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Research article

Incidence of *Sarcocystis* spp. infestation in pork and wild boar samples in Transylvania

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Abstract. The prevalence of *Sarcocystis* spp. in pork and wild boar sample from Transylvania area has not been extensively studied and many consumers are not aware of the possible risks that they are exposed to. This study was conducted on a total of 150 samples, of which 120 were represented by diaphragmatic pillars collected from domestic pigs raised in extensive systems and 30 by muscle tissue from wild boars. The method used for identifying the *Sarcocystis* spp. cysts was represented by classical trichinelloscopy, which normally can also detect these forms. From the total number of samples examined, 64% were found positive and 23% declared with massive contamination of the carcass. In conclusion we established that the pork meat produced in the traditional system represents a risk in consumers' contamination with *Sarcocystis* spp.
Key Words: pork, wild boar, *Sarcocystis*, diaphragmatic pillars.

Introduction. The first discovery of *Sarcocystis* spp. cysts was published in 1834 by Miescher who revealed their presence in the striated muscles of rodents, reason why they are also known as 'Miescher's Tubules'. Their occurrence was found to be higher in striated muscles and lower in the heart or brain of the hosts. They are looked for in the striated muscles of various animal species such as: pigs, horses, bovines, birds etc. Given the fact that the occurrence mechanism was not fully understood, the disease was considered to be unimportant. It was only in 1972 that the researchers have elucidated the life cycle patterns and the possible transmission routes to humans (Fayer 1972; Heydorn & Rommel 1972). From that moment it was established that this parasite has a two-host life cycle and the herbivores and omnivores are the intermediate hosts. The definitive hosts become infected with *Sarcocystis* spp. by ingesting the sarcocysts found in the muscles of the intermediary hosts (Dubey 1976; Levine 1977; Mehlhorn & Heydorn 1978; Stalhein et al 1980; Dubey & Feyer 1983; Tadros & Laarman 1976; Dubey et al 1989).

Humans acquire the disease by eating raw or undercooked meat which contains schizonts of *Sarcocystis hominis* and *S. suihominis*. The prevalence of this parasite in meat has been declared in many countries (Ginawi & Shommein 1977) but unfortunately an accurate investigation in Romania has not yet been published. The clinical signs of intestinal sarcocystosis in humans are digestive system disturbances such as nausea, vomiting, and diarrhoea (Dubey et al 1989) especially in immunocompromised patients (Velásquez et al 2008). In a study conducted by Li et al (2007) it was reported on a human experimental model that signs of abdominal distension are noticed about five hours after infection. The muscular sarcocystosis disease in human is normally caused by *S. lindemanni*.

Given the great risk of contamination for humans, this study aimed at investigating the prevalence of *Sarcocystis* spp. in pork and wild boar meat destined for consumption.

Materials and methods.

Sampling. The pork samples represented by diaphragmatic pillars (n=120) were brought in by the consumers in order to investigate the possible occurrence of *Trichinella* spp. Other muscle samples (n=30) were taken from wild boars which were hunted in the surrounding areas. The samples were all examined one hour after they were brought in, within The Food Safety Laboratory from The Faculty of Veterinary Medicine, Cluj-Napoca.

Identification of Sarcocystis spp. The examination followed the steps normally stipulated by the European Directive for identification of *Trichinella* spp. (EC Reg 2075/2005). Briefly, 28 small pieces of muscle tissue weighting 0.5 g were cut along the length of the muscle fibre. The muscle pieces were compressed between two thick glass plates of the compressorium until they became translucid. Each compressed field was examined individually for *Trichinella* cysts but also for the possible occurrence of *Sarcocystis* spp. The examination was performed with a trichinoscope with 15x and 40x magnification.

Statistical methods. The statistics was performed with Origin 8.5 software and one way ANOVA and the least significant difference test was applied to accurately state the results. Differences were considered significant at a *p* value lower than 0.05.

Results and discussion. Following trichinelloscopy it was noted that a large amount of samples from the total (n=150) were found positive for *Sarcocystis* spp. These samples revealed characteristic cysts in the muscle fibres examined (Figures 1 and 2) which cannot be mistaken for *Trichinella* spp. (Figure 3).

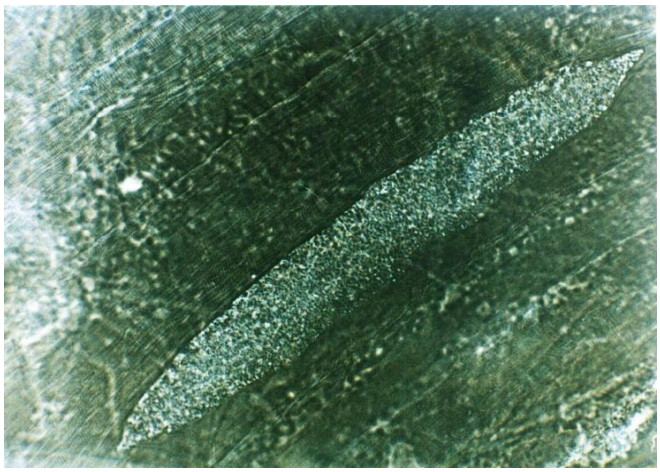

Figure 1. Characteristic cyst of *Sarcocystis* spp. isolated from pork samples.

