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Prevalence, Intensity and Identification of Gastro Intestinal Nematodes of Urban Goats in Arbaminch, Southern Ethiopia

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Abstract: The cross-sectional study was conducted from October 2019 to May, 2020 in Arbaminch city with the aim of estimation of the prevalence of GIT nematode infection and assesses the level of infection in goats at Arba Minch town, southern Ethiopia. Totally 384 pellets were taken from goats, and coprological examination by fecal floatation technique and McMaster egg counting was done. From the total examined goats, 226 (58.9%) of them found positive for one or more GIT nematode infection. Based on the morphology of the nematode eggs the following GIT nematodes were identified: *Strongyle* type (77.876%), *Trichuris* spp. (7.08%) and *Nematodirus* spp. (3.982%) whereas 11.1% mixed infestation. Furthermore, the overall mean EPG was 662.2. The mean EPG and proportion of light, moderate and heavy infection level was 294.4 (51.3%), 926.7 (32.3%) and 1293.2 (16.4%), respectively. There was no statistically significant differences in the prevalence of GIT nematode infection among age group and sex ($p > 0.05$), but there was statistical difference in body condition ($p < 0.05$). The prevalence of GIT nematodes infection in goat was significantly greater in poor body condition and medium body condition than good body condition of goats. The result of this study revealed higher prevalence of GIT nematode infection, and presence of various genera in the study area. Hence, more study is necessary to identify the species of nematodes dominant in the area, and strategic deworming of goats with broad spectrum anthelmintic is recommended to reduce the prevalence the parasites.

Keywords: Arba Minch, EPG, GIT Nematode, Goats, Ethiopia

1. Introduction

Ethiopia is having abundant livestock resources of -varied and diversified genetic roles with specific adaption to its wide range of agro ecologies. Ethiopia possesses a large number of small ruminants (sheep and goat) which are predicted to approximately 31.3 and 32.74 million sheep and goats respectively [8].

Gastrointestinal nematode parasite infections are world-wide problem in animal health system. But their impact is greater in sub- Saharan Africa in general and Ethiopia in particular. It is due to the presence of different ecology which favors the growth and multiplication of the parasite and for diversified hosts [27].

Gastro-intestinal nematode parasitic infection cause major health problem in both human health and the animals which decrease the productivity of livestock sector [29]. Economic losses from nematode parasite infection is caused by decrease in fertility, work power, loss of weight, treatment cost for diseased animals and the death of the animal [21]. In addition, the presence of different weather condition, hasubandary or management system of the animal define the occurrence and harshness of various parasitic infection in certain area. Besides, the prevalence of gastrointestinal nematode parasites, the genera, species and the severity of infection also vary greatly depending on local ecological conditions such as humidity, temperature, rainfall, vegetation and management practices [4, 18].

Nematodes parasite accountable for gastrointestinal tract infections in small ruminants in tropical environment are: Haemonchus, Trichostrongylus, Nematodirus, Ostertagia, Bunostomum, Oesophagostomum, Trichuris and

Strongyloides species [20]. Even if there are so many practices done to control the infestation of nematode parasite, still there is a significant losses of product and productivity in ruminant due to parasite infestations [27]. To practice effective control meanes; assessment and epidemiological study of the parasite by fecal examination, EPG, determination and identification of nematode parasite species in the area is important [2, 15]. Prominent work must be done on preventing the environment from contamination. This is done by production of safe pastures and applying proper husbandry practices for animals and anthelmintic treatment [29]. So many study has been conducted about gastrointestinal nematode of ruminant in different part of ethiopia while there was no previous study conducted on prevalence and associated risk factor on gastrointestinal nematodes of Goat in Arbaminch, Gamo zone, South Ethiopia.

Therefore, the objectives of the present study was

1) To assess the prevalence and associated risk factors of GIT nematode parasite of Goat in Arbaminch, southern Ethiopia.
2) To investigate the degree of GIT nematode infestation in Goat in Arbaminch city.

