

REDUCTION OF *SALMONELLA* SPP. BY UV-C LED IRRADIATION

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I. OBJECTIVES

The objective of this study was to evaluate the effectiveness of UV-C light-emitting diode (LED) light at different exposure time points and intensities for the reduction of *Salmonella* spp. applied to the surface of chicken breast, stainless steel, and high-density polyethylene.

II. MATERIALS AND METHODS

Portions of 2 × 2 cm of 3 different surfaces were obtained. The upper surface of the portions was inoculated with a 5-strain *Salmonella* cocktail at a target concentration of 6.0 log CFU/cm². The 3 different surfaces were treated with UV-C LED irradiation: (1) boneless skinless chicken breast, (2) stainless steel, and (3) high-density polyethylene. Each treatment was based on different exposure times using 2 different irradiance intensities of 2 mW/cm² (50% intensity) and 4 mW/cm² (100% intensity). Different time points were tested for each surface. For the chicken breast, time points of 0, 1, 3, 5, 10, and 15 min of exposure to both 50% and 100% intensity were observed in triplicate. For stainless steel, time points of 0, 0.25, 0.5, 0.70, and 1 min of exposure to both 50% and 100% intensity were observed in triplicate. For high-density polyethylene, time points of 0, 0.5, 1, 1.5, 2, 2.5, 3, 5, 10, and 15 min of exposure to both 50% and 100% intensity were observed in triplicate.

III. RESULTS

The population of *Salmonella* on the boneless skinless chicken breast had a reduction of 1.71 log₁₀ CFU/cm² and 2.05 log₁₀ CFU/cm² for the 50% and 100% intensity treatments, respectively. Furthermore, the stainless steel coupons showed a reduction of 1.85 log₁₀ CFU/cm² for the coupons treated at 50% intensity and a 4.57 log₁₀ CFU/cm² for the ones at 100% intensity. Finally, for the high-density polyethylene coupons, there was a reduction of 4.48 log₁₀ CFU/cm² in the 50% intensity treatment, and a complete reduction to 0 log₁₀ CFU/cm² after 5 min of being treated at 100% intensity.

IV. CONCLUSION

Many efforts to control *Salmonella* in poultry products and food contact surfaces involve the application of chemical treatments at different steps of process. UV LED are increasingly being used to treat food and food contact surfaces. Further testing is needed to understand the efficiency of UV-C LED treatment on food surfaces and food contact surfaces to be used while on production line.

Keywords: *Salmonella* reduction, ultra violet irradiation