International Journal of Advanced Research in Biological Sciences
ISSN: 2348-8069
www.ijarbs.com
DOI: 10.22192/ijarbs Coden: IJARQG(USA) Volume 6, Issue 9 -2019

Research Article

DOI: http://dx.doi.org/10.22192/ijarbs.2019.06.09.002

Prevalence of *Haemonchus Contortus* in Sheep and Goats slaughtered at Modjo Luna export Abattoir, Bishoftu, Ethiopia

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Abstract

A cross sectional study was conducted from November 2017 to May 2018 in slaughtered sheep and goats at Modjo LUNA export abattoir to determine the prevalence of Haemonchosis and associated risk factors. Post mortem examination of abomasums of randomly selected sheep and goats were carried out according to standard procedures for characterization and identification of adult *Haemonchus contortus.* A total of 404 animal carcasses (201 sheep and 203 goats) were examined during study period. SPSS version 20 software using descriptive statistics was used for data analysis and P-value < 0.05 was considered significant. The findings of this study revealed that an overall prevalence of haemonchosis was foud to be 57.18%. Meanwhile, the prevalence of the disease was statistically significant (P = 0.009) in sheep 128 (63.68%) compared to goats 103 (50.74%). Meanwhile, the prevalence of haemonchosis was a Based on age group, prevalence of haemonchosis was significantly higher (p<0.05) in young animals 122 (64.21%) compared to adults 109 (50.93%). Therefore, strategic prevention and control measures should be implemented at least at farm level to decrease the burden of *Haemonchus contortus* to improve productivity sheep and goats and income of the farmers.

Keywords: Goats, *Haemonchus contortus*, Luna, Modjo, Prevalence, Sheep.

Introduction

Livestock production in Ethiopia's agricultural economy is an important sector providing a significant contribution to gross domestic and export products (Bekele *et al*., 2011). Small ruminants are important source of income for agricultural community and are one of Ethiopia's major sources of foreign currency through exportation of live animals, meat and skin (Sheferaw *et al*., 2010).

There are about 25.5 million sheep and 24.06 million goats in the country playing an important role in the livelihood of poor farmers (CSA, 2017). Sheep and goats are among economically important livestock in Ethiopia. They contribute a quarter of domestic meat consumption; about half of the domestic wool requirements, about 40% of fresh skin and 92% of the value of semi-processed skin and hide export trade. It is estimated that 1,078.000 sheep and 1,128.000 goats are used in Ethiopia for domestic consumption annually (CSA, 2017).

Parasitic diseases are a global problem and considered as a major constraints in the health and productivity of livestock (Melese *et al*., 2010). Among parasitic diseases that constrain the survival and productivity of sheep and Goats, gastrointestinal nematode infections ranks highest on a global index and are recognized as a major constraint to livestock production throughout the tropics and elsewhere. They are responsible for lower productivity and high economic losses affecting the income of small holder farming communities (Dagnachew *et al*., 2011).

Among Haemonchus species *Haemonchus contortus* being of overwhelming importance and is a voracious blood sucking nematode parasite (Perry *et al*., 2002). The parasites cause retarded growth, loss of appetite, anemia, edema, decrease in protein and even mortality in young animals (Paddock, 2010; Bhat *et al*., 2011; Qamar and Maqbool, 2012). Despite the economic importance of this parasite and high population of small ruminants, limited work has been made on epidemiology of small ruminant haemonchosis. Therefore, the objectives of this study were to determine the current prevalence of *Haemonchus contortus* in sheep and goats slaughtered at Modjo Luna export abattoir and assess risk factors associated with the disease.

Materials and Methods

Study Area: The study was conducted from November 2017 to May 2018 at Luna export abattoir which is located in Modjo tow which is a capital of lume district situated in East Shoa Zone of Oromia Regional State. It is located 70 km southeast of Addis Ababa 8° 35'N and 39°10' E at an altitude of 1777-1880 m.a.s.l. The average maximum and minimum temperature is 28° C and 18° C, respectively. Luna export abattoir was established in on 50,000 square meters of area. It is a private limited company established to supply fresh chilled meat, mainly goat and sheep meat to the Middle East (Saudi Arabia, Turkey, United Arab Emirates) and some African countries mainly to Egypt (LDAO, 2016).

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Study Animals and study Design: The animals subjected to this study were 404 Small ruminants (201 sheep and 203 goats) slaughtered at Modjo Luna export abattoir. A cross-sectional study using simple random sampling was conducted. Animals were indigenous breeds kept under extensive production system. The study animals were with different species, ages, body condition and origins. The origins of the animals were recorded and thdir was estimated by using teeth eruption. Conventionally, those animals with the age of less than one year were considered as young while those greater than or equal to one year were considered as adults based on the method described by Vatta *et al*., (2006). The body condition score was determined and grouped as medium and good based on method recommended by ESGPIP (2007).

