Effectiveness of eBeam technology in reducing *Salmonella* by 90%

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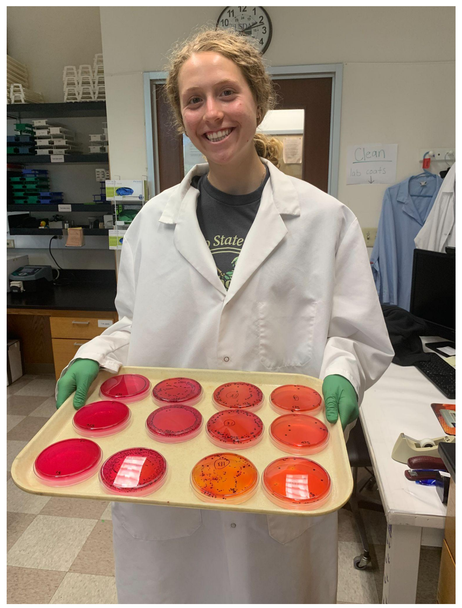
Introduction

- *Salmonella* is a food borne pathogen which infects upwards of 1.35 million people[2] in the US each year causing $2.8 billion dollars worth of economic impact.[1]
- Currently antibiotics are used to control Salmonella.
- Electron beam (eBeam) technology accelerates electrons from commercial electricity.
- eBeam technology causes DNA damage and reproductive death in bacteria.[2]
- By utilizing this technology in vaccines the amount of *Salmonella* found in poultry products can be drastically reduced.
- The goal of this experiment was to determine what eBeam dosage reduces the *Salmonella* bacteria present by one log or 90%.

Figure 1: A display of plates containing *Salmonella* colonies.

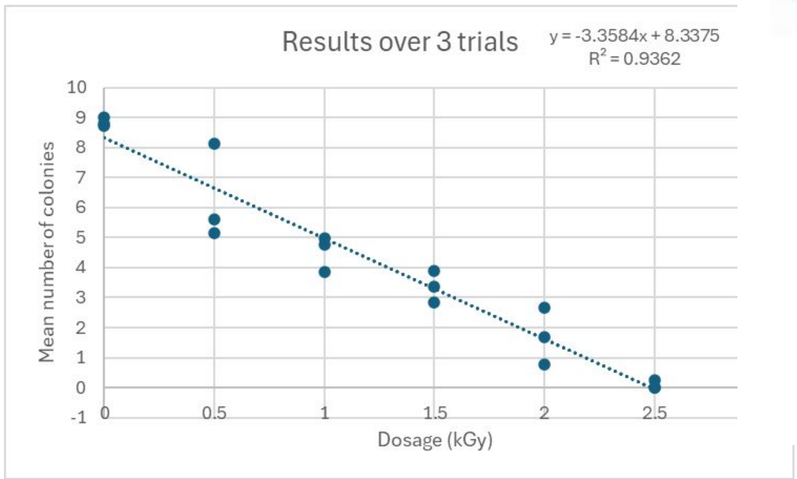


Methods

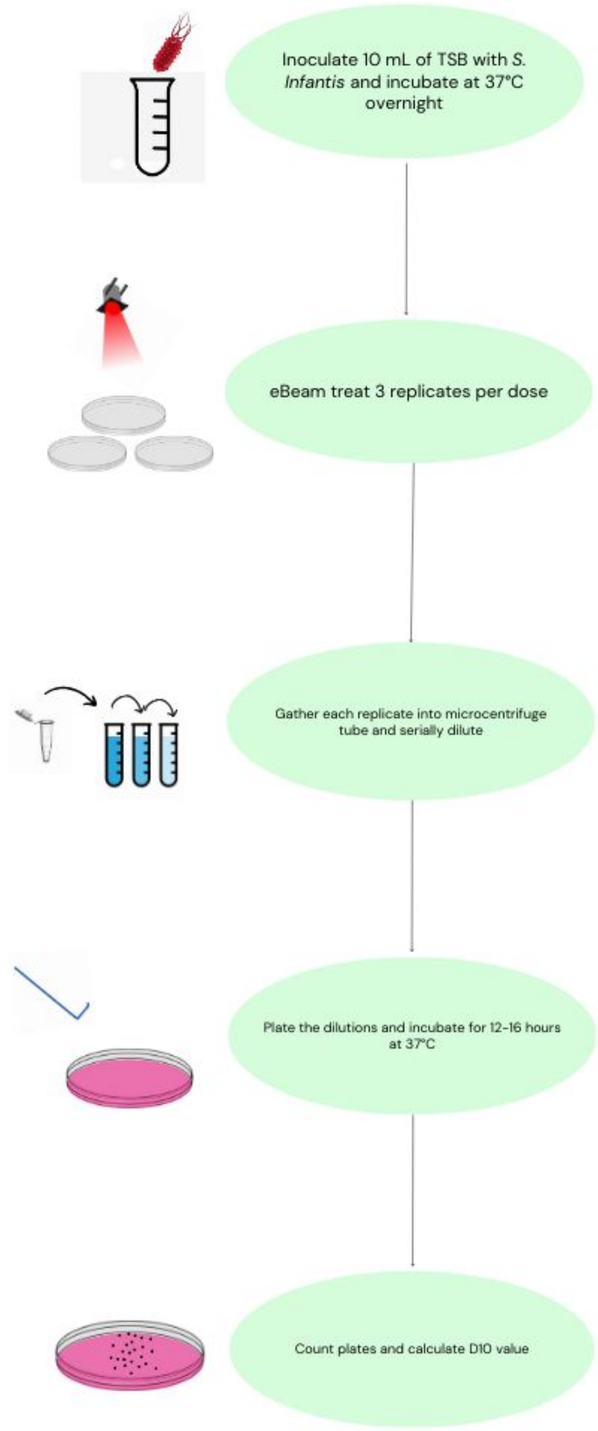
- There were three trials conducted each containing three replicates per dose.
- Dosages were 0 kilograys, 0.5 kGy, 1 kGy, 1.5 kGy, 2 kGy, and 2.5 kGy. For each replicate 250µL of *S. infantis* was placed in a petri dish and then dosed with the appropriate kGy dosage in the low energy eBeam machine.
- The *Salmonella* was then collected, serially diluted via buffered phosphate diluent, plated on Xyline Lysine Deoxycholate, and incubated at 37℃ for 12-16 hours.

Results

- eBeam is effective at reducing *Salmonella* populations.
- 3-4 kGy is an effective dose to inactivate all *S. Infantis.*
- 0.26-0.33 kGy dosage reduces *Salmonella* by 1 log.
- In order to effectively inactivate 10 log of *S. Infantis* 2.6-3.3 kgy dosage of electron beam is needed.
- D10 value average: 0.300.



Experimental Design



Discussion

- This study investigated the ability of eBeam technology to be used in combating food borne illness through multiple modes.
- Full inactivation of *S. infantis* occurs above 2.5 kGy.
- Due to the broad spectrum of this study it can be applied to food treatment and vaccine development.
- In addition since the study is so broad more specific research should be conducted before this technology can have large-scale applications.

References

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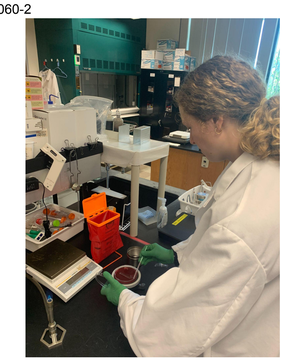

Figure 2: The plating set up and process.