

## Lungworm Infections in Sheep Slaughtered in Tiaret Abattoir (Algeria)

<sup>1</sup>Kouidri Mokhtaria, <sup>1,2</sup>Selles Sidi Mohammed Ammar, <sup>1</sup>Boulkaboul Aboud,  
<sup>3</sup>Aissi Miriem, <sup>1</sup>Meliani Samia, <sup>1</sup>Nkundwanayo Canesuis and <sup>1</sup>Khelil Chahrazed

<sup>1</sup>Institute of Veterinary Science, Ibn-Khaldoun University of Tiaret, Tiaret 14000, Algeria

<sup>2</sup>Laboratory of Research on Local Animal Products,

Ibn-Khaldoun University of Tiaret, Tiaret 14000, Algeria

<sup>3</sup>National Higher Veterinary School of Algiers, BP 161 Hacène Badi, EL Harrach, Algiers, Algeria

**Abstract:** The aim of this study was to estimate the prevalence and identification of species of lungworm infection in sheep slaughtered in Tiaret abattoir from December 2011 to November 2012. Post mortem examination was conducted on 1433 animals and laboratory work was done on 100 rejected lungs for lungworm infections to identify parasite species. Results: 318 sheep were found to be positive for lungworm infections with an overall prevalence of 22%. There was a higher statistically significant difference ( $P=0.0000$ ) observed between female and male animals with prevalence of 27% and 12%, respectively. The older animals were more affected, than the younger's ones ( $P=0.0000$ ). The prevalence of species of lungworm identified were *Muellerius capillaris* (40%), *Protostrongylus rufescens* (27%), *Dictyocaulus filaria* (28%) and 5% of mixed infections. This study showed high prevalence of lungworm infections in the study area implying the need for control intervention.

**Key words:** Lungworm Infection • Sheep • *Muellerius Capillaris* • *Protostrongylus rufescens* • *Dictyocaulus filaria* • Abattoir • Tiaret • Algeria

### INTRODUCTION

Sheep play a vital role as sources of meat, milk and wool for smallholder's keepers in different farming systems and agro-ecological zones of country [1], but endoparasitic infections and management problems are known to be the main factors that affect productivity [2]. Lungworms are commonly found in sheep and they are an important problem for sheep breeders throughout the world [3, 4]. These parasitic nematodes are known for infection of the lower respiratory tract, characterized by respiratory distress, trachitis, bronchitis and pneumonia [5].

The three respiratory parasites that cause a significant damage in small ruminant production are *D. filaria*, *P. rufescens* and *M. capillaries* [3]. These helminthes belong to two super family, Trichostrongyloidea (*D. filaria*) and Metastrongyloidea

(*P. rufescens* and *M. capillaries*). *D. filaria* has a direct life cycle, whereas, *M. capillaries* and *P. rufescens* have indirect life cycles [6].

*M. capillaries* and *P. rufescens* occur in the alveoli, bronchioles and parenchyma of the lungs of various species of mammals. *D. filaria* is located in respiratory passages of lungs [3]. These lungworms, particularly *D. filaria* can suppress the immunity of the respiratory tract [7] and causes death, poor weight as well as greatly affects the potential productivity of the industry in the area where it is prevalent [1, 8].

Few studies have been conducted in Algeria to indicate the prevalence of lungworm infection in sheep. Therefore, the objectives of this study were to investigate the prevalence of lungworms infection in sheep slaughtered in Tiaret abattoir, the effects of age, sex and identifying the major lungworm species circulating in this region.

## MATERIALS AND METHODS

**Study Area:** The present study was conducted in Tiaret Abattoir and parasitological laboratory of the veterinary institute of the University of Tiaret (Northern part of Algeria) (39°, 26-, 20.6-N latitude and 48°, 5-, 26.4-E longitude). The region is situated in the high plateau of Algeria, a semi-arid area characterized by cold and humid winter and hot and dry summer. Temperatures vary between 2.1 and 16.4 °C in winter and between 21.9 and 35.5 °C in summer. The annual rainfall ranges between 250 and 600mm.

**Study Design:** The current study was carried out on 1433 sheep slaughtered at the Tiaret abattoir, from December 2011 to November 2012. During the study, the slaughterhouse was visited regularly to examine the lungs of slaughtered sheep for the presence of lungworm infections. It comprises both sexes and all age groups. Age was determined based on the dentition and the owner's information.

**Postmortem Examination:** During routine inspections of the veterinary staff of the slaughterhouse, lungs rejected for lungworm infections were recorded and identified. Lungworm infections were recognized based on presence of nodules, which are usually grayish white in color [9], brownish spots [10] and adult worms.

**Laboratory Work:** To determine species of lung worms, 100 lungs rejected for lungworm infections in the Tiaret abattoir, during the current study, were conducted to the laboratory of parasitology of the Veterinary Sciences Institute of Ibn Khaldoun University of Tiaret for more investigations.

