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Research Article

Study on the Assessment of the Prevalence of *Haemonchus Contortus* in Sheep and Goats in East Dembia, Amhara, Ethiopia

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Abstract

A cross-sectional epidemiological study was conducted from September 2024 to June 2025 on randomly selected sheep and goats to determine the overall prevalence of haemonchosis in and around Koladiba town. A simple random sampling technique was employed. Faecal samples were collected from young and adult sheep and goats of all sexes raised on natural pasture in the study area. A total of 196 small ruminants, comprising 98 (sheep) and 98(goats), were examined for the presence of *Haemonchus contortus* eggs in their faeces. Feaces were scooped from the rectum of the animals using a gloved index finger, with the animals restrained in a standing position. Species, sex, and approximate age of all animals were recorded before collection. Collected faecal materials were subjected to flotation and sedimentary techniques. Both the risk factors assessed in this study had almost equal contributions to the prevalence of *Haemonchus Contortus.* Therefore, to keep small ruminants healthy, strategic deworming of sheep at the beginning and end of summer is crucial.

Keywords: Faeces; Goats; *Haemonchus contortus*; Koladiba; Prevalence; Sheep

Introduction

Ethiopia has the largest livestock population in Africa, with 65 million cattle, 40 million sheep, 51 million goats, 8 million camels and 49 million chickens in 2020 [1]. Between 2000 and 2016, the average stock of livestock, measured in tropical livestock units (TLU) per 100 people, stood at 51 TLU, which is more than double the continental median of 23 TLU. The gross production value average growth rate during the same period was 4.5%, also twice the continental median of 2.2% [2]. The national herd supports, at least in part, the livelihoods of more than 11.3 million rural households, including 27– 35% of the highland livestock keepers, and a large proportion of the lowland herders, who live below the Government of Ethiopia's established poverty line [3]. Livestock is a major source of animal protein, power for crop cultivation, means of transportation, export commodities, manure for farmland and household energy, security in times of crop failure, and means of wealth accumulation [4].

The Ethiopian livestock population is almost entirely composed of indigenous animals. Recent estimates showed that 97.8%, 1.9%, and 0.3% of cattle are indigenous, hybrid, and exotic breeds, respectively. The estimates for sheep are 99.6% and 0.3% for local breeds and hybrids, respectively; for poultry 81.7%, 10.9%, and 7.4% are indigenous, hybrids and exotic, respectively. Nearly all goats (99.9%) are indigenous breeds [1]. 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. Sheep and goats are among the 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 [5]. Parasitic diseases are a global problem and considered a major constraint in the health and productivity of livestock [6]. Among parasitic diseases that constrain the survival and productivity of sheep and Goats, gastrointestinal nematode infections rank 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 [7].

Haemonchosis caused by *Haemonchus contortus* is a predominant, highly pathogenic and economically important disease of sheep and goats [8]. These parasites are common blood feeders that cause anaemia and reduced productivity and can lead to death in heavily infected animals [9]. *Haemonchosis* is primarily a disease of tropical and sub-tropical regions. However; high humidity, at least in the microclimate of the faeces and the herbage, is also essential for larval development and their survival. Apart from direct effects of *H. contotus* infection on animals production and efficiency, it could also increase the cost of medication as well as management [10]. Therefore, this study was designed to record the prevalence of *Haemonchus contortus* egg shedding in sheep and goats in Minna metropolis, Niger State, Nigeria with the view to suggest preventive and control measures to improve the productivity of sheep and goats farming. The frequency and severity of the disease largely depend on the rainfall in any particular area. Surveys in countries around the world have shown that amongst domestic animals, sheep and Goats suffer more frequently from *haemonchosis* [11,12,13].

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In developed countries, the data on the epidemiology of various parasites are published efficiently as an aid to combat infections more effectively. In contrast, in developing countries, little published information exists and data on the epidemiological aspect of parasitic infections, particularly on *haemonchosis,* is rare.

Therefore, the objectives of the present study is designed to record the prevalence of *haemonchosis* in sheep and Goats found in kebeles of East Denbia district in relation to meteorological factors, host, age, and physiological status, and An attempt to bridge the gap in knowledge of these aspects.

Materials and Methods

Study Area

The study was conducted from November 2024 to June 2025 in East Denbia district Koladiba animal health clinic situated in the Central Gondar Zone of Amhara Regional State. It is located 35 km southeast of Gondar city. 12° 25'46"N and 37°20' 23"E at an altitude of 1850-2600 m.a.s.l. The average maximum and minimum temperature is 27° C and 13° C, respectively.

Study Animals and Study Design

A cross-sectional epidemiological study was conducted from November 2024 to June 2025 on randomly selected sheep and goats to determine the overall prevalence of haemonchosis in and around Koladiba town. A simple random sampling technique was employed.

Sample Size determination: The sample size (n) was anticipated using the statistical formula described by Thrusfield [14].

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

Where, n = minimum number of sample size, z = 1.96 at 95% level of confidence
d = absolute precision, p = expected prevalence.

