

Hot Water Rinses as a Bacteriological Intervention Strategy on Swine

Luisa Eggenberger-Solorzano and
James S. Dickson; Department of Microbiology,
Immunology, and Preventive Medicine
Iowa State University, Ames, IA 50011

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Introduction

During slaughtering, contamination of animal carcasses is for the most part unavoidable. It is important to use correct butchering techniques so that the contents from the viscera do not make contact with the carcass. Bacteria from the skin of pigs can be transferred to the bloodstream and even further to the entire body of the pig when the animal is dying, making the internal carcass surfaces that normally are sterile, a niche for growing bacteria. The reason the external surface of the hide and the hair constitute the primary source of bacterial contamination during slaughtering is because they are exposed to contamination such as dust, dirt, and fecal material. Thus, if animals reached the abattoir in a clean condition, less contamination would be carried to the carcass during the butchering procedure. Most of the contamination obtained in the slaughter plant is not from pathogenic organisms, however some of them such as *Salmonella*, *Campylobacter* and *Listeria* can be present. This project deals with contamination in both pork's skin and tissue. The first experiment was performed in a laboratory, while the second was performed in a small abattoir. The hot water treatment was performed by using a low pressure spray wash system with a nominal wash pressure of 25 psi. The objectives of this research project are to determine the minimum application criteria (temperature, volume, and exposure time) of hot water rinsing to significantly reduce the population of salmonellae on the skin and meat of swine carcasses.

Material and Methods

Immersion: Slices of pork (skin and tissue) 0.5 (1.0 X 1.0 X 0.5 cm.) from the Meats Laboratory were inoculated by immersing them in a semi-solid material (1-1 mixture of manure and distilled water) inoculated with an 18-24 hrs. stationary phase culture (approximately 10^8 CFU./ml.) of *Salmonella typhimurium* (ATCC 13311) that was grown and maintained in tryptic soy broth.

Hot Water Treatment: Samples were vortexed in 50 ml. centrifuge tubes containing different water volumes (20, 30, 40 ml.) of hot water at different temperatures (25°C, 55°C, 65°C and 80°C) at different exposure times ©0 sec. (control), 5, 10, and 15 seconds™.

Microbiology: All platings were made in duplicate. Aerobic plate counts were performed using tryptic soy agar and *Enterobacteriaceae* using violet red bile glucose agar.

Abattoir: Entire carcasses were obtained from the slaughtering facility at the Meats Laboratory. The front legs (lowest portion of the carcass) were inoculated with manure obtained from the holding pens of the abattoir. Two control samples and two hot water treated samples were obtained from each hog. A low pressure spray wash system was used with a nominal wash pressure of 25 psi. The temperature of the water was 80C and it was applied for 15 seconds.

Results and Discussions

Skin Samples:

Aerobic Bacteria: In general there was a pattern that as the temperature of the wash water increased, the reductions of aerobic bacteria increased. This is up to the temperature of 65°C especially since at 80°C no real reductions are observed. The best reduction of aerobic bacteria was observed at 15 seconds of hot water rinsing at 65°C.

Enterobacteriaceae: The best reduction for it *Enterobacteriaceae* was observed at 55°C at any time applied (5, 10, or 15 seconds). As opposed to what would be expected at 65°C and 80°C, no further reductions are attained. This could be the result of lower original populations, or due to an experimental error.

Abattoir: In the abattoir, a clear reduction from the control to the treated samples can be observed. In the first trial a 33.37% reduction of aerobic bacteria and 39.43% of *Enterobacteriaceae* were obtained. In the second trial a 49.59% reduction of aerobic bacteria and 63.42% of *Enterobacteriaceae* occurred. A greater reduction was observed in the second trial due to more constant temperature.

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