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Survey of Gastrointestinal Helmenthes of sheep in and around Adama (East Shoa zone)

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Abstract

Helminth parasites are among the most important problems affecting small ruminant production worldwide. Similarly, helminthosis is a major health problem responsible for suboptimal production or performance in Ethiopia. This study was therefore initiated to assess the prevalence of gastrointestinal helminth parasites in sheep in and around Adama (East Shoa zone). Faecal samples from 384 male sheep were collected and examined by using floatation and sedimentation techniques. The results reveal that overall prevalence of strongyle and *Fasciola* eggs in faeces were 92.2% and 11.2% respectively. The difference in the prevalence of the problem among age groups was not significant. However, large proportion of young animals was found to harbor high number of faecal eggs than older animals. Based on the study results obtained, further investigation on gastrointestinal helminth prevalence is recommended to complete the epidemiological gaps in the designing of control programs.

Keywords: Adama, Faecal, egg count, Helminthes, Prevalence, Sheep

1. Introduction

Small ruminants provide several services and support lives of people in the tropics and subtropics. It is projected that by the year 2025 small ruminants will account for half of the red meat production in Sub-Saharan Africa [1]. The sale of sheep and goats and their products are important source of income for small holders who do not have access to credit and other income.
Ethiopia with its diverse climate and topography has a large livestock population. The number of small ruminants is estimated to be 28 million of which sheep constitute slightly more than 50% [2]. Studies show that small ruminants contribute 30% of meat for domestic consumption [3, 4]. They are important export commodities, about 155,000 heads of live sheep and goats being exported annually. Skin accounts for 43% of the livestock product export while mutton accounts for 5% [4].

Inspite of the presence of huge sheep population, the country fails to optimally exploit their services due to various disease and management problems [1, 5]. In Ethiopia small ruminant production and

productivity are affected by disease, inadequate nutrition and poor management system. The most important impediments to sheep production in the lowlands of Ethiopia are health problems including infectious diseases, parasitism and nutritional problems.

Helminth parasites are among the most important problems affecting small ruminant production worldwide. Economic losses are caused by decreased production, costs of prophylaxis and treatment and death of the infected animal. The situation is much worse in Ethiopia where climatic conditions in most parts are favorable for parasite development [6,7].

Economicaly important helminth species affecting sheep include *Haemoncus spp*, *Trichostrongylus spp*, *Fasciola spp*, etc covering a wide range of agro-ecologies. They cause clinical disease and mortalities in lambs and adults during heavy infection. They are also responsible for reduced grown rate, poor feed utilization, reproductively inefficiency, poor wool production, organ condemnation and financial loss through expensive control. Such losses are usually aggravated in countries or areas where there is no nutritional supplementation [8]. A study has shown that losses due to ovine fasciolosis alone were estimated to be 48.4 million Ethiopian birr/year of which 46.5%, 48.8% and 4.7% were due to mortality, reduced productivity and liver condemnation respectively [9]. It was also estimated that a loss of 2.4 million Ethiopian birr could be incurred due to reduced weight gain.

Though the lowlands of Ethiopia have low rainfall and hot (warm) temperature that cant provide conductive environment for the development of helminth parasites, infection of sheep with helminthes is as common as that of highland regions. Examples are Debre berhan for highland [10] and Eastern Shoa for lowland [11] regions of the country. However, most of these studies particularly those in Eastern Shoa were realized more than two decades ago. Since then, veterinary services have expanded and as anywhere else, the ecology might have undergone some changes in light of this, to design an effective control strategy, obtaining up to date epidemiological data is one of the most important prerequisite.

The objective of this study was therefore:

- To assess the prevalence of helminthes of sheep in and around Adama (East Shoa Zone)

2. Materials and Methods

2.1 Study Area

The study was undertaken, from November 2007 to April 2008, in and around Adama town East Shoa Zone of Oromia Regional State (Central Ethiopia). The town is located 95km south east of Addis Ababa, at 39.1^0 N latitude and 8.31^0 E longitudes. It has an elevation of 1770 meteres above sea level and situated in the great east African Rift valley. It has annual rainfall ranging between 400mm and 800mm of which 84% fall in the long rainy season (June to September). The dry season extends from October to February. The mean annual maximum and minimum temperature are 27.7^0c and 13.9^0c, respectively [12]. The town is one of the most populous from the regional state and is located at an important multidirectional trade route. Farmers around Adama practice a mixed crop-livestock farming system.