Data Collection

Faecal samples were collected from young and adult sheep and goats of all sexes raised on natural pasture in the study area. A total of 196 small ruminants, comprising of 98 (sheep) and 98(goats) were examined for the presence of *Haemonchus contortus* egg in their faeces. Feaces were scooped from the rectum of the animals using a gloved index finger, with the animals restrained in a standing position. Species, sex and approximate age of all animals were recorded before collection. Collected faecal materials were subjected to flotation and sedimentary technique in accordance with the technique described by 15 Rick *et al*., 2000). All data obtained were analyzed using the statistical software package for the social sciences (SPSS) version 26.

Data analysis: The data collected were entered into Microsoft Excel spreadsheets and analyzed using SPSS version 26 statistical software. Descriptive statistics were used to evaluate (frequency and percentages) values. Pearson's chi-square (x2) to measure association between prevalence of the haemonchosis with the species and age, 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 ($P < 0.05$).

Overall prevalence of haemonchosis in sheep and goats was found to be 109 (56.61%) in the study area. Out of the total 196 small ruminants examined for the presence or absence of *Haemonchus contortus*, 196 animals were found positive, of which 77 and 32 were sheep and goats, respectively. The prevalence of haemonchosis was found to be higher among sheep (78.57%) than goats (32.65%), and statistical analysis of the data showed that there was statistically significant difference on the occurrence of haemonchosis between species. (P=0.001). (Table 1).

Out of the total 196 examined animals for presence or absence of *Haemonchus contortus*, 109 animals were positive in which 66 and 43 were young and adult, respectively. The prevalence of haemonchosis was different with age groups of small ruminants; and it was found that 56.41% and 54.43% in young and adult respectively. The difference was statistically significant (p =0.001).Table 2: Prevalence of *Haemonchus contortus* in sheep and goats based on age. (Table 2).

Results and Discussion

In this study, a total of 399 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 to be 109 (55.56%) in the study area. Out of the total 196 small ruminants examined for the presence or absence of Haemonchus contortus, 109 animals were found positive of which 17 and 32 were sheep and goats respectively. The prevalence of haemonchosis was found higher among sheep (78.57%) which is greater than goats (32.65%), and statistical analysis of the data showed that there was statistically significant difference in the occurrence of haemonchosis between species. (P=0.001) (Table 1).

Out of the total 196 examined animals for the presence or absence of *Haemonchus contortus*, 109 animals were positive, of which 66 and 43 were young and adult, respectively. The prevalence of haemonchosis was different among age groups of small ruminants; and it was found that 56.41% and 54.43% in young and adult, respectively. The difference was statistically significant (p =0.001) (Table 2).

The overall prevalence of haemonchosis (55.61%) 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 [9]; 78% was reported in small ruminants in Heilongjiang [16]; 80.64% reported in small ruminants in Pakistan [17] and in Ethiopia; 96.5% in sheep and 100% in goats from arid and semi-arid zone of eastern Ethiopia [18]; 79.68% (81.35% in sheep and 72.6% in goats) from Komobolcha town [19]; 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 [20].

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	98	77	78.57	246.349[a]	0.001
Goat	98	32	32.65		
Total	196	109	55.61		

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	117	66	56.41	203.078[a]	0.001
Adult	79	43	54.43		
Total	196	109	55.61		

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=0.001) 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 [20] who reported 81.2% and 73.5% in sheep and goats, respectively; [21] who reported 69.5% and 65% in sheep and goats, respectively. However, the current study is disagreed with [22] 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 they 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 because goats browse on bushes and small trees where translation of infective larvae to such heights seems impossible.

Statistical analysis of the data on the prevalence of *Haemonchus contortus* among age groups showed that there was a significant difference (P = 0.001) between young and adult with the prevalence of 56.41% and 54.43% respectively. The current finding on the prevalence of haemonchosis between the two age groups is also lower than with previous findings which was reported 66.9% and 59.0% in young and adults, respectively [23]; 86.9% in young and 86.6% in adult animals [24]. The more infections observed in young people 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 [26; 26].

Conclusion

In general, the overall prevalence of gastrointestinal helminth parasites in the study area indicates gastrointestinal helminthosis to be an important health problem due to its high prevalence and occurrence of polyparasitism. The result also showed that sheep carry more parasitic types than goat. This is because they predominantly graze in grass, which harbors infective larvae, while goats mostly consume browse, which is uncontaminated with parasite larvae. The majority of sheep and goats were infected by two or more parasite types, with some animals showing pure infestation. Strategic deworming of animals, when conditions are most favorable for larval development on the pasture, using broad-spectrum anti-helminthics, since polyparasitism is a common problem. The high prevalence of Haemonchosis was reported in the current study, which shows animal breeders are at high risk of losses due to the effect of this parasite on both age groups of animals. 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 a traditional extensive grazing system. However, the prevalence of haemonchosis was higher in sheep compared to goats. Because of the high pathogenicity of Haemonchus spp, strategic deworming of small ruminants with improvement of their husbandry system is crucial. Furthermore, a study that focuses on other economically important gastrointestinal parasites with due emphasis on major risk factors should be conducted in order to decide the appropriate time for strategic deworming of animals.

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