Fact Sheet #8

Reducing the Risk of Groundwater Contamination by

Improving Livestock Yards Management

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Besides addressing the potential of livestock yards to pollute groundwater, other good reasons for improving management practices include improved herd health, ease of maintenance and quality milk or meat production.

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 New Mexico Water Supply Regulations require a minimum separation from existing livestock yards of 100 feet for new private wells, and 200 feet for new public wells. 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.

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

If groundwater protection is a major consideration in siting a livestock yard, soil characteristics are the most important factor. Important soil characteristics include surface and subsoil texture, soil depth, permeability and drainage class. The best site 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 more assistance in assessing your site's vulnerability to groundwater contamination, see Worksheet #11, *Site Evaluation.*)

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

3. Clean water diversion

One way of reducing water pollution from livestock yards is to reduce the amount of clean water entering the yard. In all cases, these structures need to be maintained.

For glossary, see Worksheet #8.

- Waterways, small terraces and roof gutters 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

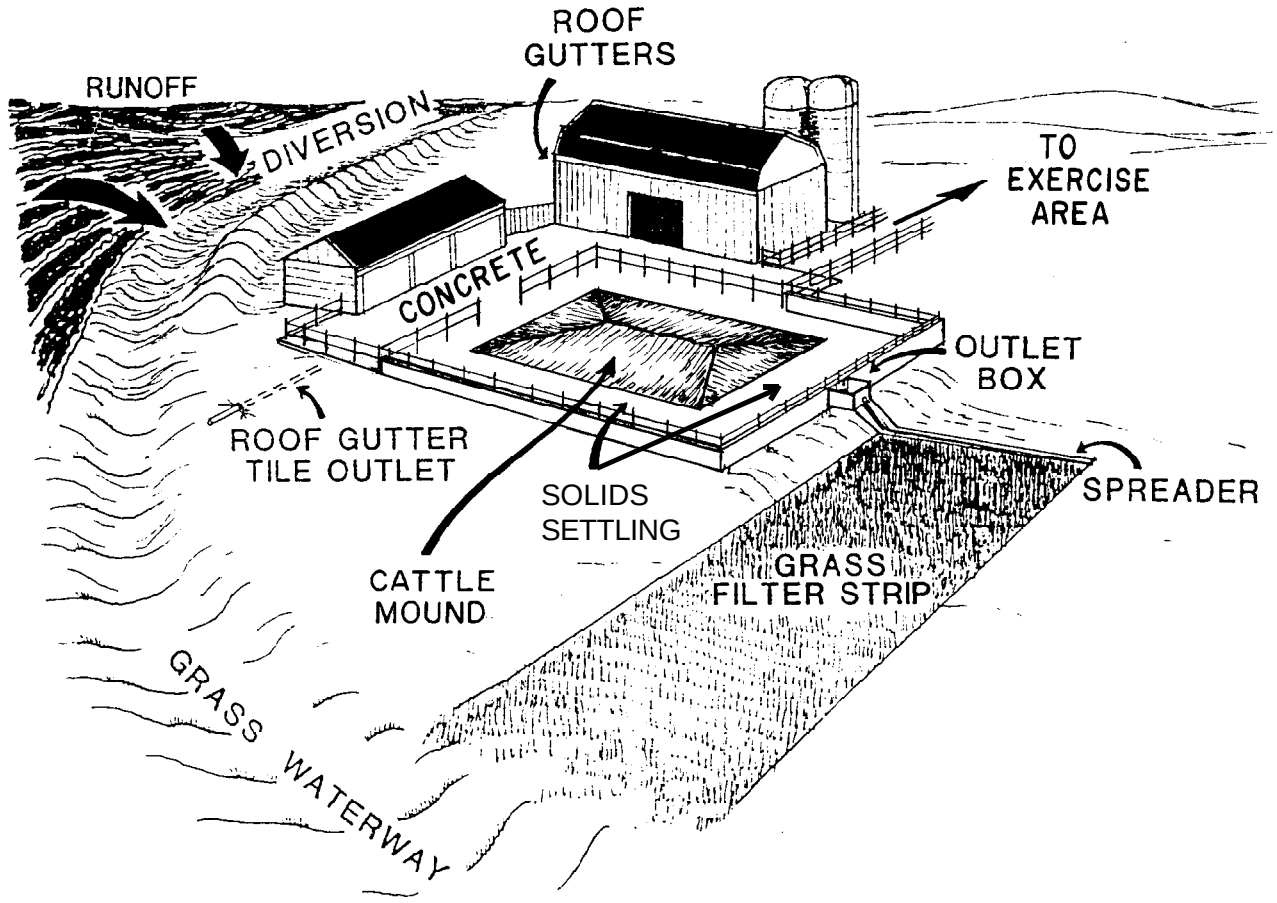
A livestock yard without a runoff control system typically has an earthen surface compacted by animal traffic. This surface is not shaped for water drainage, so it is sometimes dry and sometimes muddy. Manure typically accumulates on the surface, and decaying manure is mixed into the soil by animal traffic.

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

> 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 flow through the soil and threaten groundwater quality. This risk is particularly high on sites with high infiltration and percolation rates, such as sandy soils and other soils with good to moderate drainage.

Runoff control systems can remedy such problem situations. These systems collect livestock yard runoff, settle out manure solids, and direct the remaining water to open fields or filter strips, away from streams, ditches, waterways and areas of permeable soils and creviced bedrock. Another option is to collect and store runoff for later land application. Figure 1 shows some options for controlling livestock yard runoff.

Figure 1: Livestock Yard Runoff Management Options



Adapted from Barnyard Runoff Management, Wisconsin Department of Natural Resources and Department of Agriculture, Trade and Consumer Protection, 1987. Adapted by Leonard Massie, with graphic assistance by Andy Hopfensperger, University of Wisconsin-Madison Department of Agricultural Engineering.

5. Concentration of animals and type of yard surface

The area needed per animal for minimizing the risk of groundwater 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 will result in animals having difficulty moving about.

For dairy operations, the best protection for groundwater is to confine animals to a free-stall barn or roofed yard. Where a yard is needed, 75 square feet of fenced concrete per cow is recommended (400 square feet of earthen surface) and roughly 2000 square feet of exercise area, if one is used. Direct runoff water carefully from the concrete onto the earthen area. Curbs will keep runoff from flowing off the edges of the concrete lot.

Yard management involves considerations other than surface and groundwater 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 and animal concentration also affect management decisions. The amount of manure on a livestock yard depends on the number of animals and the hours per day animals spend on the lot. Cleaning and scraping at least once a week is perferable. Heavy concentrations of animals may require solids removal more often. Concrete surfaces are easier to clean than earthen lots, which may only be cleaned when dry.

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

6. Livestock storage and waste utilization

In addition to the condition of your livestock yards, your farm animal waste management should consider waste storage and utilization. (Worksheet and Fact Sheet #7, *Livestock Waste Storage*, provide guidelines for minimizing impact on groundwater.)

Ranging should be part of a crop rotation. Crop production on rangelands is designed to remove accumulated nutrients. High nutrient concentrations that are possible from poultry make this especially important.

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

7. 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 particular groundwater contamination risk. As the manure pack breaks up from lack of use, water can leach through and reach the groundwater.

If you have a permanently abandoned earthen 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 use the nitrogen released by soil and the manure decomposition process. 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.

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