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# Prevalence of Ovine Lungworm in Banja District, Awi Zone, North West Ethiopia

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**Abstract:** A cross sectional study was conducted from December, 2013 to April, 2014 with the objective of determining the prevalence and assessing the associated risk factors of lung worm infection in Banja District, Awi zone. Coprological examinations were conducted in 384 sheep and an overall prevalence of 25.78% was found by Modified Baeremannes technique. The higher prevalence was observed in males (27.23%) than female (23.75%) and in age group less than 2 years old (31.82%) than in age group greater than 2 years old (21.74%). A questionnaire format was also designed and a total of 40 livestock owners having 5-20 sheep were interviewed to collect information about the disease and its impact in the study area. According to the respondents 97.5% of the livestock owners were knew about lung worm infection with local name of "*Yebegsal*" and lung worm infection is more severe in age group less than two years old (87.5%) than in age group greater than two years old (12.5%). Lack of appropriate treatment, poor management and husbandry practices are the most likely responsible factors for the observed high prevalence in the study area. Prevalence of lung worm diseases prevailing in ovine in the area requires serious attention to minimize their impact on production; hence a great emphasis should be given for the control and prevention strategies of lung worm infection in the study area.

**Key words:** Banja District · Lungworm · Modified Baeremannes Technique · Prevalence · Sheep

## INTRODUCTION

Ethiopia possess the largest livestock population in Africa, with an estimated population of 7.8 million equines, 1 million camels, 47.5 million cattle, 39.6 million chickens, 26.1 million sheep and 21.7 million goats [1]. The contribution of livestock to human being particularly in developing countries is numerous [2]. In Ethiopia, the livestock sector is the major source of income for the rural communities and it is one of the major sources of foreign currency from exports [3]. Sheep and goat production contribute a quarter of the domestic meat consumption, about half of the domestic wool requirement, 40% of fresh skins and 92% of the value of semi- processed skin and hide export trade. There is also a growing export market for sheep and goats meat in the Middle Eastern Gulf States and some African countries [4]. Sheep in Ethiopia are the dominant livestock, providing up to 63% of cash income and 23% of the food subsistence value obtained from livestock production [5]. In addition it plays a vital role as sources of meat, milk and wool for smallholder livestock keepers in different farming systems and agro-ecological zones of the country [6- 9].

However, the rich potential from the livestock sector in general and sheep production in particular is not efficiently exploited due to several constraints like malnutrition, traditional management system and disease [10]. Livestock diseases are widely distributed and are one of the major causes of livestock mortality and sub optimal productivity in all agro-ecological zones of the country [11].

Respiratory diseases resulting from parasites are of a great economic concern in sheep production in the highlands of Ethiopia where sheep are important livestock units [12]. The three respiratory parasites that cause a significant damage in small ruminant production are *Dictyocaulus filaria*, *Protostrongylus rufescent* and *Mullerius capillaries* but the diseases caused by the genus Dictyocaulus have more economic importance [13, 14]. These lung worms can suppress the immunity of the respiratory tract and resulting in bronchitis or pneumonia, affects the potential productivity of sheep industry by causing death and loss of body weight [14]. The incidence of respiratory helmenthiasis varies greatly from place to place depending on various risk factors. Several studies conducted in different parts of Ethiopia

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indicated lung worm infection as an important disease of small ruminants [15- 18]. However, there is no well recorded and published information regarding ovine lung worm infection in Banja District. Therefore, the objective of the present study was to determine the prevalence and assess associated risk factors of lung worm infection in Banja District, Awi zone.

## MATERIALS AND METHODS

**Study Area:** The study was conducted from December to April in Banja District which is located in Awi zone of Amhara region. The district is located at latitude of 11° 10' north and longitude of 36° 15' east and 122km far from the regional city Bahir Dar to south and 447km north to Addis Ababa. The average elevation of the district is 2560m above sea level and the mean annual rain fall is 1300mm. The annual mean temperature also varies from 12°C to 25°C with mean value of 18.5°C. The district has a total of 26 peasant association. Like other parts of the country agriculture is the main economic activity and livestock supports the crop production. The district is classified into one agro climatic zone, which is high land with wet and cool weather condition [19]. According to the 2010 census report, the district has 55,543 bovine, 59,510 sheep and goat and 23,523 equine [20].