2.2 Study Animals and Design

Faecal samples were collected from the rectum of 384 randomly selected male sheep [13] of all age groups. The study was originally designed to compare the prevalence of gastrointestinal parasites between castrated and noncastrated sheep. However, due to the very low number of castrated sheep observed in the area during the first half of the study period such comparison was cancelled from the study protocol while we were forced to continue with only male sheep for the rest of the study period for the parasite survey.

Animals were sampled at grazing fields, market places, veterinary clinics and during field services to peasant associations in three different areas: Marmarsa (East), Boku (South) and Geldia (East).

Samples were preserved at $+4^0$c until analysis. Data were grouped according to animal age. Age was estimated by history obtained from attendant and by dentition which is the dental eruption and wears. Eruptions of 1^{st}, 2^{nd} and 3^{rd} pairs of incisors were considered to correspond with ages 1-1½, 2½ and 2½-3 years respectively. Eruption of canine teeth indicates age of 3-4 years as described previously [14]. Egg counts/microscopic field were graded from 0 to 4 (grade 0; no eggs, grade 1: 1-5 eggs, grade 2: 6-10 eggs, grade 3: 11-15 eggs and grade 4: above 15 eggs).

2.3 Laboratory techniques

Presence or absence of faecal egg was studied using direct floatation (strongyle and cestode eggs) and sedimentation (trematode eggs) techniques as described by [15]. For floatation, three grams of faeces was homogenized in 42ml of saline solution. The mixture was filtered with a 250µm sieve. The filtrate was collected, thoroughly mixed and filled in to a test tube up on which was placed a cover slip for few minutes. The cover slip was transferred after some time on to a glass slide and egg counting was made under low magnification (10x objective) using a microscope.

For sedimentation technique, 3 grams of faeces was homogenized in 42 ml of tap water and filtered through 250 µm sieve. The filtrate was transferred to a conical centrifuge tube and allowed to sediment for 2 minutes at 1200 revolution per minute. After decanting the supernatant, 2-3 drops of methylene blue was added. Part of the sediment was then placed on a glass slide , covered with a cover-slip and examine under 10 x objectives using a compound microscope. In both techniques, three slides were examined for a sample to be registered as negative for helminth eggs.

2.4 Data Analysis

Percentage of helminth positive animals was compared between different age categories using Chi- square (χ^2) statistics. Similar statistical tool was used to compare proportion of positive animals for different grades of egg counts.

P-value less than 0.05 were considered significant when differences exist between groups [16].

3. Results

3.1 Overall Prevalence

The overall prevalence of helminth eggs among the 384 male sheep sampled was 92.2% for Strongyle and 11.2% for Fasciola with significant differenece between the two ($P<0.05$). Very few animals were found to have eggs of Pramphistomum spp, Cestode spp and larvae of lung worm spp.

3.2 Effect of age

Although, the frequency for positive animals is slightly higher in younger animals, there is no statical variation in the prevalence of Strongyle and *Fasciola* eggs between the different age groups (Table 1).

Table 1. Prevance of Strongyle and Fasciola species in sheep at different age categories

Age in months	No. of animals	% Strongyle +ve	% Fasciola +ve
<6	115	94.8	13
6-10	204	91.2	9.3
>10	64	90.6	14

3.3 Intensity of faecal egg counts

Generally, number of animals harbouring grades 3 and 4 strongle eggs (higher egg counts) were significantly lower than those harbouring grades 1 and 2 (lower egg counts) at all age groups ($P<0.01$). there was a slight deviation from this generalization at age greater than 10 m0nths where animals with grade 4 FEC were more frequent than those with grade 3 (Table 2). The proportion of animals having low grade FEC increases with age while large proportion of younger animals had FEC of grade 3 compared to older animals ($P<0.01$). On the other hand, all FEC for Fasciola species were of grade 1 category making comparisons difficult.

