THE PREVALENCE OF BOVINE FASCIOLOSIS AND ITS ASSOCIATED RISK FACTORS: THE CASE OF BAMBASI MUNICIPAL ABATTOIR

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Abstract: A cross -sectional study on the prevalence of Bovine Fasciolosis and its associated risk factors in the Bambasi Municipal Abattoir from **September 2024 to February 2025.** The study was based on antemortem examinations and postmortem inspection of livers of slaughtered animals at Bambasi municipality Abattoir. In this study, 384 study animals were selected by random systematic sampling techniques for postmortem examination. The overall prevalence of Bovine Fasciolosis in the study was 63 (16.40). The prevalence of Fasciola hepatica was 40(63.49%) which was followed by Fasciola gigantica 15(23.80%) and 8(12.69%) animals were mixed infected. There was a significant difference (P<0.02) in the prevalence of Bovine Fasciolosis within different body condition scores. The highest prevalence (52.38%) was found in animals with poor body condition scores and the lowest prevalence (6.62 %) was found in good body conditioned animals. There was no significant difference (P>0.05) in the prevalence of bovine fasciolosis in different age groups, sex and origin of the animal. In view of the current result, fasciolosis could be considered as a major problem in and surrounding areas as the ecological factors and management conditions are suitable both for the snail intermediate host and the parasite to be maintained. Strategic treatments need to be implemented at appropriate timing with the aim of reducing worm burden from infected animals and preclude pasture contamination. Integrated control approaches involving livestock owners has to be implemented in reducing the population and activity of snail intermediate hosts to enable maximization of long-term returns from such endemic areas.

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1. INTRODUCTION

Ethiopia has the largest livestock herd in subsaharan Africa, with an estimated cattle population of 52 million, sheep population of 25.5 million and goat population of nearly 24 million. Cattles are the most economically important livestock species with high estimated population and the majorities are indigenous zebu breed. In spite of the presence of huge number of ruminant populations, Ethiopia fails to optimally exploit these resources due to a number of factors such as recurrent drought, infrastructures problem, rampant animal diseases, poor nutrition, poor husbandry practices, and shortage of trained man power and lack of government policies for disease prevention and control (ILRI, 2009).

Among many parasitic problems of farm animals, Fascioliasis is a major disease, which imposes direct and indirect economic impact on livestock production, particularly of sheep and cattle (Menkir *et al*., 2007). Bovine fasciolosis is an economically important parasite disease of cattle which can imposes direct and indirect economic impact on the livestock production and productivity; particularly of sheep and cattle (Sissay. M, *et al*, 2007).

The two most important species of this genus are *F. hepatica and F.gigantica*. The presence of fasciolosis due to *F. hepatica and F. gigantica* in Ethiopia has long been known and its prevalence and economic significance have been reported by several workers (Tadelle and Worku 2007). Diagnosis is based primarily on the clinical signs and seasonal occurrence in endemic areas but previous examination, hematological tests and examination of feces for fluke eggs are useful. Coprological analysis is still commonly employed to diagnose bovine fasciolosis even though eggs cannot be detected until after the latent period of infection, when much of the liver damage has already occurred (Rokni *et al*. 2003).

The disease is found in vast water lodged and marshy grazing field condition anticipated to be ideal for the propagation and maintenance of high prevalence of fasciolosis. In Ethiopia, the highlands contain pockets of waterlogged marshy areas. These provide suitable habitats year-round for the snail intermediate hosts (Solomon.W and Abebe. W, 2007). Though fasciolosis was reported from different parts of the country by different researchers, there is no available information on the current status of bovine fasciolosis in Bambasi district of Western Benishangul Gumuz region, Ethiopia.

