

# STUDY OF THE GASTROINTESTINAL PARASITES IN FELINES FROM ITAIPU BINACIONAL WILD ANIMAL NURSERY, BRAZIL

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**ABSTRACT:** The felines are animals that have great importance for the ecosystem, because they do the control of several species, like small mammals, birds, insects and so on. These predators have been threatened due to the destruction of their habitats and a way to preserve them is their breeding in captivities. This study aims to discover what kinds of intestinal parasites infected the felines (*Leopardus pardalis*, *L. wiedii*, *L. tigrinus*, *Herpailurus yagouarondi*, *Panthera onca*) of the Itaipu Binacional wild animal nursery (CASIB). Two methods were processed in the feline's faecal samples: Sedimentation (HPJ) and Rithie. Among the forty-two felines' enclosures analyzed, 38.09% (16/42) were positive and 61.90% (26/42) negative for intestinal parasites. The genus of parasites found were: *Isospora*, *Toxocara*, *Ancylostoma*, *Toxoplasma* (like oocysts), *Taenia*, *Toxoascaris* and *Spirometra*, in spite of the control of hygiene in the company. This can be due to the visit of intermediate hosts infected in the felines' enclosures.

**KEYWORDS:** Felines. Parasites. Enclosures. Itaipu. Faecal. *Toxocara*. *Isospora*.

## ESTUDO DOS PARASITAS GASTROINTESTINAIS EM FELINOS DO BERÇÁRIO DE ANIMAIS SELVAGENS DA ITAIPU BINACIONAL, BRASIL

**RESUMO:** Os felinos são animais de grande importância para o ecossistema, pois realizam o controle populacional de diversas espécies, tais como pequenos mamíferos, pássaros, insetos entre outros. Estes predadores tem sido ameaçados devido à destruição de seus habitats e uma maneira de preservá-los é sua criação em cativeiros. O objetivo deste estudo foi descobrir que espécies de parasitos intestinais infectam os felinos (*Leopardus pardalis*, *L. wiedii*, *L. tigrinus*, *Herpailurus yagouarondi*, *Panthera onca*) do criadouro de animais silvestres da Itaipu Binacional (CASIB). As amostras fecais dos felinos foram analisadas por dois métodos: Sedimentação (HPJ) e Rithie. Dos quarenta e dois recintos de felinos analisados, 38.09% (16/42) estavam positivos e 61.90% (26/42) negativos para parasitos intestinais. Os gêneros dos parasitos encontrados foram: *Isospora*, *Toxocara*, *Ancylostoma*, *Toxoplasma* (oocistos semelhantes), *Taenia*, *Toxoascaris* e *Spirometra*, apesar do controle de higiene realizado pela empresa. Este parasitismo possivelmente está relacionado à visita de hospedeiros intermediários infectados nos recintos dos felinos.

**PALAVRAS-CHAVE:** Felinos. Parasitos. Recintos. Itaipu. Fezes. *Toxocara*. *Isospora*.

## ESTUDIO DE PARÁSITOS GASTROINTESTINALES EN FELINOS DEL VIVERO DE ANIMALES SILVESTRES EN ITAIPU BINACIONAL, BRASIL

**RESUMEN:** Los felinos son animales de gran importancia para el ecosistema, pues realizan el control de población de diversas especies, tales como pequeños mamíferos, aves, insectos y otros. Estos depredadores han sido amenazados debido a la destrucción de su hábitat y una forma de preservarlos es su creación en cautiverios. Este estudio tuvo como objetivo descubrir qué especies de parásitos intestinales infectan a los felinos (*Leopardus pardalis*, *L. wiedii*, *L. tigrinus*, *Herpailurus yagouarondi*, *Panthera onca*), del vivero de animales silvestres en Itaipu Binacional (CASIB). Las muestras de heces de felinos fueron examinadas por dos métodos: Sedimentación (HPJ) y Rithie. De los cuarenta y dos lugares del cautiverio analizados, 38,09% (16/42) estaban positivas y 61,90% (26/42) negativos para parásitos intestinales. Los géneros de parásitos encontrados fueron: *Isospora*, *Toxocara*, *Ancylostoma*, *Toxoplasma* (ooquistes similares), *Taenia*, *Toxoascaris* y *Spirometra*, a pesar del control de higiene realizado por la empresa. Este parasitismo posiblemente está relacionado con la visita de huéspedes intermediarios infectados en los recintos de los felinos.

