A3608

Milking center wastewater management

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Controlling milking center wastewater: An overview

This fact sheet is part of a series for dairy farmers and others in the dairy industry concerned about managing wastewater generated from milking activities. The series introduces practices and devices that help conserve water, energy and cleaning chemicals. Ways to treat and dispose of milking center wastewater are also discussed. The goal is to help dairy farmers operate in a more profitable and environmentally-sound manner.

The information presented here reflects state-of-the-art concepts in milking center resource conservation and wastewater disposal. As research into new technologies goes forward, advances in milking center wastewater management will continue.

Titles in this series include:

Controlling Milking Center Wastewater: An Overview (A3608)

Estimating the Volume of Wastewater (A3609)

Managing Waste Milk (A3610)

Treating and Disposing of Wastewater (A3611)

Reducing Phosphorus Levels in Wastewater (A3612)

Conserving Water in the Milking Center (A3613)

This series was developed by the University of Wisconsin–Extension with cooperation and financial assistance from the Water Quality Demonstration Project–East River.

Milking center wastewater: What is it and why is it important?

Part of developing a profitable and environmentally sound dairy operation involves planning to dispose of milking center wastewater. Wastewater derives from water used to clean milking systems, bulk tanks, cows, buildings and equipment in milkhouses, milking parlors and holding areas. Additional wastewater may be produced by cooling milk, softening water, and washing hands and boots. Small to medium dairy farms typically generate 200 to 400 gallons of milking center wastewater daily. Larger farms may generate 1,000 gallons or more.

Milk, detergents and sanitizers all contaminate milking center wastewater. Other substances, such as manure, urine, dirt, feed and bedding, may also play a role. As a result, wastewater typically possesses high concentrations of biodegradable organic solids, nitrogen- and phosphorus-containing compounds, and even disease-causing organisms. It is important that you handle, treat and dispose of these substances properly because they may cause pollution.

In streams and lakes, organic solids from milk and manure are broken down by bacteria in a process requiring oxygen. Lowered oxygen levels lead to fish kills and reduce the diversity of plants and animals in an area.

Phosphorus from milk, manure and cleaning chemicals promotes the growth of algae and aquatic plants in lakes. Lakes may become choked with vegetation and decaying organic material. Ammonia-nitrogen and chlorides released from manure and cleaning chemicals are toxic to fish and other aquatic organisms.

Groundwater quality is also threatened by improperly discharging milking center wastewater. In most rural areas, groundwater is the source of drinking water. Serious health hazards can arise when it becomes contaminated. For example, infants less than six months old who ingest nitrate may be susceptible to methemoglobinemia, also called "blue baby syndrome." This condition develops when nitrate reduces the blood's ability to carry oxygen. The body's resulting lack of oxygen causes the characteristic blue or lavendar skin color.

Wisconsin state law prohibits discharging wastewater to surface and groundwater without a permit. The Department of Natural Resources (DNR) is concerned about milking center wastewater discharges into state waters and prefers to see them corrected voluntarily. Dairy producers who do not cooperate can be issued citations as high as $400 per citation. Proper wastewater handling and disposal is necessary to comply with the law and prevent surface or groundwater contamination.

Disposing of milking center wastewater

The best way to dispose of milking center wastewater is to add it to manure and land spread the resulting mixture. This method is possible only on farms equipped with liquid manure handling facilities. On farms that handle solid manure, milking center wastewater must be treated separately. In Wisconsin, the most common treatment system consists of an underground settling/flotation (septic) tank and soil absorption (leach) field. Other treatment and disposal options include storing wastewater in a holding tank or lagoon and periodically applying it to farm fields. Another option is to intensively land-apply such water on vegetated filter strips. If you use intensive land application methods, pretreatment in a settling/flotation tank or aerobic lagoon is recommended to remove solids and fats and begin bacterial breakdown. For more information on milking center wastewater treatment options, see *Treating and Disposing of Wastewater* (A3611).

Wastewater treatment systems are not foolproof. Septic tanks and leach fields are particularly prone to failure because leach fields become plugged with milk and manure solids. Other reasons for failure include excessive wastewater volume, infrequent settling/flotation tank clean out, and the toxic effect of sanitizers on bacteria the system needs to function properly. When a leach field fails, wastewater backs up into milking center drains or rises to the soil's surface, creating foul-smelling, marshy areas that can violate dairy sanitation regulations and water quality standards.

