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EC98-756 Farm*A*Syst Nebraska's System for Assessing Water Contamination Risk Worksheet 13: Milking Center Effluent Treatment

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Farm•A•Syst

WORKSHEET 13

Nebraska's Farm Assessment System for Assessing the Risk of Water Contamination

Milking Center Effluent Treatment

Why should I be concerned?

Milking center effluent is usually considered a dairy sanitation problem. If not properly managed, however, the effluent can contaminate both groundwater and surface water.

The amount of effluent generated varies with milking system. Typically, four to six gallons of milking center effluent is generated per cow per day. Depending upon the amount of cleanup water used and the amount of reuse made of pipeline wash water, individual farms may vary from these typical values.

Milking center effluent contains 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 cause groundwater contamination. Surface water is also affected by manure, milk solids, ammonia, phosphorus and detergents.

The key to minimizing the environmental impact of milking center effluent that is treated separately from manure is to minimize the manure and milk added to the waste water. A typical way of measuring a waste's strength is Biochemical Oxygen Demand (BOD). Manure (BOD of 20,000 mg/l) is 50 times greater than municipal sewage (200 to 500 mg/liter) and milk (BOD of 100,000 mg/l) is 250 times stronger. Feeding waste milk to calves and limiting manure additions to milking center effluent is preferred to attempting to treat these high strength by-products.

The goal of Farm*A*Syst is to help you protect the groundwater that supplies drinking water and recreational uses of surface water.

How will this worksheet help me protect my drinking water?

- It will take you step-by-step through your milking center effluent treatment practices.
- It will evaluate your activities according to how they might affect the groundwater that supplies your drinking water.
- It will provide you with easy-to-understand "risk level scores" that will help you analyze the relative safety of your milking center effluent treatment practices.
- It will help you determine which of your practices are reasonably safe and effective, and which practices might require modification to better protect your drinking water.

How do I complete the worksheet?

Follow the directions at the top of the chart on page 3. It should take you 15 to 30 minutes to complete this worksheet and determine your risk level.

Information derived from Farm*A*Syst worksheets is intended only to provide general information and recommendations to farmers regarding their own farm practices. It is not the intent of this educational program to keep records of individual results.

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Elbert C. Dickey, Interim Director of Cooperative Extension, University of Nebraska, Institute of Agriculture and Natural Resources.

Glossary

These terms may help you make more accurate assessments when completing *Worksheet 13*. They may also help clarify some of the terms used in *Fact Sheet 13*.

Below-ground absorption field: An effluent treatment system that applies septic tank effluent to the soil through a trench, bed, or pit.

Field application: Application of effluent to croplands and pastures by irrigation equipment or a liquid manure spreader.

Rapid surface infiltration: Application of effluent to coarse-textured soils to encourage rapid infiltration of water into the soil. Treated effluent drains rapidly to surface water or groundwater. A much greater portion of the applied effluent percolates to groundwater than in other discharge methods.

Slow surface infiltration: Application of effluent at one end of a gently sloping grass filter strip or terrace, so that it is treated as it slowly flows through the plant-soil system. A portion of the flow percolates to groundwater, and some is used by vegetation.

Soil permeability: The quality that enables the soil to transmit water or air. Slowly permeable soils have fine-textured materials, like clays, that permit only slow water movement. Moderately or highly permeable soils have coarse-textured materials, like sands, that permit rapid water movement.

Surface (overland) flow: The process of allowing effluent to run slowly in a uniform layer over a grass-covered slope and relatively impervious clay soil. There is little percolation into the soil with this method because of the impervious soil. Water eventually flows into runoff collection ditches (for subsequent discharge).

Milking Center Effluent Treatment: Assessing the Risk of Surface Water and Groundwater Contamination

1. Use a pencil. You may want to make changes.
2. For each category listed on the left that is appropriate to your farm, read across to the right and circle or mark the statement that best describes practices or conditions on your farm. (Skip and leave blank any categories that don't apply to your farm.)
3. Then look above the description you circled to find your "risk number" (1, 2, 3, or 4) and enter that number in the blank under "YOUR RISK."
4. Allow about 15-30 minutes to complete the worksheet and figure out your risk for milking center effluent treatment practices.

