Study on the Prevalence of GIT Nematode Infection of Small Ruminants in Kurmuk Woreda, Assosa Zone of Benishangul Gumuz Region, Western Ethiopia.

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Abstract: A cross-sectional study was conducted from November 2016 to June 2017 in kurmuk woreda, Assosa Zone of Benishangul Gumuz Regional State, Western Ethiopia with the objective of determining the prevalence and associated risk factors of gastrointestinal nematodes in Small ruminants. A total of 384 faecal samples were examined using flotation techniques. Out of the total sampled small ruminants (384), 82(21.35%) small ruminants were infested by Gastro intestinal nematodes. The current study showed that age-wise prevalence of nematodes infestation showed no significant difference on both species. However, prevalence of nematodes infestation was significantly higher in young goat (23.8%) & sheep (33.3%) than adult goat (18.2%) & sheep (20.4%). The host species-wise analysis of the data didn't reveal statistical significant association (X2 = 1.55 & P > 0.05) with prevalence of GI nematodes infestation between both host species of small ruminants. However, higher prevalence of GIT parasites was observed in sheep (26%) than in the goat (20%). The present investigation has revealed significant seasonal variation in the prevalence of nematodes infestation during the study period. In this regard, the prevalence of GIT nematode in wet season (24.9%) was higher than in dry season (17%). Thus, it depicts significantly higher (P = 0.0004) prevalence of nematodes infestation in both hosts during wet season compared to dry season. Gender-wise analysis of the data revealed high significant difference (P = 0.0003) in prevalence of GI nematodes infestation between male and female hosts in both species of small ruminants. 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 medium body conditioned animals as compared to animals having good body condition. Thus, the current study has explored association of parasitic infestation with various risk factors encompassing gender, age, season, body condition score (body weight) and host species. As recognized in this study, GI nematodes are one of the major problems that could hamper health and productivity of small ruminants 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.

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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). Ethiopia is the second in Africa, and the sixth in the world, in terms of small ruminant population. 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; Kefyalew, and Tegegne, 2012).

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, disease being the most important. Disease alone accounts for mortality of 30% in lambs and 20% in adults (Demelash et al., 2006). Among various diseases parasitic disease is the major constraint which leads to significant economic losses attributable to reduced weight gain, retarded growth and impaired productive and reproductive efficiency (Jas R. & Ghosh J.D., 2009). It has well recognized that in resource poor regions of the world, helminth infections of sheep and goats are major factors responsible for economic losses through reduction in productivity and increased mortality (Tibbo et al., 2006).

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 (Odoi, 2007). 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).

Infections with gastro-intestinal nematodes can have detrimental effect on animal health (Lüscher *et al.,* 2005), leading to clinical and sub-clinical diseases, that may result in financial loss and overall decreased productivity (Hassan *et al.,* 2013) stated that among the helminths, nematodes caused the greatest problem in ruminants in the tropics. Gastro-intestinal nematode infection is one of the major health problems in the world. Nematode parasites of greatest importance in 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).

Although helminth parasites specifically nematodes 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 diseases. Among the diseases that constrain the survival and productivity of sheep and goats, gastrointestinal parasitic nematodes infection ranks highest on a global index (Perry et al., 2002). Review of the available literature in Ethiopia strongly suggests that helminthosis has distribution and is also considered as one of the major setbacks to livestock productivity incurring huge direct and indirect losses in the country. Although considerable work has been done on endo parasites of small ruminant in many parts of Ethiopia, there was no previous study carried out on prevalence and associated risk factors of small ruminant gastrointestinal nematodes in the present study area, where mixed crop-livestock production system is the main form of agriculture. Knowing the current situation of GIT nematode in the area could be the basis for all possible actions including its control and prevention. Therefore, this study was designed with the objectives of determining:

- ❖ the prevalence, identification of the species involved and assessing possible risk factors of gastrointestinal nematodes in small ruminants in Kurmuk Wereda, western Ethiopia.
- ❖ To obtain baseline data so as to design effective control & prevention options.
- ❖ To lay down postulate (inception) for the next researcher.

