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Nematode Burden in Sheep and Goat Slaughtered In Hawassa Hotels and Restaurants

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Abstract

A cross-sectional study was conducted from November 2013 to February 2014 at Hawassa, Southern Nation Nationality and People Regional state to determine the prevalence of abomasal nematodes, species composition and its worm burden in small ruminants (150 and 50 abomasum of sheep and goats respectively). The animals were examined using a standard worn recovery procedure of which 121(60.5%) were found to be positive for abomasa nematodes. Two genera of abomasa nematodes were identified in both sheep and goats, with the species-level prevalence of 93 (62%) and 28(56%) respectively.Specifically,85(56.7%) were *Haemonchus contortus* while 8(5.3%) were *Trichstrongylus axei* infection in sheep. Similarly, a prevalence of 24(48%) for *Haemonchus controtus* and 4(8%) for *Trichastrongylus axei* were observed in goats. Statistically significant differences ($p>0.05$)were not observed among the risk factors like sex groups and host of species in relation to the prevalence of abomasal nematodes. Average mean worn burdern in sheep were 364 and 605.6 for *Haemonchus contorts* and *Trichstrongylus axei*, respectively. Similarly, in goats, the mean worm burden was 590.2 for *Haemonchus contorts* and 512.5 for *Trichstrongylus axei*. Majority of sheep and goats harboring adult abomasal nematodes were with light to the modret degree of infection for *Heamonchus contortus*, but there was no moderate and heavy degree of infection in the case of *Trichstrongylus axei*. In general, this study showed that abomasal nematodes were still a core problem for small ruminant in the study area. Therefore, an appropriate control measure should be implemented in the area.

Keywords: Abomasa, *Haemonchus contorts, Trichostrongylus axei*, Hawassa, Sheep, Goat.

1. Introduction

Ethiopia's livestock population is often said to be the largest in Africa. It is estimated to the number over 150 million in 2007/2008. There were approximately 47.57 million cattle, 26.1 million sheep, 21,7 million goats, 2.1 million horses, and mules, 5.6 million donkeys, 1million camels, 39.6 million poultry (CSA,2009). Despite the large population animal productivity in Ethiopia is low and even below the average for most countries in Eastern and Sub-Saharan African countries, due to poor nutrition, reproduction insufficiency, management constraints and prevailing animal disease (Freman *et al.*, 1998).With little inputs sheep and got play an important role in the rural economies through the provision of meat, milk, blood, cash income accumulating capital, fulfilling a cultural obligation, manure, and contribute to the national economy through the export of live animals, meat and skin (Bayou, 1992). However, problems such as feed and grazing land shortage, lack of input, lack of reliable marketing outlets and disease cause great obstacles to production and productivity (Mitiku, 2004).

Helminths infections in domestic ruminants are of major importance in many agro-ecological zones in Africa (Nasser, 2009). In Ethiopia, helminthiasis has nationwide distribution and also considered as one of the major setbacks to livestock productivity in carrying huge direct and indirect losses, and responsible for causing an estimated annual loss of US$ 400million to the Ethiopian meat industry and to the export of livestock to foreign markets (Kimsa and Wessene, 2006). These diseases have a major impact on morbidity and mortality rate, with annual losses as high as 30-50% of the total value of livestock products of Ethiopia (Bayou, 1992). Among the many prevalent parasitic problems, nematodes arean economically important parasite of small ruminants (Bayou, 1992). The abomasal nematode *Haemonchus contorts* is particularly important and cause severe anemia and death in severely infected animals *(*Perry *et al., 2002).*

Haemonchus contorts and other abomasal nematodes like Ostealgia and *T.axei* have been identified as major parasites that constraint to sheep and goat rearing in East Africa (Kassai, *1999;* Taylor *et al., 2007*).Available information indicates that the parasites occur in all ecological zones and production system and economic losses may be high due to both clinical and sub-clinical infections *(*Jacquiet *et al., 1998)*. A lot of works has been done regarding helminths infection of small ruminants in many parts of Ethiopia, but there is not enough data on the status of helminths infection of small ruminants in the study area, despite the presence of a large number of small ruminants. Therefore, the objectives of this study were to estimate the prevalence of abomasal nematodes in small ruminants and to estimate species composition and worm burden of abomasal nematodes on small ruminants in Hawassa town based on postmortem survey.

2. Materials and Methods

2.1. Description of Study Area

Hawassa is a capital city of Southern Nation, Nationalities and Peoples Region Ethiopia and also of the Sidama zone. It is located on the shore of one of the Rift Valley lakes and found at 270km south of Addis Ababa. It geographically lies between4°, 2 7'and 8°, 30'latitude Northand 34°,21 and 39°,1' Eastlongitude (lat7.06 long 38.48). The annual rainfall and temperature range of the town are 800-1000 mm and 20.1-25℃, respectively in and around Hawassathe total population of Hawassa is estimated to be 150,000; dwelling over an area of 50 km. The type of the farming in the area is mixed crop-livestock production system and production of sheep and goats in the area is an integral component of the traditional farming system (extensive farming) (**CSA, 2003**).

