Abomasal Nematodes: Prevalence in Small Ruminants Slaughtered at Bishooftu Town, Ethiopia

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Citation

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Abstract

A study was carried out to estimate the prevalence, species composition and worm burden of abomasal nematodes of small ruminants slaughtered at restaurants of Bishooftu town from October 2008 to March 2009. During the study period, 114 and 64 abomasum of sheep and goats respectively were examined according to standard procedures. Three genera of nematodes were identified in both sheep and goats abomasum with an overall prevalence of 83. 6% and 77.6%, respectively. The specific prevalence observed was T. axei (90.4%), Teladorsagia spp. (82.5%) and Haemonchus species (78.1%) in sheep, and T.axei (81.3%) Teladorsagia
spp. (75.0%) and Haemonchus species (76.6%) in goats. There was no statistically significant difference (P>0.05) observed among the risk factors (age and month) considered in relation to the prevalence of abomasal nematodes. However, there was statistically significant difference (p<.005) observed among the risk factors (host species) in the prevalence and worm count of three abomasal nematodes. In general, a high infection rate with abomasal nematodes was observed in both sheep and goats during the study period.

INTRODUCTION

Despite the large livestock population of Ethiopia, the economic benefits remain marginal due to prevailing diseases, poor nutrition, poor animal production systems, reproductive inefficiency, management constraints and general lack of veterinary care. These diseases have a major impact on morbidity and mortality rates, with annual losses as high as 30–50% of the total value of livestock products of Ethiopia (Tibbo et al. 2003). With little inputs, sheep and goats play an important role in the rural economy through provision of meat, milk, blood, cash income, accumulating capital, fulfilling cultural obligations, manure, and contribute to the national economy through the export of live animals, meat and skins (Bayou 1992).

Endoparasites are responsible for the death of one third of calves, lambs and kids, and considerable losses of parts of carcasses condemned during meat inspection (Anon 2000b). It is 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 (Perry et al. 2002). Although helminth parasites 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 nematode infection ranks highest on a global index, with Haemonchus contortus being of overwhelming importance (Perry et al. 2002).Gastrointestinal nematodes are recognized as a major constraint to both small and large-scale small ruminant production in developing countries, leading to significant economic losses (Martinez-Gonzalez et al. 1998). The abomasal nematode Haemonchus contortusis particularly important and causes severe anaemia and death in severely infected animals (Allonby and Urquhart 1975). Perry et al. (2002) identified haemonchosis as one of the top ten constraints to sheep and goat rearing in east Africa. Review of the available literature in Ethiopia strongly suggests that helminthosis has nationwide distribution and is also considered as one of the major setbacks to livestock productivity incurring huge indirect and direct losses in the country. Therefore, it is important to assess the type and level of parasitism in ruminant livestock, in order to be able to determine the significance of parasite infections and to recommend the most beneficial and economically acceptable control measures.

MATERIALS AND METHODS

STUDY AREA

This study was conducted on small ruminants slaughtered at restaurants of Bishooftu town, located at 45 km South East of Addis Ababa. It has a total human population of 95 000 (CSA, 2001). The area has an altitude of 1850 meter above sea level and experiences a bimodal rainfall pattern with a long rainy season from June to October and a short rainy season from March to May. The average annual rainfall and average maximum and minimum temperature for the area are 800mm, and 27.7oC and 12.3oC, respectively (CSA, 2001).

STUDY ANIMALS AND SAMPLE COLLECTION

A total of 114 sheep and 64 goats abomasum were examined and used to estimate prevalence, species and monthly worm burden of abomsal parasites. All the slaughtered animals were male and their age ranges from 1-5 years. The abomasum was removed from the abdominal cavity and ligated at both ends and immediately taken to the laboratory of Veterinary parasitology of Faculty of Veterinary Medicine, Addis Ababa University for appropriate examinations.

