The latest on manure management

New special section looks at how farmers solve waste management problems

By Brian S. Aldrich

AS THE 21ST CENTURY UNFOLDS, dairy producers face increasing challenges to manage manure. They must reduce its impact on the environment while maintaining their businesses' profitability.

The purpose of this new section – Innovations in Manure Management – is to spread the word about manure treatment, handling and management systems being implemented on dairies across the region.

Specialists in the Cornell Manure Management Program will address such topics as the lessons learned from the new generation of anaerobic digesters, solid-liquid separation, composting and other value-added enterprises that can offset the costs of manure treatment.

Six organizations collaborate to bring you Innovations in Manure Management twice a year in *Northeast DairyBusiness*. At Cornell, participants include PRO-DAIRY, the Waste Management Institute, Department of Biological and Environmental Engineering faculty and staff, and Cooperative Extension. The New York State Energy Research and Development Authority (NYSERDA), which funds innovative manure projects in New York State, provides support for the section.

NYSERDA-supported projects range from anaerobic digestion to draghose injection, aerobic composting systems and new methods of removing phosphorus from manure. NYSERDA has a long history of working with farmers and their advisers. Together, they improve energy use efficiency in agriculture and discover new solutions to agricultural waste management problems that improve farm profitability and benefit the environment.

Installing a plug-flow anaerobic digester, such as this one on a New York dairy, is just one of many options producers have to manage their dairy's manure.

FOR MORE INFORMATION ABOUT THE CORNELL MANURE MANAGEMENT PROGRAM, contact any of these team members with different expertise.

• Brian Aldrich: Land application, nutrient management. (607) 255-1819 bsa9@cornell.edu

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Also see the Cornell Manuare Management Program's website: www.manuremanagement.cornell.edu

It features the latest information on new approaches to manure treatment and management. The website is designed for producers and their advisers, farm system designers and builders, nutrient management consultants, university specialists and agencies servicing agriculture.

The site contains a growing list of case studies and fact sheets describing on-farm manure handling systems. There are also lists of consultants and equipment and financial assistance sources. A series of on-line software tools is planned: The first one – CoComposter – is now available. Links to other websites and announcements of upcoming meetings, funding opportunities and farm tours will keep you connected to breaking news in manure management.

Innovations in Manure Management, a special section prepared by the Cornell Manure Management Program, appears in *Northeast DairyBusiness* two times a year. The mission of the Cornell Manure Management Program is to transfer technology from various manure management systems to farmers and their advisers. Many of these projects are supported by the New York State Energy Research and Development Authority (NYSERDA). NYSERDA's Innovation in Agriculture Program is helping New York's agricultural community to improve energy efficiency and profitability, while meeting environmental challenges. For reprints of Innovations in Manure Management, contact Kim Gabriel, 324 Riley-Robb Hall, Cornell University, Ithaca, NY 14853. Phone: (607) 255-0150. E-mail: kmg39@cornell.edu

PRO-DAIRY

In this issue

Innovations in Manure Management this month looks at two questions many dairy producers ask:

1. How can I get help to assess my dairy's manure management problems?

2. How can I get help to assess the solutions available?

A feasibility study done by a qualified consultant is an excellent starting point to learn more about manure and nutrient management issues and potential solutions for your dairy.

Manure treatment systems have high capital costs, so producers want to make sure they pick the appropriate system for their dairy before they start to borrow and build. For dairy producers considering anaerobic digestion, our article on net metering shows what two northeastern states have done to improve the payback for renewable energy systems on farms. By taking advantage of other farmers' experiences, we hope that all dairies in the region benefit.

Editor's Note: *Jean Bonhotal, Curt Gooch, Norman Scott and Peter Wright contributed to this article.*

Look for case studies of innovative manure management on New York dairies in the next installment of Innovations in Manure Management, February 2005, in Northeast DairyBusiness.

Is a waste treatment system suitable for your dairy?

A feasibility study is the starting point to answer that question and to build a successful system for your dairy

By Curt A. Gooch

INTEGRATED WASTE WATER TREATMENT SYSTEMS have worked in municipalities for decades. They successfully reduce pollutant concentrations for discharge into water bodies. On-farm waste treatment systems, which are hybrids of municipal systems, are not common, but dairies, large and small, are taking a closer look at them.

Successful systems require careful planning, design, engineering and construction. As part of that planning, municipalities commonly have a feasibility study done as a first step after determining a need for waste treatment systems. Dairy producers should do the same.

A feasibility study will answer important questions before a decision is made to proceed with system design and implementation. Performed by a qualified team, a study can provide critical information about how a waste treatement system fits into a dairy.