Source control: a new approach to milking center wastewater management

Source control consists of a series of practices and devices to help dairy farmers operate in a more profitable and environmentally sound manner. The goal is to decrease the amount of wastewater and pollutants generated in the milking center and still maintain milk quality. Specific practices and devices fall within three general categories: water conservation, waste milk management and phosphorus reduction (table 1). You can obtain more information about each practice or device in the following fact sheets: *Conserving Water in the Milking Center* (A3613), *Managing Waste Milk* (A3610) and *Reducing Phosphorus Levels in Wastewater* (A3612).

The source control approach primarily benefits farms handling milking center wastewater and manure separately. The lifespan of existing wastewater treatment systems may be extended if you decrease wastewater volume and pollutant load. For new installations, lower cost treatment and disposal systems are feasible if effluent strength and volume are reduced. On farms where milking center wastewater is mixed with manure and land spread, source control saves manure storage space and decreases

Table 1. Source control practices and devices for milking center wastewater management.

Goal	Source Control Practice or Device	Savings potential†	Management ease‡	Cost††
Water conservation				
	Manually prep cows for milking with moistened, single-service towels	H	M	L
	Adjust milking system washwater volume to correct level	H	E	L
	Install a water-saving (conservation) milkhouse sink	M	E	M
	Install a milking unit wash manifold (around the barn pipeline system)	M	E	M/H
	Install an automatic, programmable clean-in-place sanitation system	M	E	H
	Install and/or adjust air injectors	H	E	M/H
	Replace automatic bulk tank rinse with manual rinse	L	M	L
	Inspect hoses and use spring-release nozzles	L	E	L
	Scrape holding area and milking parlor floors prior to hosing (parlors)	H	M	L
	Install a booster pump for floor cleaning (parlors)	M	E	M
	Reuse milk pre-cooler water	H	E	M
	Reuse water softener wastewater	M	E	M
	Reuse clean-in-place wastewater	M	E	M
Waste milk management				
	Prerinse milk pipelines and the bulk tank, collect and feed to livestock, or land spread	H	M	L
	Store colostrum and transitional milk to feed to livestock, or land spread	H	M	L
	Decrease amount of mastitic and antibiotic-contaminated milk through herd health management	M/H	M	M
	Feed mastitic and antibiotic-contaminated milk to livestock, or land spread	H	M	L
	Land spread large quantities of waste milk from spills, etc.	H	M	L
Phosphorus Reduction§				
	Install a water softener or increase softening time	M	E	M
	Use low-phosphorous cleaning chemicals	H	E	L

† Savings potential = Relative savings, waste reduction and/or contaminant removal by practice.

‡ Management ease = Relative effort required to conduct practice and/or maintain system after installation or implementation. D = Difficult, M = Moderate, E = Easy.

†† Cost = Installation and/or setup cost. H = High (> $1,000), M = Moderate ($250 - $1,000), L = Low (< $250).

§ Other phosphorus reduction practices and devices listed under Water Conservation include: Installing a clean-in-place sanitation system, adjusting milking system washwater volume to correct level, installing a milking unit wash manifold, unit washers or a water-saving sink, and scraping milking center floors prior to hosing. All of the practices listed under Waste Milk Management will also reduce phosphorus.

the volume of material that must be hauled and applied to fields. Whether you handle manure as a solid or a liquid, source control saves money by reducing hot water and chemical cleaner use. Most importantly, it offers increased protection against surface water and groundwater contamination.

Source control practices and devices can be used to upgrade existing milking and wastewater treatment systems or can be incorporated into new construction projects. Many of the practices and devices listed in table 1 are simple and readily implemented with little or no modification to existing systems. A few are more complex or require extensive modifications, and you should seek professional advice regarding their application. Any proposed changes to the existing milking equipment or sanitation facility should be approved by state or local milk inspectors. After changes are made, it is best to monitor milk quality with bacteria plate loop count tests.

For more information

For a more detailed discussion of milking center wastewater management, see the other titles in this series (listed on page 1) and *Pollution Control Guide for Milking Center Wastewater Management* (A3592) by R. E. Springman, D. C. Payer and B. J. Holmes, available from your county Extension office or from Extension Publications at the address listed below. You may also obtain more information from:

- University of Wisconsin–Extension county agents
- your local county land conservation department
- Soil Conservation Service field offices
- dairy plant representatives
- Department of Natural Resources district offices.

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