Effects of Safe2O™ brand Poultry Wash, a Highly Acidic Calcium Sulfate Solution, Used as a Poultry Wash Pre and Post Evisceration on Total Aerobes, E. coli., Salmonella, *and* Campylobacter

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ABSTRACT

Poultry carcasses are required to be free of fecal contamination prior to entering the chiller. Carcasses are inspected and returned for reprocessing if found to be contaminated. Some plants use a trisodium phosphate (TSP) spray prior to chilling that floods the carcasses with water containing 8 to 12% TSP in place of the off-line reprocessing. Use of TSP at pH 12 requires an acid treatment of the chillers to maintain the pH so the chlorine will be effective in reducing bacterial counts. Excess phosphates must be removed from the overflow prior to reaching the sewer system in most municipalities. The Mionix Corporation developed a Highly acidic calcium sulfate solution, Safe2O™ brand Poultry Wash composed of generally recognized as safe (GRAS) chemicals to be used in place of TSP. Ninety-six plant run carcasses were picked up from a local processor, transported to the research facility, and inoculated with a marker strain of *Salmonella* 30 min prior to treatment. Twenty-four plant run carcasses (PRC) were subjected to a whole carcass rinse, and the diluent analyzed to obtain baseline microbial counts. The remaining 72 carcasses were treated with either water, TSP (pH 12), or Safe2O™ brand (pH 1.3) at a rate of 1.2 L per carcass for the simulated pre evisceration rinse, and 1.3 L per carcass for the inside/outside washer. After chilling for 45 minutes a whole carcass rinse was performed on all carcasses and the diluent analyzed for total aerobes, *E. coli., Salmonella* , and *Campylobacter* (log 10 cfu/ml). Microbial counts for the PRC carcasses were total aerobes 3.99, *E coli.* 2.68, *Salmonella* 1.98, and *Campylobacter* 2.47. The water spray significantly lowered all counts to 3.11, 1.28, 0.60, and 1.38 for the respective organisms. The TSP and Safe2O™ brand treatments significantly reduced the counts even lower. Total aerobes for the TSP and Safe2O™ brand were 2.31 and 2.30 respectively. Counts for *E coli.* 0.64 and 0.52, *Salmonella* 0.24 and 0.15, and *Campylobacter* 0.15 and 0.08 for the TSP and Safe2O™ brand respectively. The Safe2O™ brand Poultry Wash reduced counts slightly more than the TSP without the problems associated with phosphate disposal.

Material and Methods

Ninety-two carcasses were picked up from a local commercial processor and transported to the research facility in insulated containers. All carcasses were inoculated with a marker strain of *Salmonella* within 30 min of removal from the processing line. After 30 min, 24 carcasses were subjected to the whole carcass rinse procedure and the resulting diluent was taken to the micro lab for microbial analyses. The remaining carcasses were subjected to a timed spray with either

water, trisodium phosphate, or Safe2O™ brand Poultry Wash. Treatment solutions consisted of deionized water, 8% w to w solution of trisodium phosphate (TSP) and deionized water, or a 50 % w to w solution of Safe2O™ brand Poultry Wash and deionized water. Treatments consisted of a 5 s outside spray (1.2 L), 5 min hang time, 5 s inside/outside spray (1.3 L), and a 45 min chill in separate agitated chillers. After chill, all carcasses were drained for 30 s and subjected to the

whole carcass rinse procedure (Cox et al., 1981) in an automated shaker sampler (Dickens et al., 1985).

Microbiological Procedures

All carcasses were inoculated with 1 ml of a Log 10 3.0 culture of *naladixic acid resistant Salmonella typhimurium.* The isolates were allowed to attach for 30 min prior to treatments. After respective treatments all carcasses were rinsed in 200ml of Butterfields buffer to neutralize the treatment compounds and 100 ml of the rinsate was used for microbiological analyse.

