Journal of
Advanced Veterinary Research
Volume 3 (2013) 60-63

Original Research

An Abattoir Survey on Gastrointestinal Nematodes in Sheep and Goats in Hemex-Export Abattoir, Debre Ziet, Central Ethiopia

Gonfa Shankute, Basaznew Bogale, Achenef Melaku

Faculty of Veterinary Medicine, University of Gondar, Ethiopia

Accepted 01 February 2013

Abstract

The current study was carried out from November 2011 to March 2012 with the objective of determining the prevalence, species and worm burden of abomasal nematodes of sheep and goats slaughtered at Helmex export abattoir in Debre Zeit, central Ethiopia. A total of 199 sheep and 185 goats' abomasums were subsequently collected and examined for adult parasites. Of these, 333 (86.7%) were positive for one or more abomasal nematodes. The overall prevalence was 86.9 and 86.5% in sheep and goats, respectively. The recovered species were identified as *Haemonchus contortus*, *Trichostrongylus axei* and *Teladorsagia species* in both animals. Statistically significant difference ($P > 0.05$) was not found between hosts and ages in prevalence of these parasites. However, statistically significant difference ($P < 0.05$) was noticed between the level of prevalence and different body conditioned animals. The highest prevalence was in poor body condition (94.4%). The mean worm burden was 497.3 and 472.4 21 for sheep and goats, respectively. The current study epitomized that the prevalence of nematodiasis were high and consequently; sustainable control programs should warrant.

Keywords: Abomasum; small Ruminant; prevalence; worm burden; Debre Zeit; Ethiopia

Introduction

Parasitic diseases represent a major problem for the health of small ruminants and hamper the poverty alleviation programs in livestock farming system in the developing countries (Mulcahy *et al*., 2004). Helminthiasis in particular nematodiasis of domestic ruminants are of major importance in many agro-ecological zones in Africa, but their impact is greater in Sub-Saharan Africa in general and Ethiopia in particular due to availability of a wide range of agro-ecological factors suitable for diversified hosts and parasite species (Kumsa and Wossene, 2006). *Haemonchus contortus*, *Trichostronglus circumcincta*, *Ostertagia trifurcata*, *Trichostronglus axei*, and *Marshalalgia marshali* and *Teladorsagia species* are most common abomasal worms of sheep and goats in most part of the world including tropical areas resulting in significant loss of production (Kumsa and Wossene, 2006; Taylor *et al*., 2007; Abunna *et al*., 2009)

No recent study has been conducted on abomasal nematodes of small ruminants in relation to the status, worm burden and parasite composition in our courtiers. Therefore, the objectives of this study were to determine the prevalence, worm load and species of abomasal nematodes in sheep and goats slaughtered at Helmex Export abattoir in Debre Zeit, Central Ethiopia.

Materials and methods

Study area

The study was conducted at Helmex export abattoir in Debre Zeit, Central Ethiopia. Debre Zeit 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 averages maximum and minimum temperature of the area are 800mm, 26 and 14^{o}C, respectively (CSA, 2010).

Study animals

The study animals were local breeds of sheep

*Corresponding author: Achenef Melaku

E-mail address: achenefmela@yahoo.com

ISSN: 2090-6277/2090-6269, www.advetresearch.com

(n=199) and goats (n= 185) slaughtered at Helmex export abattoir. The animals were presented to the abattoir from different local markets available in and around Debre Zeit. All the slaughtered animals were male. Based on their age, animals were categorized into young (<1 year old) and adult (>1 year old). Body condition of the animals was also determined as poor, moderate and good.

Study design and sample size determination

A cross sectional study design was used to determine the prevalence, species composition and worm burden of abomasal nematodes in small ruminants at Helmex export abattoir. The sample size for the study was determined by using the following formula (Thrusfied, 2005).

n = [1.96 2 Pexp (1-Pexp)]/d2

n = Required sample size

Pexp = Expected prevalence

d = Desired absolute precision

Since there was no information about the prevalence of the disease in the area, 50% was taken as expected prevalence, 5% absolute precision and 95% confidence interval were used to calculate the sample size. Hence, a total of 384 abomasums were collected randomly.