	HIGH RISK (risk 4)	HIGH-MODERATE RISK (risk 3)	MODERATE-LOW RISK (risk 2)	LOW RISK (risk 1)	YOUR RISK
MILKING CENTER EFFLUENT DIRECTED TO MANURE STORAGE					
All effluent directed to manure storage or feedlot runoff pond storage	If using this practice, do not complete the rest of this worksheet. Complete risk assessment results for *Worksheet 9, Livestock Manure Storage* and *Worksheet 11, Land Application of Manure* to determine potential risks.				
MILKING CENTER WASTE REDUCTION					
Manure addition to milking center effluent	Most manure, excess feed, and other solids from parlor and holding pen manure is added to milking center effluent.	Some manure, excess feed, and other solids from parlor and holding pen manure is added to milking center effluent.	Most manure, excess feed, and other solids are scraped from parlor before cleanup. Holding pen manure and cleanup water are not added to milking center effluent.	All manure, excess feed, and other solids are scraped from parlor before cleanup. Holding pen manure and cleanup water are not added to milking center effluent.	
Milk addition to milking center effluent	Waste milk and first rinse of pipeline and bulk tank is added to milking center effluent.	Waste milk is collected for feeding to animals but first rinse of pipeline and bulk tank is added to milking center effluent.	Most waste milk and first rinse of pipeline and bulk tank is collected for feeding to other animals or adding to manure.	All waste milk and first rinse of pipeline and bulk tank is collected for feeding to other animals or adding to manure.	
PRETREATMENT (before discharge to soil absorption bed/field)					
Storage / settling tank liner	No liner to prevent seepage.	Cracked or porous liner.	_____	Concrete, clay or plastic lined.	
Solids cleanout from settling tank	Tank never cleaned.	Annual cleaning.	Tank cleaned every 6 months.	Tank cleaned as needed or every 3-4 months.	

	HIGH RISK (risk 4)	HIGH-MODERATE RISK (risk 3)	MODERATE-LOW RISK (risk 2)	LOW RISK (risk 1)	YOUR RISK
IF FINAL DISPOSITION OF MILKING CENTER EFFLUENT IS (select one of following five systems that best matches farm's disposal of effluent):					
Field application by irrigation	Applied to permanent vegetation at more than 54,000 gallons per acre per week (2 inch rainfall equivalent). Vegetation not removed.	Applied to cropped or grazed land at 27,000-54,000 gallons (1-2 inch rainfall equivalent) per acre per week.	Applied to permanent vegetation at less than 27,000 gallons (1 inch rainfall equivalent) per acre per week. Vegetation not removed.	Applied to cropped or grazed field at 27,000 gallons (1 inch rainfall equivalent) per acre or less per week.	
Surface flow	Discharged to ditch, drainage, or stream; OR Applied in sheet to highly or moderately permeable soil. Vegetation not removed.	Applied in sheet to slowly permeable soil. Vegetation not removed.	Applied in sheet to slowly permeable soil. Vegetation sometimes removed.	Applied in sheet to slowly permeable soil. Vegetation regularly removed.	
Slow surface infiltration	No pretreatment. 1 foot of medium- or fine-textured soil[1] above bedrock or high water table. Vegetation not removed.	Some pretreatment. Medium- or fine-textured soil[1] more than 2 to 3 feet over bedrock or high water table. Vegetation not removed.	Combined with high-level pretreatment. Medium- or fine-textured soil[1] more than 3 feet to water table or bedrock. Extended rest period between loadings. Vegetation removed.	Combined with high-level pretreatment. Medium- or fine-textured soil[1] more than 10 feet to water table or bedrock. Extended rest period between loadings. Vegetation removed.	
Subsurface absorption field	Located on medium or coarse-textured soil (silt loam, loam, sands, sandy loam) less than 5 feet to water table or creviced bedrock. No air allowed to enter subsoil.	Located in deep medium-textured soils (silt loam, loam). Soil dries every few weeks.	No medium to low risk options. System has at least a moderate risk of nitrate pollution. This is not a recommended practice.		
Rapid surface infiltration	No pretreatment. Sandy loam or loamy sand soil less than 5 feet thick. Vegetation not removed.	Combined with high-level pretreatment. Sandy loam or loamy sand soil 5 or more feet thick. Vegetation removed regularly.	No medium to low risk options. System has at least a moderate risk of nitrate pollution. This is not a recommended practice.		

