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Efficacy of the FreshLight® 220 Ultraviolet Light System¹ for Controlling the Natural Microflora of Marinades in Commercial Beef Production Environments (Flow Rate = 20 GPM and Turnover Time 1 = minute)

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ABSTRACT

The recirculation process used during the injection of whole muscle beef products with marinade solutions can allow for a buildup of naturally occurring microorganisms in the marinades throughout a production shift. This study was designed to investigate the possibility of controlling the microbial population in commercial beef marinades using ultraviolet light technology. Two separate studies were conducted in a USDA-inspected commercial beef processing plant. In both studies the FreshLight® 220 ultraviolet light system (Safe Foods Corporation, N. Little Rock, AR) was utilized to treat beef marinade solutions, during normal production and usage, at a flow rate of 20 gallons per minute and a solution turnover rate of 1 min. In the first study, the ultraviolet lights in the FreshLight® 220 system were not turned on until after 1 h of continuous operation. During this hour-long period, the marinade solution was allowed to run through the meat injector to the FreshLight® 220 system, but without ultraviolet light treatment. At the initiation of the second study, the ultraviolet lights were turned on in the FreshLight® 220 ultraviolet light system before injection started and at no time was the marinade solution untreated. In both studies, representative samples of the marinades were sampled every 10 min over a 3 h period in Study 1 and over a 3.5 h period in Study 2. All samples were microbiologically evaluated, on-site, using Aerobic Plate Count Petrifilm™³ to determine bacterial reductions over time. As would be expected, the Aerobic Plate Count increased rapidly, in linear fashion, in Study 1 where there was no ultraviolet light treatment during the first hour of production, from an initial count of 0.5 logs to 4 logs in the first hour of operation. After the ultraviolet lights were turned on, the level of organisms in the marinade remained constant at 4 logs for the next 2 h of operation. In Study 2, where the ultraviolet lights were on from the initiation of injection, the initial level of bacteria in the marinade solution was 3.5 logs. After only 40 min of operation, the bacterial level was reduced to approximately 1.3 logs where the count remained constant for the remainder of the study. Results from these studies indicate that when using ultraviolet light to control microorganisms in marinade solutions, it is critical that the ultraviolet light system be fully operational at the initiation of production and that at no time during processing should the ultraviolet lights be turned off allowing for a possible buildup of organisms in the marinade solution. In conclusion, the FreshLight® 220 ultraviolet light system offers an extremely cost effective, commercially available solution for controlling the levels of microorganisms in commercial beef marinade solutions.

Key words: Beef marinades, microbial control, FreshLight® 220 ultraviolet light system

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