2. Materials And Methods: Methodology

2.1. Study Area

The study was conducted from November 2016 to June 2017 in 4 selected peasant association namely Abadi, Husherguma, Horazehab and kurmuk kebele of Kurmuk Woreda, Benishangul Gumuz, Western Ethiopia. The geographical area is largely inhabited by people whose main occupation is gold mining and subsistence agriculture; the natives are also small ruminant livestock farmers. The area is located, 762 km west of Addis Ababa. The estimated animal population in the area is about 1215 cattle, 8965 sheep, 18930 goats, 895 donkeys, and 16500 chickens (KWARDO, 2015). Communal grazing is in practice in most part of the area. Topographically, it is situated at altitude of 900 - 1500 m above sea level with the mean annual minimum and maximum temperature of 29°C and 32° 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 Kurmuk area receives an average annual rain fall of approximately 700 mm, with a bimodal distribution pattern, picking in mid-April and mid-August (KWARDO, 2015).

2.2. Study Population

The study animals were all local breeds of small ruminants, kept under traditional extensive management system of different age, sex and body condition groups from four purposely selected peasant associations (PAs) of Kurmuk woreda. Conventionally, those animals with the age of less than one year were considered as young while those greater than or equal to one year were included as adults according to the classification of age groups by (Kumssa et al., 2011).

2.3. Sample Size Determination

The sample size was determined by the formula described by Thrusfield (2007). Accordingly, since there was no research carried out previously in the study area, considering 50% expected prevalence at 95% confidence level and 5% absolute precision, the total sample size was determined to be 384. Four (4) PAs 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.

$n = [1.96^2 \text{ Pexp } (1\text{-Pexp})] / d^2$

Where; n = required sample size

Pexp =expected prevalence

d2 = desired absolute precision

$n = 1.96^2 * 0.5(1-0.5) / (0.05*0.05) = 3.8416*0.25/0.0025 = 0.9604/0.0025$

n = 384. Therefore, 384 small ruminants were subjected to parasitological study.

2.4. Study Design and Sampling Methodology

A cross-sectional study was carried out for determining the prevalence of small ruminant GIT nematode by coprological examination. Out of 16 peasant associations (PAs) of Kurmuk district, four were selected purposely. The selected sites were: Hora zehab, Kurmuk, Abadi & Husherguma. Equal proportions of samples were collected from each site by simple random sampling technique was used to select study animals. The samples were collected from different age, sex, body condition scores and seasons (dry and wet) were considered as risk factors for the occurrence of gastrointestinal nematode infections in small ruminants. Those animals with the age of less than one year were considered as young while those greater than or equal to one year was considered as adults according to the classification of age groups by (Kumssa *et al*., 2010). Body condition scoring of sampled animal was carried out according to the method describe d by (Kripali *et al*., 2010) and was categorized into three scores as poor, medium and good.

2.4.1 Sample collection and transportation

The fecal samples were collected from individual study animals using simple random sampling. The fecal sample was taken from local goats after proper restraining of the animal according to Urquhart *et al, (*1996). For the fecal collection the tail of the animal was held up and the hand with glove was inserted and taken away. Then faecal sample was transported aseptically to the local disease diagnosis laboratory of Kurmuk Woreda.

2.4.2. Parasitological study

Faecal examination*: Examination of faecal samples was performed by using standard direct and indirect parasitological techniques (flotation) as suggested by Hayat and Akhtar (2000).* A fresh faecal sample of approximately 10 gram was collected directly from the rectum of each sampled small ruminant using gloved fingers. 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 was transported to Kurmuk Woreda Animal Disease Diagnosis Laboratory for analysis. The collected samples were subjected to qualitative flotation parasitological techniques using saturated sodium chloride (specific gravity of 1.2) as flotation fluid. The eggs of different parasite species *were identified on the basis of morphological appearance and size with the help of keys (Urquhart et al., 1996).* Examination methods were the following

2.4.4. Direct microscopic examination

First the sample was examined before mixing with formalin then observing the color, observing the consistency to know whether the animal has diarrhea or constipation. The fecal sample on clean and dry glass slides were prepared from the feces taken from rectum.

The procedures were first placing a drop of water on the clean slide, then adding a small fecal sample of about 3 mm of diameter to the water and mix a loop of tooth pick after that covering the sample with cover slip then examining first using the low power (*10) and then high dry power (*40) to confirm.

2.4.5 Indirect (Floatation: Zinc sulphate floatation method)

The procedures were first thoroughly mixing the standard suspension then while keeping the standard suspension well stirred but without excessive shaking, fill around bottomed, rimmed plastic centrifuge tube (15ml capacity approximately) to a mark known volume on the tube after that using the centrifuge briefly and discarding the supernatant, almost fill the tube with zinc sulphate solution SG,1.3, re-suspending the sediment with spatula, placing the tube in a test tube rack and top up with sulphate solution to just fill the tube, place apiece sellotape over the mouth tube, in contact with the fluid, sticking down to the rim but not wrapping in round the tube, avoid trapping large air bubble, place the tube in hand centrifuge taking care to avoid the sellotape fouling the, centrifuge briefly, remove the sellotape vertically (three finger technique) and place wet side down on a microscope slide at the end examine under the low power microscope.

