RESEARCH ABSTRACT
PORK SAFETY

Title: Efficacy of novel food antimicrobial combinations for control of *Listeria monocytogenes* for preservation of ready-to-eat (RTE) products. **(07-186)**

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Scientific Abstract

The primary purposes of this study were to: (1) define the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of various food antimicrobials approved for use with ready-to-eat (RTE) meat products for the inhibition of the Gram-positive foodborne pathogen *L. monocytogenes*, (2) to define the MIC and fractional inhibitory concentrations (FIC) of combined antimicrobials for the inhibition of *L. monocytogenes*, and (3) to define the interactions of antimicrobials as antagonistic, additive, or synergistic. It was hypothesized that use of dual antimicrobials would result in inhibition of the pathogen at lower levels than those observed for single antimicrobial use as a result of pathogen inability to adapt to simultaneous multi-antimicrobial attack.

For the determination of single antimicrobial MICs and MBCs against experimental strains, a broth dilution microassay was employed. A checkerboard broth dilution microassay was used to detect the inhibition of individual strains of *L. monocytogenes* following exposure to food antimicrobials in combination. Following incubation of pathogenic strains in a non-selective microbiological medium and antimicrobial at 35°C for 24 hr, growth or inhibition was detected via observation of change in sample optical density (turbidity) at 630 nm (OD630). Samples for which the change in OD630 was <0.05 were pronounced as exhibiting inhibition; MICs for each antimicrobial were defined as the lowest concentration for which <0.05 ΔOD630 was observed across duplicate replications. Following incubation, samples demonstrating <0.05 ΔOD630 were subjected to MBC testing via the spread plating of 0.1 ml of sample solution on the surface of a Petri dish containing a non-selective agar-solidified microbiological medium. Minimum bactericidal concentrations were defined as the lowest concentration of antimicrobial for which a 3-log cycle reduction was observed between the sample inoculum and the resulting plate following incubation across duplicate replications.

Results indicate that combinations of Acidic Calcium Sulfate with Nisin or Octanoic Acid resulted in synergistic-type inhibition of the pathogen, while other combinations displayed either additive or antagonistic-type interactions. The use of single compounds was generally found to be as effective as the use of combined antimicrobials for the purpose of pathogen inhibition. The use of combined antimicrobials must be experimentally validated prior to adoption.