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A study on prevalence of small ruminants lung worm infection and associated risk factors in and around Jimma town, Southwestern, Ethiopia

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Abstract

The study was carried out from November 2018 to April 2019 in selected Kebeles in and around Jimma town, Oromia regional state, to determine the prevalence and the risk factors associated with small ruminants' lungworm infection. Modified Baermann technique was under taken to detect the first stage larvae (L1) from 357 randomly sampled small ruminants kept under extensive and semi intensive management systems. Out of thetotal, 357 small ruminants (225 sheep and 132 goats) were included in this study. Examination of fecal samples was conducted from small ruminants of all age groups, both sexes, with various body conditions and history of deworming kept under different management system. The overall prevalence of lungworm infection was 29.13%. With regard to prevalence of specific species level, 15.68%, 7.28% and 6.16% for *Dictyocaulus filaria*, *Protostrongylus rufescens* and *Muellerius capillaris* respectively. Though no statistically significance difference associated with management system and species, those kept under extensive were more affected (31.1%) than under semi-intensive (21.6%) and prevalence in sheep (32.9%) was higher as compared to in goats (27.7%). Statistically significance difference was observed between sex, among age group, body condition and history of deworming of study animals. The infection rate in sex group was higher in female (34.0%) than male (19.7%). Prevalence regarding to age group was highest in young and lowest in adults, which was described as 68.29% for ≤ 6 months, 18.53 for 6-24 months and 15.46% for >24 months. Different prevalence rates were observed among body condition of animals such as poor (55.1%), good (22.0%) and medium (17.6%) body condition of animals. Small ruminants with deworming history (16.1%) less affected than those did not have (49.3 %). Thus, due to significant prevalence in the study area, emphasis should be given for the control and prevention of lung worm infection.

Keywords: Jimma; lung worm; prevalence; small ruminant

1. Introduction

Ethiopia hasthe largest numbers of small ruminant's population in Africa. An estimate indicates that the country is a home for about 23 million sheep and 23 million goats; however, the economic gains from these animals remain insignificant when it is compared to their huge number (Muktar *et al.*2015). This low productivity is a reflection of disease, limited genetic potential and husbandry standard (Dawit and Abdu, 2012). Frequently Sheep and goats are the most numerous of domestic livestock in Ethiopia (Bogale *et al*., 2012).

In Ethiopia, small ruminants as much as provide 33% of meat and 14% of milk consumption, and accounts for 40% of cash income and 19% of the house hold meat consumption in sub Saharan African. And also they play a great role in food supply, a source of income, foreign currency and as well as to increase

foreign exchange earnings (Kouldri *et al.,* 2013; Yitagele, et *al*., 2012,). Moreover, the economic benefits to the farmers and generate cash income from export of live animals, meat, edible organs, skin and in the central high lands where mixed crop-livestock production system is practiced (Asaye and Alemneh, 2015). However, the productivity is much less when compared with the population size of small ruminant in Ethiopia (Fentahun *et al*., 2012). The production loss is a direct result of clinical and sub-clinical helminthes infection result low productivity due to prevailing disease, as well as, insufficient weight gain, mortality, poor nutrition,and indirect production loss which associated with general lack of veterinary care (Sissay *et al*., 2007) And also *D.filaria*, are major cause of lungworms infection of small ruminants particularly affects the potential productivity of sheep in the areas where it is prevalent (Gelagay *et al*.,2005).

Helminthiases of small ruminants are one of considerable parasitic diseases which have significance in a wide range of agro-climatic zones in Sub-Saharan Africa. It is one of the most important constraints to production and prevalent with many tropical and sub-tropical environments of the world providing nearly perfect conditions for their survival and development (Zeryehun and Degefaw, 2017).

Verminous pneumonia is a chronic and prolonged infection of sheep and goats caused by any of these parasitic nematodes which include *Dictyocaulus fiaria*, *Protostrongylus rufescens*, and *Muellerius capillaris*(Gorski *etal*.,2004;Tewodros,2015).Clinicall y characterized by respiratory distress and pathologically by bronchitis and bronchopneumonia due to infection colonize the lower respiratory tract, resulting in bronchitis or pneumonia or both (Chakraborty *et al.,* 2014).

The clinical signs of infected animals with lungworm can be less obvious than signs of other livestock diseases. Partly for this reason, infections with gastro-intestinal and other helminthes parasites are among the most neglected areas of veterinary care in much of the developing world. It has been established that high prevalence of lungworm infection associated with poor production and unthriftness. However, it is less productive due to morbidity and mortality from different parasite infection. Among this parasite infection, lungworm is the common parasitic disease of sheep and goat (Zeryehun and Degefaw, 2017).

In the highland areas, infection with lungworm parasites is the common cause of high mortality and morbidity in sheep population (Kadi *et al*., 2017) and it's parasitic of nematodes known for infection of the lower respiratory tract, characterized by respiratory distress, trachitis, bronchitis and pneumonia (FAO, 2002).In addition, About half of all sheep mortality and morbidity in Ethiopian highlands are caused by pneumonia and endoparasitism including lung worms (ILRI, 2002).

