African Journal of Basic & Applied Sciences 6 (2): 25-29, 2014
ISSN 2079-2034

DOI: 10.5829/idosi.ajbas.2014.6.2.85153

Small Intestinal Helminth Parasites in Slaughtered Sheep and Goats in Hawassa, Southern Ethiopia

Kassaye Aragaw and Gebrehiwot Gebreegziabher

Hawassa University,
School of Veterinary Medicine, P.O. Box 05, Hawassa Ethiopia

Abstract: This study was carried out from November 2007 to March 2008 to identify the species and to determine the burden of small intestinal helminth parasites of sheep and goats slaughtered in Hawassa, southern Ethiopia. Intestines of 116 sheep and 71 goats were examined using standard procedures. Three species of parasites namely *Trichostrongylus colubriformis*, *Bunostomum trigonocephalum* and *Moniezia expansa* were found infecting intestines of both sheep and goats. The overall prevalence of nematodes was 93.1% and 91.5 % in sheep and goats respectively. *Moniezia expansa* was identified in 69.0% sheep and 55.0 % goats. The prevalence of *T. colubriformis* and *B. trigonocephalum* in sheep and goats were 83.6% and 77.5% and 50.8% and 38.0% respectively. There was no statistically significant difference in the prevalence of the parasitic worms between the two species of animals (P >0.05). The mean adult worm counts of *T. colubriformis, B. trigonocephalum and* scolices of *M. expansa* in sheep were 641, 25.1 and 42.6 respectively, while they were 543.8, 19.7 and 33.9 in goats. There was no significant difference in worm burden among the same species of parasites between sheep and goats (P >0.05). The study animals, in general, had light to moderate worm burden. The study indicated a high prevalence of intestinal nematodes and cestodes in sheep and goats slaughtered in Hawassa with light to moderate degree of infection.

Key words: Cestode · Goat · Helminth · Nematode · Parasite · Sheep · Ethiopia

INTRODUCTION

Ethiopia with its great variation in climate and topography possesses one of the largest small ruminant populations in Africa. The small ruminant population of Ethiopia was estimated in 2012 at 24.2 million sheep and 22.6 million goats [1]. However, marked lose of this abundant resource occurs for various reasons including diseases. Helminthoses are among diseases which cause heavy economic loss in sheep and goats in Ethiopia [2, 3]. High prevalence of helminth parasites in sheep and goats have been documented by various researchers in southern [4-7] as well as other parts of Ethiopia [8-10].

Some studies demonstrated the role of helminthes in the mortality of sheep in Ethiopia [2, 3]. Kusiluka *et al*. [11] found that 7.2% of goats' deaths were related to helminth infections in Morogoro district in Tanzania. Helminths also cause loss of productivity through reproduction loss and poor weight gain. Anthelmintic use in sheep and goats improved productivity through weigh gain [12-14] and improved reproductive performance [13, 15].

The development of cost-effective and sustainable program to control helminth infections requires, among others, thorough knowledge of the species of parasites present in a particular area. Therefore the present study was conducted to determine the species composition and burden of intestinal parasites of sheep and goats in the study area.

MATERIALS AND METHODS

Study Area: The study was conducted from November 2007 to March 2008 in Hawassa town, the capital of Southern Nations Nationalities and Peoples Regional State (SNNPR), Ethiopia. Hawassa is located at 7° 3' latitude N and 38° 28' longitudes E, 270 km south of Addis Ababa at an altitude of 1708 meters above sea level

Corresponding Author: Kassaye Aragaw, Hawassa University, School of Veterinary Medicine, P.O. Box 05, Hawassa Ethiopia.

Table 1: Prevalence of intestinal helminth parasites in sheep and goats

		T. colubriformis			*B. trigonocephalum*			*M. expansa*		
Species	N	Positive	%	P value	Positive	%	P value	Positive	%	P value
Sheep	116	97	83.6	0.295	59	50.9	0.087	80	69.0	0.053
Goat	71	55	77.5		27	38.0		39	54.9	
Overall	187	152	81.3		86	46.0		119	63.6	

(http://en.wikipedia.org/wiki/Awasa). The area receives an average rainfall of 800-1000 mm annually. During the study period the mean minimum and maximum temperature of the area was 20.1°C and 25.0°C respectively and mean relative humidity was 51.8%.

