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Project Title: A Novel Approach to Measuring *Salmonella* Levels in Raw Beef and Poultry Products

Presenter: Melody Thompson, MPH, Ted Brown, Casey Weber, PhD
Presenters email address: Melody_Thompson@Cargill.com
Mailing address: 151 N. Main St
Wichita, KS 67202

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Objective: The objective of this project was to develop a testing method that identifies raw beef and poultry products that contain levels of *Salmonella* with the greatest risk to public health.

Experimental Design & Analysis:

Traditional methods of enumerating pathogens in product samples are very time intensive, taking up to 5 days to obtain final results. We developed an approach that would identify product at a level of *Salmonella* that research suggests is the greatest risk to public health. We began by determining the sample processing parameters required to grow a known level of *Salmonella* in raw beef and poultry products to a quantity that is detectable on current pathogen testing platforms. This was accomplished by inoculating samples of raw beef and poultry products with *Salmonella* at our public health level of 1 CFU/g then testing different sample preparation protocols to identify the ideal sample preparation conditions. The inoculated samples were enriched with multiple growth mediums, at different dilution ratios, incubation temperatures, and incubation times. Each product matrix was then validated under the ideal sample preparation conditions by analyzing at least 3 replicates with at least 25 inoculated samples in each replicate.

Key Results:

We found that by shortening the incubation time we are able to discern between different levels of *Salmonella* in raw beef and poultry products. The incubation times were highly dependent on the sample matrix and the beginning sample temperature. Frozen products present a greater challenge due to the time required to equilibrate the temperature of the media and product. The testing platform utilized also impacted the incubation time required to grow *Salmonella* to a detectable level. Platforms with a higher degree of sensitivity showed greater ability to detect between different levels of *Salmonella* and exhibited detection at earlier incubation times. This approach allowed us to understand levels of *Salmonella* in our products without the large time to result associated with traditional MPN methods.

Industry Application:

The Threshold approach to *Salmonella* quantification in raw beef and poultry products is a means to prevent illness by managing outliers. Removing product from commerce that has a high probability of causing illness will impact public health to a greater degree than only monitoring prevalence. With a short incubation time, products can be placed on test and hold for *Salmonella* with minimal impact to inventory management and downstream customers.