Reduction of Surrogates for *Escherichia coli* O157:H7 and *Salmonella* during the Production of Non-intact Beef Products by Chemical Antimicrobial Interventions

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Abstract

The efficacy of chemical antimicrobials for controlling *Escherichia coli* O157:H7 and *Salmonella* during production of marinated non-intact beef products was evaluated using nonpathogenic surrogates. Boneless beef strip loins were inoculated with either approximately 5.8 or 1.9 log CFU/cm² (high and low inoculation levels, respectively) of nonpathogenic rifampin-resistant *E. coli*. Inoculated strip loins were chilled at 2°C for 24 h, vacuum packaged, and aged for 7 to 24 days at 2°C. After aging, strip loins received no treatment (control) or one of five antimicrobial spray treatments: 2.5% L-lactic acid (pH 2.6), 5.0% L-lactic acid (pH 2.4), 1,050 ppm of acidified sodium chlorite (pH 2.8), 205 ppm of peroxyacetic acid (pH 5.2), or tap water (pH 8.6). Mean application temperatures were 53, 26, 20, and 18°C for lactic acid, water, peroxyacetic acid, and acidified sodium chlorite treatments, respectively. Treated and control strip loins were vacuum tumbled in a commercial marinade. Samples were collected throughout the experiment to track the effects of antimicrobial treatment and processing on inoculated surrogates. For high-inoculation strip loins, the 5.0% L-lactic acid treatment was most effective for reducing surrogates on meat surfaces before marination, producing a 2.6-log mean reduction. Peroxyacetic acid treatment resulted in the greatest reduction of surface-located surrogate microorganisms in marinated product. Water treatment resulted in greater internalization of surrogate microorganisms compared with the control, as determined by enumeration of surrogates from cored samples. Producers of non-intact beef products should focus on use of validated antimicrobial sprays that maximize microbial reduction and minimize internalization of surface bacteria into the finished product.


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