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Small Ruminant Haemonchosis: Prevalence and Associated Determinants in Randomly Selected Restaurants and Hotels of Gondar Town, Ethiopia

Tewodros Fentahun and Girja Luke

Unit of Basic Veterinary Science, Faculty of Veterinary Medicine,
University of Gondar, P.O. Box 196, Gondar, Ethiopia

Abstract: A cross sectional study was performed with an attempt to determine the prevalence and associated risk factors of haemonchosis in randomly selected slaughtered sheep and goats in restaurants and hotels in Gondar town, Amhara region, northwest Ethiopia from November 2011 to April 2012. A total of 384 animals (335 sheep and 49 goats) were examined. Overall prevalence was 80.21%. The specific prevalence of *Haemonchus. contortus* infection was 81.2% and 73.5% in sheep and goats respectively. The difference in infection rates between the two species was not statistically significant ($\chi^2 = 1.607$, $p>0.05$). The prevalence of haemonchosis in males and females was 80.9% and 77%, respectively but, the difference is not statistically significant ($\chi^2 = 0.583$, $p>0.05$). Relationship between body condition and haemonchosis in sheep and goats showed no statistical difference ($\chi^2= 1.727$, $p>0.05$) between medium and good body conditioned animals. In the present study, a high infection rate with *H. contortus* was observed in both sheep and goats during the study period affecting health of those animals and appropriate control measure should be instituted.

Key words: Ethiopia · Goats · Gondar · *Heamonchus contortus* · Hotels · Prevalence · Restaurants · Sheep

INTRODUCTION

Ethiopia lies within the tropical latitudes of Africa and has an extremely diverse topography, wide range of climatic features and multitude of agro-ecological zones, which make the country suitable for different agricultural production systems. This in turn has contributed to the existence of a large diversity of farm-animal genetic resources in the country. Ethiopian livestock production systems are broadly characterized as low input, mixed crop-livestock, agro-pastoral and pastoral systems; as well as medium input, peri-urban and urban enterprises. These livestock are almost entirely managed by the poor small-holder farmers and pastoralists [1].

In the tropics, the most important nematode species affecting small ruminants are *Haemonchus contortus*, *Trichostrongylus* species, *Nematodirus* species, *Cooperia* species, *Bunostomum* species and *Oesophagostomum* species [2, 3]. *Heamonchus contortus* commonly known as the twisted stomach worm is a blood sucking nematode parasite, primarily occurring in the abomasum of small ruminants, notably sheep and goats. It has been ranked as the most important parasite of small ruminants in all regions across the tropics and subtropics and causes an insidious drain on production, weight losses and even mortality in young animals as reported by Paddock [4], Miller [5] and Bhat *et al*. [6] as well as the emerging anthelmintic resistance [7, 8]. The disease caused by this parasite (haemonchus contortus) is prevalent wherever sheep and goats are raised, but it exerts the greatest economic losses in temperate and tropical regions [9]. The disease has also found in the colder climates and recently been found as far north as the Arctic Circle [10]. Due to the economic importance of this parasite, the high population of small ruminants in the study site and since there is no any previous work, up to our knowledge, done in the study area to alleviate the highest problems of this parasite, therefore, major objectives of the current research were: To determine the prevalence of small ruminant haemonchosis based on postmortem examination in Gondar town, to assess the associated risk factors with the small ruminant heamonchosis and to provide base line data for planning future research and control strategies.

Corresponding Author: Tewodros Fentahun, Unit of Basic Veterinary Science, Faculty of Veterinary Medicine, University of Gondar, P.O. Box 196, Gondar, Ethiopia.

MATERIALS AND METHODS

Study Area: A cross sectional study was conducted to determine the prevalence of small ruminant haemonchosis in Gondar town, South Gondar Zone, Amhara region, Northwest Ethiopia from October 2011 to may 2012. The livestock population of North Gondar is estimated to be 1,936,514 cattle (exotic, cross and local), 524,083 sheep, 682,264 goats, 36,828 horses, 12, 473 mules, 223,116 donkeys and 3,165,068 poultry [11].

Study population: The study animals were 335 sheep (63 females and 272 males) and 49 goats (9 females and 40 males) slaughtered at various restaurants in Gondar town. Animals were indigenous breeds kept under traditional management system. The animals in the present study were adult. The abomasums were collected at random from the slaughtered animals. As the animals were obtained from different markets, it was difficult to trace the exact origin of the animals.

Sample Size: The desired sample size was calculated using the standard formula described by Thrusfield [12]. Since there was no previous work done on this area, the expected prevalence is 50%, so that the sample size in this study is calculated using the following formula.

$$n = \frac{1.96^2 (p) (1- p)}{d^2}$$

where

n = Sample size
p = Expected prevalence (50%)
1.96 = The value of Z of 95% confidence level
d = Desired absolute precision = 5%
n = 384 animals

Sample Collection and Worm Recovery: The study was conducted on sheep and goats slaughtered in different restaurants and hotels in Gondar town. A total abomasums of 335 sheep and 49 goats were examined for the presence of adult *H.contortus*. The abomasums were collected as soon as possible, usually within 30 minute of evisceration. They were legated at both ends to avoid leakage, separated from omasum and duodenum and immediately taken to Parasitology Laboratory, Faculty of Veterinary Medicine, University of Gondar, for examination in plastic bags. After the arrival in the laboratory they were opened and examined for the presence of adult *H.contortus* worms according to standard procedure described by Hansens and Perry [13].