Study Animals and Sample Collection: The study involved 116 sheep and 71 goats slaughtered in different restaurants in Hawassa town. Most of the study animals originated from Hawassa zuria and other districts of Sidama zone.

The small intestines were collected as soon as possible, usually within 30 minutes of evisceration. They were ligated at both ends to avoid leakage, separated from the abomasum and large intestine and transported to the laboratory for examination.

Worm Recovery: The laboratory work was done at parasitology laboratory of Animal and Range Sciences Department of College of Agriculture of Hawassa University. The intestines were opened and examined for adult parasitic worms according to the procedure described by Hansen and Perry [16]. The recovered worms were collected and preserved in 10% formalin for identification and count.

Species Identification: The worms which were preserved in 10 % formalin were poured into Petri-dishes or mounted on microscopic glass slides and examined under a stereomicroscope or a microscope, according to the need, for species identification and differential count. Identification was made according to morphological characteristics of the worms [17, 16].

The degree of infection by adult *Trichostrongylus* and *Haemonchus* was categorized as light (1-1000; 1-500), moderate (1001-10000; 501-1500) and heavy (>10000; >1500) respectively as described by Hansen and Perry (1994) and infection with 20-250 adult *Bunostomum* was considered as an intermediate degree of infection [18].

Data Management and Analyses: Prevalence of parasites among sheep and goats was compared with Pearson's Chi-squared test. Parasite counts were log transformed before they were compared among sheep and goats using student t-test. All statistical analyses were made using Stata 11.0 software (StataCorp, College Station, Texas, 77845 USA).

RESULTS

Prevalence: Out of the 187 small ruminants (116 sheep and 71 goats) examined 180 (96.3%, 95% CI [93.5-99.0]) were positive for at least 1 helminth parasite (Table 1). The overall prevalence of nematodes in sheep and goats was 92.5%, while the prevalence of *Moniezia expansa*was 63.6%. Two species of nematodes (*Trichostrongylus colubriformis* and *Bunostomum trigonocephalum*) and one species of cestode (*M. expansa*) were recovered from the small intestines of both species of the study animals. The overall prevalence of *T. colubriformis* and *B. trigonocephalum* in small ruminants was 81.3% and 46.0% respectively. Infection with all the 3 species of parasites was recorded in 41 (21.9%) animals.

Out of a total of 116 sheep examined 113 (97.4%) were positive for one or more spp. of helminth parasites; 108 (93.1 %) were infected with at least one species of nematode and 80 (69.0 %) were infected with *M. expansa*. Ninety seven (83.6 %) of the sheep were harboring *T. colubriformis* while 59 (50.9 %) were positive for *B. trigonocephalum* (Table 1).

Thirty one (26.7 %) sheep were found infected with all the three parasites identified, while 61 (52.6 %) and 21 (18.1 %) were found infected with 2 and 1 species of parasite respectively.

Out of 71 goat small intestines examined 67 (94.4%) were positive for one or more helminth parasites. Of which 65 (91.5 %) were harboring nematode parasitic worms while 39 (54.9 %) were positive for *M. expansa*. Fifty five (77.5 %) goats were having *T. colubriformis* while 27 (38.0 %) had *B. trigonocephalum* (Table 1).

Ten (14.1 %) goats were infected with all the three species of parasites identified, while 34 (47.9 %) and 23 (32.4 %) were harboring 2 and 1 species of parasites respectively.

There was no significant difference in prevalence of all the three species of intestinal helminthes between the two species of hosts (P >0.05) (Table 1).

Table 2: Mean count of adult small intestinal helminthes in sheep (n=116) and goats (n=71) in Hawassa

	Sheep		Goats		
Species of the parasite	Mean ± SE	Max	Mean ± SE	Max	P value
M. expansa	42.6 ± 3.5	120	33.9 ± 4.5	120	0.0595
T. colubriformis	641.0 ± 50.8	3200	543.8 ± 69.5	3100	0.2051
B. trigonocephalum	25.1 ± 2.6	90	19.7 ± 3.2	80	0.1112

Table 3: Number of sheep and goats under different degree of infection with small intestinal nematodes in Hawassa

	Sheep (n = 116)		Goats (n = 71)		Sheep + Goats (n = 187)	
Intensity	*T. c*	*B. t*	*T. c*	*B. t*	*T. c*	*B. t*
Light	75	0	48	0	123	0
Moderate	22	59	7	27	29	86
Negative	19	57	16	44	35	101

T. c = Trichostrongylus colubriformis

B. t = Bunostomum trigonocephalum

Parasitic Burden: The mean count of *M. expansa*, *T. colubriformis* and *B. trigonocephaum* in sheep and goats were 42.6, 641.0 and 25.1 and 33.9, 543.8 and 19.7 respectively (Table 2).