Sample collection, worm recovery and count

A weekly regular visit was made to the abattoir. Body condition and age were recorded prior to slaughter and were given an identification number. After slaughter, a total of 199 sheep and 185 goats' abomasums were collected and examined for the presence of adult abomasal nematodes and worm status. Each abomasum was legated at both ends with string and separated from omasum and duodenum and then, transported in plastic bags to Parasitology Laboratory of the Faculty of Veterinary Medicine, Addis Ababa University. The abomasum was opened and filtered and the filtrate washed and the total volume was made up to 2 litters. A duplicate of 200ml was transferred to a labelled plastic container and preserved in 10 % formalin. Twenty ml of the sub-sample was taken onto a Petri dish, and equal amount of iodine and sodium thiosulphate (approximately 2 – 3 ml) were added. The numbers of parasites found were multiplied by 100 to get total worm number in each abomasum. Recovery, identification and count of abomasal parasites were made. The degree of worm burden was categorized as light (1-500 for *H. contortus* and 1-1000 *T. axei*), moderate (501-1500 for *H. contortus* and 1001-10,000 *T. axei*) and heavy (>1500 for *H. contortus* and >10,000 *T. axei*) (Hansen and Perry, 1994).

Data Management and Analysis

The collected data of parasitological examination was entered into MS-Excel spread sheet program to create a database. Descriptive statistics and frequency tables and percentages were used to describe the means of parasite burden and prevalence. The data were analyzed statistically using the Chi-square test (SPSS statistics 17.0). Differences between parameters were tested for significance at probability levels of $P< 0.05$.

Results

Out of 199 sheep and 185 goats examined, 173 (86.93%) and 160 (86.48%) of sheep and goats were found infected with one or more genera of abomasal nematodes, respectively. There was no significant difference in prevalence ($P > 0.05$) between sheep and goats. The nematode parasites identified for sheep were: *Haemonchus contortus* (77.38%), *Trichostrongylus axei* (74.37%) and *Os-*

Table 1. Prevalence of abomasal nematode parasites in sheep and goats

Abomasal nematodes	Animals	No. examined	No. positive	Prevalence (%)
H. contortus	Sheep	199	154	77.38
	Goat	185	144	77.83
Total		384	298	77.60
T. axei	Sheep	199	148	74.37
	Goat	185	139	75.13
Total		384	285	74.6
Teladorsagia	Sheep	199	55	27.64
	Goat	185	45	24.32
Total		384	100	26.04

Table.2 Prevalence of abomasal nematode infection based on species, age and body condition

Risk factor	Categories	No. examined	No. positive	Prevalence (%)	Chi-square	*P-value*
Species	Sheep	199	173	86.9	0.017	0.897
	Goats	185	160	86.5		
Age	Young	168	148	86.9	0.009	0.925
	Adult	216	187	86.57		
Body condition score	Poor	144	136	94.44		
	Medium	79	61	77.21	14.363	0.001
	Good	161	136	84.47		

tertagia /Teladorsagia (27.64%), while for goats, *Haemonchus contortus* (77.83%), *Trichostrongylus axei* (75.13%) and *Ostertagia/Teladorsagia* (24.32%) (Table 1).

The overall prevalence of abomasal nematodes in the examined young and adult animals was 86.9 and 86.57%, respectively. There was no significant ($P > 0.05$) difference in age susceptibility. The overall prevalence of abomasal nematodes was 94.44, 77.21 and 84.47% in poor, moderate and good body condition score, respectively. There was a statistical significant difference ($P < 0.05$) in prevalence among body condition scored sheep and goats (Table 2).

The mean worm burden was 497.30 ± 108.9 and 477.70 ± 66.3 for sheep and goats, respectively. The mean worm burdens of abomasal nematodes in both sheep and goats were 255.35, 225.12 and 223.00 for *H. contortus, T. axei* and *Teladorsagia species*, respectively. From a total *H. contortus* positive cases of sheep and goats, 93 and 6% were infected with light and moderate degree of infection, respectively. In case of *T. axei* infection, from the total positive cases, 77.7, 18.12 and 4.2% were infected with light, moderate and heavy degree of infection, respectively.

