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## Helminths of Wild Boar in Spain

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**ABSTRACT:** Forty-seven wild boars (*Sus scrofa*) collected from two areas in the province of Valencia (eastern Spain) were examined for digestive and respiratory helminth parasites. Helminth species and their prevalence were *Taenia hydatigena* cysticercus (19%), *Ascarops strongylina* (87%), *Physocephalus sexalatus* (6%), *Ascaris suum* (2%), *Metastrongylus* spp. (85%), *Capillaria* sp. (2%) and *Macracanthorhynchus hirudinaceus* (21%). *Trichinella* spp. were not found. *Physocephalus sexalatus*, *A. suum*, *Capillaria* sp. and *M. hirudinaceus* were found only in wild boars collected from one area (National Hunting Reserve of Cortes de Pallás). *Macracanthorhynchus hirudinaceus* did not occur in hogs < 1-yr-old, whereas the intensity of *Metastrongylus* spp. infection was the greatest in this age group.

**Key words:** Helminth parasite fauna, survey, *Sus scrofa*, wild boar.

Although the helminth parasites of domestic hogs are well documented in Spain, little information is available about the digestive and pulmonary helminth infections of wild boar (Cordero-del-Campillo et al., 1994). The aim of this study was to elucidate the helminth fauna of wild boar (*Sus scrofa*) in the province of Valencia (Mediterranean Spain) in order to know the species implicated and to estimate their prevalence.

Forty-seven wild boars (26 male and 21 female) were shot by authorized hunters during the 1999 hunting season (October to February) in the province of Valencia (40°13' to 38°41'N, 0°01' to 1°32'W). Twenty-one animals were shot in the National Hunting Reserve of Cortes de Pallás (64.5 km<sup>2</sup>) and 26 were shot in Los Serranos-Alto Turia region (56.6 km<sup>2</sup>). Both areas are mountainous and covered with natural perennial forest, characterized by *Pinus halepensis* and *Quercus ilex* (Cortes de Pallás); and *Pinus sylvestris* and *Juniperus thurifera* (Los Serranos) as the predominant trees. Mean elevation varies

from 635 m above sea level in Cortes de Pallás to 949 m above sea level in Los Serranos. In terms of climate, both areas belong to the Mediterranean region with an arid period during the summer. Monthly rainfall and mean annual temperature are 26 mm and 13 to 17 C, respectively for Cortes de Pallás, compared to 16 mm and 8 to 13 C for Los Serranos.

Wild boars were necropsied immediately after death. Thoracic and abdominal viscera were isolated, ligated, removed, placed into plastic bags, labeled, and brought to the laboratory in refrigerated containers. Data recorded at sampling time included site of shooting and sex and age of wild boars. Host age was estimated according to Sáenz-de-Buruaga et al. (1991) and three age-groups were established based on tooth development (<1-yr-old, 1- to 3-yr-old, and >3-yr-old).

In the laboratory, complete digestive and respiratory tracts were opened, examined macroscopically, and large helminths were removed. After that, the mucosa of the stomach and the small and large intestines was scraped and the contents were washed with tap water on a 60-mesh sieve (aperture size 250 µm) in order to retain the adult helminths. All the sieve contents were examined in a Petri dish under a dissecting microscope. Parasites were fixed in 70% ethanol and cleared with lactophenol blue solution for identification according to Soulsby (1982). Sometimes lungs and stomach were destroyed by gunshot and a fecal sedimentation and Baermann exam was performed on the rectum contents (Sloss et al., 1994). Due to its zoonotic importance, the presence of *Trichinella* spp. larvae also were examined by means of trichinelloscopy (compressorium method) using 1.0 g of

tongue and pillars of the diaphragm as muscle samples (Kaufmann, 1996).

Chi-squared tests of independence were used to portray any association between helminth infections and wild boar site of collection, sex, and age-group. For statistical analysis the Epi Info computer package was used (Epi Info 6, 1994). Values of  $P \leq 0.05$  were considered to be significant.

One species of cestode, one acanthocephalan and at least five nematodes were identified. Helminth prevalence, intensity, and abundance are listed in Table 1 (Margolis et al., 1982). All but one of the wild boars examined (98%) were infected with one to five species of mature helminths. All helminths reported in our study are found in the domestic pigs in Spain, especially those reared under traditional practices (Rueda-Sabater and Montes-Tejeda, 1990; Cordero-del-Campillo et al., 1994). However, this is the first report of the cysticercus of *Taenia hydatigena*, *Ascarops strongylina*, *Physocephalus sexalatus* and *Macracanthorhynchus hirudinaceus* in wild boar in Mediterranean Spain. Some of the common helminths are transmitted by intermediate hosts such as earthworms and dung beetles. Only *A. suum* has a direct life cycle.