2.5. Data Management and Analysis

The collected data was coded into appropriate variables and entered in to MS excel worksheet. All statistical analysis was performed using statistical data packages for social science (SPSS 17.0 software (SPSS Inc., Chicago, USA). Differences between independent variables (age groups, sex, host species, body condition scores and site of collection,) with respect to prevalence of parasitic nematodes were explored using Chi-square test (categorical variables) or Kruskal-Wallis test (continuous variables). The odds ratio (OR) and confidence interval of each risk factor were calculated using the category with the lowest prevalence as baseline. Data was analyzed using Relative prevalence of different nematodes species or groups, respectively, was calculated as follows: Prevalence (%) = [Number of positive samples / Total number of samples examined] x 100. In all the analyses, confidence level was held at 95% and P<0.05 was set for significance.

2. Results

A total of 384 faecal samples were analyzed using simple floatation technique, the overall prevalence was found to be 21.3% with 95% CI. From all sampled small ruminants, 82 (21.35% of the samples) revealed different types of nematodes eggs while 302 or 78.65% did not reveal nematodes eggs. Two hundreds & ninety six (296) faecal samples were from goats while eighty eight (88) faecal samples were from the sheep. Out of the 296 samples analyzed in goats, 59 (20%) were positive with different types of nematodes eggs while 237(80%) were negative. Out of the 88 faecal samples analyzed in sheep, 23 or 25% were positive with nematodes eggs while 66 or 75% were negative (Table 1).

These results indicate that prevalence of parasitic nematodes in small ruminants in the study area was higher in Sheep (25%) than in goats (20%). Out of the 208 and 49 adult goats and sheep that were examined, 38 (18.2%) and 10 (20.4%) were infected respectively. Out of 39 and 88 young sheep and goats that were examined, 13(33.3%) and 21 (23.8%) were infected respectively (Table 1). These results clearly indicate that from the faecal samples among the sheep and goats that were examined, the young animals were found to be more infected than the adults. Out of the 41 male sheep and 144 male goats examined, 10 (24.3%) and 14 (9.7%) were infected respectively. Out of the 47 female sheep and152 female goats that were examined, 13(27.6%) and 45 (29.6%) were infected respectively (Table 1). From these results it was clear that the female goats and sheep were more infected than male goats and sheep, however; there was highly statistical significance at p = 0.0003 among male and female animals.

The highest prevalence of 22.9% (22/96) was recorded in Kurmuk kebele & the least prevalence of 18.75% (18/96) was recorded in Horazehab kebele as shown in Table 3. Of the GI nematodes of small ruminants in this study, Haemonchus & Strongyle possess the highest equivocal prevalent rates (7%) & the least prevalent nematode was Trichuris (0.005%) as shown in below table 2.

Table 1: Prevalence of gastrointestinal nematodes in small ruminants by considering different risk factors

Risk factors	No examined	No positive	Prevalence (%)	X^2	p- value
Species					
Caprine	296	59	20		
Ovine	88	23	26	1.55	0.212
Total	384	82	**21.3**		
Age (goats)					
Young	88	21	23.8		
Adult	208	38	18.2	4.855	0.182
Subtotal	296	59	19.9		
Age (sheep)					
Young	39	13	33.3		
Adult	49	10	20.4	4.855	0.182
Subtotal	88	23	26.1		
Total	384	82	**21.3**		
gender (goats)					
Male	144	14	9.7		
Female	152	45	29.6	19.051	0.0003
Subtotal	296	59	19.93		
gender (sheep)					

Risk factors	No examined	No positive	Prevalence (%)	X^2	p- value
Male	41	10	24.3	19.051	0.0003
Female	47	13	27.6		
Subtotal	88	23	26.1		
Total	384	82	**21.3**		
Season					
Dry	248	42	17	8.120	0.0004
Wet	136	40	24.9		
Total	384	82	21.3		
Body condition score					
Good	123	6	4.8	58.270	0.0001
Medium	150	26	17.3		
Poor	111	50	45		
Total	384	82	21.3		

Note: as shown from the above table 1, the potential risk factors such as gender (sex), body conditions, and seasons of study period revealed a high statistical significant associations at (P < 0.005) with the occurrence of the disease while the age & species of the animals did not show any statistical associations at (P = 0.212) & (P = 182) respectively with the occurrence of the disease. From the examined small ruminants of the current study, the Ovines revealed higher prevalence rate (26%) than the Caprine which revealed 20% prevalence rate. The young small ruminants and those with poor body conditions were the highest affected group with 26.77% and 45% prevalence rate respectively. Wet season is the season of highest infection rate with 24.9% prevalence during the study period.

