# Raymond RedCorn

Raymond (a.k.a Studie) grew up in Kansas and Oklahoma and attended the University of Kansas, where he graduated with a Bachelor of Science in Civil Engineering in 2008. Raymond worked on the design and construction of wastewater treatment plants for Camp Dresser Mckee Engineering from 2008-2011. In 2012 Raymond entered the Ecological Sciences and Engineering Interdisciplinary graduate program and the Agricultural and Biological Engineering Graduate program at Purdue. He works under Dr. Abigail Engelberth in the Laboratory of Renewable Resources Engineering where he has studies the potential of anaerobic digestion to produce value added chemicals from waste sources life food waste and wastewater sludge.

# Identifying Conditions to Optimize Lactic Acid Production from Food Waste

## November 5, 2014

## 3:00 PM Potter 234

Ecological Sciences and Engineering
Agricultural and Biological Engineering

Everyone is Welcome!

There is an increased demand for lactic acid for the production of bioplastics and to aid nutrient removal in wastewater treatment. Food waste offers a source of soluble sugars to produce lactic acid, which does not increase land demand, but digestion conditions have yet to be optimized when co-digested with primary sludge.

Food waste was collected from cafeteria waste bins, homogenized and seeded with primary sludge. A Box Behnken Response surface design was used to optimize lactic acid production based on pH, temperature, loading rate, and retention time. Subsequent experiments verified and refined those conditions to optimize for both yield and concentration of lactic acid.

When optimized for concentration and yield, 58 g $L^{-1}$ and 48 g $L^{-1}$ lactic acid were achieved respectively and retention time was reduced three-fold over previous experiments. Digestion rates of carbohydrates to lactic acid demonstrate homolactic fermentation as the dominant microbial pathway. Approximately 60% of the lactic acid produced was L(+) lactic acid. The ratio of soluble chemical oxygen demand to $NH_4$-N was 176 indicating high potential for biological nutrient removal.