



THE COMBINED EFFECTS OF MOISTURE AND TEMPERATURE ON THE MICROBIAL LOAD IN POULTRY FAT



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Introduction

- *Salmonella* spp. is one of the most common sources of foodborne illness and is said to cause around 1 million illnesses each year with 19,000 hospitalizations and 380 deaths in just humans alone (CDC 2017).
- Now, *Salmonella* spp. is being linked to the outbreaks in pet food because of the rendered animal fat that is present in the products (Laban, S.E. and others 2014)
- This has caused many problems for pet food companies since the animal fat is added after the pasteurization process that the pet food goes through (Himathongkham, S and other 1996)
- *Salmonella* infections are zoonotic, making them transferrable from animal to human, so if a pet gets sick it is likely that the owner could suffer from infection as well (CDC 2017).

Objective

The objective of this experiment was to determine the effects that temperature and moisture levels have with the growth of *Salmonella* in rendered poultry fat that will be used in pet food production.

Experimental Procedures

- Overnight cultures of *Salmonella Newport*, *Salmonella Thompson*, and *Salmonella Infantis* were grown to create cocktail mixtures of a low 2.3×10^5 and high 5.8×10^8 dilutions.
- Two fat samples of 450 g. each were obtained and one inoculated with the high cocktail and the other with the low.
- The samples were then transferred to four 100 g. sterile beakers for the high and four for the low inoculated fats.
- Water was then added to three of the four beakers to achieve a moisture level of 0.5%, 1.0%, 3.0% and a control was held for the fourth.
- The fat was incubated at 48°C for seven days.
- An enrichment procedure was added which began with sampling 10 g. of fat from each beaker and adding 90mL of BPW (Buffered Peptone Water) with tween 80 into a sterile bag and incubating them at 37°C for 24 hours.
- After 24 hours, 1mL from each bag was transferred to 9mL of RV broth and incubated at 42°C for 24 hours.
- Finally, serial dilutions were performed on the RV tubes and plated on XLD agar and incubated at 37°C for 24 hours before obtaining the final results.

Experimental Results

Figure 1: Both the left and right image show the positive *Salmonella* colonies that grew on the XLD media

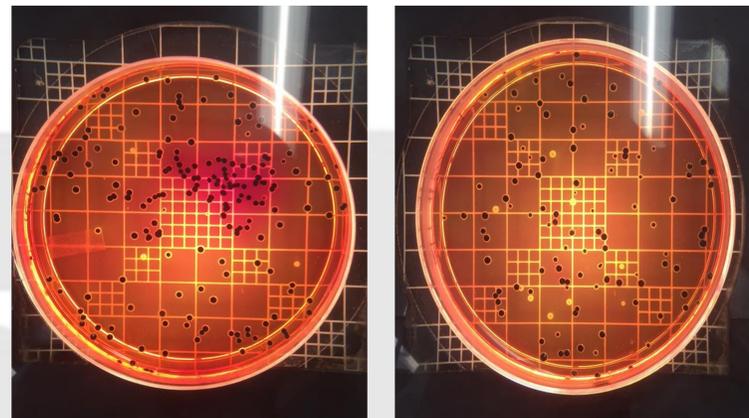


Figure 2: Poultry fat (left) that was used for the research. RV broth tubes (right) that show a lighter blue color when more *Salmonella* is present.

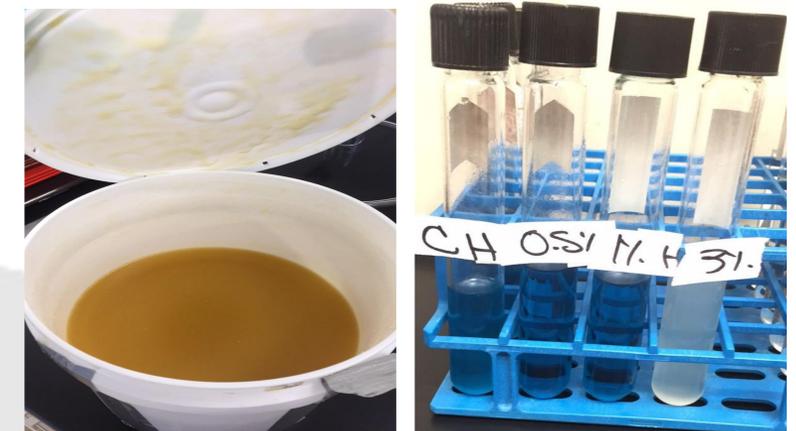


Figure 3: Effect of surface treatments on *Salmonella* inoculated onto stainless steel surfaces

