

PORK SAFETY

Title: Enumeration of *Salmonella* throughout the Pork Harvesting Process - NPB #07-050

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Scientific Abstract

The objective of this project was to provide a comprehensive evaluation of the levels and prevalence of *Salmonella* on pork carcasses during processing to benchmark the effectiveness of in-plant interventions on *Salmonella* reduction. Ninety five pork carcasses were sampled per day over two consecutive days in all four seasons for one year (Spring, Summer, Winter, Fall) at a pork processing plant in the United States. Using enumeration, the research quantified the number of *Salmonella* (colony forming units, cfu) at three places along the pork processing chain. Samples were obtained from the skin just after exsanguination and before scalding, the pre-evisceration carcass after scalding, singeing, and polishing, and the chilled final carcass in the cooler. Additionally, prevalence was measured to determine the overall presence of *Salmonella* on carcasses and finally the identification of serotype and antibiotic sensitivity of *Salmonella* positive samples collected from skin, pre-evisceration chilled and final carcasses was determined. Comparisons of *Salmonella* carcass prevalence at each site, or of the median skin enumeration values determined for each sample day, were made using the Kruskal-Wallis one-way ANOVA for non-parametric data and Dunn's multiple comparison post-test and *P* values of less than 0.05 were considered significantly different. Overall prevalence of *Salmonella* on skins was near 100% in all seasons with a one-day low of 85% in the winter. Pre-evisceration carcass prevalence ranged from a low of 13.6% to a high of 55%. Final carcasses had *Salmonella* prevalence as low as 0% but as high as 12.6%. Skins had higher *Salmonella* prevalence than carcasses when the data were pooled across seasons. During the four seasons, 371 out of 760 skin samples had enumerable levels of *Salmonella* ranging from 27 cfu/100cm² up to 2322 cfu/100cm². The eight sampling days from all four seasons were divided into two groups where the median *Salmonella* level of the skin samples from Group 1 was 27 cfu/100cm² while the level from Group 2 was 661 cfu/100cm². When less than 50% of the skin samples had enumerable levels of *Salmonella* (Group 1) the pre-evisceration carcasses had an average prevalence of 20%. When greater than 50% of the skin samples were enumerable (Group 2), the pre-evisceration carcasses had an average prevalence of ~51%. The total number of isolates collected from enumeration and prevalence samples on all three sample types yielded 4208 isolates. Of those isolates collected, 2176 isolates were characterized identifying 22 *Salmonella* serotypes. Many of the serotypes identified have yielded numerous antibiotic resistance profiles. Although some serotypes are susceptible to all antibiotics, 29 antibiotic resistance profiles have been identified. Although the prevalence of *Salmonella* on skins and carcasses was higher than expected, the percentage of carcasses with levels high enough to enumerate and the enumeration levels were both relatively low.

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