

EPIDEMIOLOGY OF SWINE TRICHINELLOSIS IN YUGOSLAVIA

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Abstract. Intensive epidemiological and seroepidemiological studies of *Trichinella spiralis* infection in swine have been carried out in the borough of Kladovo, one of the four regions in Yugoslavia where trichinellosis is endemic. A high prevalence (4.7%) of trichinellosis was discovered in three neighboring parishes adjoining the bank of the river Danube. Both geographically and epidemiologically these three parishes constitute a very unique condition that is very vulnerable to *T. spiralis* infection.

Studies of 7,409 swine showed that the ELISA test for the detection of specific antibodies to *T. spiralis* in swine was highly reliable.

INTRODUCTION

In Yugoslavia, trichinellosis was first recorded in 1970 (Modic, 1982). From the beginning of the century to the present, the main sources of human infections has been pork, mainly in the form of smoked meat or homemade sausages. In this period, flesh from infected wild animals (wild boar, bear, badger) rarely served as a source of infection.

In 1918 Germany imported a large quantity of swine from Yugoslavia ("Serbia"). Meat inspectors in Berlin detected *Trichinella spiralis* infection in 0.11% of carcasses (Djordjevic *et al.*, 1989). Seventy years later, in 1989, 1.2 million swine were slaughtered in the Republic of Serbia and veterinary inspectors discovered *T. spiralis* infection in 90 carcasses, a 15-fold reduction from that of 1918.

According to evidence accumulated over the decades, the number of infected pigs before World War II was much higher than after the war, in contrast to human infections which increased significantly in the postwar period. Except for 1985, when 684 subjects were reported to have clinical trichinellosis (Timotin, 1986), annual infections average 100–200 people. The increase in human infections can be easily explained by better clinical recognition of the disease since the war and the fact that almost 25% of the Yugoslav pig population is raised on small rural farms and slaughtered without veterinary inspection (Rapic, 1985).

Systematic epizootiological investigations into trichinellosis, as carried out in Yugoslavia as part of a Yugoslav-American scientific project, have revealed four endemic regions: three in the Republic of Serbia and one in the Republic of Croatia (Rapic *et al.*, 1987; Cuperlovic *et al.*, 1989; Djordjevic, 1989).

The present communication will focus on studies carried out in one of the four endemic regions, the borough of Kladovo.

MATERIALS AND METHODS

Intensive epidemiological and seroepidemiological investigations in the borough of Kladovo took place during January to November 1988 and involved parasitological examinations in 6,293 swine. The prevalence of *T. spiralis* infections was also assessed by serological examination of 1,116 swine from the parishes of Velika Vrbica, Mala Vrbica and Rtkovo. For a negative control a pool of 20 *T. spiralis*-free pig sera was used. Positive controls were sera from artificially infected swine as previously reported (Sofronic-Milosavljevic *et al.*, 1988).

Excretory-secretory (ES) antigens were obtained by 18-hour *in vitro* cultivation of *T. spiralis* muscle larvae (Gamble *et al.*, 1988). ELISA was performed using standard procedure (Gamble *et al.*, 1983).

A team of researchers examined 218 households at Velika Vrbica, Mala Vrbica and Rtkovo,

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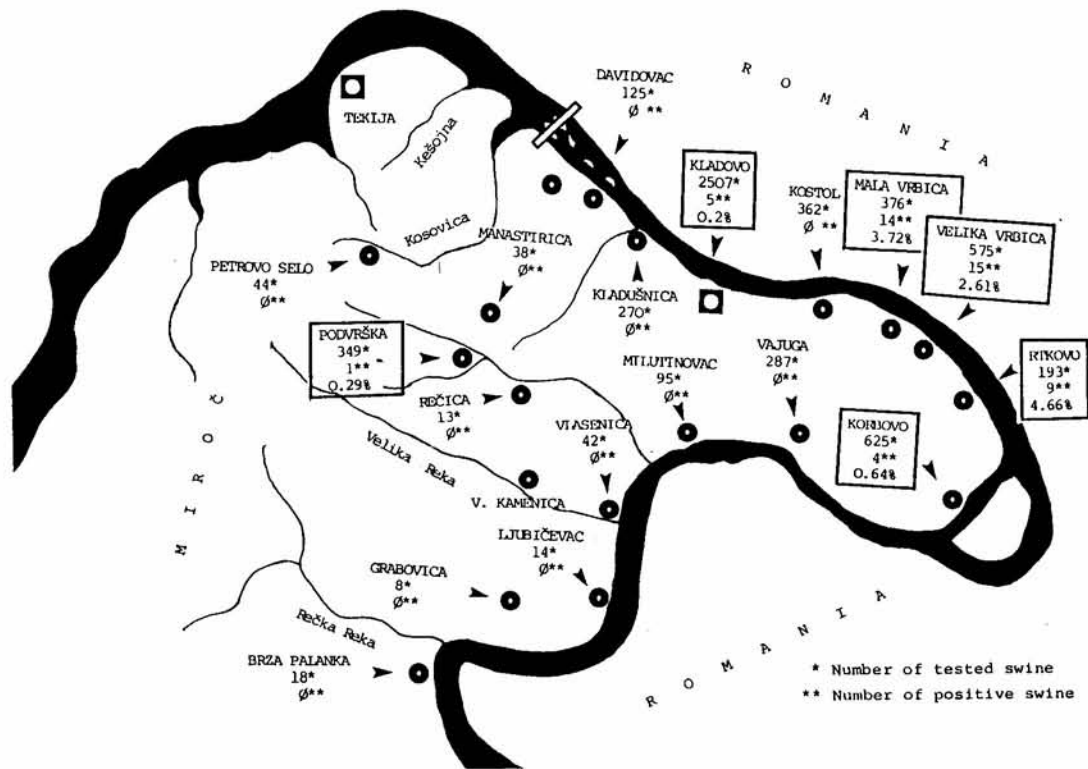


