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Research Article

Occurrence of Ovine Haemonchosis Slaughtered at Abergele Export Abattoir, Northern Ethiopia

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ABSTRACT

A cross sectional study was conducted at Abergele export abattoir with the objectives of determining the occurrence of ovine haemonchosis and investigating potential risk factors associated with them. During the study period, a total of 380 abomasums of sheep, collected from randomly selected male sheep were examined on postmortem for the presence or absence of the parasite according to standard procedures. Among those, 200 sheep were positive for *Haemonchus contortus* with overall occurrence of 52.6%. The findings of this study exposed that the occurrence of ovine haemonchosis was more frequently recorded in adult (greater than one year) (28.6%) than in young (less than one year) sheep (23.9%). Based on body condition it was noticed that high occurrence was recorded in animals with medium body condition (29.7%), followed by poor body condition (13.2%) and the lowest were recorded in animals with good body condition (9.7 %).The highest occurrence was recorded during the month of April (16.3%), followed by February (12.9%), January (9.2%), December (8.2%) and the lowest occurrence was recorded during the month of March (6.05%). In this study, there was no statistically significant difference (P>0.05) observed with the risk factor like age, origin and months of inspection in relation to the occurrence of *Haemonchus contortus*. However, there was statistically significant difference (P<0.05) observed among the risk factors (body condition) in relation to the occurrence of *Haemonchus contortus*. In conclusion, the study revealed that the occurrence of ovine haemoncosis is high in Abergelle export abattoir slaughtered sheep and consequently affects the productivity of the sector. Hence appropriate disease prevention and control measures are requiring to be undertaken to reduce its impact.

Keywords: Abattoir; Abomasum; *Haemonchus contortus*

INTRODUCTION

Ethiopia which lies within the tropical latitudes of Africa is naturally endowed with different Agro Ecological Zones (AEZ) and suitable environmental conditions and home for many livestock species and suitable for livestock production. Ethiopia is also believed to have the largest livestock population in Africa. More than 80% of the Ethiopian population is dependent on agriculture which contributes 45 % of the country's Gross Domestic Product (GDP) and more than 90% of the export earnings. Livestock donates 30%-35% of the agricultural GDP and more than 85% farm cash income of smallholders [1].

In Ethiopia, sheep were the second most important livestock species next to cattle and ranks second in Africa and sixth in the world in sheep population. They play a great role in the economy of the world since they are a source of meat, milk, fiber, skin and generate cash income. Generally, sheep are the predominant livestock in the area of high lands of 3,500 meters above sea level; sheep assume a great share in socio-economic activities of about 85% of the population.

Despite the large livestock population of Ethiopia, the economic benefits remain marginal due to prevailing diseases, poor nutrition, and poor animal production system, reproductive inefficiency, management constraints, and general lack of veterinary care. These diseases have a major impact on morbidity

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and mortality rates, with annual losses as high as 30%–50% of the total value of livestock products of Ethiopia. One of the most noteworthy antagonistic factors to sheep farming is parasitic diseases; especially those caused by nematodes. *Haemonchus contortus* (*H. contorts*) is one of the most important endoparasites of sheep that needs greater emphasis [2].

Gastro Intestinal Nematodes (GIN) are recognized as a major constraint to both small and large-scale small ruminant production in developing countries, leading to significant economic losses. The GINs that mostly affect sheep are belong to the Super family *Trichostrongyloidea* and includes the genera of *Haemonchus*, *Trichostrongylus*, *Cooperia*, *Ostertagia*, *Oesophagostomum*, *Bunostomum*, *Strongyloides*, *Nematodirus* and *Trichuris*.