**Study Design and Sample Size Determination:** A cross-sectional study was conducted in 384 sheep to determine the prevalence of lungworm. Simple random sampling was implemented to select the study animal in the area. Additionally, questionnaire survey was conducted to assess the status of ovine lungworm diseases and farmer's awareness at the time of study.

The required sample size for this study was estimated according to Thrufield [21]. By considering the expected prevalence of 50% and 5% absolute precision with 95% confidence level the sample size was calculated as follow:

$$N = \frac{1.96^2 X Pexp\ (1-Pexp)}{d^2}$$

Where:
N = required sample size
P exp = expected prevalence
d = desired absolute precision (usually 0.05)
1.96 = Z-value for 95% confidence level.

$$N = \frac{1.96^2\ X\ (0.5)\ (1-0.5)}{(0.05)^2}$$

Accordingly, the minimum sample size for the present study was found to be 384 sheep.

**Study Animals and Husbandry:** The study animals were sheep from four Peasant Associations of Banja District viz. Enjibara, Kesa, Akayita and Batambi, which were selected on the basis of sheep population and the existence of different husbandry practices. The study animals were local (indigenous) breed of both sexes. The age of the sheep was determined using dental eruption formula and classified into two age categories (greater than two and less than two years [22]. All animals in the selected Peasant Association were privately owned by small holder farmers and were managed under extensive system with no supplementary feed except in Enjibara. The management system in Enjibara is slightly different from the other peasant associations' feeding is depended on concentrates and dry roughages.

**Study Protocol**

**Sample Collection and Processing:** Fresh fecal samples were collected directly from the rectum of a total of 384 sheep from the four selected Peasant Associations of the Banja District. Then, the specimens were transported to Zengena College of Veterinary Science Laboratory in screw cap bottles under airtight conditions. Finally, the fecal samples were prepared and examined using Modified Baeremannes Technique as described by Dreyer *et al.*[23]. During sampling, information regarding to the breed, sex and age of individual animals, owner's name and name of the Peasant Associations were recorded.

**Questionnaire Survey:** A mixed type of questionnaire format (open and closed) was designed and a total of 40 livestock owners having 5-20 sheep were interviewed to collect information concerning the prevalence and risk factors of ovine lung worm and farmer' awareness about the disease, its clinical signs, the ages of mostly affected groups and the traditional and scientific methods of treatment practiced by the farmers and local names were used for all scientific terms during the interview.

**Data Management and Analysis:** Coproscopic examination results from the study individual sheep and risk factors such as age, sex and breed were registered during the study period and imported into the database system. Data from the records of the questionnaire survey were properly gathered and registered. The collected data from the study were entered into Microsoft Office Excel spread sheet and analyzed using SPSS statistics version 17 software program. Descriptive statistics was used to

determine the prevalence of lung worm in sheep. The chi-square ($\chi^2$) test was also used to determine the existence of any association between the infection and the risk factors like Peasant Association, age and sex of the animal. In all cases, 95% confidence intervals and $P<0.05$ were set for significance.

## RESULTS

**Coprological Results:** Coprological findings revealed that, out of the total 384 examined sheep 99 (25.78%) were found positive for ovine lung worm infection. The prevalence of ovine lung worm in the four selected Peasant Associations (PAs) study areas viz. Enjibara, Batambi, Kesa and Akayita was 20.83%, 25%, 26.04% and 31.25%, respectively. The highest and lowest prevalence of ovine lung worm infections were recorded in Akayita and Enjibara, respectively. The prevalence of the disease was relatively higher in males (27.23%) than female (23.75%). Similarly, its prevalence was higher in sheep having less than 2 years old (31.82%) and lower among the age group greater than 2 years old (21.74%). However, there was no significant difference in the prevalence of lung worm between/among the different risk factors (Table 1).