Discussion

The overall prevalence of abomasal nematodes was very high in the study area being the maximum for *Haemonchus contortus* and *Trichostrongylus axei* and minimum for *Ostertagia/Teladorsagia* in both sheep and goats. A number of previous studies noted the high prevalence of *Haemonchus species* infestation in many parts of Ethiopia, Kumsa and Wossene (2006) and Abunna *et al*. (2009) reported respective prevalence of 91.2 and 83.6% in sheep in Eastern and Central Ethiopia, respectively. It is also in agreement with Fakae (1990) who found a prevalence rate of 77.8 - 100 % in Nigeria. Likewise, Abebe and Esayas (2001) reported a prevalence of 90.82, and 96.55 % in sheep and goats for *H. contortus* and *T. axei*, respectively in the Eastern part of Ethiopia. However, a lower prevalence of *H. contortus* was reported by El-azazy (1995) in sheep (47.9%) and goats (42.2%) in Jeddah, Saudi Arabia. Such variations may be due to agro-ecological, breed, management and/or veterinary health care level differences (Radostits *et al*., 2007). A lower prevalence of *Haemonchus contortus* in sheep (53.4%) and goats (26%) was also reported by Almalaik *et al*. (2008). Vanimisetti *et al*. (2003) and Chaudhary *et al*. (2007) stated that genetic variations and natural resistance could be responsible for the differential prevalence of *H. contortus* among different breeds of sheep. Statistical significant difference in the overall prevalence of abomasal nematodes among sheep and goats was not recorded in the current study. This finding is in harmony with the works of Abunna *et al*. (2009) (83.6%, 77.6%) and Kumsa and Wossene (2006) (90.2%, 82.9%) in sheep and goats, respectively. A variety of factors such as host, age, breeding status, grazing habits, level of education and economical capacity of the community, the standard of management and anthelmentics usage are crucial elements influencing the development, distribution and survival of parasites (Rahmeto *et al*., 2010). There was a significant difference ($P < 0.05$) in prevalence of abomasal nematode in relation to body condition of the animal. The highest prevalence was recorded in poor. The highest infection rate recorded in poor body condition may be due to the effect of heavy infection rate of abomasal nematode parasite and other factors, which lead to significant weight loss. The high prevalence of *T. axei*, 74.34% in sheep and 75% in goats, was relatively similar with finding of Abunna *et al*. (2009) who indicated that 90.4% in sheep and 81.3% in goat. But a lower infection rate was recorded by Kumsa and Wossene (2006) that is 37.7% and 40.2% in sheep and goats at Ogaden region. This

might be due to the agro-ecological, seasonal, breed, management and/or sample size differences. The prevalence of *Ostertagia* (*Teladorsagia*) observed in the present study in sheep and goats is in agreement with reports of Amenu (2005) with a prevalence of 19.4% and 20.5% in sheep and goats at Awassa, Southern Ethiopia and Nabavi *et al*. (2011) 19.35% in sheep at Iran, but the result of this study disagree with work of Abunna *et al*. (2009) that reported a prevalence of 82.5% and 75% in sheep and goats, respectively at Central Ethiopia. The possible reason for the lower prevalence of the current study result might be due to increased environmental temperature that harsher larval survival, as theoretically, Teladorsagia is parasites of temperate and subtropical countries (Urquahart *et al*. 1996). The overall prevalence of the three genera of abomasal nematodes was not statistically significant (P>0.05) among young (86.9%) and adult (86.6%) small ruminants. This indicates that both age groups have equal chance of acquiring the infection if exposed to contaminated grazing pasture.

The intensity of the nematode infections was light to moderate in most animals. The mean worm burden was 497.30 ± 108.90 and 477.7 ± 66.30 for sheep and goats, respectively. There was no significant different showed for total worm burden within age and sex groups and months in both sheep and goats. The mean adult worm burden of *H. contortus*, *T. axei* and *Teladorsagia* was 255.35, 225.12 and 223.00, respectively. The effect of climatic factors on worm burden revealed a significant positive correlation with rainfall and relative humidity which favourably support the larvae survival and development. This finding consisted in Amenu (2005) who reported that the higher prevalence and worm burden occur during Months of rainy season. In conclusion, the current study indicated that the prevalence of abomasal nematodes in sheep and goats was highly and interfering their productivity. Consequently, control sanitary measures should be warranted.

