

Assessing the Risk of Groundwater Contamination from Livestock Yards Management

Why should I be concerned?

Livestock yards, such as barnyards, holding areas and feedlots, are areas of concentrated livestock wastes. They can be a source of nitrate and bacteria contamination of groundwater. This is especially true if there is no system to:

- ◆ Lower the seasonal groundwater table, if necessary.
- ◆ Divert clean water flow from the livestock yard.
- ◆ Collect polluted runoff from the yard for diversion to an area where its effect on surface water or groundwater is minimal.

The potential for livestock yards to affect groundwater is greatest if:

- ◆ The yard is located over coarse-textured permeable soils.
- ◆ The water table is at or near the surface.
- ◆ Bedrock is within a few feet of the surface.
- ◆ Polluted runoff is discharged to permeable soils and bedrock.

Nitrate levels in drinking water above federal and state drinking water standards of 10 milligrams per liter (mg/l; equivalent to parts per million for water measure) nitrate- nitrogen can pose health problems, including the condition known as methemoglobinemia (blue baby syndrome), for infants under 6 months of age. Nitrate can also affect adults, but the effects are much less certain.

Young livestock are also susceptible to health problems from high nitrate-nitrogen levels. Levels of 20-40 mg/l in the water supply may prove harmful, especially in combination with high levels (1,000 ppm) of nitrate-nitrogen from feed sources.

Fecal bacteria in livestock waste can contaminate groundwater if waste seeps into nearby wells, causing such infectious diseases as dysentery, typhoid and hepatitis. Organic materials, which may lend an undesirable taste and odor to drinking water, are not known to be dangerous to health but their presence does suggest that other contaminants are flowing directly into groundwater.

The goal of Farm-A-Syst is to help you protect the groundwater that supplies the drinking water for you, your neighbors, and the public. It is not used for, nor is it related to, any type of enforcement action from any agency.

How will this worksheet help me protect my drinking water?

- ◆ It will take you step by step through your drinking water well condition and management practices.
- ◆ It will rank your activities according to how they might affect the groundwater that provides your drinking water supplies.
- ◆ 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 you fill out the worksheets?

Focus on the well that provides drinking water for your home or farm. If you have more than one drinking water well on your farmstead, fill out a worksheet for each one.

- ◆ Use a pencil. You may want to make changes.
- ◆ For each category listed on the left that is appropriate to your farmstead, read across to the right and circle the statement that best describes conditions on your farmstead. (skip and leave blank any categories that don't apply to your farmstead.)
- ◆ Then look above the description you circled to find your "Rank number" (4, 3, 2, or 1) and enter that number in the blank under "Your Rank."
- ◆ Directions on overall scoring are explained in the next section "What do you do with the rankings?"
- ◆ Allow between 20-45 minutes to complete the worksheet to figure out your risk ranking for management practices and complete the Farmstead Improvement Action Plan.

What do you do with the rankings?

Step 1: Look over your rankings for individual activities:

- ◆ Low-risk practices (4's): ideal; should be your goal despite cost and effort
- ◆ Low-to-moderate-risk practices (3's): provide reasonable groundwater protection
- ◆ Moderate-to-high-risk practices (2's): inadequate protection in many circumstances
- ◆ High-risk practices (1's): inadequate; pose a high risk of polluting groundwater

Any individual rankings of "1" require immediate attention. Some concerns you can take care of right away; others could be major-or costly-projects, requiring planning and prioritizing before you take action.

Find any activities that you identified as 1's & 2's and list them under "High Risk and Medium-High Risk Practices" in the Farmstead Improvement Action Plan section following the worksheet.

Step 2: Read Fact Sheet # 8, Livestock Yard Management, and consider how you might modify your farmstead practices to better protect the public and your drinking water. This may help with filling out the Farmstead Improvement action Plan.

Step 3: Fill out the Farmstead Improvement Action Plan (FIAP). Contact your local Soil and Water Conservation District for technical assistance and help with the FIAP if needed.