Table 2. The prevalence of typical small ruminant gastrointestinal nematodes in the study area

Nematode eggs identified	No of animals examined	No of positives	Prevalence (%)	X^2	P = value
Haemonchus type eggs	384	27	7 %	383	0.0001
Strongyles eggs	384	27	7%		
cooperia eggs	384	11	2.8%		
Strongyloides eggs	384	3	0.78%		
Nematodirus eggs	384	8	2.08%		
Trichostrongylus eggs	384	4	0.0104%		
Trichuris eggs	384	2	0.005%		
Total	384	82	21.3%		

As indicated from the above table 2, the highest prevalence rate was recorded equivocally in haemonchus & strongyle type eggs (7%). This study revealed that the Tricuris was the least prevalent nematode with known prevalence rate of 0.005% throughout the study period.

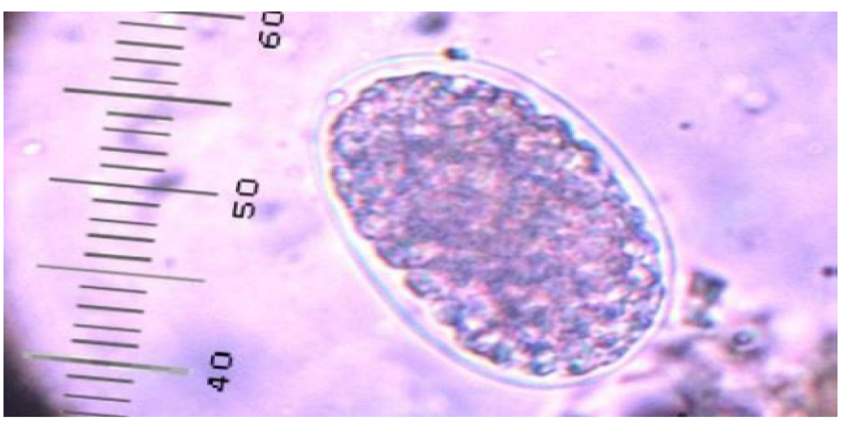

Figure 2. The typical egg of haemonchus contortus

Table 3. Prevalence of gastrointestinal nematodes of small ruminant in four (4) selected peasant associations of the study area

Pas	No of examined	No of positives	Prevalence (%)	X^2	p- value
Abadi	96	21	21.875	0.557	0.906
Horazehab	96	18	18.75		
Husherguma	96	21	21.875		
Kurmuk	96	22	22.91		
Total	384	82	21.3		

As stated in the above table 3, the highest prevalence rate (22.9%) was combiled in Kurmuk kebele & the least prevalence rate (18.75%) was recorded in Horazehab kebele. However, Pas did not showed a statistical significant association (at P = 0.906) with the occurrence of the disease.

4. Discussion

In this study, the overall prevalence rate of GI nematodes of small ruminants was found to be 21.3 % out of which seven (7) species of GI nematodes comprising of Haemonchus spp (7%), Strongyle spp

(7%), Cooperia (2.8%), Strongyloides spp (0.78), Nematodirus spp (2.08%), Trichostrongylus spp (0.0104%) and Trichuris spp (0.005%) were identified using simple floatation techniques. The study showed that 26% of sheep and 20% of goats harbor one or more nematodes. This finding was lower than the earlier results of other surveys in small ruminants in Western (Regassa et al., 2006), Central (Kumsa, 2011), Northern (Tesfaye H, 1998) and Southern (Amenu A., 2005) Ethiopia. The current finding was also much lower than the results of (Gebreyesus, 1986; Esayas, 1988; Tesfalem, 1989; Melkamu, 1991; Bayou, 1992; Yoseph, 1993; Genene, 1994; Getachew, 1998; Hailelul, 2002). They have reported a prevalence of 96.38% in goats of Ogaden range lands, 90.41% and 82.13% in sheep and goats in and around Wolayita Soddo, 88.1% and 84.32% in sheep and goats in and around Mekele, 91.43% in sheep in and around Kombolcha, 90.94% and 94.85% in sheep and goats of Gonder, 92.23% and 94.1% in sheep and goats of Mendayo district of Bale, 93.22% and 92.24% in sheep and goats of four Awrajas of Eastern Shoa, 90.23% and 88.33% in sheep and goats of Buno province and 85.79% in sheep in and around Asella respectively. The differences of the prevalence may be due to management and the current study area had scattered type of vegetation such as herbs & shrubs that animals are grazing elsewhere rather than around water source which is most favorable for development and survival of free-living stages of the parasites. However, hot, dry conditions can be lethal for infective larvae, while extreme cold is also lethal with significant species variation (O'Connor et al., 2006; Paula et al., 2010). A climate that is too hot or dry can kill most larvae on the pasture & Larvae numbers peak in late winter and early spring that is why the prevalence in the current study area became lowered. This difference of prevalence may be also due to that the previous study areas were occupied by pastoralist and very congested animals, which increase the transmission of the parasite.