Data Collection

Antemortem inspection: Ante mortem examination was performed before the slaughtering process from randomly selected sheep and goats. Accordingly, age, origin and body condition score of each selected animal was recorded on the sheet prepared for this purpose. The age of animals was estimated by using teeth eruption based on the method forwarded by Vatta *et al.* (2006). The body condition score was determined and grouped as medium and good based on method recommended by ESGPIP (2007). There was no poor body condition during study periods since only animals with better body condition brought for slaughter.

Postmortem Examination: During postmortem examination, the abomasum was ligated at both ends to avoid leakage and separated from omasum and duodenum. Then the abomasum was opened along its greater curvature and close visualization was made for the presence of adult Haemonchus. The abomasum wall and its contents were carefully observed for any gross pathological changes. The adult Haemonchus contortus were identified visually by standard method recommended by Urquhart *et al.* (2000).

Data analysis: The data collected was entered in to Microsoft Excel spread sheets and analyzed using STATA version13 statistical software's. Pearson's chi-square (x^2) to measure association between prevalence of the haemonchosis with the species, age, body condition and origin of the animal was used as the statistical tool. Descriptive statistics were used to evaluate (frequency and percentages) values. Pearson's chi-square (x^2) to measure association between prevalence of the haemonchosis with the species, age, body condition and origin of the animal was used as the statistical tool. Confidence level was held at 95% and statistical analysis for the difference in prevalence of *Haemonchus contortus* among risk factors were considered significant when the p-value was less than 0.05 ($P < 0.05$).

Results and Discussion

In this study a total of 404 sheep and goats were examined using postmortem examination for the presence or absence of *Haemonchus contortus.* The overall prevalence of haemonchosis in sheep and goats was found be to 231 (57.18%) in the study area.

Out of the total 404 small ruminants examined for presence or absence of *Haemonchus contortus*, 231 animals were found positive of which 128 and 103 were sheep and goats respectively. The prevalence of haemonchosis was found higher among sheep (63.68%) than goats (50.74%) and statistically analysis of the data showed that there was statistically significant difference on the occurrence of haemonchosis between species. (P=0.009) (Table 1).

Out of the total 404 examined animals for presence or absence of *Haemonchus contortus*, 231 animals were positive in which 122 and 109 were young and adult, respectively. The prevalence of haemonchosis was different with age groups of small ruminants; and it was found that 64.21% and 50.93% in young and adult respectively. The difference was statistically significant (p =0.007) (Table 2).

Table 1: Prevalence of *Haemonchus contortus* based on species of the animals.

Species	**No of examined animals**	**No of Positive**	**Prevalence (%)**	**X^2**	**P-value**
Sheep	201	128	63.68	6.9098	0.009
Goat	203	103	50.74		
Total	404	231	57.18		

Table 2: Prevalence of *Haemonchus contortus* in sheep and goats based on age

Age	No of animals examined	No of Positive	Prevalence (%)	X^2	P-value
Young	190	122	64.21	7.2447	0.007
Adult	214	109	50.93		
Total	404	231	57.18		

Out of the total 404 examined animals for presence or absence of *Haemonchus contortus*, 231 animals were positive in which 142 and 89 were medium and good body condition respectively. The prevalence of haemonchosis was different with different body condition of small ruminants; and it was found that 60.68% and 52.35% in medium and good respectively. The difference was statistically significant (p =0.095) (Table 3).

During the study period in the study area, the highest prevalence was observed in animals that were brought from Arbaminch (64.66%) followed by Wolaita soddo (60.63%) and Negelle borana (47.22%). There was statistical significance variation (P = 0.009) in prevalence of *Haemonchus contortus* in the different origin of the animals (Table 4).

Table 3: Prevalence of *Haemonchus contortus* in sheep and goats based on body condition

Body condition	No of animals Examined	No of Positive	Prevalence (%)	X^2	P-value
Good	170	89	52.35	2.7910	0.095
Medium	234	142	60.68		
Total	404	231	57.18		

Table 4: Prevalence of *Haemonchus contortus* in sheep and goats based on origin of animals

Origin	No of animals examined	No of Positive	Prevalence (%)	X^2	P-value
Arbaminch	133	86	64.66		
Wolaita soddo	127	77	60.63	9.4895	0.009
N. borena	144	68	47.22		
Total	404	231	57.18		

The present study revealed an overall prevalence of small ruminant's haemonchosis (57.18%). The prevalence found to be 63.7% in sheep and 50.7% in goats. Our result is in agreement with the recent report by Belete *et al.,* (2017) from Bishoftu Elfora Export Abattoir which was an overall prevalence of 63.4% (69.6% in sheep and 57.1% in goats).

