A3610

Milking center wastewater management

Managing waste milk

David C. Payer and Brian J. Holmes

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)

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Knowing how to dispose of waste milk properly is an essential part of dairy milking center management. Serious problems can develop when waste milk is handled incorrectly. These include damage to the environment and potentially, a failed wastewater treatment system. In fact, improper handling of waste milk is the main reason wastewater treatment systems fail.

This fact sheet explains why waste milk is an environmental and wastewater treatment problem and offers strategies to reduce and dispose of it (see table 1).

Waste milk originates from a number of sources, including leftover milk in pipelines and bulk tanks, colostrum and transitional milk, mastitic milk, milk from antibiotic-treated cows, spills, bulk tank failures and rejected milk loads. Waste milk should never be dumped down milking center drains (unless the disposal system is specifically designed for it) or discharged directly to surface water drainage channels such as streams, ditches or swales (low marshy ground).

Table 1. Sources of dairy waste milk and recommended control and disposal options.

Source	Recommended control and disposal options
Pipeline and bulk tank residual milk	1. Collect with prerinse prior to cleaning. 2. Feed to non-lactating stock if not too watery or contaminated with cleaning chemicals. 3. Land spread.
Colostrum and transitional milk	1. If good quality, feed fresh, frozen or fermented to livestock. 2. Land spread.
Mastitic and antibiotic-contaminated milk	1. Decrease amount through herd health management. 2. Feed to stock if it looks normal, is not from a cow with a fever, and at least one milking has occurred since antibiotic treatment. 3. Land spread.
Milk spills, bulk tank failures and rejected bulk tank loads	1. Remove from treatment system immediately if milk has entered drains and system is not designed to handle large milk loads. 2. Land spread.

Environmental problems associated with improper waste milk disposal

Many of the adverse consequences of improper milk disposal are due to milk's high biochemical oxygen demand (BOD). BOD measures the amount of oxygen consumed when organic matter such as milk is broken down by bacteria. In streams and lakes, bacteria would need the dissolved oxygen from 1,600 gallons of water to break down the organic matter in one pint of milk. Because it depletes oxygen, discharging milk into surface waters can upset biological communities and kill fish.

In treatment facilities such as leach fields and aerobic lagoons, as little as two gallons of milk per day discharged with wastewater can deplete enough oxygen to cause a treatment system to fail.

Milk has a high organic solids content. These solids form organic mats that plug leach fields, grass filter strips and other wastewater treatment systems. Milk fats and proteins form "fat cakes" inside containment facilities such as holding and septic tanks that further contribute to system failure. When treatment systems fail, wastewater is likely to back up into milking center drains or rise to the soil's surface, creating foul-smelling marshy areas that can violate dairy sanitation regulations and water quality standards.

Milk contains significant quantities of phosphorus, which promotes the growth of algae and aquatic plants. When waste milk enters surface waters (such as a lake), too much phosphorus may choke the water with vegetation and decaying organic material. This excess plant growth interferes with recreational uses. Vegetation also consumes oxygen, which increases the likelihood of fish kills.

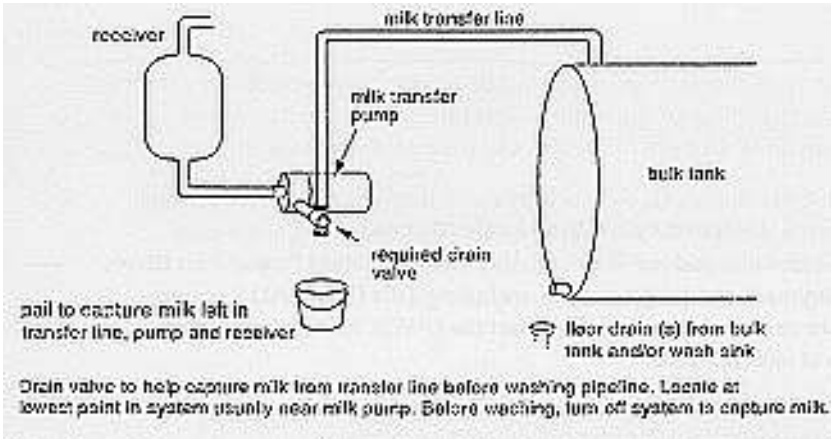
The waste milk problem: sources and solutions

Pipeline and bulk tank residual milk

Up to five gallons of milk remains in pipelines and receiver groups after milking. This leftover is usually flushed out during the rinse cycle and ends up in wastewater. Residual pipeline milk is often the major source of milk entering drains because it is generated after every milking. Flushing residual pipeline milk down drains is the most common cause of milking center wastewater treatment system failure. Unless disposal facilities are specifically designed to handle it, you should capture and dispose of residual pipeline milk separately.

Rinsing milking units and pipelines after milking and recovering the rinsate at the milkroom sink is a simple, cost-effective way to capture up to 90% of residual milk. You can prerinse manually by drawing five to ten gallons of warm water (95° to 120°F) through milking units into the pipeline. There must be enough water introduced to form one "slug" and move it around the pipeline. You then drain the pipeline by opening the wash valve, and switching on the milk transfer pump. Collect the milky prerinse solution in a bucket at the milkroom sink.

