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

Abdurezak Mohammed [1*], Haimanot Disassa[1], Tadele Kabeta[1] and Tilahun Zenebe[1], Girma Kebede[1]

[1]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.
[Abdurezak Mohammed, Haimanot Disassa,Tadele Kabeta,Tilahun Zenebe and Girma Kebede. **Prevalence of Gastrointestinal Nematodes of Sheep in Gursum Woreda of Eastern Hararghe Zone, Oromia Regional State, Ethiopia.** *Researcher* 2015;7(8):45-54]. (ISSN: 1553-9865). http://www.sciencepub.net/researcher. 8

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 (Roeber, 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 maxium 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.

$$n=\frac{1.96^2 \text{xpexp } (1\text{-pexp})}{d^2}$$

Where: n= sample size

Pexp= minimum expected prevalence=50%

1.96= the value of Z at 95% confidence interval

d= 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 described by (Charles, 2006). The eggs of different parasite species were identified using keys given by Soulsby (1982).

Those samples found positive for gastro-intestinal nematode was 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

PAs	No. of examined samples	No. of positive	Prevalence (%)	(p-value)
Ibsa	96	57	59.4	
Elalem	96	60	62.5	0.657
Abadir	96	58	60.4	0.883
Harashi	96	73	76.1	0.014
Total	384	248	64.6	

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 pre-valence 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

Nematode egg types	No.animals examined	No. of Posatives	Prevalence (%)
Strongyle	384	201	52.3
Strongyloides	384	26	6.8
Trichuris	384	7	1.8
Total	384	248	64.6

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

Nematode eggs types	Number examined	Numbers posatives	Prevalnce(%)
Strongyle+strongyloides	384	6	2.1
Strongyle+trichuris	384	4	1
Stongyle+strongyloide+trichuris	384	4	1
Total	384	14	3.6

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.

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

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

Intensity of infection	Examined NO.samples (%)
Light	95(38.3)
Moderate	88(35.5
Heavy	65(26.2)
Total	248

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 (%)

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

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).

The difference in the degree of EPG between dry and wet season was statistically significant ($p<0.05$), fecal egg output increased during rainy season as compared to dry season (table 7).

Table 8: Analysis of risk factors for the occurrence of ovine GIT nematode in study area

Risk factor	NO.of	NO.of	Prev(%)	OR	CI	P-value examined positive
Age	Young	115	96	83.5	1	
	Adult	269	152	56.5	0.25712	0.1486 - 4447675 0.00
BCS	Poor	72	60	83.3	1	
	Medium	184	124	67.4	0.413133	0.2068612 -.8258893 0.012
	Good	128	64	50	0.2	0.0983225 -.4068245 0.00
Season	Dry	281	171	61	1	
	Wet	103	77	74.8	1.90508	1.149729 - 3.156694 0.00

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 Esayas, 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 Strongloides 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 Strongloides 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; Agyei, 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; Radostits *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 (Agyei *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, strongyloides 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 anthelminthic 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

References

1. Food and Agriculture Organization (FAO). Breeding strategies for sustainable management of animal genetic resources. Animal Production and Health Guidelines, No.3. Food and Agriculture Organization of the United Nations, Rome, 2010: Italy.
2. Kefyalew A. and Tegegne F. The effect of climate change on ruminant livestock population dynamics in Ethiopia. Bahir Dar University, college of agriculture and environmental sciences, department of animal production and technology, Bahir Dar, Ethiopia and Mizan-Tepi University, college of agriculture and natural resources, department of animal sciences, Ethiopia, Livestock Research for Rural Development, 2012: Pp: 24(10).
3. Samson L. and Frehiwot M. Prevalence of Small Ruminant Trypanosomosis and Tsetse Fly Challenge in Upper Didessa Vally, Ethiopia. Adami-Tullu Agriculture Research Center, Ziway, Ethiopia, 2010: Pp: 215.
4. Central Statistical Authority (CSA). Agricultural sample survey 2010-2011. Report on livestock

and livestock characteristics, Statistical Bulletin, 2011: No. 505. Addis Ababa, Ethiopia.

