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Prevalence and Associated Risk Factors of Bovine Fasciolosis in and Around Wolkite Town Abattoir, Gurage, Central Ethiopia

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Abstract

A cross sectional study aimed at determining the prevalence and type of common *Fasciola* species in cattle was conducted in and around Wolkite from November 2024- March 2025. The study was based on post-mortem inspection of livers of slaughtered animals at Wolkite municipality abattoir. Out of 384 livers inspected 118 (30.73%) were positive for *Fasciola* species. *F. hepatica* was found to be the most prevalent species in cattle of the study area (56.78%). About 21.18% were positive for *F. gigantica* and 22.04% were harboring mixed infections. In view of the current result, fasciolosis could be considered as a major problem in Wolkite 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.

Keywords: Fasciolosis, Prevalence, Wolkite

1. Introduction

Ethiopia's economic development and efforts to fight poverty depend heavily on livestock. According to the most recent CSA animal population census (2009), Ethiopia is home to more animals than any other country in Africa, including 42 million poultry, 2.5 million camels, 5.8 million equine species, 33 million sheep, 30 million goats, and 52 million cattle. Since animals offer draft power, income for farming communities, a means of investment, and a sizable portion of the nation's foreign currencies, most people depend on them for their everyday necessities. Additionally, animals provide as a source of meat, dairy product and eggs, as well as

a vital cultural resource, a social safety net, a way to save money, and a source of revenue. They also supply crops for production and transportation (DACA, 2006).

However, the economic contribution of the cattle subsector is still unmet and falls short of its potential. Ethiopia's livestock development faces a daunting challenge. Ethiopia clearly has the capacity to boost the output of the livestock subsector. However, in order to boost production, certain constraints need to be addressed. Among the areas that need attention are the delivery of high-quality assistance services, such as extension services, technology development and dissemination, methods to enhance animal nutrition and health, breeding, and marketing, as well as the collection and assessment of baseline data for development planning (Juyal and Single, 2011).

The frequency of cattle diseases is one of the main barriers to Ethiopia's livestock development. Investment in a potentially profitable area of the economy that would increase rural employment, incomes, and aid in the fight against poverty is being hampered by the livestock industry's and commerce's vulnerability to disease outbreaks (Shitaye *et al.,* 2007).

Fasciola, often known as liver flukes, is the digenean Trematode that causes fasciolosis, the most prevalent parasitic infestation that has a direct and indirect impact on cattle output. *F. hepatica* and *F. gigantica* are the two species most commonly identified as the causative agents of fasciolosis in Ethiopia. Fasciola infestations naturally occur in cattle and sheep (Ahmed et al., 2007). In Ethiopia, *F. gigantica* and *F. hepatica* coexist; regions between 1200 and 1800 meters above sea level are known to have mixed infections with both species (Graber, 1978).

Fasciolosis is associated with liver damage and hemorrhage due to migration of flukes through the liver parenchyma. There is also haematophagic activity of the adult flukes and damage to the bile duct mucosa by their cuticular spines due to fluke residence in the bileduct (Taylor *et al.,*2007; Urquhart *et al.,* 1996).Diagnosis of fasciolosis may be established basedon the epidemiology of the disease, observations of clinical signs, and information on grazing history (Kassai, 1999). However, confirmatory diagnosis is based on coproscopic examination inthe laboratory and post-mortem examination of infected animals by the detection of flukes in the liver (Slosse*t al*., 1994). The treatment offasciolosis, should be focused on the juveniles and adult fluke. In general Triclabendazole iseffective against all developing stages over one week old. Moreover reduction of snail population is important measure in the control and prevention strategies (Radostits *et al*., 2007).

The geographic distribution of Fasciola species is dependent on the distribution of suitable species of snails such as Lymnaenatalensis and Lymnaetruncatula, the most common intermediate hosts and usually associated with herds and flocks grazing wet marshy land area. Both Lymnae species are needed for the parasites life cycle to be completed (Brown, 2005).In the Ethiopian highlands, fasciolosis is also major health problem and causes production losses in domestic ruminants. Highland regions of the country contain pockets of water logged marshy areas that provide suitable habitats year round for the snail intermediate hosts (Brook *et al*., 1985). Both *F. hepatica* (high land) and *F.gigantica* (low land) type of liver flukes cause severe losses in Ethiopia where suitable ecological conditions for the growth and multiplication of intermediate host snails are available (Anne and Gary, 2006).