**PALABRAS CLAVE:** Felinos. Parásitos. Recintos. Itaipu. Heces. *Toxocara*. *Isospora*.

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## Introduction

The felines in general present nocturnal habits and prevent contact with human. The feeding of this group is constituted of small mammals, insects, rodents, reptiles and birds (EMMONS, 1987). They are animals of great importance for the ecosystem, occupying the top levels in the food-web, or either, controlling several populations of wild animals (VIDOLIN; BRAGA, 2004). The felines, as well as other wild animals, are extremely sensible to the environmental changes provoked mostly by human action. These changes reduce their habitats drastically, compromising the ecological niche.

The increase in the frequency that these environmental changes are occurring has provoked a reduction or even the extinction of many populations of felines in several regions (OLIVEIRA, 1994). A viable alternative for the maintenance of the populations, in view of the huge destruction of its ecosystems, is the breeding of these wild animals in captivity (MORATO; BARNABE, 1998). Aiming at preserving threatened species, the Itaipu Binational company implanted the Itaipu Binacional wild animal nursery (CASIB) which keep and sometimes allow the reproduction of these wild animals. However, the adaptation of the animals kept in captivity requires special strategies, such as the environmental enrichment of the enclosure that reduces stress, disgust and other behaviors that compromise their health (CASTRO apud SHEPERDSON et al., 1998).

One factor to be considered when dealing with animals is the parasitic load that attacks them, which can also make impracticable their reproduction or, in extreme cases, lead then to death (SCHIMITT et al., 2003). The stress, particularly in captivity animals, can result in a lack of appetite and cause a reduction in their immunologic defense system. This deficiency turns the organism into an easy target for opportunist parasites that can increase their population, endangering the life of the host. Thus, to allow the animals to breed and reproduce in captivity, it is necessary to keep their health under control. One way is making a periodic parasitic control. Due to scarce scientific registers about intestinal parasites of wild felines, the aim of the present work was to analyze the parasitism level and to subsidize its control.

## Material and Methods

The felines were grouped by enclosure and each enclosure could contain an isolation feline, in couples (male and female) or in groups. This division resulted in a total of 42 enclosures in the CASIB. The faecal samples were collected in the morning and immediately sent to the Laboratory, for the processing. Each sample was analyzed by two methods: Sedimentation (HPJ) and Ritchie (CARLI, 2001). The slides produced were observed in optic microscope in zoom of 100 and 400X. For register, the majority of the parasitic structures, identified or not, were photographed with the use of a digital camera connected to the microscope. The parasites structures (cysts, eggs and larvae) were identified according to data from literature (GEORGI, 1980; URQUHART et al., 1998; FORTES, 2004). In order to determine the influence of host sex on prevalence, the log-likelihood "G" test was used with 2x2 table (ZAR, 1996).

## Results and Discussion

Among the 42 felines' enclosures, 38.09% (16) were positive for intestinal parasites. Some information indirectly produced through this work was the analysis between the two methods used in the identification of the parasitic structures, HPJ and Ritchie. Among the positive samples, 81.25% (13/16) were detected through the Ritchie method, while 62.5% (10/16) were detected by HPJ method. Thus, in the total (16) of positive samples, 7 (43.75%) were detected through both methods, 3 (18.75%) only by HPJ method and 6 (37.5%) only by Ritchie method. These results show the importance of using more than one method in a parasitological survey; if used only once, the prevalence would have been quite small. The analysis of effectiveness of methods is not recent in the literature (BASSO et al. 1998), and in this case, the Ritchie method has presented itself more sensible when compared with to the HPJ.

In 32 out of 42 enclosures, the felines were isolated by sex (17 with males and 15 with females), while in the 10 remaining enclosures they were coupled. Among the 17 enclosures occupied by males, seven had parasites. Out of the 15 enclosures with females, six were positive. There wasn't a significant statistic difference between the contamination in males and females enclosures ( $G = 0.0046$ ;  $p = 0.9461$ ).