In the central highlands of Ethiopia where mixed crop livestock production system is practiced and also small ruminants account for 40% of cash income and 19% of the house hold meat consumption. Sheep and goats contribute a quarter of the domestic meat consumption; however the domestic wool requirement; 40% of fresh skins and 92% of the value of semi-proceed skin and hide export trade. It is estimated that 1, 078, 000 sheep and 1,128,000 goats are used in Ethiopia for domestic consumption annually. There is also a growing export market for sheep and goats meat in the Middle Eastern Gulf States and some African countries. At optimum off take rates, Ethiopia can export 700, 000 sheep and 2 million goats annually and at the same time supply, 1, 078, 000 sheep and 1, 128, 000 goats for the domestic market (Alemu and Merkel, 2008).Very few and limited studies were done so far pertaining in concern to respiratory helminthes of small ruminants in this study area. So, the current study was done to determine the current status in prevalence of lungworm in small ruminants, and its associated risk factors.

Thus, the objectives of this study were:-

- To determine the current prevalence of lungworm infection of small ruminants and
- To identify the associated risk factors involves in lung worm infection in Jimma town

2. Materials and Methods

2.1. Study Area

The study was conducted in Jimma town, Southwestern part of Ethiopia November 2018 to June 2019 in and around Jimma town. Jimma town is the capital city of Jimma zone located in Oromia Regional Administration, 352 Km Southwest of Addis Ababa at

latitude of about 7013'-8056' N and longitude of 35052'-37037' E and at an elevation which ranges from 880 to 3360 meter, above sea level. The rainfall pattern of the district is bimodal, of about 1530 millimeter which comes from with a short rainy season from March to May, followed by a long rainy season from June to September. The annual mean temperature ranges from about 12.1C to 28°C (JZARD, 2009). The livestock population of the area comprises were 29.33 million sheep, 11 million goats, 2.03 million horses, 7.43 million donkeys, 0.4 million mules, 1.16 million camels, 56.87 million poultry in the sedentary areas of the country (CSA, 2008).

2.2. Study animals

The study was conducted on local breed of small ruminants (225 sheep and 132 goats) selected from five Kebeles in and around Jimma town. Different age group, sexes, various body conditions, history of deworming and their management system were taken in to account for this study. From the total sample there were 235 females and 122 males.

2.3. Study Design

Cross sectional study was conducted from November from 2018 to June 2019 to determine the prevalence of small ruminant's lung worm infection.

2.4. Study Methodology

2.4.1 Sampling Methods and Sample Size Determination

All the five Kebeles and herds within each Kebeles were selected purposefully based on accessibility and the willingness of the owner. Animals were selected using simple random sampling and categorized in to three age group such as <6months, 6-24 months and > 24 months and study animals with good, medium and poor body condition scoring.

The desired sample size for the study was calculated by using the formula given by Thrusfield (2005). The previous prevalence report of lungworm infection in small ruminants in and around Jimma town was reported as 26.7% (Dawit and Abdu, 2012).Therefore; an expected prevalence of 26.7% was taken to estimate the sample size. Then a total of 357 sheep and goats were sampled to determine the prevalence of lung worm in the study area by taking 95% confidence interval at 5% absolute precision.

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

n = required sample size
Pexp = expected prevalence
d2 = desired absolute precision
$Z=1.96^2$

Therefore $n= 1.96^2\ (0.267(1-0.267))/(0.05)^2 =300$
However, in order to increase the accuracy, the number of examined animal were included 357 (225 sheep and 132 goats).

2.4.2 Sample Collection and Transportation

Fecal samples were collected directly from the rectum by two fingers using disposable plastic glove and stored in universal bottle packed in an icebox until examination. During sample collection the date, Kebele, species, sex, age, history of deworming and management system and body condition of the sample animal were properly recoded each day. Each bottle was properly labeled corresponding to the animal identity. Then, transported to JUCAVM Veterinary Parasitology Laboratory. Samples were in laboratory processed by modified Barman technique as described by Charles (2016).

2.4.3 Laboratory examinations

The techniques were employed as recommended by Urquhart et.al, 1996 for identification of lung worm species. In laboratory, recovery of lungworm larvae from feces was performed by using Modified Barman technique. Ten to fifteen grams of fresh feces were weighed from each sample using Modified Barman technique. Feces samples were fully enclosed in cheese cloth fixed with metallic stick (a graph) rest on the edges of the funnel glass. The glass was filled with Luke water until the sample became submerged by making sure that the corners of the cheese cloth did not hang over the edge of the funnel. The whole apparatus was left for 24 hours and then the sediment was examined under the low power of microscope after siphoning off the sediment. If the sample were found to be positive. Drop of 1% iodine solution was used to immobilize the larvae for species identification. Finally If the larvae are detected under microscope the result is recorded as positive if not recorded as negative (Anne and Gray 2006), and followed by larval identification using their morphology.