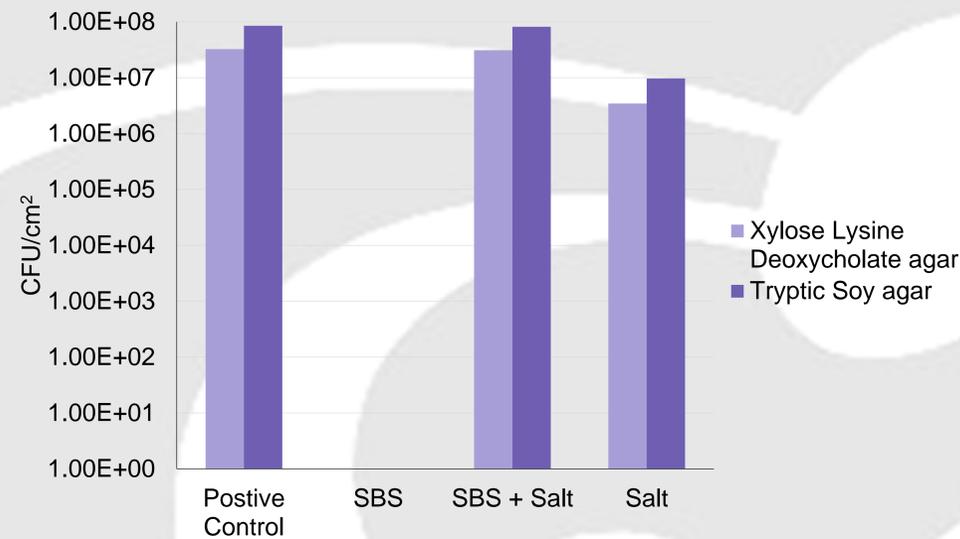
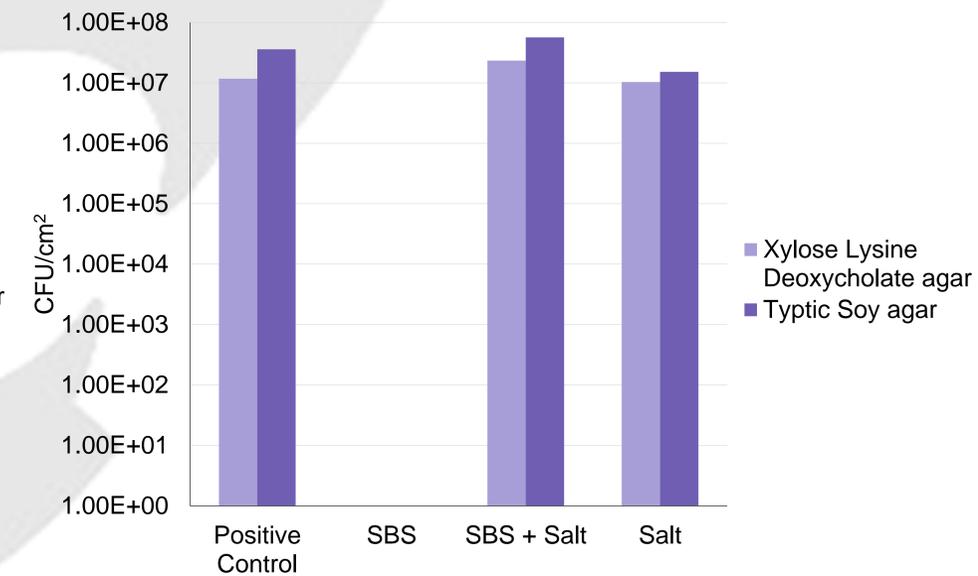


Figure 4: Effect of surface treatments on *Salmonella* inoculated onto plastic surfaces



Conclusions and Future Work

- All inoculated plates from the positive control yielded 3.24×10^7 CFU/cm² and 1.17×10^7 CFU/cm² for steel (Figure 3) and plastic, respectively. Treatment with salt saw little reduction, with 3.10×10^7 CFU/cm² and 2.34×10^7 CFU/cm², respectively for steel and plastic. The SBS+Salt blend also resulted in little reduction with counts of 3.45×10^6 CFU/cm² and 1.03×10^7 CFU/cm² for steel and plastic, respective
- SBS treatment had the most dramatic effect with no detectable growth (<100 CFU/cm²), regardless of surface.
- These preliminary findings warrant further evaluation of the dry acidulant, SBS, as an effective method for surface decontamination against *Salmonella* in dry environments like pet food and animal feed manufacturing facilities.
- Planned further research will entail replication, additional surfaces, ideal contact time, and other dry chemicals.

References

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