Fasciolosis also known as Fascioliasis, Distomatosis and liver Rot is an important disease of cattle caused by trematodes i.e *Fasciola hepatica* and *Fasciola gigantica* (common liver flukes). This condition of internal parasitism is one of the major problems that lowers the livestock productivity throughout the world (Vercruysse and Claerebont, 2001). The significance of helminth infestation has been increased many folds in developing countries. The disease is of paramount importance due to its broad distribution and definite hosts (Rondelaud *et al*., 2001). It causes acute and chronic infections (Sampaio Silva *et al*., 1996). The disease in predominantly caused by *F. hepatica* and / or *F. gigantic*a (Soulsby, 1987).

The common liver fluke, *F. hepatica* is a trematode and widely distributed throughout the world. It occurs chiefly in cattle, sheep, goats, buffalos and may affect man / other species. The mature flukes live in the bile ducts and immature live in the parenchyma of the liver, very rarely in other organs. They are flat and mostly resemble a laurel leaf in outline. The adult are 18-30 mm long and 4- 13 mm broad appearing dirty grey to brownish in colour. Eggs are excreted through feces and require snail as intermediate host that lives mainly in water. The parasites pass through different stages in snail before attaching themselves in the form of cysts to the ground vegetation. Thereon it is taken up by the host during grazing. Cyst wall is dissolved in the gastrointestinal tract of the host and the young fluke emerges. It penetrates and passes through intestines into the liver. Spends 6-8 weeks drifting in the liver and then settles down in the bile duct. In the host the total period of development i.e. from swallowing of the cysts to develop into sexually mature parasite is 2 ½ - 3 months. Most of the above description is also applicable to *F. gigantica*, another species of liver fluke, which is restricted to certain areas, mainly in tropical areas. Under certain circumstances it may cause severe damage to the liver. In adult cattle, the infection usually takes a chronic course, with no obvious clinical signs. Significant production losses occur in the herds having a prevalence of *F. hepatica* infection of 25 % or above (Vercruysse and Claerebout, 2001).

High prevalence of *F. hepatica* infection has been reported in dairy cattle in many countries (Mezo *et al*., 2008). Acute Fasciolosis causes huge economic loses as directly or indirectly in terms of anemia due to its ability to suck blood to the extent of 0.2-0.5 ml per day and decrease in the total proteins especially albumin (Mezo *et al*., 2008) while chronic diseases can reduce growth rate, wool production and feed conservation rate. Chronic Fascioliasis causes a chronic inflammation of the liver and bile ducts accompanied by loss of condition, digestive disturbances and a general reduction in productivity. Very few studies on their effects on milk production have been carried out and the results have not been consistent. Therefore, the objective of this study were to determine the prevalence of Bovine Fasciolosis in Bambasi Municipal Abattoir and to determine the associated risk factors.

2. METHODOLOGY

2.1 Description of the Study area

Bambasi district is one of the districts found in BenishangulGumuz Regional State underAssosa zone. The district is located at 616km on the main road from Addis Ababa to the regional capital, Assosa town and 45km in the north east direction of Assosa town. The geographical location of the study area is depicted using figure 1. The study was conducted from November to January 30, 2025 in Bambasi district of Asossa zone. The study was conducted in Bambasi local slaughter house. Bambasi district has 38 kebeles stretches over an area of 2210.16 k.m.square with human population of 62693. The region is found in the north west of the country between latitude of 9 and 110 N and longitude of 34 and 350 E and its altitude range is 1500-1900 meter above sea level. Annual rain fall is between 1350-1400 mm with uni modal type of rain fall that occurs between April and October. Annual temperature ranges between 21^0c - 35^0 c. The livelihood of the society largely depends on mixed livestock and crop production having livestock population of 36,735 Cattle, 10732 Goat, 3739 Sheep, 4467 Equines, 41438 Poultry and 23423 beehives (CSA,2015).

