

## SHORT COMMUNICATION

### DISTRIBUTION OF *SARCOCYSTIS* IN EQUINE MUSCULAR TISSUE

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**SUMMARY:** The distribution of *Sarcocystis* was studied in several different muscular tissues from 94 horses slaughtered in Apucarana, Paraná State, Brazil, to identify the main site for parasitism. A total of 470 fresh muscle samples were removed from equine carcasses. These samples were from tongue, esophagus, heart and diaphragm for macroscopic and microscopic examination. They were ground and processed to search for parasitic cysts under a stereoscopic microscope. The tongue and esophagus were the tissues with the highest infection rates. No cysts were found at gross post-mortem examination. The present work indicates that the tongue and esophagus are the main sites for parasitism, and should therefore be the target for sanitary inspection procedures.

**KEY WORDS:** *Sarcocystis*, cysts, equine, horses.

Protozoan of the genus *Sarcocystis* are commonly found as cysts located in the skeletal muscles of domestic and wild animals, and in several species of birds, reptile and fishes (KALGACIN & ZASUKIN, 1975; DUBEY, 1976; LEVINE & TADROS, 1980).

Two hosts are needed in order to complete the biological cycle of this genus: an intermediate host (a herbivore, among them the equines) where the asexual phase takes place with the production of schizonts and muscular cysts, and the final host (a carnivore – the dog) where the sexual stage is found with the production of oocysts and sporocysts (FAYER, 1972; HEYDORN & ROMMEL, 1972; ROMMEL *et alii*, 1972; DUBEY, 1976).

Parasitic cysts in the muscle fibers can be found at routine post-mortem gross examination of muscles and several tissues at slaughterhouses, or aspects necropsies. *Sarcocysts* can present a filamentous or various different shapes, depending upon the parasite and host species (DUBEY *et alii*, 1989).

There are several microscopic techniques for the diagnosis of *sarcocysts* at the muscular tissue of intermediate hosts: trichuinoscopy, histology, digestion with pepsin or trypsin, impression on slides, and tissue grinding or maceration.

Of several domestic animal species, muscles from tongue, oesophagus, heart, diaphragm, and skeletal muscle have been

described as the main sites for the occurrence of cysts (HEYDORN & ROMMEL, 1972; FAYER, 1975; DUBEY & STREITEL, 1976; TADROS & LAARMAN, 1976).

This study was aimed at the verification of the distribution of *Sarcocystis* in several tissues, as well as the identification of the main site of occurrence with the purpose of choosing a principal inspection site for the diagnosis of *Sarcocystis* in equines.

Muscular tissue samples were collected from 94 equines from a slaughterhouse from Apucarana, Paraná State, Brazil. A total of 470 samples were taken from tongue, esophagus, heart, diaphragm, and skeletal muscles.

After collection, tissue samples were sliced and a gross examination was performed to find *sarcocysts*.

The fat-free tissue samples were sliced into 20 g fragments and 100 ml of distilled water was added to each. The material was then ground for 15 minutes with a food processor, and filtered with the help of gauze folded four times. It was then allowed to decant in a sedimentation flask for 20 minutes, after which the supernatant was discarded, and the sediment placed in a Petri dishes with 2 or 3 drops of distilled water and examined under stereomicroscope for cysts.

No cysts were found by the visual inspection of tissues. DUBEY & FAYER (1983) describe some *Sarcocystis* species

in the principal domestic animals, and identify *Sarcocystis equicantis* as a parasite of equines, which can be seen under microscopic examination. *Sarcocystis fayeri* was also described, but this species can be found by gross examination.

The muscular structures (tongue, esophagus, heart, diaphragm) studied presented cysts at microscopic examination, after being processed by the grinding technique (Fig. 1).

