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Ovine Lungworm Infections are Serious Production and Health Problems in Amhara National Regional State, Deneba, Northeast Ethiopia

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Abstract: A cross sectional study was conducted in and around Deneba town from October 2010 to January 2011 to determine the prevalence of ovine lungworm infections. Feacal sampleswere collected from 384 sheep of different sex and age groups and examined by modified Berman technique for identification of lungworm larvae. The finding of coprological examination indicated the presence of lungworm in 117 sheep, which account foroverall prevalence of 30.46%. Three species were identified in the study area with relative prevalence of 20.83% (n=80) *Dictyocaulusfilarial*.7.55% (n=29) *Muelleriuscapillaris*and 2. 08% (n=8) *Protostrongylusrufescens*. The prevalences of ovine lungworm infection in female and male animals were 31.22% and 29.00% respectively with no significant variation in prevalence ($P > 0.05$). There was significant variation in prevalence among the three age groups ($P < 0.05$).

Key words: Deneba · Ethiopia · Lungworm · Ovine · Production · Health

INTRODUCTION

Goats and sheep are important domestic animals in tropical livestock production systems [1]. About 21% of the world small ruminant population is found in Africa. The population of sheep in Africa represents 17% of the total world population while goats represent 30% [2]. Small ruminants provide a number of advantages to the producers. They are source of food (milk and meat) fiber (wool and skin) cash income. Ethiopia is a country with different agro-ecological zones where considerable populations of small ruminants are raised. The small ruminants of the country are estimated to be 24 million herd of sheep and 23 millionsherd of goats of these, the highlands have 75% of sheep and 25% of goats while the low lands mostly pastoral area have 25% of sheep and 73% of goats [3, 4].

Lungworm infection results in significant loss of production and mortality. This has already been recorded as one of the most important economic constraint and has been an important task to scientists to produce a control regimen. Therefore, development of vaccine is essential [5]. The preliminary finding of lungworm infection was done by Bekele [6], Brook [7], Sisay [8], Natsanet [9] and Tefera [10] in Ethiopiaand they have indicated high prevalence of lungworm infection. In addition to finding out the prevalence of these infections, they have indicated sound lungworm control strategy at local and regional level. Therefore, further and detailed investigation of epidemiology and importance of lungworm infection with respect to its temporal distribution is necessary. Denebais located at 2600 meters above sea leveland hence higher prevalence of lungworm infection is expected. Therefore, the objectives of this study are to determine the prevalence of lungworm infection and to identify the species involved.

MATERIALS AND METHODS

Study Area: The study was conducted in and around Denebatown that is found in North Shoa zone, Seyadebrandwayudistrict, Amhara region, 175 km north east of Addis Ababa. The area is highland about 2600 m. a. s. l. with bimodal rainfall pattern consisting of a long

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rainy season from June to September and short rainy season from February to March and land position of 83% is plateau, 6% ups and hills and 11% mountainous. The annual average rainfall is 996 mm and average mean temperature 10.6°C [11].

The livestock population of this district is 74,141 cattle, 43,306 sheep, 11,864 goats, 2, 849 horses, 13,262 donkeys, 160 mules and 63,265 poultry.Mixed farming system is the main economic activity of the woreda and generally cattle are mainly kept for traction purpose, meat and milking are secondary important. Those small and large ruminants are raises as a source of case income for rural householder [3].

Study Population: The study animals were privately owned sheep in and around Deneba town. It comprises both sexes and all age groups.

Sample Size Determination: A total of 384 samples were randomly selected and examined for the presence of lungworm infection. The sample size was determined based on Thrusfield [12] with expected prevalence of ovine lungworm 50% and desired precession 5%.

Study Method

Laboratory Method: Isolationof L_1 was done using modified Barman technique described by Glovirina [13]. Fecal sample was directly taken from the rectum and transported to the laboratory of Deneba veterinary clinic in fresh state and the larvae were identified morphologically as described by Soulsby [14].

Data Analysis: All data were entered in the Microsoft Excel program. Analyses of the lungworm data, such as basic descriptive statistics, cross tabulation and chi-square tests in relation to region, animal age and sex were done using STATA and SPSS programs, 2011.

RESULTS

Prevalence: In the present study, a total of 384 sheep were examined and 117 (30.46%) were found infected with lungworms and the three species of lungworm were identified with prevalence of 20.83% with *D. filaria*, 7.55% with *M. capillaris* and 2.08% with *P. rufescence* (Table 1).

Risk Factors Analysis

Sex: Sex was considered as risk factor for the occurrence of lungworm infection in sheep. The prevalence of lungworm infection in male and female sheep was 29.00% and 31.22% respectively with no significant difference in prevalence between the two sexes ($P>0.05$) as shown in Table 2.