Figure 1. Residual milk from a transfer line captured in a bucket

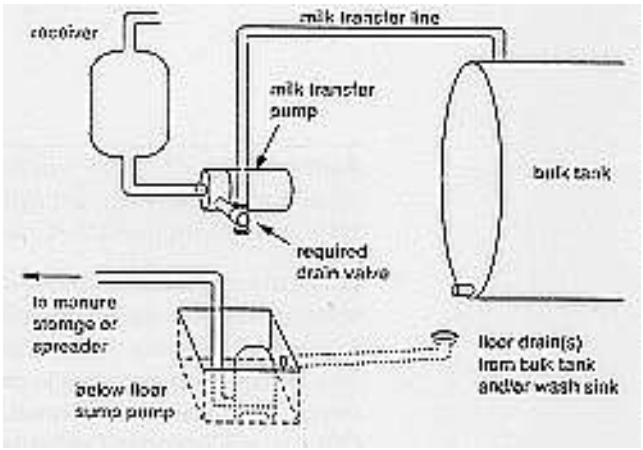


Prerinsing can also be programmed into some clean-in-place systems, and a diverter valve installed to automatically divert the prerinse to a bucket. Milk collected by prerinsing can be fed to calves or hogs if it is not too watery or contaminated with cleaning chemicals. If it is not used to feed animals, you should deliver the rinsate to manure storage or put it in a manure spreader.

You can remove residual milk between the transfer pump and the bulk tank by prerinsing as above. In most cases it can also be gathered by turning off the vacuum pump when milking ends. This opens a valve at the pump so the milk above the pump drains out. Milk collected this way will not be diluted or contaminated with cleaning chemicals. You can capture it in a bucket or sump pit and feed it to animals. If it is not fed to animals, take it to manure storage or put it in a manure spreader (figures 1 and 2).

Manually prerinsing the bulk tank with a high pressure hose after milk pick-up is also recommended. You can dispose of the rinsate by feeding it to livestock or placing it in a manure spreader or storage.

Figure 2. Collection sump for pumping waste milk to manure storage



Colostrum and transitional milk

Colostrum, the first milk after freshening, is an important source of nutrients for newborn calves and contains antibodies that help ward off diseases and infections. Transitional milk, produced during the next four to five days, is somewhere between colostrum and whole milk in composition. Neither colostrum nor transitional milk are legally saleable; only milk produced after the fifth day can go into the bulk tank.

It is essential that calves get a meal of colostrum soon after birth. Calves not allowed to nurse or those born to dams with abnormal or deficient amounts of colostrum should receive high quality colostrum supplements. For detailed information on storing and feeding colostrum and transitional milk, see North Central Regional Extension publication 205, *Raising Dairy Replacements*, available from your county Extension office or Cooperative Extension Publications, Room 245, 30 N. Murray St., Madison, WI 53715, (608) 262-3346.

Colostrum and transitional milk can also be fed to hogs. Excess amounts or poor quality (thin, excessively bloody or mastitic) milk should be land spread away from milking facilities and cattle exercise areas. You can also deliver the milk to manure storage facilities and land spread it along with manure.

Milk from antibiotic-treated cows and mastitic milk

Milk from cows with mastitis or cows recently treated with antibiotics is not saleable. Milk from treated cows must be withheld for the period recommended by the drug manufacturer. Mastitic milk and milk from treated cows can be fed to calves at least six days old if:

- The milk appears normal.
- The milk is from cows not infected with *staph aureus* or mycoplasma mastitis.
- The milk is not from a sick cow (one with a fever).
- At least one milking has taken place since antibiotic treatment.
- Calves are housed separately for 30 minutes after feeding. (This prevents calves from suckling each other, which could spread disease and result in heifer mastitis.)

Milk meeting the above criteria can also be fed to hogs.

Livestock fed milk with antibiotic residues cannot be slaughtered for food until all traces of antibiotic have left their bodies. Consult a veterinarian for specific withdrawal times.

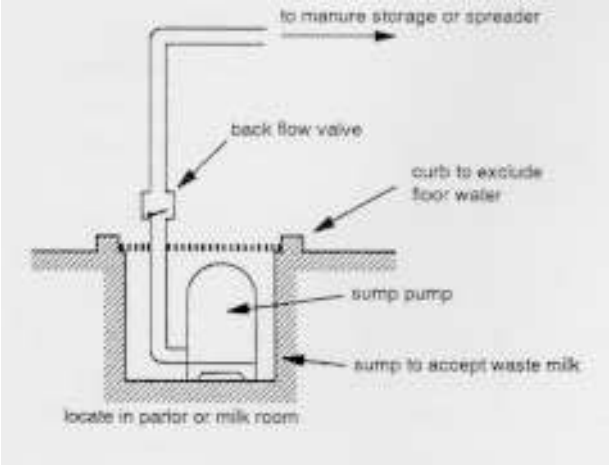
Excess or visibly abnormal milk, or milk from the first milking after antibiotic treatment, must be discarded. Land spreading is the recommended way to dispose of such milk. Figure 3 shows a sump, located in a milking parlor, which delivers waste milk to a manure handling system.

The best way to deal with the problem of mastitic and antibiotic-contaminated milk disposal is by preventing disease. A herd health program that addresses causes and prevention of mastitis will reduce the amount of contaminated milk.

Milk spills, bulk tank failures and rejected bulk tank loads

When a pipeline ruptures, a valve is opened inadvertently, a cooling system fails, or milk from an antibiotic-treated cow is added to the bulk tank, large quantities of waste milk can be generated. With most conventional wastewater treatment facilities, discharging such large quantities into milking center drains will cause the system to fail. This milk should be land spread. Many farmers pump or haul milk from large spills to manure storages or other long-term waste storage facilities if immediate land spreading is not possible or convenient.

Figure 3. Sump for pumping waste milk to manure storage



Large quantities of milk sometimes enter milking center drains before milk spills are detected (for example, when the bulk tank valve is left open during milking). Unless the drain leads to manure storage, try to remove as much of this milk as possible to prevent your wastewater treatment system from failing. If large quantities of milk enter a septic tank, immediately pump the tank. Routing the milkhouse drain into the milking parlor platform gutter or pit sump can provide early warning of an open bulk tank valve.

For more information

For a more detailed discussion of milking center wastewater management, see *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 Cooperative 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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