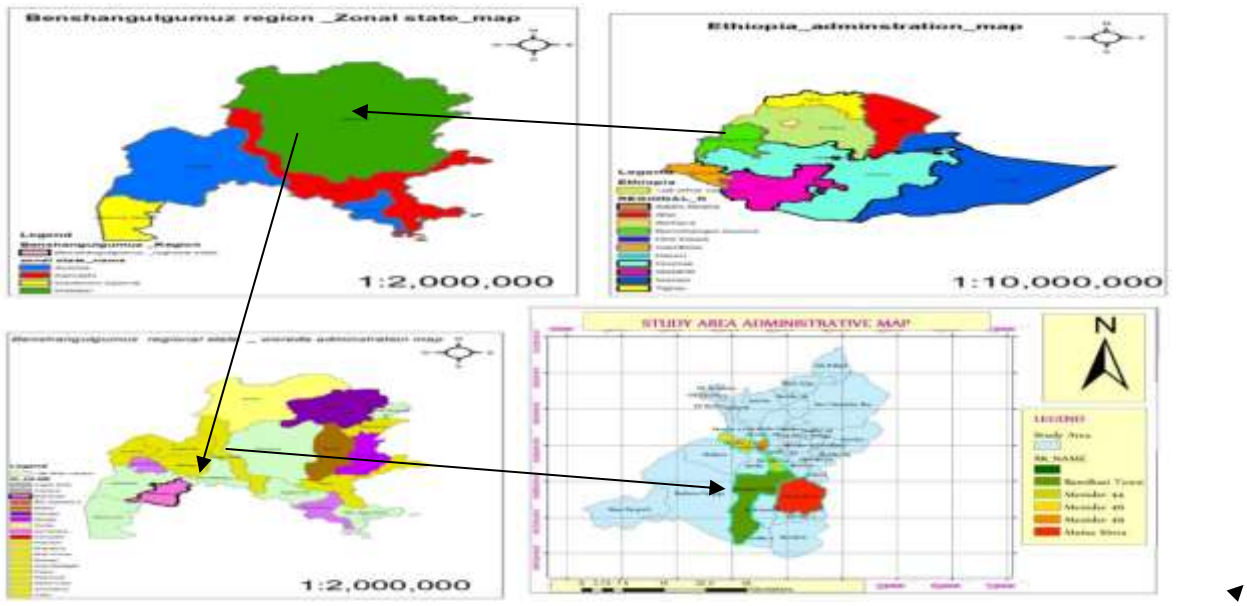

Figure 1: Administrative Map of Bambasi district

2.2 Study population

The study was undertaken on both sexes of local breeds of cattle and on some exotic breeds brought from different agro ecologic zones of Ethiopia that was slaughtered at Bambasi municipality abattoir. Most of cattle's slaughtered at the abattoir was adult males of local breeds. A few exotic females was culled due to old age, poor performance and reproductive problems was also slaughtered.

2.3 Research Design

A cross sectional study was performed to assess the characteristics of fasciolosis (*F.gigantica, F. hepatica*) in red offals like liver in Bambasi municipality abattoir through meat inspection conducted on 384 samples during the study period from September 2024 to Febuarary , 2025.

2.4 Sampling Method and Size Determination

Simple random sampling method was employed for selecting animals from cattle slaughtered in Bambasi Municipal Abattoir during the study period. To calculate the total sample size, the following parameters was used: a 5% desired level of precision at 95% confidence level, and 50% expected prevalence of Bovine fasciolosis among cattle in the study area since there was no previous work in the study area, and the formula given by Thrusfield (2007) was used for determining the sample size. Therefore, the total sample size for this study was calculated as follows:

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

Where: n = the total sample size

P = expected prevalence (50%)

d= desired absolute precision (0.05) at 95% CI

$$n = \frac{(1.96) \times (1.96) \times (0.5) \times (1-0.5)}{(0.05) \times (0.05)} = 384$$

Therefore to isolate bovine fasciolosis a total of (n= 384) samples was taken.

2.5 Data collection procedures

2.5.1 Antemortem Inspection

Ante-mortem examination was conducted on randomly selected 384 cattle for the presence of disease or abnormality before they were slaughtered. Age, sex, breed, and body condition of each randomly selected animal was assessed and recorded. The animals was slaughtered and checked for the presence of Fasciola.