Out of 97 sheep infected with *T. colubriformis* 75 (77.3%) and 22 (22.7%) were lightly and moderately infected respectively. Similarly 48 (67.6 %) goats were with light infection with *T. colubriformis*, while only 7 (9.8 %) had moderate infection. There was no sheep and goat with heavy infection of *T. colubriformis*. All of the sheep and goats infected with *B. trigonocephalum* were with intermediate degree of infection (Table3).

There was no significant difference ($P > 0.05$) in the burden of parasites among the two hosts for all the three parasites identified (Table 3).

DISCUSSION

There was a very high prevalence of small intestinal nematodes both in sheep (93.1%) and goats (91.5%). This is very high compared to the 72.3% (sheep) and 36.8% (goats) prevalence recorded in the same study area [5]. The difference might be attributed to the effect of year on helminth prevalence. Our finding was also very high compared to 52.1% and 47.9% prevalence of gastrointestinal nematodes in sheep and goats respectively reported from Pakistan [19]. The results suggest that the ecological conditions in the areas supplying slaughter small ruminants to Hawassa are conducive for the development and survival of the free living stages of helminth parasites of sheep and goats.

There was no significant difference both in prevalence and burden of intestinal helminth parasites between sheep and goats. Even though the prevalence of *M. expansa* and *B. trigonocephalum* tended to be high in sheep ($P < 0.1$) it failed to be statistically significant. This may show that goats, which naturally prefer to browse, were forced to graze because of shortage of browsing material possibly due to expansion of cultivated land. In contradiction to our observation Bitew *et al*. [5] reported higher prevalence of intestinal nematodes in sheep than in goats from the same study area. Kumsa *et al*. [20] also reported high prevalence of *Moniezia* in sheep than in goats from central Ethiopia through coprological examination.

The prevalence of *T. colubriformis* in sheep (83.6%) and goats (77.5%) was very high compared to 63.4% and 29.4% prevalence reported for sheep and goats respectively by Bitew *et al*. [5] from the same study area. Much lower prevalence of 14.7% and 24.4% were recorded for *T. colubriformis* in sheep and goats respectively in the Sudan [21] and 16% for sheep in Iran [22].

The prevalence of *B. trigonocephalum* (50.9%) in sheep was comparable to 47.3% recorded by Bitew *et al*. [5] in the same study area. However it was very high compared to 2% prevalence reported from Iran [22]. The 38.0% prevalence of *B. trignocephalum* in goats was higher compared to 23.5% reported by Bitew *et al*. [5] from the same study area and 18.25% from Bangladesh [23].

The prevalence of *Moneizia* in sheep (69.0 %) and goats (54.9%) in our study is consistent with 61% and 53% prevalence reported for the two hosts respectively from eastern Ethiopia [24]. However, it was very high compared to 0.2% and 0.1% prevalence of *M. expansa* in slaughtered sheep and goats in the Sudan [21]. It was also high compared to 2.3% cestodes in sheep in Saudi Arabia [25], 25% and 33.3% cestode prevalence in sheep and goats in Pakistan [19], 13.9% in slaughtered sheep in

India [26] and 14% *M. expansa* in sheep in Iran [22]. A coprological prevalence of 37% was reported in goats from Ziway, mid rift-valley, Ethiopia [7].

The species of helminth parasites identified in our study have been reported earlier in Ethiopia [4, 27, 9, 5] and elsewhere [21, 22]. Sissay *et al*. [9] reported additional genera and species of intestinal nematodes (*T. vitrinus*, *Nemtodirus spathiger*, *N. filicolis*, *Cooperia curticei*, *Strongyloides papillosus*) in sheep and goats from eastern Ethiopia on top of what we have detected.