It takes into consideration such items as the facility layout, existing and future dairy size, and the producer's goals for the dairy, as well as the basic economics of the system.-Many grants that can help cover the capital costs of a manure treatment system require a feasibility study as the first step.

Need to know

Prior to a feasibility study, dairy producers must provide the following items to the feasibility study team:

1. Site plan. This drawing accurately shows the relative location, both current and planned, of buildings, storages, roads, utilities, etc. The plan also includes site topography and building elevations. Surveying or engineering firms can develop site plans.

2. Energy use. This is important for studies that investigate on-farm electricity generation. The study shows whether sufficient cow numbers exist to produce biogas and, in turn, electricity to meet or exceed the dairy's electrical demand. Energy use plays a big role in the economic analysis.

Copies of at least a year's worth of utility and heating fuel bills are important for studies that investigate on-farm biogas and electricity generation.

An energy audit is one of the best ways to quantify energy use. The New York State Energy Research and Development

Authority (NYSERDA) contracts with Flex-Tech Program contractors to perform energy audits in the state at no, or little, cost to dairy producers. For details, contact Jessica Zweig at NYSERDA. (518.862.1090, Ext. 3346) In other Northeastern states, check with utility companies or Extension educators for energy audit resources.

3. Herd information. The number of lactating and dry cows and replacements is used to predict manure production and its components. Prediction equations for lactating cows that have the highest accuracy require knowing milk production, milk true protein, butterfat content and dry matter intake.

4. Goals and objectives. A clear statement of a producer's goals and objectives for a waste treatment system – odor control, electrical generation, nutrient management plan compliance, nutrient removal, etc. – helps the feasibility team tailor its analysis to the dairy. Helping a producer define goals and objectives may be the team's initial step.

Study results

A feasibility study provides information dairy producers need to make an educated decision on a waste treatment system. A study generally provides:

1. A summary of all farm information used in the analysis.

2. A determination if a system can meet a producer's goals and objectives. And if it's possible to determine, the study answers how well a system meets those goals.

3. Projected values for key items investigated. For example, a study may indicate how many pounds per cow per day of separated manure solids are recovered from a solid-liquid separator. It can provide values for the nutrient concentration, moisture content, bulk density, and energy required to dry separated solids for bedding.

If applicable to the dairy, a study can project how much electrical energy is available for on-farm use; how much, if any, is available for sale to the grid and how much the annual check from the utility company may be.

4. A site plan with the proposed location(s) of the waste treatment system.

5. An economic analysis that shows the anticipated total capital cost, annual capital cost and total annual cost. With this information, producers can further investigate the economics with cash-flow projections, predicted returns on investment and net present value analysis.

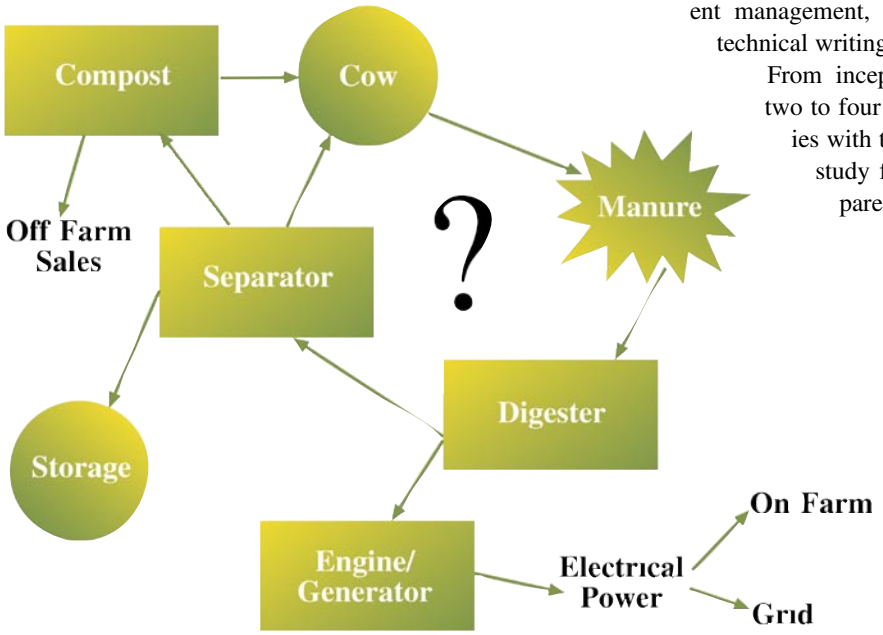
6. A sensitivity analysis of items that have the largest impact on the system's success and economic outcome.

The Cornell Manure Management Program is assembling a list of individuals and consulting firms in the Northeast that perform feasibility studies. Once completed, the list will be posted on the Cornell Manure Management Program's website: www.manuremanagement.cornell.edu. Or call the program at (607) 255-1819.

