Glycerol, a by-product of biodiesel production, is being used to optimize the production of biogas. The initial hypothesis stated that eight percent glycerol would optimize the production of biogas. The results from figure 1 show that 6% glycerol produced the greatest amount of biogas at The Island School. This finding supports an aerobic environment which is not conducive to biogas production. Biodigestion will allow us to reduce our carbon footprint and meet our energy needs.

The purpose of our research this term is to find the glycerol percentage that will help make our biodigester as efficient as possible. Based upon previous research, we hypothesize that the presence of glycerol up to 8% by volume of feedstock will optimize biogas production. We will also monitor how temperature and retention time affect gas production. Our results from this semester are going to help determine how to maximize the efficiency of our digester based on available feed stocks.

There are many factors that could have altered the production of biogas. In order to dye the water, we added curry, which has been shown to inhibit the growth of algae. We also added chemical fertilizer at the same time. For future research, students can experiment with different uses of methane on the Island School campus and should be researched more because it is so appropriate and relevant for our campus.

METHODS
Three small-scale biodigesters were constructed of uniform properties. Each consisted of three buckets and a series of tubing. An anaerobic setting was achieved by sealing the buckets with the tubing and caulk. Stage 1 was filled with a homogenous mixture of 11.4 L of water and 1.4 kg of pig waste that maintained an 8.1 ratio of water to solids. The mixture contained an extra 36 grams of pig waste to account for any residual waste left after pouring the mixture into the bucket. Stage 2 was filled with five gallons of water that upon the production of gas was displaced into stage 3. Stage 3 was marked every 0.5 liters in order measure the amount of water displaced. It was elevated in order to prevent the flow of water without the production of gas. There were three systems with the same percentage of glycerol simultaneously digesting, to maintain a precise measurement. The batches contained glycerol content of 0% (control variable), 4%, 6%, 8%, and 10% to compare the gas production in order to find the glycerol threshold.

The biodigesters were located in a sunny area where temperatures were higher. It has been found that warmer temperatures increase productivity. Data was recorded on the date, time, gas level, temperature and notable weather conditions twice a day.

Figures 1 and 2 show the average production of biogas in relation to the amount of glycerol that was added to the feedstock. As the graph shows, it took several days before biogas was produced, with 8% beginning most quickly. The graphs show that the batches with glycerol additions produced a steady stream of gas for four days after gas was first produced, while the batch with no glycerol produced from day 5 until day 11.

Figure 2 shows the average production of total liters of biogas in relation to the amount of glycerol added. It conveys that 6% glycerol produced the most biogas, averaging 833 liters between three digesters. Although 8% glycerol started producing sooner than 6%, it produced 0.78 liters while 6% produced 0.73 liters. After the data was run through an ANOVA test, a value of 0.1 was received, indicating that the addition of glycerol was not the only factor that affected the production of biogas.