



Feasibility Studies of Dairy Waste Treatment Systems

Introduction

Integrated waste treatment systems to treat municipal wastewater have been commonplace for several decades. They reduce priority pollutants to a level deemed sufficiently clean to be received by water bodies of the state. Although these systems are successful, they require careful planning, design, engineering, construction, and management. It is common for a municipality to conduct a feasibility study after a needs assessment has been performed.

Dairy producers should do the same to increase the chances for success of a waste treatment system installed on their farm. Also, many of the grant opportunities available in the area of manure treatment require a feasibility study be conducted. Feasibility studies not only provide a recommendation, they provide the data and the reasoning behind the recommendation.

What is a feasibility study?

Considerable investigation is needed prior to selecting a manure treatment system. Items that need to be considered include existing and future farm size, facility layout, cow numbers, and needs and goals that the producer has relative to manure handling and nutrient management. Finally, the economics of the system need to be assessed.

A feasibility study report provides extensive information that a dairy producer can use to make an educated decision relative to manure treatment system options. A report generally provides the following information:

- **A determination of whether farm goals can be met** by the system(s), and if met, how well they are quantifiable.

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- **Projected values for key items** that were investigated. For example, a report may indicate how many pounds per cow per day of separated manure solids are recovered from a solid-liquid separator. Values for the nutrient concentration, moisture content, and bulk density of system outputs should be provided. For systems that will make power, the report will project how much electrical energy would be available from the system for on-farm use. If any electricity is left over, the study would determine how much electricity and what the annual check from the utility company would be, considering the governing regulations under the net metering law.
- **A site plan** with the proposed location(s) of the waste treatment system.
- **An economic analysis** that predicts the anticipated total capital cost, annual capital cost, and total annual cost. Also this information can be used by the producer or their advisor to perform a cash-flow analysis, calculate the return on investment (if there is one), and conduct a net present value analysis.
- **A sensitivity analysis** is important for considering variable factors that can have a major impact on the system's success and economic outcome.

How to prepare for a feasibility study

A dairy producer needs to provide the following items to the feasibility study team prior to the initiation of the process.

- **Goals and objectives** – A clear definition of the goals and objectives helps the feasibility team tailor the analysis for the producer. Alternatively, an additional step of the feasibility study may be to help the producer determine them. Common goals and objectives that producers may include, but are not limited to, odor control, electrical generation, bedding material generation from separated manure solids, compli-

ance with a nutrient management plan, nutrient removal, and reduced land application costs.

- **Herd information** – This includes the number of cows and heifers in each animal group and any other sources of waste that are to be treated by the system. Manure production and its constituents are predicted from this information. Prediction equations for lactating cows that have the highest accuracy require milk production, milk true protein, milk butter fat, and dry matter intake as input variables.
- **Site plan** – A site plan drawing should accurately show the relative location of objects such as buildings, storages, roads, utilities, etc., with both present conditions and future planned or potential expansions. Site topography and building elevations are also part of a site plan. A site plan can be prepared by a surveyor, some engineering firms, or in some cases by the feasibility study team.
- **Energy use** – This is important for studies that will investigate on-farm generation of electricity. The feasibility study is used to determine if there are sufficient cow numbers to produce enough biogas to produce adequate electricity to meet the electrical demand of the farm. Energy use plays heavily with the economic analysis.

An energy audit is one of the best ways to get this information. In New York State, NYSERDA's Flex Tech services can perform an energy audit at little or no cost to the producer. (Contact Ms. Mary Sauvie at NYSERDA for more details. Phone: 518-862-1090, ext. 3229.) Other states in the Northeast may have similar programs. Check with the utility company or extension educator.

Summary

Planning is an important part of a successful manure treatment system. A feasibility study provides a structured, well-organized layout for a producer to thoroughly think through the decision of integrating an anaerobic digester or other waste treatment systems into their facility. A feasibility study can assist this evaluation by quantifying the benefits and costs of systems and options. Feasibility studies are best performed by independent consultants or consulting firms that have expertise in farm facilities, manure and nutrient management, engineering principles, gas utilization, and electrical interconnection. A list of individuals or companies is available at www.manuremanagement.cornell.edu. When considering investment in comprehensive and capital-intensive manure management systems, feasibility studies are particularly important.

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