The overall prevalence of haemonchosis (57.18%) observed in the present was lower than the previous studies reported from different parts of the world. These including: 77% reported in small ruminants in Kenya Githigia *et al*., (2001); 78% was reported in small ruminants in Heilongjiang Wang *et al*., (2006); 80.64% reported in small ruminants in Pakistan Asif *et al*., (2008) and in Ethiopia; 96.5% in sheep and 100% in goats from arid and semi arid zone of eastern Ethiopia Wossene and Gelaye, (2003); 79.68% (81.35% in sheep and 72.6% in goats) from Komobolcha town Ketama *et al*., (2011); 71.03% from Finote-selam Mengistu *et al*., (2014) and 77.38% also reported from Bishoftu, Helmex-Export Abattoir (Shankute *et al*., 2013).

The prevalence of the current study is lower than some previous studies such as 90.1% in sheep and 81.8% in goats from Haramaya, eastern Hararghe Argaw *et al*., (2014); 91.2% in sheep and 82.9% in goats of Ogaden region slaughtered at Bishoftu Elfora export abattoir (Kumsa and Wossene, 2006) which might be due the difference in to agro-ecology, husbandry system that could have support extended survival and development of infective larval stage of *Haemonchus contortus*. Moreover, this difference might be due to the difference in management system of examined animals and sample size (Tewodros and Girja, 2012). Other factors that provoke this variation might be frequency of adequate rainfall during the study period which favored the survival of infective larvae in grazing land and higher chance of uptake of the infective larvae that basis for higher prevalence.

In this study, there was significant difference (P=0.009) in the prevalence of haemonchosis between sheep and goats, indicating that sheep are more susceptible to the infection than goats. The result of the present study is also in line with previously reported by Tewodros and Girja (2012) who reported 81.2% and 73.5% in sheep and goats, respectively; Mulugeta *et al*. (2011) who reported 69.5% and 65% in sheep and goats, respectively. However, the current study is disagree with Mengist *et al.* (2014) who reported the prevalence of 71.3% and 67.57% in goats and sheep, respectively.

The higher prevalence of haemonchosis in sheep than goats also might be due to a diversity of factors like ground grazing habit of sheep and usually graze very close to the soil which might be helpful in the acquisition of more infective larvae (L3) of *Haemonchus contortus* from the contaminated herbage. Additionally high prevalence of haemonchosis in sheep than goat might be due to the fact that goats browse on bushes and small trees where translation of infective larvae to such height seems impossible.

Statistical analysis of the data on the prevalence of *Haemonchus contortus* among age groups showed that there was significant difference (P = 0.007) between young and adult with the prevalence of 64.21% and 50.93% respectively. The current finding on the prevalence of haemonchosis between the two age groups was in line with previous findings which was reported 66.9% and 59.0% in young and adults, respectively (Belete *et al.*, 2017); 86.9% in young and 86.6% in adult animals (Shankute *et al.*, 2013). In contrary to the current finding; Mesele *et al*. (2013) reported prevalence of 37.9% and 49% in young and adult shoat, respectively. The more infection observed in young might be due to their low resistance or greater susceptibility to the parasite. This also explained that young sheep and goats are less or no previous exposure to the parasite than adults. During the first year of their life they fed, grazed on grasslands, thus the first stage of their exposure to infection with parasites occurs. Gradually, as the exposure to parasitic infection increases, the immune system of host animals builds up especially against *Haemonchus contortus* through age resistance (Bhat *et al*., 2011; Seth, 2014).

Prevalence of *Haemonchus contortus* with regard to the body condition was studied and the result showed that the prevalence was higher in medium body condition shoat compared to the good body condition with the prevalence of 60.68% and 52.35%, respectively with not statistically significant (P = 0.095). This indicated that both body condition sheep and goats were equally susceptible for haemonchosis. This current study was agree with previous research reported with prevalence of 67.3% in medium and 55% in good body condition shoat (Tibeso and Mekonnen, 2015); 81.2% in medium and 73.6% in good body condition sheep and goats (Tewodros and Girja, 2012); 77.21% in good and 84.44% in medium body condition animals (Shankute *et al*., 2013). However it disagrees with the study reported by Ragassa *et al.* (2006). This might be due to differences in seasonal change of feed, poor management system and the presence of other concurrent diseases that decreases the ability of the host to cope with the adverse consequences of parasitism and resistances of the host to overcome parasitism by limiting the establishment, development and fecundity of the parasites.