The prevalence of the disease is known to be relatively high causing considerable economic losses in livestock production (Baharu, 1997). The areas around Wolkite and peasant association areas are generally considered as one of the most affected and endemic area of fasciolosis in thecountry region, Veterinary practitioners and animals owners complain of huge annual losses from it. However, there are practically no dependable detailed studies that have been conducted on the prevalence the monthly/seasonal variations in the prevalence rates of the disease

and other related parameters so as to design relevant control strategies that can be implemented against the disease in the area. The information regarding the prevalence and associated risk factors of bovine fasciolosis in Wolkite area is scanty.

Therefore, the aim of this study is to determine the prevalence and associated risk factors of trematode infections identify the fluke burden and species identification in particular positive livers and determination of the liver pathology (Lesion)in cattle owned by smallholder farmers located in and around Wolkite area, south western Ethiopia.

2. Materials and Methods

2.1. Description of the Study Area

The study was conducted in and around Wolkite Municipal abattoir of Gurage Zone, Central Ethiopia, which is located 155 km from the capital city (Addis Ababa). The town has latitude and longitude of 8˚17'N 37˚47'E and an elevation between 1910 and 1935 meters above sea level (GZADD, 2011). The weather condition is hot and humid. The livestock population of the area includes a total of36,516 cattle; 8,442 shoats; 800 horses; 200 mules;3,080 donkey; 53,796 poultry.

2.2. Study Animals and Sampling Technique

Study population comprises of indigenous (local) breed of animals of different age, sex, body conditions and origin category found under the extensive grazing system. In the abattoir study male indigenous animals were provided for slaughter from different localities in the Wolkite, Central part of Ethiopia. Simple random sampling technique was the sampling strategy used to collect all the necessary data from fecal samples and abattoir survey of the study animals.

2.3. Study Design and Sample Size Determination

A cross-sectional investigation of the prevalence of bovine fasciolosis in the six peasant association in and around Wolkite was carried out from November 2024 to November 2025. Since there was no previous study in Wolkite and around peasant association to establish the prevalence, associated risk factors, fluke burden and species identification in of bovine fasciolosis, the sample size was determined by taking the prevalence of 50% and 5% absolute precision fasciolosis using the formula given by (Thrusfield, 2005). Accordingly, 384 animals were supposed to be sampled.

2.4. Abattoir Study

Active abattoir survey was conducted based on cross sectional study during routine meat inspection on randomly selected cattle slaughtered at Wolkite municipal abattoir. During ante mortem examination detail records about the age, sexes, origins and body conditions of the animals were performed. During post-mortem inspection, each liver visually inspected, palpated and incised based on routine meat inspection by (Soulsby, 1986). All livers having *Fasciola* species condemned were registered and flukes were conducted for species identification as described by (Ogurinide and Ogurinide, 1980). Hepatic lesions in *Fasciola* positive livers were further grouped into lightly, moderately and severe affected base on the severity of damage inflicted by the parasite. The task of categorization was performed based on the criteria forwarded by Richard (1993).

2.5. Species Identification

After collecting the flukes in the universal bottle containing 5% formalin as a preservative, *Fasciola* species were easily identified based on morphological characters such as shape, size. They were classified as *Fasciola hepatica* (relatively small sized), *Fasciola gigantica*(relatively large sized and more leaf like), mixed forms (*Fasciola hepatica and Fasciola gigantica*) and undifferentiated or immature forms of *Fasciola* species (Urquhart *et al*.,1996). The types of infection are classified as *Fasciola hepatica, Fasciola gigantica*, mixed

Fasciola species (*Fasciola hepatica, Fasciola gigantica*) and juveniles.

2.6.Body Condition Scoring

Body condition of the study animals was scored based on the criteria set by Mihrete *et al*., (2010) which ranged from 0 to 5. Body condition score 0 stands for cows with the poorest body condition while score 5 for cows with the best condition. All cattle under the study their body condition grouped into three groups poor (score 0-1), medium (score 2-3) and good (score 4-5).

2.7. Statistical Analysis

The recorded data were entered in to Microsoft excel data base system to be analyzed using SPSS version 21 statistical software. Descriptive statistics was computed. Pearson's chi square (X_2) was used to evaluate the association between the prevalence of fasciolosis and different factors. A95% confidence interval and P-value less than0.05 (at 5% level of significance) were considered significant in all analysis.

3. Results

A total of 384 local and cross cattle breeds that slaughtered at Wolkite municipal abattoir were examined for the presence of fasciolosis. Among the examined animals, 118 (30.73%) were positive for fasciolosis. Out of 118 livers positive for fasciolosis, 67 livers (56.78%) harbored *Fasciola hepatica*, 25 (21.18%) harbored *Fasciola gigantica* and the remaining 26 livers(22.04%) harbored mixed infection of *Fasciola*(Table 1).