2. Materials and Method

2.1. Study Area

The present study was conducted in and around Arba Minch southern Ethiopia from October 2019 to June, 2020. Arba Minch town is located in the Gamo-Gofa Zone about 500 km far south of Addis Ababa. located in the Southern rift valley of Ethiopia, in between 5° 57'N latitude and 37° 32'E longitude. The area has somehow hot climate area with 22°C on average and is located at elevation of 1285 meters above sea level (m.a.s.l) [9]. The area is covered with good vegetation and is dominated by wood-grasses and Acacia spp. is the most commonly available tree in the area. The city is Its name refers to "springs" and it consists of the uptown administrative center of Shecha which is four km far away to the downtown commercial and residential areas of Sikela. On the Eastern part, Sikela bounds with Nechisar National park, Lake Abaya to the North and Lake Chamo to the South. Also, Kulfo River flows along the center of the town and drains into Lake Chamo.

2.2. Study Design

A Cross-sectional study design was undertaken from October, 2019 to May, 2020 on goats to determine the prevalence of goat GIT nematodes, level of GIT nematode infestation and to differentiate genera of parasite involved by qualitative and quantitative corprological examination. During sample collection information like sex, age and body condition score of animals selected for the study were recorded.

2.3. Study Population

The study population includes goats in Arba Minch town of all age groups and both sex. The body condition of goats was grouped in to three, namely poor, medium and good as described by [12].

2.4. Sampling Method and Determination of Sample Size

Systematic random sampling method was followed to choose the study goats and collect faeces from each animals. The sample size required for this study was computed by using 50% expected prevalence in order to get the maximum sample size and based on the formula described by [32]. The study considered 5% absolute precision and 95% confidence interval. So, the calculated total sample size was 384.

$$n = \frac{z2 * Pexp\ (1 - Pexp)}{d2}$$

$$n = \frac{1.962 * 0.5(1 - 0.5)\ /\ (0.05)2}{n = 384}$$

Where, n= required sample size, z= confidence interval (95%), P_{exp}= expected prevalence and d = desired absolute precision.

2.5. Study Methodology

Fecal Sample Collection and Investigation

10 g of fecal sample was taken from each goats directly from the rectum or during defecation by avoiding contamination. The sample were placed in a plastic container (universal bottle) and labeled with necessary information and then transported to Arbaminch University College of Agriculture Parasitology laboratory. The samples transported to the laboratory on the same day with that of collection day and preserved in refrigerator at 4°C and processed within 48 hours of the collection. Collected fecal samples were processed by flotation methods to detect the nematode eggs [35, 14]. McMaster technique conducted for faecal egg count (FEC). The intensity of infection was categorized as (50-800 FEC), (801-1,200 FEC) and (>1,200 FEC) light, medium and heavy respectively [14].

2.6. Data Analysis and Management

Data was obtained from feacal sample collection and investigation, EPG, and feacal culture was coded and stored in to Microsoft excel and it was analyzed by using SPSS version 16. Descriptive statistics was computed. The prevalence was calculated as the number of parasitemic samples divided by the total number of examined samples. Chi-square (χ^2) test was used to evaluate the host risk factors such as age, body condition, and sex of goats with prevalence of having GIT parasite and P value which is < 0.05 will considered as significant.

3. Results

Coproscopic prevalence of gastrointestinal nematodes of goat

Among 384 goat tested 226 (58.9%) are positive for different gastro-intestinal nematode infections. The study

revealed higher prevalence in young as compared to adult that 64.2% and 54.3% young and adults infected, respectively. The prevalence of GIT nematode is higher in male (61.2%) as compared to female (56.4%) poor body condition score goat have higher prevalence record (79.1%) followed by medium body condition score (58.4%) whereas the low occurrence was distinguished in good (35.4%) body condition score of the goat. Prevalence for each of the risk factors considered during the study was shown in (table 1).

Table 1. Coproscop*i*c prevalence of GIT Nematodes of goats vs. associated risk factors analysis.

Risk factors	Factors level	No examined	No positive (%)	95% CI	$\chi 2$	P-value
Age	Young	176	113 (64.2%)	56.8-71.0	3.84	0.050
	Adult	208	113 (54.3%)	47.5-61.0		
Sex	Female	188	106 (56.4%)	49.2-63.3	0.93	0.335
	Male	196	120 (61.2%)	54.2-67.8		
BCS	Good	113	40 (35.4%)	27.1-44.7	48.45	0.000
	Medium	137	80 (58.4%)	50.0-66.4		
	Poor	134	106 (79.1%)	71.3-85.2		

Quantitative faecal examination result

Number of eggs counted per gram of faeces (EPG) was determined for those goats positive (226) for gastrointestinal nematodes. An overall mean EPG of infected sheep was 662.2. The proportions of level of infection of the 226 infected goats were 51.3% light, 32.3% moderate and 16.4% heavy infection (Table 2).

