Prevalence of Haemonchosis in Sheep slaughtered at Jimma hotel, Southwest, Ethiopia

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ABSTRACT
A cross-sectional study was carried out from April 2018- May 2018 to determine the prevalence of Haemonchus contortus in sheep slaughtered at Jimma restaurants, south west Ethiopia. Appropriate procedure was applied for postmortem examination and sample collection. A total of 384 sheep Abomasums, collected from randomly selected sheep, were examined on postmortem. The overall prevalence of H. contortus was found to be 29.9%. It was noticed that high prevalence was recorded in animals with poor body condition (37.6%), followed by good body condition (23.07%) and the lowest was recorded in animals with medium body condition (22.6%). The occurrence of haemonchosis was more frequently recorded in youngest (less than one year) (28.5%) than in older (above one year) sheep (25.9%) but there was statistically significant difference (P<0.05) observed with the risk factor (age) in relation to the prevalence of H. contortus. However, there was no statistically significant difference (P>0.05) observed among the risk factors (body condition) in relation to the prevalence of H. contortus.

Keywords: Haemonchus contortus, prevalence, sheep, postmortem, college education, veterinary, restaurants, medicine, agriculture, Jimma Ethiopia.

1. INTRODUCTION
In many countries particularly, small ruminants play a great role in the economy of the country, as sources of meat, milk, fiber, cash income, and skin and they can live in extreme climatic conditions, they can exploit herbage, which is unsuitable for large ruminants, and they require few labor-intensive inputs (Fraser et al., 1991). Ethiopia lies within the tropical latitudes of Africa and has an extremely diverse topography, wide range of climatic features, and multitude of agro-ecological zones, which make the country suitable for different agricultural production systems. This in turn has contributed to the existence of a large diversity of farm-animal genetic resources in the country. Ethiopian livestock production systems are broadly characterized as low input, mixed crop-livestock, agro-pastoral, and pastoral systems, as well as medium input, peri-urban, and urban enterprises. These livestock are almost entirely man-aged by the poor smallholder farmers and pastoralists (Sisay et al., 2007). Generally, sheep are the predominant livestock in area of high lands of 3,500 meters above sea level; sheep assume a great share in socio-economic activities of about 85% of the population. Small holders in the high land area where is mixed crop-livestock population is practiced own most sheep in Ethiopia, these sheep are an integral part of the livestock sector of the economy. Sheep supply meat, wool/hair and skin that generate about 89% of the farmer’s cash income (Gryseels et al., 1998). Other special attributes of sheep over the other livestock resources include that they are highly adaptable to broad ranges of environment, have short generation cycles, and have high reproductive rates which lead to high production efficiency and poor people can afford few ewes since cost of them is less than a cow. With little inputs, sheep play an important role in the rural economy through provision of meat, milk, cash income, accumulating capital, fulfilling cultural obligations, manure and contribute to the national economy which can be incurred due to the export of live animals, meat, and skins (Tibbo et al., 2003). Endoparasites are responsible for the death of one-third of calves, lambs, and kids and considerable losses of parts of carcasses condemned during meat inspection. It is well recognized that, in resource poor regions of the world, helminthes infections of sheep and goats are major factors responsible for economic losses through reduction in...
productivity and increased mortality. Nematode parasites of small ruminants result in low productivity due to stunted growth, poor weight gain, and poor feed utilization (Pedreira et al., 2006).

The principal abomasal worms of sheep are Haemonchus contortus, Ostertagia circumcincta, Ostertagia trifurcata, and Trichostrongylus axei. Haemonchus contortus is one of the most important abomasal worms of sheep which is known as “red stomach worm” or “wire worm” of small ruminants. It is most prevalent and pathogenic parasite and also economically important disease of sheep. Haemonchus contortus is a species most commonly found in sheep and goat but Haemonchus place is the usual species in cattle and even soccors infection may occur when small ruminants and cattle graze together but the infestations are usually of less severity (Radostits et al., 2000).

Although helminthes parasites of ruminant livestock are ubiquitous in all of the agro-climatic zones of Ethiopia with prevailing weather conditions that provide favorable condition for their survival and development, their presence does not mean that they cause overt disease. Among the diseases that constrain the survival and productivity of sheep, gastrointestinal nematode infection ranks highest on a global index with Haemonchus contortus being of overwhelming importance (Perry et al., 2002).

