OCCURRENCE OF PATHOGENIC *YERSINIA PSEUDOTUBERCULOSIS* IN PIGS IN FINLAND

Niskanen, T., Fredriksson-Ahomaa, M. and H. Korkeala
Department of Food and Environmental Hygiene
Faculty of Veterinary Medicine,
P.O. Box 57
00014 University of Helsinki, Finland
Tel. +358 9 191 49700
Fax: +358 9 19149 718
E-mail: taina.niskanen@helsinki.fi

Background

Yersinia pseudotuberculosis is an animal pathogen which infects humans occasionally (3). Human yersiniosis due to *Y. pseudotuberculosis* may be acquired by ingestion of contaminated food or water. Most *Y. pseudotuberculosis* infections are sporadic and outbreaks have been rare. In Finland five human outbreaks of *Y. pseudotuberculosis* have been reported from 1997 to 1999 (1). *Y. pseudotuberculosis* has sporadically been isolated from tonsillar and fecal samples of clinically healthy pigs (2, 4). However, no research has been done about the actual prevalence of *Y. pseudotuberculosis* in pigs in Europe.

Objectives

The purpose of this work was to study the prevalence of *Y. pseudotuberculosis* in fattening pigs and sows. Different isolation procedures were used to find out the most efficient recovering method of *Y. pseudotuberculosis* isolates. Pathogenicity of the isolates was confirmed with pheno- and genotypic methods.

Methods

Altogether 425 pig tonsils were collected from seven different abattoirs in various parts of Finland from June 1999 to March 2000. Of these samples, 210 were taken from fattening pigs and 215 from sows. A 10-g sample of tonsil tissue was homogenized in 90 ml trypticase soya broth (TSB) and phosphate buffered saline (PMB). The samples were studied after direct plating, overnight enrichment in TSB, selective enrichment in modified Rappaport broth, 7 and 21 days cold enrichment in PMB, and 14 days in cold followed with alkali treatment. Strains were sero- and biotyped, and the pathogenicity was confirmed on CR-MOX agar plate and by using polymerase chain reaction (PCR).

Results and Discussion

In Finland, fattening pigs carry pathogenic *Y. pseudotuberculosis* of bioserotype 2/O:3 in the tonsils. This was the only bioserotype recovered. The prevalence of *Y. pseudotuberculosis* in tonsils of fattening pigs was 4% varying from 0% to 10% between slaughterhouses. All sow tonsils tested negative for the bacterium. Sows might develope natural resistance against *Y. pseudotuberculosis*, whereas fattening pigs are more sensitive to infections.

Several culture methods for isolation of *Y. pseudotuberculosis* were compared. A 14 days cold enrichment followed by alkali treatment was the most productive isolation method. *Y. pseudotuberculosis* was not isolated after direct plating, overnight enrichment, or selective enrichment in MRB which is widely used in isolation of *Y. enterocolitica*.

All *Y. pseudotuberculosis* isolates were shown to be pathogenic when one genotypic and two phenotypic methods were used. All isolates showed calcium dependence and Congo red absorption on CR-MOX plates. PCR assay was used to determine the presence of the *virF* gene located in the virulence plasmid of all pathogenic *Y. pseudotuberculosis*. PCR was a rapid method to confirm pathogenicity of the isolates.

Pertinent literature

1. Anonymous 2000. Infectious diseases in Finland 1995-1999. KTL B4 / 2000, National Public Health Institute, Helsinki, Finland.
2. Nesbakken, T., and G. Kapperud. 1985. *Yersinia enterocolitica* and *Yersinia enterocolitica*-like bacteria in Norwegian slaughter pigs. Int. J. Food Microbiol. 1: 301-309.
3. Schiemann, D. A. 1989. *Yersinia enterocolitica* and *Yersinia pseudotuberculosis*, p. 601-672. *In* M. P. Doyle (ed.), Foodborne bacterial pathogens. Marcel Dekker, New York.
4. Weber, A., and W. Knapp. 1981. Über die jahreszeitliche Abhängigkeit des Nachweises von *Yersinia enterocolitica* und *Yersinia pseudotuberculosis* in Tonsillen gesunder Schlachtschweine. Zbl. Bakt. Hyg. I. Abt. Orig. A. 250: 78-83.

Table 1. Prevalence of *Yersinia pseudotuberculosis* in tonsils of fattening pigs and sows, and the number of isolates recovered from pig tonsils after cold enrichment.

	Tonsils of fattening pigs					Tonsils of sows	
			Cold enrichment [a]				
Slaughter-house	No. of samples	No. of positive samples (%)	7	14 [b]	21 days	No. of samples	No. of positive samples (%)
			Number of isolates				
A	30	1 (3)	0	0	1	30	0 (0)
B	30	1 (3)	0	5	0	29	0 (0)
C	30	3 (10)	2	6	1	35	0 (0)
D	30	0 (0)	0	0	0	30	0 (0)
E	30	1 (3)	0	1	0	30	0 (0)
F	30	0 (0)	0	0	0	30	0 (0)
G	30	2 (7)	4	5	5	31	0 (0)
Total	210	8 (4)	6	17	7	215	0 (0)

[a] Cold enrichment in PMB at 4°C for 7, 14, and 21 days.
[b] KOH treatment in 0.25% solution for 20 s before plating.