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Prevalence of Abomasal Nematodes in Sheep Slaughtered at Jimma Town Municipality Abattoir, South West Ethiopia

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Abstract

The aim of this study was to determine the prevalence of abomasal nematodes of sheep slaughtered in Jimma town municipal abattoir. A total of 384 abomasums of sheep were examined. Three genera of nematodes were identified in sheep with overall prevalence of 69% with species wise prevalence of 62% for *Haemonchus* spp., 32% for *Trichostrongylus axei*, and 37% for *Teladorsagia* spp. *Haemonchus* spp was identified as the important parasite of the area during the study period. Out of 265 positive sheep, 37.7% were young and 62.3% were adult. The difference in prevalence of abomasal nematode between and age groups was statistically significant ($p<0.05$). The difference in the occurrence of these parasite between and sex groups were statistically insignificant ($p>0.05$), that was 17.4% in females and 82.6% in males. On the other hand, body condition score was found to have statistically significant difference in the occurrence on the disease High prevalence was recorded in animals with medium body condition (63.8%) than good body condition score (32.2%). Generally a high infection rate with abomasal nematodes was observed in sheep during the study period. Hence, regular deworming and good grazing management was recommended to reduce the worm burden in sheep.

Keywords: *Abattoir, abomasum, Haemonchus, prevalence, Sheep, Teladorsagia*

Introduction

Sheep are the predominant livestock in area 3,500 meters above sea level where farmers are raised only sheep are survived; sheep assume a great share in socioeconomic activities of about 85% of the population (Ayele *et al*., 2003). Small holders in the high land area are where mixed crop livestock population own most sheep in Ethiopia, these sheep are an integral part of the livestock sector of the economy. With little inputs, sheep play an important role in the rural economy through provision of meat, milk, cash income, accumulating capital, fulfilling cultural obligations, manure and contribute to the national economy the export of live animals, meat, and skins (Tibbo *et al*., 2003).

Despite the large livestock population of Ethiopia the economic benefits remain marginal due to prevailing diseases, poor nutrition, and poor animal production system, reproductive in efficiency, 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. 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. It is well recognized that in resource, poor regions of the world, helminthes infections of sheep and goats are major factors responsible for economic

losses through reduction in productivity and increased mortality (Anon, 2005).

The principal abomasal worms of sheep are *Haemonchuscontortus, Ostertagiacircumcinca, Ostertagiatrifurcata,* and *Trichstrongylusaxei. Haemonchuscontortus* is one of the most important abomasal worms of sheep which is known as red stomachworm or wire worm of small ruminants. It is most prevalent and pathogenic parasite and also economically important disease of sheep. *Haemonchuscontortus is* a species most commonly found in sheep and goat but *Haemonchusplacei* is the usual species in cattle and cross-infection may occur when small ruminants and cattle graze together even though the infestations are usually of less severity (Radosotis *et al*., 2007). Most previous studies carried on abomasal nematodes in Ethiopia were based on carpological examinations, which are less sensitive in identifying the nematode species. Hence, the current study was conducted to identify the species and determine the prevalence of abomasal nematodes of sheep slaughtered at Jimma town municipality abattoir and to assess major risk factors associated with abomasal nematodes of sheep.

Materials and Methods

Study area

The study was conducted at Jimma town, located 350 km south-west of Addis Ababa, capital city of Ethiopia. Jimma geographic coordinates are 7°41' N latitude and 36° 50' E longitude (Alemu *et al.*, 2011).

Study design and animals

A cross sectional study design was conducted from November 2014 through April 2015 on sheep slaughtered in Jimma town municipality abattoir by collecting their abomasums. Most of the study animals were originated from Jimma town and different areas of Jimma zone. The ages of slaughtered animals ranges from 1-5 years and estimated according to Oltenacu (1999). The studied animals were both male and female. Body condition score was taken during antemortem examination. Simple random sampling was employed to select animals that were included in the study. The abomasums were excised from omasum and duodenum immediately after opening of abdominal cavity, legated at both ends, and immediately taken out and washed to the sample container. The collected sample was transported to Jimma University, College of Agriculture and Veterinary Medicine, Veterinary parasitology laboratory for appropriate examination.