Haemonchus contortus found in abomasum of sheep and goat causes blood loss resulting in decrease in erythrocytes, lymphocytes, hemoglobin, packed cell volume, body weight, and wool growth. The abomasal nematode Haemonchus contortus, which is particularly important and causes severe anemia and death in severely infected animals, identified haemonchosis as one of the top ten constrains to sheep and goat rearing in east Africa (Perry et al., 2002).

Haemonchus is one of the important endoparasites of sheep. The first and second stages of larvae are free-living organisms and the host ingests the third stage larvae starting the infection. Adults of the parasite are found on the surface of the mucosa (the lining of the stomach). Both the larvae (L4) and the adults of Haemonchus species suck blood. A thousand Haemonchus species of adult can suck 50mL of blood/day causing severe anemia. A heavy Haemonchus species infection (20,000–30,000 worms) can kill sheep very quickly. All ages of sheep are susceptible to Haemonchus species infection but lambs are more susceptible than adults (Shapiro et al., 2005).

The cardinal sign of haemonchosis is pallor of the skin and mucous membranes. A hematocrit reading of less than 15% is always accompanied by extreme weakness and short-breath of breath and warrants a grave prognosis; less of plasma protein results in anasarca frequently manifested externally as a submaxillary edema (bottle jaw). The appetite typically remains good and, in acute outbreaks, affected animals may not lose appreciable weight. Feces are well formed; diarrhea occurring only in infections complicated by the presence of such species as Trichostrongylus species and Cooperia species. Lambs are the most seriously affected members of the flock, but older sheep under stress also may have fatal anemia (Bowman, 2005).

While, in temperate regions, the severity of gastrointestinal (GI) parasitic disease in most livestock farms is now minimized through the seasonal use of anthelmintics and pasture management, the problem persists in the vast majority of tropical and subtropical regions. Among the gastrointestinal parasites, Haemonchus contortus is the species with greatest pathogenic and economic importance in sheep. It is important to assess the type and level of parasitism in ruminant livestock, in order to be able to determine the significance of parasite infection and to recommend the most beneficial and economically acceptable control measures. The determination of the risk factors associated with parasite occurrence can be used to design an effective control strategy (Odoie et al., 2000). Previously there was not any documented data with regard to the prevalence of the haemonchosis in small ruminants regardless of the high populations of sheep in the study area and most previous studies in Ethiopia were based on carpological examinations. Therefore, the objectives these studies were:

a) To determine the prevalence of ovine haemonchosis based on postmortem examination in Jimma municipal abattoir

b) To assess the influence of host related risk factors in the study area.

2. MATERIALS AND METHODS

2.1. Study Area

The study was conducted at Jimma municipal abattoir to determine the prevalence of ovine haemonchosis based on postmortem examination and to assess the influence of host related risk factors in the study area. Jimma town is located in Oromia region, south west of Ethiopia, at a distance of about 352 km from Addis Ababa. Geographically, Jimma is located at 7°13’ and 8°56’ N latitude and 35°52’ and 37°37’E longitude. The climatic condition of the area is midland with altitude ranging between 1720 to 2110 m above sea level and receives annual rainfall which ranges between 1200 to 2000 mm. There are two rain seasons, short rainy season (November to April) and long rainy
season (July to October). The annual mean temperature ranges from about 12.1°C to 28°C (JZARDO, 2009). Jimma
zone has a poultry population of about 1,139,735 (CSA, 2015).

2.1.1 Study Animals
The study animals were 384 sheep in which (232 females and 152 males) slaughtered in Jimma municipal abattoir.
Animals were indigenous breeds kept under traditional management system. The study animals were sheep of local
breed with different sex and body condition brought for slaughter. In addition, the age of the sheep was
characterized using teeth eruption by (Vatta et al. 2006) and body condition scoring method as per (ESGPIP, 2007).

2.1.2 Study Design and Type of Study
A cross-sectional study using simple random sampling technique was conducted from April 2018 to May 2018 to
determine the prevalence and associated risk factors of Haemonchosis in sheep slaughtered at the study area.

