THE UNIVERSITY OF TENNESSEE
AGRICULTURAL EXTENSION SERVICE
SP484 M

TENNESSEE
FARM•A•SYST

Assessing Your Milking-Center Wastewater Treatment

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The goal of this *Farm•A•Syst* factsheet is to help you protect and improve the groundwater that supplies your drinking water as well as the ponds, lakes, rivers, and streams that make Tennessee beautiful.

The following questions are designed to help you pinpoint potential problem areas on your farmstead. These problem areas may contribute to the contamination of your drinking water if they are not managed properly.

If your answer to any of these questions is *YES*, or if you don't know the answer, you may have a high-risk situation in your home or on your farmstead. Refer to the fact section with the same number as that question (under the heading, "What you should know about . . .") for more information.

Don't be alarmed if your answer is *YES* to many or even all of these questions. That does not automatically mean you have a water-quality problem. It may,

YES	NO	
❑	❑	1. Is your milking-center wastewater discharged to a septic system, a settling tank, or directly to land? (If you discharge wastewater directly to a liquid-manure storage facility, you do not need to complete the rest of this factsheet.)
❑	❑	2. If you use a septic tank and drainfield, do you pour all your waste milk down the drain or often wash manure and spilled feed down the drain?
❑	❑	3. If you use a settling tank before discharging wastes to a drainfield or to the land, is this tank *not* lined with concrete or plastic?
❑	❑	4. Is the settling tank *never* cleaned out?
❑	❑	5. Is your liquid storage period less than one week, or is liquid waste discharged directly to the soil?
❑	❑	6. Is the drainfield located less than 100 feet from your drinking-water well, or upslope from the well?
❑	❑	7. When you discharge parlor wastes, do you always apply them to the same area?

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YES	NO	
❑	❑	8. Do you allow parlor wastes to flow over highly **permeable** soil (that is, one which allows water to flow through rapidly)?
❑	❑	9. Do you practice **surface infiltration** of parlor wastes (application of wastes to a grass filter strip) on soils with a high water table?
❑	❑	10. Is your drainfield located on medium- or coarse-textured soil less than five feet from the water table or bedrock?
❑	❑	11. Do your parlor wastes flow directly into a stream or other navigable waterway?

however, tell you that change is needed to avoid potential problems. In the same way, answering *NO* to every question does not mean you are *not* at risk.

Why should you care?

Groundwater is the underground water that supplies wells and springs and recharges surface water bodies. It is the source of drinking water for many Tennesseans. Up to 20 million gallons of groundwater may be stored under the typical farmstead—stored within 100 feet below fertilizer and pesticide storage areas, fuel tanks, livestock pens, and septic systems, all potentially major sources of pollution. The management decisions you make on your farmstead can significantly affect the quality of your drinking water and your family's health. These decisions can also affect your potential legal liability and the value of your property.

Surface water includes bodies such as ponds, lakes, rivers, and streams. Besides their aesthetic and recreational value, they are often an important source of drinking water for livestock.

Dairy wastewater is usually considered a dairy sanitation problem, not a water-quality concern. If it is not carefully managed, however, dairy wastewater can contaminate both surface and groundwater.

The amount of wastewater generated depends on the milking preparation, the type of equipment used, and the number of cows milked. A 100-cow freestall operation may use anywhere from 100 to 1000 gallons of water per day in the milking center alone.

Milking center wastewater is contaminated with organic matter, nutrients, chemicals, and microorganisms. Poorly designed or mismanaged waste disposal systems can contaminate water with ammonia, nitrate, phosphorus, detergents, and disease-causing organisms. If not managed properly, these contaminants can be carried directly to a well or can cause groundwater contamination. Surface water can also be affected by manure, milk solids, ammonia, phosphorus, and detergents.

Farm•A•Syst is only for your own use and benefit. It is a voluntary program intended to provide general information about protecting and improving water quality. Information from a *Farm•A•Syst* assessment will not be collected by Extension or any other outside agency and should remain in your private records.

