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Research Article

Prevalence and Financial Losses Associated with Bovine Fasciolosis on Cattle Slaughtered at Masha Municipal Abattoir, South-west Ethiopia

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Abstract

A cross-sectional study was conducted from May to July 2016 to determine the prevalence and its associated financial losses of bovine fasciolosis in cattle slaughtered at Masha municipal abattoir, Sheka Zone, South-West Ethiopia. A total of 270 animals' livers were examined, from which 114 were found positive for liver fluke infection (fasciolosis) with an overall prevalence of 42.2%. The prevalence of fasciolosis has shown variations between animals originating from the four different kebeles. The highest prevalence was 65.15% (n=66) noted in animals originated from Attile kebele, and the least 13.8% (n=72) in cattle from Keja. There was statistically significant difference ($p<0.05$) in prevalence of fasciolosis between cattle originating from the four kebeles. The study has found slightly higher prevalence 45.61% in females (45.6%, n=52) than males (39.7%, n=62). Sex has no statistically significant ($p>0.05$) influence on the prevalence of fasciolosis. The prevalence of fasciolosis was analysed by body condition score (Bcs) and there was significantly ($p<0.05$) higher infection (53.6%) in animals with poor body condition than with good body condition (32.41%). The study shows that prevalence of fasciolosis was 54.31% on adult and 33.11% on older cattle. There was statistically significant difference ($p<0.05$) in prevalence between the two age groups. Based on the prevalence of bovine fasciolosis in the current study, the direct financial loss resulted from livers condemned due to fasciolosis during the 60 days of study period was estimated at 34200 ETB. Likewise, the annual financial loss was extrapolated to be 171000 ETB (5700.65 USD). The study has recommended that farmers should be made more aware of the fact that fasciolosis is a serious animal health problem in the study area with additional financial loss from condemnation of affected livers. Appropriate methods of controlling fasciolosis should be adopted that include regular deworming of cattle with correct doses and regime; and the use of moliuscicides to kill snails in the breeding places where cattle graze.

Keywords

Abattoir, Bovine Fasciolosis, Financial Losses, Liver, Masha, Prevalence

1. Introduction

Despite the greatest contribution of the livestock sector to the economy and livelihood of the people of Ethiopia, the livestock sector is constrained by many challenges which include poor management practices, lack of enough capital to

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buy inputs, the existence of endemic disease among other. Among the major parasitic diseases of cattle in Ethiopia includes fasciolosis, schistosomiasis and paraphistomiasis [14].

Fasciolosis, also known as liver fluke disease, is an economically important disease of domestic livestock, in particular cattle and sheep, and occasionally man. The disease is caused by digenean trematodes of the genus *Fasciola*, family Fasciolidae, commonly referred to as liver flukes. The two species most commonly implicated as the aetiological agents of fasciolosis are *Fasciola hepatica* and *F. gigantica*. *F. hepatica* has a worldwide distribution but predominates in temperate zones while *F. gigantica* is found on most continents, primarily in tropical regions [2].

The Digenea are sub-class within the class Trematoda generally characterized by a complex life cycle in which one or more intermediate hosts are involved. Many variations on the life cycle exist, but each typically includes a molluscan primary or intermediate host in which larval multiplication occurs, and a vertebrate final or definitive host in which sexual reproduction occurs. Members of the family Fasciolidae are hermaphroditic and self-fertilization can occur, although sexual reproduction is normally by cross-fertilization in the final host [2].

Integral to the successful completion of the life cycle, are biological and physical factors that favour occurrence of fasciolosis include moisture and temperature that could allow persistent surface wetness on posture for the snail and free living stages of the parasite to strive [5]. Grazing cattle in wet lands during dry season promote infestation of cattle with fasciolosis. Clinical sign of fasciolosis include weight loss, anemia, diaharrea, and sub mandibular edema due to hypoalbunemia [1]. But these are not pathognomic for fasciolosis and therefore difficult to diagnose on the basis of clinical signs.