2.1.3 Sample Size Determination
To calculate the total sample size, the following parameters were used: 95% of confidence level (CL), 5% desired
level of precision; and with the assumption of 50% expected prevalence of haemonchosis among sheep and goats in
the study area, the sample size was determined using the formula given by Thrusfield (2005).

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

Where, n=required sample size; P_{exp}= expected prevalence; d= desired absolute precision. Hence, by using this
formula, the sample size was calculated to be 384.

2.2 Study Methodology
Ante mortem examination was performed a few hours before slaughtering from randomly selected Sheep. The age,
sex, body condition and general health condition of the animals were properly recorded. The animals in the present
study were adult and young and there were poor, medium and good body condition animals during study periods
since the owners of hotels and restaurants preferred animals with better body condition for slaughter. As the animals
were obtained from different markets, it was difficult to know the exact origin of the animals. The abomasum was
opened along its greater curvature and close visualization was made for the presence of adult Haemonchus parasite.
The abomasum’s wall was carefully observed for any gross changes including its contents and the adult H. contortus
worms were identified visually by standard method given by (Urquhart et al. 2003).

2.3 Data Analysis
Computation of descriptive statistics was conducted using SPSS version 20. Descriptive statistics such as
percentages, proportions and frequency distributions were applied to compute some of the data. The prevalence of
the haemonchosis was calculated by dividing the number of sheep and goats harboring the parasite by the number of
sheep and goats examined. Pearson’s chi-square ($\chi^2$) to measure association between prevalence of the
haemonchosis with the species, age, sexes, body condition and months was used as the statistical tool. Confidence
level was held at 95% and statistical analysis for the difference in prevalence of H. contortus among risk factors
were considered significant when the p-value was less than 0.05 (P < 0.05).

3. RESULTS

3.1 Overall Prevalence of Haemonchosis
In this study a total of 384 sheep were examined using postmortem for the presence or absence of H. contortus and
the result revealed that 115 were positive and the overall prevalence of haemonchosis in sheep was found to be
29.9% (115/384) in the study area. Similarly, the prevalence of the parasite in sheep having different body condition
indicated that there is no significance difference of the parasite higher in poor body condition animals with the rate
of 37.6% compared to medium body condition sheep having the rate of 23.07% (Table 1).

<table>
<thead>
<tr>
<th>Body conditions</th>
<th>No. of examined</th>
<th>No. of positive</th>
<th>Prevalence (%)</th>
<th>$\chi^2$</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>186</td>
<td>70</td>
<td>37.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>133</td>
<td>30</td>
<td>22.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>65</td>
<td>15</td>
<td>23.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>115</td>
<td>29.9</td>
<td>10.165</td>
<td>0.006</td>
</tr>
</tbody>
</table>

This study reveals, higher prevalence of haemonchosis infection was observed in young animals (41.8%) as
compared to adult (16.3%). There was highly statistically significant difference (P = 0.000) between the two ages
groups (Table 2).

<table>
<thead>
<tr>
<th>Age</th>
<th>No. of examined</th>
<th>No. of positive</th>
<th>Prevalence (%)</th>
<th>$\chi^2$</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young</td>
<td>255</td>
<td>94</td>
<td>41.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In the present study, higher prevalence of haemonchosis infection was observed in male sheep (32.9%) as compared to female (28.01%). There was statistically not significant difference (P = >0.308) between sex groups of sheep.

Table 3: Prevalence of Haemonchus in sheep based on the sex

<table>
<thead>
<tr>
<th>Sex</th>
<th>No. of examined</th>
<th>No. of positive</th>
<th>Prevalence (%)</th>
<th>X²</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>152</td>
<td>50</td>
<td>32.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>232</td>
<td>65</td>
<td>28.01</td>
<td>1.041</td>
<td>0.308</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>115</td>
<td>29.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. DISCUSSION

Sheep is one of the most important animals that provide farmers with food and other products and by products. One of the most noteworthy antagonistic factors to sheep farming is parasitic diseases; especially those caused by nematodes. H. contortus is one of the most important endoparasites of sheep that needs greater emphasis (El-Dakhly et al., 2012).