The air passages were opened starting from the trachea to the small bronchi with scalpel and smears were taken and placed between slide and cover slip for microscopic observation. Identification of species lungworms was done based on first stage larvae (L1). *D. filaria*, L1 has a characteristic cuticular knob at the anterior extremity and dark granulation of the intestinal cells. While the others ovine lungworms are devoid of anterior protoplasmic knob. *P. rufescens* has a wavy outline at the top of its tail and *M. capillaries* have an undulating tip and a dorsal spine [2].

**Data Analysis:** Prevalence of lungworm infections was calculated as a percentage of the population screened.

ANOVA test was used to compare sex, age groups for possible significant differences using STATISTICA version 5. The differences were regarded as significant if P-value is less than 0.05.

## RESULTS

From a total of 1433 sheep slaughtered at the Tiaret abattoir, 318 (22%) were found to be positive for lungworm. The prevalence of lung worm infections observed in female animals was 27% (266/991) while in males 12% (52/442). There was a higher statistically significant difference (P=0.0000) between the two sexes. The higher prevalence was recorded in adult sheep as compared to younger (P=0.0000) (Table 1).

Three species of bronchopulmonary nematodes were identified; namely, *M. capillaries*, *P. rufescens* and *D. filaria*. The proportions of each species were 40%, 27% and 28%, respectively. Mixed infections represented only 5% (Table 2).

## DISCUSSION

Post mortem examination revealed that coproscopic examination had limited value in terms of estimating the prevalence of lungworm infections in live sheep [1]. The stage of parasites can lead to this situation. Because in the prepatent (L1) or post patent (L5) phases it is very difficult to detect these nematodes by coproscopic methods. Another explanation would be that egg production may be inhibited by the immune reaction of the host [11, 12].

In the current study, of the total sheep examined the overall prevalence rate of 22% was recorded. This finding agrees with data reported by Mengestom [13] in Atsbi woreda (Ethiopia) where the recorded prevalence was 21.5%.

Higher rates as 24.18%, 30.33% and 30.76% were reported by Dar *et al.* [14], Fentahun *et al.* [15] and Weldesenebet and Mohamed [16], respectively.

However, Lower prevalence's were recorded by Borjii *et al.* [9] (4.1%) in northeast of Iran and 17.65% in Uttar Pradesh (India).

Prevalence of lungworm infections in sheep varied depending on climate condition and management practices [17].

In the present study, higher level of prevalence was observed in female (27%) animals compared to male animals (12%). This finding was in agreement with the

Table 1: Prevalence of ovine lungworm infections based on age.

Age	No of examined	No of positive	Prevalence (%)
1 year	160	19	12
2 years	168	26	15
3 years	245	16	7

>3 years 860 257 30\*

\*P=0.0000

Table 2: Prevalence of lungworms based on the species of the parasite

Species of lungworms	No of positive	
	lungworms examined	Prevalence (%)
<i>M. capillaries</i>	41	40
<i>D. filaria</i>	28	28
<i>P. rufescens</i>	27	27
Mixed infections	5	5

data reported by Ibrahim and Godefa [1] and Addis *et al.* [18]. This difference in prevalence's between female and male could be due to the fact that resistance to infection decreases at the time of parturition and during early lactation. This per parturient relaxation of resistance result in the females in ability to expel adult worm's which cause higher level of larvae detection [18].

The way that males and females are treated in terms of nutrition may also attribute for such differences. Males are kept for fattening to be sold latter except some which are kept for breeding, thus, males receive more attention by farmers [5].

Equal prevalence of lungworm infections was observed in male and female animals in study done by Fentahun *et al.* [15] and Hasen *et al.* [19].

With regard to age, adult animals were found more affected by the lungworm infections than young. These findings were in agreement with the study of Alemu *et al.* [11]. They found that the highest infection rates with lungworm were observed in older than youngsters.

However, Beyene *et al.* [5] indicated significant differences among different age groups. The prevalence was higher in young than adult.

In the present study, *M. capillaries* showed highest prevalence in relation to other species of lungworm in sheep with 41% followed by *D. filaria* and *P. rufescens* with 28% and 27%, respectively. Where as mixed infections was the least prevalent. This result agrees with the findings of Basaznew *et al.* [20] who reported that *M. capillaries* ranks first. The high rate of *M. capillaries* can explain that slugs or snails as intermediate hosts are very present in our region. In contrast to the present findings, Nematollahi and Moghaddam [21] reported that *D. filaria* was the most prevalent.

The overall prevalence of ovine lung worms recorded in the study area using post mortem examination was high. Female animals were more susceptible to lung worm infections than males. Older sheep were found to be more affected by the infection of lung worm than younger ones. The identified lung worm species were *M. capillaries* followed by *D. filaria* and *P. rufescens*.

Strategic deworming of sheep using broad-spectrum anthelmintics and isolation of most susceptible age groups during the season when pasture contamination occurs are necessary to increase productivity of these animals and. Further works are recommended to study the seasonal pattern of lung worms and define other species in this region.

**Conflict of Interest Statement:** None of the authors of this paper has a financial or personal relationship with other people or organizations that could inappropriately influence or bias the content of the paper.

#### ACKNOWLEDGMENT

The authors would like to express their special thanks to the staff members of Tiaret municipal abattoir for all sorts of assistance, especially Dr. Khattab and Dr. Charfaoui.