The presence of fasciolosis due to *F. hepatica* and *F. gigantica* in Ethiopia has long been known and its prevalence and economic significance has been reported by several workers [6-8]. Available published reports have indicated that bovine fasciolosis causes economic losses of roughly 350 million ETB per annum due to deceased productivity alone [12]. More recently, [17, 6] have reported financial losses of 6300 USD and 4000 USD per annum, respectively due to liver condemnations at slaughter houses.

Abattoir studies have shown that significant financial losses results from liver condemnation [13, 1]. Fasciolosis causes economic losses to cattle farmers and cattle traders in many ways: by causing loss of body condition in affected cattle, unthriftiness and reduced growth rate; reduced fertility, milk production and drought power; increased costs of anthelmintics, drenches, lobar; losses due to condemned liver at slaughter, and sometimes of mortalities [11].

The prevalence of fasciolosis in many parts of Africa has been determined mainly at slaughter. Hence abattoir liver inspection plays a great role in establishing the prevalence of fasciolosis on the animal species of importance. From the two Spp. of *Fasciola*, the one most frequently and commonly found in cattle in Ethiopia is *F. hepatica* [1]. However estimation of economic loss due to fasciolosis at national or regional level is limited by lack of accurate estimation of the prevalence of disease [15]. The objectives of the present study are, therefore:

1. To determine the prevalence of bovine faciolosis in cattle slaughtered at Masha Municipal Abattoir, and
2. Estimate the financial loss incurred by cattle owners due to abattoir condemnation of liver infested with the parasite in the study area.

2. Materials and Methods

2.1. Description of the Study Area and Animals

A cross-sectional study was carried out from May to July 2016 on cattle slaughtered at Masha municipal abattoir, Sheka Zone, South-West Ethiopia. The study has purposefully selected from Masha municipal abattoir to involve cattle originating from four kebeles (peasant associations) found in Masha woreda of the Sheka Zone namely: Degele, Yina, Keja and Attile kebeles that are covered with marshy grazing lands. Usually cattle from these four kebeles are come to be slaughtered at Masha municipal abattoir found in Masha town. Masha is the capital city of Sheka zone and found at 675 km southern of Addis Ababa. It is geographically located between 7 °24`-7 °52` latitude north and 35 °13`-35 °35` East, longitude. The annual rainfall and temperature range of the town is 1800-2200 mm and 15 °-17 °C respectively.

2.2. Description of the Abattoir

Masha municipal slaughter slab has a fence, guardroom, lairage, and slaughterhouse. The slaughterhouses are built of blocket and cemented floor. The wall has a facility to hang the carcasses at one side, and the offal and heads at one side. The floor has installed iron rod at the middle for casting animals, while on the opposite side of the floor, where offal and heads are processed, is a drainage tunnel, while on the opposite side the carcasses are hanged.

2.3. Study Design

A cross-sectional study designs was chosen to undertake the desired study, based on an active abattoir-based examination of cattle slaughtered from May to July 2016 at Masha municipal abattoir, South-West Ethiopia. The study was based on ante-mortem (AM) examination of animals before slaughtering and post-mortem (PM) inspection of livers after slaughtering. The sample size was determined by Thrusfield (2005) [18].

3. Results

As the study shows, based on the 270 cattle examined, the prevalence of bovine fasciolosis was found to be 42.2%. The prevalence fasciolosis based on Sex, Age, Body condition and origin of the animal is also determined as shown in the following tables.

3.1. Prevalence of Bovine Fasciolosis Based on Post-mortem Liver Inspection

From a total of 270 livers examined, 114 were found positive for liver fluke infection (fasciolosis) with an overall prevalence of 42.2%. The prevalence of fasciolosis showed variations between animals originating from the four kebeles. Higher prevalence 65.15% (n=66) was found in animals originating from Attile kebele, than the other 3 kebeles that include 50.94% (n=53) Yinna, 43.03% (n=79) from Degele kebele, and the least 13.8% (n=72) in cattle from Keja, as indicated in Table 1. There was statistically significant difference ($p<0.05$) in prevalence of fasciolosis between animals originating from the four kebeles.

