

# Evaluation of *Sandia* Solution as a Sanitizer for the Food Industry: A Preliminary Report

---

Jill Bieker, H. Thippareddi, R. K. Phebus and C. L. Kastner  
Dept. Animal Sciences & Industry  
Kansas State University, Manhattan, KS 66506

---

Major processed meat manufacturers operate under a Hazard Analysis Critical Control Point (HACCP) program to reduce, control and/or eliminate foodborne pathogens in meat products. In addition, the meat processors should develop Sanitation Standard Operating Procedures (SSOPs) to assure that the product contact and non-contact surfaces in the meat processing environment are clean and sanitary. However, due to the common carriage of the organisms in plant personnel, their ability to survive or grow at refrigeration temperatures, their ability to form biofilms and evade the effects of sanitizers, and their survival for long periods in aerosols, this has not been possible.

The documented efficiency of thermal processing protocols to eliminate/reduce the risk of *L. monocytogenes*, presence of this pathogen in processed meats at high frequency (Wilson, 1989; WHO, 1988), the ubiquitous presence of this organism in the processing plant environment, along with the high rate of asymptomatic human carriers suggest that the key issue with safety of cooked RTE products is post-process re-contamination (i.e. contamination of cooked products during peeling and slicing operations). This is of great consequence in RTE meat products as these products are not routinely subjected to heating and further cooking at point of consumption.

Thus there is a great need in the food manufacturing industry to develop and utilize sanitizers that are effective in destroying these pathogens in the meat processing environment. Although several sanitizers such as chlorine based, quaternary ammonium, peroxy acids, hydrogen peroxide and other sanitizers are commonly used, their efficacy is greatly reduced due to the formation of biofilms. Thus there is a great need for a sanitizer in the food processing industry that can inactivate the pathogens which can be an integral part of the biofilms. This further will assure the product safety as well as improve the shelf life of the food products by reducing or eliminating the spoilage organisms as well.

The objective of the study was to evaluate the efficacy of the Sandia sanitizing solution against *Salmonella* spp. and *Listeria monocytogenes* in suspension.

## ***Materials and Methods:***

***Bacterial Cultures:*** Five strain mixtures of *L. monocytogenes* (101M, 109, 108M, 4c, 3) and *Salmonella* spp. (Typhimurium, enteritidis, Montevideo, Lille and Newport) were used. Fresh cultures of each of the strains was prepared by two sequential transfers of the cultures from a slant to tryptic soy broth (TSB) and incubated for 24 h at 35 C. Fresh cultures were grown in TSB and incubated for 24 h at 35 C. The cultures were

centrifuged (13,300 x g, 10 min; 4 C) and resuspended in 50 mL of sterile de-ionized water (SDW). The cell pellet was washed twice as described and resuspended in 10 mL SDW and the five strain cocktail of each pathogen was prepared by mixing the individual culture suspensions. The five strain cocktail suspension was standardized to ca. log 10 CFU/mL spectrophotometrically.

**Methodology:** Three treatments were evaluated: Sandia foam solution treatment (15 min), Sandia foam solution treatment control (0 min) and control sample. The cocktail suspension (1 mL each) was transferred to sterile tubes (triplicates for each pathogen), either Sandia foam solution (1 mL) or peptone (1 mL) was added to each tube and mixed thoroughly for treatments and controls. Treatment controls were prepared as described for the treatments and addition of SDW (9 mL) immediately following addition of the Sandia foam solution. Control samples were washed at least twice with SDW (5 mL) and resuspended in nutrient broth (NB, 5 mL), serially diluted in SDW and plated on Nutrient Agar (NA). The plates were incubated at 35 C for ca. 48 h and enumerated.

**Results and Discussion:** Three replications with triplicate samples were conducted for evaluation of the Sandia sanitizing solution for its efficacy to destroy *Salmonella* spp. and *Listeria monocytogenes* in solution. Exposure of *Salmonella* spp. and *Listeria monocytogenes* to the sanitizer resulted in > 9.5 log CFU/mL reductions at both 0 and 15 min exposure times.

These results indicate that the sanitizer is highly effective against *Salmonella* spp. and *Listeria monocytogenes* planktonic cells. Further evaluation of the sanitizer as both solution and foam to inactivate the pathogens and food spoilage organisms (*Salmonella* spp., *Listeria monocytogenes*, *Staphylococcus aureus* and *Pseudomonas* spp.) as both planktonic cells and biofilms are planned and will be conducted.

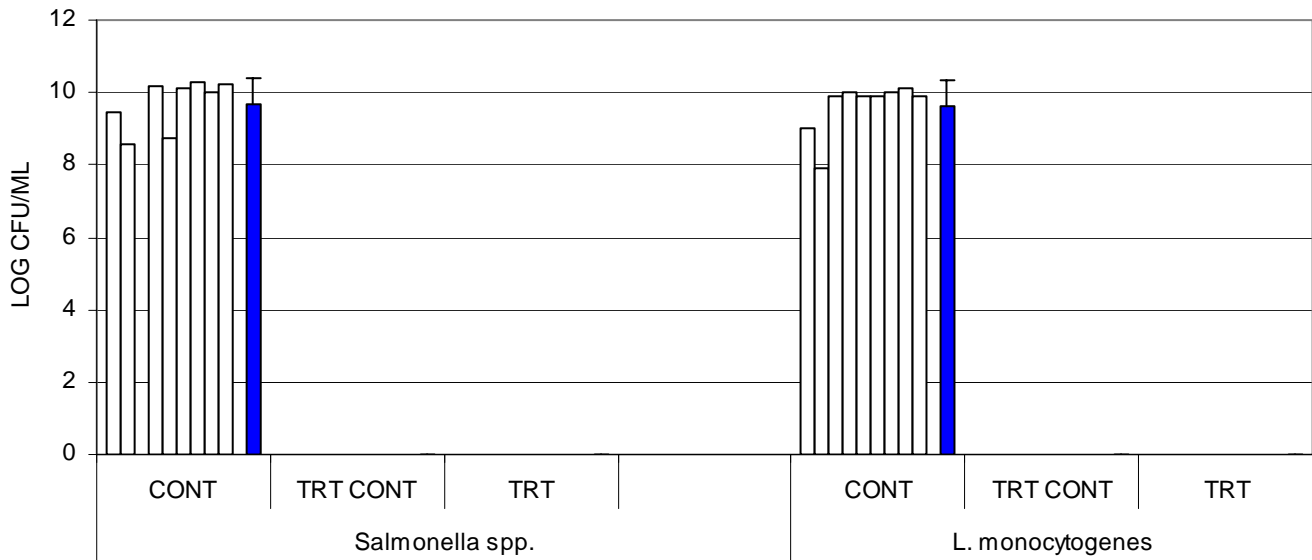


Fig. 1. Reductions in *Salmonella* spp. and *Listeria monocytogenes* on exposure to Sandia sanitizer solution. (CONT: no exposure to Sandia sanitizer; TRT CONT: 0 min [ca. 30 sec] exposure to Sandia sanitizer; TRT: 15 min exposure to Sandia sanitizer). Detection limit =1 CFU/mL or 0.0 log CFU/mL