



Control of *Listeria monocytogenes* and Shelf Life Extension in Uncured, Grass Fed Beef Hot Dogs Treated with Buffered Vinegar

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Objectives

The objective of this study was to evaluate the impact of buffered vinegar on *Listeria monocytogenes* and shelf life in uncured hot dogs made with grass fed beef and pre-converted celery powder as an alternative nitrite source.

Materials and Methods

Two treatments of beef hot dogs, control (CTL) and buffered vinegar (BV), were produced by a commercial meat manufacturing facility with 1.5% salt and 0.4% celery powder on a formula weight basis. A control treatment was manufactured without BV to show the impact of celery powder alone on *L. monocytogenes* and lactic acid bacteria growth. Buffered vinegar was added to the BV treatment at 0.85% of the formula. For each sample, 2 links (approximately 100 g) were placed in vacuum bags and inoculated with a *L. monocytogenes* cocktail to target 3 log CFU/g, then vacuum sealed and stored at 4°C. Enumeration of *L. monocytogenes* was conducted every 2 wk from d 0 through 112 in triplicate samples, by rinsing each package with 100 mL of bufferfield's phosphate buffer and plating appropriate serial dilutions on MOX agar. Enumeration of lactic acid bacteria and total aerobic plate counts was conducted on uninoculated

duplicate samples. Sensory acceptability based on flavor was performed using a hedonic scale with scores at 0, 28, 56, 84, and 112 d and only assessed on BV for food safety of panelists. The study was replicated three times and data was analyzed by Analysis of Variance (ANOVA) with statements of significance declared when $p < 0.05$.

Results

A significant difference was observed ($p < 0.05$) between CTL and BV hot dogs in the control of *L. monocytogenes*. Two log growth of *L. monocytogenes* beyond the initial inoculation (d 0) was seen at d 56 in CTL whereas BV restricted growth to < 1 log CFU/mL rinse through 112 d. Lactic acid bacteria and total plate counts were < 1 log CFU/mL rinse in CTL and BV. There was no significant difference in the pH ($p > 0.05$) observed between the 2 treatments. No significant difference was observed ($p > 0.05$) between each testing point, indicating sensory quality remained stable over the shelf life.

Conclusion

This data suggests that buffered vinegar used in hot dogs made with an alternative source of nitrite such as celery powder can be an effective ingredient to enhance the safety of uncured ready-to-eat meat products.