

## Prevalence of Lung Worms in Naturally Infected Sheep in Hawasa Zuria District, Sidama Zone, Southern Nations Nationalities and People Region

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**Abstract:** A cross-sectional study was carried out in Hawassa Zuria district, Sidama Zone, Southern Nations, Nationalities and Peoples Region from November, 2010 to March, 2011 with the aim of determining the prevalence and identification of species of lungworm infection in sheep. Faecal samples were collected from a total of 384 sheep kept under extensive and semi-intensive management systems and subjected to coprological examination. Of these animals, 8.07% (31/384) were found to be positive for lungworm infection. The prevalence of species of lungworm in infected sheep were *Dictyocaulus filarial*, 4.43 % (17/384), *Protostrongylus rufescens* 2.08% (8/384), *Muellerius capillaris* 0.78% (3/384) and 0.78% (3/384) of mixed infection. There was no statistically significant difference ( $P>0.05$ ) observed in the prevalence of the disease between different age groups, body condition and management of the animals. Due attention should be given to the control and prevention of the disease because of its impact on production.

**Key words:** Lungworm • Prevalence • Sheep • Hawassa Zuria • Southern Nations • Nationalities And People Region • Ethiopia

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### INTRODUCTION

In Ethiopia; ruminants contribute about 80% of the total food production from livestock in tropical Africa. Of this, small ruminants account for about 22%, it has been estimated that ruminants supply over 3.2 million tone of meat per year, representing over 72% of total meat production [1]. The population of sheep and goats in Ethiopia is estimated to be 26.1 and 21.7 million respectively [2].

The major problems that greatly affect the economy of sheep and goat production in Ethiopia are diseases [3]. Disease alone accounts for 30% mortality in young's and 20% in adults. A loss of US \$81.8 million is reported annually due to helminth parasite infection. In a country confronted with such enormous losses caused by helminth parasites, it is unaffordable to the country [4]. Helminthes parasite of ovine is ubiquitous, with many

tropical and sub tropical environment of the world providing nearly perfect conditions for their survival and development. Helminthosis is one of considerable significance in a wide range of agro-climatic zones in Sub Saharan Africa and constitute one of the most important constraints to small ruminant production [5]. The production loss is a direct result of clinical and subclinical helminth infections resulting in low productivity due to stunted growth, insufficient weight gain, poor feed utilization and mortality and indirect losses associated with treatment and control costs [6].

In the highland areas, infection with lungworm parasites is the common cause of high mortality and morbidity in sheep population [7]. Lungworms are parasitic nematodes known for infection of the lower respiratory tract, characterized by respiratory distress, trachitis, bronchitis and pneumonia [8]. The lungworm in sheep is most commonly by three species such as

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*Dictyocaulus filaria*, *Muellerius capillaris* and *Protostrongylus rufescens* [9]. These nematode parasites belong to two super family, Trichostrongyloidea (*Dictyocaulus filaria*) and Metastrongyloidea (*Protostrongylus rufescens* and *Muellerius capillaris*). *Dictyocaulus filaria* has a direct life cycle where as *Muellerius capillaris* and *Protostrongylus rufescens* have indirect life cycles [10]. Dictyocaulidae and/ or certain Metastrongylidae are known to exist in East Africa (Ethiopia, Kenya and Tanzania) and South Africa. Endoparasites, including *Dictyocaulus filaria*, are major cause of death and morbidity in the Ethiopian highlands. Up to half of all sheep deaths and morbidity on farms in Ethiopia highlands are caused by pneumonia and endoparasites [11].

A study on required optimal environmental conditions for growth and survival of lungworm larvae in the pasture showed that *D. filaria* could survive well at temperature of 4-5°C and high humidity [12]. However, at temperature above 21.1°C the viability of the larvae is seriously degenerated. The larvae of *M. capillaris* can survive for several months in faecal pellets, on herbage and soil under optimum natural climate condition. Since the larvae are able to survive for long periods in intermediate hosts, control of this parasite can be achieved by good grazing management [13]. Thus, control of lungworms need basic information on epidemiology of the parasite and factors affecting the transmission dynamics. Therefore, the objectives of this study were to determine the prevalence of lungworms in sheep and identifying the circulating species and to assess the association between risk factors influencing the occurrence of the worms/disease.

