Efficacy of the FreshLight® 210 Ultraviolet Light System

for Control and Elimination of Escherichia coli O157:H7 in a Commercial Beef Brine Solution (Flow Rate = 10 GPM and Turnover Time = 2.5 min)

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ABSTRACT
A large percentage of whole muscle beef products are injected with a brine solution to improve texture and flavor. However, if not handled correctly, recirculated brine solutions can pose a potential microbiological hazard. To investigate the use of ultraviolet light for controlling this potential hazard, a sample (25 gallons) of a fresh commercial beef brine solution was collected from a USDA-inspected facility and was shipped overnight to MCA Services (Rogers, AR) under refrigerated conditions. Upon arrival at the laboratory, the brine solution was inoculated, under strict hygienic conditions, with Escherichia coli O157:H7 to a level of 5.4 logs per mL (colony forming units). The inoculated brine was passed through the FreshLight® 210 ultraviolet light system (Safe Foods Corporation, N. Little Rock, AR) for 30 min (flow rate = 10 gallons per minute and solution turnover time = 2.5 min). Samples of the inoculated brine were collected at 0, 5, 10, 15, 20, 25 and 30 min which corresponded to 0, 2, 4, 6, 8, 10 and 12 passes through the ultraviolet light system. Brine samples were plated on Aerobic Plate Count Petrifilm™ to determine microbial reductions. Linear reductions in Escherichia coli O157:H7 were achieved as follows: 1.4 logs at 10 min (4 passes through the ultraviolet light system), 2.4 logs at 20 min (8 passes) and 3.2 logs at 30 min (12 passes). Thus, the FreshLight® 210 ultraviolet light system effectively reduced the Escherichia coli O157:H7 inoculum in the beef brine from 5.4 logs per mL to 2.2 logs per mL in 30 min (12 passes) resulting in an overall bacterial reduction of greater than 99.9%. Results from this trial indicate that the commercially available FreshLight® 210 ultraviolet light system can provide an effective means for controlling Escherichia coli O157:H7 in beef brine solutions at a limited cost to the processor.

Key words: Beef brine, Escherichia coli O157:H7, FreshLight® 210 ultraviolet light system

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