2.5.2 Post-mortem examination

By postmortem examination, Liver was inspected for the presence of Fasciola parasite applying the routine meat inspection procedures. Each mature fluke was identified to species level according to its shape and size. Investigation and identification of Fasciola was done according to their distinct morphological characteristics following the standard guidelines given by Urquhart *et al*. (1996).

The post mortem inspection was carried out according to the guideline by Ministry of Agriculture (MoA, 2011). The examination was conducted through visualization, palpation and two longitudinal ventral incision of the liver, longitudinal incision of the heart from base to apex; visual examination, palpation and incision of liver and kidneys. Findings was registered according to the organs inspected. During post mortem inspection procedure was conducted on organs namely lung, liver, heart, kidney and spleen involving visualization and palpation to detect the presence of *fascioloa spp*. Number of Fasciola that was found per organ and per animal was registered. Further laboratory examination was carried out in the Veterinary Parasitology Laboratory of the Asossa Regional Veterinary Laboratory and the fasciola and fascioloa egg was transported using ice box to identify the type of fasciola (F. hepatica and F. gigantica) and the burden of the parasite in the liver was assessed (MoA, 2011).

2.6 Questionnaire survey on Bovine Fasciolosis

Questionnaire survey on Bovine Fasciolosis occurrence and its associated factors was administered on 384 respondents of animal owner from Bambasi town. The predisposing factors of Fasciolosis such as age, sex, breed, religion, occupation, educational levels (illiterate, primary school, secondary school, preparatory stage, college and university), habit of raw meat consumption, presence and usage of sanitary facilities and hygienic practices and knowledge of Fasciolosis was assessed. Following detailed discussion on the objectives of the study with each participant, the interview was conducted face to face.

DATA ANALYSIS

All raw data collected from this study was recorded and entered in Micro Soft Excel spread sheet for analysis; STATA version 12 software was used. Descriptive statistics was used to determine the prevalence of the parasite and Chi-square ($\chi 2$) test was used to assess the association of the prevalence of fasciolosis and its associated risk factors such as sex, age, breed, and body condition score of the animals. In all of the statistical analysis, a confidence level of 95% is used and P-value of less than 0.05 (at 5% level of significance) was considered as statistically significant.

4. Ethical Considerations

This protocol was presented for initial and continuing review and approval by JUCAVM Institutional ethical review board. Any changes to the protocol or consent form will be approved by all ethics committees. Since the study involves domestic animals subject, the ethical approval for the study will be obtained from Ethical Research Board (ERB) of the JUCAVM for domestic animal.

5.Result

5.1 Post mortem examination

A total of 384 local cattle breeds that were slaughtered at Bambasi town municipal abattoir were examined for the presence of fasciolosis. Among the examined animals, 63 (16.40%) were positive for fasciolosis. Out of 63 livers positive for fasciolosis, 15 livers (23.80%) harbored F. gigantica, 40 (63.49%) harbored F. hepatica and the remaining 8 livers (12.69%) harbored mixed infection of Fasciola (Table 1).

Table 1: Prevalence of Fasciolosis in Slaughtered Cattle at Bambasi Municipal Abattoir during Study Periods

Species of hepatica	No. positive	prevalence	Chi2	P value
F.hepatica	40	63.49%	3.75	0.05
F. Gigantica	15	23.80%	10.00	0.002
Mixed infection	8	12.69%		
Total	63	100		

5.2 Ante mortem examination

As viewed in Table 2, among 384 cattle examined at Bambasi municipal abattoir, 345 were male, from these, 54 (15.65%) were positive for fasciolosis and 39 of them were females which showed 9 (23.07) prevalence of fasciolosis. There was no statistically between female and male animal (P>0.05).

