

# Study on the prevalence of bovine fasciolosis in hirna and its surroundings, western hararghe, Ethiopia

Girma Y<sup>1\*</sup> and Delelegn M<sup>2</sup><sup>1</sup>Ministry of Agriculture, Addis Ababa, Ethiopia<sup>2</sup>College of Veterinary Medicine, University of Mekele, Mekele, Ethiopia

## Abstract

Fasciolosis, caused by *Fasciola hepatica* and *Fasciola gigantica*, is one of the most prevalent helminthes infections of ruminants in different parts of the district. It is one of the most important parasitic diseases that hamper livestock production in Ethiopia. Fasciolosis in cattle is considered to be of a great economic importance by both species of *Fasciola*. In Ethiopia, there is still a gap for many potential sites of the country and information is not available to review country wide prevalence and economic significance. A cross-sectional study was conducted with the objective of; to determining the prevalence of bovine fasciolosis in Hirna and its surrounding in western Hararghe based on coprological examinations. A total of 384 faecal samples were collected from different sites of the district. The faecal examination shows that out of the examined animals, 75(19.5%) were positive for fasciolosis. Fasciolosis is a common parasitic disease in the study site which are swampy or marshy grazing areas, prevailing favorable condition for the survival of intermediate host, snail. The tenth study site (Awujemijim, Burahisa, Gara-Qufa, Gamachis, Kira-Kufiss, Libu-Dukeb, Kufa-Kass, Oda-Nagaya, Oda-Belina and Reketa-Fura) prevalence rate as determined from faecal examination indicates a higher Libu-Dukeb (37.83%) followed by Oda-Belina (31.25%) and lower in Kufa-Kass (9.09%) and Burahisa (8.33%). Statistical analysis of the coprological result was made on the basis of sex and age. The influence of age on the prevalence of fasciolosis was found nil ( $P > 0.05$ ). The result of the study indicated that sex has significant difference ( $\chi^2 = 8.71$ ,  $P < 0.05$ ) on the prevalence of fasciolosis. Based on selected site prevalence and local factors, appropriate control strategies pertinent to local situation have been designed and forwarded so as to reduce the disease problem on livestock production.

## Introduction

Fasciolosis is one of the most common parasitic diseases of domestic livestock, particular in cattle, sheep, goat and occasionally man. The disease is caused by digenean of the genus *Fasciola* commonly referred to as liver flukes. The two species most commonly implicated as the etiological agents of fasciolosis are *Fasciola hepatica* (*F. hepatica*) and *Fasciola gigantica* (*F. gigantica*). In Europe, Americas and Oceania only *F. hepatica* is a dread, but the distributions of both species overlap in many areas of Africa and Asia [1]. It is one of the most important parasitic diseases that hamper livestock production in Ethiopia [2].

In Ethiopia; Fasciolosis in cattle is considered to be of a great economic importance by both species of *Fasciola*. Major economic losses due to fasciolosis have been described when animals grazing in irrigated system. Areas with seasonally flooded pastures, grazing areas of lake shores, slowly flowing water ways and banks of rivers are favorable environment for breeding of vectors of *Fasciola* [3,4]. Mixed infections by both species of *Fasciola* may occur in areas where the ecology is conducive for replication of snail intermediate host. In Ethiopia *Fasciola hepatica* is widespread in areas with altitude above 1800 to 2000 meters above sea level while *Fasciola gigantica* appears to be the most common species in areas below 1200 meters above sea level. Both species co-exist in areas with altitude ranging between 1200 to 1800 meters above sea level [5].

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

Fasciolosis reduces animal productivity, weight gain, and the production of meat and milk. In addition, it causes moderate icterus, metabolic disorders, and secondary infections due to decrease immunity by chronic fasciolosis and liver condemnation during postmortem inspection in slaughterhouses while the acute fasciolosis may lead to mortalities [7].

Human fasciolosis infection occurs accidentally after ingestion of eggs/larvae while ruminant ingestion of forage containing metacercarial cyst [8]. Ingested parasite lives in hepatic parenchyma or in bile duct, which causing liver hemorrhagic black tunnels [9].

Diagnosis is depending on the history of snail habitats or fasciolosis on the farm, symptoms and seasonal occurrence in endemic areas, postmortem examinations, coprological examinations and blood examination for *Fasciola* eggs [10]. The presence of fasciolosis due to *F. hepatica* and *F. gigantica* at abattoir surveys in some parts of the country has long been known and its prevalence and economic significance have been reported by several workers [11-16]. But there is still a gap for many potential sites of the country and information is not available to review country wide prevalence and economic significance. In the district there is no available data or information's about bovine

\*Correspondence to: Girma Y, Ministry of Agriculture, Addis Ababa, Ethiopia, Tel: 251912906079; E-mail: girmayeshibelay@gmail.com

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Fasciolosis prevalence. Therefore, the objective of the study was to determine coprological prevalence of bovine fasciolosis in the district.

