Discussion: The odds ratio linking collection one status vs. collection two status of 2.6 suggests that herds positive for collection one were more than two times more likely to be positive on the subsequent shipment. However, this association was demonstrated when examining other pairs of results. The limited correlations between prevalence of samples one and two suggests that there is some repeatability. However, this relationship was moderate in strength, and also was not seen in other pairings.

Since these samples were collected at the slaughter plant, it is possible that *Salmonella* isolates originated from trucks or from the lairage at the plant. If this were the case, associations between sequential collections would be weakened, since the exposure after the farm gate might not be associated with the shedding status of the farm. Another study of these same farms, however, has demonstrated a strong correlation between the *Salmonella* spp. prevalence among fecal samples collected immediately before shipment and prevalence detected in caudal mesenteric lymph nodes from the same pigs at slaughter. (Kim, et al.) Thus, it seems probable that the poor correlations and associations observed between sequential samples reflects changes on the farm in addition to variation caused by bacteria acquired after leaving the farm.

We conclude that single time bacterial culture of mesenteric lymph nodes at slaughter is relatively poor predictor of subsequent test results of a farm. Accurate description of *Salmonella* bacterial culture status requires repeated or ongoing sampling, particularly at the farm level.

References:

PE 11

*Salmonella* infection in a multiple-site swine production system in Brazil


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Summary: A longitudinal study was conducted in a multiple-site swine production system. Individually identified piglets were sampled for *Salmonella* fecal excretion and serology. Furthermore, intestinal content, mesenteric lymph nodes and blood samples were taken from these animals at slaughter. In addition, feed samples were taken throughout the study period. Piglets were fecal-culture and serology negative until the nursery phase, but became *Salmonella* positive in the early finishing phase. On this sampling day, 28.6% of finishers were seropositive and 75% were shedding *Salmonella* in feces. At slaughter, the seroprevalence (76.9%) was higher than in the early finishing, but *Salmonella* was isolated from intestinal content or mesenteric lymph nodes in only 19.2% of the sampled pigs. *Salmonella* was isolated from three out of 26 feed samples, being all positive samples collected during the finishing period. In spite of being isolated from different system sites, 89.56% of all *Salmonella* strains belong to serovar Typhimurium.
Keywords: longitudinal study, bacteriological, serological

Introduction: Pigs can become infected with *Salmonella* at the farm, during transportation, at the lairage or at slaughter (Swanenburg et al., 2001). Previous studies conducted in southern Brazil demonstrated that *Salmonella* could be isolated from healthy slaughtered pigs. Furthermore, the prevalence of carrier animals at slaughter contributed to the contamination of carcasses and of pork products (Castagna et al., 2001). On the other hand, control programs to reduce *Salmonella* in pork should include monitoring at farm level (Funk et al., 2001). In the present study a cohort of pigs was followed from farrowing to slaughter, in order to demonstrate when the *Salmonella* infection occurred.

Material and Methods: Nineteen sows from a farrowing unit, that presented *Salmonella* positive animals in a previous bacteriological evaluation, were randomly chosen and included in the study. From each sow blood and feces were taken on day 100 of gestation (n=19) and on day 15 of lactation. During this visit, 99 piglets from their litters were individually identified and also included in the study. Subsequently, all pigs were sampled for blood and feces on day 38 and a sub-set of them (n=56) on day 59 and on day 80. Furthermore, samples of feed and environmental swabs were collected at the farm, in the transportation truck and at the lairage. At slaughter, intestinal content, mesenteric lymph nodes and blood samples were taken from 26 pigs of the cohort. The isolation of *Salmonella* followed the previously described protocol (Michael et al., 1999). Serum samples were tested through an ELISA test using *Salmonella* Typhimurium LPS antigens. The cutoff was calculated based on the optic density mean of a negative population with four standards deviations added (Kich, 2003).

Results: 94.7% (18/19) of sows sampled during gestation were seropositives, but none was excreting *Salmonella* in feces on the sampling day. On day 15 of lactation seroprevalence of the group reduced to 66.7% (10/15), but two sows were shedding *Salmonella*. Piglets were negative on serology and *Salmonella* fecal isolation until the nursery phase. However, in the finishing, 28.6% (16/56) seroconverted and 75% (42/56) were shedding *Salmonella* in feces. At slaughter the seroprevalence was 76.9% (20/26), and *Salmonella* was isolated from intestinal content or mesenteric lymph nodes in 19.2% (5/26) of the sampled pigs (Table1). Contamination of the environment was found at the finishing site only after animals were housed, but the lairage was already positive before pigs entered. It was possible to isolate *Salmonella* from 3/26 samples of feed, and all positive samples were collected during the finishing phase. Serovar Typhimurium was isolated from all positive animals during the finishing, but from two animals serovar Senftenberg was isolated concomitantly. At slaughter, serovars Typhimurium and Senftenberg were found in three and two animals, respectively. All isolates of feed samples belonged to serovar Senftenberg. Strains isolated from the environment belonged to serovars Typhimurium and Panama.

Discussion: As previously related (Kranker et al., 2002), the shedding and seroprevalence of *Salmonella* presented marked variation. In contrast to previous studies (Berends et al., 1996), where the reproduction units were pointed out as responsible for up to 10% of the *Salmonella* contamination of herds, in the present study pigs became infected only during the finishing. In spite of the decrease in the *Salmonella* shedding observed at slaughter, these animals remain a hazard of contamination for negative pigs during the lairage, as previously demonstrated (Van der Gaag et al., 2003). The isolation of serovar Senftenberg from animals at finishing and at slaughter as well as from feed samples indicated feed as the probable contamination source of this herd.

Conclusions: These results indicate the importance of the finishing period for the diffusion of the *Salmonella* infection in this production system and demonstrate the possible relation with the consumption of contaminated feed.
References:


Kich, J. D. (2003); Personal Communication.


Table 1. Distribution of pigs according to bacteriological and serological results at the finishing phase (n=56) and at slaughter (n=26).

<table>
<thead>
<tr>
<th></th>
<th>Finishing Isolation Positive</th>
<th>Finishing Isolation Negative</th>
<th>Slaughter Isolation Positive</th>
<th>Slaughter Isolation Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELISA Positive</td>
<td>13</td>
<td>3</td>
<td>3</td>
<td>17</td>
</tr>
<tr>
<td>ELISA Negative</td>
<td>29</td>
<td>11</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

PH 01

Prevalence and number of Salmonella in retail pork sausages

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Summary: The aim of this study was to assess the prevalence of Salmonella in Irish pork sausage at retail level. Samples, comprising branded prepacked sausages, loose sausages from supermarket meat counters and butcher shops, were collected from selected retail sites in four cities from October to December 2001 and from June to August 2002. A 3-tube Most Probable Number (MPN) method was used to enumerate Salmonella in a selected number of samples, which were positive by enrichment. Salmonella serotypes were detected in 4.4% and 1.7% of samples at each of the respective sampling periods; a level similar to those reported in other U.S. and U.K. studies. Limited results available on enumeration suggest that contamination rates were low. This study revealed that Salmonella are present in a proportion of Irish sausages and further risk analysis work is necessary in order to quantify...