ANAEROTIC DIGESTER TECHNOLOGY:
THE POTENTIAL FOR COW-POWERED SUSTAINABILITY

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Research Question—What potential exists for cooperative-based anaerobic digester adoption by Wisconsin dairies?

Anaerobic digester systems break down manure and other substrates into their liquid, solid and gas components, all of which have valuable post-digestive applications, including electricity generation.

Primarily due to their expense, all of the systems in Wisconsin (~30) are located on Concentrated Animal Feeding Operations (CAFOs) with 800 to 5,000 dairy cows. However, the majority of the state’s cows are located on approximately 12,000 small to medium-sized dairy farms.

The goal of the study is to assess the potential for farmers with less than 800 cows to form anaerobic digester cooperatives. Cooperatives may provide the advantage of scale these farmers need to remain competitive in the face of fluctuating milk prices and high operational costs, such as energy costs. The study utilizes GIS to locate possible sites in southeastern Wisconsin and a survey to assess farmers’ interest in the technology and concerns related to the hurdles of adopting it.

Results—Survey

Sixty-three of 400 farmers returned the survey for a return rate of 16.75%. Data is based on the sixty respondents who completed the survey fully or in part.

This figure indicates that the major challenges for farmers regardless of size are prices received for their products, the cost of energy, and moving/too much land for crops.

Additional findings:

Overall, 88-90% have no knowledge of specific systems other than covered lagoons
35% have slight to moderate knowledge about covered lagoon systems
Only one respondent had been approached directly by a manufacturer—his farm herd of 2,200 animals is considered a Concentrated Animal Feeding Operation (CAFO)
27% of respondents have had an energy audit
50% have implemented one or more energy conservation changes or renewable energy technologies

Results—GIS Analysis

Analysis Criteria:
Analysis was based on Wisconsin dairies averaging 200 head per farm. The actual range is < 10 to > 5000. The number of animals required is dependent on the overall goals of the cooperative’s members. For study purposes a 1200 head minimum was used. Each farm must be within 3 miles of a transmission line. There are 865.27 miles of lines in the study area. Each farm must be within a minimum cluster of six farms within 3 miles of each other.

Key Findings:

• Total farms in the study area—851
• Total farms, including CAFOs, as potential central locations for a cooperative—288
• 33% of the farms have the potential to host an anaerobic digester for a cooperative

Conclusion

The survey revealed that the majority of farmers have little specific knowledge about anaerobic digester technology, but their perceptions of cost related hurdles indicate that they are aware that system expenses are a significant hindrance to adoption. Interest in adopting the technology has an inverse relationship to these hurdles, although other factors may be involved. Regarding challenges, the survey did not define energy types, but energy costs are rated as a primary challenge for farmers. The potential to produce their own electricity and utilize residual heat were rated most highly among the benefits. Spatial analysis of the seven southeastern Wisconsin counties revealed that a substantial number of farms have the potential to host a cooperative based on a manure hauling distance of three miles. However, further study is required to determine actual herd sizes at each farm, appropriate physical farm sites and local infrastructure, and other site based issues.

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