A3613

Milking center wastewater management

David C. Payer and Brian J. Holmes

Conserving water in the milking center

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.

Conserving water in the dairy milking center by reducing consumption and recycling can enhance your profits and protect the environment at the same time. Water-conserving practices and devices can lessen the amount of energy required to heat and pump water, decrease the chemical cleaners needed, and lower the overall volume of wastewater.

Reducing wastewater extends the lifespan of a wastewater treatment system and allows you to use more economical options for new installations. If you mix wastewater with manure, you can save manure storage space and decrease the amount of material to haul and apply to fields.

The practices and devices described in this publication should maintain or improve the quality of milk. But remember that every farm's sanitation requirements are unique. Before you make any changes in milking equipment or facility sanitation, we suggest that you discuss them in advance with state or local milk inspectors. It is also a good idea to closely monitor indices of milk quality (such as plate loop counts) after you make changes.

Conserving water used to clean and stimulate cows

Manually prep cows for milking

When you prepare a cow for milking you should:

- Inspect its teats for cleanliness.
- Use a teat dip to sanitize the teats if they are free of dirt. Remove the teat dip with a single service towel.
- Wash dirty teats with a single service towel moistened with sanitizing solution. Dry them with a single service towel.

This is the best way to control mastitis and use water efficiently. Prepping cows with moist towels requires less than half a gallon of water per cow per day, compared to 1 to 4 gallons per day with automatic prep stalls or hand spraying. Switching to the moist towel technique may slightly increase cow prep time.

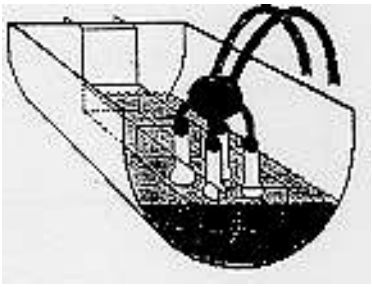
Dirtier cows naturally require more effort to clean. When you keep cattle housing areas clean and dry, you conserve water and cow-prepping time. You also help reduce the incidence of mastitis.

Conserving water used to clean the milking system

Adjust washwater volume to the correct level

When you reduce the amount of washwater, you conserve water, energy and cleaning chemicals. During pipeline cleaning, the water level in the wash sink should be the minimum required to keep teat cup ends submerged. If the washwater is more than a few inches deeper than needed to cover the cup ends, you will be wasting water.

Figure 1. A stainless steel rack inserted into a milkhouse sink to hold milking units in place during cleaning.



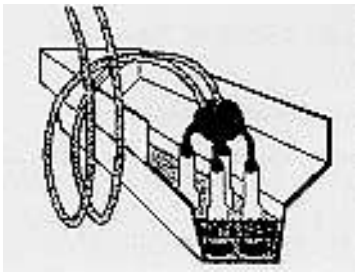
Traditional round-bottomed sinks were designed for washing bucket milking machines. When milking units are cleaned in these sinks, teat cups tend to spread out and float to the surface. The sink must be quite full before the teat cup ends are submerged. As a result, large volumes of washing solution are wasted. You may want to consider an untested, but potentially useful device—a stainless steel rack that can be inserted in the sink to hold milking units upright and keep teat cup ends close to the sink bottom (figure 1).

Maintaining washwater temperature is a concern with decreased water use. Many manufacturers recommend that chemical solutions be kept at 110°F or greater to prevent milk deposits from forming in pipelines. If the return temperature is too low, you can raise the temperature of the water heater or install a booster heater. Insulating or covering the sink also helps.

Install a water-saving (conservation) milkhouse sink

Designed by a Canadian dairy farmer, the conservation milkhouse sink helps conserve water, cleaning chemicals and energy. Its Y-shaped sink differs from a traditional one in that it has slanted sides and a narrow trough at the bottom (figure 2). Teat cups fit snugly in the trough, where they are held in place throughout the cleaning procedure. This design keeps the cup ends submerged and lets you fill the sink to the lowest acceptable level (using the same principle as the rack shown in figure 1). You may also need to take measures such as those described earlier to maintain washwater temperature.

Figure 2. Cross-section of a water-saving (conservation) milkhouse sink with a milking unit in place for cleaning.



