Efficacy Peracetic Acid against *Salmonella* Heidelberg Inoculated Pork

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Purpose

This study will determine the efficacy of peracetic acid (PAA) at 150 and 400 mg/L (ppm) against *Salmonella* Heidelberg inoculated pork trim with a 60 second treatment time.

Materials and Methods

Salmonella Heidelberg Preparation

A culture of *S.* Heidelberg (ATCC 8326) was grown on Hardy Diagnostics 5% blood agar plates (Cat. No.:A600) and incubated at 32°C for 48 hours. Bacteria colonies were transferred from the blood agar plates to 500 mL of sterile water via L-shaped spreader. The bacterial solution was ascetically mixed to ensure homogenization.

Preparation of Pork

Approximately five pounds of pork shoulder meat was shipped overnight on ice to Enviro Tech's laboratory in Modesto, CA. The pork product was cut into nine pieces approximately equal in a mass and surface area (~200 grams). The cuts of meat were submerged in the bacterial solution for 60 seconds. The meat samples were then transferred to a sterile cutting board where they were allowed to sit undisturbed for 45 minutes to ensure bacterial attachment.

Peracetic Acid Solution Preparation

Two PAA treatment solutions were prepared by diluting 12.55 grams and 33.46 grams PAA (Lot # 844-032816, Perasan MP-2C) in 20 L of Modesto city water to produce a nominal 150 ppm PAA solution and a 400 ppm PAA solution. The concentration of PAA in the treatment solutions were analyzed using the Palin Modified DPD Methodology (Enviro Tech US Patent 7,651,860 B2). The actual concentrations were found to be 150.9 and 395.9 ppm PAA respectively.

Treatment

Three of the inoculated pork pieces were transferred to individual sterile stomacher bags along with 100 mL of D/E Neutralizing broth. The bags were agitated for 60 seconds. Aliquots were taken from each bag, serially diluted, and plated on 3M Enterobacteriaceae Petrifilms™. These three samples would serve as the control for the study.

Three of the remaining cuts of pork were submerged in the 150 ppm solution for 60 seconds. The cuts were then transferred from the treatment solution to individual sterile stomacher bags along with 100 mL of sterile D/E Neutralizing broth. The bags were agitated for 60 seconds. Next, aliquots were taken from each bag, serially diluted, and plated on 3M Enterobacteriaceae Petrifilms™.

The remaining three cuts were submerged in the 400 ppm solution for 60 seconds. The cuts were then transferred from the treatment solution to individual sterile stomacher bags along with 100 mL of sterile D/E Neutralizing broth. The bags were agitated for 60 seconds. Next, aliquots were taken from each bag, serially diluted, and plated on 3M Enterobacteriaceae Petrifilms™.

All Petrifilms were incubated at 35°C for 24 hours then enumerated.

Results

Table 1 shows the average remaining *S.* Heidelberg colonies for the control, 150 ppm PAA treatment, and 400 ppm PAA treatment.

Description	Avg. log_{10} (CFU/mL)	Avg. log_{10} Reduction (CFU/mL)	Percent Reduction	Replicates
Control (untreated)	7.63	NA	NA	3
150 ppm (60 secs)	6.31	1.33	95.3	3
400 ppm (60 secs)	5.99	1.64	97.7	3

Conclusions

Treatment with 150 ppm and 400 ppm PAA against *Salmonella* Heidelberg inoculated pork showed modest efficacy with a 60 seconds contact time. The average log_{10} reduction for the 150 and 400 ppm PAA treatment was 1.33 and 1.64 CFU/mL respectively. Greater log_{10} reductions of *S.* Heidelberg can be achieved by increasing PAA concentration and/or increasing the treatment time.