was 14.4% and 12.4%, Kassaye *et al*. 20.3 [24] at Dire Dawa, Kombolcha and Addis Ababa, respectively. However, the result of the study was relatively lower compared to the report of Bahiru and Ephrem [25] (86%) in Keffa, Dagne [26] (80.5%) in and around Debre Berhan, Yadeta [27] (82.5%) in western Shoa and Terefa *et al.* [28] (53.48) in Jimma. The variation in climato-ecological conditions such as altitude, rainfall, temperature, livestock management system and suitability of the environment for survival and distribution of the parasite as well as the intermediate host might have played their own role in such differences.

In this study, higher prevalence of the disease was recorded in animals less than *2* years old 16.98%, followed by those of more than 4 years old, 11.85%. The result indicated that, there was statistical significant difference ($P<0.05$) between age groups of animals. The finding was agreed with the work of Hansen *et al.* [29], Abebe [30] Nekemte, Getu [31] Wolayita, Haimanot [32] Hararge and Parry and Gray [33] in Ireland. This might be associated with the apparent inability of the host to develop acquired immunity so that young animals had the heaviest infections and the highest prevalence. Moreover, adult cattle were likely exposed to frequent attack of fasciolosis and developed acquired resistance; hence they showed lower prevalence of bovine fasciolosis Urquhart *et al*. [34]. Also according to the report of Dwinger *et al*. [35] the animal became resistant as age increased due to liver fibrosis which impeded the passage of immature flukes. However, this was in argument with the work done by Ephrem *et al.* [36] at Asella in which there was no decrease in infection rate as age increase.

In the current study, the result revealed that the prevalence of bovine fasciolosis was 13.7% in females and 10.98% in males with significant statistical difference between them. This was in line with the study of Ephrem *et al.* [36] that showed significant effect of sex on prevalence of bovine fasciolosis. This might be due to female animals had spent most of their time on grazing the pasture, so that they had higher chance of getting infection, besides the stress due to pregnancy and lactation. This result was not agreed with the report of Graber and Dans [37] that, fasciolosis was not a disease directly related to sex of the animal.

In the current study, the higher prevalence of the disease was recorded in Aira (13.02%), followed by Gullisso districts (11.98%). This study explained that, there was statistical significant difference ($P<0.05$) between the woreda. This statistical difference might be due to variety levels of marshy grazing land and use of anthelmintics for treatment of fasciolosis.

In this study, the result revealed that the prevalence of bovine fasciolosis was 17.2%, 14.65% and 6.4% in Poor, medium and good body condition of the animals, respectively. The study indicated that, there was strong statistical significance difference between the body condition scores of animals and disease occurrence ($P=0.00$). This result was in agreement with Ibrahim *et al*. [23] who reported that the disparity of prevalence between different body conditions of animals might be associated with immunity and poorly nourished animals appeared to be less competent in getting rid of infection.

CONCLUSION

This study indicated the prevalence of bovine fasciolosis in the study area during the study period. Among the assessed risk factors; sex, age, body condition score and origin were found to be the associated potential risk factors with the occurrence of the disease. There was paucity of information on control and prevention options of the disease. Hence, effective prevention and control strategies should be designed and applied in the study area.

ACKNOWLEDGEMENTS

The authors would like to thank Wollega University, School of Veterinary Medicine for logistic and material support. Moreover, the animal owners and all individual who render help during study period are highly acknowledged.

REFERENCES

1. Central Statistical Authority (CSA), 2003. Central statistics Authority, number of livestock and poultry in different Regions of Ethiopian. Addis Ababa, Ethiopian.