Fig 1 – Results of trichinelloscopy of 6,293 swine.

the three parishes with the highest prevalence of trichinellosis. The facilities were examined and a questionnaire used to obtain information on the number of pigs, the mode of feeding, the general health of animals, the presence of cannibalism, pig management, type of piggery, its maintenance and the potential for rodents to pass in and out easily, functional features and facilities in the yard, distribution of rodents, possible former history of trichinellosis in pigs in a particular yard and the mode of slaughtering of privately reared swine.

RESULTS

The results of trichinelloscopy of 6,293 swine are presented in Fig 1. A high proportion of infected animals originated from only three parishes (Velika Vrbica, Mala Vrbica, Rtkovo), adjacent to the bank of the Danube. On the other hand, only one out of the 452 swine from five hillside settlements was infected.

Parasitological findings prompted seroepidemiological studies in the district. ELISA tests were carried out on sera from 1,116 swine from Velika Vrbica, Mala Vrbica and Rtkovo; the swine originated from 218 farms where other relevant epidemiological evidence was also collected. Specific antibodies were detected in 51 animals, ie, 4.7% of those examined. The seropositive swine were from 43 farms.

All serologically positive and 10 seronegative animals were sacrificed. The diaphragm muscle was examined by both trichinoscope and by enzymatic digestion. The results agreed fully with serological findings, ie, *T. spiralis* larvae were found in positive animals but were undetected in serologically negative swine.

Distribution of infection over different age categories was as follows: sows 9.2%, fattening pigs 5.6%, piglets 0.8%.

Most households had inadequate swine

housing and the level of sanitation was poor. Pigs were fed greens and uncooked swill; their feed lacked nutritive animal proteins, inducing them to eat animal wastes, although evidence of cannibalism was noted. The rodent population (rats, mice) was high. In six yards examined during the team's visit, six rats were caught using leg-hold traps. Three of these had *T. spiralis* larvae in their diaphragm tissues (over 300 larvae per gram tissue) as detected by enzymatic digestion.

T. spiralis infection in swine was recorded in 43 out of the 218 households examined. Based on the findings of the Veterinary Service, however, infection cannot be associated with the same household each year. Home slaughtering and improper disposal of waste is one of the factors favoring the spread of the infection among animals.

DISCUSSION

From available data and current studies of *T. spiralis* epidemiology in Yugoslavia over the past 10 years, the number of infected pigs in Yugoslavia is relatively small. The infection rate is much less than 1:10,000. Although infection is endemic in both rural and urban areas, results obtained under the Yugoslav-American project (JFP-713) incriminates only four highly endemic regions. The borough of Kladovo is one of those, accounting for almost half of the total infected carcasses found.

A retrospective investigation has shown that *T. spiralis* infection in the three parishes was first recorded in 1981, the year when Yugoslav border veterinary authorities reported the pulling down of a slaughterhouse and an industrial pig farm in the neighboring Romania, close to the town of Turnu Severin, allegedly due to inability to cope with trichinellosis in these two facilities. Therefore, it is possible that the infection was imported from Romania by way of the Danube (carried downstream from the Romanian region of Olteanu which is known for its prevalence of trichinellosis) to settle in a part of Yugoslavia where circumstances for its persistence proved favorable.

The research team working in the borough of Kladovo was composed of veterinarians from

Kladovo and parasitologists, animal nutritionists, administrators and experts in meat technology and hygiene. Thus the problem of trichinellosis in this region assumed a multi-disciplinary approach which resulted in feasible recommendations. Hopefully, some of these will be enforced through legislation after having been accepted by competent authorities in the Republic and region concerned. Recommendations given by the research team can be divided into two types: strict compliance to existing rules and legislation; and plans designed together with local veterinary authorities with the objective of stopping further spread of trichinellosis in pigs in this region and to gradually eradicate it. The results of field investigations have been submitted to all public health and veterinary services in the region, in the Republic of Serbia and in the Federation of Yugoslav republics.

ACKNOWLEDGEMENTS

The author is thankful for all help extended by USDA, OICD, SFCRP (JFP 713 and FG-YU 265), RZN Serbia and the Town Council of Kladovo.

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