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Synergistic Effect of Phages and Organic Acid Salts on *Listeria* Contaminated Ready to Eat Turkey Ham

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Objectives

Ready To Eat (RTE) are foods that have already been cooked and needs no further heating, making it easy and fast for consumers to prepare meals. For this reason that most RTE do not undergo any lethality steps at consumer level before consumption, companies must care to deliver “*Listeria*-free” foods.

In this study ability of PhageGuard Listex (a natural bacteriophage solution against *Listeria*) in combination with buffered vinegar or a commercially available solution comprising potassium lactate (72.8%) and sodium diacetate (5.2%), to control *Listeria* during the shelf-life (120 d) of sliced RTE turkey meat was assessed.

Materials and Methods

Cooked turkey slices were inoculated with a cocktail of 4 *Listeria monocytogenes* strains at 1 Log cfu/cm² (duplicate sample per treatment). Contaminated samples were treated by spraying either only PhageGuard Listex (2×10^7 PFU (Plaque Forming Units)/cm²), PhageGuard Listex plus buffered vinegar and PhageGuard Listex plus potassium lactate/sodium diacetate on the surface of the turkey slices. Other samples were sequentially treated with just either of the organic acids and tap water (untreated) and were used as negative controls. Subsequently, all samples were vacuum packed and stored at 40°F/4°C. During the shelf-life of 120 d, samples were retrieved in peptone buffered water to detect and enumerate *Listeria*.

Results

When applied on artificially contaminated turkey ham, the phage solution or buffered vinegar alone kept *Listeria* concentration below detection limit for 20 and 30 d respectively (mean value of 2 individual experiments). However, when a combination of phages with buffered vinegar was applied, *Listeria* was kept below detection limit for 120 d (mean value of 2 individual experiments). A similar though less strong, effect was observed when turkey slices were sequentially treated with a combination of phages and potassium lactate/sodium diacetate. In this case, *Listeria* was not detected for 30 d (mean value of 2 individual experiments) and *Listeria* was kept below 2 logs outgrowth (compared to the initial contamination) for 70 d (mean value of 2 individual experiments). Application of just potassium lactate/sodium diacetate alone resulted in more than 2 logs outgrowth after 40 d.

Conclusion

A clear synergistic effect was observed when combining a bacteriophage product against *Listeria* with 2 different organic acid solutions on *Listeria* contaminated cooked turkey slices. Results showed combining phages with buffered vinegar, *Listeria* levels were kept below detection limits for an additional 90 d when compared to buffered vinegar alone. Combining such *Listeria*-specific phage product with these organic acids has the added beneficial effect of inhibiting the outgrowth of spoilage bacteria.

All in all, these results establish the combined effect of PhageGuard Listex and organic acids as an effective anti-*Listeria* hurdle during processing of RTE meals, leading to an increase in consumer safety.