## MATERIALS AND METHODS

**Study Area:** The study was carried out in Hawassa Zuria district, Sidama Zone of Southern Nations Nationalities and Peoples Region (SNNPR). The zone is located in northern part of the region, with its capital at Awassa, which lies about 275 km south of Addis Ababa. Geographically the zone lies between 40 27' and 80 30' N latitude and 340 21' and 390 11' E longitude [14]. Like most parts of Ethiopia, the relief configuration of Sidama ranges from very high mountains to lowland plains, where the altitude varies between 1001 to 3200 m above sea level. The mean annual temperature is 20.1°C, with monthly means ranging 18.1°C in November and December to 20.4°C in March; however, the diurnal variation can be very wide reaching 30°C in the dry season. The mean

annual rainfall is 960 mm, with the rainfall having bimodal regime, that is, two rainy seasons in a year. The small rainy season Belg starts from February to May and the big rain starts from mid June to October.

**Livestock Population and Economic Activity:** According to Sidama zone agricultural department statistical abstract, the total livestock population of Sidama zone is estimated to constitute 653, 100 cattle, 316, 620 goats, 404, 130 sheep and 194, 530 equines. As elsewhere in rural Ethiopia, the economic life of the people in the zone is mostly dependant on mixed farming in that 93% of the population is engaged in agriculture. Livestock production occupies an enormous share in farm economy. The high and mid Landers are sedentary while transhumance is the style for lowlanders.

**Study Population:** The study populations were indigenous breed of sheep in selected Peasant Association (PAs) of Hawassa Zuria, which are kept under extensive management system. During sampling; sex, age and body condition were recorded from apparently healthy animals.

**Study Methodology:** A cross-sectional study was conducted from November, 2010 to March, 2011 in a randomly selected study sites to determine the prevalence of lungworm infection and simple random sampling technique was utilized. Sheep from each selected household of PAs was examined with equal sample size (128) from each Peasant Association.

**Sample Size Determination:** A lungworm prevalence of 50% was taken into consideration since there was no any research conducted on lungworm infection in the area. The desired sample size for the study was calculated using the formula given by Thrusfield [15] with 95 % confidence level (CI) and 5% desired absolute precision. Accordingly, the estimated sample size was 384 animals.

**Sample Collection and Parasitological Examination:** Fresh faecal samples were collected per rectum from individual sheep and immediately transported to the Hawassa University, Veterinary School Laboratory and processed by using Modified Baermann Techniques as described by Hansen and Perry [16]. Briefly, 5 g of faecal material was wrapped in double layered gauze and suspended in beaker containing warm water using a clip wire. The faeces were partially immersed in the water and allowed to stand for 24 h. Then, after the wrapped faeces

were removed and the supernatant discarded from the beaker, the sediment was transferred to the petridish for examination of L<sub>1</sub> under stereomicroscope. All larvae were identified morphologically as described by previous workers [17].

**Data Analysis:** STATA software version 7.0 was used to analyze the data. Descriptive statistics was used to summarize the data. Prevalence was calculated as the number of positive sheep harboring the worms divided by the total sheep examined. Chi-square statistics were used to test the association between variables. P- Value less than 0.05 at 95% confidence level was considered in interpreting the results.

### RESULTS

Out of 384 studied sheep, 8.07% (31/384) were found invariably infected with different species of lungworm. Of the total prevalence, *Dictyocaulus filaria* 4.43 % (17/384), *Protostrongylus rufescens* (8/384) 2.08%, *Muellerius capillaris* 3/384 (0.78%) and 3/384 (0.78%) of mixed infection (either with two or three species).