Table 1. *Prevalence of Bovine Fasciolosis in Cattle Originnated from Four Kebels.*

Origin (kebele)	Number of cattle examined	Positive	Negative	Prevalence%
Attile	66	43	23	65.15%
Yinna	53	27	26	50.94%
Degele	79	34	45	43.03%
Keja	72	10	62	13.8%
Total	270	114	156	42.2%

$\chi 2$ (Mantel-Haenszel) = 5.484; p (2 tailed) = 0.019.

Table 2 shows that prevalence of fasciolosis was 45.61% on females and 39.74% on males. Sex have no statistically significant ($p>0.05$) influence on the prevalence of fasciolosis. The prevalence of fasciolosis was given by body condition score (BCS) (Table 3) and there was significantly ($p<0.05$) higher infection (53.6%) in animals with poor body condition than with good body condition (32.41%) (Table 3).

Table 2. *Prevalence of Bovine Fasciolosis in Cattle by Sex of an animal.*

Sex	Number of cattle examined	Positive	Negative	Infection rate in%
Male	156	62	94	39.74
Female	114	52	62	45.61
Total	270	114	156	42.2

$\chi 2$ (Mantel-Haenszel) = 0.932; p (2 tailed) = 0.33415.

Table 3. *Prevalence of Bovine Fasciolosis in Cattle by Body Condition of an animal.*

Body condition	Number of cattle examined	Positive	Negative	Infection rate in%
Poor	125	67	58	53.6
Good	145	47	98	32.41
Total	270	114	156	42.2

$\chi 2$ (Mantel-Haenszel) = 12.30; p (2 tailed) = 0.00045.

Table 4 shows that prevalence of fasciolosis was 54.31% on adult and 33.11% on older cattle. There was statistically significant difference ($p<0.05$) in prevalence between the two age groups.

Table 4. Prevalence of Bovine Fasciolosis in Cattle by Age of an animal.

Age	Number of cattle examined	Positive	Negative	Infection rate in%
Adult	116	63	62	54.31
Old	154	51	94	33.11
Total	270	114	156	42.2

$\chi 2$ (Mantel-Haenszel) = 6.357; p (2 tailed) = 0.0116.

3.2. Annual Financial Loss from Livers Condemned Due to Fasciolosis

During the 60 days of study period, 270 cattle were slaughtered at Masha municipal abattoir, Sheka Zone, South-West Ethiopia. Based on a 42.2% prevalence of bovine fasciolosis, and an average market price of a healthy liver at 300 ETB, the financial loss from livers condemned due to fasciolosis during the 60 days of study period was estimated at 34200 ETB.

Likewise based on an estimated average number of 1,350 heads cattle slaughtered annually at the slab (calculated for 10 months), the financial loss from livers condemned due to fasciolosis during the study period was extrapolated to be 171000 ETB (5700.65 USD) annually.

4. Discussion

The study was found that prevalence of bovine fasciolosis on cattle slaughtered at Masha municipal abattoir, Sheka Zone, was 42.2%. The highest prevalence was 65.15% (n=66) noted in animals originated from Attile kebele, and the least 13.8% (n=72) in cattle from Keja. The origin of cattle in the four kebeles has shown to significantly affect ($p<0.05$) the prevalence of fasciolosis when slaughtered at the abattoir. Although cattle in this study were traced to the four kebeles, the slaughter slab is a destination for cattle coming from some 19 kebeles in Masha Woreda (district), including from other districts in Sheka Zone, from neighboring Zones of Kafa and from Oromia Region.

Generally, the use wetlands for grazing and watering of cattle during dry seasons is a common practice in the study area. This could explain the observed high prevalence of fasciolosis in cattle originating from some of the kebeles. This situation could be exacerbated by absence of proper cattle de-warming program and the movement of cattle by trading. Factors that favour occurrence of fasciolosis are moisture and temperature that allows persistent surface wetness on posture for the snail and free living stages of the parasite to strive. Grazing cattle in wet lands during dry season promote infestation of cattle with fasciolosis [5].

