

MILK HOUSE WASTE



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Funding for this project was provided to the Bioproducts and Biosystems Engineering Department through two US EPA 319 grants administered by the Minnesota Pollution Control Agency. Additional significant matching funding was provided by other state and local agencies and the cooperating dairy producers. The purpose of the project was to design, install and monitor sixteen milk house wastewater treatment systems in four counties in Minnesota.

The results were used to develop design and management guidelines. Additional information can be found at www.manure.umn.edu/applied/milkhouse_waste.html.

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MILK HOUSE WASTEWATER TREATMENT DEMONSTRATION PROJECT OVERVIEW

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Introduction Minnesota regulations (Minnesota Rules Chapter 7020) restrict milk house wastewater discharges into waters of the state, whether through overland flow or through subsurface tile lines. Subsequently, dairy producers using solid manure handling systems must have a separate system to handle this wastewater. Because milk house wastewater has high concentrations of organic material, fats, and nutrients, standard septic systems are not a viable option. Prior to this project, the only real options available were short or long term storage with land application.

The objective of this project was to develop and test alternative milk house waste handling systems. For this project, 16 milk house wastewater treatment systems were installed and monitored in four counties in Minnesota. Experience and monitoring results from these sites was used to develop design and management guidelines for these alternative systems. Information from the projects was distributed through tours, presentations, fact sheets, a design guide and refereed publications. Many materials are available on the project website found at www.manure.umn.edu/applied/milkhouse_waste.html.

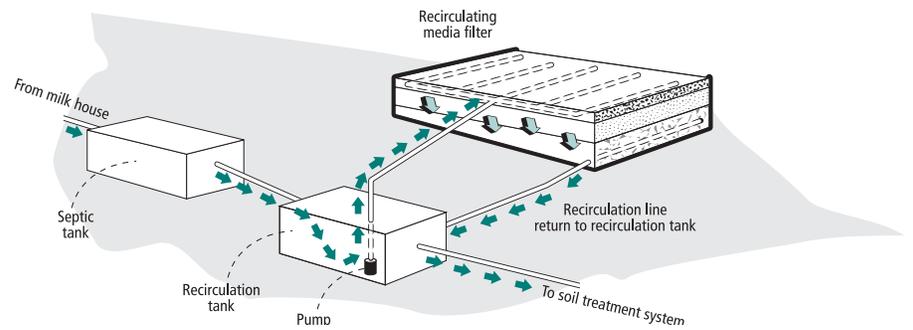
Which wastewater treatment options were studied?

Four wastewater treatment systems were studied. They were:

- *Bark Beds*: A large soil infiltration area covered by wood or bark shreds,
- *Aerobic Treatment Units* (ATUs) followed by a subsoil infiltration area,
- *Recirculating Media Filters* (RMFs) followed by a subsoil infiltration area
- *Daily surface irrigation* to pasture or cropland.



Finished bark system.



Recirculating Media Filter

Other options available to dairy producers but not studied include chemical flocculation with the treated effluent discharged into a soil infiltration area (drainfield), constructed wetlands and vegetative filter areas using a dosing system. Commercial chemical flocculation systems are available and have been installed in Wisconsin, Minnesota, Canada and elsewhere with success. Constructed wetlands have been used in Wisconsin with limited success. Dosing systems have been used in other states for feedlot runoff treatment but not for milkhouse wastewater treatment.

What types of farms were these treatment systems tested on?

Fourteen farms had stall barns with pipeline milking systems. Two farms had parlors with parlor wastewater mixed in with the milk house wastewater. Milking herd sizes ranged from 40 to 130 cows.



What was included in the wastewater?

Milk house wastewater includes wash water from cleaning bulk tanks, milk pipelines, milking units, miscellaneous equipment, and the milk house floor. Milk house wastewater commonly includes residual milk (i.e. milk that remains in the pipeline, receiver, and bulk tank after emptying), cleaning chemicals (i.e. detergents, sanitizers and acid rinses), water softener recharge water, and small amounts of manure, bedding, feed, grit and dirt.



Aerobic Treatment

Wastewater from milking systems which combine parlor wastewater with milk house wastewater has more manure and larger volumes of wastewater. Toilet wastes were not included. A separate treatment system is needed for toilet wastewater due to pathogen concerns and subsequent regulations.

Who funded the project?

Two US EPA 319 grants administered through the Minnesota Pollution Control Agency provided almost half of the funding for the project. Significant matching and in-kind funds were obtained from other state and local agencies and the cooperating dairy producers.

What were the results of the project?

- Milk house wastewater can have very high organic loading. Average concentrations of BOD₅ ranged from 500-2,600 mg/L.
- Wastewater flow rates based on water usage in the milk house varied from 2 to 7 gallons per cow per day.
- All treatment systems studied were effective treating milk house wastewater. The systems studied were not designed to treat waste milk.
- System costs, which were site specific, ranged from \$6,700 to \$25,000.
- Septic tanks with at least three days of retention time provided effective primary treatment but needed to be pumped at least once per year.





Summer Irrigation on corn field

Which system is best for me?

All of the systems studied, can be effective when designed and managed appropriately. Choosing the right system is a matter of water usage, farm layout, site geography, soil types, depth to ground water or bed rock and proximity to surface waters. Producer preference and management are important factors when selecting a system.

Where can I get additional information?

For additional information visit www.manure.umn.edu/applied/milkhouse_waste.html or contact your local Extension office.

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