

Cross-Sectional Study on The Prevalence of *Stilesia Hepatica* on Small Ruminants Slaughtered at Modjo Modern Export Abattoir, Ethiopia

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ABSTRACT

A cross-sectional study was conducted at Modjo Modern Export Abattoir, Modjo town, central Ethiopia from November 2007 to April 2008 on 1920 young and adult sheep and goats (960 sheep and 960 goats) from highland and low land areas. The objectives of the study were to determine the prevalence of *Stilesia hepatica* in young and adult sheep and goats originated from highland and lowland areas of Ethiopia. The overall prevalence of *Stilesia hepatica* in sheep and goats was 31.43% (302/960) and 25.3% (243 /960), respectively. The prevalence of *Stilesia hepatica* in young and adult sheep was 25.8% (124/480) and 30.6% (147/480) and those of young and adult goats was 24.4% (117/480) and 27.5%. The prevalence in sheep from highland and lowland origin was 33.75 (154/480) and 27.5% (132/480), respectively and the prevalence in goats brought from highland and lowland origin was 26.8% (129/480) and 22.9% (110/480), respectively. The prevalence of *Stilesia hepatica* in highland sheep of adults and young was 33.75% (81/240) and 30% (72/240) and the prevalence of those of lowland origin adult and young sheep was 28.3% (68/240) and 26.25% (63/240). For the highland goats of highland adults and young the prevalence was found to be 25.42% (61/240) and 21.25% (51/240) respectively, for the lowland goats of adult and young the prevalence was 23.3% (56/240) and 17.9% (43/240) respectively. Statistically no significant difference was recorded in the prevalence of *Stilesia hepatica* between goats and sheep, between highland and lowland sheep and goats and between young and adults of the two species. In conclusion, this study indicated that *Stilesia hepatica* in sheep and goats is prevalent in the region from where sheep and goats are brought.

INTRODUCTION

Ethiopia has the largest livestock population in Africa, estimated at 38 million cattle, 23 million sheep and 18 million goats, which are raised almost entirely by small holder farmers throughout the country^[1]. Small ruminants are particularly important resources of the country as they provide more than 30% of local meat consumption and generate cash income from export of meat, live animals and skins^[2].

The annual national mutton production is 77 metric tons, which covers 13.9% of total domestic meat production^[3]. Even though the livestock sector contributes much to the nation's economy, its development is hampered by different constraints, these include rampant animal diseases, poor nutrition, poor husbandry, poor infrastructures shortage of trained manpower^[4]. Disease causes extensive financial wastes as a result of direct and indirect economic losses, because disease is the major concern to small ruminants' industry. Study conducted in different abattoirs of Ethiopia revealed that parasitic infections of livers, pneumonia pericarditis and nephritis are found to be the major causes of organ condemnation^[5].

Parasites in the tropics are responsible for greater losses to the meat industry than any other diseases. Similarly, like many other tropical African countries, it is well known that parasitic diseases are among the major factors responsible for the low productivity of livestock in

Ethiopia^[6,7]. Parasitic infestations not only cause clinical diseases and mortalities but also cause economic losses through production losses and condemnation of whole carcass and organs at slaughter^[8].

Various abattoir surveys have been conducted to determine the prevalence and economic losses resulting from organ and carcass condemnation in Ethiopia^[9-11]. However, most of the surveys paid attention to parasitic causes; fasciolosis and hydatidosis in cattle. There is lack of information on the causes of organ and carcass condemnations and associated economic losses in small ruminants especially due to *Stilesia hepatica*. Recently various new export abattoirs have been established to enhance the export of red meat and edible offal to international market. The export of meat of sheep and goats contribute much to the economic development of the country.