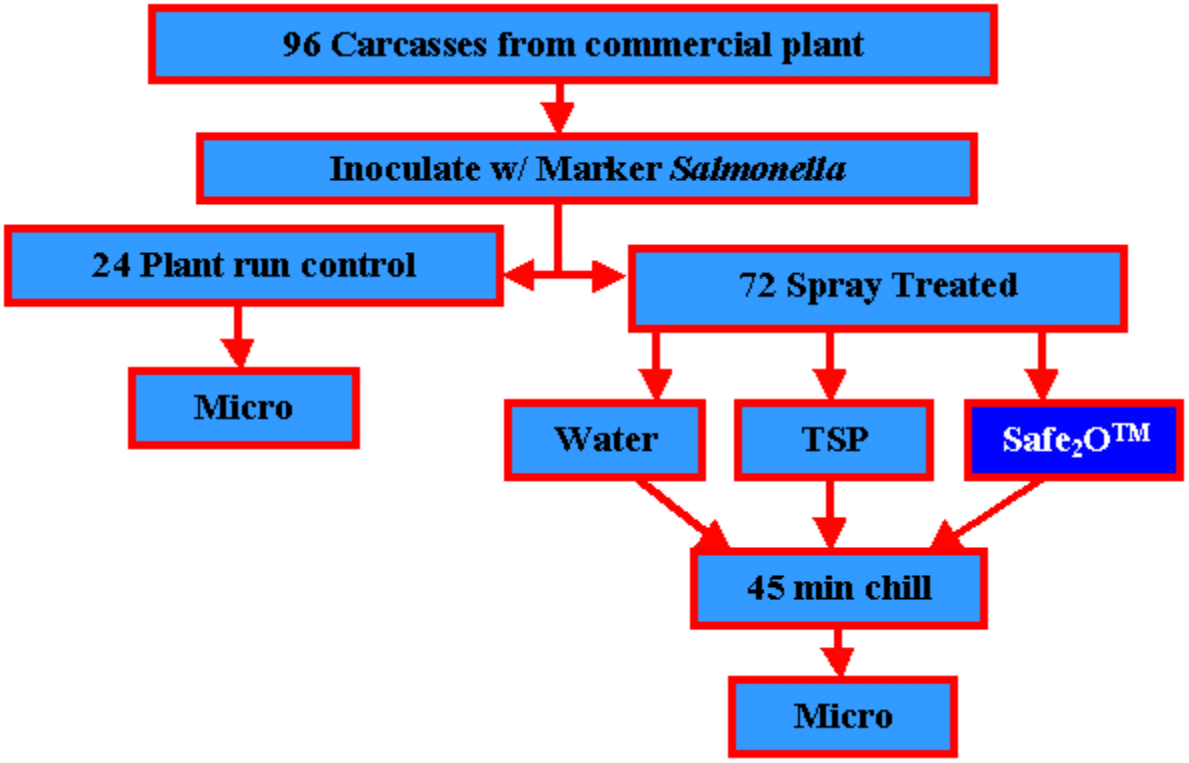
Total aerobes were enumerated on plate count agar Incubated at 35 C for 48 hr.

Petrifilm was used to enumerate the generic *E. coli* and Incubated at 35 C for 48 hr.