Install a milking unit wash manifold (pipeline system)

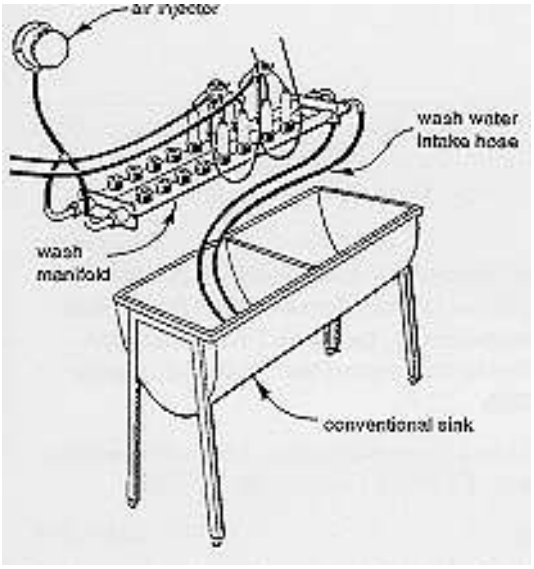
The milking unit wash manifold provides an alternative to immersing teat cups in a wash sink. Milking units are attached to the manifold, which is usually installed above the milkhouse sink (figure 3). A hose from the sink draws the washwater into the manifold. Solutions are delivered via pipeline to each milking unit; they then flow back into the milk pipeline.

Advantages of wash manifolds include increased labor efficiency and reduced use of water and chemical cleaners. These devices can be retrofitted on many milking systems. You may need to adopt some of the measures mentioned earlier to keep washwater temperature hot enough. Using a manifold also simplifies fitting a cover to the wash sink.

Install an automatic, programmable clean-in-place sanitation system

Clean-in-place (CIP) systems can automate the chore of milking system cleaning. Modern systems are programmable and electronically controlled, allowing you to consistently regulate water temperature, chemical cleaner concentrations and timing. This consistency can lead to substantial water and chemical savings, as well as improved sanitation.

Figure 3. A milking unit wash manifold with milking units in place for cleaning.

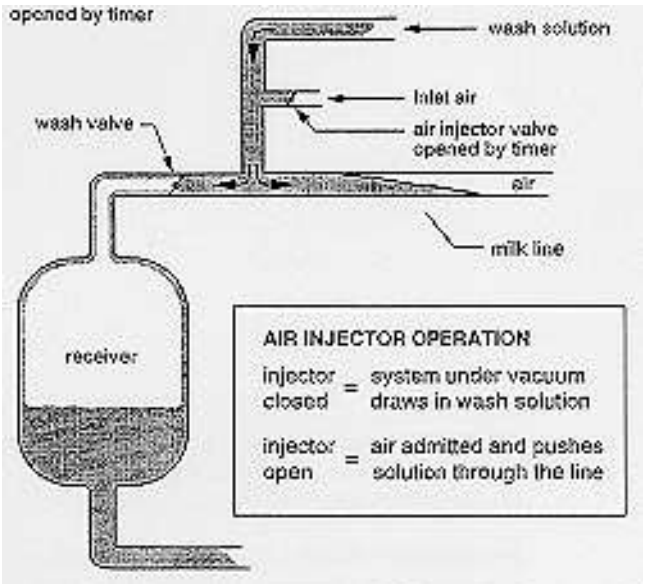


Clean-in-place systems are expensive (more than $1,000), and require proper adjustment. To ensure that a CIP system is dispensing chemicals accurately and performing at peak efficiency, you should calibrate it periodically.

Install and tune air injectors

Air injectors intermittently admit air into the milking system during the pipeline cleaning cycle. The bursts of air create turbulence and form slugs of cleaning solution that travel ahead of them, boosting cleaning power (figure 4). Properly adjusted air injectors reduce the amount of water and chemicals needed to clean pipelines by 10% to 30%. Air injectors are standard equipment on new milking systems with pipeline diameters greater than 2 inches, and can be retrofitted on most existing systems.

Figure 4. Air injectors intermittently admit air into milk pipelines during cleaning cycles.



Replace automatic bulk tank rinse with manual rinse

If bulk tanks are cleaned with a CIP system, replacing the automatic rinse cycle with a manual rinse reduces the amount of water used to rinse the tank by as much as 50%. The best way to rinse manually is by using a high-pressure spray—a practice that calls for some extra labor.

Conserving water used to clean buildings

Inspect hoses and use spring-release nozzles

You should inspect water hoses often and repair leaks as soon as you find them. Spring-release nozzles conserve water more efficiently than un-nozzled hoses, and improve cleaning by increasing the water's velocity.