The most prevalent helminthiasis were *A. strongylina* and *Metastrongylus* spp. (Table 1). Other nematodes like *P. sexalatus* and *A. suum* seem to have minor importance. Capillariid eggs were identified by means of coprological examination in one animal. It is probable that these were *Capillaria garfiai* described previously in wild boar in Catalonia, northeast of Spain (Gállego et al., 1977). *Trichinella* sp. larvae were not found in the muscle samples we examined, but the number of animals used in this study may have been too small to enable an evaluation of the importance of wild boar trichinellosis in Mediterranean Spain. The estimated prevalence of trichinellosis in wild boar is 0.08 to 0.48% in other areas of Spain according to Pozio (1998).

Pereira-Bueno et al. (1994) found that

TABLE 1. Helminth prevalence, intensities and abundance from 47 wild boars hunted in the province of Valencia (Mediterranean Spain) in 1999.

Species	Site	Prevalence	Intensity		Abundance	
			Mean $\pm$ SE	Range	Mean $\pm$ SE	Total individuals
<i>Taenia hydatigena</i> cysticercus	mesenteries and liver	19 (9) <sup>a</sup>	1.2 $\pm$ 0.15	1-2	0.2 $\pm$ 0.08	11
<i>Ascarops strongylina</i>	lower esophagus and stomach	87 (41)	23.4 $\pm$ 5.80	1-166	20.0 $\pm$ 5.10	937
<i>Physocephalus sexalatus</i>	stomach	6 (3)	6.0 $\pm$ 2.00	4-10	0.4 $\pm$ 0.24	18
<i>Ascaris suum</i>	upper intestine	2 (1)	1.0	1.0	0.02	1
<i>Metastrongylus</i> spp.	lungs	85 (40)	72.2 $\pm$ 19.01	1-522	59.0 $\pm$ 14.85	2,528
<i>Capillaria</i> sp.	feces <sup>b</sup>	2 (1)	unknown	unknown	unknown	unknown
<i>Macracanthorhynchus hirudinaceus</i>	lower intestine	21 (10)	4.3 $\pm$ 1.38	1-16	0.9 $\pm$ 0.38	43

<sup>a</sup> % prevalence (number hosts infected).

<sup>b</sup> Eggs found by coproscopic examination.

50% of 20 wild boars from Riaño Mountain (province of León, northcentral Spain) were infected with helminths. In that survey *Metastrongylus* spp. prevalence was lower (55%) than those reported in this study, and *A. strongylina* was not reported. However, the diversity of wild boar helminth parasites is similar in both areas (7 and 8 species in northcentral and Mediterranean Spain, respectively). Humbert and Henry (1989) showed high prevalence rates (>90%) of *A. strongylina* and *Metastrongylus* spp. in wild boars from France, but in our study wild boar infected with *P. sexalatus*, *A. suum*, *Capillaria* sp. and *M. hirudinaceus* were only found in animals hunted in the National Hunting Reserve of Cortes de Pallás.

Our study shows that no parasites differed significantly in prevalence from different host age groups and between both host sex groups, except for *M. hirudinaceus*, which was only found in hosts >1-yr-old (Chi-square = 7.24, df = 2,  $P = 0.026$ ). The prevalence rates of the stomach spirurid and lung nematodes tended to increase with age. However, the intensity of *A. strongylina* and *Metastrongylus* spp. infections were greater in wild boars <1-yr-old compared to older animals, but no significant differences could be demonstrated. Elevated intensities of stomach and lung helminth parasites have been reported in young wild boars compared to adult ones (Humbert and Henry, 1989).

Finally, apparent health status of wild boar examined was good and no gross lesions on internal organs associated to helminths reported were detected. But a hypersecretion of bronchiolar and stomach mucus was observed in animals with higher *Metastrongylus* spp. and *A. strongylina* intensities, respectively. In summary, this study reveals that helminth infections, especially ascariasis and metastrongylosis in wild boar in Mediterranean Spain are widespread, but no major zoonotic parasite species was found.

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