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Developing a Break-through in Methane Production from Anaerobic Digestion of Open-Lot Feed lot Manure

Abstract.

A traditional grain ethanol system that utilizes distillers grains for cattle feed and cattle manure for biogas generation to power 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). Past research on manure biogas generation has focused on confinement feedlot manure. In Nebraska, approximately 90,000 cattle are finished in confinement lots and 2.5 million cattle are finished in open feedlot pens each year. When pens are cleaned at the end of a feeding period, the manure is typically 10%-25% organic matter and 75-90% ash. Therefore, in order for the closed loop system to be viable there needs to be a breakthrough in technology to remove ash contamination from open lot manure. In this study, we will evaluate multiple manure harvesting strategies and determine the minimum level of ash contamination allowable for efficient biogas generation and manure separation. In addition, we will identify key microbes involved in methane production to enhance biogas production cattle manure. For example, microbial species and methane levels generated are influenced by diet. Therefore, we may be able to identify novel isolates with enhanced capacity to produce methane from cattle on distillers grains. Once isolated, a comparison of industry and UNL developed inoculants can be made for methane production within anaerobic digesters.