In cattle, similarly high prevalence of 35% had been reported at Hawassa municipal abattoir in Ethiopia [1], 32% at Arusha abattoir in Tanzania [13] and 43.7% at slopes of Mount Elgon [9]. However, the fasciolosis prevalence found in this study was found to be lower than what had been reported for most areas in Ethiopia. For example, a prevalence of 80% has been reported in Kafa [3], in Debre Berhan [4] and Western Shoa [19]. Also a prevalence of 50 - 63% has been reported in Ethiopia from Gonder [3], around Lake-Tana [20]. More generally, a prevalence ranging from 30 to 90% has been recorded for fasciolosis in tropical countries, the disease being considered as the single most important helminth infection of cattle [16].

The current study also found that Bovine fasciolosis was more prevalent and more severe in poor body condition than good. This may be due to the fact that animals with poor body condition are generally more susceptible.

Based on a 42.2% prevalence of bovine fasciolosis in the current study, the financial loss from livers condemned due to fasciolosis during the 60 days of study period was estimated at 34200 ETB. The annual financial loss was extrapolated to be 171000 ETB 5700.65 USD). The financial losses estimated could be much higher if all the direct and indirect losses associated with the disease, including that caused by weight loss, were included.

A study done at Assela Municipal abattoir in Ethiopia by Mulugeta *et al.* (2012) [12] found that losses associated with fasciolosis weight loss were 17.5 time more than losses caused by liver condemnation. The projections were based on the fact that fasciolosis causes 10% weight loss. Condemnation of a large quantity of liver due to fasciolosis reduces its market availability (supply) and increases its market price [10] thus making it unaffordable by the vulnerable people who need it most. Liver tissue is a very rich source of nutrients including proteins, some important vitamins (A, D, E and K) and minerals. Liver is often recommended for pregnant mothers, children and for prevention and treatment of anemia and deficiencies of mineral and vitamins [10]. Liver rejection at the abattoir tends to increase the level of aggregation by butchers who sometimes bear the complete financial burden of such condemnation [10]. Fasciolosis also has public health significance and it has been shown that fasciola fluke can cause human fasciolosis [11].

5. Conclusion and Recommendations

Fasciolosis is a serious health problem of cattle which causes liver condemnation in the slaughter slab, and reduction in the production of the animals. In the current finding the slaughter slab prevalence of fasciolosis showed that the infection is common in most parts of the woreda as most of the animal were originated from the different sites (kebeles) of the woreda. The parasite (*Fasciola*) mostly affects animals which were originated from marshy areas. Thus, the infection is common in the region due to marshy grazing areas and different ponds which merits attention by the responsible bodies to control the parasites (fasciola) and its vectors. The current study also found that Bovine fasciolosis was more prevalent and more severe in poor body condition than good.

The high prevalence of bovine fasciolosis observed in cattle slaughtered at Masha municipal Abattoir, Sheka Zone, South-West Ethiopia, and the significant annual financial loss that results from condemnation of infected liver associated with the disease signifies fasciolosis is a disease of prime concern in the study area. Therefore, based on the above conclusions the following recommendations are forwarded:

1. The disease must be considered in the urgency list in any disease control program to be applied in the study area.
2. To minimize posture contaminations strategic anthelimentic treatment should be practiced at the beginning of the rainy season.
3. Drain swampy areas and awareness creation among livestock owners is important to diminish the prevalence of the disease.
4. Prominence must be given for the control of the disease to reduce its prevalence rate and -concurrent should be treated and controlled.
5. Improving of animal health service is important to reduce the prevalence rate of fasciolosis.
6. Future study should be conducted on the epidemiology of the disease, biology and ecology of intermediate host snails (*Lymanae*) for appropriate control strategies.

Abbreviations

USD	United States Dollar
ETB	Ethiopian Birr
AM	AntiMortem
PM	Post Mortem
BCS	Body Condition Score

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Author Contributions

M. M., Design the work, wrote the paper, performed the analysis and interpretation of data: S. G. and A. D. Data Collection.

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Conflicts of Interest

The authors declared no conflicts of interest.

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