

## **Bacterial infection risk associated with outdoor organic pig production with special reference to *Salmonella* and *Campylobacter* infection - Status 2003.**

Ph.D. period: From 1 Oct. 2002 to 30 Sept. 2005.

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### **Objective**

The objective of this project is to improve the knowledge on the risk of outdoor pig production in relation to spread and persistence of *Campylobacter* and *Salmonella* infections. For *Salmonella* the specific objectives are to evaluate the survival of *Salmonella* Typhimurium in soil and grass of contaminated pastures used for outdoor pig production, measurement of the infectivity of naturally *S.* Typhimurium contaminated pastures in relation to time, and in the case of high infectivity, evaluation of the pathogen reducing effect of soil treatment. For thermophilic *Campylobacter*, the objectives are to describe the infection dynamics of natural *Campylobacter* infections over time in outdoor pigs, including time of colonisation, level of excretion in faeces, species distribution in the group and in the individuals, interaction with the environment, and to describe the possible changes in prevalence and species distribution in relation to time and environmental contamination.

The experimental work is divided in two main parts.

- 1) Setup of experimental pastures for outdoor organic pig production
- 2) Setup of a closed-system microcosm to study the impact of physical factors on survival of *Salmonella* and *Campylobacter* in the soil environment.

### **Status**

Six experimental pastures for production of outdoor organic piglets were set up from April to September in 2003 at Rørrendegård (research animal facility under the Danish Royal Veterinary and Agricultural University). Three pigs in each of 4 pastures were experimentally infected with either a high or a low number of salmonella and grouped together with 7 uninfected tracer piglets in order to monitor the transmission of infection. Blood and faecal samples were collected weekly (bacteriological (qualitatively and semi-quantitatively) and serological examination) and in addition, soil samples were analysed to determine the level of contamination in the pasture. After 6 weeks the pastures were vacated, and a new set of uninfected piglets were introduced in each pasture for another 6 weeks period and some of these animals became infected due to their habitation in the salmonella contaminated pastures. Due to large variation of infection dynamics in the first two periods among "identical" pastures, the investigation of the ploughing effect was excluded. As an alternative, for further monitoring of the infectivity of the salmonella contaminated pasture environment, new tracer animals were introduced in one pasture (still contaminated),

whereas the set-up from the first period was repeated (high number of cells only) in those three pastures with no or little contamination of the environment.

During the experiment, an unexpected high number of non-inoculum *Salmonella* serotypes were found. In order to elucidate the potential source of these salmonella types, wildlife such as crow birds and mouse were collected for a period in cooperation with the Danish Pest Infestation Laboratory, and these animals were examined for *Salmonella* and *Campylobacter*. However, *Salmonella* was not found.

The two groups of pigs serving as controls in the experimental *Salmonella* infection study was used for studying the dynamics of natural *Campylobacter* infection in outdoor pigs. The piglets were monitored for natural colonisation of thermophilic *Campylobacter* species, and the ratio between *C. jejuni* and *C. coli* was determined by a real-time PCR test developed for detection of *Campylobacter* in pre-enriched faecal samples. Furthermore, colonies of *C. jejuni* were identified by a colony-blot hybridisation method in order to isolate *C. jejuni* in minority. Likewise, soil and water samples from the pastures were analysed throughout the experimental periods. All the obtained isolates were stored at  $-80^{\circ}\text{C}$  for further analysis. The identification of isolates and serotyping of selected strains have been initiated.

### **Congress**

SAFE PORK 2003, The 5<sup>th</sup> International Symposium on the Epidemiology and Control of Foodborne Pathogens in Pork, Crete. Oral presentation (O44) of preliminary results of the *Campylobacter* results

### **PhD courses: - participation in**

- Research methodologies in relation to principles and practice of organic agriculture. Arranged by SOAR. October 2002. 4 ECTS.
- Microbial growth and activity in complex communities, Arranged by Section of Genetics and Microbiology, Dept. Ecology, KVL. Aug. 2003. 6 ECTS

### **Plans for 2004**

All the data obtained from the experimental salmonella study, will be analysed and finally submitted as a scientific paper, in a journal with referee. The analysis of the *Campylobacter* data, including identification of the obtained isolates from pigs, wild animals and pasture environment to species level (*C. coli*/*C. jejuni*) will continue, with serotyping of selected strains. This will show the dynamics of the infection with the time of colonisation, number of different strains in each pig and the possible interaction with the environment and the persistence / exchange of strains over time. The results of the study will be published in an international journal. The results of the experimental study will also be presented in a seminar.

A closed-system microcosm to study the impact of physical factors on survival of *Salmonella* in the soil environment will be designed and the set-up of this microcosm experiment will be initiated.

Participation in the following ph.d. courses; Infection microbiology (15 ECTS), statistics for veterinarians (9 ECTS) and SOAR Summerschool: Is Organic Farming the Key to Sustainability? (4 ECTS).