[1]Coarse textured soils: gravels, sands and sandy loams. Medium or fine-textured soils: silt loam, loam, clay loams and silty clay.

	HIGH RISK (risk 4)	HIGH-MODERATE RISK (risk 3)	MODERATE-LOW RISK (risk 2)	LOW RISK (risk 1)	YOUR RISK
LOCATION OF DISCHARGE, ABSORPTION FIELD, OR INFILTRATION AREA					
Distance from drinking water well	***Well is within 100 feet[1]***	Well is 100 to 250 feet, AND Downslope or at grade,	Well is more than 250 feet, AND Downslope or at grade.	Well is more than 100 feet, AND Upslope	
Distance from nearest surface water source	Less than 100 feet.	100 to 199 feet.	200 to 500 feet.	Greater than 500 feet.	

Bold italic type: Besides representing a higher-risk choice, this practice also violates Nebraska law.
[1]Illegal for new well installation. Existing wells must meet separation requirements in effect at time of construction.

Your groundwater vulnerability score from *Worksheet 2* was _____
Note: If the surface texture, subsurface texture, or depth to groundwater used to calculate this score are not characteristic of the site conditions present for the activities / practices discussed in this worksheet, calculate a new vulnerability score for this site.

If your groundwater vulnerability score is:
- 1 to 1.4: your site has a LOW VULNERABILITY to pollution reaching groundwater.
- 1.5 to 2.4: your site has a MODERATE-LOW VULNERABILITY to pollution reaching groundwater.
- 2.5 to 3.4: your site has a HIGH-MODERATE VULNERABILITY to pollution reaching groundwater.
- 3.5 to 4.0: your site has a HIGH VULNERABILITY to pollution reaching groundwater.

Your surface water vulnerability score from *Worksheet 2* was _____
Note: If the surface texture, slope toward surface water, or distance from surface water used to calculate this score are not characteristic of the site conditions present for the activities / practices discussed in this worksheet, calculate a new vulnerability score for this site.

If your surface water vulnerability score is:
- 1 to 1.4: your site has a LOW VULNERABILITY to pollution reaching surface water.
- 1.5 to 2.4: your site has a MODERATE-LOW VULNERABILITY to pollution reaching surface water.
- 2.5 to 3.4: your site has a HIGH-MODERATE VULNERABILITY to pollution reaching surface water.
- 3.5 to 4.0: your site has a HIGH VULNERABILITY to pollution reaching surface water.

Look over your worksheet scores for individual activities:

- **Low risk** practices (1's): are ideal and should be your goal regardless of your site's vulnerability to pollution reaching ground or surface water. Cost and other factors may make it difficult to achieve a low risk rating for all activities.

- **Moderate-low risk** practices (2's): provide reasonable water quality protection unless your site's vulnerability to pollution reaching ground or surface water is moderate-high or high.

- **High-moderate risk** practices (3's): do not provide adequate protection in many circumstances, especially if your site's vulnerability to pollution reaching ground or surface water is high or high-moderate. They may provide reasonable water quality protection if your site's vulnerability to pollution reaching ground or surface water is low to moderate-low.

- **High risk** practices (4's): pose a serious danger of polluting water, especially if your site's vulnerability to pollution reaching ground or surface water is high, high-moderate, or moderate-low. Some high risk activities may not immediately threaten water quality if your site's vulnerability to pollution reaching ground or surface water is low, but still pose a threat over time if not corrected.

Read ***Fact Sheet 13 Improving Milking Center Effluent Treatment*** and consider how you might modify your farm practices to better protect your drinking water supply and other ground and surface water supplies. Some concerns you can take care of right away; others could be major or costly projects requiring planning and prioritizing before you take action.

Summary Evaluation for Milking Center Effluent Treatment Worksheet

Summarize your potential high risk activities in the following table and consider the response options you can take to reduce the potential for water quality contamination.

High Risk Activities and Activities Impacted by Site Vulnerability	**Response Options (Check One)**		**Taking Action** For "immediate action possible" items, note practices and when each will occur. For issues "requiring further planning," note estimates, consultations, or other activities necessary and when each will occur. Establish a target date for making necessary changes.
	Immediate Action Possible	**Further Planning Required**	

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