5. Sisay M. Helminth Parasites of Sheep And Goats in Eastern Ethiopia. Epidemiology and Anthelmintic Resistance and its Management. Faculty of Veterinary Medicine and Animal Science. Department of Biomedical Sciences and Veterinary Public Health Division of Parasitology and Virology Uppsala Sweden Doctoral thesis Swedish University of Agricultural Sciences, 2007: Pp: 11-12.
6. Food and Agriculture Organization (FAO). Biological control of nematode parasites of small ruminants in Asia.FAO Animal Production and Health Paper, 2002:Pp: 1-100.
7. Demelash B, Yilma J, Hassen C. Ovine helminthosis, a major health constraint to productivity of sheep in Ethiopia. *Anim. Health Res. Rev.* 2006: 7(1/2): Pp: 107–118.
8. Regassa F, Teshale S, Reta D, Yosef K. Epidemiology of gastrointestinal parasites of ruminants in Western Oromia, Ethiopia. *Int. J. Appl. Res. Vet. Med*, 2006: *4(1).* Pp: 51–57.
9. Takelye B. Epidemiology of endoparasites of small ruminants in sub-Saharan Africa. In: Proceedings of the 4th National livestock Improvement Conference, Addis Ababa, Ethiopia, 1991: Pp: 7-15.
10. Hutchinson G. Nematode Parasites of Small Ruminants, Camelids and Cattle diagnosis with emphasis on anthelmintic efficacy and resistance testing formerly at Elizabeth Mcarthur agricultural Institute, New South Wales, department of primary Industries, 2009: Pp: 1-61.
11. Roeber F, Jex R. and Gasser R. Impact of gastrointestinal parasitic nematodes of sheep and the role of advanced molecular tools for exploring epidemiology and drug resistance-an Australian perspective. The University of Melbourne, *Australia, Journal of pharmaceutical policy and practice*, 6: 153. 13. Pugh, D.G., 2002. Sheep and Goat Medicine. 1st ed.tCollege of Veterinary Medicine, Auburn University, Alabama, 2013: Pp: 88-89.
12. Gursum Woreda Agricultural Development Beureau GWADB. 2014.
13. Thrusfield M. Veterinary Epidemiology. Blackwell Science Limited, USA, 2007: Pp: 180-181, 224-225.
14. Kumsa B, Tolera A, Nurfeta A. Comparative efficacy of seven brands of albendazole against naturally acquired gastrointestinal nematodesin sheep in Hawassa, Southern *etghiopia, Turk. J. Vet. Anim. Sc,* 2010: 34.Pp:417-425.
15. Kripali K, Rajput S, Jitendra V, Shivan V.and G. Pritee G. Prevalence of helminthes in small ruminants in Tarai region of Uttarakhand. Veterinary World, 2010: 2: Pp:265-266.
16. Charles M. Diagnostic veterinary Parasitology. 3 red. Stilous Elsevier science.d 2006.
17. Soulsby L. Helminthes, Arthropods and Protozoa of Domesticated Animals, 1982: 7th Ed. The English Language Book Society and Ballière Tindall, London, pp: 809.Pp:521–531.
18. Urquhart M, Armour J, Duncan L, Dunn M, Jennings W. Veterinary parasitology, 2nd ed. The Faculty of Veterinary Medicine, University of Glasgow Scotland, 1996: Pp: 4-137.
19. Soulsby E. Helminthes, arthropods and protozoa of domestic animals 7th Edition.Bailliers Tindall, London, UK, 1986: Pp: 247-250.
20. Bekele T, Woldeab W, Lahlou-Kassi A, Sherington J. Factors affecting mortality and morbidity on-farm and on-station in the Ethiopian highland sheep. *Acta. Trop.* 1992: 52:Pp:99–109
21. Amenu A. Epidemiology of gastrointestinal tract nematodiasis of small ruminants in three different agro-ecological zones of Southern Ethiopia. Master of Science Thesis in Tropical Veterinary Epidemiology, School of Graduate Studies, Addis Ababa University. 2005: Pp: 86.
22. Takele S, Yacob H. and Getachew T. Epidemiology of gastrointestinal nematodes of Horro sheep in Western Oromiya, Ethiopia. Addis Ababa University, College of Veterinary Medicine and Agriculture, Department of Pathology and Parasitology, 2013: P.O. Box 34, Debre Zeit, Ethiopia.
23. Abebe W, Esayas G. Survey of ovine and caprine intestinal helminthosis in eastern part of Ethiopia during the dry season of the year. *Rev. Vet. Med.* 2001: 152(5): Pp: 379–384.
24. Diriba L. and Birhanu A. Prevalence of ovine gastrointestinal nematodes in and around Asella, South Eastern Ethiopia Asella Regional Veterinary Laboratory P. O. Box 212, Asella, Ethiopia. *J. Vet. Med. Anim. Health*. 2013: Pp: 223-228.
25. Njau C, Scholtens G, Dasali O. Parasites of the sheep. International Livestock Centre for Africa, Debre-Zeit station, Ethiopia. *Prev. Vet. Med.* 1990: 9.Pp: 267–277.
26. Tigist T. Gastrointestinal parasitosis of small ruminants in and around Debre Zeit. DVM thesis HU, FVM, Haramaya, Ethiopia. 2008.
27. Temesgen T. Study on prevalence of ovine gastrointestinal parasite in and around Bedele DVM thesis, HU, FVM, Haramaya, Ethiopia. 2008.