Among those, *H. contortus* is one of the most important abomasal nematodes of shoats which are most prevalent and pathogenic blood sucking parasite. It is known as "red stomach worm" or "wire worm" of small ruminants that causes Haemonchosis probably causes more losses than any other species of nematodes in small ruminants on global basis. Adult worms are parasitic in the mucosa of abomasum and females which have barber's pole appearance lay eggs that pass out in the faeces, where they develop through first and second larval stages to the infective third larval stage (L3). The L3 moves out of the faeces and onto the herbage, where it is ingested by a future host. Ambient temperature, environmental humidity, grazing behavior of the host, host risk factors and quantity and quality of pasture are some factors responsible for the prevalence of gastrointestinal helminths. Outbreaks are most common and severe in warm, humid climates [3].

The pathogenesis of haemonchosis is that of an acute hemorrhagic anemia due to the adult *H. contortus* and fourth stage larvae puncture small blood vessels of the abomasal wall and suck blood. *H. contortus* secrets anticoagulant and inject into the wound so that the host actually loses more blood or the worm ingest. Each worm removes about 0.05 ml of blood per day by ingestion and seepage from the lesion. The pathogenesis of *H. contortus* results from inability of the host to compensate for blood loss. *H. contortus* is of primary concern since it is a highly pathogenic blood-feeder helminth that causes anemia, reduces productivity and can lead to death in infected animals [4].

The disease caused by this parasite is prevalent wherever sheep and goats are raised, but it exerts the greatest economic losses in temperate and tropical regions. Mortality, loss in production, stunted growth; poor weight gain and poor feed utilization are the primarily economic losses. Occurrence and severity of *H. contortus* infection largely depends on the rainfall and temperatures of an area. High rainfall and temperatures promote rapid hatching of eggs on pasture and hence increased contamination. Clinically, the disease occurs in three forms: per-acute, acute and chronic. Acutely infected sheep exhibit pale mucous membranes, dark colored faeces, weakness, and edema (bottle jaw) and may die suddenly. Chronic disease may manifest as decreased appetite, weight loss, and anemia. The cardinal sign of Haemonchosis is pallor of the skin and mucous membranes. Loss of plasma protein results in anasarca frequently manifested externally as a sub maxillary edema (bottle jaw) and diarrhea occurring only in infections complicated by the presence of *Trichostrongylus* and *Cooperia* species. Lambs and kids are the most affected members of the flock and older sheep and goats under stress also may have total anemia. Diagnosis is made on the basis of clinical signs, grazing history season, detection of eggs in faeces and observation of adult parasite in the abomasum during post mortem examination. The demonstration of *H. contortus* eggs in faecal sample using fecal examination method is confirmative but specific identification is difficult and required specialized laboratories and experts [5].

For many years, anthelmintic have extensively been used to control this endoparasite. Current control strategies against *H. contortus* primarily rely on repeated anthelmintic treatments. However, the widespread use of anthelmintic drugs has resulted in serious drug resistance problems worldwide in domestic a nimals. For example, benzimidazole and ivermectin have been used heavily to control nematode infections in China, resulting in the development of drug resistance. Despite the economic importance of this parasite and high population of sheep in the study area, limited work has been made on the epidemiology of small ruminant haemonchosis [6].

MATERIALS AND METHODS

Study area

A cross sectional study was conducted to investigate the occurrence of ovine haemonchosis slaughtered at Abergele export abattoir in Mekelle, Northern Ethiopia. Mekelle is the capital city of Tigray regional state which is located 783 km north of the capital city of Ethiopia, Addis Ababa. Its geographic location is 13°32' N and 39°33' E with an elevation of 2000 meters above sea level (masl). The climate in this area is characterized by relatively high temperatures year-round and distinct wet and dry seasons. The climate type of this area is tropical savanna climate as all month's average above 18°C or 64.4°F; however it borders both on a subtropical highland climate and a semi-arid climate.

Study animals

The sampling unit of the study was sheep which was presented for slaughter at Abergele export abattoir with age groups, sex (all males) and different body condition and origin. In this study; the origins of the animals were recorded from merchants that provide animals for the abattoir. In addition, The age of the sheep was characterized using teeth eruption and animals with the age of less than one year were considered as young, which have 0 Permanent incisor while those greater than or equal to one year were included as adults, which have 1 and greater than 1 pair of Permanent incisors according to the classification of age groups [7].