The prevalence of species of felines at CASIB was 35.29% (6/17) for *L. tigrinus*, 100% (3/3) for *H. yagouarondi*, 30.76% (4/13) for *L. wiedii*, 25% (2/8) for *L. pardalis* and 100% (1/1) for *P. onca* (Table 1).

**Table 1.** Positivity in enclosures of the CASIB by feline species.

Feline Species	Enclosures	Positive	%
<i>Leopardus tigrinus</i>	17	6	35.29%
<i>Herpailurus yagouarondi</i>	3	3	100%
<i>Leopardus wiedii</i>	13	4	30.76%
<i>Leopardus pardalis</i>	8	2	25%
<i>Panthera onca</i>	1	1	100%

**Table 2.** Parasitic diversity and prevalence found by feline's species.

Host	Parasite	Prevalence
<i>Leopardus tigrinus</i>	<i>Isospora</i> sp.	11.76% (2/17)
	<i>Toxocara cati</i>	23.53% (4/17)
	<i>Toxoascaris leonina</i>	5.88% (1/17)
	<i>Ancylostoma</i> sp.	5.88% 1/17
	Trematode	5.88% 1/17
<i>Leopardus wiedii</i>	<i>Isospora</i> sp.	33.33% (1/3)
	<i>Toxocara cati</i>	66.67% (2/3)
<i>Leopardus wiedii</i>	<i>Isospora</i> sp.	7.69% (1/13)
	<i>Toxoplasma gondii</i> -like oocysts	15.38% (2/13)
	<i>Taenia</i>	7.69% (1/13)
	Cestode	7.69% (1/13)
<i>Leopardus pardalis</i>	<i>Isospora</i> sp.	25% (2/8)
	<i>Toxocara cati</i>	12.5% (1/8)
	<i>Toxoplasma gondii</i> -like oocysts	12.5% (1/8)
<i>Panthera onca</i>	<i>Toxocara cati</i>	100% (1/1)
	<i>Toxoascaris leonina</i>	100% (1/1)
	<i>Spirometra</i> sp.	100% (1/1)

Wild and domestic felines share great similarity with relation to the genus of their parasites (TORRES et al., 1998; MÜLLER-GRAF et al., 1999; MARTINEZ et al., 2002; RAGOZO et al., 2002; ROBBEN et al., 2004; VALERIO et al., 2004). Among the protists found in this research, the most frequent agents were coccids of the genus *Isospora* 14.28% (6/42). Other works show levels of infection varying from 4.3 to 50% in domestic cats (VANPARIJS et al., 1991; RAGOZO et al., 2002; EPE et al., 2004; ROBBEN et al., 2004). Martinez et al., (2002) mention a frequency of 3.3% in felines of Argentina zoos. Oocysts of *Isospora* sp. were found in all of the “wild cats”, however they did not appear in the enclosure of the “spotted ounce”. A 7.14% (3/42) prevalence of *T. gondii*-like oocysts was observed, only found in *L. pardalis* and *L. wiedii* species. Many works mention, in populations of domestic cats, a prevalence from 0.3 to 36.9% (OVALLE et al. 2000; EPE et al. 2004; MIRO et al. 2004; ROBBEN et al. 2004).

With regard to the found helminths the one who had greater frequency were *Toxocara cati*, in 19.05% (8/42) of the enclosures. We can observe that eggs of *T. cati*. were detected in all the species of felines, except in the *L. wiedii*. Its occurrence was already expected, since parasites of this genus show a large distribution in Brazil (DESPOMMIER, 2003). In felines of the genus *Lynx*, the prevalence of this parasite varies from 37.5 to 68% (TORRES et al., 1998; VALDMANN et al., 2004). An important data with regard to the epidemiology of this parasite is the incidence of transmammary transmission, which associated the great resistance of eggs, guarantee a high prevalence in the endemic regions (URQUHART et al., 1998) and can collaborate with the existence of this parasite in CASIB. Eggs of *Toxoascaris leonina* were found with prevalence of 4.76% (2/42) in the

enclosures and were found in the species of *L. tigrinus* and *P. onca*. This value is considered low when compared with the percentage of 15% of prevalence found in carnivores, which more than a half is consisted of felines from the Park Dois Irmãos in the city of Recife (FREITAS et al., 2001).

