Prevalence of Gastrointestinal Nematodes of Sheep in Gursum Woreda of Eastern Hararghe Zone, Oromia Regional State, Ethiopia

Abdurezak Mohammed, Haimanot Disassa, Tadele Kabela and Tilahun Zenebe, Girma Kebede

Wollega University, School of Veterinary Medicine, Nekemte, Ethiopia

girmakebede27@yahoo.com

Abstract: The gastrointestinal nematodes of sheep are one of the important parasitic diseases that obviously result in reduced productivity of sheep. A cross-sectional study was conducted from November 2014 to April 2015 in Gursum Woreda, eastern Hararge, Ethiopia with the objective of determining the prevalence and intensity of gastrointestinal nematodes in naturally infected sheep and associated risk factors. A total of 384 faecal samples were examined using flotation technique. Out of the total sampled sheep, 248 (64.6 %) had a gastrointestinal nematode infection. Coprological investigation revealed that sheep in the district were infested by a variety of helminth nematodes. Strongyles were the most frequently (52.3%) recovered nematode eggs followed by Strongyloides (6.8%) and Trichuris species (1.8%). The eggs per gram (EPG) count was determined using McMaster technique showed that 95(38.3%) of the sheep were lightly infested, 88(35.5%) moderately infested and 65(26.2%) heavily infested. There was a statistically significant difference between age, body condition scores and season (p < 0.05) with prevalence and eggs per gram (EPG) counts, but no between the sexes. The study revealed that statistically significant difference (p>0.05) was not found in prevalence among the first three PAs, but there is significant difference between harashi and the others. Gastrointestinal nematodes are one of the major problems that could hamper health and productivity of sheep in the study area. Therefore emphasis should be given for the control and prevention of gastrointestinal nematode infection with further studies on species identification and larval ecology.

Key words: Ovine, Nematode, Prevalence, Eggs Per gram (EPG), Eastern Haraghe, Ethiopia

1. Introduction

Livestock systems in developing countries are characterized by rapid change, driven by factors such as population growth, increases in the demand for livestock products as incomes rise and urbanization. Livestock currently contribute about 30 percent of agricultural gross domestic product in developing countries (FAO, 2010) and is becoming the fastest-growing sub-sector of agriculture (Kefyalew and Tegegne, 2012). Africa hosts 205 and 174 million sheep and goats representing 17% and 13% of the world total small ruminant population, respectively. The population of small ruminants in sub-Saharan Africa is estimated to be 274 million (Samson and Frehiwot, 2010). The population of livestock found in Ethiopia is estimated to be 53.4 million cattle, 25.5 million sheep and 22.78 million goats (CSA, 2011).

Ethiopia is the second in Africa, and the sixth in the world, in terms of sheep population. In spite of huge population and importance of small ruminants, the country has benefited little from this enormous resource owning to a multitude of problems like poor nutrition, poor animal production systems, reproductive inefficiency, management constraints, lack of veterinary care, and disease being the most important. Disease alone accounts for mortality of 30% in lambs and 20% in adults (Sisay, 2007).

Globally parasitic diseases continue to be a major constraint for poor developing countries. They are rarely associated with high mortality and their effects are usually characterized lower outputs of animal products, by-products, manure and traction all contributing to assure food security (FAO, 2002). They are responsible for immunosuppression, enhancing the susceptibility of the animals to other diseases. A loss of US $81.8 million is reported annually due to helminth parasites in Ethiopia (Demelash et al., 2006).

Helminthes infections in small ruminants are serious problems in the developing world, particularly where nutrition and sanitation are poor. Gastro-intestinal nematode infection is one of the major health problems in the world. In developed world, the greatest component of impact by these nematode parasites is probably found in the cost of control. But their impact is greater in the sub-Saharan Africa in general and Ethiopia is particular due to ecological factors suitable for diversified hosts and parasite species (Ragassa et al., 2006). The epidemiology of gastro-intestinal (GIT) parasites in livestock varied depending on the local climatic condition, such as humidity, temperature, rainfall, vegetation and management practices. These factors largely determine the incidence and severity of various parasitic diseases in a region (Takelye, 1991).
Nematode parasites of small ruminants are primarily parasites of the gastrointestinal tract. A range of nematodes are usually present as mixed infections. The most important species are those found in the abomasum and small intestine. This includes; Haemonchus, Cooperia, Ostertagia, Bunostomum, Trichostrongylus, Oesophagostomum and Nematodirus (Hutchinson, 2009).