The larvae (L1) of *Dictyocaulus filaria* was seen larger in size, brown in colour with cranial cuticular knob and blunt tail while L1 of *Muellerius capillaris*is smaller in size, whitish in colour with "S" shaped tip and dorsal spine (VanWyk, *et al.*,2004). For *D. filaria*, L1 has a characteristic cuticular knob at the anterior extremity and bluntly pointed tail and dark to brownish granulation of the intestinal cells. Large in size, the other small ruminantsof lungworms are devoid of anterior protoplasmic knob. *P. rufescens* has a wavy outline at the top of its tail but without dorsal spine and M. capillaries have an undulating tip and a dorsal spine.

2.4.4 Data Analysis.

All the data will be entered through Microsoft Excel and will be analyzed by using SPSS. The results were analyzed in relation to sex, species of animal, age, management. Body condition and species of lung worm. Then chi- square(x^2) test was used to measure association of small ruminant lung worm infection with possible risk factors. Descriptive statistics used to determine the prevalence of lungworm infections. The statistical significance difference was determined using p value, if p- value less than 0.05 was taken as significant.

3. Results

3.1. The Overall Prevalence

From a total of 357 small ruminants (225 sheep and 132 goats), this study result showed from 225 sheep, 74 were found with lug worm infection (32.9%) and from 132 goats 30 were found infected (22.72%). Indicating an overall prevalence of 29.13% lungworm infection, sheep and goats. Concerning with specific species of lung worms, prevalence rate were identified in different species of parasite group of sampled animals. The prevalence rate of *D. filaria* was the predominant species in the study area 15.68 %(56/357), followed by *P. refuscens*7.28% (26) and was found the least with *M. capillaris*6.16 %(22/357) (**Table 1**).

Table 1: Prevalence of different species of lung worm(n= 357)

Species	Number of animal	Prevalence (%)
D.filaria	56	15.68
P.refuscens	26	7.28
M.capillarius	22	6.16
Total	104	29.13%

3.2. Prevalence of lung worms of small ruminants in five selected Kebeles

The prevalence of lungworm in selected Kebeles of Guddamuleta, Bubbemuleta, Ifabula,Frustalle and Gicho peasant association, accounted 37.7%, 32.8, 26.5 ,24.7 and 20.3% respectively. The highest prevalence was observed in Guddamuleta and the lowest prevalence was observed in Gicho. However, the prevalence of different species of lung worms was also different in different area of animal sampled *Protostrongylus rufescens* (23.1%) is the highest in Ifabula and *Dictyocaulusfilaria* (33.9%) is the highest in Guddamulet, respectively. *Dictyocaulus filaria (*23.2%) was the highest prevalent in Bubbemulet *while Muellerius capillaris (*18.2%) is the highest in Gicho *and also Dictyocaulus filaria* (19.6%) was almost the highest prevalent in Frustalle There was no significant difference (P value= 0.964) in the prevalence of lung worms among different peasant association (Table 4). Were identified during study. The animal found in Gicho are less risky than animals those found in Guddamuleta, Bubbemuleta, Ifabula and Frustalle. While the animal found in Frustalle are less risky than the animal found in Ifabula, Bubbemuleta and Guddamuleta and also the animal found in Bubbemuleta are less risky than the animal found in Guddamuleta. However, the animal found in Guddamuleta is more risky than those animal found in Bubbemuleta, Ifabula, Frustalle and Gicho and (**Table 2).**

Table 2: Prevalence of different species of lung worm infection based on the origin

Origin	Number of animals	Number and prevalence of lung worm species.					
		D.filaria	*P.rufescens*	*M.capillaris*	Total	X^2	P value
Ifabula	68	8(14.3%)	6(23.1%)	4(18.2%)	18(26.5%)	9.16	0.964
Guddamuleta	90	19(33. %)	8(30.8%)	7(30.7%)	34(37.7%)		
Bubbemuleta	67	13(23. %)	5(19.2%)	4(18.2%)	22(32.8%)		
Gicho	59	5(8.9%)	3(11.5%)	4(18.2%)	12(20.3%)		
Frustall	73	11(19.6%)	4(15.4%)	3(13.6%)	18(24.7%)		
Total	357	56(15.68%)	26(7.28%))	22(6.16%)	104(29.13%)		

3.3. Risk factors associated with lung worm infection

In this study, the prevalence was found to be higher in sheep (32.9%) than goats (27.7 %,) but was not statistically significant (*P* value =0.232). As indicated in the result sheep are highly affected by *Protostrongylus refuscens* compared with by other species which comprises of 73.1% prevalence, on the other hand *Muellerius capillaries* is highest in goat which posses 31.8% (Table 5).Though there was no statistically significance difference observed in management system (P value=0.349). *Muelerius capillaris* was highest prevalent (90.9%) for animals kept under extensive management whereas *Dictyocaulus filaria* (17.9%) was most prevalent in animals kept under semi- extensive management (**Table 3**).

