UNIVERSITY OF COPENHAGEN

Gastrointestinal parasites of Lamas in the Bolivian Andes

Nissen, Anne Malene; Nees, Ellinor Spörndly; Monrad, Jesper; Kyvsgaard, Niels Christian

Publication date:
2009

Document version
Publisher's PDF, also known as Version of record

Citation for published version (APA):
Nissen, A. M., Nees, E. S., Monrad, J., & Kyvsgaard, N. C. (2009). *Gastrointestinal parasites of Lamas in the Bolivian Andes*. Poster session presented at World Association for the Advancement of Veterinary Parasitology, Calgary, Canada.

DEPARTMENT OF VETERINARY DISEASE BIOLOGY

SECTION FOR PARASITOLOGY, HEALTH AND DEVELOPMENT

FACULTY OF LIFE SCIENCES

UNIVERSITY OF COPENHAGEN, DENMARK

Gastrointestinal parasites of lamas in the Bolivian Andes

[1]Nissen, M.; [2]Spörndly, S.E., [1]Monrad, J. and [1]Kyvsgaard, N.C.

1) Faculty of Life Sciences, Department of Veterinary Disease Biology, Dyrlægevej 100, Frederiksberg C, Denmark. 2) Björkstigen 3, S-75591 Uppsala, Sweden.

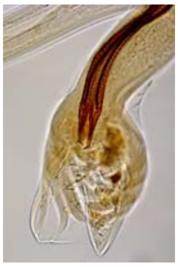


Fig. 1 : *Camelostrongylus mentulatus*, ♂ bursa

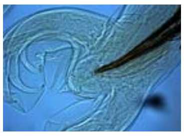


Fig. 2: *Haemonchus contortus*, ♂ bursa

Fig. 3 : *Graphinema aucheniae*, ♂ bursa

Fig. 4. : *Marshallagia occidentalis*, ♂ bursa

Fig. 5. : *Ostertagis ostertagi*, ♂ bursa.

Introduction

Parasitism is a major cause of impaired health and productivity in lamas and other camelids indigenous of South America (Chavez 2007). Two major studies revealing high prevalence rates and relatively large parasite burdens were conducted in Peru and in Chile. To our knowledge lama parasite burdens have not previously been investigated in Bolivia.

Materials and methods

In order to determine the actual prevalences and the potential significance of GIT nematodoses and other Bolivian lama endoparasitoses, a quantitative and qualitative necro-coproparasitlogical study including 33 lamas was conducted on 14 farms located in the most lama dense areas of the Bolivian Andes: Oruro (8 farms represented by 15 lamas), Potosi (4 farms represented by 8 lamas), La Paz (1 farm represented by 4 lamas), and the highlands above Cochabamba (1 farm represented by 6 lamas); the study took place between October and December 2007.

At the time of slaughter the lamas were aged between 1½ and 4 years. Initially, the skeletal muscle surfaces, the liver and the lungs were macroscopically inspected for lesions related to sarcocystosis, fasciolosis and dictyocaulosis, respectively. Subsequently the entire GIT system was removed, and major emphasis was put on identification and quantification of GIT nematode burdens collected from the 3rd stomach compartment (C3), the small intestine (SI) and the large intestine (LI), respectively. From each section a 5% sub-sample of the contents were washed through a 212 µm (C3 and SI) or a 500 µm (LI) wire mesh screen. The worm sub-samples were quantified and separated, preserved in 70% alcohol, and finally the worms were microscopically examined, photographed, measured and identified according to morphological features. *Lamanema chavezi* and *Nematodirus lamae* were identified according to Becklund (1963) and Guerrero et al (1981).

Faecal samples from each of the 33 lamas were examined according to Hansen & Perry (1994) by McMaster for GIT worm eggs and coccidian oocysts, by sedimentation for fluke eggs and by Baermann for lungworm larvae.

Results and discussion

Observations on GIT worm burdens appear in table 1.

In C3: A total of 5 species were recorded, of which *Camelostrongylus mentulatus* infection (fig. 1) was most prevalent (33 %) and most intense (mean of 328 of adult worms per infected animal).

In SI: A total of 10 species were recorded, of which *L. chavezi* was the very most common GIT nematode found in the lamas, at all, with a prevalence rate of 64 % and an intensity of 2121 adult worms per infected animal; it must be taken into consideration that lamanemosis is also the most pathogenic nematodosis of lamas, causing patholocical lesions in the liver of infected animals (see below). Diagram 1 shows that *L. chavezi* worm intesities differed significantly between farms, indicating that farm management and location may affect the farm-specific transmission rates.

Another remarkable observation in this study was the detection of two nematode species - *Nematodirus abnormalis* (fig. 8) and *Trichostrongylus probolurus* (fig. 9) - none of which which have - to the authors' knowledge - been found in lamas previously.

