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Research Article

Prevalence and the associated risk factors of gastrointestinal parasites of shoats in Tiyo District, Arsi zone, Oromia, South West Ethiopia

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Abstract

A cross-sectional study was conducted during October 2018 to November 2019 in Tiyo district, Arsi Zone of Oromia National Regional State in order to determine the prevalence of Shoats GIT parasites and the associated risk factors. A total of 384 fecal samples were collected from all animals. The collected samples were kept in cold chain and transported to Asella Regional Veterinary Laboratory. The quantitative method of fecal examination was conducted by using a modified McMaster egg-counting technique. The overall prevalence of GIT parasites was 70.5% (271/384). The prevalence of GIT parasites in sheep and goats were 52.8% (150/284) and 64% (64/100) respectively. The most GIT parasites found in the study area was Strongyle (39%), Stronglyoid (21%), Trichuris(11%) Paramphistomum (74%), Monezia (6%) Coccidia (25%) and mixed infection (121%). The degree of light, medium and severe GIT infestations in the study area was, 88(22.9%), 56(14.5%) and 75(19.5%) respectively. There was no significant association of parasites infestations with district, species, age and body conditions of the animals ($P>0.05$). This study showed that, GIT parasites are the major health problems of small ruminants in the study area. Therefore, a further study on species of GIT parasites circulating in the area is crucial. Cost effective deworming strategy and awareness creations to the farmers in the study area should be advised.

Introduction

Sheep and goats are the most numerous of man's domesticated livestock and are especially important in more extreme climates of the world. Over two-thirds of the total population of sheep and goats occur in the less developed countries where they often provide major contribution to farming enterprises [1].

In Africa, the distribution of small ruminants varies widely, with a higher concentration found in dry areas than in humid areas [2,3]. They require minimal inputs and maintenance costs to live in various conditions, from desert to humid rainforest. They survive better under drought conditions than cattle due to their low body mass and low metabolic requirements, which in turn minimize their water requirements and maintenance needed in arid and semi-arid areas [4,5].

Ethiopia is a country known for possession of huge

livestock numbers and has an immense potential for increasing the volume of products from livestock, both for local use and for export purposes. Sheep and goats are among the major economically important livestock playing an important role in the livelihood of resource-poor. They provide more than 30% of the local meat consumption to the country and form a vital source of income generation for the community. They also contribute greatly to the national economy of the country [6]. The total livestock populations estimated in million heads were about 56.71 cattle, 29.33 sheep, 29.11 goats, 2.03 horses, 7.43 donkeys, 0.40 mules, 1.16 camels and 56.87 poultry with total tropical livestock unit (TLU) of 52.93 [7].

Sheep and goats production and productivity in Ethiopia is constrained by many factors. Among these GIT parasites, constitutes to pose a serious health threat and a limitation to the productivity of small ruminants. The Gastrointestinal Parasites of small ruminants were distributed in all regions across the tropical and sub-tropical countries. They are



triggering serious problems in the developing countries, particularly where nutrition's and sanitation status are very scarce. They can cause huge amount of economic losses because of low production, productivity and mortality in young animals [8-12]. Study on the prevalence of GIT parasites in Ethiopia have been reported by [13-16]. Ethiopia has different agro ecology that is suitable for different hosts and parasite species [17]. These parasites are one of the major constraints in the small ruminants production and productivity. Therefore, it is very important to generate accurate information about these parasites in the study area in order to design effective control and prevention strategies. Hence, the objective of this study was to determine the prevalence of GIT parasites of small ruminants and to assess the associated risk factors in the area.

Materials and methods

Study area and study population

The study was conducted from October, 2018 to November, 2019 in three Peasant Association (PAs) of Tiyo district of arsi zone: namely W/Chilalo, Amsagash and Tulu Chabi. Arsi zone is located in Oromia National Regional State at a distance about 175 km to South East of Addis Ababa. Tiyo district is characterized by mid subtropical weather with minimum and maximum temperature ranging from 8.4°C - 22.6°C with the relative humidity ranging from 43% to 60%. The average annual rainfall is 2000 mm. The area has a bimodal rainfall occurring from March to April (short rainy season) and July to October (long rainy season). The area is densely populated with livestock population. The farmers in the area practice mixed crop-livestock farming system.