Clinical diagnosis of GI strongylosis is difficult, since the signs are not pathognomonic. However, diagnosis of gastrointestinal nematode infections plays a major role in investigating parasite epidemiology. The ante mortem diagnosis of nematode infections in livestock has been based on the detection of nematode eggs or larvae in the faeces by microscopic examination using the methods of flotation and/or larval culture. Quantifying of the egg per gram of feces is the best way of estimating parasite loads (Roeb, 2013).

Although considerable work has been done on endoparasites of sheep in many parts of Ethiopia, there was no previous study carried out on prevalence and intensity of ovine gastrointestinal nematodes in the present study area, where mixed crop-livestock production system is the main form of agriculture. On the other hand knowing the current situation of GIT nematode in the area could be the basis for all possible actions including its control and prevention.

Therefore, the current study was carried out to determine the prevalence and intensity of ovine gastrointestinal nematodes and associated risk factor in Gursum Woreda, eastern Ethiopia to obtain baseline data so as to design effective control options.

2. Materials and Methods

2.1. Study area

The study was conducted from November 2014 to April 2015 in 4 selected peasant association Ilalam, ibsa and harashi and abadir of gursum Woreda, Eastern Haraghe, Ethiopia. The area is located, 579 km east of Addis Ababa. The estimated animal population in the area is about 90121 cattle, 25352 sheep, 65665 goats, 13885 donkeys, 6870 camels and 52886 chickens. Topographically, it is situated at altitude of 1200 - 2950 m above sea level with the mean annual minimum and maximum temperature 16°C and 27% respectively. There are four seasons; a short rain season (from March to mid-May), a short dry season (from end of May to end of June), a long wet season (early July to mid-October) and a long dry season (end of October to end of February). The Gursum area receives an average annual rain fall of approximately 700 mm, with a bimodal distribution pattern, picking in mid-April and mid-August (GWADB, 2014).

2.2. Study population

The study populations were local sheep kept under traditional extensive management system consisting of different age, sex and body condition groups from four purposely selected peasant associations (PAs), of Gursum woreda.

2.3. Sample size determination and Sampling method

The sample size was determined by the formula described by Thrusfield (2007). Accordingly, at 95% confidence level and precision of 5% the total sample size was determined to be 384. Since there was no Research carried out previously in the study area. Four peasant associations were purposively selected and equal proportions of samples were collected from each PAs, but the house hold and animals were selected by simple random sampling method. The fecal samples were collected from individual study animals using simple random sampling.

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

Where: n= sample size  
\[ P_{exp} = \text{minimum expected prevalence} = 50\% \]  
1.96= the value of Z at 95% confidence interval  
\[ d = \text{desired accuracy level at 95% confidence interval} \]

2.4. Study design and study methodology

A cross-sectional type of study was used for prevalence determination of sheep GIT nematode by coprological examination. The samples were collected from different age, sex and body condition within two seasons (dry and wet). Age was determined for both sexes based on dentition. Those animals with the age of less than one year were considered as young while those greater than or equal to one were considered as adults according to the classification of age groups according to (Kumssa et al., 2010). Body condition scoring of sampled animal was carried out according to the method described by (Kripali et al., 2010) and categorized into three scores as poor, medium and good.

2.4.1. Parasitological Study

A fresh faecal sample of approximately 10 gram was collected directly from the rectum of 384 sheep using gloved finger. Each sample was clearly labeled with animal identification, date and place of collection. The faecal samples were placed in a universal bottle, labeled and 10% formalin was added to preserve parasite eggs and transported to Jigjiga university Veterinary parasitology Laboratory for analysis. Those samples which were not examined within 24 hr of arrival at laboratory were stored at +4°C and examined the next day early in the morning. The collected samples were subjected to qualitative flotation and quantitative McMaster egg counting parasitological techniques using saturated sodium chloride (specific gravity of 1.2) as flotation fluid.
The eggs of different parasite species were identified using keys given by Soulsby (1982). Those samples found positive for gastrointestinal nematode were subjected to EPG counting to determine the number of egg per gram of feces (EPG) and performed according to the procedure described by Urquhart et al., (1996). The degree of infection was categorized as light, moderate and severe (massive) according to their egg per gram of faeces (EPG) counts. Egg counts from 50-799, 800-1200 and over 1200 eggs per gram of feces were considered as light, moderate and massive infection, respectively (Soulsby, 1986).

