

Cycle 5 – Energy Research Grants

Optimizing Algae and Biogas Production in SUPER Loop Biorefineries

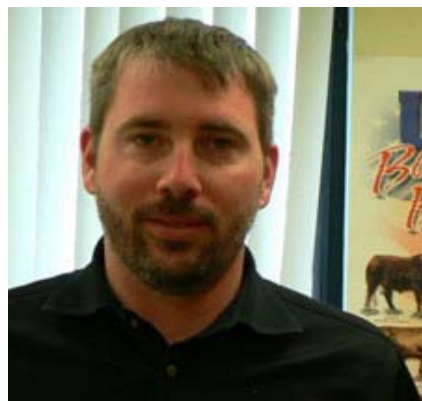
Principal Investigator:

Galen Erickson, Professor

Animal Science

402-472-6402

<http://animalscience.unl.edu/anscgalerickson>



ABSTRACT:

A traditional grain ethanol system that utilizes distillers grains for cattle and then cattle manure for biogas generation for the ethanol plant has been referred to as a “closed loop” system due to energy recycling within three segments (ethanol plant, cattle production, and manure biogas generation). A pilot-scale biorefinery that refines this concept by adding algae production to recycle heat, CO₂, water, and nutrients is a new integrated biorefinery, which is termed a “SUPER Loop” system.

This project brings together a multidisciplinary team, including industry partners, and focuses on the two least proven components (algae production and manure biogas generation) of the SUPER Loop concept. Specific objectives are optimizing feedstocks, evaluating CO₂ sources, and reducing energy requirements of algae production in Nebraska, and evaluation of manure biogas production from different feedstocks (manure types as influenced by cattle diets and housing systems) and subsequent impact of digestate on algae growth.

Preliminary greenhouse gas (GHG) life-cycle analysis suggests an 80% reduction in GHG emissions relative to gasoline in the SUPER Loop biorefinery compared to 40-60% in traditional plants. Both intact and de-oiled algae will be evaluated for nutritional value for cattle.