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Reducing the Risk of Surface and Ground Water Contamination by Improving Livestock Yards Management

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FARM •A• SYST
Farmstead Assessment System

Reducing the Risk of Surface and Ground Water Contamination by

Improving Livestock Yards Management

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In addition to reducing the potential of livestock yards to pollute surface and ground water, other good reasons for improving management practices include improved herd health, ease of maintenance and quality milk or meat production.

1. Distance from surface water or 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. Utah code does not specify a minimum separation distance between existing livestock yards and private wells, but they should be located as far apart as possible. With good farmstead planning, livestock facilities would be 300-400 feet from the house. Since the well is often near the house, it is likely that there would be more than 200 feet between the well and the livestock yard.

If irrigation ditches, canals or streams are near the livestock yard, contamination potential to surface waters can be high, especially if the land slopes toward the water source or is in close proximity to it. Runoff should be controlled so that it does not enter into a surface water source or well.

2. Site characteristics

Surface and ground water protection is a major consideration in siting a livestock yard, with soil characteristics being the most important factor. Important soil features include surface and subsoil texture, soil depth, permeability and drainage class. The best site has a deep clay soil. Next would be a 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 more assistance in assessing site's vulnerability to ground water contamination, see Worksheet # 9, *Site Evaluation.*)

For existing livestock yards on poor sites, the best options for protecting ground water might be eliminating the yard and using total confinement for the livestock or providing paved yards and liquid-tight basins to store yard runoff.

For glossary, see page 2 of Worksheet # 8

3. Clean water diversion

One way of reducing pollution from livestock yards is to construct and maintain structures to reduce the amount of clean water entering the yard.

•Waterways, small terraces and roof gutters can be used to 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

A livestock yard without a runoff control system typically has an earthen surface compacted by animal traffic. This surface is not shaped for water drainage, so it is sometimes dry and sometimes muddy. Manure typically accumulates on the surface, and decaying manure is mixed into the soil by animal traffic.

Water running off concrete pads located near barn doors and clean water from roofs and upslope areas can flush manure from the yard.

Such a yard is difficult to manage, and the absence of runoff controls may lead to water quality problems. Contaminated runoff from an active feedlot that accumulates in areas adjacent to the lot may percolate through the soil and threaten ground water quality or enter irrigation ditches, canals or streams. Ground water contamination risk is particularly high on sites with high infiltration and percolation rates, such as sandy soils or other soils with good drainage. Surface water contamination risk is high on sites that are close to surface water and are steeper than 3%.

Runoff control systems can help to remedy such problem situations. These systems collect livestock yard runoff, settle out manure solids and direct the remaining water to storage areas away from streams, ditches, waterways and areas of permeable soils and creviced bedrock. The collected runoff water can be used for land application at a later time when conditions are favorable for preventing surface or ground water contamination.

5. Yard cleaning or scraping

Clean livestock yards regularly. The amount of manure which accumulates on a livestock yard depends mainly on the number of animals and the hours per day animals spend on the lot. Cleaning and scraping at least once per week is preferable. Heavy concentrations of animals may require solids removal more often. Naturally, concrete surfaces are easier to clean than earthen lots. Earthen yards are cleaned when dry, so solids may be removed less frequently.

6. Type of yard surface

The minimum area required per animal for reducing the risk of ground water contamination depends on the type of lot surface. The amount of concrete surface area needed is much less than that required for an earthen lot.

The concrete area needed is a balance between traffic on the lot and resting area provided for animals. Too large an area results in manure freezing to the surface for long periods, while too small an area results in animals having difficulty moving about.

For dairy operations, the greatest protection for ground water is provided by confining animals to a free-stall barn or roofed yard. Where a yard is needed, 75 square feet of fenced concrete per cow is recommended, or 400 square feet of earthen surface. If an exercise area is desired, it should provide roughly 2,000 square feet. Direct runoff water carefully from the concrete or the earthen area into a storage facility. Curbs should be used to keep runoff from flowing off the edges of the concrete lot while ditches may be sufficient for an earthen lot.

Yard management involves considerations other than ground and surface water protection. A combination of yard surfaces can offer the most flexibility in adapting to weather conditions. Livestock location can be chosen based on the amount of mud in the yard: on concrete in sloppy conditions, on an earthen surface in dry weather, and on a mound in intermediate conditions.

The type of surface also affects management. Earthen yards, for example, might be cleaned only once or twice per year.

If bedrock or clean gravel or sands are close to the surface where your livestock yard is located, pave the surface with concrete, or totally confine livestock.

7. Livestock storage and manure utilization

In addition to the condition of your livestock yards, your farm animal manure management plan should consider manure storage and utilization. (Worksheet and Fact Sheet #7: *Livestock Manure Storage and Utilization* provide guidelines for minimizing impact on surface and ground water.)

Animal manure can be a valuable nutrient source and soil conditioner. When managed properly, the nutrients in manure can be substituted for commercial fertilizers, saving money and protecting both ground water and surface water. Matching nutrient applications to crop nutrient needs is critical.

8. 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 water moves very slowly. Therefore, leaching of nitrate and bacteria through the surface seal and compacted layers is not likely within the livestock yard. If livestock yard runoff is discharged to permeable soils or bedrock, leaching may occur. Studies have found little nitrate in the soil of active feedlots.

Nevertheless, abandoned yards can pose a significant risk of ground water contamination. As the manure pack breaks up from lack of use, water can leach through and reach ground water.

If you have a permanently abandoned yard, dig it up, spread the manure and soil combination on fields, and refill the former yard with other material. Another option is to till and plant the yard to a high-

nitrogen-using crop, which will consume most of the available nitrogen released by soil and the manure decomposition process. It is also a good practice to remove manure from a feedlot that will not be used for an extended period. Otherwise, cracks developing in the surface may allow leaching of nitrates and other compounds.

CONTACTS AND REFERENCES

Who to call about . . .

Design and technical standards for runoff control systems

Your local office of the USDA Natural Resources Conservation Service.

Financial and technical assistance in remedying a risky situation

Your local offices of the USDA Farm Service Agency and the USDA Natural Resources Conservation Service.

What to read about . . .

Publications are available from sources listed at the end of the reference section. (Refer to number in parentheses after each publication.)

Design criteria and general information

Beef Housing and Equipment Handbook. Midwest Plan Service. MWPS-6 (1)
Sheep Housing and Equipment Handbook. Midwest Plan Service. MWPS-3. (1)
Swine Housing and Equipment Handbook. Midwest Plan Service. MWPS-8. (1)
Dairy Housing and Equipment Handbook. Midwest Plan Service. MWPS-7. (1)
Livestock Waste Facilities Handbook. Midwest Plan Service. MWPS-18. (1)
Agricultural Waste Management Field Handbook. 1996. United States Department of Agriculture Natural Resources Conservation Service. (2)

Publications available from...

1. MidWest Plan Service, Ag and Biosystems, Engineering Extension, 207 Davidson Hall, Ames, IA 50011-3080. (515-294-6361. FAX (515-294-6361. Email: mwps@iastate.edu.

2. Local offices of the USDA Natural Resources Conservation Service

Internet sites . . .

Utah NRCS Web Site: (http://www.ut.nres.usda.gov)

USU Extension Water Quality Web Site: Farm A Syst and Home A Syst (http://www.ext.usu.edu/natres/wq/a-syst.htm)

Utah Department of Agriculture and Food, Concentrated Animal Feeding Operations (http://www.ag.state.ut.us/divisns/mkt&cons/cafo.htm)

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