The mean count of 641.0 and 543.8 adult worms for *T. colubriformis* and 25.1 and 19.7 for *B. trigonocephalum* in sheep and goats respectively recorded in this study is very high compared to 7.23 and 8.35 and 1.74 and 2.13 reported for the two species of worms respectively from the same study area [5].

The degree of infection observed in the present study was in close agreement with Bitew *et al*. [5] in which the majority of *T. colubriformis* infections were light and all of the *B. trigonocephalum* infections were moderate. This may suggest the parasites incur insidious loss in the productivity of small ruminants in the study area. However, concurrent occurrence of these parasites, even with this light to moderate level, with others may lead to morbidity and even mortality. It has to be also noted that the study was conducted on slaughter animals and in the dry season which is likely to underestimate the prevalence and degree of infection as animals with good body condition are generally preferred for slaughter and parasite prevalence tend to be high in the wet season.

This study showed that small ruminants of the study area are affected with high prevalence of intestinal nematodes and cestode with light to moderate degree of infection. The high prevalence of intestinal helminthes coupled with the pathological importance of the species identified implies that there is helminth associated economic loss in small ruminants in the study area. Sheep and goats in the study area were affected with the same species of intestinal helminthes with more or less the same magnitude. It shows that goats are as exposed to parasites as sheep are, despite their preference to browse.

Studies should be conducted to determine the economic losses associated with helminth infections in sheep and goats. The studies should also address the epidemiology of the parasites so as to design appropriate sustainable control strategies.

ACKNOWLEDGEMENTS

The authors appreciate the technical support of Ato Arega Getaneh during the laboratory work.

REFERENCES

1. CSA, 2012. Report on Livestock and Livestock Characteristics (Private Peasant Holdings). Agricultural Sample Survey 2011/12 (2004 E.C.), Federal Democratic Republic of Ethiopia, Central Statistical Agency (CSA), Addis Ababa, Ethiopia.
2. Njau, B.C., O.B. Kasali, R.G. Scholtens and M. Degefa, 1988. Review of sheep mortality in the Ethiopian Highlands 1982-86. International Livestock Centre for Africa (ILCA), Bulletin No. 31.
3. Bekele, T., O.B. Kasali and T. Woldeab, 1992. Causes of lamb morbidity and mortality in the Ethiopian highlands. Veterinary Research Communications, 16(6): 415-424.
4. Asha, A., 2005. Epidemiology of gastro intestinal tract nematodiosis of small ruminants in three different agro-ecological zones of Southern Ethiopia. Unpublished MSc thesis, Faculty of Veterinary Medicine (F.V.M.), Addis Ababa University (A.A.U.). Debrezeit, Ethiopia.
5. Bitew, M., Y. Amde and K. Belachew, 2011. Abomasal and small intestinal nematodes of small ruminants slaughtered in different restaurants in Hawassa. Veterinary Research, 4(2): 39-44.
6. Abebe, R., M. Gebreyohannes, S. Mekuria, F. Abunna and A. Regassa, 2010. Gastrointestinal nematode infections in small ruminants under the traditional husbandry system during the dry season in southern Ethiopia. Trop Anim Health Prod, 42: 1111-1117.
7. Kumsa, B., E. Debela and B. Megersa, 2010. Comparative efficacy of albendazole, tetramisole and ivermectin against gastrointestinal nematodes in naturally infected goats in Ziway, Oromia Regional State (southern Ethiopia). Journal of Animal and Veterinary Advances, 9(23): 2905-2911.
8. Regassa, F., T. Sori, R. Dhuguma and Y. Kiros, 2006. Epidemiology of gastrointestinal parasites of ruminants in western Oromia, Ethiopia. Intern J Appl Res Vet Med, 4(1): 51-57.