There was a statistically no significant difference (P>0.05) in the prevalence of bovine fasciolosis in different age groups. Out of 121, 122, and 141 cattle examined in Bambasi, keshmando, Oromiya neigbourng areas and there was no significant difference in the prevalence of fasciolosis among origin areas. 16.96 % of bovine fasciolosis was recorded in local breeds and 13.20% of bovine fasciolosis of cross breed was investigated in the Bambasi abattoir house, which was not significatly associated (P>0.05).

27(22.31%), 16(13.11%) and 20(14.18%) were found to be positive for fasciolosis, respectively; in Bambasi, Keshmando and Oromiya areas. Among three different origins, no significant difference (p > 0.05) in the prevalence of bovine fasciolosis was observed. There was significant difference (P<0.02) in the prevalence of bovine fasciolosis within different body condition scores. The highest prevalence (52.38%) was found in animals with poor body condition scores follwed by medium body conditions and the lowest prevalence (6.62%) was found in good body conditioned animals (Table 2).

Table 2. Prevalence of Fasciolosis in Considered Risk Factors at live animals

Factors	Categries	No. examined	Positive(%)	CHI2	P value
Sex	male	345	54(15.65)	1.40	0.23
	female	39	9(23.07)		
Age	Young	41	6(14.63)	0.44	0.80
	Adult	297	48(16.16)		
	Old	46	9(19.56)		
Origin areas	Bambasi	121	27(22.31)	4.53	0.103
	keshmando	122	16(13.11)		
	Oromiya area	141	2(1.42)		
BCS	good	136	9(6.62)	3.72	0.02
	medium	227	43(18.94)		
	poor	21	11(52.38)		
Abattoir hygiene	good	332	51(15.36)	1.95	0.16
	poor	52	12(23.07)		
Breed	Local	330	56(16.96)	0.47	0.43
	cross	53	7(13.20)		

6.DISCUSSION

The study revealed an overall prevalence of Bovine *Fasciolosi*s of 16.40% in the study area, which closely aligns with previous research findings and it was closely agreement with the reports of Aragaw *et al*., (2012), Petros *et a*l.,(2013), Yusuf *et al*.,(2016) Gebretsadik *et al*. (2009), Nuraddis *et al*. (2010) and Meshesha M and Tesfaye W (2017) who reported prevalence of 20.3, 21.9, 24.4%, 24.3%, 28% and 30.47, at Addis Ababa Nekemt, Haramaya, Mekelle area, Kombolcha and Hossaina Industrial Abattoir respectively. However, it is much lower than that of many other studies from different abattoirs in the country and elsewhere in Africa. Yilma and Mesfin (2000) reported 90.7% prevalence of fasciolosis in cattle slaughtered at Gondar abattoir, while Tolosa and Tigre (2007)

recorded prevalence of 46.2% at Jimma abattoir. Phiri *et al*. (2005) from Zambia and Pfukenyi and Mukaratirwa (2004) from Zimbabwe reported prevalence of 53.9% and 31.7%, respectively.
The present findings were low as compared to previous findings of Tsegaye *et al*. (2012) reported a prevalence of 41.41% Woreta, while Demssie *et al*. (2012) found 54.5% in Jimma. Additionally, studies conducted Angacha Woreda (Eshetu *et a*l., 2017), the North-East Amhara Region (Ayelign & Alemneh, 2011 and Eastern Shoa, Kuyu District (Mohammed *et al.*, 2018) documented prevalence rates of 40.62 47.10%, and 54.2%, respectively. These similarities are attributed to shared agro-ecological condition across Ethiopia, which provide favorable habitats for the intermediate hosts of Fasciola spp., such snails of the genus Lymnaea. Agrarian practices like communal water sources and irrigation facility transmission, with contaminated pastures and water serving as major infection routes for cattle (Geb & Alemneh, 2015).