Study design, sampling method and sample size determination

A cross-sectional study was conducted from October, 2018 to November, 2019 in order to determine the prevalence of sheep and goats GIT parasites and the associated risk factors in the study area. The animals were selected based on simple random sampling method. The animals were carefully identified and the risk factors such as PAs, species, sex, age and body condition of the animals were recorded. The age of the animals was determined according to [4]. The selected animals were grouped in to three classes i.e., less than 2 years, 3 to 4 years and greater than 4 years. Likewise, body condition score was classified into three levels i.e., poor, medium and good according to the [18].

The sample size of the animals was calculated by using 50% expected prevalence, 5% absolute precision and 95% confidence interval according to [19]. Accordingly, the calculated total sample size was 384.

$$N = 1.962 * P \exp (1 - P \exp) / d^2$$

Where; n = sample size, Pexp = expect prevalence, d = absolute precision (5%).

Fecal Sample collection and EPG determination

A total of 384 fresh fecal samples were collected from the

rectum of the animals by wearing plastic hand gloves. The collected samples were placed in a screw capped universal bottles and transported to Asella Regional Veterinary Laboratory. The fecal samples were examined by using standard floatation and sedimentation techniques simultaneously. The presence of at least one parasite egg in either of the tests indicates that the result is positive. The egg morphology, appearance, size, color and presence of blastomeres were used to identify the parasites. The quantitative method of fecal examination was conducted by using a modified McMaster egg-counting technique according to [19,20] and the level of infection was determination according to [21].

Data management and statistical analysis

All the data collected were stored in Micro-Soft Excel spreadsheet and analyzed by using STATA version 11. During sampling animal species, sex, age and body condition of the animals were recorded. Descriptive statistics was used to determine the prevalence of the GIT parasites and Pearson Chi-square (x²) test was used to assess the association between the risk factors and the GIT parasite infestations. The GIT prevalence was calculated by dividing the number of infected animals by the total number of examined animals. For all statistical analysis, a confidence level of 95% and P-values less than 0.05 were considered as a significant.

Results

The overall prevalence of GIT parasites of sheep and goats in the study area was 55.7% (214/384). The prevalence the GIT parasites in sheep and goats were 52.8% (150/284) and 64% (64/100) respectively (Table 1). The prevalence of the identified parasite spp. was Strongyle (39%), Stronglyoid (21%), Trichuris (11%) Paramphistomum (74%), Monezia (6%) Coccidia (25%) and mixed infection (121%) in the study area (Table 2). The overall degree of infestations was, 88(22.9%), 56(14.5%) and 75(19.5%), with light, medium and high infestation rates respectively (Table 3). The prevalence of Nematode, Trematodes and Coccidia eggs in the study area was 44.5 %, 13.2 %, and 6.2% respectively (Table 4).

Table 1: Prevalence of GIT Parasites with respect to species sex, age and BCS.

Risk factors	Total Examined	No. positive	Prevalence (%)	x ²	P-value
Species				3.7490	0.053
Sheep	284	150	52.8%		
Goat	100	64	64 %		
Total	384	214	55.72		
Sex				4.8107	0.028
Female	279	165	59.13		
Male	105	49	46.66		
Total	384	214	55.72		
Age				0.0143	0.905
Young	78	43	55.12		
Adult	306	171	55.88		
Total	374	214	55.72		
Body condition				3.4137	0.181
Good	255	137	53.72		
Medium	107	67	62.61		
Poor	22	12	54		
Total	384	216	56.25		



In this study the Nematode, Trematodes and Eimeria eggs were the most identified genera in sheep and goats in the study area. The Nematodes and Eimeria eggs were higher in young animals, whereas Trematodes eggs are higher in adult animals (Table 4). The prevalence of Nematodes and Trematodes eggs were found to be higher in female, while the Eimeria oocysts were higher in male animals.

