

**Title:** Risk Assessment for *Salmonella* spp. in Cooked Pork – NPB #06-144

**Investigator:** Arthur J. Miller, Ph.D.

**Institution:** Exponent, Inc., 1150 Connecticut Avenue, NW, Washington, DC 20036

**Date Submitted:** December 4, 2007

### Scientific Abstract

The objective and scope was to develop a retail-to-table probabilistic risk assessment to evaluate the risk per serving for developing salmonellosis from moisture enhanced and un-enhanced pork chops (bone-in) and roasts (boneless) that was cooked to the current USDA recommended (160°F) and alternative consumer cooking end point temperatures (145–155° F) at the geometric center of the product. Exposure simulation was carried out using Crystal Ball<sup>®</sup> and Latin Hypercube sampling for 10,000 iterations. The sequence of simulation sampling was: (1) estimation of levels of *Salmonella* in pork meat at retail; (2) estimation of growth during transportation from retail stores to consumer homes; (3) estimation of growth during storage in homes (refrigeration); (4) estimation of surviving *Salmonella* levels in product after cooking and at consumption and risk of developing illness per serving. At 160°F there were no surviving *Salmonella* per serving. In the alternative cooking scenarios risks per serving were similar to baseline at  $\leq 99^{\text{th}}$  percentile. At the extreme percentiles ( $> 99^{\text{th}}$ , representing high storage and transport temperature and long storage and transport times) at temperatures below 160°F for some cuts, a low risk of illness was estimated. Sensitivity analyses, which focused on alternative input data and distributions, show that for all pork cuts, the risk per serving for the baseline scenario (160° F cooking endpoint temperature) remained at zero. Using an alternative distribution of *Salmonella* levels at retail, based on FSIS carcass prevalence data (4%), a predicted higher risk per serving in the upper percentile ( $> 99^{\text{th}}$  percentile) was obtained at some lower end-point temperatures. Enhanced pork had higher positive rates and levels than un-enhanced pork. Uncertainty in retail levels was assessed by redefining the distributions used to characterize the model parameters and running alternate sets of simulations and comparing the resulting estimates to those derived using the base model. Currently, USDA recommends consumers to cook pork to 160-170°F. However, FDA's institutional and retail establishment guidance permits 145°F. This study shows that pork cooked to 145 °F for 15 seconds does not increase salmonellosis risk, if good pre-cooking handling practices are used. Further, a greater safety margin is achieved for products cooked to Food Code recommendations.

*These research results were submitted in fulfillment of checkoff funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer reviewed*

### For more information contact:

**National Pork Board, P.O. Box 9114, Des Moines, Iowa USA**

800-456-7675, **Fax:** 515-223-2646, **E-Mail:** [porkboard@porkboard.org](mailto:porkboard@porkboard.org), **Web:** <http://www.porkboard.org/>