2.5. Data management and Analysis

The raw data was entered into Microsoft excel spread sheet and analyzed using SPSS statistical software version 11. Descriptive statistics were used to quantify the problems and Chi-square test and Odds ratio was used to compare association between independent variables (sex, age, body condition scores and season) and parasitism. Confidence interval was set at 95% and statistically significant association between variable was considered to exist if the computed p-value is less than 0.05.

3. Results

The overall prevalence of ovine gastrointestinal nematodes was 64.6% (248/384). A prevalence of 66.9% in females, 60.8% in males, 56.5% in adult, 83.5% in young, 83.3% in poor, 67.4% in medium and 50% in good, 61% in dry season and 74.8% in wet season were observed.

Table 2. Prevalence of gastrointestinal nematodes of sheep at different PAs of the study area

<table>
<thead>
<tr>
<th>PAs</th>
<th>No. of examined samples</th>
<th>No. of positive</th>
<th>Prevalence (%)</th>
<th>(p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ibsa</td>
<td>96</td>
<td>57</td>
<td>59.4</td>
<td>0.657</td>
</tr>
<tr>
<td>Elalem</td>
<td>96</td>
<td>60</td>
<td>62.5</td>
<td>0.883</td>
</tr>
<tr>
<td>Abadir</td>
<td>96</td>
<td>58</td>
<td>60.4</td>
<td>0.014</td>
</tr>
<tr>
<td>Harashi</td>
<td>96</td>
<td>73</td>
<td>76.1</td>
<td>0.014</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>248</td>
<td>64.6</td>
<td></td>
</tr>
</tbody>
</table>

Of all the sheep examined in the four PAs, samples from harashi (76.1%) showed the higher GIT nematode infection prevalence and samples from ibsa (59.4%) showed lower infection prevalence recorded. There was no statistically significant difference (P > 0.05) in prevalence of gastro-intestinal nematode infection of sheep between the three sites (ibsa, elalem and abadir), but there was statistically significant difference between harashi and other three sites (P < 0.05) (Table 2).

Table 3. The prevalence of particular ovine gastrointestinal nematodes infection in the area

<table>
<thead>
<tr>
<th>Nematode egg types</th>
<th>No.animals examined</th>
<th>No. of Posatives</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongyle</td>
<td>384</td>
<td>201</td>
<td>52.3</td>
</tr>
<tr>
<td>Strongyloides</td>
<td>384</td>
<td>26</td>
<td>6.8</td>
</tr>
<tr>
<td>Trichuris</td>
<td>384</td>
<td>7</td>
<td>1.8</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>248</td>
<td>64.6</td>
</tr>
</tbody>
</table>

The predominant GIT nematodes identified in sheep in study area were strongyle, strongyloides and trichuris with overall prevalence of 52.3%, 6.8% and 1.8% (Table 3).

Table 4. Mixed types of nematodes eggs in sheep

<table>
<thead>
<tr>
<th>Nematode eggs types</th>
<th>Number examined</th>
<th>Numbers posatives</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongyle+strongyloides</td>
<td>384</td>
<td>6</td>
<td>2.1</td>
</tr>
<tr>
<td>Strongyle+trichuris</td>
<td>384</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Strongyle+strongyloide+trichuris</td>
<td>384</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>14</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Mixed nematode eggs were noticed in some of the slides examined beside the single type of nematode eggs, with an overall prevalence of 3.6% (14) in sheep. Among these, strongyle type eggs and strongyloides eggs coexist most of the time, with an overall prevalence of 2.1% (Table 4)
Table 5. Prevalence of ovine gastrointestinal nematodes by sex, age, body condition and season.