Discussion

The present study revealed the overall GIT parasite prevalence of 55.72% (271/384) with 52.8 % (284/343) and 64 % (64/100) in Sheep and Goat, respectively. This result is lower than the reported GIT parasites prevalence in different parts of Ethiopia. The GIT prevalence of 69.01% was reported in Arsi Negele [22], 70.2% in Haromaya town [23], 70.8% in Gonder town [24], 77.8% in bale Zone [25], 79.09% in Debre Berhan [26], 82% in Genchi distric [27], 86% in Wolayita Sodo, [28], 90.4% in Gondar [29], 84.3% in East Shewa Zone [30], 91.4% in Illubabor, [31], 90.9% in Asella, [32]. This variation could be due to the difference in agro-ecology of area of study, season

of study, sample size, methods of examination employed, flock size, management system and deworming activities performed in respective areas.

The present study revealed that there was no significant association between parasites infestations and species, sex and body conditions of the animals. This finding agrees with the study reports from Gambia [33] and Semi-arid part of Kenya [34]. Nevertheless, it does not agree with the study conducted in West Oromia, Ethiopia, which reported the significant association of parasites with age [17].

The current prevalence of Strongyle spp in sheep and goats was 65.33% and 34.63 % respectively. This result was lower than the previous studies, who reported the prevalence of 68.4% in sheep and higher than prevalence of Strongyle spp in goats 70.7% [35].

The prevalence of Strongloides spp in the present study was (21%), which agrees with the study conducted by [25], who recorded the prevalence of 25.26% in Bale Zone.

Conclusions

The present study was showed only on faecal examination of the animals in order to estimate the prevalence GIT parasites and the associated risk factors. It revealed that GIT parasites of small ruminants were a prevalent disease in the study area affecting the health status of small ruminants. Therefore, strategic deworming of shoats in the study area is needed to mitigate this problem. Likewise, awareness creations to the farmers in the study area should be advised. Moreover, further studies are also recommended to identify the species of GIT parasites in this area.

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Table 2: Occurrence of different GIT parasite species in relation to animal species.

Type of parasite	Sheep		Goats		over all
	No. Examined	No of positive	No. examined	No of positive	
Strongyle spp		98(34.5%)	52	52%	150 (39%)
Stronglyoid spp	54	19.01%	27	27%	81 (21%)
Trichuris spp	7	2.47%	4	4%	11 (2.86%)
Paramphistom spp	56	19.71%	18	18%	74 19.27%
Monezia spp	6	2.11%	0	0	6 (2.1%)
Coccidia spp.	17	5.98%	8	8%	25 (6.5%)
Mixed Infestation	87	30.6%	34	34%	121 (31.5%)
Total examined	284		100		384

Table 3: Degree of GIT parasitic infection in relation to animal species.

Spp	Light	Moderate	High
Sheep	65/284 (22.8%)	39/284 (13.7%)	47/284 (16.5%)
Goat	23/100 (23%)	17/100 (17%)	28/100 (28%)
Total	88 (22.9%)	56 (14.5%)	75 (19.5%)

Table 4: Prevalence of GIT parasites in genera level with related to animal species, sex and age.

Risk factor	Nematode	Trematod	Eimeria
Spp			
Sheep	112/284 (39.4%)	55/284 (19.3%)	16/284 (5.63%)
Goats	59/100 (59%)	16/100 (16%)	8/100 (8%)
Total	171/384 (44.53%)	71/384 (18.48%)	24/384 (6.25%)
Age			
Young	35/7 (44.8%)	12/78 (15.3%)	6/78 (7.6%)
Adult	136/306 (44.4%)	59/306 (19.2%)	18/306 (5.8%)
Sex			
Female	130/279 (46.5%)	57/279 (20.4%)	15/279 (5.3%)
Male	41/105 (39%)	14/105 (13.3%)	9/105 (8.5%)
Total	171/384(44.53%)	71/384(18.48%)	24/384(6.25%)



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