

Title:

An accessible approach to reduce *Listeria monocytogenes* from lettuce

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Abstract:

Raw vegetables have been identified as a vehicle of transmission of foodborne outbreaks and play an important role in listeriosis epidemiology. Proper food handling at home can maintain the hazard at a safe level and even reduce it. Thus, it is important to develop strategies to control *L. monocytogenes* in the home environment. Retail environments also play a role in the contamination of foods and/or amplification of *L. monocytogenes*.

The purpose of this study was to determine the antimicrobial activity of vinegars, acetic acid and water, and their role at the stage of washing Iceberg lettuce on removing *L. monocytogenes*. The vinegars used were balsamic vinegar from Modena and white wine (selected by previous studies), and all the solutions were diluted to accomplish the following rates: 15, 20, 37 and 50 % (v/v). An inoculated level (6-7 log CFU/mL) of *Listeria monocytogenes* was applied on Iceberg lettuce and the antilisterial properties of solutions were investigated.

Viable *L. monocytogenes* reductions obtained after washing were relative to populations on inoculated lettuce (positive control). This study revealed that the usual method, for home and retail environments, of water dipping lettuce with water is not effective in removing *Listeria* from lettuce.

The maximum log reduction of *L. monocytogenes* observed was 2.15 ± 0.04 for balsamic vinegar (50% v/v), 1.18 ± 0.06 for white wine vinegar (50% v/v) and 1.13 ± 0.06 for acetic acid (50% v/v).

Balsamic vinegar showed similar and even better effectiveness than chlorine-based sanitizers on removing *L. monocytogenes* from lettuce surface, even though the time of storage of inoculated lettuce allowed the formation of biofilms.

Balsamic vinegar washings may be a promising method to reduce other foodborne pathogens present in produce or other foods, at home and retail environments.