28. Tesfaye H. Ovine and bovine helminthiasis in Kelala (S. Wollo). Ethiopian Veterinary Association Proceedings of the 12th Conference. Addis Ababa, Ethiopia, June,1998: 30-34.
29. Bikila E, Yeshitla A, Worku T, Teka F. and Benti D. Epidemiology of Gastrointestinal Parasites of Small Ruminants in Gechi District, Southwest Ethiopia. Advances in Biological Research. 2013: 7 (5): Pp: 169-174.
30. Haileleul N. Study on prevalence of GIT helminthes of small ruminants in and around Wolayta Soddo, southern Ethiopia.DVM Thesis, Faculty of veterinary medicine, Addis Ababa university, Debre-Zeit. Ethiopia, 2002: Pp: 353.
31. Dagnachew S, Amamute A, Temegen W. Epidemiology of gastrointestinal helminthiasis of small ruminants in selected sites of North Gondar zone, Northwest Ethiopia. Ethiop. *Vet. J.* 2011):15 (2): Pp:57-68.
32. Kumsa B, Tadesse T, Sori T, Dugum R, Hussen B. Helminths of sheep and goats in Central Oromia (Ethiopia) during the dry season. *J Anim. Vet. Adv,* 2011: 10(14).Pp:1845- 1849.
33. Tefera M, Batu G, Bitew M. Prevalence of Gastrointestinal Parasites of Sheep and Goats In And Around Bedelle, South-Western Ethiopia. *Internet J. Vet. Med,* 2011: 8:Pp: 2.
34. Ageyi A. Epidemiological studies on gastrointestinal parasitic infection of lambs in the costal savanna regions of Ghana. *Trop. Anim. Health Prod*., 2003: 35: Pp: 207-217.
35. Githigia M, Thamsborg M, Maingi N, Munyua K. The epidemiology of gastrointestinal nematodes in Goats in the low potential areas of Thika District, Kenya. *Bull. Anim. Health Prod. Afr*, 2005: 53(1): Pp:5-12.
36. Waruru M, Mutune N, Otieno O. Gastrointestinal parasite infections of sheep and goats in a semi-arid area of Machakos District, Kenya. Bull. Anim. Health Prod. Afr, 2005: 53(1):Pp:25-34.
37. Assefa D, Sissay L. Preliminary investigation on the seasonal occurrence of parasites around Sheno: In: 5th national conference of society of animal production, Addis Ababa Ethiopia, 1998: Pp: 123-137.
38. Keyyu D, Kassuku A, Kyvsgaard C, Willingham W. AL 3rd: Gastrointestinal nematodes in indigenous zebu cattle under pastoral and nomadic management systems in the lower plain of Southern highlands of Tanzania. *Vet Res Commun,* 2003: 27(5): Pp: 371-380.
39. Ghanem M, Naser H, Abdelkader H, Heybe A. An epidemio coprological study of protozoan and nematode parasites of ruminants in tropical semi-arid district of Somali 1 and (Northern Of Somalia). *Vet. Med. J. 3rd Sci. Congres*s. 10-12 May, 2009: Pp: 768-787.
40. Armour J. The epidemiology of helminthes diseases in farm animals. *Vet. Parasitol*.1980: 6: Pp: 7-46.
41. Maqsood M, Igbai Z, Chaudhry H. Prevalence and intensity of haemonchosis with reference to breed, sex and age of sheep and goats. *Pakistan Vet. J*, 1996: 16.Pp:41-43.
42. Ng'ang'a J, Kanyari W, Maigi N, Munyua K. The effect of weather on the occurrence and magnitude of peri-parturient rise in trichostronglid nematode egg output in Dorper in a semi-arid area of Kajiado Districct of Kenya. *Trop. Anim. Health Prod*, 2006: 38.Pp:389-395.
43. Magona W, Musisi G. Influence of age, grazing system, season and agro-climatic zone on the prevalence and intensity of gastro intestinal stronglosis in Ugandan goats. Small ruminant research. 2005.
44. Knox P. Development of vaccines against gastrointestinal nematodes. Parasitol. 2000: Pp: 120:43-61
45. Raza A, Iqbal Z, Jabbar A, Yaseen M. Point prevalence of gastrointestinal helminthiasis in ruminants in southern Punjab. *Pakistan J. Helminthol*. 2007: 81.Pp: 323– 328.
46. Taswar Z, Ahmad S, Lashari H, Hayat S. Prevalence of Haemonchus contortus in sheep at Research Centre for Conservation of Sahiwal Cattle Jehangirabad, District Khanewal, Punjab, Pakistan. Pakistan J. Zool, 2010: 42:Pp: 735-739.
47. Negasi W, Bogale B, Chanie M. Helminth parasites in small ruminants: prevalence, species composition and associated risk factors in and Around Mekelle Town, Northern Ethiopia. Europ. *J. Biol. Sci.* 2012: 4 (3):Pp:91-95.
48. Van Wyk A, Hoste H, Kaplan M, Besier B. Targeted selec-tive treatment for worm management - How do we sell rational programs to farmers? *Vet. Parasitol*, 2006: 139:Pp:336–346.
49. Gonfa S, Basaznew B, Achenef M. An Abattoir Survey on Gastrointestinal Nematodes in Sheep and Goats in Hemex-Export Abattoir, Bishoftu (Debre Zeit), Central Ethiopia. J. *Adv. Vet. Res*, 2013: (3). Pp: 60-63.
50. Radostits M, Gay C, Hinchcliff W, Constable D. Nematode diseases of the alimentary tract. In: Veterinary Medicine, A textbook of the diseases of cattle, horses, sheep, pigs and goats, 10th ed. 2006: Pp:1541-1553.
51. Odoi A, Gathuma M, Gachuiri K, Omore A. Risk factors of gastrointestinal nematode parasite infections in small ruminants kept in smallholder