As noted earlier by several researchers, parasitic infestation in small ruminants may be influenced by a variety of factors including grazing habits, age, gender, body condition (weight) and species of the host animal. In addition, variation in agro-climatic conditions like rainfall, humidity and temperature have also shown profound effects on helminthes infestation in small ruminants (Bhat et al., 2012 & Demissie et al., 2013). Thus, the current study has explored association of parasitic infestation with various risk factors encompassing gender, age, season, body condition score (body weight) and host species.

In this context, **gender-wise** analysis of the data revealed high significant difference (P = 0.0003) in prevalence of GI nematodes infestation between male and female hosts in both species of small ruminants. According to Boag and Thomas (1971), sex does not really have direct influence on epidemiology of helminthes (nematodes) except that ewes contribute to pasture contamination and enhance transmission of infection during pregnancy and lactation through peri-paturient rise in faecal egg output. The presence of sex difference in infection is also disagreed with other's reports (Ghanem et al., 2009; & Hassan et al., 2013). However, Dagnachew et al. (2011) reported higher prevalence of helminth infection in females. Some of the previous studies gave notion that females are more prone to helminthes (nematodes) infestation compared to male small ruminant, whereas others have opposite results (Emiru et al., 2013).

The current study showed that **age-wise** prevalence of nematodes infestation showed no significant difference on both species. However, prevalence of nematodes infestation was significantly higher in young goat (23.8%) & sheep (33.3%) than adult goat (18.2%) & sheep (20.4%). Thus, my results are in close lines with a previous report which showed maximum parasitic infestation in young compared to adults which may be attributed to the development of significant immunity in adult hosts (Lashari and

Tasawar, 2011). Age was considered as an important risk factor in GIT helminthiasis (Raza et al., 2007). Several authors have documented that adult and old animals develop acquired immunity against helminth infections as they get mature due to repeated exposure (Dagnachew et al., 2011) and this will help expel the parasite before it establish itself in the GIT (Shah-Fischer M. & Say R., 1989). Furthermore, it is evident too from several studies that age of the host animal greatly influences level of parasitic infestation in small ruminants with higher prevalence in young hosts than adult hosts. As mentioned earlier, the higher parasitic infestation of young than adult animals may be attributed to a weaker immunological response of young animals (Raza et al., 2014 & Zeryehun, 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 medium body conditioned animals as compared to animals having good body condition. This might be due to either well-fed animals have good immunity or parasitic infection leads to poor immunological response to the fecundity of the parasites. This finding agrees with (Keyyu et al.2006; Van Wyk et al., 2006; Negasi et al. 2012; Gonfa et al., 2013). In addition, (Radostits et al., 2006; Odoi et al., 2007) indicated that animals with poor condition are highly susceptible to infection and may be clinically affected by worm burdens as compared to well-fed healthy animal. Moreover, Knox et al. (2006) observed that a well-fed animal was not in trouble with worms, and usually a poor diet resulted in more helminth infections.

The **host species-wise** analysis of the data didn't reveal statistical significant association ($X^2 = 1.55$ & $P > 0.05$) with prevalence of GI nematodes infestation between both host species of small ruminants. Higher prevalence of GIT parasites was observed in sheep (26%) than in the goat (20%) which is consistent with other reports in Ethiopia (Teklye B., 1991) and elsewhere in the world (Waruiru et al., 2005) & (Asif et al., 2008). In this regard, this could be due to the fact that sheep have frequent exposure to communal grazing lands that have been contaminated by feces of infected animals. Goats are browsers (selective feeders) in behavior but sheep are grazers from the ground where the GIT parasites egg hatches and reaches the infective stage (Waruiru et al., 2005). However, it is in contrary with previous reports from Western (Urquhart et al., 1996) and Eastern (Abebe W & Esayas G, 2001) Ethiopia and elsewhere (Raza et al., 2007). These could be due to the fact that most of the goats were from lowland and mid altitude areas, which are thought to be suitable for survival of the larval stage of the parasites (Fikru et al., 2006). The other reason assumed to be that sheep do have a considerably higher immunological response to GIT parasites compared with that of goats (Urquhart et al., 1996).

