Bioconversion of Pelletized Big Bluestem, Switchgrass, and Low-Diversity Grass Mixtures into Sugars and Bioethanol

Background/objective
Challenges in biomass storage, transport, and processing are impediments to large-scale ethanol production from perennial grasses cultivated on marginal land. This study explores biomass pelletization as a solution to these issues and compares sugar and ethanol yields among three pelletized feedstock grasses.

Approach
- Big bluestem, switchgrass, and a low-diversity grass mixture were grown on marginal land fields near Lincoln, NE.
- Harvested biomass was pelletized, pretreated with hot water or low-moisture ammonium, enzymatically hydrolyzed, and fermented to ethanol using a xylose-fermenting yeast.

Results
- Pelletization increased bulk density 5x, which is estimated to reduce feedstock transportation costs by up to 50%.
- Pelletization did not substantially affect sugar or ethanol yields when compared with non-pelletized biomass.

Significance
- This work successfully leveraged an existing feed plant to generate pelletized biomass, demonstrating the potential for integrating perennial grass feedstock processing with existing local infrastructure.
- Pelletization of biomass grasses cultivated on marginal land could address current challenges in feedstock transport, storage, and processing without detriment to sugar or ethanol yields.