



Pulsed UV Light as a Microbial Reduction Intervention for Boneless/Skinless Chicken Thigh Meat

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Objectives

Salmonella, *E. coli* and *Campylobacter* are pathogens of concern in poultry processing. Pulsed Ultra Violet (PUV) light is an effective antimicrobial treatment with limited use in the food industry. Research using PUV light has established that it can be a more effective antimicrobial treatment than conventional UV light. The germicidal, UV-C wavelengths fall between 100 to 280nm with the optimum germicidal effect at 254nm. PUV light includes a much broader spectrum, 100 to 1100nm, with 50% of the energy deriving from the UV region. Unlike the continuous, low intensity output of conventional UV light, PUV light is emitted in short bursts of very high intensity light. The objective of this work is to investigate application of PUV light for destruction of *Salmonella*, *E. coli* and *Campylobacter* on chicken thigh meat.

Materials and Methods

Lean and skin surface chicken thighs, acquired from a commercial poultry integrator, were inoculated to a 6 to 7 log CFU/cm² concentration before exposure to PUV light in separate trials for each of the above mentioned pathogens. Treatment variables included the distance from the quartz window of the PUV light (8 and 13 cm) and application time (5, 15, 30, and 45 s). Inoculated control samples were not exposed to PUV light. Nine thighs were used for each distance by time treatment combination for each bacterial species. After treatment, samples were stomached in buffered peptone water and the suspensions were serially plated on selective agars. Comparison of treated samples to control samples allowed for quantification of microbial reduction due to PUV light treatment. The main effects,

distance and treatment time and their interaction, were evaluated in a 2-way ANOVA. When needed, a Tukey multiple comparison test was used to detect significant differences ($p < 0.05$) among treatment means.

Results

For lean and skin surface samples, the distance by treatment time interaction was not significant ($P > 0.05$) for microbial reduction of *E. coli*, *Campylobacter* or *Salmonella*. Distance from the PUV light did not affect lean surface microbial reduction for *E. coli*, *Campylobacter* or *Salmonella* ($p > 0.05$). Lean surface microbial reduction increased ($p < 0.05$) with PUV light exposure time for *E. coli*, *Campylobacter* and *Salmonella*. Exposure to PUV light for 5 and 45 s on lean surface thighs resulted in log₁₀ reductions of 1.5^A and 2.0^B for *E. coli*, 1.2^A and 2.2^B for *Campylobacter*, and 1.5^A and 2.4^B for *Salmonella*, respectively. Distance from the PUV light did not affect skin surface microbial reduction for *Campylobacter* ($p > 0.05$). Skin surface microbial reduction for *E. coli* and *Salmonella* was increased ($p < 0.05$) with closer proximity to the PUV light source. Skin surface microbial reduction increased ($p < 0.05$) with PUV light exposure time for *E. coli*, *Campylobacter* and *Salmonella*. PUV light exposure for 5 and 45 s on skin surface thighs resulted in log₁₀ reductions of 1.1^A and 2.0^B for *E. coli*, 1.2^A and 1.9^B for *Campylobacter*, and 0.9^A and 1.8^B for *Salmonella*, respectively.

Conclusion

This study clearly demonstrated the potential of using PUV light as a microbial reduction intervention on chicken meat.