Prevalence of Salmonella in fattening pigs and pork from animal friendly farms.

Gertraud Regula¹, Béatrice Choisat², Jürg Danuser¹, Katharina D.C. Stärk¹, Ursula Ledergerber¹, Thomas Jemmi²

¹Monitoring group, ²Diagnostic Laboratory
Swiss Federal Veterinary Office, Schwarzenburgstr. 161, CH-3003 Bern, Switzerland,
Phone: +41-31-323 5902, Fax: +41-31-323 9543, E-mail: Gertraud.Regula@bvet.admin.ch

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Summary: The objective of this project is to compare the prevalence of Salmonella spp, Campylobacter coli/jejuni and Yersinia spp in pigs and in pork from traditional housing systems to new animal friendly systems. On a representative sample of 50 traditional and 50 animal-friendly farms, faecal samples are collected. Faecal culture is performed for all three micro-organisms; isolated strains are further characterised. From a batch of pigs of each farm, meat samples are collected at the slaughterhouse and presence of anti-Salmonella spp antibodies is tested by meat juice analysis. Additionally, fresh pork cuts from animal friendly and conventional production are collected from 300 retailers. Analysis results from farm, slaughterhouse and retail level are compared. The influence of the production system is assessed using regression analysis, correcting for other possible risk factors. The outcome of this study will be used as a basis for the development of new control strategies for zoonotic pathogens on Swiss fattening farms.

Introduction: Consumers are becoming increasingly critical about the quality of meat. The most important concerns are human health hazards through zoonotic pathogens or drug residues, and animal welfare. Thus, food safety and animal friendly production of meat products are important market success factors. Conventional farms housing fattening pigs in Switzerland are indoor systems with partially or fully slatted floors. Animal friendly systems provide a lying area with straw bedding, a concrete or slatted floor area for feeding and defecating, and an outdoor yard for exercise. The Swiss government provides financial incentives for farmers to keep their animals in these improved housing systems. In addition, farmers receive a higher market price for their meat. In 1999, 17% of all Swiss swine farms kept their animals in animal friendly systems (Swiss Federal Office of
Agriculture, 1999). Because of the straw bedding and the outdoor access, there have been concerns that these systems might bear a higher danger of contamination with zoonotic pathogens than traditional indoor systems with slatted floors. On the other hand, there could also be a positive effect due to a better immune status of the animals and decreased stocking density. Up to now, there has been little research on comparing the level of zoonotic pathogens among farms with different housing systems.

**Materials and methods:** Fifty farms of each housing system are randomly selected among the clients of a swine herd health service. On each farm, the housing system and management is described. Twenty faecal samples are collected from the floor of pens with market weight finishing pigs. For bacterial culture for the monitored pathogens, five samples are combined to build one pooled sample (Stege et al., 2000). Cultures are performed according to standard methods as described in the Swiss Food Manual (Anonym., 1985). A pre-enrichment for Salmonella is performed in buffered peptone water. Tetrathionate broth and Rappaport Vassiliadis broth are used for enrichment. Bacteria are cultured on Brilliant Green agar and SMID Agar. Typical colonies are identified using biochemical methods. Serotyping of strains is also performed. For Campylobacter, enrichment is performed in Campylobacter Enrichment broth according to Skirrow, in a microaerophil environment. Bacteria are then cultured on Campylosel Gelose agar (Goossens et al., 1986). Typical colonies are identified microscopically. *Campylobacter coli, jejuni* and *lari* are distinguished using biochemical methods. For Yersinia, samples are cultured on Yersinia selective agar (Schiemann, 1979) following a cold enrichment in buffered peptone water. Typical colonies are identified with biochemical methods and serotyped.

The prevalence of each pathogen is reported on a herd level and pooled sample level. Characteristics of the management and housing system are screened for potential risk factors for infection of the herd with zoonotic pathogens using simple contingency table analysis. For each pathogen, a logistic regression model is constructed with risk factors significant in the bivariate analyses (Hosmer and Lemeshow, 1989). Thus, pathogen prevalence of animal friendly housing systems can be compared to traditional farms with correction for confounding factors of management or housing.

A group of 20 pigs from each farm is followed to the abattoir. Meat samples are collected from the diaphragm. A meat juice ELISA testing against antibodies to Salmonella is performed (Nielsen et al. 1998). For the ELISA, a cut-off value of OD% > 10 is used.

From a list of retailers for pork, 300 stores are randomly selected for sample collection. From each of these stores, three pork products from traditional and three
products from animal friendly production are sampled. Information on type of product, storage temperature, packaging type and best before date are recorded. Meat samples are cultured for *Salmonella* spp, *Yersinia* spp and *Campylobacter coli/jejuni*. Protocols are listed in the Swiss Food Manual (Anon., 1985) and are corresponding to international standards. Based on the microbiological results, prevalences for each type of product are estimated. Risk factor analysis is performed as described above.

**Preliminary results:** Faecal culture results are available for 17 farms. Of these, one farm was found positive for *Salmonella*, and one farm was positive for *Yersinia*. *Campylobacter coli* could be cultured from all farms in at least one pool. Of 76 pooled samples, 3 pools (3.9%) were positive for *Campylobacter coli* and *C. jejuni*, 64 pools (84.2%) were positive for *Campylobacter coli* only, and 2 (2.6%) were positive for *Campylobacter jejuni*.

**Discussion:** There is a need for information on the impact of new animal friendly production systems on the prevalence of zoonotic pathogens. Preliminary results show that *Campylobacter* is widely prevalent on swine farms with animal friendly systems as well as on traditional farms. It will be possible to compare the prevalence of zoonotic pathogens in both systems by the end of the year 2002.

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**References**