Table 3: Prevalence based on species of animals and different management Systems

Risk factors	Animal Examined	No and Prevalence of lung worm species (%)				X^2	P value
	D.filariae		*P.rufescens*	*M.capillaris*	**Total**		
Species							
Ovine	225	40(71.0%)	19(73.0%)	15(68.2)	74(32.9%)	427	0.232
Caprine	132	16(28.0%)	7(26.9%)	7(31.8%)	30(22.7%)		
Management system							
Extensive	283	46(82.0%)	22(84.0%)	20(90.9%)	88(31.1%)	3.9	0.349
Semi-Intensive	74	10(17.0%)	4(15.4%)	2(9.1%)	16(21.6%)		
Total	357	56(15.78%)	26(7.28%)	22(6.16%)	104(29.1)		

The result indicated that there was difference in prevalence rate of lung worm between different sex, age, body condition score, history of deworming. The prevalence rate of the lung worm infection was found 34.0% in female and 19.7% in male, which showed female, are highly affected in this study area. Whereas, the prevalence of different species of lung worms was also different in different sex groups, such that *Protostrongylus rufescens (*84.6 %) is the highest prevalence in female while *Dictyocaulus filaria* (26.8 %) is highest in male. Furthermore, comparison of the overall prevalence of lung worm infections in the different age groups. Higher prevalence in age group of ≤ 6 months (68.29 %), followed by between 6-24 months of age (18.53%) and lower prevalence was observed in animals >24 months of age (15.46%) (Table 6).It was found that the prevalence of different species of lung worms was also different in different age groups of animals. *Muellerius capillaris* (59.1%)and *Protostrongylus rufescens* (26.9%) was highest prevalent species of lung worms in young (≤ 6 months) and adult (>24 months) respectively (Table 6).Based on body condition, animals were categorized into three groups, namely poor, medium and good body conditioned animals. The lungworm infection rate according to the physical body condition was recorded to be 55.1% relatively the highest prevalence in animals with poor body condition, followed by

22% high in animals having with good body condition and 17.6% relatively low in that animal with medium body condition. Furthermore, Similarly, the prevalence of different species of lung worms was also different in different body condition animals *Protostrongylus rufescens* (69.2%) and *Muellerius capillaris* (27.3%) was highest prevalent species of lung worms in poor and good body condition of animals while *Muellerius capillaris* (32.1 %) was highest prevalent species of lung worms in medium body condition of animals .As the table 4 below shows this result indicates a significance association (p value =0.000) of lung worm infection in animals having different body condition. Generally, lungworm infection is found more prevalent in poor body conditioned sheep and goat. Moreover, in this study the prevalence of lung worm was found to be higher in Non-dewormed of small ruminants' of 49.3% (69 of 140 animals when compared to that of animal Dewormed 16.1 % (animals 35 of 217).The prevalence rate in non-dewormed animals while lower prevalence rate observed in dewormed animals. However, It was found that the prevalence of different species of lung worms was also different in deworming history animals such that *Dictyocaulus filaria* 67.9% almost the highest prevalence in non-dewormed whereas *Muellerius capillaris* (36.4 %) the highest in dewormed animals, the infection rate was statistically significant (P value=0.000) in non-dewormed and dewormed small ruminants (**Table 4).**

Table 4: Prevalence based on different risk factors such as Sex, Age. Body condition and deworming history

Risk factor	Animal examined	Prevalence of lung worm species (%)					
		D.filariae	*P.refuscens*	*M.capillaris*	Total %	X^2	Pvalue
Sex							
Female	235	41(73.0%)	22(84.0%)	17(77.0%)	80(34.0%)	9.01	0.028
Male	122	15(26.)	4(15.4)	5(22.7%)	24(19.7%)		
Age							
≤6 M*	82	32(57.)	11(42.)	13(59.1)	56(68.29)	83.7	0.000
6-24M	178	19(33.)	8(30.8)	6(27.3%)	33(18.5%)		
>2 M	97	5(8.9%)	7(26.9)	3(13.6%)	15(15.5%)		
BC*							
Poor	98	27(48.0%)	18(69.0%)	9(40.9%)	54(55.1%)	51.0	0.000
Medium	159	18(32.)	3(11.5)	7(31.8%)	28(17.6%)		
Good	100	11(19.)	5(19.2)	6(27.3%)	22(22.0 %)		
DH*							
No	140	38(67.)	17(65)	14(63.0%)	69(49.3%)	45.7	0.000
Yes	217	18(32.)	9(34.6)	8(36.4%)	35(16.1%)		
Total	357	56(15.68)	26(7.28%)	22(6.16%)	104(29.13%)		

*Keys: M= months, BC= body condition, DH= deworming history.