Eggs of *Ancylostoma* sp. were only observed in enclosure of *L. tigrinus*, in a low frequency (5.88%) (1/17). An egg of cestode not identified and one of *Taenia* sp. was detected in two different enclosures of *L. wiedii*. This data contrasts with the results found in another study with wild felines (VALDMANN et al., 2004), where the same ones presented the highest levels of contamination by parasites of the genus *Taenia*. However, it is a very close value found in research done with domestic cats (GREGORY; MUNDAY, 1976; NICHOL et al., 1981; ROBBEN et al., 2004).

Finally, one enclosure (*L. tigrinus*) was observed containing non-identified Trematode eggs. Therefore they were not similar to the traditionally known structures. Eggs related to the genus *Spirometra* were observed only in the “spotted ounce”. Reports about this parasite in lions (MÜLLER-GRAF et al., 1999), domestic cats (VALERIO et al., 2004) and in *Panthera onca* (TANTALEAN; MICHAUD, 2005) had already been found. The species of genus *Spirometra* could not be established because the animals were not sacrificed for this.

An unexpected fact was the absence of *Giardia* sp. and *Dipylidium* sp. in the samples, once that they are normally found in cats. Perhaps the *Dipylidium* absence is due to the difficulty of the diagnosis by means of excrement examination. The visualization of the proglotids is the easiest way to determine the infection, whereas since the visualization of eggs-capsules in the faecal is rare (URQUHART et al., 1998).

## Conclusions

We tried to investigate the way which these parasites were brought to CASIB. Some of CASIB's animals are brought from different regions to the breed and go through the quarantine, where they are examined and, if necessary, treated. Later on, they are conducted to the enclosures, which practically eliminate the hypothesis of parasites coming with the field animals.

Another hypothesis is that the contamination has occurred through the animals feeding. However, this is not very probable, once rats and rabbits, which feed the felines, suffer periodical parasitic controls. Therefore, it is improbable that the contamination has occurred through this traditional source of feeding.

The most feasible hypothesis is the contamination possibility through animals that serve as intermediate hosts, come from abundant vegetation next to the captivities, for example, rodents, birds, amphibians, reptiles or other small mammals. These can repeatedly visit the felines' enclosures in search for food and get eaten by the enclosed animals that become contaminated by their parasites (*Spirometra* sp, *Giardia* sp, *T. cati*, *Isospora* sp, *T. gondii*- like oocysts).