In the current findings, the highest prevalence rate (22.9%) was combiled in Kurmuk kebele & the least prevalence rate (18.75%) was recorded in Horazehab kebele. Theses might be due to that Kurmuk kebele possessed highly crowded small ruminants responsible for the nematodes transmission, contaminated leftover feeds of the metropolitan residents as well as poor veterinary services for regular deworming as compared to other Pas. However, **Pas** did not showed a statistical significant association (at $P = 0.906$) with the occurrence of the disease.

The present investigation has revealed significant **seasonal variation** in the prevalence of nematodes infestation during the study period. In this regard, the prevalence of GIT nematode in wet season (24.9%) was higher than in dry season (17%). Thus, it depicts significantly higher ($P = 0.0004$) prevalence of nematodes infestation in both hosts during wet season compared to dry season. The lowest prevalence rate in dry may be due to adverse climatic condition in dry season subsequences to arrested evolution of larvae in host and environment, short photo period in winter and reduce period of grazing support in reduce chance of contact between host and parasite, also phenotype or strain have difference response to temperature changes and high temperature shortened their evolution while low temperature prolong developed of free living stage (Khajuria et al., 2013). Climatic conditions, particularly rainfall, are frequently associated with differences in the prevalence of GI-parasitic infections, because free-living infective stages (eggs, larvae, cysts, and oocysts) survive longer in moist conditions (Waruiru RM., 2000).

This study revealed that the highest prevalence rate was recorded equivocally in haemonchus & strongyle type eggs (7%) whereas the Tricuris was the least prevalent nematode with known prevalence rate of 0.005% throughout the study period. The high prevalence of Haemonchus contortus in this study was in line with the observation of (Osakwe and Anyigor, 2007) in Nigeria. A number of previous studies noted the high prevalence of Haemonchus spp. infestation in many parts of Ethiopia: (Brook L., 1983) reported a prevalence rate of 82.1 % in Awassa, (Solomon N., 1987) 93.6 % in the Ogaden region, (Dereje G., 1998) 80 % in Wollaita Sodo and (Getachew G., 1998) 92.19 % in Mekelle. It is also in agreement with (Fakae B., 1990) who found a prevalence rate of 77.8 - 100 % in Nigeria and (Abebe W et al., 1998) who reported a sero-prevalence rate of 70 - 100 % of haemonchosis in small ruminants of West and Central Africa. Considering the voracious blood sucking & pervasive nature of the Haemonchus spp, huge quantities of blood would be lost daily, which will undoubtedly have an impact on the health and productivity of these animals. However, nematode species had strong statistical significant association (P = 0.0001) with the prevalence of nematode infestation in small ruminants.

5. Conclusion And Recommendations

The overall this considerable incidence of nematodes infection in the studied area could be attributed to lower immunity of hosts as a result of malnutrition. All the livestock in the area under investigation largely depended on grazing in deteriorated range-lands. Prevention, rather than cure, is the philosophy used in developing control programs against gastrointestinal nematodes. It should be assumed that worms cannot be eradicated from the environment and livestock will continually be re-infected. However, infections can be limited to the extent that they will not cause substantial economic loss to the producer.

Keeping in view the above results some control measure for gastrointestinal nematodes can be undertaken to reduce the intensity of the parasitic infection. A combination of treatment and management is usually necessary to achieve control. In this regard, it is suggested that practice of separated grazing of animals with low stocking rate may be adopted. Furthermore, during the rainy season climatic factors like temperature and humidity are favorable for the development and survival of pre-parasitic stages of nematodes, therefore, it is suggested that anthelmimtic treatment on quarterly basis (regular deworming) may be implemented to reduce the risk of reinfection. However, resistance to these drugs might recently been observed on some occasions. In order to delay the development of drug-resistant parasite strains, anthelmintics must not be overused and drugs must be delivered at optimal times. Knowledge concerning gastrointestinal helminth biology and epidemiological infection patterns caused by these parasites is essential in the development of appropriate control strategies and this has a potential to reduce production losses.

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