4. Discussion

In the present study, the overall prevalence was 29.13%. The specific prevalence of lung worm in two species of small ruminants was 32.9 and 22.7% in sheep and goat respectively whereas with regards to species of lung worm such as *Dictyocaulus filaria, Protostrongylus rufescens*, and *Muellerus capillaris*, 15.68%, 7.28%, 6.16%. Of prevalence was found respectively.

The overall prevalence, 29.13% in this study nearlyin agreement with previous Ethiopia researchers reported: 27.8 % in Assela (Brook *et al.* 1986), 28.3% in and around Bahir Dar (Tewodros, 2015), 26.7 % in and around Jimma Town (Dawit and Abdu, South West Ethiopia, 2012), 32.2% at Gaint (Tsegaye, 1985), 27.6% at Hawassien Awraja (uqubazgi, 1990), 27.7% in and around Tse-Ada-Emba (Dawit, 2000).

However, the result in this study is greatly higher than to that, 21.5 % in Tigray (Atsbi) (Mengestom 2008), 18.16% in and around Bahir Dar (Muluken 2009), 24.5% in and around Jimma Town (Tewodros *et al* ,. 2012).The result in this study lower than to33.83% in Gondar (Mekonnen*et al*, 2011), 33.83% in Gondar town (Addis *et al*., 2011), 39.6% in North Gondar Zones (Tigist, 2009), 36.9% in Dessie and Kombolchadistricts (Regassa *et al*. 2010). Further, this study result greatly lower than 73.25% in DebreBirhan (Netsanet, 1992), 53.6% in North east Ethiopia, in six districts of Wello and Chilalo(Alemu *et al.*, 2006; (Serkalem *et al 2014)* respectively), 52.40 % in Munesa districts (Alemu *et al.*, 2006), and 49% in and around DebreBirhan (Habtamu, 2010).The differences in the prevalence of lung worms of small ruminants in the above studies for such infection rate variation could be attributed variation in agro-ecology, altitude, rainfall, humidity and temperature difference, nutritional status, level of immunity, management practice of the animal and season of examination on the respective study areas, which favor or disfavor the survival of parasite larvae.

Prevalence across different locations of study sites was found highest in 37.7%,32.8%,26.5%,24.7% and 20.3% in Guddamuleta, BubbemuletaIfabulaFrustalle and Gicho respectively. Variation might be associated with the time of sampling or due to variation in climatic variability in the study areas, time of sample collection.

Concerning with prevalence at species level of lung worm, it was found15.68%, *7.28%), and* 6.16% for *D. filaria P. rufescens* and *M.capillaris* respectively. Indicating the study area and which is predominantly species present in the area was *D. filaria*. This result it is quite agreement with 15.86% in Gondar town (Mekonnen *et al*. (2011), 11.4% fantuhun *et al.* (2012) in jimma town, 15.86% Addis *et al*. (2011) in Gondar,23.3%Alemu *et al*. (2006) in Debresina, town,23.3% Dinka *et al (*2011) in Ambo town. All the above researchers reported higher than the study result. Reason for the difference might be attributed to difference in their life cycles. Thus, *D. filarial* has a direct life cycle and requires shorter time to develop to an infective stage. After ingestion, the larvae of these parasites can be shed with feces within 5 week. (Mengestom 2008). Unlike to *D. filaria*, the transmission of *P. rufescens*and *M. capillaries* is epidemiologically complex event involving intermediate host (Radostitis *et al*., 2007).

Though, statistically insignificance association with species of study animals and prevalence was slightly higher in sheep (32.9%) than goats (27.7%). This result agreement with Regassa et al.(2009) atDessie and Kombolcha districts, who reported 40.40% in sheep and 31.70% in goats. Such variation in prevalence between the two species of small ruminants might be arising from the difference in grazing behavior of the two species of animals. It is known that sheep predominantly grazer so that they have higher exposure to ingest large number of infective larvae (L3) in pasture than goats. Goats with their browsing behavior have less exposure to ingest the infective larvae (L3) (Alemu *et al*. 2006; Wilmore, 2006).

The result revealed different prevalence relation to sex; 32 1% and 19.7 % in female and male respectively. This indicated that female animals are more susceptible to lungworm infection than male. This is in agreement with the result of Paulos (2000) as28.9% in female 13.4% in male in and around Bahir Dar, Tewodrose (2010) as 43.3% in female and 33.57% in male in North and South Gondar, Alemuet al. (2006), as 59.3% female and 44.4% male in Northern Ethiopia, and Addis et al. (2010) as 36.22% and 30.43% in female and male animals respectively in Gondar Town. The reason for the difference in prevalence two sex groups that was observed in this study might be due to the fact that resistance of female animals to lung infection can be reduced at the time of parturition and during early lactation. Per parturient and lactation relaxation of the resistance of animals may result in female animals to unable to expel adult worms, and cause higher level of larvae detection. The other reason may be due to the ways how males and females were treated in terms of nutrition; males are kept for fattening to be sold except some which for breeding, thus, males received more attention by farmers than females (Beyene *et al*., 2013).