#### REFERENCES

- Ibrahim, N. and Y. Godefa, 2012. Prevalence of Ovine Lung Worm Infection in Mekelle Town, North Ethiopia. The Internet Journal of Veterinary Medicine, 9: 1.
- Bogale, B., A. Ebre and A. Melaku, 2012. Ovine Lungworm Infection: Prevalence, Species Composition and Associated Risk Factors in Dessie Zuria District, Northeastern Ethiopia. African Journal of Basic and Applied Sciences, 4: 73-76.
- Girisgin, O., B. enlik, A.O. Girisgin and V. Akyol, 2008. Study on the Prevalence of Lungworm Infection. Studies on Sheep Lungworms in Bursa Province of Turkey: Determination of Prevalence and Relationships between Larval Output and Parasite Burden in the Lungs. Pakistan Journal of Zoology, 40: 365-369.
- Bekele, M. and A. Abu, 2011. Ovine Lungworms in Tiyo District, South-East Ethiopia: Prevalence, Effect of Altitude and Major Host Related Risk Factors. Global Veterinaria, 7(3): 219-225.

5. Beyene, D., I. Sisay, I. Nigussie, D. Ayana and F. Abunna, 2013. The Prevalence of Lungworms in Naturally Infected Sheep of Ambo District, Oromia, Ethiopia. *Global Veterinaria*, 10(1): 93-98.
6. Radostits, O., C.C. Gay, K.W. Hinchcliff and P.D. Constable, 2007. *Veterinary Medicine: a text book of the diseases of cattle, sheep, pigs, goats and Rd horses*, 10 Edition. New York: Elsevier Saunders, pp: 1541-1564.
7. Gelagay, A., Y. Leakemariam, G. Esayas, T. Selam and A. Kassahun, 2005. The Ethiopian veterinary journal, 9: 75-76.
8. Chanie, M., T. Yeshitila and T. Fentahun, 2012. Ovine Lungworm Infections are Serious Production and Health Problems in Amhara National Regional State, Deneba, Northeast Ethiopia *American-Eurasian Journal of Scientific Research*, 7(4): 168-171.
9. Borjii, H., M. Azizzadeh, M. Ebrahimit and M. Asadpour, 2012. Study on small ruminant lungworms and associated risk factors in northeastern Iran. *Asian Pacific Journal of Tropical Medicine*, pp: 53-56.
10. Etminani, A., 1980. *Veterinary Respiratory Diseases* publication center of Tehran University, pp: 470-472.
11. Alemu, S., E.G. Leykun, G. Ayelet and A. Zeleke, 2006. Study on small ruminant lungworms in northeastern Ethiopia. *Vet Parasitol*, 142: 330-335.
12. Regassa, A., M. Toyeb, R. Abebe, B. Megersa, B. Mekibib, S. Mekuria, E. Debela and F. Abunna, 2010. Lungworm infection in small ruminants: Prevalence and associated risk factors in Dessie and Kombolcha districts, northeastern Ethiopia. *Vet. Parasitol.*, 169: 144-148.
13. Mengestom, G., 2008. Preliminary study on prevalence of ovine lung worm infection in Atsbi, DVM Thesis, Jimma University, Jimma, Ethiopia.
14. Dar, L.M., M.M. Darzi, M.S. Mir, A.K.. Shayuaib and A.R.S. Abdullah, 2013. Prevalence of lung affections in sheep in northern temperate regions of India: A postmortem study. *Small Ruminant Research*, 110: 57-61.
15. Fentahun, T., Y. Seifu, M. Chanie and N. Moges, 2012. Prevalence of Lungworm Infection in Small Ruminants in and Around Jimma Town, Southwest Ethiopia. *Global Veterinaria*, 5: 580-585.
16. Weldesenebet, D. and A. Mohamed, 2012. Prevalence of Small Ruminant Lung Worm Infection in Jimma Town. *Global Veterinaria*, 8: 153-159.
17. Umur, S., E. Koroglu, F. Guclu and R. Tinar, 2006. Nematoda. In: *Helminthology* (ed. R. Tinar), pp: 214-449.
18. Addis, M., A. Fromsa and Y. Ebuy, 2011. Study on the prevalence of lungworm infection in small ruminants in Gondar town, Ethiopia. *Vet. Res.*, 4: 85-89.
19. Hasen, A., S. Takele and K. Simenew, 2013. Ovine Lungworm Infestation Rate on Fecal Larvae Recovery Basis. *Acta Parasitologica Globalis*, 4: 29-33.
20. Basaznew, B., E. Ayalew and M. Achenef, 2012. Ovine Lungworm Infection: Prevalence, Species Composition and Associated Risk Factors in Dessie Zuria District, Northeastern Ethiopia. *African Journal of Basic and Applied Sciences*, 4: 73-76.
21. Nematollahi, A. and G.H. Moghaddam, 2009. A survey on annual infestation of sheep with lungworms based on fecal test and slaughter house study in Tarbiz. *J. Vet. Res.*, 64: 339-342.