

## HIGH PREVALENCE OF *TRICHINELLA NATIVA* INFECTION IN WOLF (*CANIS LUPUS*) POPULATIONS OF TVIER AND SMOLIENSK REGIONS OF EUROPEAN RUSSIA

CASULLI A.\*, LA ROSA G.\*, AMATI M.\* & POZIO E.\*

### Summary :

Domestic and sylvatic trichinellosis have frequently been documented in European regions of Russia, with the highest prevalence reported in wolves (*Canis lupus*). From 1998 to 2000, 75 carcasses of wolves shot by hunters were tested for *Trichinella* larvae, and 73 (97.3 %) of them were found to be positive. This very high prevalence of infection, the highest ever detected in a natural population of carnivores, could be explained by the human impact on the natural ecosystem. In fact, the diet of wolves living in the region under study mainly consists of carcasses of dogs and wolves, which are left in the forest or used as bait by hunters.

**KEY WORDS :** *Trichinella nativa*, wolf, European Russia, human influence.

Domestic and sylvatic trichinellosis have frequently been documented in European regions of Russia (Bessonov, 1985; 1994). The highest prevalence (i.e., up to 61 %) has been reported in wolves (*Canis lupus*), which is the most abundant large predator in Russia, where it is still considered as a pest species (Bibikov, 1994). In the Tvier and Smoliensk regions, the wolf is persecuted with many killing methods and governmental hunting offices pay a bounty for each kill. The ecology of the wolf varies with the specific environment. In recent years, the human impact on the natural ecosystem of Russia has changed as a result of social and economic changes. The aim of the present study was to investigate the prevalence of *Trichinella* infection in wolves in an area of European Russia where previous surveys showed a high hunting pressure on wildlife and to determine the correlation between prevalence and trophism.

### MATERIALS AND METHODS

The study area covers approximately 40,000 km<sup>2</sup> in the Tvier and Smoliensk regions of northwest Russia (54° N 31°E to 57°N 35°E). The study was carried out during the winters of 1998-99 and 1999-2000. Carcasses of wolves were collected from hunting offices and local farmers. The diet of these wolves was investigated by examining stomach contents, which was expressed as the percent frequency of occurrence (PFO). Specifically, PFO is the frequency with which each food item is detected, and it is expressed as the percentage of the total number of occurrences of all food items, rather than a percentage of the total number of stomachs (Lockie, 1959). Muscle samples of about 50 g were taken from the anterior tibial. Samples were frozen at -20°C and transported in ice from the study regions to Italy, where they were again frozen at -20°C until use. All muscle samples were digested according to standard protocols. Larvae from positive samples were washed several times in cold water and counted under a microscope in ice. Five larvae from each sample were collected separately in a conical tube with 5 µl of water and frozen at -30°C. Muscle larvae were identified by a multiplex-Polymerase Chain Reaction according to a published protocol (Zarlenga *et al.*, 1999). Muscle larvae of reference strains of *Trichinella spiralis* (code ISS3), *T. nativa* (ISS10), *T. pseudospiralis* (ISS13), and *T. britovi* (ISS2) were used as controls.

### RESULTS

Muscle samples were collected from 75 wolves, of which 73 (97.3 %) were found to be positive for *Trichinella* larvae. The average number of larvae per gram was 5.8 (range 0.036-33.3). *Trichinella nativa* was the most common species detected in wolves, whereas *T. britovi* was detected in only one animal. Diet was investigated in 63 wolves. The PFO was 38 % for wolf and dog, 30 % for moose, 5 % for small rodents, 4 % for wild boar, domestic

\* Laboratory of Parasitology, Istituto Superiore di Sanità, viale Regina Elena 299, 00161 Rome, Italy.

Correspondence: E. Pozio.

Tel.: +390649902304 - Fax: +390649387065 - e-mail: [pozio@iss.it](mailto:pozio@iss.it)

ungulates, and hedgehog, 3 % for bear and badger, and 9 % for birds and other mammals.

## DISCUSSION

In Russia, in the years 1979-1983, the prevalence of *Trichinella* infection ranged from 33.3 % to 65.2 % in wolves and from 6.8 % to 37.5 % in red foxes (Bessonov, 1985). In 1993, in the European regions of Russia, the prevalence of infection was reported to be 35.7 % in wolves and 22.2 % in raccoon dogs (Bessonov, 1994). The prevalence of 97.3 % found in our study is the highest prevalence ever documented in wolves and other sylvatic mammals in any region of the world. Regarding the cause of this extremely high prevalence, the study of the trophism of wolves in the regions of Tvier and Smoliensk showed that domestic dogs killed near villages and skinned carcasses of wolves left in the forest by hunters represented the most important source of food for this carnivore (38 % PFO), whereas the PFO for moose, which had been the most important natural prey of wolves in the area under study, was only 30 %. In fact, in the regions under study, hunters use wolf carcasses as bait for other wolves and at the same time they exert a strong hunting pressure on the moose population, removing most of this animal species from the habitat. Furthermore, the population density of wild boars is very low, which explains the low PFO observed for this species. This epidemiological picture suggests that improper human behaviour is the main cause not only of domestic trichinellosis but also of the high prevalence of infection in wildlife. A similar epidemiological picture has been described in northern Kazakhstan (Irtysh territory), where the prevalence of *T. nativa* infection in the corsac fox population has been reported to be as high as 50 %, because of improper human behaviour. In fact, during the winter, hunters use fox carcasses as bait and improperly dispose of residues of carcasses, which represent a new source of infection for other foxes (Batkaev & Vakker, 1992).

The presence of *T. nativa* as the most important etiological agent of sylvatic trichinellosis in this geographical area of Europe is not surprising because the Tvier and Smoliensk regions are located to the north of the -6°C isotherm in January, which is the southern limit of the distribution of this *Trichinella* species (Shaikenov, 1992; Pozio *et al.*, 1998). The presence of *T. britovi* in a wolf could be related to a passive introduction of the parasite in a domestic animal from a temperate region of Russia followed by transmission to wildlife.

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