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EC98-759 Farm*A*Syst Nebraska's System for Assessing Water Contamination Risk Fact Sheet 10: Improving Livestock Yards Management

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Farm A Syst

FACT SHEET 10

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

Improving Livestock Yards Management

Besides addressing the potential of livestock yards to pollute surface and groundwater, other good reasons for improving management practices include ease of maintenance, improved herd health, and quality milk or meat production. This fact sheet discusses six issues critical to minimizing the impact of livestock yards on water quality.

1. Distance from well

Wells should be located in an elevated area upslope of the livestock yard, so that runoff will not drain into the vicinity of the well. The Nebraska well code requires a minimum separation of 100 feet between existing livestock yards and new wells. It is preferable to maintain setback distances of more than 200 feet between the well and the livestock yard.

Minimum separation distances regulate new well installations, as well as the distance from existing wells to new sources of contamination. Existing wells are required by law

only to meet separation requirements in effect at the time of well construction. Make every effort, however, to exceed "old requirements," and strive to meet current regulations whenever possible.

2. Site characteristics

Soil characteristics are the most important factor. Important soil characteristics include surface and subsoil texture, soil depth, permeability, and drainage class. The best site for groundwater protection has a deep, well-drained silt loam/clay loam soil with low permeability. A very poor site has shallow soil, or a high water table, or a very sandy/gravelly soil with excessive drainage and high permeability.

For surface water protection, feedlot runoff control systems are the "primary" barrier...not soil characteristics. (For more assistance in assessing your site's vulnerability to groundwater contamination, see *Worksheet 2, Site Evaluation*.)

For existing livestock yards

on poor sites, one option for protecting groundwater might be moving away from an outdoor yard and more towards total confinement for the livestock or paved livestock yards with curbs.

3. Clean water diversion

One way to reduce water pollution from livestock yards is to reduce the amount of clean water entering the yard. In all cases, the following structures should be used.

- Waterways, small terraces, and roof gutters should direct water away from livestock yards.
- An earthen ridge or terrace can be constructed across the slope upgrade from a livestock yard to prevent runoff from entering the yard.
- In some areas, if a diversion terrace is not practical, a catch basin with a tile outlet could be installed above the livestock yard.



4. Runoff control systems

Runoff control systems are designed to prevent runoff from reaching local surface waters. Such systems also reduce the threat of groundwater pollution from livestock yards which is greatest immediately beyond the fence line. Animal traffic and manure tend to seal livestock yards from infiltration, assuming lots that are continuously filled with animals. Runoff beyond the fence line is more likely to infiltrate towards groundwater.

Runoff control systems can remedy such problem situations. These systems collect livestock yard runoff, settle out manure solids, and direct the remaining water to either a holding pond (Figure 1) or grassed areas or filter strips, away from streams, ditches, waterways and areas of permeable soils (Figure 2). A holding pond is the traditional runoff control system. More recently, Nebraska Department of Environmental Quality (NDEQ) is willing to consider grassed filter strips as an alternative to a holding pond.

Livestock manure and runoff control facilities are required by the Nebraska Environmental Protection Act for existing or proposed livestock operations when this manure and runoff violates surface and groundwater quality standards or discharge into the waters of Nebraska. Nebraska law states that it is the responsibility of the owner

