Evaluating Bleach-Based Sanitation for Reducing Escherichia coli Contamination on Baby Carrots

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The objective of this study was to evaluate the effectiveness of bleach-based sanitation by measuring how contact time in a 50 ppm sodium hypochlorite solution affects the Log10 Reduction Factor (LRF) of Escherichia coli K-12 on baby carrots. The sanitizer concentration was selected based on recommendations from produce safety guidance documents for fresh produce washing. Baby carrots were inoculated with 10 µL of an overnight E. coli K-12 culture and allowed to dry for 30 minutes to promote bacterial adhesion. The carrots were submerged in a 50 ppm chlorine solution for 1, 2, 3, 4, or 5 minutes. Following treatment, carrots were transferred to sterile saline and agitated to recover surviving bacteria. Samples were serially diluted and plated on Tryptic Soy Agar. After 48 hours of incubation at 37 degrees Celsius, colony forming units (CFUs) were counted and used to calculate the Log10 Reduction Factor for each contact time. Untreated control carrots averaged 8,190,000 CFUs. Increasing contact time generally increased bacterial reduction. The 5 minute wash achieved a 3.73 Log10 reduction, corresponding to a 99.98 percent decrease in bacterial count. The hypothesis was supported, as longer contact times generally resulted in greater bacterial reduction. However, measurable bacterial populations remained after treatment, indicating that bleach sanitation at this concentration does not completely eliminate surface contamination under these conditions. These findings suggest that contact time is an important factor in sanitation effectiveness and support continued evaluation of combined or multi step decontamination strategies for produce safety.

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