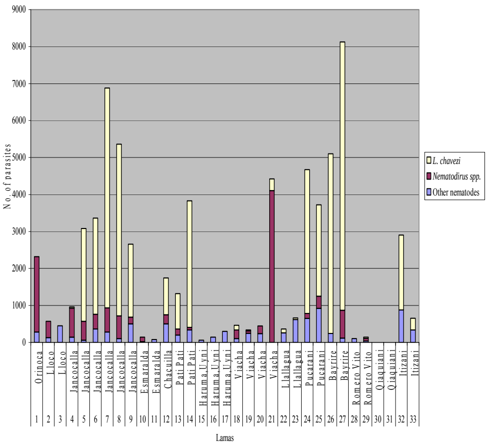
In LI: Two species were recorded, of which *Trichuris* spp. was most prevalent (42 %), while *Skrjabinema* spp. was scarcely observed (3 %), and the latter species is considered non-pathogenic.

Table 1. Species composition, prevalence rates, intensities and range of GIT nematodes recovered in 33 lamas.

Parasite / GIT section	N+*	Prevalences rates %	Intensities* Worms per infected lama	Min./ Max.
C3				
Camelostrongylus mentulatus	11	33	328	20 / 880
Haemonchus contortus	5	15	89	20 / 160
Graphinema aucheniae	4	12	67	40 /100
Ostertagia ostertagi	4	12	65	20 / 140
Marshallagia occidentalis	2	6	50	40 / 60
Small intestine				
Lamanema chavezi	21	64	2121	29 / 7259
Nematodirus spathiger	18	55	565	57 / 4065
Nematodirus spp.*	7	21	84	33 / 227
Nematodirus abnormalis	5	15	55	32 / 109
Nematodirus lamae	4	12	268	83 / 592
Cooperia onchophora	3	9	99	57 / 175
Trichostrongylus probolurus	2	6	200	100 / 300
Trichostrongylus colubriformis	2	6	133	27 / 240
Trichostrongylus vitrinus	1	3	43	43 / 43
Cooperia surnabada	1	3	27	27 / 27
Large intestine				
Trichuris spp.	14	42	140	40 / 420
Skrjabinema spp.	1	3	294	294 / 294

*) N+ = Number of animals infected with a particular nematode (species or genus) ; intensity = mean number of a particular nematode per infected host animal.

Diagram 1. Nematode burdens per infected lama categorised in *Lamanema chavezi*, *Nematodirus* spp. and other nematodes.



In the liver: Fasciolosis (*Fasciola hepatica*) was observed by patholocical of liver flukes in the bile ducts and coprologícal detection of typical eggs in 4 lamas (12 %), all located in the in the La Paz region.

Faecal examination also revealed a high prevalence of GIT coccidiosis, since 82 % of the animals excreted *Eimeria* spp. oocysts. Pathological changes in the liver were ascribed to be most probably caused by *L. chavezi* larva migration, thus focal granulomatous liver processes (figs. 11 and 12), were recorded in 82 % of the lamas in the present study.

In the muscles typical *Sarcocystis aucheniae* processes were observed in 28 animal (85%), i.e. at the very highest prevalence rate recorded for any of the parasitoses detected during the present study; it was found in all farms but one, and it must be kept in mind that sarcocystosis may deteriorate the farmers' economy due to condem-nation of meat containing calcified cyst.

In the lungs: No lungworms were observed on macroscopical inspection; furthermore, no lungworm larvae were detected on coprological examination.

Conclusion

The lama parasite burdens and prevalence rates recorded in the Bolivian Andes did not differ significantly from previous studies on camelids in neigbouring South American countries. Sarcocystosis was most prevalent (85%), but lamanemosis was second (82%) causing, both causing losses to the lama owners. Two GIT nematodes located in the small intestine were recorded in the lama for the first time.

Fig. 6.: Lamanema chavezi, ♂ bursa.

Fig. 7.: *Nematodirus lamae*, ♂ bursa

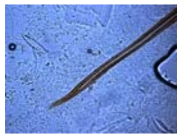


Fig. 8.: *Nematodirus abnormalis*, ♂ spicules

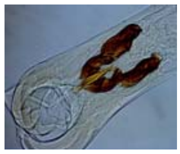


Fig. 9.: *Trichostrongylus probolurus*, ♂ bursa.

Fig. 10.: *Skrjabinema* spp., ♂ bursa.

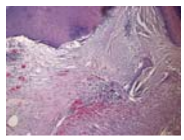


Fig. 11.: Histology of liver process

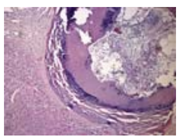


Fig. 12.: Granulomatous of liver lesion

Danish Centre for Experimental Parasitology

FAO Collaborating Centre on Helminthology - WHO/FAO Collaborating Centre for Parasitic Zoonoses