**Project check-in # 1: Preliminary findings Report**

# 1. Preliminary Analysis

**Data Description:** The dataset is of the chemical characterization of 88 food waste substrates with specific importance on the principle nutrient components of the substrate i.e. carbohydrates, proteins, and lipids (fats). A snapshot of the dataset is shown below. Each food waste item, heretofore referred to as ‘substrate’, is assigned to a group based on rough commonalities of the substrate’s characteristics or what would be generally considered a food group in modern society i.e. products containing milk are all assigned to the group ‘Dairy Products’ while products containing animal flesh (non-fish) are assigned the group ‘Meat Products’. There are 15 groups across the 88 food substrates.

In the proposed analysis we will utilize the MATLAB based Anaerobic Digestion Model #1 (ADM1) to estimate the amount of biogas (methane) that can be produced from each food substrate. The model requires that the mass of the principal nutrients be provided, which can be determined by the characteristics listed in the table. Briefly: the amount of substrate material is determined by ‘TS.Perc’ or total solid percentage i.e. the mass of material that is not water, from the total solid percentage we then take the volatile solids percentage (VS.Perc) which is the fraction that can engage in anerobic digestion. Within the volatile solids we can then fraction out the principal nutrients (carbohydrates, proteins, and fats) by their listed percentages. The final mass of each of these will be what is fed into the model.

A screenshot of a computer program

AI-generated content may be incorrect.

**Initial Analysis:**

**Carbohydrate, Proteins, Fats Percentages**

To better understand the variability of each of the principal nutrients in the dataset, we developed histograms based on their percentages. We see that carbohydrates generally dominate the overall mass of the substrates with the majority of foods being >40% carbohydrates (by mass of VS). Proteins in general occupy a smaller percentage of the VS mass with he majority of foods having <20% proteins. In comparison, more than half the food substrates have 0-10% fats marking them as the lowest represented nutrient by mass with notable exceptions that are fat dominant such as oils, grease, and fatty dairy products.