Some firms that conduct feasibility studies may also design anaerobic digesters. Before entering into any agreement with a feasibility study provider, thoroughly check references. Qualified firms will have practical farm knowledge and specific expertise and experience in the areas of manure handling, nutrient management, economics, design and engineering, and technical writing.

From inception, a feasibility study generally takes two to four months to complete, though the time varies with the scope of work. A good basic feasibility study for a relatively simple system can be prepared for $5,000 to $10,000.

NYSERDA offers cost sharing on feasibility studies where waste treatment systems have a waste-to-energy component. For information, contact Jessica Zweig at (518) 862-1090, Ext. 3346.



Manure can follow several possible pathways on a dairy with anaerobic digestion.

Curt Gooch, P.E., is a senior Extension associate with the Cornell University PRO-DAIRY program and a team member in the Cornell Manure Management Program.

Net metering laws revamped

Better deal on selling electricity to the grid improves payback for anaerobic digestion

By Brian S. Aldrich and Norman R. Scott

NET METERING SHOULD REMOVE ANOTHER BARRIER to the adoption of anaerobic digestion so dairies can take advantage of that technology's benefits. Net metering is measuring the difference between electricity delivered to the grid by a customer with a generator and the electricity sent by the utility to the customer.

Net metering allows qualified farms, generating more electricity than they can use, to bank the monthly surplus. Then they can use the surplus' retail value to offset their electricity costs in months when a farm generates less power than needed.

This watt-hour meter is on a dairy with net metering.

Eleven Northeast states have net metering laws, but only two states – New York and Vermont – have new net metering laws that apply to electric generation powered by biogas from the anaerobic digestion of farm wastes.

Manure treatment systems using anaerobic digestion are expensive, and the new laws significantly improve the projected payback periods for these large investments.

Variations on net metering

The way net metering works boils down to the way electric bills are calculated for farm-based generators, and the net metering laws govern these calculations. In essence, electricity produced on a farm is credited at retail instead of wholesale rates.

In New York, the retail rate is only applied to the cost of electricity consumed annually on a farm, including any demand charges. If the farm produces a net annual surplus of electricity, it is credited at wholesale rates, and the utility must issue payment to the farm. The credit can't be applied to other meters on a farm, such as a home or a separately metered barn, that aren't part of the net metering system.

In Vermont, surplus electricity is valued at retail rates, and the credit can be applied to other meters on the farm. However, the law doesn't require direct payment from the utility to the farm. If a Vermont farm doesn't use the credit within 12 months, it loses the credit. But a farm can enter into a voluntary agreement with the utility to purchase the credit.

In both New York and Vermont, net metering customers are exempt from "standby" charges. These are the electric rates that a utility bills to independent generators to cover the capacity it must maintain in case the independent generator shuts down. The utility is "standing by" with back-up generating capacity that can be called upon in an emergency, or at times when more power is needed than the farm can generate.

Here are additional comparisons of the states' net metering laws:

• To be eligible for net metering in New York, the generating equipment must have a rated capacity of no more than 400 kW; Vermont's is 150 kW.

• Biogas must make up a minimum of 90% of the fuel used annually under New York law. Livestock manure must make up a minimum of 75% by weight of the feedstock used in the digester; up to 25% of the feedstock can be food waste. Vermont's law doesn't have these restrictions.

• In New York, if a utility determines it must install one or more dedicated transformers to connect a farm generator to the grid, the farm pays the utility's actual purchase and installation costs, up to a maximum of $3,000 per farm operation.

• In Vermont, farms with net metering must maintain a liability insurance policy with a minimum coverage of $300,000. New York utilities can't require a farm to purchase additional liability insurance.

If you're planning a feasibility study of anaerobic digestion and electric generation on your dairy, it's important to consider the logistics and costs of connecting to the grid. (For information on feasibility studies, see page 30).

Editor's Note: *Dan Scruton and Amanda Van Blarcom contributed to this article.*

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• Contact your local utility for information on your service class and details of net metering in your state. Successfully interconnecting your generator to the grid requires you to work closely with your utility and your electrician. Find a good energy consultant to help you through the process.

• The New York net metering law is found in Section 66-j of Article 4 of the New York State Public Service Law. Find it on the website of the New York State Department of Public Service: www.dps.state.ny.us at http://assembly.state.ny.us/leg/?cl =95&a=5

• The rule for Vermont's net metering law is on the Vermont Public Service website at www.state.vt.us/psb/rules/rules.stm

• The Standard Interconnection Requirements for New York may be found at http://www.dps.state.ny.us/SIR_Require_ 08_03.PDF

• The Cornell Manure Management Program's website also has information on net metering: http://www.manuremanagement.cornell.edu