What you should know about . . .

1. Methods of disposal

Septic systems are commonly used to dispose of milking-center water. Such a system often fails because 1) large amounts of water and solids entering the system can overload it, and 2) sanitizers used in the milking center can destroy the bacteria in the septic tank which normally treat the wastewater.

Wastewater is discharged onto the ground on some farms. If the soil on the farm is relatively **impermeable** (does not allow water to penetrate), like clay, the wastewater may flow over it until it reaches a surface water source and contaminates it. On the other

hand, if the soil is highly permeable or shallow, wastewater can percolate down through the soil and contaminate groundwater.

A good disposal solution for dairy wastewater in most situations is delivering it directly to a liquid-manure storage facility for application to fields at rates determined by a soil test and manure analysis. Combining milking center wastes with manure has the advantage of allowing a common disposal system for both types of waste. A liquid-manure storage facility, properly constructed and sized, provides the additional flexibility of storing wastes until they can be applied at the right time to the right sites. If this is the method you use, do not complete the remainder of this factsheet. Instead, see *SP484 J, Assessing Your Livestock Manure Storage.*

This option is limited, however, to farmers who handle their manure in slurry form. While using such a system adds to transportation and spreading costs, nutrients from dairy wastewater can be used to meet crop requirements, which reduces fertilizer costs.

2. Disposal by drainfield.

Wastewater from the dairy milking center, including wastes from the milking parlor (manure, feed solids, hoof dirt) and milkhouse (bulk-tank rinse water, detergent used in cleaning), is commonly disposed of in Tennessee by means of an underground tank and a soil absorption field, or **drainfield**. Milk solids and fats or manure solids can plug the absorption field and cause inefficient disposal of parlor wastes.

Alternatives to using a drainfield include piping the wastes to a liquid-manure storage tank and applying to fields at the appropriate rate, and using overland flow systems designed according to the type of soil on the farm. Two of these systems, **slow surface infiltration** and **surface (overland) flow**, are described in sections 7 and 8.

3. Settling-tank lining

While soil has a great capacity to absorb and degrade wastes, treating wastewater before it reaches the soil can extend the effective life of a soil application area. Such pretreatment usually consists of a settling tank that holds the wastewater long enough for heavier particles to settle to the bottom so that they can be pumped out later. If this tank is not lined with concrete or plastic, it can leak, possibly contaminating the **aquifer** (an underground layer of sand, gravel, or rock used as a water source) that contains your groundwater.

4. Settling-tank cleanout

The settled solids in the tank must be cleaned out every few months. Otherwise, storage volume in the tank will be lost, and the solids will eventually get into the drainfield area, clogging the spaces between soil particles and causing wastewater to collect on the surface. Solids that are pumped out should be applied to the land at appropriate rates.

5. Length of liquid-storage period

A settling tank with the capacity to store wastewater for several weeks before being emptied by a pump or dosing siphon is another way to allow time for drainfield **aeration** (the filling of spaces between soil particles with air, which is necessary for adequate treatment of wastes). It is important to provide air inlets to the drainfield so that the soil does not become saturated.

Waste milk should not be discharged directly to a drainfield without pretreatment, because milk solids will plug the absorption field.

6. Location of the drainfield relative to wells

If your drainfield is within 100 feet of a well or upslope from a well, contaminants from the absorption bed can **leach** (move *with water* down through the soil) into the wellhead, or into the groundwater that supplies the well. The absorption field should be downslope from any well.

7. Parlor-waste application

Applying wastewater consistently to the same area can overload the soil's ability to absorb waste. Saturation of the area can cause wastewater to percolate rapidly to groundwater or to run off the soil to a surface-water outlet. In addition, overapplying wastes to one area supplies crops with more nutrients than they can use. These excess nutrients can then become pollutants of surface and groundwater.

