



Category 1b: Bioenergy Conversion Processes – chemical and industrial engineering

2. Improving Ethanol Production Efficiency: Optimization of Corn-based Feedstock Energy Conversions

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The project seeks to increase ethanol production efficiency using corn-based feedstocks, while maintaining high-quality cattle feed byproducts.

Corn ethanol production processes can be divided into three major stages: input/raw material processing, fermentation, and product/byproduct separation and processing. The project plan is to alter raw material (feedstock) processing prior to fermentation by introducing new dry-fractionation and fraction separation techniques. This will increase overall process efficiency by diverting feed byproducts from the fermentation step. This will increase overall process efficiency by diverting feed byproducts from the fermentation step. In addition, thermal pre-processing will be optimized to impart only the minimum starch modification/cooking necessary to ensure enzymatic digestion. The fermentation process step will also be improved by determining the optimal process conditions to increase ethanol yield. Thermal energy requirements and processing times will be reduced by exploring techniques that allow direct fermentation of starch by yeast. As production practices are evaluated, the energy inputs and ethanol plus byproduct outputs will be measured to ensure high yields and economic efficiency, including measuring the relative feed-quality of byproducts.

Infrastructure will also be developed at the University of Nebraska-Lincoln to evaluate and optimize grain and cellulose inputs, and generate critical data on novel ethanol production processes.