The prevalence of the *Haemonchus contortus* in sheep and goats that originated from different sites of the study area indicated different with higher prevalence in those sheep and goats originated from Arbaminch with the rate of 64.66% followed by shoat originated from Wolaita soddo and Negelle borana with the rates of 60.63% and 47.22%, respectively and there is statistical difference of the prevalence of the parasite (p= 0.009). In line with reported by Belete *et al.* (2017) small ruminants originated from Yebello with the rate of 69.6% followed by shoat originated from Ginka and Negelle borana with the rates of 59.1% and 55.2%, respectively. This variation might be due to the difference between the geographical and environmental location of the area, the standard of management and anthelmentics usage are crucial elements influencing the development, distribution and survival of parasites. Another possible explanation might be due to inadequate nutritional status, poor veterinary infrastructure and services of the area.

Conclusion

The high prevalence of Haemonchosis was reported in the current study which shows animal breeders are at high risk of losses due to effect of this parasite mainly on young animals. The parasites were more common in young animals and animals with medium body condition which needs due attention when designing the control programs against the parasite. In addition, the production system of the animals might contribute to the occurrence of the parasite as sheep and goats highly infested by the parasites were from traditional extensive grazing system. However, the prevalence of haemonchosis was higher in sheep with compared goats. Because of high pathogenecity of Haemonchus spp, strategic treatment of small ruminants with improvement their husbandry system is crucial. Furthermore, study that focuses on other economically important gastrointestinal parasites with due emphasis on major risk factors should be conducted in order to decide appropriate time for strategic deworming of animals.

Acknowledgments

The authors are grateful to Addis Ababa University, Directorate for Research and Technology Transfer for funding the cost of this research work through thematic research project ***"Market-Oriented Livestock and Public Risk Assessment through Investigating and Mitigating Major and Economically Important Diseases and Devising Interventional Strategies, MOLS-TR***".

References

Argaw, S., B. Desta and A. Belay, 2014. Prevalence of abomasal nematodes in sheep and goats slaughtered at Haramaya municipal abattoir, eastern Hararghe, Ethiopia. *J. Bio. Agr. Heal*., **4**: 2224-3208.

Asif, M., S. Azeem, S. Asif and S. Nazir, 2008. Prevalence of Gastrointestinal Parasites of Sheep and Goats in and around Rawalpindi and Islamabad, *American-Eurasian Journal of Scientific Research*, **2**: 5-12.

Belete, A., T. Wale and S. Tilaye, 2017. Prevalence of Haemonchosis and Associated Risk Factors in Small Ruminants Slaughtered at Bishoftu ELFORA Export Abattoir, Ethiopia. *J. Natur. Scie. Resea.*, **7**: 2224-3186.

Bhat, S., M. Mir, S. Allaie, M. Khan, I. Husain and A. Ali, 2011. Comparative Resistance of Sheep Breeds to *Haemonchus Contortus* in Pasture in Jammu and Kashmir. *Glob. Vet*., **8**: 222-228.

CSA, 2017. Federal Democratic Republic of Ethiopia Agricultural Sample Survey volume II Report on livestock and livestock characteristics.

Dagnachew, S., A. Amamute and W. Temesgen, 2011. Epidemiology of gastrointestinal helminthiasis of small ruminants in selected sites of North Gondar zone, Northwest Ethiopia. *Ethio. Vet. J*., **15**: 57-68.

ESGPIP, 2007. Body condition scoring of sheep and goats, *Technical Bulletin* No.8.

Wossene, A. and E. Gelaye, 2003. Small Ruminant Haemonchosis: Morphological and Prolificacy Study in Eastern Ethiopia. *Bull. Anim. Heal. Prod. Afr*., **51**: 67-73.

Githigia, S., S. Thamsborg, W. Munyua and N. Miangi, 2001. Impact of Gastrointestinal Helminthes on Production in Goats in Kenya. Small Ruminant Research, **42**: 21-29.

Ketama, E., T. Fentahun and M. Chanie, 2011. Small Ruminant Haemonchosis is a serious nematode parasite in Slaughtered at Kombolcha Slaughter Houses. IJAVMS. Online First, 16 Dec, 20011. (doi.10.5455/ijavms.13000).

Kumsa, B. and W. Abebe, 2006. Abomasal nematodes of small ruminant of Ogaden region Eastern Ethiopia: prevalence, worm burden and species composition. *Rev. Vet. Med*., **157**: 27-32.

LDAO, 2016. Lume district Agricultural office, Animal Health Clinic report. pp: 87-90.