Table 1: Prevalence of haemonchosis in male and female small ruminant species

Sex	No. of negatives	No. of positives	Total	Prevalence (%)
Male	60	254	314	80.9
Female	16	54	70	77.1
Total	76	308	384	

$\chi^2 = 0.583$, p = 0.45

Table 2: Relative prevalence of haemonchosis between sheep and goats

Species	Number of positive	Number of negative	Total	Prevalence (%)
Sheep	272	63	335	81.2
Goat	36	13	49	73.5
Total	308	76	384	

$\chi^2 = 1.607$, P = 0.205

Table 3: Prevalence of haemonchosis based on body condition

Body condition	No. of positives	No. of negatives	Total	Prevalence (%)
Medium	248	56	304	81.6
Good	60	20	80	75
Total	308	78	384	

$\chi^2 = 1.727$, P = 0.189

Species Identification: The worms which were preserved in 10% formalin were poured in to petri dishes and examined under a stereomicroscope. Identification was made using keys developed by Hansens and Perry [13].

Data Management and Analysis: All collected data were (age, species and parasitic infestation) entered to MS excel sheet and analyzed using SPSS 17.0 version software. Descriptive statistics was used to determine the prevalence of the *H. contortus* and χ^2 – test was used to look the significance of difference between age, body condition and species of the host with parasites.

RESULTS

308 small ruminants out of 384 were infected and prevalence of haemonchosis was 80.21%. The overall prevalence of haemonchosis in male and female small ruminants species was 80.9% (254/314) and 77.1% (54/70), respectively. There was no significant difference (p>0.05) in prevalence of the disease between sheep and goats.

Overall 272 out of 335 sheep were positive and prevalence of haemonchosis was 81.2% while 36 out of 49 goats were found positive and prevalence was 73.5%. The difference in infection rate was not statistically significant (p>0.05) between the small ruminant animals species.

Concerning the prevalence of haemonchosis in different body conditioned animals, higher prevalence was observed in medium body conditioned animals (81.6%) than good body conditioned ones (75%). There was no significant difference (p>0.05) in prevalence of the disease between both groups.

DISCUSSION

The present study revealed an overall prevalence of 80.2% of haemonchosis which accounts 81.2% in sheep and 73.5% in goats. There was no significant difference (P>0.05) in the prevalence of haemonchosis between sheep and goats, indicating that both species are equally susceptible to the infection. This observation disagrees with previous reports by Iqbal *et al.* [14]. The high prevalence of haemonchosis in the study area may be due to the fact that sheep and goats are managed under extensive system with the high stocking density, where large numbers of animals graze together throughout the year, inadequate nutritional status and poor veterinary infrastructure and services are exist.

The overall prevalence of haemonchosis (80.21%) in the present study area was lower than the previous studies conducted by different workers in different study areas of Ethiopia. Bayou [15] in Wellega recorded prevalence of 88.2%, Solomon [16] 93.6 % in the Ogaden region and Abebe and Esayas [17] 96.5% in sheep and 100% in goats in the arid and semi arid zone of eastern Ethiopia and Kumsa and Wossene [18] 91.2% in sheep and 82.9% in goats of Ogaden region slaughtered at Debrezeit ELFORA abattoir. This variation in prevalence of haemonchosis in small ruminants may be due to the differences in agro-ecology, season, sample size and management practices.

The specific prevalence was 81.2% in sheep and 73.5% in goats and this report shows the highly significance of the parasite in view of worldwide importance which is regarded as one of the most prevalent, pathogenic, with the very biotic potential. Its prominent ability of emerging in anthelmintic resistance, unique survival strategy due to considerable biological and ecological plasticity and economically most important nematode with the ability of causing losses in most classes of animals are recorded. Similarly the observed prevalence of haemonchosis in sheep and goats is relatively in line with earlier studies conducted by Asif *et al*. [19] in Pakistan (80.64%), Dereje [20] in Wolayta Soddo (80%), Brook [21] in Awassa (82.1 %), Githigia *et al*. [22] in Kenya (77%) and Wang *et al*. [23] in Heilongjiang province(78%). This could be due to the existence of a direct relationship between prevalence and rainfall, humidity and temperature. The presence of sufficient rainfall and moisture during the wet season favored the survival of infective larvae in pasture and higher probability of uptake of the infective larvae leading to higher prevalence rate.

In the present study it was noted that there was no significant difference (p>0.05) based on sex. Since, the prevalence was 80.9% and 77.1% in males and females respectively. However, most of the researchers have observed higher rate of haemonchosis in female hosts compared with males [24-27].

Relationship between body condition and haemonchosis in sheep and goats was recorded and no statistical difference between medium and good body conditioned animals which means both body conditioned animals were equally susceptible for haemonchosis which agrees with Regassa *et al*. [28]. However, it disagrees with previous reports by Tasawar *et al*. [29]. This could be explained by the fact that loss of body condition in the study animals could be due to other factors, such as seasonal change of forageable feed staff and the presence of other concurrent diseases.

CONCLUSION

The results of the present study clearly indicated that the productivity of small ruminants of the study area is confronted by amazingly very high prevalence rate of haemonchosis; 81.2% and 73.5% in sheep and goats respectively. This high frequency of occurrence coupled with very significant pathogenic effect and the losses it imposes on productivity of the small ruminant sector of agriculture which is very important for the livelihood of pastoralists of the study area should receive special attention.

Based on above conclusive remarks the following recommendations were forwarded.

- The problems of Helminthosis and anthelmintic resistance should receive special attention at all levels.
- Education and awareness creation of farmers with regards of haemonchosis epidemiology and choosing of the best parasitic control strategy and possible management systems should be given through strong extension.
- Use of alternate grazing system for different host species and integrated rotational grazing practices and separation of animals according to their age group should be practice.

- Strategic de-worming of animals, when conditions are favorable for larval development on the pasture (at the beginning and after rainy season) using broad spectrum antihelmintics must be applied.

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