Sample collection and worm recovery

A total of 384abomasums of sheep were examined respectively according to the standard procedures described by Hanson and Perry (1994) and Urquhart *et al*.(1996).The abomasums were opened along its great curvature and its contents were washed thoroughly in to a graduated bucket under a slow jet of water. The mucous membrane was carefully rubbed with fingers to remove any worms adhering to it. The content and washings were made to a total volume of two litters. Then it was vigorously stirred until all the abomasal contents, mucous and water was thoroughly mixed. Aliquot of 200ml was transferred to a labeled graduated cylinder in five steps of 40ml per step while string the mixture continuously. The wash jar was filled with water and screwed securely. The jar was inverted and shaken until most of the fluid was shaken out and repeated until all the ingest are moved and water was added. The 200ml sub sample was filtered through sieve of 250µm aperture that can retain adult worms there in. Finally 5ml of sample was taken in to Petri-dish and stained with 2-3ml of iodine solution, allowed to stand for 35 minutes and examined under Stereo-microscope for presence of nematode and species identification of the nematodes was examined under compound microscope (×10) power. The identification of worm was according to Over *et al*. (1992).

Sample size determination

The sample size for the study was calculated using Thrusfield (2005) formula. Accordingly, a sample size of 384 sheep was considered for the study.

Data analysis

The collected data during sampling and laboratory results was entered and stored in Microsoft Excel spread sheet 2007 (Microsoft Corporation, Redmond, Washington, USA) and SPSS (version 17; SPSS Inc., Chicago, IL, USA) was used to analyze the data. Descriptive statistic was used to estimate the prevalence for abomasal nematodes in the study area. Its association with risk factors such as age, sex and body condition were analyzed using the Pearson chi-square test. P value is less than 0.05 was considered as statistical significant.

Results

From all 384 abomasums of sheep slaughtered at Jimma town municipal abattoir265 sheep were found positive with the overall prevalence of 69%abomasal nematodes. At different species of nematodes the prevalence was found about 238(62%), 126(32%) and 145 (37%) for H*eamonchuscontortus*, *Trichostrongylusaxei* and Teladorsagia, respectively (Table 1).

Table 1: Prevalence of each species of the nematode parasites

Parasites identified	**Total abomasums examined**	**Number of positive**	**Prevalence (%)**
Haemonchouscontortus	384	238	62
Trichostrongylusaxei	384	126	32
Teladorsagia	384	145	37
Total	384	265	69

The cumulative prevalence of the three different parasite were different in different age groups, which was statistically significant (p<0.05). The significance difference were also seen in different groups of body conditions (<0.05). However, no significant difference were recorded between sexes (p>0.05) (Table2).

Table 2: The proportion of mixed infection by three nematodes in sheep

No.	Variables	Categories	No of examined sheep	Positive Results	Percent (%)	X^2	P value
1	Age	young	125	100	80	10.46	0.001
		adult	259	165	63.7		
Total			384	265	69		
2	sex	Female	65	46	70.8	0.11	0.74
		Male	319	219	82.6		
Total			384	265	69		
3	Body condition	Medium	201	169	84.1	44.8	0.00
		Good	183	96	52.5		
Total			384	265	69		

Occurrence of *haemonchuscontortus* in 384 examined sheep has significant difference between age groups and body condition scores (P< 0.05) but its difference is insignificant between the sexes (P>0.05). Significant difference was also seen only in age and body condition score in infestation of *Teladorsagia* and body condition was only significant for *T. axei* (Table 2).

Table 3: The percentage values and significance values of the each parasite in every variable

Factors with their respective X^2 and P-value, for each parasites		Types of the parasites isolated from the sheep stomach					
		Haemonchus		T.axei		Teladorsagia	
		No of examined animals	Positive animals (Percentage)	No of examined animals	Positive animals (Percentage)	No of examined animals	Positive animals (Percentage)
Age	Young	125	90 (72%)	125	41(32.8%)	125	71(56.8%)
	adult	259	148 (57.1%)	259	8532.8%)	259	74(28.6%)
	X^2	7.89		0.0		28.5	
	P-value	0.005		0.99		0.00	
Sex	Female	65	42(64.6%)	65	22(33.6%)	65	18(27.8%)
	Male	319	196(61.4%)	319	104(32.6%)	319	127(39.8%)
	X^2	0.23		0.38		3.4	
	P-value	0.63		0.85		0.066	
BCS	medium	201	160(79.6%)	201	104(51.7)	201	93(46.3%)
	Good	183	78(42.6%)	183	22(12%)	183	52(28.4)
	X^2	55.5		68.5		12.9	
	P-value	0.00		0.00		0.00	

Discussion

The overall finding of abomasal nematodes was less in this study (69%) when compared to the findings of Shimalis*et al*. (2010), Thomas *et al*. (2007) and Gonfa*et al*. (2013), in Haramaya (94.5%), Awassa (91.1%) and DebreZeit (86.9%), respectively. This difference might be due to feeding difference and management. Almost all of sheep slaughtered in jimma municipal abattoir were brought from fattening farms or in households, in which concentrate feed and dry grass are common feed supplements. In concentrate and hay feed the parasite egg unable to hatch, because the eggs and the larvae need moisture and humid environment to hatch and climb the blades of grass. So this might decrease the exposure of sheep toabomasal nematodes in the study area.