Stilesia hepatica is extremely common tapeworm in sheep and goats of Africa and Asia. Large numbers of these tape worms are often found in the bile ducts of sheep and goats at slaughter and also they cause neither clinical signs nor significant hepatic pathology, the liver condemnations are a source of considerable economic losses on aesthetic grounds. Its epidemiology is poorly understood. Wild animals are the natural reservoirs of this parasite and play an important role in its epidemiology^[12]. The parasite has a predilection site in the bile ducts and causes no pathogenesis, but it is a cosmetic problem that leads to liver condemnations at slaughter of the affected animals^[13].

Stilesia affected livers may show signs of mild cirrhosis with thickening of bile ducts^[13]. Heavy infestations are frequently seen in apparently healthy ovine and caprine, with complete occlusions of the bile ducts. Icterus and other clinical signs are not commonly observed. At meat inspection, the liver is condemned for aesthetic reasons. Its epidemiology in small ruminants is poorly understood.

Slaughter surveys have been conducted in most Sub-Saharan African countries to estimate the prevalence and economic significance of fasciolosis in various ruminant production systems. Unfortunately, the impact of *Stilesia hepatica* on productivity of ruminants has not been elucidated through these surveys. *Stilesia hepatica* has been reported to occur in sheep and goats. Abattoir surveys have estimated the condemnation rates of 56% and 47% of the total livers in slaughtered sheep and goats respectively^[14]. The highest liver condemnation (40%) and 48 % of the liver are condemned due to *Stilesia hepatica* in goats and sheep, respectively in Kenya in 1989.

Economic losses associated with liver condemnation due to *Stilesia hepatica* infestation in ruminants contributed to 14807 USD of which 876 USD 9720 USD and 4210 USD was attributed to cattle, goats and sheep, respectively^[14].

Stilesia hepatica causes significant loss to farmers, butchers and consumers. It leads to destruction of liver of affected animals. There are other additional losses such as poor carcass quality and quantity due to disruption in liver functions in animals infested with the parasite. It is also a major cause of concern in the trade of small ruminants^[14]. Therefore, the disease should be investigated further on farms to determine the prevalence in animals of various ages, species and breeds and to develop economic strategies for disease control at farm level.

Therefore, the objectives of this study were

- To study the prevalence of *Stilesia hepatica* in small ruminants slaughtered at Madjo Modern Export Abattoir.
- To study the influence of certain risk factors on the prevalence of *Stilesia hepatica* in sheep and goats.
- To generate baseline information for further studies on small ruminants affected with *Stilesia hepatica*.

MATERIALS AND METHODS

Study Area and Abattoir

The study was conducted in Modjo Town, Lume District in East Shewa Zone of Oromia Regional State, Central Ethiopia from November 2007 to April 2008. Modjo is located 70 km South East of Addis Ababa at 8035'N and 39010'E at an altitude of 1777 masl. The average maximum and minimum temperature is 28°C and 18°C, respectively^[15]. The town has one municipality and two main export abattoirs. It is a town where the two main roads from the Eastern and Southern parts of the country meet. This makes Modjo as an important trade route of livestock. Modjo Modern Export Abattoir, one of the main mutton and offal export abattoirs, was established in 2001/2002, and has almost all the required facilities stocking pen, unloading ramp, lairage, slaughter hall, refrigerator room, water supply, electricity, telephone veterinary office, laboratory, administration office, waste disposal, etc. Veterinarian performs antemortem inspection 24 h before slaughter. Animals with disease condition are isolated for further laboratory diagnosis. Each day, about 300 to 2000 and 20-300 male goats and sheep are slaughtered, respectively, according to Islamic Religion "Halal". Almost all inspected mutton and little offal are exported Arab countries after it has been chilled. The overall dressing percentage of those goats and sheep slaughtered at Modjo Modern Export Abattoir is 38-43.5%.

Study Population and Sampling

The animals, which are slaughtered in this abattoir, are brought from different parts of the country both from lowland and highland areas including Borena, Jinka and Bale areas. In this study, animals were classified into two species: sheep and goats, two age groups (young and adult) and two origins (highland and lowland). Age was determined by observation of the erupted permanent incisors and classification in to two age groups was performed accordingly^[16,17].