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>No. of examined</th>
<th>No. of positive</th>
<th>Prevalence (%)</th>
<th>$X^2$ (P-value)</th>
<th>95% Conf. Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Young</td>
<td>115</td>
<td>96</td>
<td>83.5</td>
<td>27.75 (0.000)</td>
<td>.1486439-.4447675</td>
</tr>
<tr>
<td>Adult</td>
<td>269</td>
<td>152</td>
<td>56.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>248</td>
<td>64.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>236</td>
<td>158</td>
<td>66.9</td>
<td>1.49 (0.221)</td>
<td>.499727 - 1.174279</td>
</tr>
<tr>
<td>Male</td>
<td>148</td>
<td>90</td>
<td>60.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>248</td>
<td>64.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body condition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>72</td>
<td>60</td>
<td>83.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>184</td>
<td>124</td>
<td>67.4</td>
<td>24.52 (0.012)</td>
<td>.2068612 -.8258893</td>
</tr>
<tr>
<td>Good</td>
<td>128</td>
<td>64</td>
<td>50</td>
<td>24.52 (0.000)</td>
<td>.0983225 -.4068245</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>248</td>
<td>64.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Season</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry</td>
<td>281</td>
<td>171</td>
<td>61</td>
<td>6.60 (0.000)</td>
<td>1.149729 - 3.156694</td>
</tr>
<tr>
<td>Wet</td>
<td>103</td>
<td>77</td>
<td>74.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>248</td>
<td>64.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Females and males were found to be infested with a prevalence of 66.9% and 60.8%, respectively, but there was not significant variation (P>0.05) between the two sexes (Table 5). Adult and young animals were found to be infested with a prevalence of 56.5% and 83.5%, respectively with statistically significant difference (p<0.05) (Table 5). Infection prevalence was significantly higher in animal with poor body condition when compared to that of medium and good body condition scores (P < 0.05). The overall infection prevalence according to body condition grades, 83.3%, 67.4% and 50% with poor, medium and good, respectively (Table 5).

Analysis of prevalence of gastrointestinal nematode infections of sheep by season showed that there was statistically significant variation between the two seasons (P < 0.05). The higher infection prevalence was recorded during wet season (Table 5).

Table 6: Degree of severity of nematodes in infected sheep based on FEC at the study area

<table>
<thead>
<tr>
<th>Intensity of infection</th>
<th>Examined NO.sheep (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>95(38.3)</td>
</tr>
<tr>
<td>Moderate</td>
<td>88(35.5)</td>
</tr>
<tr>
<td>Heavy</td>
<td>65(26.2)</td>
</tr>
<tr>
<td>Total</td>
<td>248</td>
</tr>
</tbody>
</table>

Egg counts from 50-799(light), 800-1200(moderate) and over 1200(massive)(Soulsby, 1986)

A total of 248 fecal samples that were positive by qualitative parasitological techniques were subjected to EPG count using McMaster egg counting technique. Accordingly, 95(38.3%), 88(35.5%) and 65(26.2%) were found to be lightly, moderately and massively infested respectively (Table 6).

Table 7: Degree of gastrointestinal nematodes infection with different risk factors (EPG) Category (%)

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Degree of infection</th>
<th>Low (%)</th>
<th>Moderate (%)</th>
<th>Heavy (%)</th>
<th>$X^2$ (p-value)</th>
<th>95% Conf. Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Female</td>
<td>47(29.7)</td>
<td>53(33.5)</td>
<td>58(36.7)</td>
<td>1.49(0.221)</td>
<td>.499727 - 1.174279</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>48(53.3)</td>
<td>35(38.9)</td>
<td>7(7.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Young</td>
<td>24(25)</td>
<td>35(36.5)</td>
<td>37(38.5)</td>
<td>27.75 (0.000)</td>
<td>.1486439 -.4447675</td>
</tr>
<tr>
<td></td>
<td>Adult</td>
<td>71(46.7)</td>
<td>53(34.9)</td>
<td>28(18.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body condition</td>
<td>Poor</td>
<td>12(20)</td>
<td>16(26.7)</td>
<td>32(53.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>51(41.1)</td>
<td>43(34.7)</td>
<td>30(24.2)</td>
<td>24.52 (0.012)</td>
<td>.2068612 -.8258893</td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td>32(50)</td>
<td>29(45.3)</td>
<td>3(4.7)</td>
<td>24.52 (0.000)</td>
<td>.0983225 -.4068245</td>
</tr>
<tr>
<td>Season</td>
<td>Dry</td>
<td>81(47.4)</td>
<td>54(31.6)</td>
<td>36(21.1)</td>
<td>6.60 (0.012 )</td>
<td>1.149729 - 3.156694</td>
</tr>
<tr>
<td></td>
<td>Wet</td>
<td>14(18.2)</td>
<td>34(44.2)</td>
<td>29(37.7)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This study has shown that parasite burden is highly related to the body condition of the animals and the difference was statistically significant (p<0.05). This can be shown by the fact that severely affected animals were high in numbers with poor body condition as compared to good body condition. As
well, the difference in the degree of EPG between young and adult sheep was statistically significant (p<0.05), younger animals were found to harbor heavier parasite load than adult ones. On the other hand, sex had no significant association with EPG (p>0.05) in the study (Table 7).