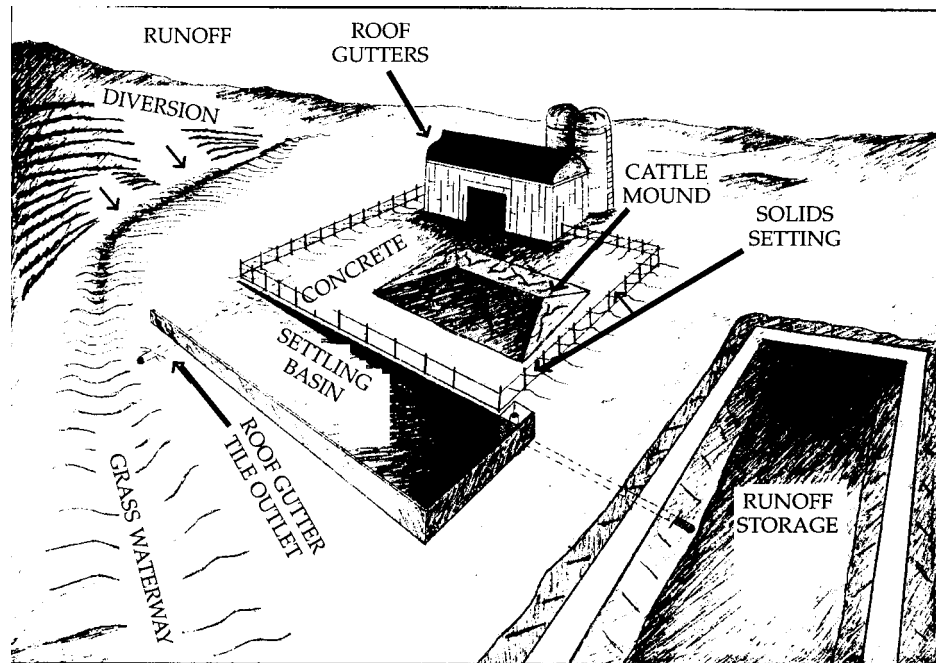


Figure 1. Typical livestock yard runoff management system based upon a holding pond.

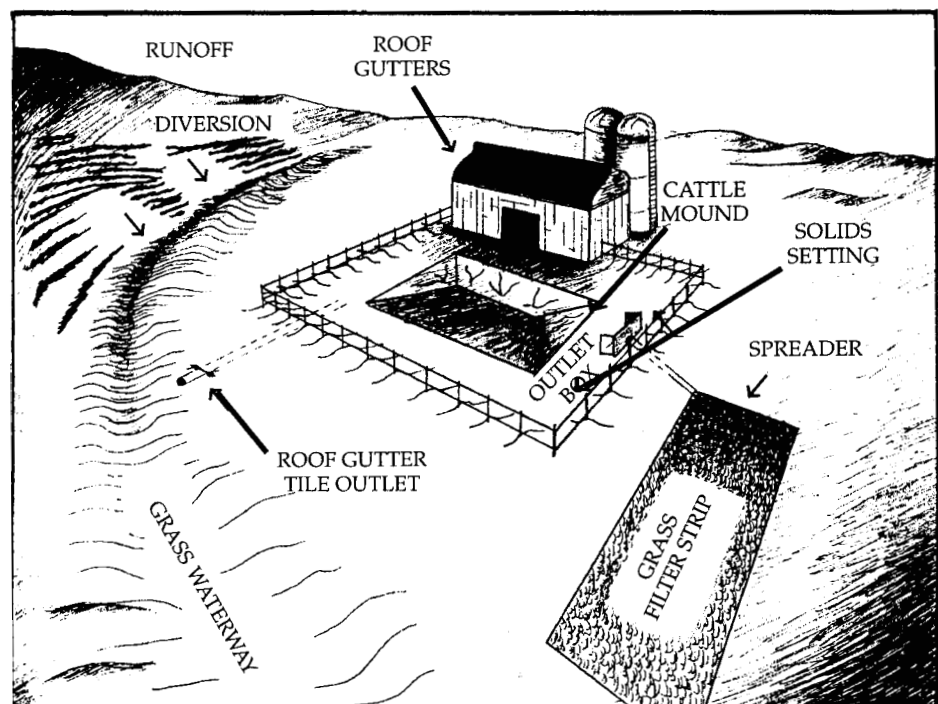


Figure 2. Typical livestock yard runoff management system based upon a grass filter strip.

or operator of any livestock operation, *regardless of size*, with a potential water pollution problem to contact the Department of Environmental Quality to determine if a storage or runoff control facility is required. Control facilities are defined as any structure or combination of structures used to control manure or runoff until it can be managed in a proper manner.

Control facilities may include:

- diversion terraces
- holding ponds
- debris basins
- liquid manure storage
- lagoons
- grass filter strips
- other devices utilized to control manure and runoff

If livestock manure or runoff control facilities are required by NDEQ they must be designed by a registered professional engineer or other qualified person according to NDEQ specifications.

NDEQ has two criteria for livestock manure control facility design. For open lots, the control facility must have sufficient capacity to contain all runoff from the drainage area which would result from a 25-year, 24-hour rainfall event plus June rainfall. This rainfall event ranges from 5.9 inches in southeastern Nebraska to 3.5 inches in western Nebraska. Surface drainage should be diverted around the livestock operation and the control facility to the maximum extent possible.