Table 2. Distribution of different grades of FEC at three age species were of grade 1 categories of sheep examined

Age in months	No. of animals	Grade 1	Grade 2	Grade 3	Grade 4
<6	109	40.4	31.2	16.5	11.9
6-10	186	55.9	25.8	10.2	8.1
>10	58	58.6	22.4	3.4	15.5

4. Discussion

The overall prevalence of strongyle eggs in the study area was high compared to that of Fasciola species. Similar results were reported by Bekele (2007) [17] and Melkamu (1991) [18] where the prevalence of strongyle spp. was higher than that of *Fasciola* spp. This is may be due to the unfavorable environment and ecology of the rift valley area for snail development and survival of infective metacercaria. The intermediate hosts for *Fasciola hepatica*, *Lyminea truncatula*, and for *F. gigantica*, *L. natalensis* are most adapted to murshy areas, irrigated land and around water bodies [15] (Urquhart *et al*., 1996), which is not the case for East Shoa zone. This is in agreement with Graber (1995) [19] who indicated that in Ethiopia, Fasciolosis is wide spread disease in areas with an altitude above 1800 to 2000 meters above sea level. It might also be due to the fact that strongyles have a direct life cycle and thus the chance of a successful infection is much higher than the trematodes which need intermediate hosts to complete their life cycle.

Previous studies conducted in the area have shown that the overall helminth prevalence reaches 82.22% (Melaku, 1991) [11]. The result of the present study indicates a slight increment (92.2% for Strongyles). The difference could be attributed to many factors, lack of data for the female sheep in this study, ecological changes, difference in study protocol etc.

A number of studies have reported that variations exist in the development of helminth parasites between male and female animals which could be attributed to hormonal, physiological and other related factors [20, 21]. Therefore, exclusion of female sheep in this study due to the aforementioned reason undoubtedly makes the data presented incomplete.

This study was based solely on faecal examinations due to inaccessibility of slaughtered animals. It is known that FEC are fairly reliable in situations where parasite burdens are high and worms are mature enough to release eggs in faeces [22]. Therefore, the prevalence rate reported might be higher especially for *Fasciola* species than what is reported here.

Young animals are generally more susceptible to parasite diseases than adults. It is believed that lower resistance to disease in young ruminants is partly due to immunological hypo responsiveness, and is not simply a consequence of their not having been exposed sufficiently to pathogens to develop immunity [23, 24]. Innate immunity, often age-related, is also considered important in many cases. This may be due to physic-chemical differences in the gut environment in adult compared with young hosts [25]. In this study, although there was similarity in the proportion of helminth positive animals between young and adults, FEC were more intense (grades 3 and 4) in youngs (<6 months) than in adult sheep (>6 months) while relatively large proportion of older animals were found harbouring low FEC. High FEC could mean large number of adult worms, enhanced development or fecundity of individual worms or both. Terefe *et al*., 2005; Douch *et al*., 1996; Stear and Bishop, 1999) [26, 27, 28] all being indicators of lower resistance.

5. Conclusion and Recommendations

In conclusion, the prevalence of strongylosis in sheep at East Shoa is extensive followed by fasciolosis. These are the most important gastrointestinal helminthosis that must be considered in the area during any curative and prophylactic treatment. Compared to previous studies, there is no apparent sign of decline and hence needs further attention. Parasite intensity appear to be more significant in young animal while most older sheep were found to have fewer faecal egg counts, which suggests that the latter have developed better immunity.

In light of the above conclusion and the results of the study the following points are suggested for further study and possible design of effective control measures.

- The present study lacks data for female sheep. Therefore, these should be included in future studies to obtain a complete estimate of the prevalence of helminth infections in sheep in the study area.

- As faecal egg counts are not always reliable, findings should be supported by post-mortem investigations so that better understanding about the extent of the problem could be obtained.

- Studying seasonal prevalence of the most important parasite swill have paramount importance in the designing of effective intervention strategies.

- Study of the age-dependent immunological responses to helminth infections in the area should be carried out to investigate the mechanism behind the difference in parasitological parameters.

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