

A pilot study on occurrence of *Yersinia enterocolitica* and *Yersinia pseudotuberculosis* in Latvian pigs at slaughtering

Terentjeva, M.*, Bērziņš, A., Liepiņš, E.

Institute of Food and Environmental Hygiene, Latvia University of Agriculture, Jelgava, Latvia
*corresponding author: Margarita.Terentjeva@llu.lv

Abstract

The aim of the study was to detect the distribution of presumptive pathogenic *Yersinia* species in pigs of Latvian origin. In total tonsils of 108 pigs were collected from 6 farms in two abattoirs situated in different parts of Latvia. Samples were investigated by using direct plating on the selective CIN media and cold enrichment technique for 2 weeks. All presumptive isolates were confirmed biochemically. During the direct plating only 58% of cultures of *Y. enterocolitica* and *Y. pseudotuberculosis* were recovered. *Y. enterocolitica* was isolated from the pig tonsil samples originated from all six farms. The distribution of positive samples among different farms varied from 15 to 45%. *Y. pseudotuberculosis* was recovered from 3 out of 6 herds studied ranging from 5 to 25% on each positive farm. The mean prevalence of *Y. enterocolitica* and *Y. pseudotuberculosis* in all six farms was 31% and 8% respectively. Results of study indicate that none of the investigated herds was free of potentially pathogenic *Yersinia*. The presence of *Yersinia* species in pigs indicates that a possibility for contamination with bacteria occurs during the offal removal of and meat inspection of carcasses. Further investigations on pathogenic properties and slaughtering techniques at the slaughterhouses involved in this study should be continued.

Introduction

Yersiniosis is one of the most actual human food-borne infections in the European Union (EU) caused by two *Yersinia* genus species- *Yersinia enterocolitica* and *Yersinia pseudotuberculosis*. Disease is characterized by gastro- intestinal disorders, sometimes with severe immunological sequelae. Yersiniosis is recognized in Latvia and at present a trend to increase is observed with average incidence of 2.3 cases per 100 000 inhabitants during 2001-2005 (2).

An important source of pathogenic *Yersinia* is suggested to be pigs. Healthy animals may harbour pathogenic microorganisms in their lymphatic tissues, especially in tonsils without any clinical signs. Thus, it is not possible to detect the presence of *Yersinia* in animals without additional laboratory tests at the routine ante-mortem inspection in abattoirs. During slaughtering and dressing of yersinia- positive pigs, the offal and carcass of animal easily become contaminated with pathogen if cross- contamination from the pig tonsils occurs (1). Thereby, it is important to estimate the prevalence of presumptive pathogenic microorganisms in pigs to prevent introduction of bacteria in the food chain. This is the first Latvian survey on occurrence of presumptive pathogenic *Yersinia* species in Latvian pig tonsils.

Material and methods

In total of 108 pig tonsil samples were collected from 6 different farms in two main Latvian slaughterhouses located in Zemgale and Vidzeme during January- March, 2006.

The samples of tonsils were directly plated out onto Cefsulodin- Irgasan- Novobiocin agar (CIN agar) (Oxoid, UK) and plates and incubated for 48 h at 30°C. The presumptive colonies with a typical "bull-eye" like appearance were tested for oxidase and urea reaction. Urea- positive and oxidase- negative isolates were confirmed with API 20E (BioMérieux, Marcy l'Etoile, France). *Yersinia* negative samples were cold enriched for 2 weeks at 4°C with plating out on 8th and after alkali treatment on 15th day of incubation with a subsequent confirmation.

Results

All the selected herds were presumptive pathogenic *Yersinia* spp. positive with the mean prevalence of 31% of *Y. enterocolitica* and 8% of *Y. pseudotuberculosis*. *Y. enterocolitica* was isolated from 6 herds, located in different parts of Latvia ranging from– 3/20(20%) on farm situated in North Zemgale to 6/20(45%) in herd located in North West Zemgale (Table 1). *Y. pseudotuberculosis* was recovered from 3 out of 6 herds.

Table 1. The prevalence of *Y. enterocolitica* and *Y. pseudotuberculosis* in different pig farms

Region	No. of positive samples/ No. of samples (%)	<i>Y. enterocolitica</i> positive samples (%)	<i>Y. pseudotuberculosis</i> positive samples (%)
North Zemgale	5/20 (25)	4	1
North West Zemgale	11/20 (55)	6	5
South Kurzeme	9/20 (45)	9	-
South East Latgale	6/20 (30)	5	2
South West Latgale	8/20 (40)	7	-
North Vidzeme	3/8 (38)	3	-

Discussion

None of randomly selected herds was *Yersinia* negative. Moreover on some farms the prevalence of presumptive pathogenic *Yersinia* was about 50% - in North West Zemgale and South West Latgale. *Y. enterocolitica* was isolated more frequently than *Y. pseudotuberculosis* from all six herds. The highest *Y. pseudotuberculosis* prevalence was found from the herd situated in North West Zemgale- 25%. Besides, 60% of *Y. pseudotuberculosis* isolates were recovered after direct plating during 1st week of incubation. This may indicate that the herd was heavily contaminated with *Y. pseudotuberculosis*. The results of the study may support evidence that *Yersinia* can establish a long-term reservoir within pig herds (3). Bacteria are easily spreading in a healthy pig population, or even contamination may occur at abattoirs from *Yersinia*- positive animals, so the animal became a carrier of bacteria before slaughtering (4). All the investigated herds were placed in the waiting pens, located in the same unit, where they stayed for 3-4 hours. This could be the additional factor for introduction of bacteria in negative herds, as the contact between animals is not completely excluded. Pigs usually harbour the human pathogenic *Y. enterocolitica* bioserovars, so transmission of bacteria within pig herds is unfavorable from the epidemiological point of view. During the dressing and *post-mortem* examination possibilities for introduction of bacteria to carcasses and by-products from pig tonsils is higher in herds heavily contaminated with *Yersinia*. It seems to be more difficult to avoid from cross-contamination with pathogen.

High prevalence of potentially pathogenic *Yersinia* (39%) shows evidence that Latvian pigs could be an important factor for transmission of pathogenic bacteria to consumers.

Conclusions

Latvian pigs can be an important source for raw meat and meat products contamination with pathogenic *Yersinia*.

Further epidemiological studies on *Yersinia* pathogenic properties and the role of slaughtering techniques in distribution of bacterium are needed to evaluate the significance of this pathogen in epidemiology of yersiniosis in Latvia.

References

1. Fredriksson –Ahomaa, M., Bucher, M., Hank, C., Stolle, A., Korkeala, H., 2001. High prevalence of *Yersinia enterocolitica* 4:O3 on pig offal in Southern Germany: a slaughtering technique problem. *Systematic and Applied Microbiology*. 24: 457-463
2. Public Health Agency, Latvia. www.sva.lv
3. Nesbakken, T., Iversen, T., Eckner K., Lium, B., 2006. Testing of pathogenic *Yersinia enterocolitica* in pig herds based on the natural dynamic of infection. *International Journal of Food Microbiology*, 111(2), 99- 104
4. Skjerve, E., Lium, B., Nielsen, B., Nesbakken, T., 1998. Control of *Yersinia enterocolitica* in pigs at herd level. *International Journal of Food Microbiology*. 45:195- 203