Inactivation of pathogens on pork by steam-ultrasound treatment

The objective of the study was to evaluate a new pathogen inactivation concept that combines application of pressurized steam simultaneously with high-power ultrasound through a series of nozzles. On skin and meat surfaces of pork jowl samples, counts of total viable bacteria were reduced by 1.1 log CFU/cm(2) after treatment for 1 s and by 3.3 log CFU/cm(2) after treatment for 4 s. The mean reduction of 1.7 to 3.3 log CFU/cm(2) on the skin surface was significantly higher than the reduction of 1.1 to 2.5 log CFU/cm(2) on the meat surface. The inactivation of Salmonella Typhimurium, Salmonella Derby, Salmonella Infantis, Yersinia enterocolitica, and a nonpathogenic Escherichia coli was studied on inoculated samples that were treated for 0.5 to 2.0 s. With one exception, no significant differences in reduction were observed among the bacterial types. After treatment for 0.5 s, the 0.9-to 1.5-log reductions of E. coli were significantly higher than the 0.4- to 1.1-log reductions for Salmonella and Y. enterocolitica. Overall, reductions increased by increasing treatment time; reductions were 0.4 to 1.5 log CFU/cm(2) after treatment for 0.5 s and 2.0 to 3.6 log CFU/cm(2) after treatment for 2 s. Reductions on the skin (1 to 2.5 log CFU/cm(2)) were significantly higher than reductions on the meat surface (1 to 2.5 log CFU/cm(2)). The reduced effect on the meat surface may be explained by greater protection of bacteria in deep structures at the muscle surface. No significant difference in reduction was observed between samples inoculated with 10(4) CFU/cm(2) and those inoculated with 10(7) CFU/cm(2), and cold storage of samples for 24 h at 5°C after steam-ultrasound treatment did not lead to changes in recovery of bacteria.