Scrape holding area and milking parlor floors before hosing (parlor systems)

In parlor milking systems, cows produce about 20% of their manure output in holding areas. Manure and waste feed can be minimized by moving cattle gently, using a crowd gate, and not feeding grain in the milking parlor. You should mechanically scrape holding area and milking parlor floors to remove manure and hoof dirt prior to hosing. The solids collected can be delivered to manure handling systems. This technique reduces the volume of water required to clean floors by at least 30%, and decreases the amount of solids, nitrogen and phosphorus in the wastewater.

Install a booster pump to clean floors (parlor systems)

Booster pumps increase the velocity of water delivery, adding to the cleaning efficiency of hosing. A booster pump combined with floor scraping results in significant water savings.

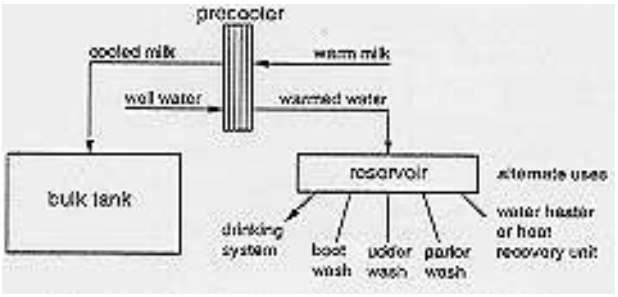
Recycling water in the milking center

Reuse milk pre-cooler water

Pre-coolers are in-line heat exchangers that use well water to cool milk en route to the bulk tank. These devices can provide significant energy savings, but they generate large quantities of wastewater (one to two gallons of water are often used to cool a single gallon of milk).

Pre-cooler wastewater is warmed but potable. You can use it for a number of purposes (figure 5), including watering livestock, washing floors, gutters and boots, and cleaning udders. Some farmers discharge pre-cooler water directly to stock tanks or reservoirs. If you reuse the water for cleaning you must install holding tanks, pumps and distribution lines.

Figure 5. Pre-cooler water recycling options.



Reuse water softener wastewater

Water softeners treat water supplies by replacing dissolved magnesium and calcium with sodium. Water softening lessens detergent needs and reduces mineral buildup on water heater surfaces. Water softener regeneration cycles produce large quantities of salty wastewater that is suitable for rinsing milking center floors and walls if it is diluted with water from other sources (figure 6).

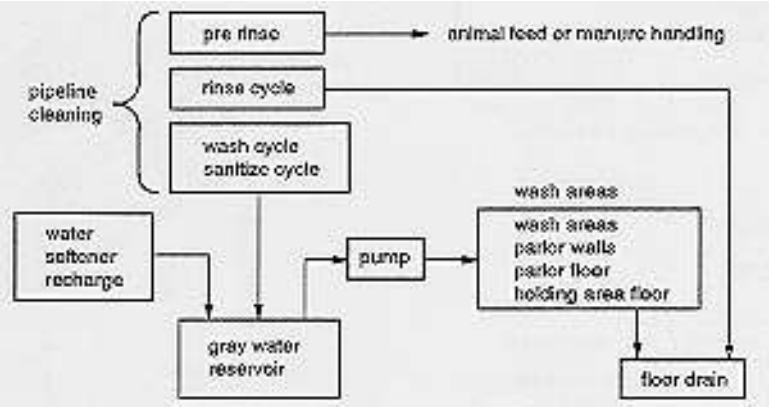
Reuse clean-in-place wastewater

During pipeline cleaning, wastewater from CIP cycles is usually discharged to milkhouse drains. When the proper plumbing and holding tanks are installed, detergent and acid rinse solutions can be captured separately and reused one time for a subsequent CIP cycle. The system can be programmed to accomplish this. Recycled solutions may require additional chemicals and must be heated before they are reused.

Detergent, acid rinse and sanitizer solutions can be collected and reused for cleaning floors and walls (figure 6). The CIP system can be programmed to divert used solutions.

CAUTION: Some acid rinses and sanitizers are incompatible and can generate dangerous chlorine gas when mixed. *Read labels carefully before you mix these chemicals!*

Figure 6. Water softener and clean-in-place wastewater recycling options.



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 on the back page. 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.

Authors: David C. Payer was formerly an outreach specialist and Brian Holmes is a professor with the Department of Agricultural Engineering, College of Agricultural and Life Sciences, University of Wisconsin-Madison and the University of Wisconsin–Extension, Cooperative Extension.

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