Step 4: Implement the FIAP- Contact NRCS for possible designs and/or funding for practices. Funding availability depends on the practice installed and the current USDA farm programs.

Glossary

Livestock Yards Management

These terms may help you make more accurate assessments when completing Worksheet #8. They may also help clarify some of the terms used in Fact Sheet #8.

Infiltration: The downward entry of water through the soil surface.

Percolation: The downward movement of water through the soil.

Runoff control system: A combination of management practices that can be used together to prevent water pollution from livestock yard runoff. Practices may include diversion of runoff from the yard, roof runoff systems, yard shaping, settling basins, and wastewater treatment strips or buffer areas.

Soil drainage class: The conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soils, as opposed to human-altered drainage. Different classes are described by such terms as "excessively drained," "well-drained," and "poorly drained."

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.

Soil texture: The relative proportions of the various soil separates (clay, sand, silt) in a soil, described by such terms as "sandy loam" and "silty clay."

Wastewater treatment strip: A treatment component of an agricultural waste management system consisting of a strip or area of herbaceous vegetation.

Worksheet # 8

Livestock Yards Management: Assessing Drinking Water Contamination

	Low Risk (Rank 4)	Low-Mod Risk (Rank 3)	Mod-High Risk (Rank 2)	High Risk (Rank 1)	Your Rank
<u>Location</u>					
8.1 Distance from drinking water well	More than 100 feet downslope from well.	More than 300 feet upslope from well.	Less than 300 feet but more than 100 feet upslope from drilled well and less than 100 feet downslope. Dug well or not designed by professional.	Less than 100 feet upslope from well.	_____
<u>Design and Management</u>					
8.2 Spill or leak control in storage area	All upslope and roof water diverted or no upslope watershed.	Most upslope surface and roof water diverted or limited upslope watershed.	Limited surface water diverted. Some roof water collected and redirected. Substantial upslope watershed.	All water (surface and roof water) runs through the yard. Substantial upslope watershed.	_____
8.3 Lot runoff control system	No yard runoff (either barn or roofed area).	All runoff collected from curbed lot. Solids separated. Water directed onto wastewater treatment strip. Site has deep groundwater table or a mechanism in place to lower the groundwater table.	Most of lot runoff collected. Some solids removed. No wastewater treatment strip.	Lot runoff uncontrolled or located on highly permeable or shallow to bedrock soils	_____

	Low Risk (Rank 4)	Low-Mod Risk (Rank 3)	Mod-High Risk (Rank 2)	High Risk (Rank 1)	Your Rank
8.4 Yard cleaning and scraping practice	No yard (animals confined).	Once per week.	Once per month.	Rarely.	_____

Concentration of Animals on Yard [square feet per animal (sf/a)]*

8.5 Dairy cows	No yard. Confined to barn or roofed yard.	75 sf/a or more on fenced, curbed paved lot and/or 400 sf/a on graded earthen surface. More than 1800 sf/a in exercise area.	50 sf/a or more on paved lot concrete and/or 200-300 sf/a on earthen surface. More than 1200 sf/a in exercise area.	Some paved lot (less than 50 sf/a) and earth (less than 100 sf/a).	_____
8.6 Dairy replacements	No yard. Confined to barn or roofed yard.	More than 40sf/a on fenced, curbed paved lot and/or 150-200 sf/a on earthen yard.	More than 20 sf/a on paved lot and/or more than 75 sf/a on earthen surface.	Less the 75 sf/a on earth.	_____
8.7 Beef feeders	No yard. Confined to barn with slotted floor.	Barn and/or paved lot more than 50 sf/a. Earthen lot with mound more than 300 sf/a, or without mound more than 500 sf/a.	No shelter and paved lot 40-50 sf/a. Earthen with mound more than 150 sf/a or earthen without mound less than 250 sf/a.	Paved less than 30 sf/a, or earthen less than 150 sf/a.	_____
8.8 Beef cows/heifers	Barn or roofed lot.	Barn with paved lot more than 60 sf/a. Earthen with mound more than 400 sf/a. Earthen without mound more than 600 sf/a.	Paved lot more than 30 sf/a. Earthen with mound more than 200 sf/a. Earthen without mound more than 300 sf/a.	Earthen without mound less then 200 sf/a.	_____
8.9 Sheep/ewes	No yard. Confined to barn or roofed yard.	Barn and paved lot more than 20 sf/a. Earthen more than 40 sf/a.	Barn and paved lot les than 15 sf/a. Earthen less then 25 sf/a.	Earthen less than 10 sf/a.	_____

