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EC98-761 Farm*A*Syst Nebraska's System for Assessing Water Contamination Worksheet 10: Livestock Yards Management

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Farm A Syst

WORKSHEET 10

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

Livestock Yards Management

Why should I be concerned?

Livestock yards, such as barnyards, holding areas and feedlots, are areas of concentrated livestock wastes and a potential source of nutrient, solids, and bacteria contamination of surface and groundwater. Yards that are abandoned permanently or are inactive temporarily also represent a potential risk.

The basic principles for preventing groundwater contamination from active livestock yards include:

- diverting clean water runoff around the livestock yard,
- collecting polluted runoff from the yard for timely application to a growing crop or grassland, and
- maintaining adequate separation distance between the livestock yard and water well.

Manure and yard runoff can contribute to high nitrate levels in drinking water. The federal and state drinking water standard is 10 milligrams per liter

(mg/l; equivalent to parts per million) $\text{NO}_3\text{-N}$ (nitrate-nitrogen). Levels greater than 10 mg/l can pose a health problem known as methemoglobinemia (blue baby syndrome) for infants under six months of age .

Nitrate-nitrogen can also affect adults, but the evidence is much less certain. Levels of 35 mg/l should be avoided for livestock, especially young animals and animals in gestation. For most livestock, health effects are normally observed only for concentrations of greater than 100 mg/l nitrate-nitrogen.

Organic matter in manure (50 times more concentrated than raw municipal sewage) degrades rapidly and consumes considerable oxygen. Excess nutrient levels in manure can contribute to excess algae growth in water.

A combination of these contaminants diminishes the recreational value of our ponds, streams, and lakes as a result of the excess algae growth, lower water oxygen levels, and reduced fish populations.

Fecal bacteria in livestock manure can contaminate surface and groundwater, causing

infectious diseases such as dysentery, typhoid, and hepatitis. Surface water used for drinking water or swimming is at greatest risk. Typical water purification practices such as chlorination are not effective in controlling some of the pathogens found in livestock manure.

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

How will this worksheet help me protect my drinking water?

- It will take you step-by-step through possible environmental risks associated with livestock yards management practices.
- It will evaluate your practices according to how they might affect the groundwater that provides your drinking water.



- It will provide you with easy-to-understand “risk level scores” that will help you analyze the relative safety of your livestock yards management practices.
- It will help you determine which of your practices are 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 following chart. It should take you 5 to 10 minutes to complete this worksheet and determine your risk level.

Information derived from Farm*A*Syst worksheets is intended 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.

These terms may help you make more accurate assessments when completing *Worksheet 10*. They may also help clarify some of the terms used in *Fact Sheet 10*.

Filter strip: A gently sloping grass plot used to filter runoff from the livestock yard. Influent waste is distributed uniformly across the high end of the strip and allowed to flow down the slope. Nutrients and suspended material remaining in the runoff water are filtered through the grass, absorbed by the soil, and ultimately taken up by the plants. Filter strips must be designed and sized to match the characteristics of the livestock yard.

Flow Distance: Distance traveled by runoff following normal drainage paths. This may not be the same as the closest distance between two points (i.e. livestock yard and stream).

Glossary

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

Percolation: The downward movement of water through the soil.

Runoff control system: A combination of systems designed 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 filter strips or holding ponds.

Runoff holding pond: A structure, usually an earthen basin, designed to collect and hold the runoff from a livestock yard.

Soil drainage class: The condition caused by frequency and duration 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.”

Upslope surface water: Water originating from cropland, pasture, or a farm prior to flowing through the livestock yard.

Livestock Yards Management: Assessing Surface Water and Groundwater Contamination Risk

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. 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 SCORE."
4. Allow about 5-10 minutes to complete the worksheet and determine your risk for livestock yards management.