ABOMASAL WORM RECOVERY, IDENTIFICATION AND COUNT

A weekly regular visit was made to the randomly selected restaurants and samples were brought to the Faculty of Veterinary Medicine for laboratory works. Recovery, count and identification of abomsal parasites were made using procedure described in Hansen and Perry (1994) and Maff (1977). The abomasum was opened along its greater curvature and its contents were washed in to a bucket up to a total volume of 2 litters from which an aliquot of 200ml was transferred to 2 labeled graduated beakers and preserved in 10% formalin. A sub sample of 20 ml was taken in to a Petri dish for examination of abomasal worms under stereomicroscope. For those positive abomasal samples, the number of worms was determined by multiplying 20 ml (aliquot) x 100 (factor) as described by Handson and Perry 1994.

STATISTICAL ANALYSIS

Microsoft excel software was used to store all the data of abomasal parasites and analysis of simple statistics. Stata 2005 version Software program was used for data analysis. The prevalence of abomasal parasites, average worm burdens, total worm burdens, the monthly value of different abomasal parasites between different months of the study period and the two hosts were all compared by ANOVA. When P value is less than 0.05 the presence of significance difference is considered (Coles et al. 1992). Mean, confidence interval, percentage values, standards deviation and standard error were all used to compare and describe abomasal parasites in both sheep and goats.

RESULTS

A total of 144 abomasum of sheep examination and revealed the presence of three different genera of nematodes with overall prevalence rates of 83.6%. The different genera identified were, Haemonchus species 78.1%, T.axei 90.4%, and Teladorsagia species 82.5% as indicated in (Table, 1). Similarly, of the total 64 abomasum of goats examined, three genera of nematodes with the overall prevalence of 77.6% were recorded. The specific prevalence of the three genera of nematodes identified were, Haemonchus species 76.6%, T.axei 81.3% and Teladorsagia species 75.0%.

Figure 1

Table 1. Prevalence of Hemonchus spp., T. axei and Teladosagia spp in sheep and goats.

Parasite	Animals	No.	Positive	Prevalence (%)
Haemonchus spp	Ovine	114	89	*78.1*
	Caprine	64	49	*76.6*
	Subtotal	178	138	*77.5*
T. axei	Ovine	114	103	*90.4*
	Caprine	64	52	*81.3*
	Subtotal	178	155	*87.1*
Teladorsagia spp	Ovine	114	94	*82.5*
	Caprine	64	48	*75.0*
	Subtotal	178	142	*79.8*

The prevalence of Hemonchus species was higher in the months of October and March, where as that of T. axei was higher in February and March. Teladorsagia species was higher in November and March (Figure, 1). In the present study, the monthly average worm burden of Hemonchus spp. in sheep was higher in December (373.57) and lowest in January (204.35) (Table, 2). T. axei burden in sheep was higher in October (1190) and lower in March (300.00). Teladorsagia species burden in sheep was also highest in January (417.39) and lowest in October (190.00).

Figure 2

Table 2. Monthly mean worm burden and standard error of Haemonchus spp., T.axie and Teladorsagia spp. in sheep (n=114)

Month	No.	*Haemonchus spp.*		*T.axei*		*Teladorsagia spp.*		Total
		Mean	Std.Err	Mean	Std. Err	Mean	Std.Err	
Oct	10	290.00	91.23	1190.00	710.94	190.00	45.83	1670.00
Nov	24	245.83	65.10	312.50	55.27	220.83	40.82	779.167
Dec	20	373.68	86.46	400.00	91.13	300.00	85.16	1073.68
Jan	23	204.35	37.97	460.87	78.71	417.39	109.37	1082.61
Feb	22	300.00	59.36	514.29	73.45	257.14	49.56	1071.43
Mar	15	264.71	37.32	300.00	50.00	200.00	45.37	764.71
Total	144	275.44	25.79	469.30	69.66	274.56	30.46	1019.30

Concerning goats, the monthly average burden of Haemonchus spp. was the highest in October (442.8571) and the least in March (0.00) whereas, T.axei was highest in October (714.2857) and the least in March (200). Teladorsagia spp burden was highest in February (350) and the least in January (141.6667) (Table 3). As it can be seen from Tables 2 and 3, sheep with 1019.29 over all mean count were found to be more heavily infected than goats with 950.00 over all mean worm count during the study period.