Melese, A., T. Mohammed, R. Abebe, K. Aragaw and J. Bekele, 2010. Survey of ixodid ticks in domestic ruminants in Bedelle district, Southwestern Ethiopia. *Trop. Ani. Heal. Prod*., **42**: 1677-1683.

Mesele K., T. Yisehak, A. Nesibu, 2014. Prevalence of Haemonchosis in sheep slaughtered at Abergele Export Abattoir. Mekelle University, College of Veterinary Medicine, P.O. Box 231 Mekelle, Ethiopia. Acta Parasitol. Glob. 5(2):115–119

Mengistu, Z., N. Abebe, G. Gugsa and N. Kumar, 2014. Assessment of Small Ruminant Haemonchosis and Its Associated Risk Factors in and Around Finoteselam, Mekelle University, College of Veterinary Medicine, Ethiopia. *J. Agr. Vet. Scie*., **4**: 36-41.

Mulugeta, T., G. Batu and B. Bitew, 2011. Prevalence of Gastrointestinal Parasites of Sheep and Goats in and Around Bedelle, South-Western Ethiopia. *Inter. J. Vet. Med*., **8**: 134-156.

Odoi, A., J. Gathuma, C. Gachuiri and A. Omore, 2007. "Risk factors of gastrointestinal nematode parasite infections in small ruminants kept in smallholder mixed farms in Kenya." *BMC Vet. Resea*., **3**: 59-70.

Paddock, R. 2010. Breed Age and Sex Wise Distribution of Haemonchus contortus in Sheep and Goats in and around Rawalpindi Region, Pakistan. *Med. Vet. J*., **12:** 60-63.

Perry, B., T. Randolph, J. McDermott, R. Sones and P. Thornton, 2002. Investing in Animal Health Research to Alleviate Poverty International Livestock Research Institute, Nairobi, Kenya, pp 148.

Qamar, M. and A. Maqbool, 2012. Biochemical Studies and Serodiagnosis of Haemonchosis in Sheep and Goats. *J. Anim. Plant Sci*., **22**:

Ragassa, A., R. Abebe, , M. Gebreyohannes, M. Ekuria, S. and F. Abunna, 2006. Gastrointestinal nematode infections in small ruminants under the traditional husbandry system during the dry season in southern Ethiopia. *Trop. Ani. Heal. Prod*., **42**: 1111-1117.

Seth, B. 2014. A Review of the Epidemiology of Gastrointestinal Nematode Infections in Sheep and Goats in Ghana. *J. Agri. Scie*., **6**: 1916-9760.

Shankute, G., B. Basaznew and M. Achenef, 2013. An abattoir survey on gastrointestinal nematodes in sheep and goats in helmex export. *J. Adv. Vet. Resea*., **3**: 60-63.

Sheferaw, D., H. Degefu and D. Banteyirgu, 2010. Epidemiological study of small ruminant mange mites in three agro-ecological zones of Wolaita, Southern Ethiopia. *Ethio. Vet. J*., **14**: 31-38.

Tewodros F. And L. Girja, 2012. Small ruminant Haemonchosis: determinants in randomly selected restaurants hotels of Gondar Town, Ethiopia. *Eur. J. Appl. Sci.* **4(4):**168–172

Urquhart, G., J. A. Armour, M. Duncan and F. W. Junnings, 2001. Veterinary parasitology. 2nd ed. Black well science, Scotland. Pp. 39-58.

Vatta, A., M. Abbot, J.Villiers, S. Gumede, L. Harrison, R. Krecek, B. Letty, N. Mapeyi and R. Pearson, 2006. Goat Keepers' Animal Health Care Manual. Agricultural Research Council. Onderstepoort Veterinary Institute with KwaZulu-Natal Department of Agriculture and Environment, South Africa, pp: 60.

Wang, C., J. Qiu, X. Zhu, X., Han, H. Ni Zhao, Zhou, Q., H. Zhang and Z. Lun, 2006. Survey of Helminthes in Adult Sheep in Heilongjiang province, People's Republic of China. *Vet. Parasitol*., **140**: 378-382.

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Quick Response Code

DOI:10.22192/ijarbs.2019.06.09.002

How to cite this article:
Workineh Legesse, Takele Beyene, Fanta Desissa, Debela Taweya and Yacob Hailu Tolossa. (2019). Prevalence of *Haemonchus Contortus* in Sheep and Goats slaughtered at Modjo Luna export Abattoir, Bishoftu, Ethiopia. Int. J. Adv. Res. Biol. Sci. 6(9): 13-19.
DOI: http://dx.doi.org/10.22192/ijarbs.2019.06.09.002