2.2 Study Animal and Population

The study was conducted on sheep and goats slaughtered at Hawassa town's restaurants and hotels. A total of150 sheep and 50 goats were selected, and all age groups and both sexes of animals were included in the study. Most of the animals originated from Hawassa town and its surroundings like Tula and Goche.

2.3. Study design

2.3.1. Study Type

A cross-sectional study method was employed to determine the prevalence of abomasa nematodes, and worm burden and species composition of abomasa nematodes on small ruminants in Hawassa town. Samples were collected threedays perweek for four months,extending from November 2013to February 2014. Information on species of animals, sex group and place of origin were generated whiletaking samples.

2.3.2. Sampling Methods and Sample Size Determination

Hawassa was selected purposively and a total of two hotels and three restaurants were identified on the basis of high slaughter rate and willingness of the owners. The hotels and restaurants, on average, slaughtered 20 sheep and5 goats per week. Sheep and goats were randomly selected and included in the study. A total of 20-25 samples were taken on three slaughtering days per week.Thedesired samplesize was calculated according to the formula given by Thrusfeild, (2005)using a 95% level of confidence, and desired absolute precision 5%. A prevalence of 85.65% was taken from a similar study by Bayou,(1992) as the expected prevalence. Hence, the required sample size was calculated using the formula below and was found to be 150 sheep and 50 goats were actually included in the sample.

$$N = \frac{1.962\ pexp\ (1- p\ exp)}{d2}$$

Where; N= Sample size; P= expected prevalence (85.65%); 1.96= the value of Z of at 95% confidence level; d = desired absolute precision (5%).

2.4 Sample Collection and Processing

Abomasal worm recovery, identification, and count: three days weekly regular visit were made to the randomly selected restaurant and hotels. A total of 200 samples (abomasums of the selected animals) were collected and brought to the laboratory of the school of veterinary medicine, Hawwassa University for worm recovery, identification and count. Worm recovery, count and identification were made by following the procedure described by Hansen and Perry,(1994) and Maff,(1977). The abomasawereopened along its greater curvature and its contents were washed into a bucket up to a total volume of 2 litters from which liquid of 200 ml was transferred to 2 labeled graduated beakers and preserved in 10%formalin. A sub-sample of 20 ml was taken into the petri dish for examination of abomasal worms under stereo-microscope. For positive abomasal samples, the number of worms was determined by multiplying 20 ml liquid by 100 (factor) as described by Hansen and Perry,(1994).

Differential parasite count of abomasum: abomasal samples were brought and opened along the greater curvature to be washed by 2 liters of water, paying attention to the fold. Abomasal contents were measured for 20 ml in a graduated cylinder and equal volume was poured into three Petri dishes. Formalin was added and the number of different nematode species was counted.

2.5. Data Analysis

Microsoft Excelspreadsheet was used to store all the data of abomasal parasite and to generate descriptive statics. Using SPSS version16.0 windows software, the difference in prevalence of abomasal parasites between sheep and goats was analyzed and by using Chi-square test the differences in worm burden between the two hosts were compared by ANOVA. In all the analyses, the presence of statistical significance was considered when the p-value was less than 0.05 at95%confidence interval.

3. Results

From the total of 200 abomasa of sheep and goat samples collected, 121(60.5%) abomasums were found to be positive for the two genera of abomasal nematodes (*H.contorts and T.axei*). Of the total 150 abomasum of sheep and 50 abomasum of goats examined, 93 (62%) and 28 (56%) were infested by two genera of nematodes, respectively. There was no statistically significant variation was noticed in the prevalence of sheep and goats in both genera of nematodes (P>0.05) (Table 1).

Table 1:Prevalence of abomasal nematodes recovered in small ruminant species.

Species	Number of examined	Positive animals		P-values
		n	%	
Sheep	150	93	62	0.56
Goat	50	28	56	
Total	200	121	60.5	

According to the assessment made on the effect of sex on the prevalence of the two genera in both sheep and goat species, a relatively high prevalence was recorded in females among sheep and goats (62%) and (56%), respectively. But, there was no statically significant variation noticed in the prevalence of different species nematode (P> 0.05) (Table 2). The prevalence of abomasal nematodes was 93(62%) and 28(56.0 %) in sheep and goats, respectively. This indicated that the prevalence of abomasal nematode is found to be higher in ovine than caprine, but it was not statically significant (P> 0.05) (Table 3).

Table 2: The Prevalence of abomasalnematodes with respect to sex(sheep + goats)

Sex	No. examined	No of total + ve (%)		P – value
		n	%	
Male	154	91	59.1	0.577
Female	46	30	65.2	
Total	200	121	60.5	

Table 3: The prevalence of abomasal nematodes insheep and goats.