	HIGH RISK (risk 4)	HIGH-MODERATE RISK (risk 3)	MODERATE-LOW RISK (risk 2)	LOW RISK (risk 1)	YOUR RISK
Nebraska Department of Environmental Quality permit or letter of exemption exists for open lot.	<i>I do not have a Nebraska DEQ operating permit for my outdoor feedlot.</i>	<i>I have a Nebraska DEQ operating permit for my outdoor feedlot but it may not be current due to feedlot expansion.</i>	_____	I have a current Nebraska DEQ operating permit for all outdoor feedlot facilities or a written letter of exemption from DEQ.	
LOCATION					
Distance from yard to drinking water well	<i>Less than 100 feet.¹</i>	Well is 100 to 250 feet AND Down slope or at grade.	Well is more than 250 feet AND Downslope or at grade.	Well is more than 100 feet AND Upslope.	
Flow distance from yard to nearest surface water source (runoff is contained)	Less than 100 feet.	100 to 199 feet.	200 to 500 feet.	More than 500 feet	
Flow distance from yard to nearest surface water source (<i>runoff is not contained</i>)	<i>Stream or drainage to stream flows through yard or along border of yard.</i>	<i>Less than 2,000 feet (These guidelines may not be acceptable to Nebraska DEQ).</i>	<i>2,000 to 5,000 feet (These guidelines may not be acceptable to Nebraska DEQ).</i>	<i>Greater than 5,000 feet (These guidelines may not be acceptable to Nebraska DEQ).</i>	
SITE CHARACTERISTICS FOR GROUNDWATER PROTECTION					
Soil depth and permeability (groundwater protection)	Excessively well-drained, coarse-textured soils ² to gravel, or poorly drained soils. Very shallow (less than 20 inches).	Moderately well-drained coarse-textured soils. ² Shallow (20-30 inches).	Well-drained or moderately well-drained medium- or fine-textured soils. ² 30-40 inches deep.	Well-drained, medium- or fine-textured soils. ² More than 40 inches deep.	

Bold Italic type: Besides representing a higher-risk choice, this practice also violates Nebraska law.

¹Illegal for new well construction. Existing wells must meet separation requirements in effect at time of construction.

²Coarse-textured soils — sands, sandy loam. Medium- or fine-textured soils — loam, silt loam, clay loams, clays

	HIGH RISK (risk 4)	HIGH-MODERATE RISK (risk 3)	MODERATE-LOW RISK (risk 2)	LOW RISK (risk 1)	YOUR RISK
DESIGN AND MANAGEMENT					
Yard surface	Earthen yard experiences periods of several months with no animal traffic.	Earthen yard has constant animal traffic but extended periods of low animal density. Some areas are overtaken by weeds.	Earthen surface with almost continuous animal traffic.	Concrete.	
Surface water diversion	Roof and upslope surface water runs through the yard.	Some surface water diverted. Some roof water diverted.	Most upslope surface and roof water diverted.	All upslope and roof water diverted.	
Yard runoff control system	<i>Yard runoff uncontrolled.</i>	<i>Most of yard runoff collected. Solids settled out. No filter strip for released liquids.</i>	All runoff collected. Solids settled out. Released water directed onto filter strip.	All runoff collected and held in holding pond.	
Runoff holding pond capacity (see Farm*A*Syst Fact Sheet 9 and Worksheet 9 for other related considerations)	<i>Design capacity of holding pond is unknown OR Capacity is insufficient to handle runoff from 25-year, 24-hour storm (5.5" rain for eastern Nebraska to 4" rain for western Nebraska) plus month of June due to feedlot expansion or inadequate original design.</i>	Solids accumulation in holding pond has not been removed in recent years and holding capacity is diminished.	Capacity to handle precipitation on storage and runoff from 25 year, 24 hour storm (5.5" rain for eastern Nebraska to 4" rain for western Nebraska) plus month of June. AND Not always pumped regularly to maintain capacity.	Capacity to handle precipitation on storage and runoff from 25 year, 24 hour storm (5.5" rain for eastern Nebraska to 4" rain for western Nebraska) plus month of June. AND Pumped regularly to maintain capacity.	
Runoff containment overflow	None.	Emergency spillway directs flow across cropland.	Emergency spillway directs flow across permanent vegetation (pasture, alfalfa, or grass).	Emergency spillway directs flow across grass filter strip designed to distribute flow across surface.	
Abandoned livestock yards management	No cleanup of yard occurs following removal of animals. OR yard is tilled but no vegetative cover is established.	Manure was collected and land applied following removal of animals.	Manure and top 6 to 12 inches of soil were collected following removal of animals.	Manure and some soil were collected following removal of animals AND a viable vegetative cover (alfalfa or grass) is established.	

Bold Italic type: Besides representing a higher-risk choice, this practice also violates Nebraska law.

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 10 Improving Livestock Yards Management*** 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.



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