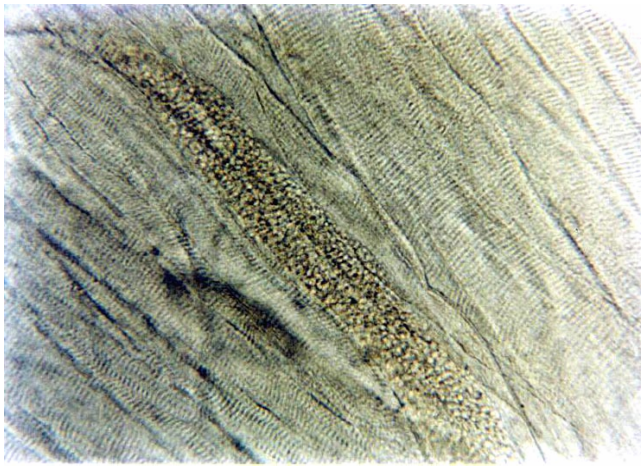

Figure 2. Characteristic cyst of *Sarcocystis* spp. isolated from wild boar meat samples.

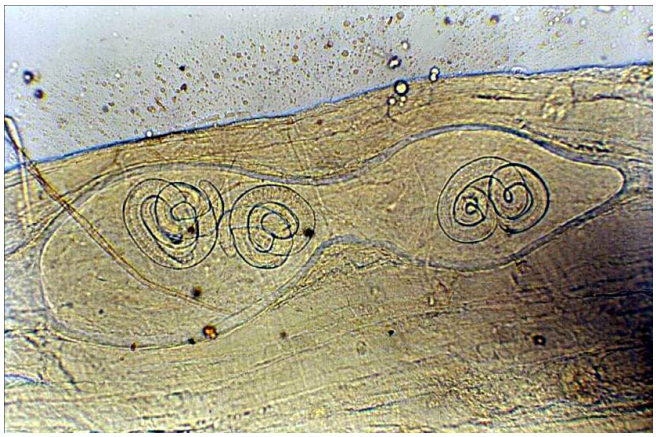

Figure 3. Characteristic *Trichinella* cysts isolated in one of the pork samples.

When comparing the frequency of *Trichinella* spp. in the meat samples examined with the prevalence of *Sarcocystis* spp. we found significant differences ($p<0.05$). *Trichinella* spp. was identified only in one sample, which was further confirmed through artificial digestion in our laboratory.

The wild boar meat samples were fewer, but with a higher rate of prevalence (100%). This fact might be due to the higher possibility of contamination in the wild and the lack of disinfestations in wild boars. Comparing the statistics for the two species, we can state that the incidence of contamination is higher in wild boar meat than it is in pork. Unfortunately even though there is such a high prevalence in Romania the identification of *Sarcocystis* spp. in meat destined for public consumption in not mandatory. Only the examination for *Trichinella* spp. is obligatory and the reference method is the artificial digestion which does not reveal the presence of *Sarcocystis* spp.

Table 1

The prevalence of *Sarcocystis* spp. and *Trichinella* spp in pork and wild boar meat samples

Species	No. of samples examined	No. of samples positive for *Sarcocystis* spp.	No. of samples positive for *Trichinella* spp.	*p*
Domestic pig	120	67	1	<0.05
Wild boar	30	30	0	<0.05

Sarcocystosis is a very important disease that should be monitored given the various clinical intestinal symptoms. It was recently discovered the most dangerous food incriminated in the transmission of this disease is fast food. For example, Americans consume about five billion hamburgers each year (Prayson 2008) and for that matter, also the incidence of the disease is higher. Other researches showed also that that there was a considerable infection rate in sheep and cattle infected with *Sarcocystis* spp. in Iran and throughout the world (Ginawi & Shommein 1997). This shows that our environment is contaminated with this parasite and strict measures have to be taken in order to prevent the infestations in humans. One particular study conducted by Rahdar and Salehi (2011) indicated that hamburgers, sausages and hot dogs were infected with *Sarcocystis* in a percentage of 56%, 8% and 20%, respectively. Unfortunately in our country there are few investigations related to meat product contamination with *Sarcocystis*.

Conclusions. This study shows that there is a high prevalence of *Sarcocystis* cysts in the pork and wild boar meat produced in Transylvania. The risk of human contamination is present and for that matter a strict surveillance and monitoring is needed in order to prevent the disease occurrence in humans.

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