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>NO.of N</th>
<th>NO.of</th>
<th>Prev(%)</th>
<th>OR</th>
<th>CI</th>
<th>P-value</th>
<th>examined</th>
<th>positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Young</td>
<td>115</td>
<td>96</td>
<td>83.5</td>
<td>1</td>
<td>0.25712</td>
<td>0.1486</td>
<td>4447675</td>
</tr>
<tr>
<td>BCS</td>
<td>Adult</td>
<td>269</td>
<td>152</td>
<td>56.5</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Poor</td>
<td>72</td>
<td>60</td>
<td>83.3</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>184</td>
<td>124</td>
<td>67.4</td>
<td>0.413133</td>
<td>0.2068612</td>
<td>0.82558893</td>
<td>0.012</td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td>128</td>
<td>64</td>
<td>50</td>
<td>0.2</td>
<td>0.0983225</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Season</td>
<td>Dry</td>
<td>281</td>
<td>171</td>
<td>61</td>
<td>1</td>
<td>1.90508</td>
<td>1.149729</td>
<td>3.156694</td>
</tr>
<tr>
<td></td>
<td>Wet</td>
<td>103</td>
<td>77</td>
<td>74.8</td>
<td>1.149729</td>
<td>1.149729</td>
<td>3.156694</td>
<td>0.00</td>
</tr>
</tbody>
</table>

- OR=Odds ratio, CI=Confidence interval, Prev= Prevalence

4. Discussion

Many studies showed that gastrointestinal nematodes are the leading causes of productivity losses in small ruminant production in Ethiopia (Demelash et al., 2006). The present study revealed the existence of major GIT nematode parasites with an overall prevalence of 64.6% in sheep originating from this area which were being parasitized at least by one type of gastrointestinal nematodes. Dissimilar findings were reported in different parts of the country including 16.4% in Central Ethiopia (Bekele et al., 1992), 98.9% in Southern Ethiopia (Amenu, 2005), 24.7% in Western Oromiya, Ethiopia (Takele et al., 2013), 97.03% strongyles type, 45.22% strongyloides and 30.25% Trichuris species in eastern part of Ethiopia (Abebe and Eseyas, 2001).

This difference could be due to the sample size considered and types of techniques utilized and the prevalence varies greatly from region to region, corresponding to ecological and climatic diversity as well as the existing host ranges (Njau et al., 1990).

Therefore, the current prevalence of gastrointestinal nematodes results agrees with reports of previous studies conducted in Ethiopia as 56.6% strongyles, 8.2% strongyloides and 5% trichuris in Debre Zeit (Tigist, 2008); 66.6% strongyles type and 3.3% Trichuris species in Bedele (Temesgen, 2008); 64% strongyles type and 7.4% strongyloides and 3.7 Trichuris (Diriba and Birhanu, 2013) in asella, southeastern Ethiopia and 42.25% strongyles type in Kelela (Tesfaye, 1998).

This study showed that strongyles were the most prominent among those gastrointestinal nematode parasites of sheep. This finding is in accordance with a number of findings obtained by different researchers in which Strongyle species were dominant (Bikila et al., 2013; Abebe and Eseyas, 2001) reported a high prevalence rate of Strongyle infection in Western Oromia, Gechi district of south West Ethiopia, Eastern part of Ethiopia, respectively. The current prevalence of gastrointestinal Strongyles agrees with reports of previous studies conducted in different parts of Ethiopia by Tigist (2008) and Temesgen (2008) who reported prevalence of 56.6% and 66.6% respectively.

Therefore, strongyles are gastrointestinal nematodes of greatest importance in sheep, and causes serious direct and indirect losses in most parts of the country according to the study carried out by Haileleul (2002) in Wolayta Soddo and Diriba and Birhanu, 2013 in Asella, (Regassa et al., 2006; Dagnachew et al., 2011; Kumsa et al., 2011).

The high prevalence of strongyles may be due to the suitability of the climatic condition of Gursum district for survival and transmission of the parasites. Strongyloides and Trichuris species were poorly represented. This agrees with the idea of Urquhart et al., (1996), (Diriba and Birhanu, 2013) which indicates only young are more susceptible to these parasites while adults usually develop certain immunity.

