

Evaluating the effect of a sanitizer (Decon7) on biofilms of bacteria in laboratory settings and in a food processing environment

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Introduction: Biofilms have been a major safety issue in the food processing environment, attributing to contamination of food processing equipment and contacted food products. Sanitizing agents are an effective method to eliminate microorganisms entrapped in those biofilms.

Purpose: The purpose of this study was to use the strains of *Pseudomonas* and *Staphylococcus* bacteria to create biofilms and examine the effect of Decon7 sanitizer under different times and concentrations in a laboratory setting and its effect on biofilms that have developed on workers boots in a food processing facility.

Methods: A biofilm of each bacterial strain was developed in 96 well microplates by continuous washing with Tris buffer and adding fresh nutrient medium each day for 7 days. The sanitizer was against 5 strains in microplate assays at 5 different time periods. Additionally, workers' boots were swabbed with sponge sticks containing trypsin and later treated with the sanitizer spray solution. Bacteria isolated from workers' boots were identified by 16S rRNA PCR and sequence analysis.

Results: Decon7 treatments were carried out in triplicate and Repeated Measures One-way ANOVA showed a significant difference ($p < 0.05$) between sanitizer treatment and control groups in microplate assays, demonstrating approximately a 4-5 log reduction in bacterial biofilm viability within the first 1 minute of treatment. Decon7 sprayed onto workers' boots also showed a greater than 3-log reduction in bacterial populations recovered from natural biofilm on the boots. Ten different strains of alkaliphilic bacteria were detected in boot biofilms due to long-term use of alkaline Bi-Quat sanitizers..

Significance: Decon7 is a new, next generation QAC (quad) sanitizer that is more effective than prior single/dual-QAC sanitizers, and its use in combination with enzyme pre-treatment can facilitate biofilm sanitizer penetration on food contact surfaces. Rotation of sanitizer chemistries may prevent selective retention of chemistry-tolerant microorganisms if they may occur.

Keywords: Biofilm, sanitizers, Decon7, *Pseudomonas*, *Staphylococcus*, food contact surfaces.