PIG HERDS FREE FROM *YERSINIA ENTEROCOLITICA* – DREAM OR REALITY?

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Introduction

Yersinia enterocolitica is an important cause of gastroenteritis in humans in the developed world, especially in temperate countries. As the consequences of yersiniosis are severe, and might include prolonged acute infections, pseudoappendicitis, and long-term sequelae such as reactive arthritis, the financial and public health effects of yersiniosis are of greater magnitude than the actual number of cases would suggest. In a case-control study, raw or undercooked pork have been identified as the main source of this infection in Norway (Ostroff et al., 1994), and *Y. enterocolitica* serovar O:3/biovar 4 seems to be common in the Norwegian pig population (Nesbakken, 1992; Skjerve at al., 1998). Thus, the ability to eliminate this agent from pig herds would be an important step in producing Human Pathogen Free (HPF) pork. The aim of this study was to investigate if it is possible to establish and keep a cluster of pig herds free from *Y. enterocolitica* O:3/biovar 4.

Materials and Methods

Herds: In 1996 a specific pathogen free (SPF) nucleus herd (herd 1) was established by hysterectomi, and the piglets were reared without contact with other pigs. In 1999 a second nucleus SPF herd (herd 2) was established with gilts recruited from herd 1. Afterwards these two herds have been totally isolated from pigs in other herds.

Since 1997 another 14 conventional SPF herds have been established with gilts recruited from one or both of the above mentioned SPF nucleus herds. The conventional herds have since they were established either been closed or they have bought replacement gilts from one of the two SPF nucleus herds. The testing procedures were based on Nesbakken et al. (2006).

Blood samples: Every year since 1996, blood samples from 30 to 60 pigs in herd 1, and from 2001 blood samples from 30 pigs in herd 2 have been tested for antibodies against *Y. enterocolitica* O:3. In 2004 and 2005 blood samples from 20 to 60 pigs from the 14 conventional SPF herds have been tested. The majority of the blood samples have been from 4-6 months old fatteners or gilts, while some samples from the two nucleus herds have been from sows.

Serology: The sera were analysed for antibodies against *Y. enterocolitica* O:3 by a LPS-ELISA (Nielsen et al., 1996). A basic cut-off of optical density (OD%) 20 was used. The analyses were performed at the Danish Institute for Food and Veterinary Research, Copenhagen, Denmark.

Culture: The bacteriological examination of faeces from 20 animals from each of four herds in 2005 and 2006 was performed according to International Organization for Standardization (1994) method (ISO 10273) with modifications (Nesbakken et al., 2003).

Results and Discussion

During the first 5 years 10 of 174 blood samples from pigs in herd 1 had a low level of antibodies against *Y. enterocolitica* O:3 (OD%: <30). None of the 223 blood samples taken from pigs in this herd during the years 2002 to 2005 have tested positive. Only one of the 16 herds examined has been classified as serologically positive for antibodies against *Y. enterocolitica* O:3.

The serological investigation indicates that 15 of the 16 SPF herds examined were free from *Y. enterocolitica* O:3/biovar 4. The low positive reactions in some blood samples from pigs in herd 1 during the first five years may have been unspecific reaction because many of these samples were from old sows which may have more serological interference. At the moment we have no explanation of why one herd has been infected with *Y. enterocolitica* O:3/biovar 4.

This investigation indicates that it is possible to establish cluster of pig herds free from *Y. enterocolitica* O:3/biovar 4, and to keep the herds free from the bacteria for many years. Thirteen herds were also confirmed negative by culture of an average of 20 animals in 2005 and 2006. Only the herd, which was classified as positive by serology, was confirmed positive by culture. Two of the herds were not tested by culture.

By a systematic work it should be possible to market pork from pigs reared in herds documented free from *Y. enterocolitica* O:3/biovar 4. This means that the whole breeding pyramid has to be free from pathogenic

Y. enterocolitica. In this context, our preliminary results are promising. If this experience is utilized in the general health and breeding pyramids of pig herds, the possibility exists for the Norwegian meat industry to provide pork from pigs raised in herds free from human pathogenic *Y. enterocolitica*, and this might be the starting point for providing HPF pork on the market.

Conclusions

The results indicate that 15 of the 16 SPF (specific pathogen free) herds examined were free from *Y. enterocolitica* O:3. In a broad perspective this investigation indicates that it is possible to establish clusters of pig herds free from *Y. enterocolitica* O:3/biovar 4, and to keep the herds free from the bacteria for many years. The basic herd at the top of this SPF pyramid seem to have been free from this pathogenic variant since 1996.

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