**INTRODUCTION**

- Greek yogurt market has grown to $2 billion per year industry in recent years, and market growth is expected to continue to rise.
- No standard identity of “Greek” yogurt by FDA
  - No mandatory straining step
  - Whey toxic byproduct is sustainability issue
  - Milk protein concentrates often used in industrial production
- Sustainability will become growing concern in yogurt industry

**OBJECTIVES**

- Create a process to expand production of Lafayette-based Parthenon Greek Restaurant
- Goal is to sell packaged yogurt in local grocery stores; e.g. Marsh and Payless
- Perform small-scale experimental procedure to measure: pH, viscosity, lactic acid, and rheology
- Perform scale-up optimal design of plant and economic analysis to give highest rate of return
  - Alternative design options
  - Optimal design/Equipment sizing
  - Economic Analysis

**EXPERIMENTAL DESIGN**

- Model non-constant temperature fermentation:
  - Ferment yogurt at four temperatures: 90°F, 100°F, 110°F, 120°F
  - Record pH hourly for 8 hours
- Analyze rheology of products from fermentation experiment:
  - Flow sweep: 25°C, 0.01 to 20 1/s
  - Strain sweep: 25°C, 1.0 Hz, logarithmic sweep, strain percent 0.5% to 10.0%
  - Frequency sweep: 25°C, 0.02 to 35 Hz

**ALTERNATIVE DESIGNS**

- Cases examined to optimize economics:
  - Case 1: Heat exchanger, fermenter, packaging
  - Case 2: Jacketed vessel, fermenter, packaging
  - Case 3: Heat exchanger, packaging
  - Case 4: Batch vessel for all operations

**IMPACT & SUSTAINABILITY**

- Design process eliminates whey waste because of lack of straining step
- Product adds to already huge national Greek yogurt market
- Product fits with trend to buy local food, and adds to local economy
- Product adds to local economy
- $2 billion per year in national Greek yogurt market
- Greek yogurt was 19% of yogurt market in 2011, growing from 2% of market in 2008
- Few full fat Greek yogurt producers
  - Less competition in market
  - Less available market