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Clinico-coproscopic study on major GIT helminthes of goats and their management approaches at Mojo veterinary clinic, Oromia region, Ethiopia

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ABSTRACTS: A cross-sectional study was conducted from January 2021 to July 2021 on 384 randomly selected goats from six purposively selected districts of Mojo town to determine the prevalence and associated risk factors of gastrointestinal helminths infestation. Fecal samples were collected from all study animals were subjected to parasitological investigation using simple test tube floatation and sedimentation techniques for screening the eggs of observed gastrointestinal (GIT) nematodes. The overall coproscopic prevalence of gastrointestinal helminthes in goat was found to be 33.6% (129/384). Among the identified nematode parasite eggs, were *Strongyles,* 123(95.3%) while among cestodes only *Moniezia* eggs 6 (4.7%) were identified. There was a significant difference ($P < 0.05$) at 95% confidence interval in prevalence of GIT nematodes between animals of different body conditions. Questionnaires introduced to animal owners revealed that helminthes control in the area is exclusively based on the anthelmitic treatment. Farmers and animal breeders also experienced to treat their animals with anthelmintics based on individual animal exhibiting clinical parasitism. However, this treatment regimen could lack precision in determining the appropriate dosages. The records available indicated that the types and sources of anthelmintics used on the farms included mainly albendazole for sheep and goats as well as tetraclozan (tetramisole 450 mg and oxyclozanide 450 mg) for sheep and goats, Ivermectin injectable were all available on the local markets. It can be concluded that, in the study area there was high prevalence of GIT parasites in goats with different age, sex and body conditions. Therefore, deworming and good management practice is recommended as well as further studies should be carried out to determine the parasites burden and their seasonal occurrence.
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1. Introduction

In Ethiopia small ruminants represent the most important part of the livestock systempossesses an estimate of 26.1 million sheep and 21.7 million goats small ruminants (Zeryehun, 2012). Small ruminants contribute around 46% of national meat consumption and 58 percent of the value of hide and skin production.Despite this because to poor nut quality, small ruminant productivity remains low in comparison to the population (Fayisa et al., 2020).

Endoparasites are economically significant parasites that have a large impact on small ruminants reared in extensive and intensive production systems. Furthermore, helminthisis refers to a complex condition caused by parasites of the nematoda, cestoda, and trematoda, despite the fact that all grazing sheep and goats can be infected with the parasite (Aliyu *et al*., 2020)

Helminthosis of sheep and goat is one of the endoparasitic infections that cause economic losses due to decreased productivity and increased mortality. The most common constraint in small-ruminant farming is gastrointestinal (GI) nematode infection. They cause weight loss, decreased weight gain in young animals, diarrhoea, and anorexia (Babják *et al*., 2017). Furthermore, gastrointestinal helminths, despite appearing subclinical in nature, are one of the major challenges that impede the health and productivity of sheep and goats in the study area(Zeryehun, 2012).Several previous studies conducted in various parts of Ethiopia revealed that the most common genera of small ruminant parasitic helminths are Haemonchus, Trichostrongylus, Oesophagostomum, Bunostomum, Strongyloides, Fasciola and Trichurisspp(Mollaet *al*., 2015). Meanwhile, the most common helminthes genera were

Trichostrongylus/Teladosagia, Haemonchus, Oeophagostomum, Bunostomum, and Strongyloides species (Kumsa *et al*., 2011).

Gastrointestinal parasite infections are a global problem for both small and large-scale farmersbut their impact is greater in Sub-Saharan Africa in general, and especially in Ethiopia, due to the availability of a diverse range of agro-ecological factors suitable for diversified hosts and parasite species.Economic losses are caused by gastrointestinal parasites due to decreased fertility and work productivity(Fayisa et al., 2020). The objective of the current study was therefore to [1] Determinethe occurrence major GIT helminthes in goats [2]Establish major risk factors [3] Assess the parasite control strategies employed in study area.

2. METHODS AND MATERIALS

2.1. The Study Area

Mojo (Lume) district is located at 70 km from Addis Ababa in East Shewa zone of Oromia Region, Ethiopia. Lume is bordered on the south by the Koka reservoir, on the west by Ada'aChukala, on the northwest by Gimbichu, on the north by the Afar Region and on the east by Adama. Mojo is the capital of the district; other towns and cities include Ejere, Ejersa and Koka. Geographically, the study area is found at latitude of 8° 34' 59.99" and longitude of 39° 09' 60.00" E. Most of this District altitude ranges from 1500 to 2300 meters above sea level. The mean monthly temperature of the area ranges from 22^{o}C to 34^{o}C. A survey of the land in this district shows that 54.3% is arable or cultivable, 3% pasture, 2% forest, and the remaining 20% is considered degraded or otherwise unusable. Vegetables are an important cash crop of the area (CSA, 2005).