Figure 3

Table 3. Monthly Mean worm burden and Standard Error of Haemonchus species, T.axei and Teladorsagia species in goats (n=64).

Month	No.	*Haemonchus species*		*T. axei*		*Teladorsagia species*		Total
		Mean	Std.Err	Mean	Std.Err	Mean	Std.Err	
Oct	7	442.86	84.11	714.28	253.95	328.57	126.71	1485.71
Nov	13	230.77	67.35	300	94.73	307.69	78.82	838.46
Des	14	226.67	46.257	440	94.52	393.33	71.35	1060.00
Jan	12	233.33	75.21	350	100.38	141.67	54.29	725.00
Feb	16	212.00	55.44	337.5	68.26	350.00	105.67	900.00
Mar	2	-	-	200	-	300.00	-	500.00
Total	64	245.31	28.60	395.31	48.31	309.37	39.38	950.00

Figure 4

Figure 1. Monthly prevalence of Hemonchus spp., T. axei and Teladosagia spp. in sheep and goats

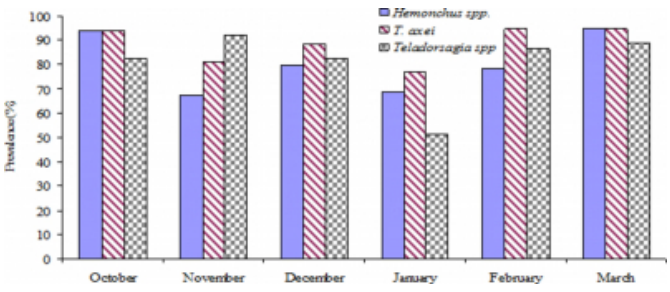
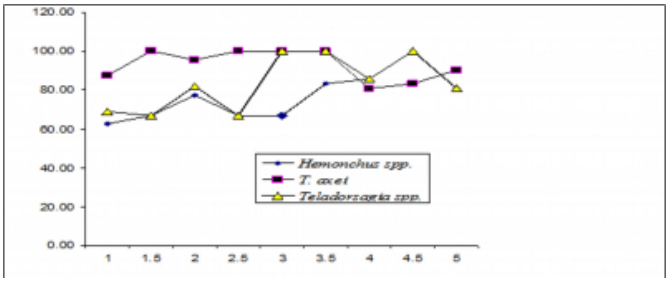


Figure 5

Figure 2. Prevalence of Hemonchus spp., T. axei and Teladorsagia spp in different age groups of sheep



The prevalence of the three genera of the abomasal nematodes increases seems as if increasing with the age of the animal increases but at the age of 2-2.5 years, the prevalence of T.axei and Teladosargia decreases in sheep (Figure 2). However, logistic regression revealed that there was no significant difference (P >0.05) observed in the month and age and species of the animals and the prevalence of the three genera of the abomasal nematodes (Table 4).

There was no statistically significance (P>0.05) difference noted among age groups (Figure 3 and Table 4) and months of the study period in the prevalence and worm load of the three abomasal nematodes.

Figure 6

Figure 3. Prevalence of Hemonchus spp., T. axei and Teladorsagia spp in different age groups of goats

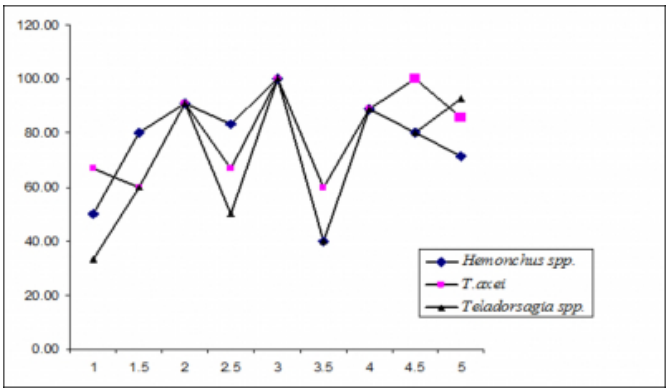


Figure 7

Table 4. Logistic regression of the risk factors for the prevalence of Haemonchus spp., T.axie and Teladorsagia spp.in goats and sheep