The Body Condition Scoring (BCS) method was determined grouped as poor, medium and good. It was based on visual assessment on anti-mortem in which scoring is based on the level of fat deposition and muscle around over the vertebrate in the loin region. Poor: Poor was characterized as no or little fat

cover in shallow Loin eye muscle, no full muscle, prominent spinous, and transversal process which are from distant. Medium: Medium was characterized as moderate fat cover, full loin eye muscle, spinous and transverse process are detected up on palpation. Good: Good was characterized as thick or very fat cover, full muscle, transverse process cannot be detected and spinous process detected as a hard line. All animals presented for slaughter at Abergelle export abattoir were male [8].

Sample size determination

The sample size required for the study was calculated using 95% level of confidence and expected prevalence rate of 49.5%. Since there was previous work done on this area, the expected prevalence was taken 49.5%.

Study design

A cross-sectional study using simple random sampling was conducted to determine the occurrence of ovine haemonchosis and to assess the associated potential risk factors.

Data analysis

The data collected was entered to Microsoft Excel 2007 spread sheet, coded appropriately and Analysis was performed using STATA version 11 software. Pearson's chi-square (x was used to measure associations between prevalence of the ovine haemonchosis with months of inspection, age, origin and body condition. Descriptive statistics was employed and statistical analysis for the difference in prevalence of *H. contortus* among risk factors are considered significant when the p value was less than 0.05 (P<0.05) [9].

RESULTS

In this study a total of 380 male sheep were examined on post mortem for the presence and absence of *H. contorts* in abomasums. From these examined sheep, 200 were positive for *H. contortus* with the overall prevalence of 52.63%. An attempt was made to see the influence of age on the prevalence of *H. Contortous* infection. When assessing age as risk factor, it was shown that adult sheep were highly affected, compared with animals young age. There was no statistically significant variation (p>0.05) in prevalence of *H. Contortus* among the studied age group (Table 1).

Age	No of examined	No of positive	Prevalence	X	P-value
Young	165	91	23.95	0.7428	0.384
Adult	215	109	28.68		
Total	380	200	52.63		

Table 1: Prevalence of *H. contortus* based on age.

DISCUSSION

The present study revealed that the overall occurrence of Ovine Haemonchosis was 52.6%, which indicated that high occurrence of the parasite in the study area. In the previous studies, various researchers reported variable occurrence rate of ovine haemonchosis in different geographical areas. However, the occurrence may vary from country to country and even within the country. This finding was two times greater than the study conducted in Abergele export abattoir who reported occurrence of 26.8 %. Similarly, the current finding is greater when compared to different researchers such as in Alamata who recorded occurrence of 39.5%, with the rate of 33.1% in the Jima municipal abattoir, and Lidya and Berihun 40.9% in northern parts of Ethiopia, Wukiro. This variation might be due to poor management system and poor immunological response to infective stage of the parasites.

The occurrence of ovine haemonchosis in this study is much lower than the occurrence in other studies that was previously conducted in different parts of Ethiopia with recorded occurrence rate of 81.2%, 63.8%, 96.5% and 88.2% respectively. This may be due to climatic factors, management practices, veterinary service and natural resistance of the host. This is still low compared to the occurrence reported in other countries; 82% in Togo, 94% in Middle, 58% from Bangladesh, 55.56% from Benin and 76.92% from India [10].

These variations in occurrence of haemonchosis in sheep in different parts of Ethiopia and country to country may be due to the differences in variety of factors such as sample size, environmental factors, host factor, availability of veterinary infrastructure, level of education and economic capacity of the community, the standard of management and with habits of anthelmintic usage which influences the development, distribution and survival of the parasite. The present study revealed that there was no statically significant difference (P>0.05) among age groups with prevalence of 24% and 28.6%, in young and adults respectively. When assessing age as risk factor, it was shown that adults were highly affected, compared with young animals. The difference in infection rate could be attributed mainly to the fact that aged animals have a longer exposure time to *H. contortus* in pastures than young one. These results are in agreement with the previous report.