Species	*H. contorts*		*T. axei*		P-value
	n	%	n	%	
Sheep	85	56.7	8	5.3	0.56
Goats	24	48	4	8	
Total	109	54.5	12	6	

Specifically, out of 93 infected abomasums of sheep, the prevalence of the two genera of nematode was 85(56.7%) *H. contortus* and 8(5.3%) *T. axei* prevalence was recorded as illustrated on (table 4). On the other hand, out of 28 infected abomasums of goats, the prevalence of two genera of nematodes was 24(48%) H.contortus and 4(8%) T.axei. so there was not statistically significant variation was noticed between the prevalence of sheep and goat, in both genera of nematodes (P>0.05) (Table 4).

Table 4:The differences in worm burden between host species and nematodes.

Factors		No. of examined animals	Mean	Std. Deviation
Species	Sheep	150	364.0	330.70
	Goat	50	430.0	314.1
Sex	Male	154	413.6	338.4
	Female	46	413.0	289.5
Nematodes	Trichostronglus	12	316.7	93.7
	Haemonchus	109	654.1	182.3

4. Discussion

The overall prevalence of abomasal nematodes (*H.contortus* and *T.axei*)of this stud was 60.5 which were lower than the previous finding reported by Bayou (1992).In another way, Noad *et al*., (2006)and Kumsa and Wessene, (2006)reported the respective prevalence of 91.2% and 83.6%in sheep in Eastern and Central Ethiopia. This discrepancy might be due to the difference in the animal management system, in agro-ecological and sample size (Rodostits *et al.*, 1994).Most of the previous studies were carried out in the eastern part of Ethiopia that probably be reflected by high prevalence rate which may be due to the reason that animals found in that area were managed under extensive pastoralist with high stocking density, inadequate nutritional status, and poor veterinary infrastructure and services in the area.

The result of the current study was not statistically significant (P>0.05) among host species with the prevalence of 62% (93/150) and 56% (28/50)of abomasal nematodes in sheep and goats respectively, this finding was in agreement with previous report by EL-Azazy,(1995) in sheep (47.9%)and goats (42.2%)in study conducted in Saudi Arabia in which he highlighted the occurrence of abomasal nematodes with high prevalence in ovine than caprine. This could possibly be explained by the fact that the difference in the grazing habit of two hosts, as sheep were 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 the shrubs and small trees where the translation of infective larvae to such a height seems to be impossible. However, slightly regarding sex groups in both sheep and goats species, there was no statistically significant difference (P>0.05) between sex of the animal in both abomasal nematode infection. This could be due to an equal chance of animals to be infected with these parasites, the fact that the difference in the grazing habit and both sex groups have an equal chance of acquiring the infection if exposed to contaminated grazing pasture. Higher infection was detected in female sheep and goats compared to the male which can be justified by the difference of physiological condition in female-like pregnancy, parturition and lactation period which perhaps decline the immunity of the animals.

In both sheep and goats, *H. contortus* with the respective prevalence of 56.7% and 48% was identified which was closely similar to the *T.axei* prevalence of 5.3 % and 8% in sheep goats respectively. This might be due to the humidity and temperature of the environment to deliver favorable conditions for both species of abomasal nematodes. In contrast to the current finding, a study carried out at Bishooftu town by Abunna *et al*., (2009)reported prevalence more than the present finding that was the prevalence of Haemonchus (62.2%) and 40% in sheep and goats respectively and *T.axei* with the respective prevalence of 10.6% and 15%. The possible suggestion may be due to the long duration of the study period and the sample size. In sheep, both the overall worm count and specific count for the two genera of abomasal nematodes where higher than that of goats, due to the difference in grazing habit. This finding was comparable with the previous report by Fritsch *et al*., (1993) and Naod *et al.*, (2006). This suggests the widespread occurrence of *H. contours* was highly prevalent in the area than *T.axei.* Generally, damage occurred in most of the infected sheep and goats by *T.axei* and hemorrhage in cases of *Haemonchus contortus* has been observed during examination of abomasal mucosa. Therefore, significant economic loss in production would be expected to occur in the study area.

5. Conclusion and Recommendations

Abomasal nematodes are the major constraints for livestock productivity in Ethiopia and the effect of nematodes are influenced by the different factory like poor management of the system, lack of disease-resistant breeds and development of drug resistance of parasite. Sheep and goats slaughtered in different restaurants and hotels showed that the abomasal nematode of small ruminants was the most common disease in the study area. The two genera of abomasal nematodes (*Haemonchus contorts* and *Trichostrongylus axei*) were identified in both species of animal. The factor of host species was the possible risk factor in the present study. The study showed that the prevalence of sheep was higher than goats which were affected with light to moderate degree of infection. Based on the above conclusion, the following recommendations were forwarded;

- ✓ Creation of awareness in farmers with regarding periodic deworming practice and other control methods of nematode parasite should be implemented.
- ✓ Using specific drugs for only the appropriate disease condition in relation to control the creation of new drug resistant parasites is recommended.
- ✓ Further studies covering all agro-ecological zones of the study area, all region of the country, should be carried out to identify the abomasal nematodes and to assess economic losses.

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