

# Population dynamics of oribatid mites in an endemic zone of sheep cestodosis in Argentina

Denegri, G.<sup>1,2</sup>; Martinez, P.<sup>1</sup>

<sup>1</sup>Laboratorio de Zoonosis Parasitarias, Facultad de Ciencias Exactas y Naturales, Universidad Nacional de Mar del Plata, Funes 3250 (7600) Mar del Plata, Argentina. <sup>2</sup>CONICET. E-mail: gdenegri@mdp.edu.ar.

## Abstract

**Denegri, G.; Martinez, P.: Population dynamics of oribatid mites in an endemic zone of sheep cestodosis in Argentina.** *Rev. vet.* 18: 2, 92–94, 2007. The dynamics in the occurrence of mites intermediate hosts of anoplocephalid cestodes causing mortalities in lambs, was studied in the southwest of Buenos Aires Province (Argentina). Three farms that breed Corriedale and Lincoln sheep, at Puan District, Buenos Aires Province, were visited monthly (from June to January) to take soil samples from 0 to 6 cm depth. A total of 22 oribatid species were found. Oribatid males, which are most susceptible to infection with larval stages of anoplocephalids, were dominant by the end of spring. *Zygoribatula lata* was the most frequent and abundant species, representing 70–90% of oribatids found. Further understanding of the dynamics of oribatid populations in sheep breeding farms, as well as prophylaxis and treatment alternatives are discussed.

**Key words:** sheep, oribatid mites, population dynamics, intermediate hosts, Anoplocephalidae, Argentina.

## Resumen

**Denegri, G.; Martinez, P.: Dinámica poblacional de ácaros oribátidos en una zona endémica a la cestodosis ovina en Argentina.** *Rev. vet.* 18: 2, 92–94, 2007. Se estudió la dinámica poblacional de ácaros oribátidos como hospedadores intermediarios de cestodos anoplocefálicos en el sudoeste de la provincia de Buenos Aires (Argentina). Tres establecimientos agropecuarios dedicados a la cría de ovinos de las razas Corriedale y Lincoln en el partido de Puan, Provincia de Buenos Aires, fueron visitados mensualmente (desde junio a enero) para la extracción de muestras de suelo de 0 a 6 centímetros de profundidad. Se hallaron en total 22 especies de ácaros oribátidos. Los oribátidos machos fueron los más susceptibles a la infestación de formas larvales de anoplocefálicos a fines de la primavera. *Zygoribatula lata* fue la especie más frecuente y abundante, representando entre el 70% y el 90% de los oribátidos hallados. Se discute la necesidad de conocer la dinámica poblacional de oribátidos en los establecimientos de ovinos y las alternativas profilácticas y de tratamiento de la cestodosis.

**Palabras clave:** oveja, ácaros oribátidos, dinámica poblacional, huésped intermediario, Anoplocephalidae, Argentina.

## INTRODUCTION

Sheep can be infected with adult tapeworms of the family Anoplocephalidae, which may cause severe infected or even lead to mortalities<sup>11</sup>. In Argentina, the most important anoplocephalid species are *Moniezia expansa*, *M. benedeni*, *Thysaniezia giardi* and *Thysanosoma actinioides*. In the southwest of Buenos Aires Province, Argentina, these species produce high mortality rates in lambs in the estival season<sup>1,4,9</sup>.

Life cycles of anoplocephalids include an intermediate host oribatid mites. Oribatid mites live in the upper layers of the soil<sup>2,3,7,8</sup>. In Argentina, 291 species of oribatid mites have been found<sup>10</sup> and many of them

been proved to serve as intermediate hosts of anoplocephalids<sup>3</sup>.

In order control effectively the diseases caused by anoplocephalids, its necessary to obtain adequate date on the biology of oribatid mites, including seasonal patterns in their occurrence.

The aim of this study is to obtain information about oribatid population dynamics in a highly endemic zone of sheep cestodosis, and to relate it with the characters of the definitive hosts.

## MATERIAL AND METHODS

The study area is situated near Puan City, Buenos Aires Province, Argentina. The study was carried out at three farms (farm A, B and C) breeding Corriedale

and Lincoln sheep. Soil samples were monthly collected between June and January at 0-6 cm of depth in containers of 15 cm of diameter. The samples were sent to the laboratory in polyethylene bags and the oribatids were extracted using the Berlesse-Tullgren technique during five days

The obtained oribatids were identified up to species level if possible. Three categories were considered: males, females with eggs and females without eggs. Monthly counts of all the species were done and abundance was determined.

**RESULTS**

Twenty-two oribatid species were found: *Zygoribatula lata*, *Paraphauloppia dactyloscopica*, *Tectocepheus sp.*, *Eremulus sp.*, *Cosmochthonius sp.*, *Oppiidae sp.*, *Podoribates foveolata*, *Oppiella nova*, *Oribatula sp.*, *Haplozetes nudus*, *Epilohmannia sp.*, *Galumna sp.*, *Oppiella suramericana*, *Lauritzenia sp.*, *Rostrozetes foveolatus*, *Scheloribates sp.*, *Banksinoma spinifera monoceros*, *Oribatulidae sp.*, *Xylobates capuccinus*, *Oppia sengbuschi*, *Microzetes sp.* and *Paraphauloppia altimontana*.

The average of individuals/m<sup>2</sup> was 6,720, 12,732 and 4,032 for farms A, B, and C, respectively. *Zygoribatula lata* was the most frequent and abundant species, representing 70 to 90% of oribatids in all samples. In Farms A and B, *Z. lata* was followed by *Oribatula sp.* with less than 10%. In Farm C, other common species were *B. monoceros* (6,9%) and *Tectocepheus sp.* (6,5%). Other species were more or less abundant, depending on the farm and the sampling time. A high number of *Z. lata* males was observed at the end of the spring (Figure 1).