The prevalence of Strongyloides species in the present study was 6.8% which agrees with the report of Tefera et al., (2011) from Bedelle and Tigist (2008) from Debre Zeit,who reported the prevalence of Strongyloides species as 13.04% and 8.2%, respectively.

The prevalence of Trichuris species in the present study was 1.8% and this finding was in route with work of Tigist (2008), Temesgen (2008), Ragassa et al (2006), Diriba and Birhanu, (2013); With prevalence of 5%, 3.3%, 4.5% and 3.7%, respectively. The current finding however was lower as compared to 30.3% from Eastern part of Ethiopia by Abebe and Eseyas (2001).
The present study has shown, the presence of mixed infection of two or more nematodes genera in single host and this is in agreement with the findings of other researchers in the country (Abebe and Esayasu, 2001; Haileleul, 2002; Regassa et al., 2006; Tefera et al., 2011; Kumsa et al., 2011; Ageyi, 2003; Githigi et al., 2005; Waruru et al., 2005).

In this study, no significant variation was observed between male and female despite slightly higher infection noticed in female sheep. The absence of statistical association between sex and prevalence of GIT nematodes is in agreement with that of (Assefa and Sissay, 1998; Keyyu et al., 2003; Regassa et al., 2006; Ghanem et al., 2009). This also agrees with report by Armour (1980) significant difference was reported in animals reared in different geographical areas. Yet, it is in disagreement with other reports including (Maqsood et al., 1996) and (Urquhart et al., 1996) who found higher infections in female animals than males with a significant difference between them. It is assumed that sex is a determinant factor influencing prevalence of parasitism (Maqsood et al., 1996) and females are more prone to parasitism during pregnancy and per-parturient period due to stress and decreased immune status (Urquhart et al., 1996; Keyyu et al., 2003; Regassa et al., 2006).

In the current study young were found more frequently infected than adult sheep. The statically significant difference (P < 0.05) was recorded between the two age groups. This might be due to new born and younger sheep; they lack strong immunity as in the adults. The possible explanation is that in adult sheep, after primary infection, rapid solid immunity is acquired. In fact, sheep continually exposed to infection are at low risk provided the rate of acquisition of infective larvae is sufficient to stimulate satisfactory response, and no cause of clinical illness (Diriba and Birhanu, 2013).

There are also special conditions encountered during peri-perturient rise in nematode eggs excretion, as early as two weeks before lambing, and persisted up to eight weeks post-partum when lambing, and took place during the wet seasons is the idea of Ng’ang’a et al. (2006). Thus, pregnant or lactating ewes became the major source of infections for the newborn lambs. In the same manner, other studies in Africa have shown that the age and immune status of the host animal have significant influences on nematode egg output (Magona and Musisi, 2005). This finding is in agreement with the hypothesis that adult animals can acquire immunity against GIT parasites which has been supported experimentally by different studies (Knox, 2000; Raza et al., 2007; Dagnachew et al., 2011; Taswar et al., 2010; Regassa et al., 2006; Negasi et al., 2012).

In this study, a significant difference was observed in prevalence of nematode infection in relation to body condition score where a higher prevalence of gastrointestinal nematodes parasites were recorded in poor and moderate body as compared to animals sheep with good body condition. This finding agrees with (Van Wyk et al., 2006; Negasi et al., 2012; Gonfa et al., 2013; Radostitis et al., 2006; Odoi et al., 2007; Knox et al., 2006).

In the present study significant difference (p>0.05) was recorded between the prevalence and season. High prevalence was observed during rainy seasons as compared to dry seasons which is in agreement with (Nginyi et al., 2001; Vlassoff et al., 2001; Keyyu et al., 2005). This is because renewal of rainy season is the most favorable period for larval development and transmission on pasture (Ageyi et al., 1991).

In dry and hot areas, except in irrigated or other permanently wet pasture, transmission is restricted to the rainy season and the only means of carry-over of infection from one rainy season to another is through animals harbouring adult worms and/or arrested (hypobiotic)larvae (Chiejina, 1994). Survival and transmission of free living stage of nematode parasites is influenced by micro-climatic factors within the faecal pellets and herbage which is in agreement with (Urquhart et al., 1996).

The degree (severity) of parasitic infestation was determined from the total fecal egg count (EPG). An effort was also made to see the existence of difference in degree of parasitic infestation with the variation of age, sex, body condition and season.

