RESEARCH ABSTRACT

PORK SAFETY

Title: Optimization of Antimicrobials for Control of *Listeria monocytogenes* and for Acceptable Pork Product Quality **- NPB #02-002**

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Abstract: Contamination of ready-to-eat meat products with *Listeria monocytogenes* is a major concern to the meat processing industry and needs to be addressed in order to enhance the safety of these products. This report describes a number of studies with this goal in mind. Two studies evaluated the effectiveness of antimicrobials, applied singly and in combination in the formulation of bologna and frankfurters against *L. monocytogenes* inoculated post-processing as well as spoilage microorganisms found naturally on the products, during storage in vacuum packages at 4°C (bologna) and 10°C (bologna and frankfurters). Furthermore, the antilisterial effect of additives in the formulation followed by immersion of frankfurters into organic acid solutions was determined. In a third study, Nisaplin®, organic acids and a preservative applied as dipping solutions either singly or sequentially to control post-processing *L. monocytogenes* contamination of commercial bologna and ham stored at 10°C in vacuum packages was investigated. The effect of additives in the formulation and dipping solutions on the sensory qualities of frankfurters (formulated in our laboratory and commercial) and commercial bologna and ham was also determined. Finally, the acid tolerance response of the pathogen on stored, inoculated frankfurters formulated and/or treated with organic acids, to synthetic gastric fluid, was investigated.

Results showed that combinations of antimicrobials in the formulation of bologna and frankfurters suppressed the growth of *L. monocytogenes* more effectively during storage at 4°C (bologna) and 10°C (bologna and frankfurters) than antimicrobials applied singly. Sodium lactate (1.8%) combined with sodium diacetate (0.25%) was found to be the most effective combination in the formulation of bologna and frankfurters. Frankfurters formulated with sodium lactate (1.8%) and sodium diacetate (0.125% and 0.25%) and treated with lactic acid (2.5%) or acetic acid (2.5%) for 2 min resulted in reductions of the pathogen during storage at 10°C. Dipping of commercial bologna and ham in acetic acid (2.5%), lactic acid (2.5%) or potassium benzoate (5%), applied singly or sequentially with Nisaplin (0.5%) for 2 min, also reduced pathogen levels during storage at 10°C.

The combination treatments, however, were more effective in reducing *L. monocytogenes* since they caused higher initial reductions. Sensory qualities of commercial bologna and ham treated with acetic acid, lactic acid and potassium benzoate treatments resulted in lower odor, flavor and overall acceptability scores as compared to the controls. The most effective formulation combination treatment (1.8% sodium lactate + 0.25% sodium diacetate) did not seem to affect the flavor and overall acceptability of frankfurters. Furthermore, dipping of commercial frankfurters in acetic acid, lactic acid or potassium benzoate had no apparent effect on their sensory qualities. Finally, under the conditions of this study, the acid tolerance response of *L. monocytogenes* to synthetic gastric fluid appeared to increase during storage of frankfurters formulated with 0.25% sodium diacetate and dipped in 2.5% lactic acid. The results of this study should be useful to the meat industry in their efforts to inactivate or inhibit the growth of this deadly pathogen on ready-to-eat meat products during storage.