9. Sissay, M.M., A. Uggla and P.J. Waller, 2007. Prevalence and seasonal incidence of nematode parasites and fluke infections of sheep and goats in eastern Ethiopia. Trop Anim Health Prod, 39: 521-531.
10. Datiko, J., G. Terefe and J. Bekele, 2012. Anthelmintic utilization practices and prevalence of gastrointestinal helminth infections in sheep kept in the urban and peri-urban areas of Bishoftu Town. Trop Anim Health Prod, 45(2): 633-639.
11. Kusiluka, L.J.M., D.M. Kambarage, L.J.S. Harrison, C.J. Daborn and R.W. Matthewman, 1998. Cause of morbidity and mortality in goats in Morogoro district, Tanzania: The influence of management. Small Ruminant Research, 29: 167-172.
12. Altaif, K.I., 1979. Effect of anthelmintic treatment on the performance of Awassi sheep in Iraq. Trop Anim Hlth Prod, 11: 241-245.
13. Gatongi, P.M., M.E. Scott, S. Ranjan, J.M. Gathuma, W.K. Munyua, H. Cheruiyot and R.K. Prichard, 1997. Effects of three nematode anthelmintic treatment regimes on flock performance of sheep and goats under extensive management in semi-arid Kenya. Veterinary Parasitology, 68: 323-336.
14. Ng'ang'a, C.J., N. Maingi, P.W.N. Kanyari and W.K. Munyua, 2009. The effects of anthelmintic treatments against gastrointestinal nematodes on the performance of breeding ewes and lambs on pasture in semi-arid Kenya. Trop Anim Health Prod, 41: 921-926.
15. Aragaw, K., M. Teferi, A. Haile and M. Tibbo, 2011. Effects of strategic helminthosis control on age at first lambing and lambing interval of communally grazed Menz ewes in Ethiopia. Livestock Science, 135: 38-43.
16. Hansen, J. and B. Perry, 1994. The epidemiology and control of helminth parasites of ruminants. A hand book. International Laboratory for Research on Animal Disease (ILRAD). Nairobi, Kenya, pp: l7l.
17. MAFF, 1977. Manual of Veterinary Parasitological Laboratory Techniques. Ministry of Agriculture, Fisheries and Food, Tech Bull. No.18: Her majesty's stationery office, London.
18. Kassai, T., 1999. Veterinary Helminthology. Butterworth-Heinemann, Reed Educational and Professional publishing Ltd., Oxford, USA, pp: 260.
19. Najeeb-ur-Rehman and A. Ali, 2001. Monthwise prevalence of gastro-intestinal trematodes, cestodes and nematodes infecting Damani sheep and goats in district D.I. Khan. Pakistan Vet. J., 21(2): 111-113.
20. Kumsa, B., T. Tadesse, T. Sori, R. Duguma and B. Hussen, 2011. Helminthes of sheep and goats in central Oromia (Ethiopia) during the dry season. Journal of Animal and Veterinary Advances, 10(14): 1845-1849.
21. Almalaik, A.H.A., A.E. Bashar and A.D. Abakar, 2008. Prevalence and dynamics of some gastrointestinal parasites of sheep and goats in Tulus area based on post-mortem examination. Asian Journal of Animal and Veterinary Advances, 3(6): 390-399.
22. Naem, S. and T. Gorgani, 2011. Gastrointestinal parasitic infection of slaughtered sheep (Zel breed) in Fereidoonkenar city, Iran. Veterinary Research Forum, 2(4): 238-241.
23. Howlader, M.M.R., Mahbub-e-Elahi, S. Habib, M.J.U. Bhuyan, M.A.B Siddique, M.A. Haye and M.G. Hossain, 2002. Gastrointestinal nematode infestations in the Black Bengal goats of Sirajgong district of Bangladesh. OnLine Journal of Biological Sciences, 2(8): 556-557.
24. Sissay, M.M., A. Uggla and P.J. Waller, 2008. Prevalence and seasonal incidence of larval and adult cestode infections of sheep and goats in eastern Ethiopia. Trop Anim Health Prod, 40: 387-394.
25. Al-Qureishy, S.A.R., 2008. Prevalence of cestode parasites in sheep slaughtered in Riyadh city, Saudi Arabia. Journal of the Egyptian Society of Parasitology, 38(1): 273-280.
26. Amin, A. and S.A. Wani, 2012. Gastrointestinal helminth parasites of slaughtered sheep with special reference to age, sex and seasonal distribution in district Doda, Jammu and Kashmir state India. Ind. J. Sci. Res. and Tech., 1(1): 25-28
27. Woldemariam, D.L., 2005. Nematode prevalence, helminth management practices and anthelmintic resistance in small ruminants in the mid-rift valley of Ethiopia. Unpublished thesis in partial fulfillment of the requirements for the degree Doctor of Veterinary Science, in the Department of Veterinary Tropical Diseases, Faculty of Veterinary Science, University of Pretoria.