**Questionnaire Survey Results:** The results obtained from the questionnaire survey were showed as they were kept their sheep mainly for economic insurance (70%), house utilities (25%) and food consumption (5%). But most of the respondents said that disease (52.5%), feed shortage (32.5%) and land scarcity (15%) are the major constraints for sheep production. Out of the total 40 respondents 39 (97.5%) of them know about ovine lung worm (named as "*Yebegsal*"). According to the respondent's lungworm infection is more prevalent from August to October (50%), January to February (27.5%) and May to June (22.5%) but most of them agreed that the well fed and managed sheep has a good resistance to the disease. Almost all the respondents were used extensive management system (90%).

In addition to ovine lung worms the questionnaire survey revealed that the widely spread diseases of sheep in the study area were Fasciolosis ("*Berer*") (50%), other respiratory related diseases (42.5%) and other disease (3%) such as sheep and goat pox (*Fentata*) and internal parasitism. According to the respondents lung worm infection is more severe in age groups less than two years old (87.5%) than in age groups greater than two years old (12.5%).

Furthermore, the questionnaire has also dealt with the delivery of veterinary service. Most of the livestock owners (72.5%) said that they got veterinary service from the District and 27.5% from the Peasant Associations Veterinary Clinics and most of them know the name of the most commonly used anthelminthics and they called them locally as green and white color "*Madabaria*" for Albendazole and Tetramisole, respectively.

## DISCUSSION

Lung worm infection (verminous pneumonia) is a chronic parasitic disease that affects the respiratory system of animals. This disease results in substantial economic losses due to the reduction of growth rate, morbidity and mortality by predisposes the animal to secondary infection [24].

The present study revealed an overall prevalence of lung worm infection in sheep to be 25.78% by coproscopic examination. This overall prevalence is in agreement with the previous studies done by Brook, Fesseha and Shibru [25] in Bahir Dar, Dawit [17] in and around Bahir Dar, Mengstom [15] in Tigray, Dawit and Abd [18] in Jimma, Tewdrose [16] in and around Tse-Ada-Emba, Weldesenebet and Mohamed [26] in Jimma and Gebreyohannes, Alemu and Kebede [27] in

Table 1: Prevalence of ovine lung worm between/among the different risk factors.

| Risk factors | Category level | No. | Positive | Prevalence | $\chi^2$ | P- value |
|---|---|---|---|---|---|---|
| Pas | Enjibara | 96 | 20 | 20.83% | 2.763 | 0.43 |
| | Batambi | 96 | 24 | 25% | | |
| | Kesa | 96 | 25 | 26.04% | | |
| | Akayita | 96 | 30 | 31.25% | | |
| | Total | 384 | 99 | 25.78% | | |
| Sex | Male | 224 | 61 | 27.23 | 2.712 | 0.100 |
| | Female | 160 | 38 | 23.75 | | |
| | Total | 384 | 99 | 25.78 | | |
| Age | >2 years | 230 | 50 | 21.74% | 2.392 | 0.122 |
| | <2 years | 154 | 49 | 31.82% | | |
| | Total | 384 | 99 | 25.78% | | |

