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Project Title.

Improving circularity by replacing synthetic urea with soy and corn byproducts in feedlot cattle diets.

Abstract.

Cattle are commonly fed urea that microbes in the rumen convert to protein for the animal. The trade-off to using urea in feedlot diets is the negative impact of energy inputs required for manufacturing urea. This project will evaluate feeding urea to finishing cattle compared to natural protein sources originating from soybean or corn production. There is a strong indication that soybean production will increase due to demand for renewable diesel which will lead to a greater supply of soybean meal. Likewise, distillers grains may become more readily available and economical for cattle as non-ruminants displace distillers grains use with soybean meal. The cattle feeding experiment (year 1) will compare these protein sources for cattle productivity and carcass/meat characteristics, which allows for robust economic modeling in year 2. In addition, a novel circularity model will be developed to evaluate the impact of diet ingredient choices and other management inputs on energy utilization, nutrient conservation, and economic dynamics resulting from byproduct utilization in integrated cropping-beef systems typical of Nebraska. We hypothesize that these opportunities are greatest in Nebraska where cropping and beef production are already aligned in many ways. Specifically, this project will work toward eliminating N inputs that are energy intense while enhancing bio-byproducts use in cattle feeding operations. Improving natural resource use by using byproducts for cattle production is a staple in Nebraska but we have not quantified the 'circularity' benefits or evaluated the energy balance of replacing urea. Quantifying these impacts is a critical outcome of this project and will allow us to expand on circularity of cropping-beef systems for things such as manure digestion, different housing systems to conserve nitrogen, precision manure nitrogen management, and others. This funding will provide baseline data to attract extramural funding in the future.