Age: Age is usually considered as a possible risk factor that may bring variation in the prevalence of lungworm infection. Studied sheep, in this research, were categorized in to three age groups and the prevalence was illustratedin Table 3. Therewasa significant variation in prevalence among the age groups ($P<0.05$).

The different lungworm species was also analyzed for the three age groups and the result was present in Table 4. There was significant variation in species prevalence among the age groups ($P<0.05$).

DISCUSSION

The studyrevealed anoverall prevalence of 30.46% of ovine lungworm infection in and around Deneba town. The prevalence of lungworm infection in the presentstudy was found less than the previous studies. Wondwossen [15] indicateda 58% in Assela, Sisay [8] in Bahir Dar (44%) and Mezgebu [16] in Addis Ababa 48%. In addition, lower prevalence rates were recorded in and around Debre Birhan (16.93%) by Yekitie [17] and in Assela 27.7%

Table 1: Overall and species level prevalence of lungworm infection

Species	No of infected sheep	Prevalence (%) (positives /total examined)
D. filaria	80	20.83%
M. capillaris	29	7.55%
P. rufescence	8	2.08%
Total	117	30.46%

Table 2: Prevalence of lungworm infection in relation to sex

Sex	No. of examined animals	No.of positive	Prevalence (%)
Male	131	38	29.00%
Female	253	79	31.22%
Total	384	117	30.46%

Table 3: Prevalence of lungworm infection in relation to age

Age	Total examined samples	No. of positive	Prevalence
<1 Year	49	22	44.89%
1-3 Year	259	65	25.09%
>3 Year	76	30	39.47%
Total	384	117	30.46%

Table 4: Prevalence of lungworm species in relation to different Age groups

Age group	Total examined No.	*D. filaria*	*M. capillaris*	*P. rufescence*
<1 Year	49	18(36.73%)	3(10.20%)	1(2.04%)
1-3 Year	259	43(16.60%)	18(6.94%)	4(1.54%)
>3 Year	76	19(25.00%)	8(7.89%)	3(3.94%)

by Brook [7]. The difference in prevalence of lungworms might be due to sample size and season where, prevalence of *D. filaria*is low in spring and summer but rises rapidly in autumn and winter [18].

Three species of lungworm parasites were identified; *D. filaria*, *M. capillaris* and *P. rufescence*. Prevalence of lungworm infection caused by *D. filaria* was found to be 20.83%. The prevalence of *M. capillaris* (7.55%) is lowerthanthat reported by Mezgebu [16] in Addis Ababa (54.9%) and Sisay [8] in Bahir Dar 39.3%. Nevertheless, the study was closer to prevalences recorded by Natsanet [9] in and around Debre Birhan 12.6% and Yekitie [17] in and around Debre Birhan 9.11%. *P. rufescence*prevalence (2.08%) is also different from the reports by Tefera [10] in Dessie and Kombolcha 10.57%. This might be due to factor of availability of intermediate host.

The difference of prevalence of *D. filaria* with those of *M. capillaris* and *P. rufescence* could be associated with the difference in the life cycle of the lung worm. *D. filaria* has direct life cycle whereas *M. capillaries* and *P. rufescence* have indirect life cycle.

No significant difference ($P > 0.05$) in the infection rate oflungworms among animals of different sexes. Whereas there was significant difference ($P < 0.05$) among age groups. *D. filaria* is high in younger animals because they are susceptibleto theparasite. In previous study, animals 2-15 months of age have higher incidence than do other age groups [19]. This can be accounted for the fact that there is development of acquired immunity in the adults due to previous exposure to the parasite [18, 20]. The prevalence of *P. rufescence*increases as age increases this is due to the ability of L_2 to survive for months in fecal pellets and the persistence of L_3 in the intermediate host for the lifetime of molluscsand the long period of potency and the apparent inability of the final host to develop acquired immunity [21, 22]. In *M. capillaris*, high prevalence rate in adult than young due to the nature of the parasite that it needs intermediate host. The intermediate host may not takenby lambs in enough amounts and even if taken, male and female adult parasites may not be found in a single nodule to produce fertile eggs [18, 23].

CONCLUSION

The prevalence of ovine lungworm infection in the study area was relatively medium in magnitude. *D. filaria*, *M. capillaris* and *P. rufescence* were identified to cause lungworm infection in sheep. *D. filaria* has significant pathogenic effect even when present in low number. Sex has no significant effect on the prevalence of lungworm but age has significant effect on lungwormprevalence.

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