With regard to age, generally, the level of prevalence was compared between animals of different age groups. This study showed that the highestprevalence,68.29% lung worm infection was found in young animals (<6 months), age groups of 6-24 months (18.5%) and greater than 12 months the lowest prevalence (15.5%).The difference was statistically significant ($p < 0.05$Thus, the present study result is in agreement with Netsanet (1992) who report that young were found to be infected more than adult. This might to associate with acquired resistance

of adult animals. Accordingly, as the age of animal's increases, susceptibility to lungworm infection decreases so that the adult has the lowest infection.

Body condition of animals was also showed variation in prevalence. The highest prevalence rate, 55.1% was found in animals with poor body condition. This result revealed that animals in poor body condition more likely to be infected by lung worm. Generally in connection to lungworm, it is reported that poorly nourished animals appear to be less competent in getting rid-off lungworm infection although it is not unusual for well-fed animals to succumb to lungworm infection (Radostitis, .2000).And also it could be due to immune-suppression in sheep with poor body conditions, concurrent infection by other parasites including GIT helminthes and for malnutrition (Kimberling, 1988). But, this result were not agreement with works of Abebe*et al.(*2006) and Dawit and Abdu (2012) who reported highest in animals with medium and good body condition respectively.

The level of prevalence was compared between animals kept under extensive and semi-intensive management systems; greater prevalence rate of lungworm infections was observed in animals under extensive management system, than those kept in semi intensive management system. There was in significant difference between the prevalence rates in the two management systems. The prevalence in extensive management system was 31.1% which is higher than semi-intensive 21.6%. The result of the present study was in agreement with Mekonnen et al. (2011)who reported 34.40% and 30.90% in extensive and semi-intensive management systems respectively. The reason for high prevalence rate of lung worm infection in extensive management system could be due to the fact that poorly nourished animals appear to be less competent in getting ride off lung worm although, it's not unusual well feed animal to succumb to the disease provided the right environmental condition are made available and also the degree of pasture contamination in the extensive system of production increases the degree of exposure that could result in high prevalence. Furthermore, the reason for this could be management practice such as provision of ample nutrition increases the resistance of the host under the semi-intensive system, contrary to this malnutrition which reduces the host-parasite response and favors the fecundity of the parasites that allows the animals for continuous larvae exposure under extensive system (Soulsby, 1986). However, it contradicted with the result of ofDawit and Abdu (2012) who reported higher prevalence of lungworm infection in sheep and goat under semi-intensivemanagement system than in extensive management system 28.0 and 26.0%, respectively.

Deworming history of study animals showed variation in prevalence of lung worms with anthelmintic usage was clearly indicating as the non-dewormed sheep and goat had higher prevalence rate, 49.1% than dewormed counter parts, 16.12%.When the infection prevalence on anthelmintic usage base was subjected to analysis,difference in the occurrence of lung worm infection between the dewormed and non-dewormed animals were statistically significant ($P<0.05$). The observation noted on the dewormed sheep in this study was in agreement with the work of Sefinew (1999). Even though the dewormed small ruminants were revealed low infection prevalence compared to non-dewormed groups, about 16.12% of them were still infected with lungworm. The reason behind this result probably, is that sheep and goat which have only cough and/or tachypnea are usually in the prepatent stage of the disease or have small adult worm burden and the anthelmintic used for the treatment of those small ruminants may be only temporarily suppress egg production of the adult worms.

5. Conclusion and Recommendation

The current study showed 29.13% of prevalence of lung worm infection in small ruminants. This study confirms that lungworm the most important respiratory nematode of small ruminants in the study area. Moreover, this study indicated sheep and goats with deworming history, management systems, body condition were found significantly related with the prevalence of small ruminant of lung worm infection at higher risk. Extensively managed sheep and goat were found to be more infected with lung worm than those in semi-intensive management system. The highest prevalence was observed in non-dewormed animals than animals of the corresponding group. In terms of lungworms identified in the study area. It was revealed three species such as *D. filaria,P. rufescens and M. capillaris*.

Based up on the above conclusive statements, the following recommendations are forwarded

❖ Short term training and awareness creation should be designed for farmers about the impacts lung worms, its transmission, and prevention measures.

❖ Emphasis should be given for advanced control and prevention of lung worm infection.
❖ Planned and strategic deworming of animals should be applied.

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6. References

Abebe, M. (2008): Study on prevalence of ovine lungworm infection in and aroudAssella, DVM thesis, Mekelle University Ethiopia: *vet. Med.,* **3** (6): 465-468.

Addis, M. Fromsa, A. Ebuy, Y. (2010): Study on the prevalence of Lungworm Infection in Small Ruminants in Gondar Town,Ethiopia*: J. Anim. Vet. Adv*., **10**:1683-1687.

Adem, J. (2016): Lungworm infection of small ruminant in Ethiopian: *J. Pharm. Sci*., **3:22**-43.

Alemu, S. Esayas, A. Gelagay, Aschalew,Z. (2006): Study on Small Ruminant Lungworm in Northwestern Ethiopia*: Glob .Vet* ., **14**: 30-35.