mixed farms in Kenya. BMC *Vet. Res,* 2007: 3(6). Pp: 1186-1746.

52. Knox R, Torres-Acosta F, Aguilar-Caballero J. Exploiting the effect of dietary supplementation of small ruminants on resilience and resistance against gastrointestinal nematodes. *Vet. Parasitol*. 2006: 139(4):Pp:385-393.
53. Nginyi M, Duncan L, Mello J. Epidemiology of parasitic gastrointestinal nematode Infections of ruminants of smallholder farms in central Kenya. *Res Vet Sci*. 2001: 70(1): Pp: 33- 39.
54. Vlassoff A, Leathwick M.and Health A. The epidemiology of nematode infection in sheep. *New Zealand Vet. J.*2001: 49(6).Pp: 213-221.
55. Keyyu D, N. C. Kyvsaard N, J. Monrad J. and A. A. Kassuku A. Epidemiology of gastrointestinal nematodes in cattle on traditional, small-scale dairy and large-scale dairy farms in Iringa district, Tanzania. *Vet. Parasitol.,* 2005: 127. Pp:285-294.
56. Agyei A, Sapong G.and Prodert, A. Peri-parturent rise in faecal nematode egg counts in West Africa dwarf sheep in southern Ghana in the absence of arrested strongyle larvae. *J. Vet parasitology.*1991: 39: Pp: 79-88.
57. Chiejina N, Fakae B. and Eze L. Development of and survival and survival of free- living stages of gastrointestinal nematodes of sheep and goats on pasture in the Nigerian derived Savanna.1994: *Veterinary.*
58. Ayele G, Nugusa F. and Tadesse B. Prevalence and associated risk factors of major sheep gastro intestinal parasites in and around Bako Town, Western Ethiopia. Livestock Research for Rural Development 26 (10) Received 14 September 2014; Accepted 17 September 2014; Published 3 October 2014.
59. Hansen J, Perry B. The Epidemiology, Diagnosis and Control of Helminth Parasites of Ruminants.1994: 2nd edition. Nairobi, Kenya.
60. Sisay M, Uggla A, Waller J. Prevalence and seasonal incidence of nematode parasites and fluke infections of sheep and goats in eastern Ethiopia. *Trop. Anim. Health Prod,* 2007: 39.
61. Fikru R, Teshale S, Reta D, Yosef K. Epidemiology of Gastrointestinal Parasites of Ruminants in Western Oromia, Ethiopia. *Int. J. Appl. Res. Vet. Med*, 2006: 4(1).Pp:51-57.
62. Ahmed M. Gastrointestinal nematode infections in small ruminants: Epidemiology, Anthelmintic efficacy and the effect of wattle tannins. Animal Science Discipline of Animal and Poultry Sciences, School of Agricultural Sciences and Agribusiness University of KwaZulu-Natal Pietermaritzburg, 2010: Pp: 1-6.
63. Desalegn L. Nematode Prevalence, Helminth Management Practices and Anthelmintic Resistance in Small Ruminants in the Mid-Rift Valley of Ethiopia University of Pretoria. 2005: etd Wolde Mariam.

8/16/2015