Table 2. Degree of infection and the mean EPG of infected goats.

Degree of infection	No examined	Mean EPG	95% CI
Light	116	294.4	257.1-331.7
Medium	73	926.7	908.3-945.2
Heavy	37	1293.2	1282.0-1304.5
Overall	226	662.2	606.4-718.0

Gastrointestinal nematodes identified

From 226 (58.9%) goats positive for all types of nematode 176 (77.876%), 16 (7.08%) goats, 9 (3.982%) and 25 (11.06%) were positive for strongyle type eggs, Trichuris, Nematodirus and mixed infestation respectively (Table 3).

Table 3. Major GIT nematode genus identified.

Genus	No positive larvae	Proportion
Strongyle	176	77.876%
Trichurus	16	7.08%
Nematodirus	9	3.982%
Mixed infection		
Strongly and trichurus	12	5.309%
Strongly and nematodirus	8	3.539%
Trichurus and nematodirus	5	2.212%

4. Discussion

The present study of goats gastrointestinal nematodes with coprological examination through fecal floatation techniques revealed that an overall prevalence of gastro intestinal nematode was 58.9%. This result is lower than the reports of other finding in goat from the country: 70.7% [22], 83.3% [5], 94.9% [10] and 92.2% [27]. But this finding is higher than the report of [16, 33, 3]. Who reported 49.2%, 52.6% and 49.1%, respectively These differences in the prevalence of GIT nematodosis in various areas of the country could be due to environmental difference which cannot support the development of the nematode parasite in to its infective stage Additionally, management system major indicator for the change of the prevalence in different area. It can be due to the extensive deworming of the ruminant, [28]. Keeping large number of animals could increase the degree of pasture contamination, which leads to higher prevalence rate [27].

This study revealed that the prevalence gastrointestinal nematode infection was not significantly varied ($p > 0.05$) between female and male. But relatively higher prevalence of GIT nematode infection observed in male (61.2%) goats than the female (56.4%). This is in a general agreement with that of [27, 28]. This finding showed both male and female are equally affected by gastro intestinal nematode. Yet, it is not the same with other findings the sex of goat is a determinant factor which influence the prevalence of parasite infections [10, 23] and females are more prone to parasitism during pregnancy and per-parturient period due to stress and decreased immune status [34].

The current study further revealed that age of the animal did not show significant association with the prevalence of the parasites. Absence of association between age groups is contrary with previous reports from the country [27, 10 - 24] and elsewhere [19, 11]. So many researchers have recognized that adult and old animals develop acquired immunity [10, 34, 13 -30] to nematode parasitisim because of repeated exposure they expel the parasite before it establish itself in the gastrointestinal tract.

There is a significant difference in the prevalence of GIT nematode infection associated with body condition (BCS) ($p > 0.00$). The prevalence of GIT nematode infection was significantly higher in poor body condition animals (79.1%) than in medium (58.4%) and good body condition (35.4%) ($p<0.05$). This result was in agreement with the reports of [27, 19, 7]. This shows well managed and -fed goat develop strong immunity which can decrease the growth and infection of parasites or goat with no good management or having malnutrition lead to poor immunological response which make the animal easily infected by the infective stage of the nematode [17].

Based on the morphology and appearance of the nematodes eggs during coprological examination the following nematode genera were identified: Strongyle type (77.876%), Trichuris spp. (7.08%), Nematodirus spp.

(3.982%) and mixed infections (11.06%) were observed in goat at the study area. Strongyle type nematodes infection in goat was the most dominant nematode observed during this study, which is in agreement with the observation of [31, 20, 6, 27, 1] in Ethiopia and [25, 26] elsewhere in the world.

5. Conclusion and Recommendations

Infection by the gastrointestinal nematode parasites are one of the major problems for livestock mainly small ruminants and which is responsible for economic losses due to reduced production, morbidity and mortality. In present study, the carpological prevalence of goat GIT nematode was 58.9%; and the dominated by genus identified based on nematode eggs morphology were Strongyle type, Trichuris spp. and Nematodirus spp.

Based on the result observed the following recommendations forwarded:

1) Further study to identify the species of nematodes prevailing in the area.
2) Strategic treatment of goats with broad spectrum anthelmintic.

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