2.2. Study animals

In the study area, small ruminants are kept under both extensive and intensive managementsystem where farmers maintain to goats. A total of 384 goats were randomly selected in Mojo town, Lume district for corpological examination. During the study, goats of local origin grazing in pasture fields were included. The study animals were categorized based on their age as young (< 1 year) and adult (1≥years)(Gatenby, 1991).

2.3. Study Design

A cross-sectional study design was conducted from January 2021 to August 2021 to estimate the prevalence of GIT parasite of goatsin and around mojo town, lume district based on coprological examination. Households were selected purposively based on easy of accessibility and interest of owners.

2.4. Sampling techniques and sampling size determination

Simple random sampling technique was used to select study animals in examined flocks. Species, age, sex, body condition and production system considered as risk factors for the occurrence of GIT parasite in goats (Fayisa et al., 2020). To calculate the total sample size the following parameter are using, 95%of level confidence interval (CL), 5% desired level of precision and with assumption of 50% of expected prevalence of brucellosis in small ruminant the study area the sample size will be determining using formula given by Thrust field formula (2005).

$$n = \frac{Z^2\ x\ p\ (1-p)}{D^2}$$

$$= (1.96)^2 \text{x } 50\% \ (1- 50\%)/(0.05)^2$$

$$= 384$$

Where N is the sample size,

Z-Is the statistic corresponding to level of confidence (1.96),

P -is expected prevalence (that can be obtained from same studies or a pilot study conducted by the researchers), and

D- is precision (corresponding to effect size).

Since no previous study was conducted in the study area, the expected prevalence was 50%. Accordingly, with 5% absolute precision at 95% confidence level, the number of goats required to determine the prevalence was found to be 384.

2.5. Sample Collection and transporting

A fresh fecal sample was collected directly from the rectum of goats by using gloved fingers. Collected fecal samples placed in plastic bottles. After collection the fecal samples were preserved with 10% of formalin to prevent the egg from hatching during transportation because the study site is far from the laboratory where the samples processed then takento the CVMA parasitology laboratory, for further processing in the same day of collection. The sample left unprocessed in the first day was stored in refrigerator at 4^{0}C to be processed in the following days. At the time of sampling the species, breed, age, sex, management system, fecal consistence, deworming, body condition, temperature, respiratory rate, pulse rate and mucus membrane were recorded on a data recording format.

2.6. Laboratory Examination

Two laboratory test processes namely fecal flotation and fecal sedimentation had been doneto identification the egg/ oocysts of nematode and cestodes.

2.6.1. Fecal floatation

Floataion was done by using saturated sodium chloride solution to identify the eggs of nematode. The coprological procedure was described as follows: taking 3 grams of faeces from each animal sample and mix with 42 ml of floatation fluid by using pistil and mortem thoroughly then the suspension pour through tea strainer. After strain the suspension was poured in to test tube and the test tube was placed in a rack and the test tube with the suspension was left a convex meniscus at the top of the test tube and coverslip was carefully placed at the top of the tube an let it to stand for 20 minutes. Finally the coverslip was removed with the drop of Fluid adhere to it and immediately the coverslip will put to microscopic slide and examined in 10x magnification to identify nematode.

2.6.2. Sedimentation

After the feces had been crushed about 3g a face was put in to universal tube Pour 40-50 ml of tap water into container Mix faeces and water thoroughly. Filter the suspension through a tea strainer or double-layer of cheese cloth into container Pour the filtered material into a test tube. Remove the supernatant with a pipette very carefully Re-suspend the sediment in 5ml of water. Allow to sediment for 5 minutes. Discard the supernatant carefully .Stain the sediment by adding one drop of methylene blue or malachite green. The dyes stain the faecal particles a deep blue or green leaving the trematode eggs unstained Transfer a small drop of the stained sediment to a microscope slide using a pipette. Cover droplet with a coverslip and examined under 10 x magnifications.

2.7. Questionnaire design and survey

Semi structured questionnaire was designed to gather data on commonly used anthelemintics (AH), reason for AH choice, sources of AH, when to use AH, treatment frequency, AH and response of small ruminants to treatment. A total of 100 individuals who brought their animal to Mojo veterinary clinic and involved in rearing of small ruminants were selected for interview.