**DISCUSSION**

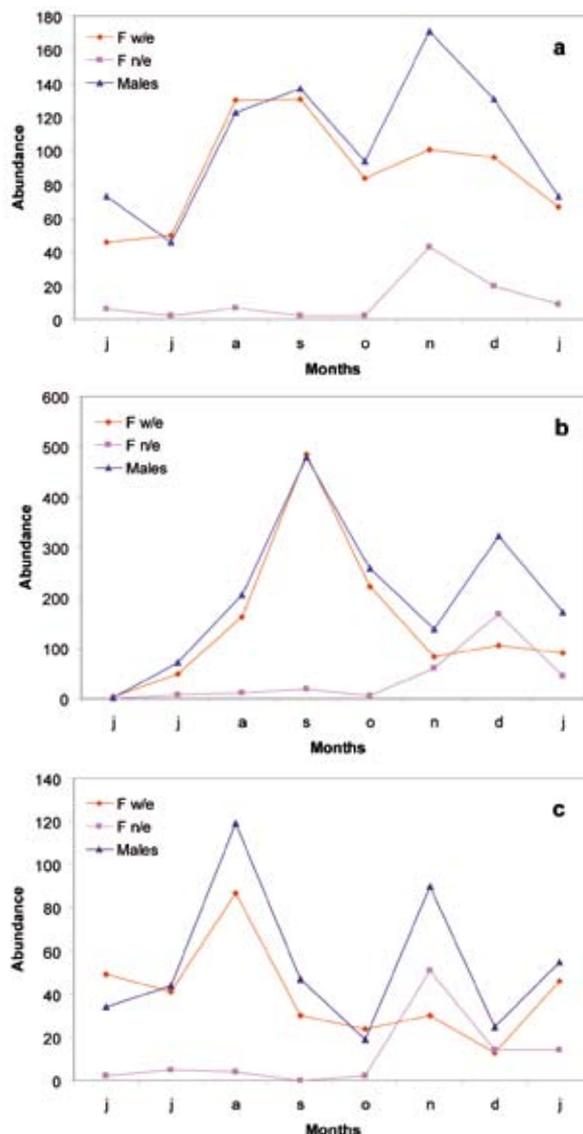
Methods of sheep management depends on the breed and geographic region. In Argentina, from the sheep (Lincoln, Corriedale, Merino among other breeds) Lincoln is the most affected by cestodosis in the study area.

This relates to parturition time, which is late in Lincoln (July-August), and lambs are weaned at the end of October beginning of November. This coincides with high temperature, an increase in the number of oribatids at top layers of soil, and rapid maturation of cysticercoids. In this form, weaned lambs are exposed to a high cestodosis risk, that ends in estival mortality (late January-early February).

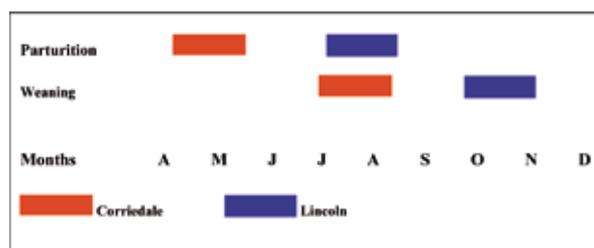
By the other hand, Corriedale sheep have early parturition time (April-May), and lambs are weaned in July-August aging more than six months in summer. For this reason, they are less susceptible to the ingestion of parasites, and consequently there are no massive death rates like those observed in Lincoln lambs<sup>11, 12, 13</sup> (Figure 2).

*Zygoribatula lata*, the most abundant and frequent species in this study, has been reported as intermediate host of *Moniezia expansa* and *Thysaniezia giardi*<sup>3, 11</sup>.

Males and females of this species without eggs are more sensitive to infestation, because of the space the larval stage needs development to infestive cysticercoids. Our results show that male category is most frequent in October and November. *Oppiella nova*, and species of other taxa found in this study (*Galumna*, *Oribatula*, *Scheloribates* and *Xylobates*) have been mentioned as intermediate hosts of anoplocephalids too<sup>3</sup>.



**Figure 1.** Abundance of males, females with eggs (F w/e) and females without eggs (F n/e) of *Zygoribatula lata* by month. a) Farm A, b) Farm B, c) Farm C.



**Figure 2.** Parturition and weaning times of Lincoln and Corriedale sheeps in the study area.

Considering this parasitosis as an annual cycle, must be taken account of all possible factors that could allow us to explain its causes. This pathology shows a marked seasonal tendency, which is aggravated at the end of spring and beginning of summer. The understanding of this behavior implies to point out some topics concerning intermediate hosts related to climatic conditions (e.g. *Z. lata* in spring-summer): i) high oribatid abundance at superficial layer of soil; ii) increase of males and females without eggs, which are more sensitive to infestation; iii) increase of temperature and rain; iv) fast development from larval stages into infestive cysticercoids (45 to 60 days at 23°-25°C)<sup>5,6</sup>.

These results suggest the importance of performing regional surveys of seasonal dynamics of populations of oribatid mites in the areas where sheep cestodosis causes illness and consequent economical losses. In this way, the use of foreign control strategies of this cestodosis, which are based on different climatic and bioecological characteristics, should be avoided.

Our results confirm those obtained by other researchers<sup>11,13</sup> in the same area, who proposed to control intermediate hosts by rotation of plots, and pharmacological treatment of the definitive hosts (sheep) attacking tapeworms at its early phase in September and October (spring). In this way, acute estival (December and January) outbreaks in lambs may be avoided, mainly in Lincoln sheep.

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