The present study revealed that the overall prevalence of Haemonchus contortus in sheep was 29.9%, which indicated low prevalence of the parasite in the study area. This finding was much lower compared with the study conducted by (Moses et al., 2017) in bahidar who reported prevalence of 40.9%, (Mekonnen and Tibo, 2015) in Arsi Negelle who reported prevalence of 67.2% in wukro who reported prevalence of 40.9%, (Tewodros and Girja, 2012) in Gonder who reported prevalence of 80.21% and (Raza et al., 2009) in Multan abattoir who reported prevalence of 37.18%.

Similarly, the current finding is lowered compared to different researchers such as (Bayu, 1992) in Wellega who recorded prevalence of 88.2%, (Solomon, 1987) with the rate of 93.6% in the Ogeden region, and (Abbe and Esayas, 2001) 96.5% in Eastern part of Ethiopia. Compared to the finding of (Mesele et al., 2014) who reported the prevalence of 26.8% in Abergale Export Abattoir, the current finding was higher. With regard to the body condition of the examined sheep the rate was higher in poor body condition sheep compared to the medium and good body condition sheep with the prevalence of 37.6%, 22.6% and 23.07%, respectively.

There was no statistical significant variation (P>0.05) in prevalence of H. contortus among different body condition scores. Similar results to the present study were reported by (Mesele et al., 2014) and (Gonfa et al., 2013). In this current study, highest infection rate was recorded in animals with poor body condition. This is due to the fact that immune compression due to weight loss that leads to immune system of the animal disturbed at a time the animal’s unable to cope up the parasite and other disease by themselves is getting worth.

This result is inconsistent with the previous reports of (Gonfa et al., 2013) who reported prevalence of 77.21% and 84.44% in good and medium body condition animal, respectively. Similarly, (Tewodros and Girja, 2012) indicated that the rate of the parasite was higher in medium body condition sheep compared to that of good body condition with the prevalence of 81.2% and 73.6%, respectively.

The current finding also indicated that there was significant difference of the prevalence of the parasite in young and adult sheep (p=0.000) where it was higher in young sheep compared to adult sheep with the rates of 41.8% and 16.3%, respectively, but (Gonfa et al., 2013) indicated that the prevalence in young and adult sheep was 86.9% and 86.57%, respectively.

Regarding the sex distribution of the parasite, the current finding revealed that the prevalence in male and female sheep was 32.9% and 28.01%, respectively. There was no statistical significant difference in male and female (p>0.05). At the same time, (Tewodros and Girja, 2012) reported that the rate was higher in male with the prevalence of 80.9% compared to female having the rate of 77%. In contrary to the current finding, (Tilaye et al., 2013) reported that the rate of the parasite was higher in male compared to female with the prevalence of 34.11% and 39.22%, respectively. In support of the finding of (Tewodros and Girja, 2012) indicated that the rate of the parasite was higher in female than male with the prevalence of 81.9% and 76.9% respectively.

5. CONCLUSION AND RECOMMENDATIONS

Haemonchus contortus is an important blood sucking parasite of the oven’s and causes loss of production. The result of the present study indicated that H. contortus is an important disease in the study area with an observed prevalence of 29.9%. The prevalence of haemonchosis in this study is statistically associated (P<0.05) with age. However, sex and body condition was not statistically significance (P>0.05) with prevalence of haemonchosis. The distribution of the parasite were higher in poor body condition animals (37.6%) than good body condition (23.07%) and medium body condition (22.6%) and males (32.9%) than females’ (28.01%) animals, which needs great attention when
designing the control programs of the parasite. The occurrence of the parasite among the sheep of the study site might be associated with the level of immunity of the animals as most of the young animals and those medium body conditions having low immune status are affected. Based on the current finding, the following points were recommended.

a) An appropriate control and prevention methods of haemonchosis should be designed like: rotational grazing, avoiding over flocking and zero grazing.

b) The strategic deworming should focus on young and poor and medium body condition on sheep at the beginning of the grazing period to prevent the contamination of the pasture and at end so as to prevent load of parasite in dry season.

c) Improvement of husbandry practices is very important.

d) Further study on the possible risk factors should be conducted.

REFERENCES