2. Central Statistical Authority (CSA), 2002. Central statistics Authority, Ethiopian stastical abstract Addis Ababa, Ethiopian.
3. Central Statistical Authority (CSA), 2008. Federal Democratic Republic of Ethiopia, Agricultural Sample Enumeration Statistical Abstract.
4. Baharu, G. and M. Ephrem, 1979. A Preliminary survey of bovine fasciolosis. Apl. Sci., 11: 50-127.
5. Gemechu, J. and G. Mammo, 1979. A survey of fasciolosis in cattle sheep and goats slaughtered at Addis Ababa, Ethiopia. IPB Research Report, 3: 10-11.
6. Keyyu, J., J. Mohrad, N. Kyvsgaard and A. Kassuku, 2005. Epidemiology of fasciola gigantica and Amphistomes in cattle on traditional, small- scale dairy and large-scale dairy farms in the southern high lands of Tanzania. Trop. An. Health Prod., 37: 303-314.
7. Menkir, M., A. Uggla and P. Waller, 2007. Prevalence and seasonal incidence of nematode parasites and fluke infections of sheep and goats in Eastern Ethiopia. Tropical Animal Health and Production, 39(7): 521-531.
8. Tolosa, T. and W. Tigre, 2007. The prevalence and economic significance of bovine fasciolosis at Jimma abattoir, Ethiopia. The International Journal of Veterinary Medicine, 3: 152-155.
9. Fufa, A., A. Loma, M. Bekele and R.R. Alemyehu, 2009. Bovine fasciolosis. Coprological, abattoir survey and its economic impact due to liver condemnation at soddo municipal abattoir, Southern Ethiopia, Trop. Anim. Health. Prod., 42(2): 289-292.
10. Dalton, J.,1999. Fasciolosis. CABI publishing,Willing ford.
11. Benard, L., M. Hezron and D. Esron, 2011. Slaughter stock abattoir survey of carcasses and organ/offal condemnations in Arusha region, Northern Tanzania Tropical Animal Health and Production, 43: 857-864.
12. Yilma, J. and A. Mesfin, 2000. Dry season bovine fasciolosis in North Western part of Ethiopia. Revaue vet. Med., 151(6): 493-500.
13. Malone, J., R. Gommes, J. Hansen, J. Yilma, J. Slingenberg, F sinijders, O. Nachet and E. Ataman, 1998. A geographical information system on the Potential distribution and abundant of fasciola hepatica and F. Gigantica in East Africa Bond on Food and Agriculture Organization Database, Vet. Parasitol., 78: 87-101.
14. Adem, A., 1994. Prevalence of bovine and ovine fasciolosis: A preliminary survey around Ziway region (shewa), DVM thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debrezeit, Ethiopia.
15. West Wollega Agricultural and Rural Development Office (WWARDO), 2007. Statistical report in Livestock population and farm Management practices of East Wollega Administrative Zone.
16. Thrusfield, M., 2005. Veterinary Epidemiology. 3rd U.K Black Well Science Ltd., pp: 182-198.
17. Boray, J.C. and I.G. Pearson, 1960. Aust. Vet. J., 36: 331-337
18. Antonia, M., P. Conceiçao, M. Rute, Durao, H. Isabel, J. Costa and C. Correia, 2002. Evaluation of a simple sedimentation method for diagnosis of bovine fasciolosis. Vet. Parasitol., 105: 337-343.
19. Cringoli, G., L. Rinaldi, V. Musella, V. Veneziano, M. Maurelli, P. Di pietro, M. Frisiello and S. Di Pietro, 2007. Geo-referencing livestock farms as tool for studying cystic echinococcosis epidemiology in cattle and water buffaloes from southern Italy, Geospatial, 2: 105-111.
20. Nicholson, M. and M. Butterworth, 1986. A guide to condition scoring of zebu cattle. ILCA, Addis Ababa (Ethiopia) Rangelands Program, pp: 4-7.
21. Statistical package for social science. Inc. (SPSS), 2007. SPSS for window (version 16.0) Chicago ILLINOS. USA.
22. Daniel, F., 1995. Economic importance of organs condemnation due to fasciolosis and hydatidosis in cattle and sheep slaughtered at Dire Dawa abattoir, DVM thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia.
23. Ibrahim, N., P. Wasihun and T. Tolosa, 2010. Prevalence of bovine Fasciolosis and economic importance due to liver condemnation at kombolcha industrial abattoir, Ethiopia. The International Journal of Veterinary Medicine, 8(2).
24. Kassaye, A., N. Yehualashet, D. Yifat, D. and S. Desie, 2012. Fasciolosis in Slaughtered Cattle in Addis Ababa Abattoir, Hawassa University, Hawassa, Ethiopia, Global Veterinaria, 8(2): 115-118. Ephrem, T., B. Feyisa, M, Shiferaw, 2011. Prevalence of bovine *fasciolosis* and its economic significance in and around Assela. The International Journal of Vet. Medicine, 11(3).
25. Baharu, G. and M. Ephrem, 1979. A Preliminary survey of bovine fasciolosis. Apl. Sci., 11: 50- 127.

26. Dagne, M., 1994. Survey on prevalence and economic significance of bovine fasciolosis at Debre Berhan region. DVM thesis, Faculty of Veterinary Medicine, Addis Ababa, University, Debre Zeit, Ethiopia.
27. Yadeta, B., 1994. Epidemiology of bovine and ovine fasciolosis and distribution of its snail intermediate host in Western Showa. DVM thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia, pp: 35.
28. Terefa, D., A. Wondimu and D. Fekadu, 2012. Prevalence and gross pathological lesions and economic losses of bovine fasciolosis at Jimma Municipal abattoir, Ethiopia. Journal of vet. Medicine and Animal Health, 4: 6-11.
29. Hansen, J. and B. Perry, 1999. The epidimology, diagnosis and control of helminte parasites of rumenint, a handbook, Rome, Food and Agricultural Organization of United Nations, pp: 72.
30. Abebe, M., 1988. Prevalence of bovine fasciolosis and its economic significance in Nekemte Awraja, DVM thesis, Faculty of veterinary Medicine, Addis Ababa University, Debra Zayit, Ethiopia.
31. Getu, D., 1987. A study on the incidence and economic significance of fasciolosis in Wolaita Awraja, DVM thesis Faculty of veterinary Medicine, Addis Ababa University, Debra Zayit, Ethiopia.
32. Hymanot, A., 1990. Preliminary survey of bovine fasciolosis in Eastern Hararge Administrative region, DVM thesis Faculty of veterinary Medicine, Addis AbabaUniversity, Debra Zayit, Ethiopia.
33. Parry, L. and J. Gray, 2000. Strategic dosing scheme for the control of fasciolosis in cattle and sheep in Ireland. Veterinary Parasitological, p: 187-197.
34. Urquhart, G., J. Armour, J. Duncan, A. Dunn and S. Jenning, 1996. Veterinary Parasitology 2nd ed. oxford, Longman Scientific and Technical Press UK, pp: 100-109.
35. Dwinger, R., P. Lericho and G. Kuhne, 1982. Fasciolosis in beef cattle in North West Argentina. Tropical Animal Health under Production, 14(3): 167-171.
36. Ephrem, T., B. Feyisa and M. Shiferaw, 2011. Prevalence of bovine fasciolosis and its economic significance in and around Assela. The international Journal of Vet. Medicine, 11(3).
37. Graber, M. and S. Dan, 1974. Helminthes and helminthiosis of domestic and wild animal of Ethiopia, Bulletin of animal healthy and production in Africa, pp: 57-86.