



Advancing Biofuels Research

NCERC at SIUE

NCERC Laboratory Capabilities

1. Laboratory Training

- a. Analytical techniques for ethanol production
- b. Fermentation
- c. Specialized assays

2. Method Development and Validation

- Assay or Test Kit Validations
- Calibration curves for indirect measurements (e.g. NIR)
- Third party validation of instruments made specifically for the biofuels industry

3. Lab Testing

a. Fermentation Products: DDG, DDGS, Wet Cake, Whole and Thin Stillage

- Fat analysis
 - Soxhlet Extraction (AOAC 945.16, petroleum ether)
 - Fatty acids profiles (various methods)
 - NIR Transmittance
- Fiber analysis
 - Fritted Glass Crucible (AOAC 978.10)
- Moisture analysis
 - Karl Fischer (for ethanol)
 - Moisture balance
 - Oven method (NFTA 2.2.2.5)
 - NIR
- Protein analysis
 - Crude protein by Nitrogen analyzer (AOAC 990.3)
 - Free Amino Acids by LCMSMS
 - Selected amino acids: Cysteine, thionine, furosine, lysine, tryptophan
 - Amino acid preparation via microwave digestion or reflux condensation
- Starch analysis
 - Enzymatic (AOAC 996.11, modified, Megazyme® kit)
 - NIR (indirect spectroscopic analysis for flour and/or DDGS)
- Sulfur analysis
 - Total sulfur analyzer
 - Sulfur speciation by Ion Chromatography
- Ashing
- Particle size analysis
- Mycotoxins by kits
- Phosphorus
 - Total phosphorus by UV-Vis
 - Phytate by UV-Vis



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- Whole and thin stillage samples can be analyzed with the above techniques after freeze-drying. NCERC is equipped with a manifold-style freeze-dryer that can accommodate twenty-four bottles of up to one liter at a time. In addition, total and suspended solids can be analyzed by oven or moisture balance, density by centrifuge or densitometer and residual ethanol and sugars by HPLC (see below)

b. Ethanol, Fermentation, Slurry and Mash Analyses

- Ethanol analysis (before or after denaturation)
 - Gas Chromatography
 - HPLC
 - Karl Fischer
 - Density (Anton Parr)
- Sugars and ethanol (fermentation broth and drop samples)
 - HPLC
 - Indirect measurements (NIR)
 - Yeast cell counts
 - pH
- Enzyme activity
 - UV analysis
 - Incubation
- Chemical Oxygen Demand (slurry samples)
 - Colorimetry by UV-Vis spectrophotometry
- Dextrose Equivalent (slurry and mash)
 - Titration with Fehling reagents
- Brix Reading
- Density
 - Centrifuge
 - Densitometer
- Solids, total and suspended
 - Moisture balance
 - Oven @105°C for 3 hours

c. Microbiology

- Ability to grow organisms from seed to scale
- Gram staining
- Optical Density (UV microscopy)
- Microscope identification and viability of organisms
- qPCR for genetic identification of contaminants
- Growth curves
- Plating on various media (in-house plate preparation)

Note: All testing services are included in our research projects at the Lab or Pilot scale. While we may occasionally test individual samples, we do not perform routine testing like a commercial laboratory.