

Climate Friendly Farming™ Project Whatcom County Dairy Component

Year One Report

Project Component Lead: Craig MacConnell

Introduction

About 65% of the methane in the atmosphere is attributable to agriculture, with a significant portion arising from the storage of manure from dairy cows. Closed-system anaerobic digestion (AD) of the manure has the potential to eliminate most of the lagoon emissions while conserving more nutrients and also producing a renewable energy source. Currently however, no dairy farms in the state and few in the nation utilize anaerobic digestion. Capital costs are a major barrier to this technology, and the development of marketable byproducts is seen as one solution. Dairy producers need more impartial comparisons of the available systems and a real-world demonstration of their performance in order to consider adoption of this technology.

The current personnel for this component includes Craig MacConnell (Chair, Whatcom County Extension) and Dan Coyne (Research Technician).

Overall goal

Widespread adoption of anaerobic digester technology on dairy farms which will lead to significantly reduced methane emissions from dairy manure storage.

Specific Objectives

1. A farm-scale digester will be designed and constructed in partnership with the Whatcom Biogas/Dairy Team.
2. Market research and development will be conducted for digester by-products, a critical component to the economic viability of anaerobic digesters in low energy cost areas such as the Pacific Northwest.
3. Project benefits will be promulgated to the dairy industry via educational tours, presentations, and publications, and convey project findings through the media.

Planned tasks by Objective

1. A farm-scale digester will be designed and constructed in partnership with the Whatcom Biogas/Dairy Team.

Accomplished to date

- Criteria for selection of dairy demonstration partner developed.
- Letters of solicitation of interest mailed to all dairy farms in Whatcom County.
- Interviews, site visits, and other due diligence investigations conducted on all respondents.
- Digester partner contract developed.
- Contract negotiated with selected dairy digester partner, with signatures expected shortly.
- Participated in negotiations with Puget Sound Energy to fix electrical power purchase rates from demonstration digester.
- Digester design completed, reviewed and approved

- Digester construction completed
 - Digester operational
2. Market research and development will be conducted for digester by-products, a critical component to the economic viability of anaerobic digesters in low energy cost areas such as the Pacific Northwest.

Accomplished to date

- Data analyzed for 2003 plant growth trials using fiber imported from dairy digesters in Midwest.
- Trials established in 2004 using 2003 imported fiber that has had pH adjustment treatments and aged for seven months. Plant performance data collected for these trials.
- New fiber samples imported from dairy digesters in Midwest. Research plans developed for next iteration of plant trials, refining pH adjustment.
- Five separate and iterative 2004 bench trials completed and analyzed using pH modified fiber using petunias and geraniums at various acidification rates. Confirmed process to produce peat moss replacement that provides equal or enhanced plant growth performance.
- Byproduct process refinement resolved to produce consistent high value horticulture grade material

Still to be completed

- Market study and analysis for byproducts completed
 - Market plan for AD fiber byproduct completed
 - Actual AD fiber byproduct sales providing adequate return on investment to ensure viability of adoption of technology by dairy industry
3. Project benefits will be promulgated to the dairy industry via educational tours, presentations, and publications, and convey project findings through the media.

Still to be completed

Milestones

Technology

- Fiber recovery and handling techniques
- A functioning digester with an on-going monitoring process.

Changes in Northwest Agriculture

- For each 1000 cows with anaerobic digestion of manure, a reduction in emissions of 30-55 tons of methane per year (700-1250 ton CO₂ equivalent).
- Developed markets for digester by-products.
- Identification and optimization of highest value markets for digester solids (fiber).

Educational and policy

- Educational experiences for farmers to facilitate climate friendly farming including workshops, field days, publications, websites and other products.
- Outreach to the general public, K-12 students, media representatives.

Supplemental Grants

- Whatcom County Nutrient Management Research & Education Project (fiber byproduct research), 2003-2004, \$63,000, Whatcom County, funded and contracted
- Whatcom County Nutrient Management Research & Education Project (fiber byproduct research), 2004, \$47,000, Whatcom County, funded and contracted
- *High Quality Fiber and Fertilizer as Co-Products from Anaerobic Digestion*, USDA NRCS Conservation Innovation Grant, \$683,920 funded to supplement PGAFF funding for digester byproduct development work.

Photos



Dairy Digester Fiber Plant Growth Trial 2004.1