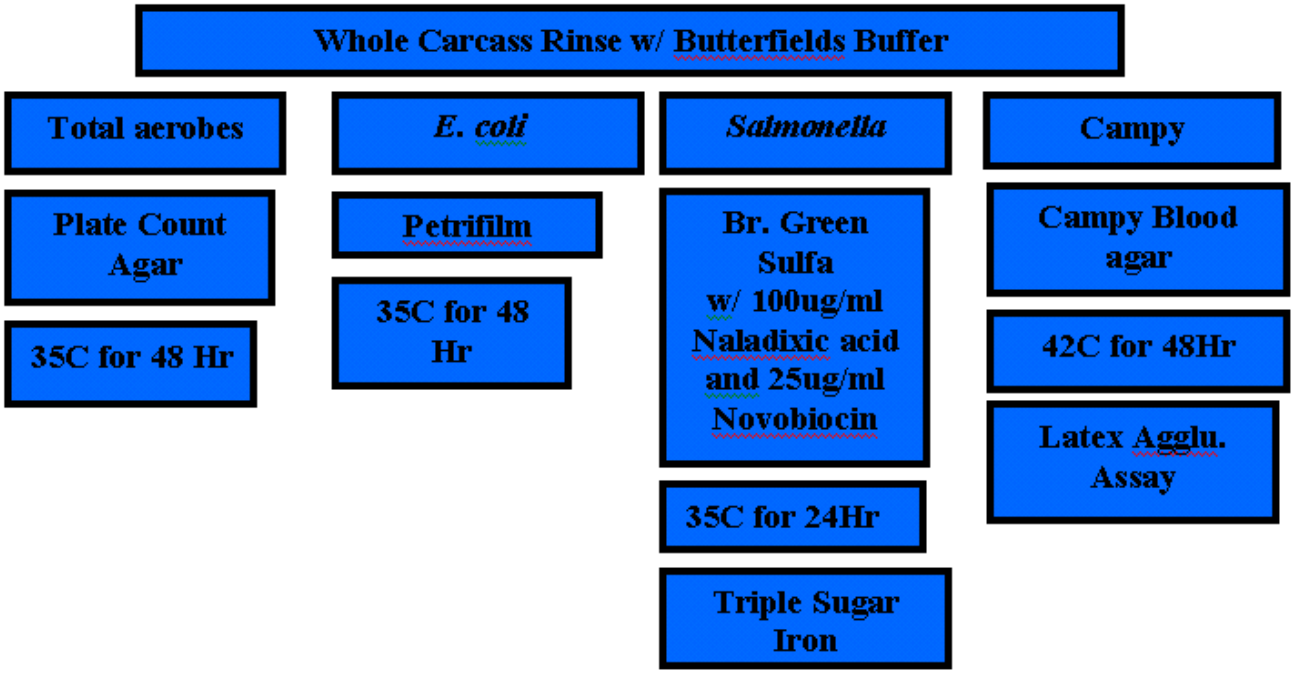
Salmonella were enumerated on Brilliant Green Sulfa agar containing 100ug/ml naladixic acid and 25ug/ml novobiocin. Plates were incubated at 35 C for 24 hr. Positive colonies were confirmed using Triple sugar iron and lysine iron agar.

Campylobacter spp. were enumerated on Campy Blood Agar (Blaser) at 42 C for 48 hr. Suspect colonies were Confirmed using latex agglutination assay (INDX –CAMPY [jel])-Integrated Diagnostics.

Experiment Design



Experiment Design Micro



Spray Apparatus

Pump Tank and Spray Chamber

Inside Spray Chamber of Inside/Outside Poultry Washer

RESULTS

Trt	pH	Total aerobes	*E. coli*	Sal *Salmonella*	Campy *Campylobacter*
		---------- Log_{10} CFU/ml----------			
PRC (Plant run control)	- - -	3.99 [c]	2.68 [c]	1.98 [c]	2.47 [c]
Water	7.72 [b]	3.11 [b]	1.28 [b]	0.60 [b]	1.38 [b]
TSP (Trisodium Phosphate)	12.1 [c]	2.31 [a]	0.64 [a]	0.24 [a]	0.15 [a]
$Safe_2O^{TM}$ Poultry Wash	1.31 [a]	2.30 [a]	0.52 [a]	0.15 [a]	0.08 [a]

Values in columns with unlike superscripts are significantly different

Conclusions

1.Water only significantly reduced all microbiological counts.

2.TSP and Safe2O™ brand Poultry Wash reduces all counts even further.

3.TSP leaves the carcasses with soapy feeling, which is gone after chill.

4. Safe2O™ brand Poultry Wash leaves skin dry looking and darkens the fat prior to chill, but changes are

not seen after chill.

5.With Safe2O™ brand Poultry Wash there are no phosphates to remove after use.

6. Safe2O™ brand Poultry Wash requires no chiller treatment to correct the pH of the chill water.

Discussion

Safe2O™ brand Poultry Wash, a highly acidic calcium sulfate solution, could be a viable alternative to TSP for on line reprocessing in commercial processing facilities. Advantages would include the reduction of phosphates that would have to be removed from the plant effluent or cost involved with the dumping of excess phosphates. The process of adding acid to the chillers to balance the pH to enable chlorine to be effective would also be eliminated. Further studies will concentrate on economic factors for using Safe2O™ brand Poultry Wash for online reprocessing as well as for incorporating it into the over all HACCP plan. Research on its effectiveness as a post-chill spray will be directed towards *Listeria* and spoilage bacteria reductions to increase shelf life.

Bibliography

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low volume rinse. Poultry Sci. 60:768-770.

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