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Prevalence of Ovine Lungworms in and Around Wukro, Tigray Region, Ethiopia

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Abstract: Cross sectional study to determine prevalence of ovine lung worm from December 2007 to March 2008 was conducted at Wukro, Eastern part of Tigray, Northern part of Ethiopia. A total of 323 sheep fecal sample were collected and examined using the flotation and Baermann technique for the presence of eggs and larvae of the parasite. The overall prevalence of the disease was 25.69% with 13.63% *Dictyocaulus filaria*, 5.57% *Mullerius capillaries* and *Protostrongylus rufescence* and 6.50% mixed infection. The prevalence in female and male were 25.85% and 25.64% respectively where there is statistically significant (P>0.05). The prevalence in poor, medium and good body conditions were 48.14%, 25% and 21.6% respectively and there is statistical significance difference among the different body conditions (P<0.05). Similarly, the prevalence was 31.58% on sheep of age less than 12 months and 20.46% on sheep greater than 12 months of age in which their difference is statistically significant (P<0.05). The monthly occurrence of infection was higher in January and December with prevalence of 44.45% and 27.28% respectively and their difference was statistically significant (P<0.05). In addition, the disease was also more prevalent in clinically sick animals (56.84%) than those that don't show any clinical signs (12.72%). The prevalence was statistically significant (P<0.05). From this study age, poor body condition and season were the major risk factors for the infection. Depending on the findings strategic deworming of the flock, immunization of sheep and education of farmers to promote good husbandry practices were recommended.

Key words: Lungworm · Prevalence · Ovine · Wukro

INTRODUCTION

Ethiopia has the largest livestock inventories in Africa, including more than 38,749,320 cattle, 18,075,580 sheep, 14, 858,650 goats, 456,910 camels, 5,765,170 equines and 30,868,540 chickens with livestock ownership currently contributing to the livelihoods of an estimated 80% of the rural population [1]. In Ethiopia, sheep are the dominant livestock providing up to 63% of cash income and 23% of food substance value obtained from livestock production. Sheep play a vital role as sources of meat, milk and wool for smallholder keepers in different farming systems and agro-ecologcal zones of the country [2-6]. They are also sources of foreign currency [7]. Unlike the large potential of small ruminants in the country their productivity is low. Endo-parasitic infection is known to be the main factors that affect productivity. Helminth parasites are among the causes of substantial productivity losses in sheep production.

Helminth parasites of ruminants are ubiquitous, with many tropical and sub-tropical environments of the world providing nearly perfect conditions for their survival and development. Although these parasites are widely prevalent, the clinical signs they showed in infected animals can be less obvious than signs of other livestock diseases [8]. The various species of gastrointestinal and pulmonary nematodes, trematodes and cestodes are known to be prevalent in Ethiopia [9].

Respiratory diseases resulting from helminth parasites are of a great economic concern in sheep production in the highlands of Ethiopia where sheep are important livestock units. Dictyocaulidae and certain Metastrongylidae are known to exist in East Africa including Ethiopia [10]. The three respiratory parasites that cause a significant damage in small ruminant production are Dictyocaulus filaria, Protostrongylus rufescent and Muellerius capillarius. These lungworms particularly Dictyocaulus filaria can suppress the

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immunity of the respiratory tract [11] and causes death, poor weight gain or loss of body weight as well as greatly affects the potential productivity of sheep industry in the areas where it is prevalent.

Previously the rate of the diseases in the region was not known because there was no research conducted to determine the prevalence of the disease. In addition, most of the farmer's rare sheep as means of income generation and there are also many irrigation sites in the study site which might predispose the animals to lung worm and other parasitic and none parasitic infection. Therefore the objectives of the study were to:

- Determine the prevalence of ovine lung worm in and around Wukro.
- To assess other epidemiological factors associated with the disease

MATERIALS AND METHODS

Study Area: The study was conducted in Wukro, located 45 km from Mekelle, in this area there is marked variation in rainfall, with mean annual rainfall of 62mm. The minimum and maximum temperatures range from 11.8°C to 29.94°C respectively.

Study Design and Sample Size: Cross sectional study was deployed to determine prevalence of lung worms in the selected site. And the sample size was calculated based on the formula given by Thrust field [12].

$$N = \frac{1.96^2 pq}{d^2}$$

Where N= total sample size, P =expected prevalence and q=1-p and d= absolute precision and in the study 95% level of confidence was used to determine the sample size and the for calculation of the sample size the following information were used and accordingly the sample size was calculated as 139 but to increase the precision of the result a total of 323 sheep were examined:

- Total sheep population 26,359
- Prevalence rate of 10%
- Absolute precision of 5%

Study Animals and Characterization: For this study local sheep having different age, sex, clinical signs and body condition from the area were used. Age estimation was estimated using the procedure given by Aiello and Mays [13]. In addition, the study was carried out in different months of the year.

Study Protocol: Fecal sample was collected directly from rectum and the samples were placed in a universal bottle. The sample was then transported to wukro woreda veterinary clinics with an ice box containing ice packs and was placed in refrigerator until all other needed samples were collected to prevent further larvae development. Finally, the fecal sample was transported to Mekelle Regional laboratory. The collected specimens were examined with Flotation techniques for nematode eggs [14].

Data Analysis: The data were entered in to Microsoft excel spread sheet and coded appropriately and for data analysis SPSS version 17 was used and to determine the association of the disease with the risk factors Chi-square (x^2) were used and significance was considered when P-value is less than 0.05.

