



Validation of Organic Acid Interventions in Chicken Thighs to Reduce Salmonella under Simulated Commercial Processing Conditions

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Objectives

The objective of this study was to validate the efficacy of organic acid formulations to reduce *Salmonella* in chicken parts to comply with the FSIS-USDA performance standards for *Salmonella* prevalence.

Materials and Methods

Varying concentrations and processing solution temperatures were evaluated to determine the best efficacy. Commercially processed chicken thighs (skin-on and skin-off) were used. Chicken parts ($n = 1,080$) were inoculated with a 5-strains *Salmonella* cocktail, including: *Salmonella* Enteritidis ATCC 13076, *Salmonella* Typhimurium 14028, *Salmonella* Typhimurium 13311, *Salmonella* Heidelberg 3347-1 and a wild-type *Salmonella* strain. Samples were submersed into a 10^6 CFU/ml of a cocktail mixture for 30 s and then placed onto racks to allow for bacterial attachment for 20 min. All acid interventions, lactic acid prepared at 2.84 and 5.11%, lactic acid and citric acid prepared at 2.0 and 2.5%, buffered lactic acid prepared at 3.25 and 5.85%, and peracetic acid at 200 ppm and 400 ppm, were applied for 15 s in an industry equivalent CHAD spray cabinet at three different temperatures of 70, 100, and 130°F. An untreated control was examined after application and attachment of the bacterial cocktail, and a water spray

treatment was also included. In addition, chicken parts were subjected to color analytical analysis ($n = 216$), and pH of chicken rinsate was measured after intervention. After treatment, samples were diluted and plated onto XLD overlaid with TSA for bacterial enumeration. All data (bacterial counts converted to log colony-forming units per sample) were reported as least squares means. Data were analyzed using one-way ANOVA followed by Dunnett's multiple comparisons using GraphPad Prism version 6 Trial Statistical software.

Results

Results indicated that 5.11% lactic acid (0.682 log reduction, 77%) and 5.85% buffered lactic acids (0.731 log reduction, 80%) achieved significant reductions ($P > 0.05$) in *Salmonella* in chicken thighs compared to the control samples, and may be effective antimicrobial interventions in poultry part applications. There were not significant differences ($P > 0.05$) between the skin-on and skin-off samples among acid and temperature treatments. Moreover, acid treatments do not affect color parameters (CIE-L*ab) in inoculated chicken parts.

Conclusion

Further investigations should be conducted with chicken parts to evaluate multiple applications and their effect to achieve significant reduction in *Salmonella* spp. loads.