3. DATA MANAGEMENT AND ANALYSIS

Data generated from laboratory investigations were recorded and coded using Microsoft Excel spreadsheet (Microsoft Corporation) and analyzed using SPSS version 20 statistical software. Descriptive statistics were used to determine the proportion of diseases based on sex, body condition, season and age. Chi-square test and the p-value were used to determine the presence of association among the different variables and the major animal health problems caused by parasites. A calculated two value at the specified degree of freedom(df) greater than the tabulated value of two at that df were reported as having a significant association and vice versa. A p-value less than 0.05 will be considered as having statistically significant. 95% confidence interval was used for interpreting the result.

4. RESULTS

4.1 Questionnaire survey results

In the study area, mixed crop livestock production was the major production system. Majority (95%) of the respondents indicated that they do not have any idea about anthelmintics rotation as a result they never rotate anthelmintics families. All the respondents indicated that doses of anthelmentics were determined only by visual estimation of the animal weight. According to respondents the commonly used anthelmintics are: Albendazole 82%, Tetramisole 17% and Ivermectine 1%. Reason for AH choice was mentioned by 25% of respondents by price, 65% by color while 10% as prescribed by veterinarians. Most of the interviewed (82%) also experienced to treat their animals with anthelmintics based on individual animal exhibiting clinical parasitism. The frequency of treatment is at least twice a year. Regarding to the response to treatment, 80 % improvement in clinical signs and body conditions and 20% responded little or no improvement.

4.2. Prevalence of gastrointestinal in helminths

The overall prevalence of gastrointestinal helminths during the study period was 129(33.6%) out of the total 384 samples, 123(95.3%) were *Strongyles,* were eggs, 6(4.7%) were *Moniezia egg*.

The prevalence of gastrointestinal helminths was higher in male Goats 106 (35.1%) than female goats 25(30.5%) in the study area. It was observed as 123 nematode (95.3%) &6(4.7%) cestodes from this result the comparisons between adults and young were 35(63.6%) for nematode &6(1.8%) for cestodes which were in young35(63.6%) nematode and cestode (0.0%) the difference in prevalence between age group was not significant with (p-value >0.05). In case of body condition animal with poor body condition infected highly which were 55 (42.1%) compared to animal with medium body condition which were 5(35.7%) and good body condition 71 (27.5%).

Table-1: Overall Prevalence of GI helminths in goats

Helminths	No of examined	No of infected (%)	χ^2	P –value
Nematodes	384	123(95.1%)	0.326	2.2559
Cestodes	384	6(4.6%) 129(33.59%)		

Table 2: Coproscopic prevalence of gastrointestinal helminths

Type of parasite	No of infected	Prevalence
Strongyles	112	86.8%
Trichuris	11	8.5%
Moniezia	6	4.6%
Total	129	33.6%

Table 3: Prevalence of GI helminthes, association between male and female goats

Mojo	No of examined	No of infected (%)	X2	P –value
Male	302	106(35.1%)	0.260	0.610
Female		25(30.5%)		

Table 4: Coproscopic Prevalence of GI Helminths based on their sex

Result	Genera of Helminths	Female	Male	Total
Positive	Strongyles spp	22	90	112
	Trichuris spp	3	8	11
	Moneizia spp	0	6	6
Negative		57	198	255
Total		82	302	384

Table 5: Prevalence of GI Helminths based on their body condition

	Genera of Helminths	Poor	Medium	Good	Total
Positive	Strongyles spp	48	5	59	42
	Trichuris spp	4	0	7	11
	Moneizia spp	2	0	4	6
Negative		58	9	188	255
Total		112	14	258	384

5. DISCUSSION

The present study revealed the overall prevalence of GIT helminths parasites of small remnants to be 33.6%Gastro-intestinal parasite infections are a world-wide problem for both small- and large-scale farmers. Infection by gastrointestinal parasites in ruminants including sheep and goat can result in severe losses. Economic losses are caused by gastrointestinal parasites in a variety of ways: they cause losses through lowered fertility, reduced work capacity, involuntary culling, a reduction in food intake and lower weight gains, treatment costs, and mortality in heavily parasitized animals (Solomon-Wisdom, 2014).