On the other hand, a lower prevalence of fasciolosis (14.0%) has been observed in slaughtered cattle at Wolaita Soddo abattoir (Abunna *et al*., 2009). Difference in prevalence among geographical locations is attributed mainly to the variation in the climatic and ecological conditions such as altitude, rainfall and temperature. Fasciola species. Prevalence has been reported to vary over the years mainly due to variation in amount and pattern of rainfall. The result of present study revealed that the sex of the animal has no significant effect ($p > 0.05$) on the occurrence of bovine fasciolosis.
This agrees with the reports of Aregay *et al* (2013) , Petros *et al.*, 2013 and Rahamato *et a*l. (2009) who concluded that sex has no impact on the infection rate and hence both male and female are equally susceptible and exposed to fasciolosis, but contradict with the report Balock and Arthur (1985) who reported that the effect of sex on the prevalence of bovine fasciolosis might be attributed to management system, with longer exposure of male outdoor when females are kept indoor at beginning of lactation.
The results of the present study indicated that body condition of the animal has significant association with the occurrence of fasciolosis ($P<.02$). The prevalence was higher in the poor followed by medium body condition animals than that of good body condition animals. The prevalence of fasciolosis was higher in the animals with poor body condition because this body condition in cattle is manifested when fasciolosis reaches at its chronic stage. This study agrees with the report of Aragaw K *et a*l (2012), Yusuf. M *et al* (2016) and Meshesha M and Tesfaye W (2017) but contradicts with report of Aregay.F *et a*l (2013) who indicated that there was no statistically significant difference between animals having good and poor body condition ($P>0.05$) .
There was no statistically significant difference in the prevalence of fasciolosis between young Adult and old animal ($P>0.05$). This study agrees with the report of Petros *et al* (2013). Postmortem examination on the 63 Fasciola infected livers of current results indicated that the prevalence of F. hepatica (63.49%) was higher than that of F. gigantica (23.80%) and certain proportion of animals (12.69%) harbored mixed infection. Similar study conducted at haramaya indicated that the prevalence of *F. hepatica* (59%) was higher than that of *F. gigantica* (26%) and certain proportion of animals (15.4%) harbored mixed infection reported by Yusuf M *et al* (2016) and the same study at Jimma municipal abattoir reported 60.3% ; of liver harbored *F. hepatica*, 23.85% of liver harbored *F. gigantica* species were recorded by Tolosa and Worku (2007).
The high prevalence of *F. hepatica* may be associated with the presence of favorable ecological biotypes for its snail vector Lymnaea truncatula. In support of the present study, Gebretsadik *et al*. (2009) reported that 56.42% of cattle were infected with *Fasciola hepatica* and 9.17% with *Fasciola gigantica*. However, in another study, Abunna *et al*. (2009) stated that the most common liver fluke species affecting cattle at Wolaita Sodo was Fasciola gigantica. Yilma and Malone (1998) indicated that *Fasciola gigantic*a in Ethiopia is found at altitudes below 1800 meters above sea level. While *Fasciola hepatica* is found at altitude of 1200- 2560 meters above sea level. Mixed infections by both species can be encountered at 1200-1800 meters above sea level. According to Yilma and Malone (1998), such discrepancy is attributed mainly to the variation in climatic and ecological conditions such as altitude, rainfall and temperature as well as livestock management system.

7.CONCLUSION AND RECOMMENDATION

Fasciolosis was found prevalent in the study areas. This was a hindrance to the livestock production by causing remarkable direct or indirect losses in the study areas. The occurrence of bovine fasciolosis in this study suggested that there was the presence of favorable ecological and climatic conditions for the development and survival of the Fasciola species as well as intermediate hosts in the study area. Therefore, Based on the conclusion, the best recommendattions were forwarded;

- Strategic application of fluckicide and avoiding animals grazing from marshy land plays considerable success for the control of fasciolosis in these study areas.

- ❖ Awareness should be created among animalowners about disease prevalence and transmission,
- ❖ Veterinary service should be strenghen to prevent the disease,
- ❖ Agriculture department should initiate actions for control of snail vector,
- ❖ Regular deworming of animals before and after the rainy season,
- ❖ Applications of molluscides are important in the control of intermidiate host.

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