For determination of sample size, the expected prevalence was decided to be 50% as there was no study conducted on the prevalence of *Stilesia hepatica* before this study in this abattoir. The desired precision was decided to be 5% and confidence interval 95%. Thus the formula described by Martin et al.^[18] was used to determine the sample size per locality. Accordingly, the sample size was calculated to be 240 per origin and age of sheep and goats. Hence the total sample size for all goats and sheep originated from low land and highland area was determined to be 1920 as indicated in **Table 1**.

Table 1. Number of samples taking.

Species	Highland	Lowland	Adult	Young	Sub total
Sheep	240	240	240	240	960
Goats	240	240	240	240	960
Grand total					1920

Study Methodology

The study methodology used was postmortem inspection of the liver. After the animals were sampled according to species, origin and age, the liver was taken from the slaughtered sheep and goats separately and inspected by visualization and making a systemic incisions to detect the presence of *Stilesia hepatica*.

DATA ANALYSIS

The prevalence of *Stilesia hepatica* was calculated by dividing the number of positives of sheep and goats with *Stilesia hepatica* divided by the total number of animals (sheep and goats) inspected and multiplied by 100 and expressed in percentage. Pearson’s chi-square (χ^2) test was used to calculate to find out whether there were statistically differences in prevalence between origin (highland/low land) young/adult sheep and goats. P values <0.05 were considered statistically significant.

Data generated from post mortem inspection was entered to Microsoft Excel 2000. Descriptive statistics, such as percentage and chi square tests were calculated with SPSS soft ware for windows version 11.5.

RESULTS AND DISCUSSIONS

Totally 1920 sheep and goats (960 sheep and 960 goats) were inspected at postmortem by categorizing them according to species, origin and ages of sheep and goat

The prevalence of *Stilesia hepatica* in sheep and goats was found to be 31.43% (302) and 25.31% (243) respectively (**Table 2**).

Table 2. Prevalence of *Stilesia hepatica* in slaughtered sheep and goats.

Species	No of animals inspected	Prevalence N (%)
Sheep	960	302 (31.43%)
Goats	960	243 (25.3%)

Among 960 sheep inspected at postmortem, 480 of them were young and 480 of them were adults. The prevalence of *Stilesia hepatica* was found to be 30.6% (147) and 25.8% (124) in adults and young sheep, respectively. Similarly, among 960 goats inspected prevalence of 27.5% (132) and 24.4% (117) was recorded in adult and young goats, respectively (**Table 3**).

Table 3. Prevalence of *Stilesia hepatica* in slaughtered adult and young sheep and goats.

Species	No Inspected	Age	Prevalence N (%)
Goats	960	Young 480	117 (24.4%)
		Adult (480)	132 (27.5%)
Sheep	960	Young 480	124 (25.8%)
		Adult (480)	147 (30.6%)

Among 960 sheep inspected at postmortem, 480 of them were from highland and lowland each and the prevalence was found to be 33.75% (154) and 27.5% (132), respectively. Similarly from 960 goats which originated from highland (480) and lowland (480), the prevalence was found to be 26.8% (129) and 22.9% (110) in highland and lowland goats, respectively (**Table 4**).

Table 4. Prevalence of *Stilesia hepatica* in Highland and Lowland sheep and goats.

Species	No of animals inspected	Origin (N)	Prevalence N (%)
Sheep	960	Highland 480	154 (33.75%)
		Lowland 480	132 (27.5%)
Goats	960	Highland 480	129 (26.8%)
		Lowland 480	110 (22.9%)

Among 480 sheep from highland origin, 240 were young and 240 were adults. The prevalence in adults and young was found to be 33.75% (81) and 30% (72), respectively.