The present prevalence of 33.6% was lower than the previous reported prevalence study revealed 87.8% an overall prevalence of small ruminant GIT helminth parasites in the study area. The current finding is inline with previous reports from different parts of Ethiopia and other tropical countries. However this finding is much higher than the studies conducted in different part of the country.The result also revealed that Strongyle nematodes were identified as the most predominant helminths in the small ruminants of the study area. This finding is in agreement with different findings. The high prevalence of strongyles may be due to the suitability of the climatic condition of the study area for survival and transmission of the parasites. In addition, the poor management practices including the poor hygienic practices employed by the pastoralists and keeping different age group and different spices of animals together may be the other (Nor-Azlina et al., 2011).

The study showed that nematode had a higher prevalence than trematodes and cestodes, this could be because of the high rainfall experienced which could lead to the favorable condition of the development of the infective stage larvae. This is in line with report in lafia, nasarawa state, nigeria Aliyu *et al*., (2020), Pam *et al*., (2020), by Al-Robaiee*et al*., (2019) in Kirkuk city, Iran (Al-Robaiee*et al*., 2019; Pam *et al*., 2020). The reasons are that nematodes do not require intermediate hosts and both larval and adult stages are all infective stages of the parasite (Gibbon, 2001).

Concerning the sex, the study revealed a high prevalence 34.5% of parasites in male Goat than their female counterparts 30.7%. The study showed none statistical significant different. The study is discordant with the report of other studies that reported that sex does not really have direct influence on the epidemiology and distribution of intestinal parasites of goats (Aliyu *et al*., 2020, Adua and Hassan, 2016; Eke et al., 2019; Pam *et al*., 2020).

Animals with poor body condition tend to harbor a significantly higher strongyle infection rate than others, which is in agreement with the previous works (Fikru et al., 2006; Rahmeto *et al*., 2010). In fact the poor body condition could be due to the strongyle itself or other diseases or nutritional problems. Whatever the cause, there is compromised immune response to infection in poor body condition animals (Skyes, 2010).

In the present study, only one genera of cestode, namely Moneizia sp. was recorded in goats. This finding was consistent with reports of Kumsa et al. (2011), but it was in disagreement with other reports in the country (Abebe and Esayasu et al. 2001; Tefera et al., 2011). The disagreement might be due to use of treatments against cestodes in the area moneizia species was report in my result (64.6%)

A high false positive result implies that animals that were not sick will be treated which comes at a price. Firstly, anthelmintic drug wastage on treating animals that are not sick and secondly anthelmintic resistance willbe prevalentbecause of frequent dosing (Hoste*et al*., 2002). Under- dosing which promotes anthelmintic resistance may also be problematic in false negative animals because of incompletetreatment of parasite especially when a general deworming program isbeing followed.Incomplete treatment implies exposure of parasites to low doses of anthelmintic drugs hence the development of parasite resistance (Degen et al., 1995; Jabbar*etal*., 2013). The study showed that higher prevalence of GIT parasite was observed inpoor body condition animals as compared to medium and good body condition animals and the difference was statically significant ($p<0.05$). This agrees with previous reports of Welemehret *et al*. (2012) in Northern Ethiopia, Diriba and Birhanu (2013) in south eastern Ethiopia, Kedir and Asfew (2017) in South Eastern Ethiopia and Tesfaye*et al*. (2019) in Northwest Ethiopia. This might be due to either well-fed animals have good immunity for parasitic infection (Fayisa et al., 2020).

Questionnaires introduced to animal owners revealed that helminthes control in the area is exclusively based on the anthelmitic treatment. Farmers and animal breeders also experienced to treat their animals with anthelmintics based on individual animal exhibiting clinical parasitism. However, this treatment regimen could lack precision in determining the appropriate dosages.

6. CONCLUSION AND RECOMMENDATIONS

Small ruminant gastrointestinal helminths are an important parasitic disease that obviously reduces goat productivity. In the study area, there was a high prevalence of gastrointestinal helminths infection, indicating that these parasites may play a role in limiting productivity and compromising animal well-being. Infection was found to be more prevalent in animals with poor body conditions than in medium and good body condition small ruminants.As a result, in order to control helminths infections, animals with poor body condition should be given special attention. Helminthes control in the area is exclusively based on the anthelmitic treatment. Farmers and animal breeders also experienced to treat their animals with anthelmintics.

Based on the above conclusions, the following points are forwarded as recommendations:

- Further epidemiological study should be conducted in the area including environmental factors like management conditions that helps to design an appropriate control measures.

- Quantitative method of study should be conducted to determine the parasite load and it is effects on the different body parameters.
- Detailed study should be conducted to clearly identify nematode parasites using fecal culture and postmortem examination in the study area.
- Regular de-worming program using broad spectrum anthelmintic and good management practices should be implemented to minimize pasture contamination with larvae.

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