Dairy wastewater can be applied to cropland and pastures by portable irrigation equipment or by a liquid-manure spreader. Pipes with sprinklers can also be permanently installed to spray wastewater over certain areas consistently.

Do not apply wastewater to areas that allow rapid percolation to groundwater or runoff to surface water, such as those with shallow or coarse-textured soils.

8. Surface (overland) flow

Never let wastewater flow over areas that allow rapid percolation to groundwater or runoff to surface water, such as those with shallow or coarse-textured soils. A preferable alternative, allowing wastewater to run slowly in a sheet over a relatively impermeable clay soil, is a process known as **surface (overland) flow**. Vegetation removes nutrients that develop on top of the soil.

Although this practice may reduce the likelihood of groundwater contamination, it can pose problems for streams, lakes, and wetlands. Especially during winter or wet weather, wastewater will run off the impermeable surface and into surface-water outlets.

9. Slow surface infiltration

Wastewater can be applied at one end of a gently sloping grass filter strip or terrace. By spreading wastewater pretreated in a settling tank over such an area, organic compounds and bacteria can be filtered out as wastes flow in a uniform sheet over the vegetated surface and percolate through the soil. This process is known as **slow surface infiltration**. However, if the water table is high, there is less soil for the wastewater to pass through, which reduces its chances for being fully treated before it reaches groundwater.

This system works best on well-drained, loamy soils with at least three feet to bedrock or groundwater. The area should be designed to minimize runoff during heavy rain or snowmelt.

10. Geology and soil texture

Drainfields treat wastewater best in loamy soils with at least three feet to groundwater or bedrock. Allowing air to enter the subsurface area can speed the decomposition of organic matter and keep soil pores open.

11. Direct discharge to waterways

This is a violation of Tennessee law. Contact your local Extension agent for assistance in eliminating the problem.

Remember:

- If possible, deliver your milking-center wastewater directly to a liquid-manure storage tank for application to fields at rates determined by a soil test and a manure analysis.
- Be sure your storage tank is lined with concrete or plastic to prevent leaks.
- Clean out your settling tank as needed.
- Use a settling tank with a capacity large enough to store flow for several weeks before discharge to the soil. This allows time for the soil to fill with air so that the wastewater can be treated properly.
- Do not discharge waste milk directly to the soil.
- Locate the drainfield as far from your drinking-water well as possible.
- When applying wastewater to the soil, do not saturate areas with highly permeable soils that will allow rapid percolation to groundwater.
- Do not construct a drainfield on medium- or coarse-textured soil in areas where the water table is high.
- Never allow parlor wastes to flow directly into a stream or other navigable waterway.

If you want more information . . .

Contact:

- Your county Extension office
- Tennessee Department of Environment and Conservation (TDEC)
  Division of Water Pollution Control
  Field Offices

Memphis	(901)368-7939
Jackson	(901)661-6200
Nashville	(615)650-7240
Chattanooga	(423)634-5745
Knoxville	(423)594-6035
Johnson City	(423)854-5400

- Your local Soil Conservation District office

Read:

Dairy Manure Management. National Extension Dairy Manure Management Project, 1994.
Dairy Cattle Waste Management. PB 1422.

These publications are available from your University of Tennessee Agricultural Extension Service county office.

Download:

These sites on the World Wide Web (WWW) are good places to start when browsing the Internet for information about water quality:

- http://funnelweb.utcc.utk.edu/~utext
  (University of Tennessee Agricultural Extension Service)

- http://www.epa.gov
  (U.S. Environmental Protection Agency)

- http://www.usda.gov
  (U.S. Department of Agriculture)

- http://h2o.usgs.gov
  (U.S. Geological Survey)

- http://wwwdtnnsh.er.usgs.gov
  (Tennessee division of USGS)

- http://hermes.ecn.purdue.edu:8001/server/water/water.html
  (National Extension Water Quality Database Website)

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