Tuberculous lesions in pigs in the Czech Republic in the years 1990-1999

I. Pavlik1*, L. Matlova1, L. Dvorska1, J. Bartl1, L. Oktabcova1, J. Docekal3, I. Parmova4

1 Veterinary Research Institute, Brno, Czech Republic, 2 District Veterinary Administration, Tachov, Czech Republic, 3 District Veterinary Administration, Znojmo, Czech Republic, 4 State Veterinary Institute, Praha, Czech Republic; *Corresponding author. Mailing address: Veterinary Research Institute, Hudcova 70, 621 32 Brno, Czech Republic. Phone +420 541 321 241. Fax: +420 541 211 229. E-mail: pavlik@vri.cz

Summary: In the Czech Republic, bovine tuberculosis in cattle was controlled in 1968. The last outbreak was diagnosed in cattle and domestic pigs in 1995. During the veterinary hygiene inspection of pigs slaughtered in slaughterhouses, however, tuberculous lesions were still being found. In the decade monitored a total of 45 873 318 pigs were slaughtered and examined according to veterinary hygiene standards. Apart from 1991, when results of tuberculous findings were not obtained, tuberculous lesions were found in 134 088 (0.32%) of the 41 458 565 pigs examined in the remaining nine years. During a detailed analysis of the pathological anatomical examination of 190 940 pigs slaughtered in one district, tuberculous lesions in lymph nodes were found in 4 107 (2.2%) pigs: mesenteric (65.3% pigs), submandibular (18.6% pigs), inguinal (0.1% pigs) and simultaneously intestinal and head lymph nodes (15.9% pigs). Miliary tuberculosis was found only in the parenchymatous organs of four (0.1%) pigs. The financial losses resulted: 6% for confiscating the head, intestines and stomach, and 22 to 24% for assessing meat as conditionally edible after processing, i.e. intended only for heat-processed products. Mycobacteria were isolated from 7 246 (41.8%) pigs through the cultivation of tissue samples from 17 326 pigs. Mycobacterium bovis was detected in only five (0.07%) animals which originated from the last outbreak of bovine tuberculosis in cattle in the Czech Republic in 1995. M. avium complex (MAC) isolates came from 6 870 (94.8%) animals: 55.7% M. a. avium isolates were mainly of serotypes 2 and 3 and genotype IS901+ and IS1245+ and 39.2% M. a. hominis suis isolates were mainly of serotypes 4, 8 and 9 and genotype IS901- and IS1245+. Conditionally pathogenic mycobacteria (M. chelonae, M. terrae, M. phlei and M. fortuitum) were isolated from 371 (5.1%) pigs. In the whole period monitored, two marked increases in the findings of tuberculous lesions were recorded: in the mid-1990s as a result of using deep bedding with wood shavings and at the end of the 1990s as a result of supplementing the pigs’ feed with peat.

Keywords: meat inspection, mycobacteriosis, pig carcasses, risk assessment, PCR

Introduction: In the Czech Republic, bovine tuberculosis was controlled in cattle and other domestic animals in 1968 (Polak, 1969). The last infection caused by Mycobacterium bovis in domestic pigs was diagnosed in 1995 (Pavlik et al., 2002). During the veterinary hygiene inspection of pigs slaughtered in slaughterhouses, however, tuberculous lesions were still being found. Pig breeders of animals affected in this way suffered major economic losses (Pavlik et al., 2003). From pig lymph nodes with tuberculous lesions were isolated not only Mycobacterium avium (MAC) complex members but less commonly Rhodococcus equi (Dvorska et al., 1999). The objectives of this work were the assessment for tuberculosis lesions of all pigs slaughtered in the Czech Republic during the years 1990-1999 and the analysis of tissue cultures from pigs.

Materials and Methods: Between 1990 and 1999, when a total of 45 873 318 pigs were slaughtered in slaughterhouses in the Czech Republic, biological material was collected from 17 326 (0.04%) pigs for laboratory examination. Tissue samples were supplied to the laboratory immediately after collection, or were frozen and delivered in this condition no more than one month later for laboratory examination described previously (Fischer et al., 2000). Mycobacterial isolates were identified using biochemical
methods (Wayne and Kubica, 1986), the Accu-Probe Probe (Accu-Probe Inc., San Diego, Calif.) system, PCR for the detection of IS901 (Kunze et al., 1992) and IS1245 (Guerrero et al., 1995). MAC isolates were also identified by serotyping (Wolinsky and Schaefer, 1973) and biological experiment on pullets (Pavlik et al., 2000). R. equi isolates were identified according described methodology (Dvorska et al., 1999).

