

Lungworm Infections in Goats Slaughtered in Algeria

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Abstract: The present study was conducted in Tiaret Abattoir (Algeria) from June to November 2012 with the objectives to determine the prevalence, identifying the species of lungworms involved and assess some risk factors of lungworms in goats. Post mortem examination was conducted on 969 animals and laboratory work was done on 36 rejected lungs for lungworm infections to identifying parasite species. The overall prevalence of lungworms in this study was 7%. There was a statistically significant difference ($P < 0.05$) observed between female and male animals with prevalence of 9% and 5%, respectively. The older animals were more affected, than the younger's ones ($P < 0.05$). The prevalence of species of lungworm identified were *Muellerius capillaris* (*M. capillaris*) (42%), *Protostrongylus rufescens* (*P. rufescens*) (25%), *Dictyocaulus filaria* (*D. filaria*) (14%) and 19% of mixed infections. Due its impact on production, emphasis should be given for the control and prevention of lungworm infections.

Key words: Lungworm infection • Goats • *Muellerius capillaris* • *Protostrongylus rufescens* • *Dictyocaulus filaria* • Abattoir • Tiaret • Algeria

INTRODUCTION

Small ruminants are important domestic animals in tropical livestock production systems [1]. They play a great role in food supply, a source of income and foreign currency [2]. However, the economic gains from these animals remain insignificant when it is compared to their huge number. This low productivity is a reflection of disease, limited genetic potential and husbandry standard [3]. Helminthes of ruminants are ubiquitous and many tropical and sub-tropical environments in the world provide nearly perfect conditions for their survival and development. Lungworms can result in infection of the lower respiratory tract, usually resulting in verminous bronchitis or verminous pneumonia [4]. Lungworms are Protostrongylids and *D. filaria*. Protostrongylids are heteroxenous parasites that infect terrestrial mollusks as intermediate host [5]. Whereas *D. filaria* has a direct life cycle [6].

Few studies have been conducted in Algeria to indicate the prevalence of lungworm infection in goats. Therefore, the objectives of present study were to determine the prevalence and the predominant species of lung worms and to evaluate the effect of sex and age

groups on the occurrence of these parasites in goats slaughtered in Tiaret (North east of Algeria).

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 (North east 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 969 goats slaughtered at the Tiaret abattoir, from June 2012 to November 2012. During the study, the slaughterhouse was visited regularly to examine the lungs of slaughtered goats 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 [4], brownish spots [7] and adult worms.

Laboratory Work: To determine species of lung worms, 36 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 [8].

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 969 goats slaughtered at the Tiaret abattoir, 66 (7%) were found to be positive for lungworm. The prevalence of lung worm infections observed in female animals was 9% while in males 5%. There was a statistically significant difference ($P < 0.05$) between the two sexes (Table 1).

The higher prevalence was recorded in adult sheep as compared to younger ($P < 0.05$) (Table 2).

Three species of bronchopulmonary nematodes were identified; namely, *M. capillaries*, *P. rufescens* and *D. filaria*. The proportions of each species were 42%, 25% and 14%, respectively. Mixed infections represented 19% (Table 3).

Table 1: Prevalence of lungworm infections in goats based on sex.

| Sex | No of examined | No of positive | Prevalence (%) |
|--------|----------------|----------------|----------------|
| Male | 477 | 25 | 5 |
| Female | 492 | 41 | 9 * |
| Total | 969 | 66 | 7 |

* $P < 0.05$

Table 2: Prevalence of lungworm infections in goats based on age.

| Age | No of examined | No of positive | Prevalence (%) |
|-----------|----------------|----------------|----------------|
| 1 year | 540 | 28 | 5 |
| 2 years | 242 | 13 | 5 |
| ≥ 3 years | 187 | 25 | 13.5* |

* $P < 0.05$

Table 3: Prevalence of lungworms based on the species of the parasite

| Species of lungworms | No. of positive | Prevalence (%) |
|-----------------------|-----------------|----------------|
| <i>M. capillaries</i> | 15 | 42 |
| <i>P. rufescens</i> | 9 | 25 |
| <i>D. filaria</i> | 5 | 14 |
| Mixed infections | 7 | 19 |

DISCUSSION

Inspection records of slaughtered animals have been used as useful sources for evaluation of the epidemiological aspect of certain diseases in several countries [9]. Postmortem examination revealed that coproscopic examination had limited value in terms of estimating the prevalence of lung worm infections [10].

The result of the present study conducted at Tiaret Abattoir indicated that lungworm infection is one of the common respiratory diseases of goats with an overall prevalence of 7%. High prevalence has been reported 27.08% and 28.02% by Fentahun *et al.* [12] and Welesebet and Mohamed [3], respectively.

The possible explanation for variation in the infection rate could be attributed variations in agroecology of the study areas, which favor or disfavor the survival of parasites larvae [12].

Moreover, according to Bradford [13], the occurrence of lungworms is associated with nutritional status, level of immunity, management practice of the animal, rainfall, humidity and temperature differences and season of examination on the respective study areas.

In the current study, higher level of prevalence was observed in female (9%) animals compared to male animals (5%). This finding coincides with the results of Addis *et al.* [2]. However, the result was not agreed with Netsanet [15] and Teffera [16] who reported equal susceptibility to infection between the two sexes.

In this work, the higher susceptibility of the females' animals 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 [2].

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 [6].

With regard to age, generally, the highest prevalence (15%) was observed in animals of =3years old. In contrast to our observations, Fentahun *et al.* [12], reported that susceptibility to lungworm infection decreases when age of animals increases.

In the present study, *M. capillaries* showed highest prevalence in relation to other species of lung worm in goat followed by *P. rufescens* and mixed infections. Whereas, *D. filaria* was the least prevalent. This result agrees with the findings of Sissay [17] who reported *M. capillaries* to be highest prevalent. In contrast to the present findings, Alemu *et al.* [18] and Nemat and Moghadam [19] reported that *D. filaria* is the most prevalent. This difference in the prevalence of the different species of lungworms could be related to the season of our study (from June to November), development from first stage to infective stage larvae in the snail (In last sprinter) takes 12 to 14 days and the prepatent period can take 30 to 60 days [20].

CONCLUSION AND RECOMMENDATIONS

The overall prevalence of lungworm infection recorded in the study area using post mortem examination was 7%. 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. Three species of respiratory nematodes were identified. *M. capillaries* ranks first followed by *P. rufescens* and mixed infections. *D. filaria* was the least prevalent.

Lungworm infection in the study area is a constraint that requires strong attention.

Treating animal with 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.

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.

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