References

Abebe, W., Esayas, G., 2001. Survey of ovine and caprine gastrointestinal helminthosis in eastern part of Ethiopia during the dry Season of the year. Revue de Médecine Vétérinaire 152, 379-384.

Abunna, F., Kumsa B., Megersa B., Regassa A., Debela E., 2009. Abomasal nematodes: Prevalence in small ruminants slaughtered at Bishooftu town, Ethiopia. Journal of Veterinary Medicine 7(1), 1-6.

Almalaik, A.H., Bashar A.E., Abakar A.D., 2008. Prevalence and dynamics of some gastrointestinal parasites of sheep and goats in Tulus area based on post-mortem examination. Asian Journal Animal and Veterinary Advance 3, 390-399.

Amenu, A., 2005. Epidemiology of gastrointestinal tract nematodiosis of small ruminant in three different agro ecological Zones of Southern Ethiopia. MSc, Thesis Faculty of Veterinary Medicine Addis Ababa University, Debre Zeit, Ethiopia.

Chaudhary, F.R., Khan, M.F., Qayyum, M., 2007. Prevalence of *Haemonchus contortus* in naturally infected small ruminants grazing in the Potohar area of Pakistan. Pakistan Veterinary Journal 27, 73-79.

CSA, 2010. Central statistical Authority; Report on livestock and livestock characteristics. Volume 2. Addis Ababa, Ethiopia.

El-azazy, O.M., 1995. Seasonal changes and inhibited development of the abomasal nematodes of sheep and goats in Saudi Arabia. Veterinary Parasitology 58, 91-98.

Fakae, B.B., 1990. Seasonal Changes and Hypobiosis in *Haemonchus contortus* infection in West African dwarf sheep and goats in the Nigerian dried savanna. Veterinary Parasitology 36, 120-130.

Hansen, J., Perry, B. 1994. Epidemiology diagnosis and control of parasites of small ruminants hand book .ILRAD. Nairobi, Kenya. pp. 13-17.

Kumsa , B., Wossene A., 2006. Abomasal nematodes of small ruminants of Ogaden region, Eastern Ethiopia prevalence, worm burden and species composition. Revue de Médecine Vétérinaire 157, 27-32.

Mulcahy, G., Sandra, O., Sheila, D., Dalton, J.P., 2004. Helminthes at mucosal barriers-interaction with the immune system, Advanced Drug Delivery Reviews 56, 853-868.

Nabavi, R., Eslami, A., Shokrani H.R., Bokaie S., Shayan P., Saadati. D., 2011. Study on the Prevalence, Intensity, Seasonal Dynamics of abomasal Helminths in Sheep from Different Climatic Zones of Iran. Iran World Applied Science Journal 12 (4), 441-445.

Radostits, O.M., Gay, C.C, Hinchcliff, K.W., Constable, P.D., 2007. A Textbook of the Diseases of Cattle, Horse, Sheep, Pigs and Goats. Veterinary Medicine. 10th ed. London: Saunders. pp 1548-51.

Rahmeto, A., Meberahtu G., Solomon. M., Fufa, A., Alemayehu. R., 2010. Gastrointestinal nematode infection in small ruminants under the traditional husbandry systems during the dry season in Southern Ethiopia. Springer science Business Media B.V. pp. 1112-1117.

Taylor, A.M., Coop, L.R., Wall, R., 2007. Veterinary Parasitology.3rd.ed UK: Blackwell. pp.158.

Thrusfied, M., 2005. Domestic Testing. In veterinary epidemiology, 3rd ed, Black Well Science Ltd., Oxford, UK. pp. 305-329.

Urquhart, G.M., Armour J., Duncan J.L., Dunn, A.M., Jennings, F.W., 1996. Veterinary Parasitology 2nd ed., Blackwell Science. pp. 261-264.

Vanimisetti, H.B., 2003. Genetics resistance to *Haemonchus contortus* infection in sheep. MSc Thesis, Virginia Polytechnic and State University, Virginia.