	Low Risk (Rank 4)	Low-Mod Risk (Rank 3)	Mod-High Risk (Rank 2)	High Risk (Rank 1)	Your Rank
8.10 Feeder lambs	No yard. Confined to barn.	Barn and paved lot more than 10 sf/a. Earthen more than 25 sf/a.	Barn and paved lot more than 5 sf/a. Earthen more than 10 sf/a	Earthen less than 10 sf/a.	_____
Concentration of Animals on Yard [square feet per animal (sf/a)]*					
8.11 Hogs/sows	No yard. Confined to barn.	Shed and paved lot more than 30 sf/a.	Shed and earthen lot less than 15 sf/a.	Shed and earthen lot less than 15 sf/a.	_____
8.12 Pigs: growing/finishing	No yard. Confined to barn.	Shed and paved lot more than 15 sf/a.	Shed and earthen lot more than 15 sf/a.	Shed and earthen lot less than 10 sf/a.	_____
8.13 Horses	No yard. Confined to barn or on pasture.	Earthen exercise lot more than 2500 sf/a. No Pasture.	Earthen lot more than 1500 sf/a. No pasture.	Earthen lot less then 1000 sf/a. No pasture.	_____

* Animal concentrations derived from Midwest Plan Service publications and other sources.

Worksheet Section #	List High Risk and Med-High Risk practice(s)	Alternative Low Risk practice (Include potential sources of technical and financial assistance.)	Action Plan	
			Planned completion date	Indicate date when completed

I understand that this farmstead assessment (Farm-A-Syst) and corresponding Farmstead Improvement Action Plan were developed on the basis that I have disclosed, to the best of my knowledge, all information pertaining to my farmstead operations.

Farmstead address:

Street _____

City _____ ME, Zip code _____

Watershed name: _____

___ Aerial map with farmstead boundaries is attached

Producer's signature _____

Date ____/____/____

Farm-A-Syst conducted by:

Name _____

Title _____ Date ____/____/____

Acknowledgments

Update by Androscoggin Valley Conservation District partnered with Maine CDC Drinking Water Program. 2007-2008.

Revision Editors of Farm-A-Syst Worksheet #8: Megan Wooster, AVSWCD; Susan Gammon, AVSWCD; Andrews Tolman, State of Maine CDC Drinking Water Program; Chris Jones, Natural Resources Conservation Service; David Wilkinson, Natural Resources Conservation Service; Dan Baumert, Natural Resources Conservation Service, Mark F. Hedrich, Department of Agriculture; Susan Breau-Kelley, Maine Rural Water Association. 2008.

Original Farm-A-Syst team members: John M. Jemison, Jr., University of Maine Cooperative Extension; Marianne DuBois, Maine Department of Environmental Protection; Tammy Gould, Board of Pesticides Control; Chris Jones, Natural Resources Conservation Service; Lisa Krall, Natural Resources Conservation Service; Craig Leonard, Maine Department of Agriculture; Craig Neil, Maine Geological Survey; David Rocque, Maine Soil and Water Conservation Commission; and David Lytle, University of Maine Cooperative Extension.
Original Worksheet #8: Adapted by Chris Jones, Natural Resources Conservation Service. 1995