RESEARCH ABSTRACT

PORK SAFETY

Title: Optimization of electrolyzed oxidizing water and comparison with other antimicrobial compounds to reduce pathogens on fresh or further processed pork products
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Investigator: Catherine N. Cutter

Institution: The Pennsylvania State University

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Abstract: Electrolyzed oxidizing (EO) water is a newly recognized disinfecting compound that has the potential to be used for inactivation of pathogenic and/or spoilage microorganisms associated with vegetables, fresh meat or further processed meat surfaces. The generation of EO water occurs when a current is passed a salt-water solution through to produce an acidic solution containing dilute hypochlorous acid, high oxidization reduction potential (ORP) of approximately 1150 mV, and 10-80 mg/l chlorine. A basic solution is also produced containing sodium hydroxide and a negative ORP. Studies were preformed to evaluate the effectiveness of EO water against pathogens in cell suspensions and associated with fresh and ready-to-eat (RTE) pork surfaces. In the first study, the stability of EO water was evaluated under different storage temperatures (4 and 25°C) and its effectiveness was determined for reducing cell suspensions of *Salmonella* Typhimurium and *Listeria monocytogenes* at 0, 1, 5, 10, and 15 min. The results demonstrated that the free chlorine concentration of acidic EO water increased after 24 h when stored at 4°C. "Aged" acidic EO water and acidic EO water made immediately prior to treatment were shown to effectively reduce both cell suspensions of *S.* Typhimurium (> 8 $\log_{10}$ CFU/ml for both temperatures) and *L. monocytogenes* (8 and 6.5 $\log_{10}$ CFU/ml for 25 and 4°C, respectively) when treated up to 15 min. In the second study, parameters were optimized for reduction of *L. monocytogenes* on RTE meat surfaces (i.e. frankfurters and ham). Preliminary studies indicated that when dipped for 15 min at 25°C with EO water produced at 14 or 19 amperage, the most significant reduction of *L. monocytogenes* was observed with water produced at 19 amperage. Acidic EO water, basic EO water, 2% acetic acid, and 10% TSP sprays were also evaluated for reducing *L. monocytogenes* on frankfurters; none of the treatments significantly reduced the pathogen. Furthermore, a combination of basic EO water spray followed by acidic EO water spray applied to experimentally inoculated frankfurter surfaces significantly reduced *L. monocytogenes* immediately after treatment 0.6 $\log_{10}$ CFU/g. However, the reduction was not maintained after 7 days of refrigerated storage (0.25 $\log_{10}$ CFU/g). Conversely, inoculated ham surfaces treated with acidic and basic EO water alone and in combination resulted in significant reductions of approximately 0.77, 1.04, and 0.7 CFU/g at 0, 3, and 7 days refrigerated storage, respectively. In the final study, the effectiveness of EO water was compared with chlorinated water and lactic acid against populations of *S.* Typhimurium, *L. monocytogenes*, and *Campylobacter coli* on fresh pork surfaces stored up to 7 days at 4°C. Acidic EO water significantly reduced S. Typhimurium and *L. monocytogenes* across all three sample days. *C. coli* was significantly reduced immediately following treatment with acidic EO water, but the reduction was not maintained following storage up to 7 days. These studies have demonstrated the effectiveness of EO water against pathogens associated with fresh and RTE pork surfaces. The results from these studies suggest that EO water may provide meat processors with an additional antimicrobial regimen for reducing pathogens associated with meat surfaces.

For more information contact:
National Pork Board, P.O. Box 9114, Des Moines, Iowa USA
800-456-7675, **Fax:** 515-223-2646, **E-Mail:** porkboard@porkboard.org, **Web:** http://www.porkboard.org/