## Material and method

### Study area

The study was conducted in Hirna and its surroundings; Western Hararghe zonal administration in the Oromiya regional state of Ethiopia. This area has a mid-sub tropical weather “weyna dega” and high land temperature type climate “Dega” accounting 57% and 43% of the climate respectively. The mean annual temperature and rain fall ranges between 10 to 34°C and 800 to 1000 ml respectively. The woreda is situated at 370 km east of Addis Ababa, the capital city of Ethiopia. The Altitude ranges from 1700 to 1800 m above sea level. (Hirna District Agricultural office data, 2017) [17].

### Study animals

A total of 384 cattle from the district were subjected to qualitative coproscopic examination to determine the overall prevalence rate in study area. All examined animals were local breed of mixed age and sex groups.

### Study design

A cross sectional study method was conducted by selecting animals randomly to estimate the prevalence of the disease in the area.

### Sampling methods and sample sizes

Simple random sampling method was applied to take the samples and the sample frame was peasant association (PA) found within the district. Ten PAs were randomly selected from the 27 PAs presented in the area. From the selected 10 PA (peasant association) the sample size was calculated by using 50% expected prevalence to get the sample size, because there were no previous prevalence studies in the district. Using Thrusfield [18] formula: accordingly, the minimum sample size needed is 384.

$$n = \frac{(1.96)^2 P_{exp} (1 - P_{exp})}{d^2}$$

Where n = sample size

$P_{exp}$  = expected prevalence taken 50%,

d = desired absolute precision of 95% confidence interval

### Sample collection

From 10 peasant association 384 cattle was selected by using simple random sampling technique based on the animal number proportion of PA (peasant associations). Faecal samples were collected directly from the rectum of each bovine species put in universal bottles and preserved with 5% formalin's, and then it was taken to Hirna provincial veterinary laboratory and examined.

### Coprological Examination /Coproscopy/

There were same laboratory techniques employed, that are direct faecal smear and sedimentation for the detections of *Fasciola* eggs.

### Data analysis

The data collected was entered into Computer Microsoft Excel spread sheet and statistically analysis was carried out by using SPSS Version 20 /for windows/. Categorical variables (Sex, Age and

Area) were expressed in percentage. Prevalence was defined as the proportion of the animals (bovine) positive for fasciolosis by coprological examination to the total of animals examined, which was expressed in percent. The association between each risk factors and the outcome variable were assessed using chi-square ( $\chi^2$ ) test. For all analysis, a p-value of less than 0.05 was taken as significant.

## Result

### Prevalence study on coprological examination

Coprological examination was conducted on 384 bovines to determine the magnitude of fasciolosis, out of examined samples, 75 samples were found positive for fasciolosis with an overall prevalence rate of 19.53% (Table 1). Prevalence variation exists between the PAs in the districts, the highest being at Libudukeb (37.83%) followed by Oda belina (31.25%) Kira kufis (25.49%), Gaumachis (22.22%) Gara-quta (20.93%), Reketa-fura (15.9%), Oda-Negaya (14.28%), Awujemijim (9.38%), Kufa-kass (9.09%), Burashisa (8.33%).

Infection rates between male and female animals were compared. The statistical analysis showed significant difference ( $P < 0.05$ ) that is 13.86% in male and 25.82% in females (Table 2).

Analysis of the prevalence rates on age basis showed no significant difference ( $P > 0.05$ ), 131 (21.37%) were young animals (below 2 years old) and 253 (18.58) Adult animals (above 2 years old) (Table 3).

## Discussion

Bovine fasciolosis exists in almost all regions of Ethiopia. However, the prevalence rate, epidemiology and *Fasciola* species involved vary

**Table 1.** Prevalence of bovine fasciolosis in the 10 Pas (peasant association)

Pas	No. of animal examined	No. of animal positive	Infection rate (%)
Awujemijim	32	3	9.38%
Burashisa	36	3	8.33%
Gara-Qufa	43	9	20.93%
Gamachis	27	6	22.22%
Kira-Kufis	51	13	25.49%
Libu-Dukeb	37	14	37.83%
Kufa-Kass	33	3	9.09%
Oda-Nagaya	49	7	14.28%
Oda-Belina	32	10	31.25%
Reketa-Fura	44	7	15.9%
<b>Total</b>	<b>384</b>	<b>75</b>	<b>19.53%</b>

$\chi^2 = 20.5023$ , p-value = 0.015,  $P < 0.05$ . The prevalence of fasciolosis between the study sites showed significant difference ( $\chi^2 = 20.5023$ ,  $P < 0.05$ ).

**Table 2.** Prevalence of bovine fasciolosis by sex basis

Sex	No. of animals Examine	No. of animals Positive	Infection rates (%)
Male	202	28	13.86%
Female	182	47	25.82%
Total	384	75	19.53%

$\chi^2 = 8.717$ , P-value = 0.003,  $P < 0.05$  (Statistically significant)

**Table 3.** Prevalence of bovine fasciolosis by age

Age group	No. of animals examined	No. of animals positive	Infection rates (%)
Young	131	28	21.37%
Adult	253	47	18.58%
Total	384	74	19.53%

$\chi^2 = 0.4296$ , P-value = 0.512,  $P > 0.05$  (Not significant)

with locality. This is mainly attributed to the variation in the climatic and ecological conditions such as altitude, rain fall, and temperature and management systems of the animals.

