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Efficacy of a novel bactericide for elimination of biofilm in food processing facilities

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A novel bactericide composed of levulinic acid and sodium dodecyl sulfate (SDS), both individually designated by the U.S. Food and Drug Administration as generally recognized as safe for direct addition to food was developed for effectively killing *Escherichia coli* O157:H7 and *Salmonella typhimurium*. The dynamics of cross-contamination of *L. monocytogenes*, *S. Typhimurium*, and *E. coli* O157:H7 from contaminated deli foods to slicers and from contaminated slicers to deli foods. After slicing surface-inoculated foods, pathogens were recovered from five contact surfaces on slicers, with significantly ($P \leq 0.05$) less transfer to the blades than to meat grips and carriage trays. At an initial inoculum of ca. 8.5 log CFU/blade, the transfer of pathogens decreased logarithmically from an initial count of 4.0 log CFU/slice to <1.5 log CFU on the sixtieth slice. Treatment of blades with a mixture of levulinic acid (1%) plus SDS (0.1%) as a foam reduces the three pathogens by at least 6 log CFU/blade within 1 min. This combination of chemicals also may have potential for use as an effective sanitizer for large-scale applications in food processing facilities. The ability of *L. monocytogenes, Salmonella*, and Shiga Toxin-producing *E. coli* (STEC) to grow as biofilms on the surface of stainless steel at 100% relative humidity and 21°C for 72 h. The combined activity of levulinic acid plus SDS was determined to be bactericidal for the three pathogens grow in bio-films with the highest concentrations (3% + 2%) achieved the highest log reduction (>6 log CFU/coupon). In addition, heat (80°C) and lactic acid (3%) indicated a synergistic work to kill the bio-film cells. These two ways may be used as tools to mitigate the problem of bio-films in food processing facilities.

Biography

Tong Zhao received his degree in Medicine from China. Since then he has spent most of his career (26 years) at the University of Wisconsin-Madison and the University of Georgia for developing better ways to detect human pathogens in foods, animals, and water through various approaches and intervention methods to reduce contamination of foodborne pathogens in animals and foods. He has more than 50 papers, 5 approved patents and 4 pending patents and was awarded as “Inventor of the Year 2010, by University of Georgia Research Foundation, Inc. for the Discovery of Highly Effective and Practical Treatments for Reducing Contamination of Foods by Harmful Microorganisms”.

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