

Research in the Safety of Pork

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ASL-R1410

Introduction to Studies in Pork Safety

Fourteen research projects have been in progress during 1995-1996, with most being continued, involving 18 investigators in eight departments and three colleges at Iowa State University, and at the National Animal Disease Center and Economic Research Service of the U.S. Department of Agriculture. These studies have focused from production animal food safety on swine farms to pork and pork products safety for consumers. Increasing emphasis is being placed on pork safety at production level, particularly on *Salmonella* infection in swine and on application of HACCP principles on farm and throughout the pork chain. Investigators at Iowa State University are extensively involved in pathogen reduction at production, in pork safety enhancement at slaughter and processing, and in HACCP education and development. Studies at Iowa State University encompass all four strategic purposes of the Food Safety Consortium.

In studies on rapid techniques for identification of pathogens which may be borne by pork and pork products, PCR systems have been developed to identify and differentiate between *Campylobacter jejuni* and the more prevalent *C. coli* in pork products with greater specificity than biochemical typing. *Arcobacter butzleri* has been identified as the primary species of this *Campylobacter* - related pathogen in meat. Additional surveys for these pathogens in turkey products identified *A. butzleri* in 88 of 100 samples and *C. jejuni* in 12 of these 100 samples.

A PCR technology has been developed which identifies 0.1-1.0 CFU of *E. coli* 0157:H7 in pork. This technique is now in study for identification of this pathogen in beef. Further studies use PCR and pulsed field electrophoresis to differentiate strains of *E. coli* 0157:H7 based on encoding Shiga-like toxins SLTI and II, and other genotypic differences.

A new bacteriologic medium has been developed for simultaneous enumeration of coliforms and generic *E. coli* in water. This culture system is being adapted to meat. A flow cytometry technique has been developed to assess viable, injured and dead bacterial pathogens in meat homogenates.

In studies evaluating potential health risks, and on-farm study relating management practices in swine production to prevalence of *Toxoplasma* infections, rodent, cat, dog, and bird control in production facilities showed a positive relationship to *Toxoplasma* reduction.

Iowa State University investigators, USDA, and the swine industry cosponsored a workshop, "Tracking Foodborne Pathogens from Farm to Table" in 1995. This

workshop is leading to expanding available food safety data bases.

Economic studies are in progress on benefits to producers in *Salmonella* control at production level and to industry in *Salmonella* control at processing level through HACCP applications. In preliminary studies on farm, *Salmonella* control yielded an increased herd productivity of approximately 5 lbs of pork per square foot of production facilities.

In studies on intervention points for hazard control, segregated early weaning of pigs is being examined for effectivity in reducing pathogen carrier states. Reduction in seroconversions to *Salmonella* has been demonstrated but elimination of infection in the segregated rearing facilities has been variable.

At slaughter and processing, hot water carcass washes at 70°C for 10 seconds have significantly reduced total aerobic bacterial counts and coliform counts on carcass surfaces. High hydrostatic pressure packaging of pork chops has been found to have no deleterious effects on meat quality while significantly extending shelf life.

A large multifarm risk-monitoring study is in progress to monitor cycles of *Salmonella* infections in the herds of swine, assessing ages at infection, tissues invaded, serotypes involved in relation to management systems, and environmental factors.

Studies on processed pork products experimentally contaminated with three viruses showed that these viruses had significant survivability even in cured products.