Some installations also may be required to maintain a current National Pollution Elimination Discharge System (NPDES) permit from the U.S. Environmental Protection Agency. Nebraska's Department of Environmental Quality also administers the NPDES permit.

5. Yard cleaning or scraping

Clean and maintain livestock yards regularly. In high density indoor facilities, once-a-day cleaning is preferable. For outdoor facilities, one cleaning per week is suggested. Beef feedlots may not find this schedule practical for outdoor facilities. More frequent cleaning around feed bunks and waterers is required for manure removal while frequency of scraping the remainder of the lot should be based on the need to maintain good drainage, prevent wet areas, and control dust.

Constantly saturated locations within a lot contribute to greater infiltration of water and potential groundwater contamination. Yard maintenance is required to maintain drainage and encourage drying of open lots. Maintaining graded lot surfaces that are free of potholes and wet spots and provide sufficient slope for adequate drainage reduces the potential for groundwater pollution.

6. Abandoned livestock yards

With active feedlots or yards, the layer of organic matter mixed with soil at the surface lies over compacted subsurface soil, forming a layer through which minimal water movement occurs. Therefore, the leaching of nitrate and bacteria through the sealed surface and compacted layers is not likely within an active livestock yard. Studies have found little nitrate in the soil beneath active feedlots.

Nevertheless, abandoned yards can pose a significant groundwater contamination risk. Cracks in the surface resulting from freezing and thawing and drying provide pathways for water and nitrates to leach beyond the root zone. Large accumulation of organic nitrogen (which will eventually be converted to nitrate-nitrogen) under abandoned lots pose a substantial risk.

If you have a permanently abandoned yard, remove the top 6 to 12 inches of manure and soil, spread the manure and soil combination on fields, and establish alfalfa or grass crop as soon as possible. Crop selection must be based upon the salinity level of the site and the tolerance of the alternative forages and crops. Additional information on this topic is available in *NebGuide G96-1293, Feedlot Abandonment*.



<p>CONTACTS AND REFERENCES</p> <p>Who to call about...</p> <p>Design assistance and technical standards for runoff control systems: Your local University of Nebraska Cooperative Extension office, Natural Resource Conservation Service, or Nebraska Department of Environmental Quality.</p> <p>Financial and technical assistance in remedying a risky situation: Your Natural Resource Conservation Service or local University of Nebraska Cooperative Extension office.</p> <p>What to read about...</p> <p>Publications are available from sources listed at the end of the reference section. (Refer to number in parentheses after each publication.)</p>	<p>Animal Management: <i>Water Quality and Requirements for Dairy Cattle.</i> NebGuide G93-1138. (1) <i>Nitrates in Livestock Feeding.</i> NebGuide G74-170. (1) <i>Mound Design for Feedlots.</i> NebGuide G73-66. (1) <i>Locating a New Feedlot.</i> NebGuide G73-65. (1)</p> <p>Management of livestock yards: <i>Manure Management for Open Lot Livestock Production.</i> (2) <i>Feedlot Abandonment.</i> NebGuide. G96-1293 (1) <i>Mound Design for Feedlots.</i> NebGuide G73-66. (1) <i>Locating a New Feedlot.</i> NebGuide G73-65. (1) <i>Beef Housing and Equipment Handbook.</i> MWPS-6. (2)</p> <p>Design criteria and general information: <i>Livestock Waste Facilities Handbook.</i> MWPS-18. (2) <i>Beef Housing and Equipment</i></p>	<p><i>Handbook.</i> MWPS-6. (2) <i>Sheep Housing and Equipment Handbook.</i> MWPS-3. (2) <i>Swine Housing and Equipment Handbook.</i> MWPS-8. (2) <i>Dairy Housing and Equipment Handbook.</i> MWPS-7. (2)</p> <p>Publications available from...</p> <p>1. Your local University of Nebraska Cooperative Extension office or directly from IANR Communications and Information Technology, University of Nebraska-Lincoln, 105 Ag Communications Building, P.O. Box 830918, Lincoln, NE 68583-0918, (402) 472-9713</p> <p>2. MWPS publications are available through your local University of Nebraska Cooperative Extension office or Agricultural Engineering Plan Service, University of Nebraska-Lincoln, 219A LW Chase Hall, P.O. Box 830727, Lincoln, NE 68583-0727, (402) 472-1646</p>
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