Efficacy of Lactic Acid Washes Applied at Increasing Concentrations to Control Shiga Toxin-Producing Escherichia coli Contamination on Chilled Beef Subprimals

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\textbf{Introduction:} Shiga toxin-producing \textit{E. coli} (STEC) are frequently associated with foodborne illness outbreaks in beef products. Intervention methods, such as organic acid and/or other chemical blend sprays, are widely used to control enteric pathogen contamination. Quantifying the antimicrobial effectiveness of different concentrations of lactic acid (LA) against STEC is important for processors to optimize applications and support regulatory food safety plans.

\textbf{Purpose:} This study evaluated the efficacy of increasing concentrations of lactic acid (88\%, Birko Corporation) to reduce STEC contamination on chilled beef subprimals when applied as a spray prior to vacuum packaging and after 24 h of vacuum packaged storage.

\textbf{Method:} Beef strip loins (\(n = 12\)) were inoculated with a 7-serogroup STEC cocktail, (30 min attachment). Subprimals were sprayed with increasing concentrations of LA (3.0-10.0 \% at 0.5\% intervals) or a water control (0\%). Meat surface excision samples and color readings (L*, a*, and b*) were obtained from each subprimal post-inoculation, 5 min after a LA spray, and after 24 h of vacuum packaged storage. Three replications were performed.

\textbf{Results:} LA spray reduced STEC contamination on subprimals by 0.2 – 0.7 log CFU/cm\(^2\) (initial level of ca. 5 log CFU/cm\(^2\)). All LA concentrations except 3 \% produced a higher population reduction (\(P \leq 0.05\)) compared to water. No differences (\(P > 0.05\)) were observed in reductions among LA concentrations of 3.5 -10 \%. After chilled vacuum packaged storage, subprimal STEC populations did not change (\(P > 0.05\)). Application of higher concentrations of LA reduced (\(P \leq 0.05\)) L* and b* color values compared to the water control; similar results were observed after the 24-h chill period.

\textbf{Significance:} LA sprays \(\geq 3.5\%\) may reduce STEC contamination on chilled beef subprimals (by <1 log cycle), but application of higher concentrations provided similar reductions and may negatively impact product color.