

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Sustainable Energy

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources			30%	
403	Waste Disposal, Recycling, and Reuse			70%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	0.5	0.0
Actual Paid Professional	0.0	0.0	0.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	17213	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	8688	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

With funding from a private donor, a state-of-the-art static pile aerobic composting system with heat capture capabilities was built at the NHAES Organic Dairy Research Farm. The composting heat, captured from composting, is used to pre-heat water for the dairy's milking parlor. Testing is underway to optimize composting mixtures, airflow, etc. to maximize heat extraction.

2. Brief description of the target audience

There are two major audiences for this work. The first is small-to-moderate scale dairy farmers in the northeastern U.S., and others who may use bedded pack systems for housing animals and managing manure. The second is the growing number of off-farm composting operations in the region who want to optimize the static-pile aerobic composting system for thermal energy gain.

3. How was eXtension used?

A static-pile aerobic composting manual is being prepared for dissemination through UNH Cooperative Extension. Eventually this information will be disseminated through eXtension.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	210	8	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2013
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	1	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of undergraduate students directly involved in the projects

Year	Actual
2013	3

Output #2

Output Measure

- Number of university courses in which project results have been incorporated
Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Number of workshops, training sessions and presentations to non-scientific stakeholders

Year	Actual
2013	6

Output #4

Output Measure

- Number of websites in which project results have been incorporated

Year	Actual
2013	2

Output #5

Output Measure

- Number of graduate students directly involved in the research.

Year	Actual
2013	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	New and improved knowledge about compost-based renewable energy systems for small animal operations available to peers and stakeholders.

Outcome #1

1. Outcome Measures

New and improved knowledge about compost-based renewable energy systems for small animal operations available to peers and stakeholders.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Among the biggest challenges facing organic dairy farmers in the Northeast are the cost of imports, which include feed, bedding, and energy. However, many of these dairy farms have underutilized resources, which could help alleviate import costs: wood from on-farm woodlands, and manure. This project is exploring technologies to produce animal bedding sustainably from softwoods in the farm's woodlands and examining the use static-pile aerobic composting to extract heat for on-farm energy needs.

What has been done

The economics of the sustainable production of animal bedding from local woodlots are being investigated in a companion McIntire-Stennis research project.

An anonymous donor contributed funds and, with additional support from a USDA-SARE award, a state-of-the art aerobic composting facility was built at the NHAES Organic Dairy Research Farm (ODRF) in Lee NH. Pilot studies with the composting facilities began in June, to optimize physical operations (manure + bedding loading) and provide the most favorable conditions for microbial growth (temperature, C:N ratio, density).

Results

Continuous measurements of the pile and air-stream temperatures started in June. Optimization of compost management to boost energy recovery is ongoing. The composting system has attracted attention at farm days and through other group visits to its location on the NHAES Organic Dairy Research Farm. Researchers have begun partnering with several local commercial composters, and continue a partnership with AgriLab Technologies, LLC who produces the heat exchange system that is part of the composting facility. This is only the 4th static aerobic composting system of its kind; a similar model has produced energy savings of approximately \$10,000 per year.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
403	Waste Disposal, Recycling, and Reuse

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Government Regulations
- Competing Programmatic Challenges
- Other (Competing time demands)

Brief Explanation

The Project Director (PD) also served as the University of New Hampshire Provost through June 2013. Provost duties competed with his time for this research project.

It has taken several years for the design phase of the composting facility and to raise money to build it. The experimental static pile aerobic composting facility went online in the fourth quarter of FY13. Work continues to optimize temperature profiles (to kill pathogens), without killing beneficial microbes, in order to maximize energy capture.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The success of the research project in this planned program is measured primarily in terms of progress towards the overall goals (1) of using on-farm resources to reduce input costs for animal bedding and (2) to compost bedding and manure for energy production with the goal of reducing energy costs associated with organic dairy farms in the NE.

Key Items of Evaluation

The static-pile aerobic composting system was completed in the spring of 2013; pilot studies were initiated in June. This is only the 2nd or 3rd system of this type in the Northeast, and it is specifically designed for research. The composting system has attracted quite a bit of attention at farm days and through other group visits to the Organic Dairy Research Farm in Lee NH. In addition to the farming community, the project has attracted the attention of several local commercial composters, a potential new market/application for this technology.