The present study indicated that fasciolosis is quite important health problem in bovine in the high lands of Western Hararghe province with an overall prevalence (19.53%). This finding was comparable with some reports from different parts of Ethiopian and nearby east African country with prevalence of 14.0%, 14.4%, 24.3%, 20.3%, 21.9%, 25.2%, 21.5%, 21.6%, 24.4%, 20.3% and 26% in Wolaita Soddo [19], Dire-dawa [20], Mekele [21], Addis Ababa [22], Bishoftu [13], Dessie, [23], Adigrat [24], Nekemte [12], Haramaya [25], Addis Ababa ([26] and Kenya [27], respectively.

In contrast to this study higher prevalence of bovine fasciolosis have been reported by other researchers, such as [28] 57.58% in Jimma municipal abattoir, [29] 33% in Arba Minch, [11] 30% in Areka, [14] 32.3% in Adwa, [30] 28% in Kombolcha, [31] 90.7% in Gondar abattoir, [32] 39.95% in Bahir Dar, [33] 46.2% in Jimma abattoir, [15] 47.1% in Mettu abattoir and [34] 53.7% in Jimma Abattoir. The current findings are also lower prevalence than previous studies from other countries in African with the prevalence of 53.9% from Zambia, 63.8% from Tanzania, 38.5% from Uganda, 31.8% from Zimbabwe and 31.6% from Sudan reported by [35-39] respectively. The results of these studies were relatively higher prevalence in different parts of Ethiopia and other countries than the present study areas and this variation might be attributed to the differences in climatic, ecological conditions and management systems.

However, the present findings showed that higher prevalence than other reports such as [40] 12.5% in [41] 4.9% in Soddo Abattoir and [42] 11.09% in Iran. 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* prevalence has been reported to vary over the years mainly due to variation in amount and pattern of rainfall [14].

Ten of the sampled PAs were having prevalence of 9.38% (Awujemijim), 8.33% (Burahisa), 20.93% (Garaqufa), 22.22% (Gamachis), 25.49% (Kirakufiss), 9.09% (kufakss), 37.835% (Libudukub), 14.28% (Odanagaya), 31.25% (Odabelina) and 15.9% (Reketafura), showed statistically significant difference ( $P < 0.05$ ). This significance difference might be due to marshy areas for long periods during the dry season (i.e. cheefe), having constant flowing rivers along the side of grazing areas, which create a very favorable environment for both the snails intermediate host and the parasites (*Fasciola*) in some sites, unlike others which has no marshy area and rivers along the side of grazing areas.

The prevalence of fasciolosis in the study area suggests the existence of favorable bionomic conditions for the survival, multiplication and spread of intermediate host, snails and the parasite (*fasciola*) in that environment. In Hiran District there are two different areas, marshy and dry areas. The swampy / marshy areas such as cheefe, like Libu-dukub, Oda-belina, Kira-kufits have a capacity of water retention, with annual over flooding of these areas during the rainy season leaves pocket of water of bodies and are mostly marshy areas for long periods during the day season. Such ecological conditions are considered favorable for breeding and survival of the intermediate host snails and the parasite (Urquhart).

There was no statistical difference ( $P > 0.05$ ) in prevalence between young (21.37%) and adult animals (28.58%). This shows that age groups

do not matter for the presence or prevalence of fasciolosis in bovine and hence both age groups are equally susceptible to the diseases as well. On the basis of grazing pattern below 2 years old cattle categorized as under young animals (Kifele). In this study, there is statistically significant variation in prevalence of fasciolosis in bovine of different sex's, male (13.86%) and females (25.82%) were observed statistically ( $p < 0.05$ ). This might be explained by the fact that in the study area the adult male animals above 2 years are not usually allowed to graze in the field or risk areas. Mostly the farmers feed their male animals by tethering around the homes for the purpose of fattening; there by access of infection will be lower compared to females.

Bovine fasciolosis is found widespread in the study area. The disease is moderately severe in villages found in the district where low lying, marshy and slowly flowing rivers area are abundant. In grazing of this area during the dry season, animals searching of good herbage (grasses) acquiring high infection of fasciolosis. Grazing of animals in marshy areas during dry period leads to increasing the prevalence rates of the diseases in the study area.

## Conclusion and recommendations

In this study, the results of coprological examinations from bovine showed that positive for *Fasciola*. Fasciolosis is the most widespread in marshy areas and prevalent parasitic disease affecting the health and productivity of animals with higher prevalence. Based on the above conclusion the following recommendations are suggested;

Strategic anthelmintic treatment with appropriate flukicidal drugs should be practiced two times per year, i.e. after the end of the dry season (April to May) and after the end of the rainy season (September to October) so as to eliminate the fluke burden of the host animals and minimize pasture contamination by reducing faecal egg outputs and thus interrupting the life cycle of the parasite.

Further study should be conducted on epidemiology of the disease, biology and ecology of intermediate host, snails (snail) to implement appropriate control strategies.

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## Conflicts of interest

We declare that there is no any conflict of interest.

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