The results for relative severity of parasitic infestation in studied animals 95(38.3%), 88(35.5%) and 65(26.2%) are in accordance with study in and around Bako Town, Western Ethiopia where 29.6 %, 54.1% and 16.6% were lightly, moderately and massively infested, respectively (Ayele et al.,2014 ), 40.5% were lightly, 48.5% were moderately and 10.9%were massively affected Tefera et al., (2011) in and around Bedelle.

In the current finding, even if the mean EPG was slightly greater in females than males there was not significantly different between the two sex which is in agreement with that of (Keyyu et al.,2003) in southern Tanzania, and (Abebe and Esayasu, 2001; Tefera et al., 2011; Bikila et al.,2013) in Ethiopia.

In the present, the EPG were high in young with significant difference from adult age group. This follows with the result reported by Hansen and Perry (1994), Sissay et al., (2007), Bikila et al., (2013) Eastern Ethiopia. It also agree with Urquhart et al. (1996) and Vlassoff et al. (2001) who suggested that younger animals were more prone to infection compared to old ones. This observation is disagrees.
with previous works in Ethiopia and Kenya (Githigia et al., 2005) that stated no association of degree of EPG and age of the animals as well as from semi-arid parts of Kenya that reported higher intensity of EPG in older sheep (Waruru et al., 2005).

In the current finding, EPG were high in poor than good and medium body condition and significantly different from good body condition. This result corresponds with reports of (Keyyu et al., 2003; Van Wyk et al., 2006).

EPG were affected by season with significant rise in wet season. Likewise, seasonal fluctuations in nematode faecal egg counts which followed seasonal rainfall pattern were reported from different studies in the country (Fikru et al., 2006; Sissay et al., 2007). Similar to the present result, seasonal influences on worm faecal egg counts were reported in areas with distinct rainy and dry seasons in Kenya (Nginyi et al., 2001) and Tanzania (Keyyu et al., 2005).

The effect of seasons on EPG was significant (P < 0.05). EPG started to increase in wet season to reach the highest level when the rainfall was highest. Subsequently, the EPG decreased during the dry season. This is because of the nematode (L3) larvae were greatest during wet season (Ahmed, 2010). Once the rainy season starts and environmental conditions become favourable for the survival of the infective larvae, the hypobiotic larvae mature and there is a continuous cycle of infection between the host and pasture for as long as these conditions last (Desalegn, 2005).

5. Conclusion and Recommendations

In the present study, the overall prevalence of gastro intestinal nematodes was 64.6% in sheep. The predominant GIT nematodes parasites identified were strongyle, strongylloides and trichuris spp. Conclusively gastrointestinal nematodes were prevalent in Gursum Woreda, and sheep are infected with diversified gastrointestinal nematodes that can seriously affect the health and productivity of the animals. These parasites affected all age and sex groups and fluctuation of gastrointestinal nematode infections were associated with seasonal changes, exhibiting highest prevalence in wet season. Age, body condition and seasonal changing aspects are utmost noticeable risk factors related with gastrointestinal nematode infection. Furthermore, weak status of animal health services and lack of proper management, crop-livestock mixed farming is highly practiced, and most land is cultivated so that many species of animals are kept together on marginal and a piece of land. They give the first line to draught animals and forced sheep to graze behind on overstocked areas which lead them to graze close to the ground and on fecal materials, causing in the uptake of higher numbers of infective larvae. Put together, the finding suggests that Gursum Woreda is favorable for the continual maintenance and successive transmission of helminth parasites to vulnerable hosts. Many animals were sub-clinically infected without attracting awareness of farmers to undertake control measures.

Based on the above conclusion and the following recommendations are forwarded:

- Strategic use of anthelmintic and good management should be practiced
- Appropriate parasitosis control strategies need to be applied in the area to reduce the infestation risk in sheep
- Detailed study should be conducted to clearly identify parasitic fauna using faecal culture and postmortem examination in the study area
- Study should be carried out on the efficacy and resistance of the anthelmintic drugs
- Awareness should be given for the farmers on the risk of the parasitic infestation
- Separating the most susceptible young animals from adults, which is a possible source of contamination

*Corresponding Author:
Girma Kebede
Department of Microbiology and Public Health, School of Veterinary Medicine, Wollega University, Nekemte, Ethiopia, Telephone: 0929038290, P.O. Box: 395, E-mail: girmakebede27@yahoo.com

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