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308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorijps@gmail.com

Efficacy of the FreshLight® 220 Ultraviolet Light System¹ for Control and Elimination of Naturally Occurring Microflora and *Listeria innocua* in a Formulated Poultry Marinade (Flow Rate = 40 GPM and Turnover Time 1 = minute)

K.W. Beers, J.W. Rheingans and A.L. Waldroup²
MCA Services, 200 S. First Street, Rogers, AR 72756, USA

Abstract: Due to the recirculation process used in poultry injection procedures, the potential hazard of a buildup of naturally occurring organisms and potential pathogens in recirculated marinade poses a concern to the poultry industry. Thus, a study was designed to investigate the possibility of alleviating this problem. A typical poultry marinade (40 gallons) was formulated in the laboratory in accordance with the manufacturer's instructions using chicken powder, sodium chloride and sodium phosphate dissolved in potable water. A sample of the marinade solution was collected and microbiologically evaluated using Aerobic Plate Count Petrifilm™³ to determine an initial bacterial count. The marinade solution was then allowed to circulate in a FreshLight® 220 ultraviolet light system (Safe Foods Corporation, N. Little Rock, AR) for 1 minute (flow rate = 40 gallons per minute and solution turnover time = 1 minute) to determine microbial reductions in the naturally occurring microflora. The initial microbial count of the marinade was 3.6 logs per mL (colony forming units). After 1 minute of ultraviolet light treatment, the level of naturally occurring microflora was reduced to 1 log representing a 99.7% reduction. The marinade solution was then inoculated with an overnight culture of *Listeria innocua* to achieve a total level of bacteria in the marinade of 5.0 logs per mL. The inoculated marinade was then treated with the FreshLight® 220 ultraviolet light system for a period of 30 minutes. A sample of the marinade solution was collected every minute during the 30-minute test period and was plated on Aerobic Plate Count Petrifilm™³ to determine bacterial reductions over time. After only 1 minute (1 pass through the system), the total level of organisms in the marinade solution was reduced by 1.5 logs, after 5 minutes (5 passes) by > 3 logs, and by 9 minutes (9 passes) by > 4 logs indicating no recovery of organisms (the lower detection level was 1 log per mL). There was no recovery of organisms at any further treatment time. Thus, in less than 10 minutes of ultraviolet light treatment, the FreshLight® 220 ultraviolet light system was capable of achieving a 4 log reduction in total organisms (primarily *Listeria innocua*) in the poultry marinade solution. This represents a 99.99% reduction. In conclusion, the commercially available FreshLight® 220 ultraviolet light system (FDA regulated under 21 CFR 179.39) provides the processor with a very cost effective means of controlling and eliminating the incidence and levels of *Listeria innocua* in poultry marinades.

Key words: Poultry, marinades, food safety, *Listeria innocua*, FreshLight®

¹Safe Foods Corporation, N. Little Rock, AR 72118, USA

²Address correspondence to: alwaldroup@safefoods.net

³Medical-Surgical Division/3M Corporation, St. Paul MN, 55144, USA