Mekedella Woreda, who reported prevalence of 27.8%, 22.7%, 21.57, 26.7%, 27.7%, 26.7%, and 28.6%, respectively. However, it is lower than prevalence reported by Regassa *et al.*[28] in Dessie and Kombolcha Districts, Alemu *et al.* [29] in Northeast Ethiopia, Bekele and Abu [30] in Tiyo District, Tigist [31] in North and South Gondar zone, Netsanet [32] in Debere Berhan, Mezgebu [33] in Addis Ababa, Mihreteab and Aman, [34] in Tiyo, Yitagele *et al.* [35] in North Gondar zone, Addis, Fromsa and Ebuy [36] in Gondar, Desta *et al.* [37] in Ambo District, Eyob and Matios [38] in Asella province, Nibret, Basaznew and Mersha [39] in Wogera District, Gelagay *et al.* [40] in the Central Highland of Ethiopia and Sissay [41] in and around Bahir Dar, who reported with prevalence of 40.4%, 53.6%, 57.1%, 39.6%, 73.25%, 48%, 57.1%, 42.3%, 33.83%, 34.9%, 72.44%, 67.69%, 55%, and, 44%, respectively. But it is higher than prevalence reported by Muluken [42] in and around Bahir Dar and Frewengel [43] in and around Mekelle, who reported 18.16% and 13.24%, respectively. These differences in the prevalence of lung worm infection of sheep and in some cases of sheep and goats in the above discussed research findings might be associated with the difference in agro ecological zones of the study area which favors the survival of the larvae of the lung worms, the methods used for the detection of the larvae, differences in the samples sizes used during the various investigations, seasonal variation during the investigation period, variation in the nutritional status of the animals that were targeted in the different study areas and the degree of availability of animal health extension and veterinary services and appropriate drugs. However, there was no statistical difference in the prevalence of lung worm infection among/between the different risk factors ($P>0.05$).

In the current study, from the four Peasant Associations, the highest prevalence of ovine lung worm was recorded in Akayita (31.25%) where as the lowest was in Enjibara (20.83%) Peasant Associations. This variation might be due to the topological location difference and difference in the management system practices among the four Peasant Associations of Banja District. The area in the Akayita is swampy as compared to the other Peasant Associations and the sheep are freely grazed on the pasture which favors the survival of larvae and exposures of the sheep for free living infective stage larvae.

The ovine lung worm prevalence was higher in males (27.23%) than females (23.75) sheep and this finding is in agreement the previous studies conducted by Dawit and Abd [18] in Jimma and Nibret, Basaznew and Mersha [39] in Wogera District, who reported prevalence of 29.7% and 24.7%, 69.78 and 68.15% for males and females, respectively. However, it contradicts to the findings of Desta *et al.* [37] in Ambo District, Eyob and Matios [38] in Asella province, Gebreyohannes, Alemu and Kebede [27] in Mekedella Woreda and, Yitagele *et al.* [35] in North Gondar zone, who reported prevalence of 28.83% and 39.37%, 72.2% and 72.8%, 23.8% and 32.3% and, 43.2% and48.0%, for males and females, respectively. These variations may be due to the improper distribution of sample selection between the two sexes in this study.

The prevalence of lung worm in this study was higher in sheep less than two years of age (31.82%) as compared to sheep greater than two years of age (21.74%). This result agrees with the previous reports by Dawit and Abd [18] in Jimma, Gebreyohannes, Alemu and Kebede [27] in Mekedella Woreda, Desta *et al.* [37] in Ambo District and Nibret, Basaznew and Mersha [39] in Wogera District, who found 28% and 24.5%, 24.4% and 33.7%, 43.59 and 28.95, 75% and 66.28%, for sheep of two years of age and greater than two years of age, respectively. The prevalence difference among the different age groups of the sheep might be associated to the development of acquired immunity in adult animals from previous exposure which makes them to have the lowest infection and lowest prevalence, which is also supported by Urquhart [44]. In the other hand, the present age wise finding contradicts to the findings of Eyob and Matios [38] in Asella province, who reported 32.8% and 36.2% for young and adults, respectively. This might be related to the variation for disease exposure among study groups in the different study areas.

Based on the respondents lung worm infection is more severe in age group less than two years old (87.5%) than in age group greater than two years old (12.5%). This could be due to the undeveloped acquired immunity of young animals [44].

## CONCLUSION AND RECOMMENDATIONS

In general this and other studies show that lung worm infection is prevalent in sheep rearing areas and affecting the health and production performance of sheep. However, the attention given for sheep diseases in general and lung worm infection in particular so far has not been sufficient enough. Considering the absence of detailed and well coordinated studies on diseases of sheep in the study area, the impact of lung worm infection in sheep production will be higher and needs appropriate attention. Therefore, well integrated studies and appropriate control measure should be implemented to improve the health of sheep.

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