Abattoir holding pens as a source of *Salmonella* for swine.

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**Summary:** This study was designed to determine if rapid *Salmonella* infection is possible during the pre-slaughter holding period at swine abattoirs. For 24 groups of pigs studied in 2 high capacity abattoirs, pooled fecal samples were collected from the transport trailer right after pigs were unloaded (pre-holding samples). Holding pens were sampled prior to the entry of study pigs for the pre-slaughter holding. After slaughter, cecal contents and ileocecal lymph nodes were collected from 30 pigs in each studied group (post-holding samples). From all holding pens sampled (100%) at least one *Salmonella* serovar was isolated. All groups of pigs were *Salmonella*-positive in the post-holding sampling, including those groups *Salmonella*-negative in the pre-holding sampling. Some groups had *Salmonella* serovars that matched serovars isolated from the holding pens, but not with serovars isolated from the pre-holding samples. Results indicate that the abattoir holding pens constitute an important source of *Salmonella* infections for swine.

**Keywords:** *Salmonella*, Swine, Abattoir, Pre-slaughter holding

**Introduction:** A significant increase in the proportion of *Salmonella*-positive pigs when comparing prevalences at the farm and after slaughter has been demonstrated by several studies (Morrow et al., 1999; McKean et al., 2001). Transportation and holding of pigs prior to slaughter have been linked to increased *Salmonella* prevalence at the abattoir. However, this has been attributed to effect of stress, increased stocking density, and reoccurrence of shedding. The effect of pre-slaughter holding, where close contact with other pigs and environmental exposure occur may also be important determinants of *Salmonella* prevalence at slaughter. A recent study demonstrated that *Salmonella* can infect market age pigs exposed to a contaminated environment in a period of time as short as 2 hours (Hurd et al., 2001). Therefore, this study was designed to determine if rapid *Salmonella* infection constitute a phenomena that routinely occurs during the pre-slaughter holding period at swine abattoirs, and consequently, determine the role of the pre-slaughter holding as a risk factor for *Salmonella* infections in swine.
Materials and Methods: Three repetitions of the experiment were executed at 2 high capacity abattoirs (16,000 pigs/day). Each repetition included 4 groups of pigs (~150 animals/group). For each group studied, pooled fecal samples were collected from the transport trailer right after the pigs were unloaded (pre-holding samples). The holding pens were sampled prior to the pigs entering for the pre-slaughter holding (holding samples). After slaughter, cecal contents and ileocecal lymph nodes were collected from 30 pigs in each studied group (post-holding samples). All samples were processed by conventional bacteriological methods for the isolation and identification of Salmonella, including pre-enrichment in Tetrathionate (48h,37°C) or GN-Hajna broths (24h,37°C), enrichment in Rappaport-Vassiliadis broth (24h,37°C), and plating on Brilliant Green Sulfa (BGS) and Xylose-Lysine-Tergitol-4 (XLT-4) agars (24h,37°C). Suspect colonies were identified through biochemical reactions in Triple Sugar Iron agar (TSI) and Lysine Iron Agar (LIA), serogrouping and serotyping.

Results: From the 24 transport trailers sampled (pre-holding samples), 20 (83.3%) were Salmonella-positive. All holding pens sampled (24/24) were contaminated with Salmonella, and in 8 (33.3%) of these holding pens, water samples from the water fountain were Salmonella-positive. All groups of pigs studied (24/24) were Salmonella-positive in the post-holding samples, including those from Salmonella-negative transport trailers. From the 24 groups of pigs studied, 25% were infected with Salmonella serovars that matched serovars isolated from the respective holding pens, 25% were infected with serovars that matched with serovars isolated from the transport trailers, and 45.8% were infected with serovars that matched with serovars simultaneously isolated from the transport trailers and holding pens. The average number of Salmonella serovars found was 1.6 serovars/transport trailer, 3 serovars/holding pen and 3.7 serovars/group of pigs. This result represents the Salmonella serovar diversity found in the pre-holding, holding and post-holding samplings, respectively. It was observed that 15.7% of the isolates from post-holding samples matched with isolates from pre-holding samples, 25.8% matched with isolates from holding samples, and 7.9% matched with isolates from pre-holding and holding samples simultaneously. Interestingly, 50.6% of post-holding isolates did not corresponded to any found in pre-holding and holding samples.

Discussion: Results from this study demonstrate that abattoir holding pens are frequently contaminated with a variety of Salmonella serovars. Swanenburg et al.(2001) also found high levels of contamination with Salmonella in holding pens from two abattoirs in Europe. Williams and Newell (1968) also found the abattoir holding pen and water fountain contaminated before the entrance of a group of studied pigs, and suggested that the contaminated abattoir environment contributed to the greatest number of positive samples analyzed. The matchings of post-holding isolates with serovars isolated from the holding pens samples observed in our study
demonstrated that the abattoir holding pens are a risk factor for *Salmonella* infections in pigs prior to slaughter. It is possible that pigs harbor *Salmonella* while on the farm, but they do not shed the organism into feces. The stress of pre-slaughter events may then induce these non-shedding infected pigs to start shedding. However, it is also possible that pigs become infected during transportation and pre-slaughter holding, through cross-infections and exposure to a contaminated environment. Our results indicate that the contaminated environment of the holding pens is probably the major source for *Salmonella* infections for swine prior to slaughter. This study identifies an important critical control point for *Salmonella* contamination in the pork production chain.

**References:**