Table 1:Prevalence of fasciolosis in slaughtered cattle by fluke species

Species of *Fasciola*	**Number of positive livers**	**Prevalence (%)**
F. hepatica	67	56.78
F. gigantica	25	21.18
Mixed infection	26	22.04
Total	**118**	**100**

Out of 119, 142 and 123 cattle examined in Rumuga, Kolakebada and Gassore, 36(25.35%), 31(26.05%) and 51(41.46%) were found to be positive for fasciolosis, respectively. There was statistically significant (P = 0.0074) association in prevalence of fasciolosis among different study location of cattle examined (Table 2). There was a statistically significant difference (p = 0.029) inthe prevalence of bovine fasciolosis between breed groups. The highest 109(32.73%) prevalence was in local breed animals and the lowest 9(17.65%) was found in cross breed animals(Table 2).

As the shown in Table 2, from the total of 370male and 14 female cattle examined, 114 (30.81%) and 4 (28.57%) were positive for fasciolosis, respectively. There was no significant association (p = 0.8585) between prevalence of fasciolosis andsex of study animals. There was a statistically significant difference (p = 0.0015) in the prevalence of bovine fasciolosis in different age groups considered. The highest 19 (54.28%) prevalence was in young animals and the lowest99(28.37%) was found in adult animals. The prevalence of fasciolosis has only significantly associated with body condition of the cattle (p =0.0039).The highest 39(51.31%) prevalence was in poor conditioned animals and the lowest35(54.24%) was found in good conditioned animals.

Table 2:The effect of risk factors on the occurrence of fasciolosis

Risk factors	Examined	Positive	Prevalence	Chi square (X2)	P-value
Origin					
Rumuga	142	36	25.35%	9.678	0.0074
Kolakebada	119	31	26.05%		
Gassore	123	51	41.46%		
Breed					
Local	333	109	32.73%	4.149	0.029
Cross	51	9	17.65%		
Sex					
Male	370	114	30.81%	0.79	0.8585
Female	14	4	28.57%		
Age					
Young	35	19	54.28%	7.62	0.0015
Adult	349	99	28.37%		
Body condition					
Poor	67	35	52.24%	15.7	0.0039
Medium	183	49	26.77%		
Good	134	34	25.37%		

4. Discussion

The overall prevalence of bovine fasciolosis (30.73%) observed in this study is in close agreement with the report of Berhe *et al*., (2009) from northern Ethiopia, who reported a 24.3% prevalence. 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 a 90.7% prevalence of fasciolosis in cattle slaughtered at Gondar abattoir, while Tolosa and Tigre (2007) recorded a prevalence of 46.2% at Jimma abattoir. Phiri*et al*., (2005) from Zambia and Pfukenyi and Mukaratirwa (2004) from Zimbabwe reported 53.9 and 31.7% prevalence, respectively. On the other hand, a lower prevalence of fasciolosis (14.0%) has been observed in slaughtered cattle at WolaitaSoddo abattoir (Abunna*et al*., 2009). However, the prevalence of fasciolosis recorded in this study is higher than that reported in Diredawa municipal abattoir (14.4%)(Daniel, 1995). 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 spp. 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 significant effect ($p < 0.05$) on the occurrence of bovine fasciolosis. This disagrees with the report of Rahamato *et al*., (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 this contradicts with the work of 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 result of present study showed that age hassignificant effect on the prevalence of bovine fasciolosis; being higher in young animals thanthe adult ($p < 0.05$). There was a decrease in infection rate (prevalence) as age increased. This may be due to the result of acquired immunity with age which is manifested by humoral immune response and tissue reaction in bovine liver due to previous challenge. There are some additional reports confirming that the increased resistance against fasciolosis (low

prevalence) with age is most likely related to the high level of tissue reaction seen in bovine liver. Liver fibrosis which impedes the passage of immature flukes acquired thickening, stenosis and calcification of bile ducts, assumed unfavorable site for adult parasites and consequently fasten their expulsion. These are in agreement with experimental study conducted by Radostits *et al.,* (1994) which confirmed the occurrence of higher infection rate in younger animals.

The results of the present study indicated that body condition of the animal has significant association with the occurrence of fasciolosis. The prevalence was higher in poor body conditioned animals than that of medium and good body conditioned 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. Post mortem examination on the 118Fasciola infected livers of current results indicated that the prevalence of *F. hepatica* (56.78%) was higher than that of *F. gigantic* (21.18%). The high prevalence of *F. hepatica* maybe associated with the presence of favorable ecological biotypes for its snail vector *Lymnaea truncatula.*

5. Conclusion and Recommendations

In general fasciolosis was 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, strategic application of fluckicide and avoiding animals grazing from marshy land plays considerable success for the control of fasciolosis in these study areas.

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