**Statistical Design Consulting**

**SEMESTER REPORT**

**Summer 2024**

**Client:** Joshua Martin  **File Number:** 24-001

**Department:** Food Science **Major Prof:**

**Consultant:** Sumeeth Guda **Initial Meeting Date:** 01/17/24

**Meeting Attendees:** Sumeeth Guda (Observer), Youha Shin, Joshua Martin, Dr. Bruce Craig

**Statement of Problem:** “To assess the impact of different doses of an antimicrobial agent on *Listeria monocytogenes* (LM) growth in food products.”

**Goal of This Project:** Industry Partnership

**Background:**

The project involves an industry partnership and is under an NDA. It aims to evaluate the effectiveness of various concentrations of an antimicrobial agent in controlling Listeria monocytogenes (LM) in a food matrix. The study entails measuring bacterial growth (CFU/g) across different antimicrobial levels, with samples collected every few days over a couple of weeks. The data analysis will be conducted using JMP software, and the client is interested in learning how to perform these analyses independently in future projects.

**Progress During Current Semester:**

The client is a continuing client from Spring 2024. Their project was part of an ongoing series of projects concerning antimicrobial agents’ effects on bacterial growth (CFU/g) with different concentrations and levels for the agents. During spring 2024, the consultant Youha made a statistical report containing the significant difference results with explanations that the concentrations were different. When the client and consultant met in summer 2024, the main goal the client wanted with the project was that they conducted a similar experiment that they did in the spring semester under the same design framework, the only difference was the concentrations. They wanted the consultant to make a similar statistical report in the summer semester using the new dataset with data collected in May. Along with a visual to show a graphical difference between the treatment groups to show to present to the industry partners.

Since the previous consultant Youha already included the R markdown file alongside the previous datasets. The summer consultant Sumeeth used Youha’s code as a template for the newly gathered dataset. When Sumeeth ran the code, he found a design issue with the data collection process in that there were not as many levels within each of the treatment groups. Hence none of the statistical methods to determine significant differences between the groups (Anova, Tukey test, F test, etc) worked and effectively all the groups were treated like individual and independent points. While the consultant could not statistically show that there existed statistical differences between the 6 microbial groups across the 6 days, the consultant made a scatterplot with all the points alongside their group means to visually show that there existed difference between the points. Ultimately, addressing the client’s main goal to show that the groups are different.

After this work was finished, the client and consultant met to discuss the results. The client was satisfied with the work and understood that the statistical report did not give them the results that they wanted. They explained that they would be moving to a different role within the food science department, and while they would not be working with the SCS anymore. Ultimately, the client’s series of ongoing projects would be inherited by one of his colleagues to continue the egg white experiments.

**Current Status: Complete.**