From 480 lowland sheep 240 were adults and 240 were young. The prevalence of *Stilesia hepatica* was 28.3% (68) and 26.25 (63) in adults and young respectively (**Table 5**).

Table 5. Prevalence of *Stilesia hepatica* in sheep of young and adult sheep from highland and lowland areas.

Species	Origin of animals (N)	Age of animals (N)	Prevalence N (%)
Sheep	Highland (480)	Young 240	72 (30%)
		Adult 240	81 (33.75)
	Lowland (480)	Young 240	63 (26.25)
		Adult 240	68 (28.3%)

Out of 480 goats brought from highland areas, 240 were adults and 240 were young. The prevalence was found to be 25.43% (61) and 21.25% (51) in adults and young, respectively. Out of the 480 goat originating from lowland areas 240 each were adult and young and the prevalence was 23.3% (56) and 17.9% (43) in adults and young, respectively (**Table 6**).

The overall prevalence of *Stilesia hepatica* in sheep and goats slaughtered at Modjo Modern Export abattoir was found to be 31.43% and 25.31%, respectively. This prevalence was in agreement with the prevalence reported by ⁽¹⁹⁾ who recorded a prevalence of 39% and 36%;

respectively Mungube et al. ^[14] reported also a prevalence of 22% and 28% in goats and sheep, respectively in Kenya. There was no significant difference between the two species in the prevalence of *Stilesia hepatica*. The prevalence reported by Sissay et al. ^[19] in Eastern parts of Ethiopia at four abattoirs found in Jijjiga, Haramaya, Dire Dawa and Harar was higher than the prevalence of the current study, whereas the prevalence reported by Mungube et al. ^[14] in Kenya was lower than the current study. This may be related with the origin of animals and differences in the environmental condition of the countries.

Table 6. Prevalence of *Stilesia hepatica* in adult goats of young and adult from highland and low land origin.

Specie	Origin of animals (N)	Age of animals (N)	Prevalence N (%)
Goat	Highland (480)	Young 240	51 (21.25%)
		Adult 240	61 (25.42)
	Lowland (480)	Young 240	43 (17.9)
		Adult 240	56 (23.3%)

The prevalence of *Stilesia hepatica* in highland and lowland sheep was 33.75 (154 among 480 sheep) and 27.5% 132 among 480 animals respectively. Even though the origin of animals was not described a study conducted at four abattoirs found in Jijjiga, Haramaya, DireDawa and Harar by Sissay et al. ^[19] showed the prevalence of 42%, 28%, 35% and 41%, for the wet season and 32% and 33% and 41% and 39% for the dry season, respectively. The same report indicated there was no seasonal variation in the prevalence of *Stilesia hepatica*. In the current study also there was no significant difference in the prevalence of the parasite between young and adult, highland and lowland sheep and goats. There were no statistically significant differences between species and within species in respect to age, this prevalence is higher than the prevalence in the current study.

CONCLUSION AND RECOMENDATIONS

This preliminary study generated information on the occurrence of *Stilesia hepatica* in sheep and goats in Ethiopia. The overall prevalence recorded in this study was generally high and no statistically differences were observed in the prevalence between species, origins, and age of sheep and goats. *Stilesia hepatica* affects liver and it results in condemnation of the liver due to aesthetic reasons thereby reducing the country's foreign exchange earnings. The epidemiology of the parasite is poorly understood and little work has been done to determine its occurrence distribution and assess the economic loss resulting from condemnation of livers. The impact of *Stilesia hepatica* on the productivity of small ruminants has not also been elucidated. Based on the above conclusions, the following recommendations are forwarded:

- Further epidemiological study should be conducted on *Stilesia hepatica* in sheep and goats.
- The economic losses due to this parasite should be assessed.
- Risk factors associated with sheep and goat of *Stilesia hepatica* should be investigated.
- Regular training on meat inspection should be provided to meat inspectors to improve their capacity in diagnosing *Stilesia hepatica*.

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