Alemu, S. Leykun, G .Ayelet,G. Zeleke,A. (2006): Study on small ruminant lungworms inNortheastern Ethiopia. *Vet. Parasitol*. **142:330**-335.

Alemu, Y. Merkel, C. (2008): Sheep and Goat Production Hand Book for Ethiopia Sheep and Goat Productivity Improvement Program*: E .S .G .P .I .P.*, **pp**2-6.

Asaye, M. Alemneh, T. (2015): Prevalence of Lungworm Infection of Small Ruminants in and Around Bahir Dar City, Amhara Regional State Ethiopia: *J. Vet. Sci. Techno.,* **41**(72): 2157- 7579.

Beyene, D. Sisay, I. Nigussie, I. D. Ayana,D.. Abunna,F. (2013): The Prevalence of Lungworms in Naturally Infected Sheep of Ambo District, Oromia Ethiopia: *Glob. Vet.,***10**(1): 93-98.

Bogale, B. Ebre, A. Melaku, .A (2012): Ovine Lungworm Infection, Prevalence, Species Composition and Associated Risk Factors in DessieZuria District, Northeastern Ethiopia: *Afri. J. Bas. App. Sci*., **4**: 73-76.

Brook, L. Fesseha, G. Shibru,T.(1986): The undergraduate computing center workers and all of those seasonal occurrence of Dictyocaulus filarial: *Sci.,***9(**1.2): 25-38.

Charles, M. Robinson, E. (2006): Diagnostic veterinary parasitology for veterinary technicians.

CSA, (2013): Agricultural Sample Survey Report on Livestock and livestock characteristics (Private peasant holdings) Addis Ababa: *Central Statistical AgencyC.S.A*., **2**: pp 12.

Dawit, M. (2000): Prevalence of ovine lungworm in and around Tse-Ada-Emba. DVM Thesis, Jimma University School of Veterinary Medicine, Jimma Ethiopia,

Dawit, W. Abdu, M. (2012): Prevalence of smallruminant lungworm infection in Jimma Town. JimmaUniversity College of Agriculture and VeterinaryMedicine, School of Veterinary Medicine, Jimma, Ethiopia*: Glob. Vet., **8(**2): 152-159.

Fantahun, T., Seifu, Y.,Chanie, M., Moges, N. (2012): Prevalence of Lungworm Infection in Small Ruminants in and Around Jimma Town Southwest Ethiopia*: Glob. Vet*., 9 (5): 580-585.

FAO (2002): Production of small ruminants Year Book: Rome, Italy, 54: 200 - 315.

Gelagay, A.Leakemariam, Y. Esayas, G. Selam,T.Keshaun, A,(2005):The Ethiopian: *Vet. J*.**, 9:** 75-76.

Gorski, P. Niznikowski, R. Popielarczyk, D. Strzelec, E. Gajewska, A Wedrychowicz, H.(2004):Natural parasitic infections in various breeds of sheep in Poland: *Archiv. für Tierzucht.,***47**(6): 50-55.

Habtamu, T. (2010): Prevalence of Ovine Lung Worm in and around DebreBirhan. DVM thesis. Gondar University FVM. Gondar, Ethiopia.

ILCA (1990): International Livestock centre for Africa annual report, Addis Ababa, Ethiopia, Pp. 37. Kimberling, C. V. (1988): Diseases of Sheep. 3rd ed., Lea and Febiger, Philadelphia, USA.,99 - 101.

ILRI (International Livestock Research Institute), (2002): Hand book of livestock statistical for developing countries socio-economic and policy research working paper in Nairobi, Kenya: *I. L .R .I.* Pp.299.

Jamel, A. (2016): Lung Worm Infection of Small Ruminant in Ethiopia Jimma University College of Agriculture and Veterinary Medicine Ethiopia, *Vet. Med. J.*, **43**: pp 13.

JZARDO. (2009): Jimma zone agriculture and rural developmental office. Annual report

Keshaun,A.Berhanu,S.Aynalem,H.Desie,Sh.Kassaye, A.Mesele,A.Rahmeto,A.(2018):lungworm infection in small ruminants in Ethiopia: *Vet.Parasitol*. **14**: 63-70.

Kouidri, M. Selles, S. Mohammed, A. Abdelhadi, A. (2013): Lungworm Infections in Goats Slaughtered in Algeria. *Glob.Vet.*,**11**(3): 293-296.

Kumar, A. Chakraborty, S. Kumar, A. Tiwari, R. Rahal, A. Malik, Y. Dhama, K. Prasad, M. (2014): Advances in diagnosis of respiratory diseases of small ruminants: *Vet. Med. Inter*., 1-12

Mekonnen, A. Abebe, F. Yohnnes, E. (2011): Study on the prevalence of lungworm infection insmall ruminants in Gondar Town, College ofAgriculture and Veterinary Medicine, JimmaUniversity, Jimma Ethiopia*: Vet. Resear.,**4**(3): 85-89.