## References

- BASSO, W. U. et al. Comparacion de tecnicas parasitologicas para el examen de heces de perro. **Parasitología Al Día**, Santiago, v. 22, n.1-2, p. 52-56, 1998.
- CARLI, G. A. **Parasitología clínica**. São Paulo: Atheneu, 2001. 810 p.
- DESPOMMIER, D. Toxocariasis: clinical aspects, epidemiology, medical ecology, and molecular aspects. **Clinical Microbiology Reviews**, New York, v. 16, n. 2, p. 265-272, 2003.
- EMMONS, L. H. Comparative feeding ecology of felids in a neotropical rainforest. **Behavioral Ecology and Sociobiology**, Berlin, v. 20, n. 1, p. 271-283, 1987.
- EPE, C. et al. Results of parasitological examinations of faecal samples from horses, ruminants, pigs, dogs, cats, hedgehogs and rabbits between 1998 and 2002. **Deutsche Tierärztliche Wochenschrift**, Berlin, v. 111, n. 6, p. 243-247, 2004.
- FORTES, E. **Parasitologia veterinária**. São Paulo: Ícone, 2004. p. 607.
- FREITAS, M. F. L. et al. Perfil coproparasitológico de mamíferos silvestres en cautiverio en el estado de Pernambuco, Brasil. **Parasitología Al Día**, Santiago, v. 25, n. 3-4, p. 121-125, 2001.
- GEORGI, J. R. **Parasitologia veterinária**. Rio de Janeiro: Interamericana, 1980. p. 353.
- GRAF, C. D. M. M. et al. Epidemiology of an intestinal parasite (*Spirometra* spp.) in two populations of African lions (*Panthera leo*). **Parasitology**, Cambridge, v. 118, n. 4, p. 407-415, 1999.
- GREGORY, G. G.; MUNDAY, B. L. Internal parasites of feral cats from the Tasmanian Midlands and King Island. **Australian Veterinary Journal**, Sidney, v. 52, n. 7, p. 317-320, 1976.
- MARTINEZ, F. A. et al. Infección por coccidios en carnívoros silvestres de cautiverio de Argentina. **Parasitología Latinoamericana**, Santiago, v. 57, n. 1, p. 146-148, 2002.
- MIRO, G. et al. Prevalence of antibodies to *Toxoplasma gondii* and intestinal parasites in stray, farm and household cats in Spain. **Veterinary Parasitology**, Iowa, v. 126, n. 3, p. 249-255, 2004.
- MORATO, R. G.; BARNABE, R. C. Biotécnicas de reprodução aplicadas à preservação de felídeos selvagens. **Revista Clínica Veterinária**, São Paulo, v. 3, n. 12, p. 24-26, 1998.
- NICHOL, S. et al. Prevalence of intestinal parasites in feral cats in some urban areas of England. **Veterinary Parasitology**, Iowa, v. 9, n. 2, p. 107-110, 1981.
- OLIVEIRA, T. G. **Neotropical cats**. Ecology and conservation. São Luís: EDUFMA, 1994. p. 220.
- OVALLE, F. et al. Frecuencia de anticuerpos anti *Toxoplasma gondii* en gatos de la ciudad de Valdivia, Chile. **Boletín Chileno de Parasitología**, Santiago, v. 55, n. 3-4, p. 94-99, 2000.
- RAGOZO, A. M. A. et al. Occurrence of gastrointestinal parasites in feces of cats from the cities of São Paulo and Guarulhos. **Brazilian Journal of Veterinary Research and Animal Science**, São Paulo, v. 39, n. 1-6, p. 244-246, 2002.
- ROBBEN, S. R. et al. Infections with helminths and/or protozoa in cats in animal shelters in the Netherlands. **Netherlands Journal of Veterinary Science**, Utrecht, v. 129, n. 1, p. 2-6. 2004.
- SCHMITT, A. C. et al. Infecção pelos vírus da leucemia felina e da peritonite infecciosa felina em felídeo selvagem de vida livre e de cativeiro da região do Pantanal matogrossense. **Acta Scientiae Veterinariae**, Porto Alegre, v. 31, n. 3, p. 185-188, 2003.
- CASTRO, M. I. et al. Environmental enrichment in a reintroduction program for golden lion tamarins (*Leontopithecus rosalia*). In: SHEPERDSON, D. J. J. D.; MELLEEN, M. H. (Ed.). **Second nature**: environmental enrichment for captive animals. Washington: Smithsonian Institution Press, 1998. p. 97-128.

TANTALEAN, M.; MICHAUD, C. Huéspedes definitivos de *Spirometra mansonoides* (Cestoda, Diphyllbothriidae) en el Perú. **Revista Peruana de Biología**, Lima, v. 12, n. 1, p. 153-157, 2005.

TORRES, J. et al. Helminth fauna of the Iberian lynx, *Lynx pardinus*. **Journal of Helminthology**, Cambridge, v. 72, n. 1, p. 221-226, 1998.

URQUHART, G. M. et al. **Parasitologia veterinária**. Rio de Janeiro: Guanabara Koogan, 1998. p. 273.

VALDMANN, H. et al. Helminth fauna of Eurasian lynx (*Lynx lynx*) in Estonia. **Journal of Wildlife Diseases**, Lawrence, v. 40, n. 2, p. 356-360, 2004.

VALERIO, I. et al. Primer hallazgo de *Spirometra mansoni* en *Felis domesticus* de Costa Rica. **Parasitología Latinoamericana**, Santiago, v. 59, n. 3-4, p. 162-166, 2004.

VANPARIJS, O. et al. Helminth and protozoan parasites in dogs and cats in Belgium. **Veterinary Parasitology**, Iowa, v. 38, n. 1, p. 67-73. 1991.

VIDOLIN, G. P.; BRAGA, F. G. Ocorrência e uso da área por carnívoros silvestres no Parque Estadual do Cerrado, Jaguaíva, Paraná. **Cadernos da Biodiversidade**, Curitiba, v. 4, n. 2, p. 29-36, 2004.

ZAR, J. H. **Biostatistical analysis**. New Jersey: Prentice-Hall, 1996. p. 662.

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