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Spread of salmonella in organic pigs

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Salmonella infections can cause clinical disease in pigs, but occur typically as sub-clinical infections. These infections normally impose a minor effect on the welfare of the pigs but a potential spread through the food chain may impair the food safety. Outdoor farrowing and late weaning, that could have a positive effect on the animals' resistance, characterize organic pig production.

However, today there is no documentation that organic pig produce has a lower incidence of common zoonotic bacteria, transferable from animals to humans, as e.g. Salmonella, Campylobacter and Yersinia.

The aim of the current project **SaCaFree** was to obtain a better knowledge on how salmonella is spread in organic pigs under outdoor conditions.

Transmission of salmonella between outdoor organic pigs

Randomly selected pigs artificially infected with different levels of the Salmonella serotype Typhimurium DT12 were mixed with salmonella-free pigs in order to follow the spread of salmonella. About half of the pigs were found salmonella-positive at least once during the 6-weeks period. This experiment was performed during the Summer 2003 on outdoor pastures with ten 8-weeks-old organic pigs placed in each of four pastures measuring 50 m² per pig. Faeces samples were tested for salmonella by bacteriological culturing methods once per week. The first sampling took place only 3 days after the artificial inoculation of pigs with salmonella and even then did some of the inoculated pigs appear salmonella-negative. This indicates that establishment of an artificial salmonella infection in pigs can be quite difficult.

However, the current salmonella contamination still appeared sufficient to cause infection in some of the non-inoculated pigs. In general, the susceptibility towards infection varied considerably both in inoculated and non-inoculated pigs. The salmonella excretion level of the pigs was mainly low and the salmonella status typically alternated between positive and negative during the 6 weeks. This may be due to re-infections of the pigs or that the pigs became carriers that shed bacteria actively only under certain favourable conditions.

Survival of Salmonella in the pasture environment may pose an infection risk

Bacteriological examinations of surface soil and water samples collected in the pasture environment showed the presence of salmonella bacteria,

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indicating their ability to survive in the non-host environment. In general, there appeared to more positive environmental samples in those pastures where the initial inoculum dose of salmonella was highest. No salmonella was detected prior to the introduction of pigs.

In order to illustrate the potential risk of salmonella infections associated with pig production on previously contaminated pastures, we removed the first batch of pigs after 6 weeks and introduced new, salmonella-free pigs. The ability to cause salmonella infections in the new pigs was limited to mainly one pasture. Characteristic for this pasture was the presence of a clinically infected pig in the first period and this pig had probably shed a very high number of bacteria before it was killed. A third experimental round was performed for this particular pastures to see if the salmonella contamination would still cause infections in new pigs introduced into the pasture. However, only two pigs were detected salmonella positive in this period although there still were many positive environmental samples.

The salmonella status of the pigs and the environmental samples was monitored weekly, but it was impossible to state for how long the salmonella actually survived in the environment as long as the pigs were still defecating in the pasture. Thus, we continued the examination of environmental samples for 7 weeks after removal of the pigs to study the persistence of salmonella in the non-host environment. Salmonella was detected in soil samples after 5 weeks, whereas some of the huts were positive all 7 weeks. This indicates that a good hygiene in general is important to prevent the persistence of salmonella infections.

Introduction of various salmonella types

Very unexpected, various salmonella types were detected in pigs and/or in environmental samples in addition to the experimental salmonella Typhimurium type. This is in contrast to conventional herds, where it is rare to find more than one salmonella type at the same time. Although a minor survey on mice, rats and birds were included in the study, we were unable to find the potential source of these non-Typhimurium types. The wildlife animals were caught in the area surrounding the pastures in cooperation with The Danish Pest Infestation Laboratory and examined via bacteriological culturing methods.

Feed has often been pointed to as a potential source of salmonella, however, the current control of feed mills indicates a very low level of salmonella in feed. Thus, the source of the found salmonella types was not readily identifiable. Since the risk of salmonella infections is affected by numerous factors that all interacts the assessment of the potential infection risk is difficult.

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