Results: During veterinary hygiene inspection, tuberculous lesions were found in 134,088 (0.32%) of the 41,458,565 pigs slaughtered. The highest incidence of tuberculous lesions identified in pigs was found in 1990 (0.45%) and 1996 (0.43%). From a total of 17,326 pigs examined, mycobacteria were isolated from 7,246 (41.8%) animals. M. bovis was detected in 1995 only in the tissues of five pigs reared together with cattle in the last outbreak of bovine tuberculosis in cattle in the Czech Republic. A total of 6,870 (94.8%) MAC isolates were detected: 55.7% M. a. avium isolates and 39.2% M. a. hominissuis isolates. Statistically highly significant (p<0.01) MAC isolates were identified more frequently from mesenteric lymph nodes (48.6%) compared to their identification from head lymph nodes (34.8%). The identification of MAC isolates from inguinal lymph nodes (4.3%) was statistically highly significantly lower (p<0.01) than the identification of MAC isolates from head or mesenteric lymph nodes. A total of 371 (5.1%) isolates were identified as conditionally pathogenic species (M. chelonae, M. terrae, M. phlei and M. fortuitum). Over the years 1996 and 1999, from the lymph nodes of 1,745 pigs, R. equi was solely isolated from 154 (8.8%) pigs and in mixed infection with mycobacteria in a further 49 (2.8%) pigs. Statistically highly significant R. equi (p<0.01) was isolated more frequently from head lymph nodes (21.0%) compared to intestinal lymph nodes (0.9%). Out of 190,940 pigs slaughtered, tuberculous lesions were found in 4,107 (2.2%) pigs, of which tuberculous lesions were found in the mesenteric lymph nodes of 65.3% pigs, submandibular lymph nodes of 18.6% pigs and inguinal lymph nodes of 0.1% pigs. Tuberculous lesions were found simultaneously in the intestinal and head lymph nodes of 15.9% animals. Miliary tuberculosis in parenchymatous organs (liver, spleen and kidneys) was only diagnosed in four (0.1%) pigs. Generalised chronic tuberculosis was not found in any pig.

Discussion: The first sharp increase of tuberculous lesions occurred in the mid-1990s, when enzymatically split sawdust began to be more commonly used in pig rearing as deep bedding (Bartl et al., 1997). Subsequently, therefore, because of the increased discovery of tuberculous lesions in pigs, most pig-breeders gradually gave up this technology with deep bedding using sawdust (Pavlik et al., 2003). The second increase in incidence of tuberculous lesions in the lymph nodes of pigs occurred at the end of the 1990s, when peat began to be used as an addition to feed for piglets for 2 up to 4 weeks after birth. The conditionally pathogenic mycobacteria isolated from the organs of pigs with tuberculous lesions were identical to the species isolated from peat (Matlova et al., 2003).

Acknowledgements: This work was supported by the National Agency for Agricultural Research, Ministry of Agriculture, Czech Republic (grant No. QC0195). Full paper was published (http://www.vri.cz/docs/vetmed/48-5-113.pdf).

References:
Genetic relatedness of *Salmonella enterica* isolates from pens and swine at slaughter

A.M. O’CONNOR*, J.T. GRAY*, H.S HURD, J.D. MCKEAN, M.H. ROSTAGNO*

*The Department of Veterinary Diagnostic and Production Animal Medicine, College of Veterinary Medicine, Iowa State University, Ames Iowa, USDA, ARS, Antimicrobial Resistance Research Unit, Athens, Georgia, National Animal Disease Center, Agricultural Research Services, Ames Iowa, *Corresponding authors current address: Office of the Chief Veterinary Officer, Agriculture, Fisheries and Forestry – Australia, GPO Box 858, Canberra ACT 2601 Australia. Phone + 61 (0)2 6272 4047, email: annette.o’connor@affa.gov.au

**Keywords**: food safety, zoonosis, abattoir, lairage, PFGE

**Summary**: The study aimed to determine if *Salmonella enterica* isolates from the floor of pre-slaughter holding pens were genetically related to isolates found in swine, held in those pens, post slaughter. Pulsed-field gel electrophoresis (PFGE) typing was used to determine genetic relatedness. On seven occasions, 100% homologous PFGE patterns were found, i.e. the pen and pig isolates were identical. This suggested that pen to pig transfer of *Salmonella enterica* occurred. Isolates from PFGE patterns associated with pig to pen transfers were more likely to occur in the S. Anatum, S. Heidelberg and S. Typhimurium serotypes. The ability of an isolate from a pen to rapidly infect animals housed in the pen may vary within serotype based on factors described by the PFGE pattern. This may explain why some *S. enterica* serotypes are prevalent in swine but not in pork products or humans.

**Introduction**: In a study examining samples collected from the holding pen prior to pigs entry and then from the gastrointestinal tract of swine after slaughter Rostagno et al.(2003) observed that 26% of swine *S. enterica* isolates were the same serotype as found in the pens. This finding, and others, suggest that the holding pen in abattoirs is a significant source of *Salmonella enterica* in swine entering the slaughter floor (Hurd et al. 2001;McKean et al. 2001;Rostagno et al. 2001). However, similarities in serotype are only suggestive that isolates are related. Therefore, a study was conducted to determine the genetic relatedness, as determined by PFGE, of isolates of the same serovar found in the pre-slaughter holding pen and the pigs at slaughter.