In the current study high prevalence was recorded for *H. contortus*than*T.axei*and teladorsagia which were 62%, 32% and 37%, respectively. A number of previous studies noted the high prevalence of *Haemonchus species* infestation in sheep in many parts of Ethiopia. Kumsa and Wossene(2006) and Abunna*et al*. (2009) reported respective prevalence of 91.2 and 83.6% in Eastern and Central Ethiopia. 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%) in Jeddah, Saudi Arabia which is a desert area where hot dry climate prevail. A lower prevalence of *Haemonchuscontortus*in sheep (53.4%) was also reportedby Almalaik*et al*. (2008).Vanimisetti*et al*. (2003) and Chaudhary*et al*. (2007) stated that genetic variations, the environment and natural resistance could be responsiblefor the differential prevalence of *H. contortus*among different breeds of sheep. Although it occurs in mixed infections with other nematode parasites, it invariably dominates the faecal worm egg counts and often approaches 90% of worm egg contamination on pastures under prevailing conditions of high temperature and humidly, which is normal in the humid tropics (Waller *et al*., 2004).

In this study the prevalence of *T.axei* was 32% which lower than the previous investigations in sheep by Abunna*et al*. (2009) in Bishoftu (90.4%), Murga (2008) in Awassa (79.2%) and Abebe and Esayas (2001) in Ogaden region (64.28%).This study also result was in harmony with Genene (1994) in Kombolcha (32.3% in sheep) and Achenef(1997) in Debrebrehan (51.72%) which were with lower prevalence and with the different geographical location.

Very few studies in Ethiopia have revealed the existence and prevalence of *Teladorsagia*infections in small ruminants (Amenu, 2005). In this study the occurrence of 37% was been found. The result of this study was lower than the works of Abunna*et al.* (2009) in sheep (82.5%). In contraryit was slightly higher than that of Naod*et al.* (2006), and Garedaghi*et al.,* (2013), who reported 19.4% and 17.31%prevalence in small ruminants at Awassa, Southern Ethiopia and Baneh town, Iran, respectively. The difference might be due to geographical management, animal health extension program or breeding difference. The prevalence of this parasite is relatively similar with the other studied parasites and the importance of it on the health and productivity of small ruminants should not over looked as the immature stages of this parasites are highly pathogenic to their host. Moreover, this nematode has developed resistance to the most commonly used anthelmintics and it has become a challenge to small ruminant production (Abunna*et al.,* 2009).

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 medium which was in agreement with the finding in DebreZeit, which was high in good body conditioned animals (Gonfa*et al.,* 2013). The highest infection rate recorded in medium may be due to the effect of heavy infection rate of abomasal nematode parasite in animals with impaired immunity (a poor plane of nutrition or management), difference feeding system and other factors, which lead to significant weight loss. There was no significant difference of abomasal nematodes among sex groups ($p>0.05$) which was in agreement with the finding of Ayichew and Kassaye (2014) at Bahir Dar. This was may be due to the slaughtered animals were dry, in that the immunity was good in dry animals than pregnant and lactating. But there was significant difference of the parasite among the age groups ($p <0.05$) which was not agreed with Gonfa*et al.* (2013) which was insignificant at DebreZeit. This difference might be due to agro ecological difference, the presence of high parasitic infestation, management system and other factors. Also the significant difference was observed on body condition for each parasites and there was difference of occurrence among age groups except*T. axei* which is not significant ($p>0.05$). The difference of occurrence among sex for each parasite was not noticed in this study.

Conclusion

This study result indicated that abomasal nematodes are of the major helminthosis of small ruminants in JImma town, with high overall and specific prevalence of three abomasal nematodes (*Haemonchus, Trichostrongylus*and *Teladorsagia*) infection. From which Haemonchus species are the important parasites and the most prevalent abomasal nematodes of sheep in the area than*T. axei* and Teladorsagia spp.The presence of abomasal nematodes in sheep results in low reproductive performance, poor quality of meat due to poor weight gain and death of sheep.Hence, integrated rotational grazing practices with separation of animals according to their age group should be practicedto reduce the prevalence of the parasite in the study area.

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