Factors	Odds Ratio	Std. Err.	z	P>z	[95%Conf. Interval]
Month	1.120737	0.2713068	0.47	0.638	.6973423 1.801199
Species	0.3523362	0.2360739	-1.56	0.119	.0947613 1.310036
Age	1.605824	1.13117	0.67	0.501	.4037352 6.387031

DISCUSSION

The current study discovered an overall prevalence of 83.6% of abomasal parasites in sheep and 77.6% in goats which is in agreement with the findings of previous studies (Graber 1975; Bayou 1992; Dereje 1992; Amenu 2005; Naod et al 2006; Kumsa and Wossene 2006). However, it is not in agreement with that of El-Azazy (1995), in which he carried out his study in Saudi Arabia, which is a desert where hot dry climate prevail, where as the present study was conducted in relatively wet and humid climate with variable amount of rain occurring during all months of the study period.

There was no significant difference ($P > 0.05$) in the prevalence of abomasal parasites in relation to the risk factors (age, species and month) between sheep and goats indicating that both species are almost equally susceptible to Haemonchus spp, T. axei and Teladosagia species. This finding is in agreement with earlier study in Kenya (Githigia et al. 2005). This could be due to equal chance of the animals to be infected with these parasites.

The results of worm counts presented here showed slightly different patterns in sheep and goats. In sheep both the over all worm count and specific counts for the three abomasal nematodes were higher than goats. This finding was in conformity with previous workers (Fritsch et al. 1993; Naod et al. 2006), who have reported that sheep generally harbor more GIT nematodes than goats, the probable explanation might be the fact that sheep are generally grazer in their feeding habit and usually graze very close to the soil which might be helpful in the acquisition of more infective larvae from the contaminated herbage. On the other hand, goats browse on shrubs and small trees where translation of infective larvae to such a height seems to be impossible.

Even though the variation was insignificant, higher worm loads was recorded during October than March in both sheep and goats. This higher worm counts during October coincides with the short rainy season in the area. This suggests that humidity and temperature during wet months favorably supports larval development and survival of nematodes in the pasture of the study area. This finding is inline with the work of Amenu (2005), and Fritsch et al (1993) all of which indicated high prevalence and worm burden during months of rainy season.In both sheep and goats, T.axei with respective prevalence of 90.4% and 81.3% was identified as the most predominant abomasal nematode of the area. This suggests the widespread occurrence of T. axei in the area and similar findings were reported in other parts of country (Dereje 1992).

In this study moderate prevalence rates of Teladorsagia (82.5% and 75%) in sheep and goats, respectively were recorded. Very few previous studies in Ethiopia have revealed the existence and prevalence of Teladorsagia infections in small ruminants (Amenu, 2005; Graber 1975). The result of this study is in support of the reports made by the previous works. Even though its prevalence was lower than T.axei, the importance of this parasites on the health and productivity of small ruminants should not over looked as the immature stages of these parasites are highly pathogenic to their host (Dunn 1978). Moreover, this nematode has developed resistance to the most commonly used anthelmintics and it has become a challenge to small ruminant production. This result is higher than the findings of Naod et al (2006), who reported a respective prevalence of 19.4% and 20.5% Teladorsagia in sheep and goats in a study conducted in small ruminants at Awassa, southern Ethiopia. This difference might be due to the differences in the detection ability of the parasites by the investigators and some other environmental factors.

The specific prevalence of Haemonchus species (87.1% and 76.6%) in sheep and goats, respectively is significance in the view of world wide importance of Haemonchosis, which is regarded as one of the most prevalent, pathogenic, with very high biotic potential, its prominent ability of emerging in antihelmintic resistance, unique survival strategy due to considerable biological and ecological plasticity and economically most important nematode with the ability of causing losses in most classes of animals.

In the present study damage in most of the infected sheep and goats by T. axei and Teladorsargia species, besides hemorrhage in case of Haemonchus species during examination of the abomasal mucosa. Therefore, significant economical losses in production are expected to occur in the study area.

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