The present finding on the occurrence of haemochosis between two age groups was in line with previous findings which were reported as 86.9% and 86.57% in adult and young animals, respectively in Helmex-export abattoir. This result does not coincide with the studies conducted at Debrezeit ELFORA export which were exported with prevalence rate of 66.9% and 59.0% in young and adult animals, respectively. This result also does not coincide with report which was 41% and 37.9% in young and adult sheep, respectively in and around Alameta Woreda, Ethiopia.

With regard to the body condition of the examined sheep the rate was higher in medium body condition sheep compared to the poor and good body condition sheep, with the occurrence of 29.7%, 13.2% and 9.7%, respectively. Relationship between body condition and ovine haemonchosis was recorded with

statistical difference between poor, moderate and good body conditioned animals, which means those animals were not equally susceptible for haemonchosis. This result is consistent with report who reported prevalence rate of 73.5%, 72.2% and 61.1% in medium, poor and good body conditioned animals, respectively. This finding is inconsistent with the previous reports who reported prevalence of 81.2% and 73.6% in good and medium body conditioned animals, respectively.

The occurrence variation of the parasite in these body condition categories varies significantly ($p<0.05$). This result contradicts the prevalence of haemonchosis based on different body condition categories which were reported with prevalence rate of 64.67%, 46.34% and 39.13% in poor, moderate and good body conditioned animals with prevalence rate of 97.77%, 60.71 % and 35.63% in poor, moderate and good body conditioned sheep, respectively. It also disagrees with the research reported by who report prevalence of haemonchosis was found to be higher in good body condition than that medium body condition. This could be explained by the fact that loss of body condition in the study animals might be due to other factors, such as seasonal change of forgeable feed staff. Poor management system and the presence of other concurrent diseases which lead to poor immunological response to infective stage of the parasites. The occurrence of the *H. contortus* in sheep that originated from different sites of the study area indicated different occurrence. The occurrence of this parasite was higher in those sheep originated from both Atsbi and Mekelle with the rate of 19.7% followed by Alamata with the rate of 13.2% and there was no statically significant variation ($p>0.05$). Even though sheep originated from Atsbi and mekelle market were equally susceptible, there was different occurrence recorded between the above two origin and sheep from Alamata. This difference might be due to the difference between the geographical and environmental ocation of the area, the standard of management and anthelmentics usage are crucial elements influencing the development, distribution and survival of parasites.

According to study, the occurrence of *H. contortus* of sheep which originated from Alamata was (27.4%) which is two times higher than the present study with prevalence rate of 13.2%. Similarly, this finding is much lower than the previous report who reported the rate of occurrence of sheep originated from Negash, Tigray (25.3%) but the prevalence of *H. contortus* of sheep of wukiro (7.6%) is lower than Atsbi, Alamata and mekelle town of this study.

In seasonal wise, it was observed that the highest occurrence of *H. contortus* during the month of April (16.3%) and the lowest occurrence was recorded during the month of March (6.05%). There was no statistically significant difference ($p>0.05$) in the occurrence of Haemonchus among the studied months. These finding are inconsistent. According to previous report, the occurrence of *H. contortus* of sheep during the month of inspection of January (58.6 %) is much higher than the present study of January prevalence (9.2%).This may be due to the high biotic potential of Haemonchus result in rapidly assuming dominance at times when environmental conditions in pasture are favorable for the development and survival of free-living stages.

The highest prevalence was recorded during the month of November (45%) and the lowest occurrence of *H. contortus* was recorded during the month of January (20.03%) which contradicts with the present study occurrence. In previous study, the occurrence of *H. contortus* of sheep in months of inspection of January (40.5%), February (30.60%) and March (36.30%) is much higher than similar months of inspection of this study which is January (9.2%), February (12.9%) and March (6.05%).

CONCLUSION

The result of the present study indicated that *H. contortus* is an important disease in the study area with an observed occurrence of 52.6%. 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 the sector of the study area should receive special attention.

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