Mekuria, S. Tefera, Y. (2016): Lungworm Infection in Ovine: Prevalence and Associated Risk Factors in DebreBirhan Town Ethiopia: *J .Vet.Sci Technol.,***7:** PP 2.

Mengestom, G. (2008): Preliminary Study onprevalence of ovine lungworm infection in Atsbi(Tigray). DVM Thesis, Jimma University, Jimma,Ethiopia.

Moges, N. Bogale, B. Chanie, M. (2011): Dictyocaulusfilaria and Muelleriuscapillarisare Important Lungworm Parasites of Sheep in Wogera District, Northern Ethiopia: *Int. J. Anim. Vet. Adv.*,**3**: 465-468.

Muktar, Y. Abdureman, A. Shiferaw, S. (2015): Prevalence of Lungworm Infection in Small Ruminants inAmbo Town European*: J. Appl. Sci.*,**7** (5): 209-212.

Muluken, Y. (2009): Prevalence of ovine lungworms inand around Bahir Dar. DVM Thesis, College ofAgriculture and Veterinary Medicine, School ofVeterinary Medicine, Jimma, Ethiopia.

Netsanet, B. (1992): Study on the Prevalence and livestock, poultry and beehives population. Control of Lungworms (Dictyocaulus and Muelleriuscapillaris) in Local highland Ethiopia. C S. A., Pp 581

Paulos, A. (2000): Importance of seasonal dynamics of lung worms infection of small ruminants in Chilalo

Radostitis, O. Blood, C. Gay, W. Kenneth. , (2000): Veterinary medicine: A text book of disease of cattle, sheep, pigs, goats and horsesLondon: *Bai. Tin.*, 1344-1370.

Regassa, A. Toyeb, R. Abebe, B. Megersa, B. Mekibib, S. Mekuria, E. Debel, Abunna, F.(2010): Lungworm infection in small ruminants: prevalence and associated risk factors in Dessie and Kombolcha districts, northeastern Ethiopia: *Vet. Parasitol*. , **169**(1-2): 144-148.

Sefinew A (1999) Survey of small ruminant lungworm in six district of Wollo, DVM thesis, Addis Ababa University Debreziet*: Vet .Med*., Pp 69.

Sefinew, A. Esayas, A. Gelagay, Aschalew, Z. (2006): Study on small ruminantlungworms in northeastern Ethiopia: Vet.ParasitoL., **142**(3-4): 330-335.

Serkalem, K.Sissay,M. Mulugeta, D. (2014): On farm and Abattoir study of Lungworm infection of small ruminants in selected areas of Dale District Southern Ethiopia: *Int. J. Curr. Microbiol. App. Sci*., **3**: 1139-1152.

Sissay, A. (1996): Preliminary study on the prevalenceof ovine lungworm infection in and around Bahir Dar. DVM Thesis, Addis Ababa University, Faculty of Veterinary Medicine, Debrezeit, Ethiopia. Small ruminants: *Vet. Parasitol.,**119***(4):277-306.

Soulsby, E.(1986): Helminthes, Arthropods andProtozoa of domesticated animals: LondonBaillierTindall, 262-271

Tewodros, F. Yeshiwas, S. Marsha, C. Nibret, M. (2012): Prevalence of lungworm infection in small ruminants in and around Jimma Town, South west, Ethiopia. University of Gondar, Faculty of veterinarymedicine, Gondar Ethipia: *Glob. Vet.*,**9**(5): 580-585.

Tewodrose, A. (2010): Prevalence of lungworminfection of small ruminants in and around Bahirdar. DVM Thesis, Gondar University Ethiopia: 75-81

Thompson,JMeyer,H.(2002):Bodyconditionscoringof sheep:http://www.orst.edu/dept/animal-sciences/bcs.htm

Tigist, B. (2009): Prevalence of lungworm infection insmall ruminants in North and South Gonda Zones. DVM Thesis, University of Gondar Ethiopia:

Urquhart, G. Armour, J. Duncan, A.Jennings, F. (1996): Veterinary Parasitology Blackwell Scotland*:Sci*., .39–58.

Van Wyk, J. Cabaret, J. Michael, L. (2004): Morphological identification of nematode larvae of parasite.

Wilsmore, T. (2006): Diseases of small ruminants in Ethiopia, the veterinary epidemiology and economics research unit school of agriculture's policy and development the University of Read, UK: 67-72.

Yitagele, T. Ketema, T.Getachew, F. Nigatu, K. (2013): Prevalence of lungworm infection in small in North Gondar Zone, Amhara National Regional State, Ethiopia: *J. Parasitol. Vect.Bio.*,5(4): 40-45.

Zeryehun, T. Degefaw, N. (2017):Prevalence and Factors Associated with Small Ruminant's Lungworm Infection in and around Mekelle Town, Tigray, Northern Ethiopia*: J. Vet., Sci Technol.*, 10: 157-757

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