Of the 94 equids examined, 45 (47.8%) presented sarcocysts. The occurrence in different organs was: 21 (46.6%) in the tongue, 7 (15.5%) in the esophagus and 12 (26.6%) in both. For simultaneous occurrence in more than one site of parasitism: only 1 (2.2%) presented cysts in the tongue and in the heart, 1 (2.2%) in tongue, esophagus and diaphragm, 1 (2.2%) in esophagus and in the heart, 1 (2.2%) in the esophagus and diaphragm, and 1 equine (2.2%) showed cysts in the esophagus and diaphragm. The remainder of animals 49 (52.1%) did not show any muscular cysts in any of the tissues examined (Table 1).

The tongue presented a higher frequency of occurrence among the tissues examined, followed by the esophagus.

ARRU & COSSEDU (1975) in Italy, ROMMEL & GEISEL (1975) in Germany, DUBEY *et alii* (1977) in USA, GORMAN *et alii* (1981) in Chile, EDWARDS (1984) in England, KIRMSE (1986) in Morocco, HILALI & NASSAR (1987) in Egypt and ACHUTHAN & RAJA (1990) in India, identify the esophagus as the main site for parasitism. In Brazil, LUZ PEREIRA *et alii* (1992) also found the esophagus to be the election site for parasitism in horses slaughtered in Paraná State, Brasil.

Some workers, using experimental inoculation, found sarcocysts in the esophagus and in the tongue. MATUSCHKA (1983) used sporocysts from dogs and inoculated them in foals obtained the development of muscular cysts. FAYER & DUBEY



Fig. 1 - *Sarcocystis* in the tongue of a horse, embedded in saline (1230x).

Table 1. Frequency of *Sarcocystis* in different muscular tissues of equines slaughtered in a slaughterhouse, Apucarana, Paraná State, Brazil.

Tissues examined	Nº equines positive	Percentage of animals positive	Percentage of animals examined
Tongue	21	46,67	22,35
Esophagus	07	15,56	7,44
Heart	0	0	0
Diaphragm	0	0	0
Tongue - esophagus	12	26,67	12,77
Tongue - heart	01	2,22	1,06
Tongue - diaphragm	01	2,22	1,06
Esophagus - heart	01	2,22	1,06
Esophagus	01	2,22	1,06
Esophagus - diaphragm	01	2,22	1,06
Sub-total	45	-	47,87
Negative	49	-	52,13
Total	94	-	100

(1982) found sarcocysts in the esophagus, diaphragm and tongue of horses and ponies after experimental inoculation. The authors concluded that the tongue was the tissue with the highest infection rate, and they did not find cysts in the heart, agreeing with DUBEY *et alii* (1977) and with the present work.

## SUMÁRIO

*Sarcocystis* foram pesquisados em diversos tecidos musculares (língua, esôfago, coração, diafragma e pilar do diafragma) em 94 equídeos, abatidos em matadouro-frigorífico no município de Apucarana - Paraná, para verificar sua distribuição tecidual e identificar os tecidos de eleição à pesquisa destes protozoários. O diagnóstico foi realizado através do exame

macroscópico dos cistos e exame microscópico através da técnica de trituração da musculatura utilizando-se um processador de alimentos. Os cistos foram diagnosticados microscopicamente e os tecidos de maior parasitismo foram a língua e o esôfago, considerados os tecidos musculares de eleição à pesquisa de *Sarcocystis* na espécie equina.