RESULTS

In this study a total of 323 sheep were examined for the presence of lung worms. Out of them, 83 were found to be positive with a total prevalence of 25.69% of which 13.62% (44) belongs to *Dictyocaulus filaria,* 5.57% (18), that of *Mullerius capillaries* and *Protostrongylus rufescence* and 6.50% (21) mixed infection as indicated in Table 1.

Similarly the prevalence of lung worm was 31.58% (48) in sheep less than 12 months and 20.46% (35) in sheep greater than 12 months age. This indicated that it is statistically significant ($P<0.05$) as indicated in (Table 2).

At the same time, the prevalence was 25.64% (30) in males and 25.85% (53) in females and this result where there is no statistically significant difference ($P>0.05$) as indicated in (Table 3).

At the same time the prevalence of the parasite during the four consecutive months were assessed and rated as 27.27% (21) in December, 44.45% (32) in January, 21.49% (23) in February and 10.44% (7) in March. This shows there is statistically significance ($P <0.05$) difference among the months (Table 4).

Table 1: Prevalence of different species of lung worm parasite and their proportion

Species	Total no of positives	Prevalence of each parasites in %	Proportion of each out of positive
D. filarial	44	13.62%	53.01
M. capillaries and P. rufescence	18	5.57%	21.68
Mixed	21	6.50%	25.3
Total	83	25.69%	100

Table 2: Lung worms prevalence in different age groups

Age group	No of sheep in the age	No of sheep infected	Prevalence in %
<12months	152	48	31.58
>12months	171	35	20.46
Total	323	83	25.69

Table 3: Lung worm prevalence in male and female sheep

Sex	No examined	No affected	Prevalence in %
Male	118	30	25.64
Female	205	53	25.85
Total	323	83	25.69

Table 4: Monthly prevalence of lungworms

Months	No of sheep exam	No of sheep infected	Prevalence in %
December	77	21	27.27
January	72	32	44.45
February	107	23	21.49
March	67	7	10.44
Total	323	83	25.69

Table 5: Prevalence of lungworm in different body condition of sheep

Body condition	No of sheep examined	No of sheep infected	Prevalence in %
Good	125	27	21.6
Medium	172	43	25
Poor	27	13	48.14
Total	323	83	25.69

Table 6: Clinical sign versus prévalence

Clinical examination	No of sheep examined	No of sheep infected	Prevalence in %
With clinical signs	95	54	56.84
With out clinical signs	228	29	12.72
Total	323	83	25.69

The prevalence rate were 21.6% (27), 25% (43) and 48.14% (13) in good, medium and poor body condition animals respectively as indicated in (Table 5).

As to the clinical signs, examination was made on all sheep where sample has been taken and were divided as with clinical sign and with out clinical sign. The rate of the disease in animals with clinical manifestation was 54(56.84%), where as in sheep without clinical sign it was 29 (12.72%) as indicated in Table 6.

DISCUSSION

The current finding indicated that the overall prevalence of lung worm parasites in sheep was 25.69% which is lower than that of Yohannes [15], Wondwossen [16] and Jovanovic [17] who reported prevalences of 70.7%, 39.7% and 83-91.5%, in Debretabour awraja, Assella awraja and Shoa respectively. At the same time, the current finding is lower compared to Natsanet [18] who reported prevalence of 37%, in and around Debrebirhan. However, it is higher than that of Frewengel [19] who reported prevalence of 13.24%, in and around Mekelle and that of Fesseha and Gebrenegus [20] with the rate of 15% in and around Debre Zeit.

In the current finding the most prevalent species was *Dictyocaulus filaria* (13.64%) which is almost similar to the previous study conducted by Frewengel [19] who reported 13.24% in and around Mekelle.

The prevalence of lung warm was 31.58% in sheep with age <12 months and 20.46% in sheep with age of > 12 months and it was found to be statistically significant ($P<0.05$). The result showed it affects mostly young sheep

which might be due to the development of strong immunity in adult sheep following their previous exposure to the parasite.

The prevalence in female and male were 25.85% and 25.64% respectively where there is statistically significant (P>0.05). This agrees with the study conducted by Frewengel [19] in which both sexes are equally susceptible to the lung parasites.

Monthly prevalence of lung worm showed that it was higher on December (44.45%) and lowest on March (10.45%) which agrees with [21] who stated that the disease is more prevalent in temperate areas with high rainfall.

The rate of the disease were 21.6%, 25% and 48.14% in sheep with good, medium and poor body condition scores respectively, where there is significance difference (P<0.05) among the different body conditions which might be due to immunosuppression in poor body condition animals and concurrent infection.

At the same time, the rates were 56.84% and 12.71% in those sheep with and without clinical manifestation. Here occurrence of disease with out clinical signs appears due to the fact that those sheep which were infected earlier would shed larval with out showing clinical signs and those that show clinical signs but with out larvae could be due to failure of procedures and existence of other disease conditions which are differential to verminious pneumonia. From the result, it seems that clinical sign would help to diagnose lung worm infection with higher rate.

CONCLUSION AND RECOMMENDATIONS

The current finding revealed that the disease is more prevalent in the study site characterized by high rate of lung warm parasites in ovine species which need particular attention by most of the professionals and the government as it affects both the production and productivity of small ruminants. The current result also showed as the disease affects young sheep and these clinical sick animals' sheep having poor body condition. At the same time, the result indicated us it is more common during the rainy season compared to the dry season. The possible reason for high prevalence of the disease might be due to poor management condition due to absence of regular deworming, lack of public awareness about the nature of the disease. Based on these facts the following points are recommended.

- Use of strategic deworming and prophylactic anthelmenthic drugs should be monitored.
- Emphasis should be given to promote good husbandry and control concurrent diseases.
- Creation of public awareness to protect the disease as well as the production loss.

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