Table 2 Shows the association between the prevalence of lungworm infection in study animals and different risk factors. Accordingly, lungworm prevalence was not significantly differed among sex, the age groups and body condition and management systems.

### DISCUSSION

The result of the present study in the selected PAs of Hawassa Zuria district, Southern Nations, Nationalities and People Region indicated that 8.07% (31/ 384) of sheep were infected with different species of lungworm.

The possible explanation for the lower prevalence in this study might be attributed to the fact this study is conducted in the dry season and low land area. However, higher prevalence of ovine lungworm infection have been reported by other workers; 34.90% in Ambo district [18], 24.4% in Wollo [19], 84.6% in Addis Ababa [20], 58.58% in and around Assela [21], 50% in Dessie and Kombolcha [22] and 59.4% in Addis Ababa [23] compared to the present study. The possible explanation for variation in the infection could be attributed to the variation in the altitude, rain fall, humidity and temperature in different areas of the country [24, 25]. The variation may be due to the expansion of animal health extension and veterinary services like intervention of nearby private veterinary drug shops/ pharmacies/.

In the present study, there was statistically significant difference (P<0.05) observed in the prevalence of the lung worm infection in relation to the sex of the study animals it may be the female animal immunity is suppressed during parturition. Statistical analysis of infection on the basis of age indicated there was no significant differences (P>0.05) among different age groups. This fact is not in agreement with the result studies conducted by Uqbazghi [26], who reported that there is statistically significant difference observed in different age groups, higher in young animals.

There was no statistically significant difference (P>0.05) observed in the prevalence of lung worm infection in regard to the body condition scores of the study animals. However, poorly nourished animals appear to be less competent in getting ride-off lungworm infection although it is not unusual for well fed animals to succumb to the disease provided the right environmental conditions are made available [27].

Table 1: Prevalence of lungworm infection in sheep in study area

Risk Factors		Number Tested	Positive Number (%)
Sex	Male	104	15 (14.42)
	Female	280	16 (5.71)
Age (year)	≤ 1	98	8 (8.16)
	1-3	178	20(11.24)
	> 3	108	3 (2.78)
Body condition	Thin	16	3(18.75)
	Moderate	263	22(8.37)
	Good	105	6(5.71)
Management system	Extensive	283	25(8.83)
	Semi-intensive	101	6(5.94)

Table 2: Association between selected risk factors and lungworm infection reactivity of sheep in the study area

Risk factors	Odds Ratio	Std. Err.	z	P>z	[95% Confidence Interval]
Sex	2.737222	1.175951	2.34	0.019	1.179292 6.353292
Age	0.8489542	0.258912	-0.54	0.591	0.4669677 1.543411
Body condition	0.4961971	0.2036258	-1.71	0.088	0.2219956 1.109083
Management systems	0.8347638	0.4101941	-0.37	0.713	0.318634 2.186931

The result of this study revealed that *D. filaria* was the dominant lungworm species that ranks first with the overall prevalence of 4.43% 17(384). There are reports from some parts of Ethiopia where there is a dominancy of this species, 13.24% in and around Mekelle [28], 32.20% in Gayint Awraja [29], 30.74% in Chilalo area [30] and 73% in and around Debra Berhan [31]. This study also recorded *Protostrongylus rufescens* 8/384 (2.8%), *Muellerius capillaris* 0.78% (3/384) and mixed infection 0.78% (3/384) of lungworm species.

### CONCLUSION

The result of the present study showed that there is an overall lower prevalence of lungworm infection than the usual reports of researchers from different corners of the country and *Dictyocaulus filaria* is the dominant species in the study area. Even though the prevalence is lower in this study, the disease is one of the most important helminthosis of sheep.

Based on the above conclusion, the following point is recommended:

- Additional investigations are required on the prevalence and intensity of these parasites otherwise it is quite difficult to establish the control and prevention strategies on the basis of facts and figures presented by this study.

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