**PALAVRAS-CHAVE:** *Sarcocystis*, sarcocistos, cistos, equinos, equídeos, protozoários.

## REFERENCES

- ACHUTHAN, H. & RAJA, E.E. (1990) Occurrence of *Sarcocystis* sp. in horse (*Equus caballus*). Indian Vet. J., v.67, n.5., p.472.
- ARRU, E. & COSSEDU, A. M. (1975) Diffusione e distribuzione dei Sarcosporidi negli animali da macello in Sardegna. Clinica Veterinaria. v.99, p.322-327.
- DUBEY, J. P. (1976) A review of *Sarcocystis* of domestic animals and other coccidia of cats and dogs. J. Amer. Vet. Med. Ass., v.169, n.10, p.1061-1078.
- DUBEY, J. P. & STREITEL, R. H. (1976) Shedding of *Sarcocystis* in feces of dogs and cats fed muscles of naturally infected food animals in the Midwestern United States. J. Parasitol., v.62, n.5, p.828-830.
- DUBEY, J. P. & FAYER, R. (1983) Sarcocystosis. Brit. Vet. J., n.139, p. 371-377.
- DUBEY, J. P.; SPEER, C. A. & FAYER, R. (1989) Sarcocystosis of animals and man. Boca Raton, CRC Press, 215 p.
- DUBEY, J. P.; STREITEL, R. H.; STROMBERG, P. C. & TOUSSANT, M. J. (1977) *Sarcocystis fayeri* sp. n. from the horse. Brit. Vet. J., n.63, p.443-447.
- EDWARDS, G. T. (1984) Prevalence of equine *Sarcocystis* in British horses and a comparison of two detection methods. Veterinary Record, v.115, p.265-267.
- FAYER, R. (1972) Gametogony of *Sarcocystis* sp. in cell culture. Science, v.175, p.65-67.
- FAYER, R. (1975) Effects of refrigeration, cooking and freezing on *Sarcocystis* in beef from retail food stores. Proc. Helminth. Soc. Washington, v.42, n.2, p.138-140.
- FAYER, R. & DUBEY, J. P. (1982) Development of *Sarcocystis fayeri* in the equine. J. Parasitol., v.68, n.5, p. 856-860, 1982.
- GORMAN, T.; ALCAINO, H. & ROBLES, M. (1981) Sarcosporidiosis en especies de abasto de la zona central de Chile. Archivos de Medicina Vet., v.13, n.2, p.39-43.
- HEYDORN, A. O. & ROMMEL, M. (1972) Contributions to the cycle of the sarcosporidia. II. Developmental stages of *Sarcocystis fusiformis* in the alimentary tract and in the faeces of dog and cats. Berl. Muench. Tierarztl. Wochenschr., v.90, p.218.
- IIIHALI, M. & NASSAR, A.M. (1987) Ultrastructure of *Sarcocystis* spp. from donkeys (*Equus asinus*) in Egypt. Veterinary Parasitology, v.23, p.179-183.
- KALGACIN, V. N. & ZASUKIN, D. N. (1975) Distribution of *Sarcocystis* (Protozoa: sporozoa) in vertebrates. Folia Parasitol., v.22, p.289-307.
- KIRMSE, P. (1986) Sarcosporidiosis in equines of Morocco. British Veterinary Journal, v.142, n.1, p.70-72.
- LEVINE, D. & TADROS, W. (1980) Named species and hosts *Sarcocystis* (Protozoa: Apicomplexa Sarcocystidae). Sist. Parasitol., v.2, n.1, p.41-59.
- LUZ PEREIRA, A. B.; GUIMARÃES Jr., J.S.; BONESI, G.L. & YAMAMURA, M. H. (1992) Frequência de *Sarcocystis* em equinos abatidos em Apucarana-Pr. In: XXII CONGRESSO BRASILEIRO DE MEDICINA VETERINÁRIA, Curitiba, Anais. p.225.
- MATUSCHKA, F. R. (1983) Infectivity of *Sarcocystis* from donkey for horse via sporocyst from dogs. Z. Parasitenkd., v.69, p.299-304, 1983.
- ROMMEL, M.; HEYDORN, A. O. & GRUBER, F. (1972) Beitrage zum Lebenszyklus der Sarkosporidien. I. Die Sporozyste von *S. tenella* in den Fazes der Katze. Berl. Munch. Tierarztl. Wschr., v.85, p.101-105.
- ROMMEL, M. & GEISEL, O. (1975) Untersuchungen über die Verbreitung und Lebenszyklus einer Sarkosporidienart des Pferds (*Sarcocystis equicanis* n. sp.) Berl. Munch. Tierarztl. Wschr., v.88, p.468-471.
- TADROS, W. & LAARMAN, J. J. (1976) *Sarcocystis* and related coccidian parasites: a brief discussion on some biological aspects of their life cycles and a new proposal for their classification. Acta Leidensia, v.44, p.1-107.

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