Enumeration of Microbial Indicators in Beef Trimmings using a MicroTally Mitt vs MicroTally Cloth Samples

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Abstract: A study was conducted to evaluate the performance of two sampling methodologies of testing for microbiological indicators in beef combos. The methodologies being compared were a singular MicroTally cloth, and a MicroTally mitt fitted to slide over the hand. Combos were swabbed either before or after treatment with an antimicrobial dip, and samples were tested for Aerobic Counts, Enterobacteriaceae Counts, and Escherichia coli Counts using the TEMPO^{*} system. There were no statistically significant difference among counts (p > 0.05) achieved from either the cloth or the mitt. This observation was for both sampling done pre and post treatment, as both cloth and mitt counts were similar, regardless of when sampling occurred in the production process. The data obtained from this study regarding the quantification of indicators is applicable to beef producers internationally as a method of maintaining consistent sampling for product imported and exported globally.

Purpose: In the United States, the Food Safety Inspection Service recently changed from the use of N60 excision testing to demine if 2000 lb beef combos were contaminated to the use of a 2-minute cloth test using a MicroTally cloth. The method is nondestructive and takes less time than the excision sample. Recently, a Mitt was developed that can be placed onto the hand to sample the beef combos [1]. However, a comparison of these two methods has not been evaluated in beef combos. This in-plant study was conducted to determine the effectiveness of the two methods for microbial sampling of beef trimmings in 2000 lb combos. The samples were collected from containers containing cuts of beef in a slaughter plant in the midwestern United States. This study is important to not only US processors, but also to international markets given the fact that any product imported into the United States could be sampled using this method. Achieving a more accurate reflection of the microbiological content of beef sampled at the slaughter plant is critical to ensuring safety for both producers and consumers.

Methods: Three repetitions were performed on different days of processing. Ten swabs and ten mitts were each used for each repetition, and samples were obtained from 10 different combos (~2,000 lbs) of beef trimmings. Combos were divided in half visually, one half of the combo trim was wiped with the cloth for one minute, while simultaneously the other half was wiped with mitt for one minute. Once the minute elapsed, subjects collecting the samples switched sides, and the other half of trim was wiped with cloth and mitt for one minute again. The standard testing time for both the cloth and the mitt is two minutes according to manufacturer instructions. Samples were transported back to the laboratory and tested for Aerobic Counts, Enterobacteriaceae Counts, and Escherichia coli Counts using the TEMPO[®] system. Statistical analysis was performed to determine if there is a difference of data collected between cloth and mitt based on significance level of 95% for the study.

Results: Aerobic Counts, Enterobacteriaceae and *Escherichia coli* counts were not statistically different between the two methods according to the Wilcoxon Test Analysis (p = 0.81, p = 0.53 and p = 0.36 respectively). A linear regression was performed to account for the variation between

repetitions. The linear model for Enterobacteriaceae counts showed the best fit for the model ($R^2 = 0.91$) with intercept and slope of 0.090 and 0.909 respectively, followed by AC with intercept and slope of 0.4913 and 0.814 respectively and R^2 of 0.607. For *Escherichia coli* count, the intercept and slope calculated were 1.218 and 0.566 respectively. In all cases, the slopes were not statistically significant (p < 0.05), and only for EB the intercept was statistically significant (p = 0.01).



Figure 1. Linear Model for EB counts. Figure 2. Wilcoxon test for all microorganisms

Conclusion: The mitt and cloth proved to have no statistical differences according to the Kruskal Test regarding the numbers of indicator bacteria detected in beef combos. The high variation within the data sets can be attributed to the fact that a repetition was done post treatment with an antimicrobial dip, while others were done before treatment. Additionally, sample collection was done in a plant environment where natural varation occurrs. Lower amounts of pathogens were detected from samples taken post-treatment, but the levels shown were comporable between cloth and mitt. Enterobacteriacae counts showed the best fit [2], followed by Aerobic counts, but further repetitions would be needed for *E.coli* counts to conclude methodologies will recover similar counts in all samples.

References:

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