

Managing Livestock Holding Pens to Protect Groundwater

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Open lots and holding pens for feeding or holding livestock contain animal manure and process-generated wastewater, which contain nitrate and bacteria. These materials can contaminate groundwater, especially if there is no system to:

- Divert clean water away from an open lot or feed yard
- Drain water away from the water well
- Collect wastewater in a retention control structure (also known as a storage basin or lagoon)

Groundwater is the underground water that replenishes wells and springs. It is the source of drinking water for many Texans. Millions of gallons of groundwater may be located under the typical acreage, farm, or ranch.

Potential sources of pollution of this water include fuel tanks, livestock pens, septic systems, and storage areas for fertilizers, manure, pesticides, and wastewater.

The management decisions you make on your property can significantly affect

the quality of your drinking water and your family's health. They can also affect your potential legal liability and property value.

Several factors can allow contaminants in livestock manure and wastewater to pollute groundwater: an area of animals concentrated over coarse-textured permeable soils; a water table at or near the surface; fractured bedrock within a few feet of the surface; or polluted runoff discharged to permeable soils and bedrock.

An animal feeding operation is a lot or facility where animals are held and fed for a total of 45 days or more in any 12-month period. Any feeding operation can be categorized as a concentrated animal feeding operation (CAFO) if it contributes a significant amount of pollution to water resources.

To operate, a CAFO must have a permit from the Texas Commission on Environmental Quality (TCEQ). A CAFO is defined based on the type and number of animals on the site. If you have more than

Table 1. Questions to help landowners determine whether the contaminants from livestock feeding and holding pens may be threatening their well water.

YES	NO	QUESTIONS
<input type="checkbox"/>	<input type="checkbox"/>	1. Do you have a livestock operation within 150 feet of a water well?
<input type="checkbox"/>	<input type="checkbox"/>	2. Is your livestock facility on a site that has shallow soil or a high water table?
<input type="checkbox"/>	<input type="checkbox"/>	3. Do you have pens or open lots where surface and roof water runs through the yard?
<input type="checkbox"/>	<input type="checkbox"/>	4. Is the runoff from your livestock yard uncontrolled?
<input type="checkbox"/>	<input type="checkbox"/>	5. Are your pesticide storage and mixing areas upslope or less than 150 feet downslope from your drinking water well?
<input type="checkbox"/>	<input type="checkbox"/>	6. Are your livestock holding facilities overstocked?
<input type="checkbox"/>	<input type="checkbox"/>	7. Does your manure and wastewater management plan focus only on disposal and not on efficient use of the resource that manure nutrients offer?
<input type="checkbox"/>	<input type="checkbox"/>	8. Do you have any abandoned livestock yards on your property?

300 head of beef cattle, 200 head of dairy cattle, or 150 horses, contact the TCEQ to determine whether you need a water-quality protection permit. The requirements may differ by county. For example, Bosque, Comanche, Erath, Hamilton, Hopkins, Johnson, Rains, and Wood Counties are more restrictive in the number of livestock permitted on site.

Texas water law requires that a water wellhead be at least a 150 feet from any feeding operation, livestock yard, or manure storage and use area. In addition, management practices must be implemented to further reduce the risk of transporting contaminants.

The questions in Table 1 may help you identify potential risks associated with livestock feeding and holding pens. Many of these situations can lead to contamination of your drinking water.

If you answer *yes* or do not know the answer to any question, you may have a high-risk situation on the property. Information on how to address each question follows.

1. Do you have a livestock operation within 150 feet of a water well?

To prevent runoff from draining into the well area, water wells should be upslope from the livestock yard. New wells should be at least 150 feet from a livestock yard.

Minimum separation distances apply legally to new well installations and to existing wells and new sources of contamination. Existing wells must meet only the separation requirements that were in effect at the time of construction.

However, make every effort to meet current regulations whenever possible because current regulations are based on more recent findings concerning well water contamination.

2. Is your livestock facility located on a site that has shallow soil or a high water table?

Groundwater protection is a major consideration in choosing a site for a livestock yard. The most important factors to consider are the soil characteristics—its depth, drainage, surface and subsoil texture, and permeability (ability of water to flow through it):

- **Best** sites have deep, well-drained silt-loam/clay-loam soil with low permeability.
- **Good** sites prevent contaminants from moving quickly to surface water and groundwater.
- **Poor** sites encourage leaching (the movement of contaminants with water through the soil).
- **Very poor** sites have shallow soil and a high water table, or very sandy/gravelly soil with excessive drainage and high permeability.

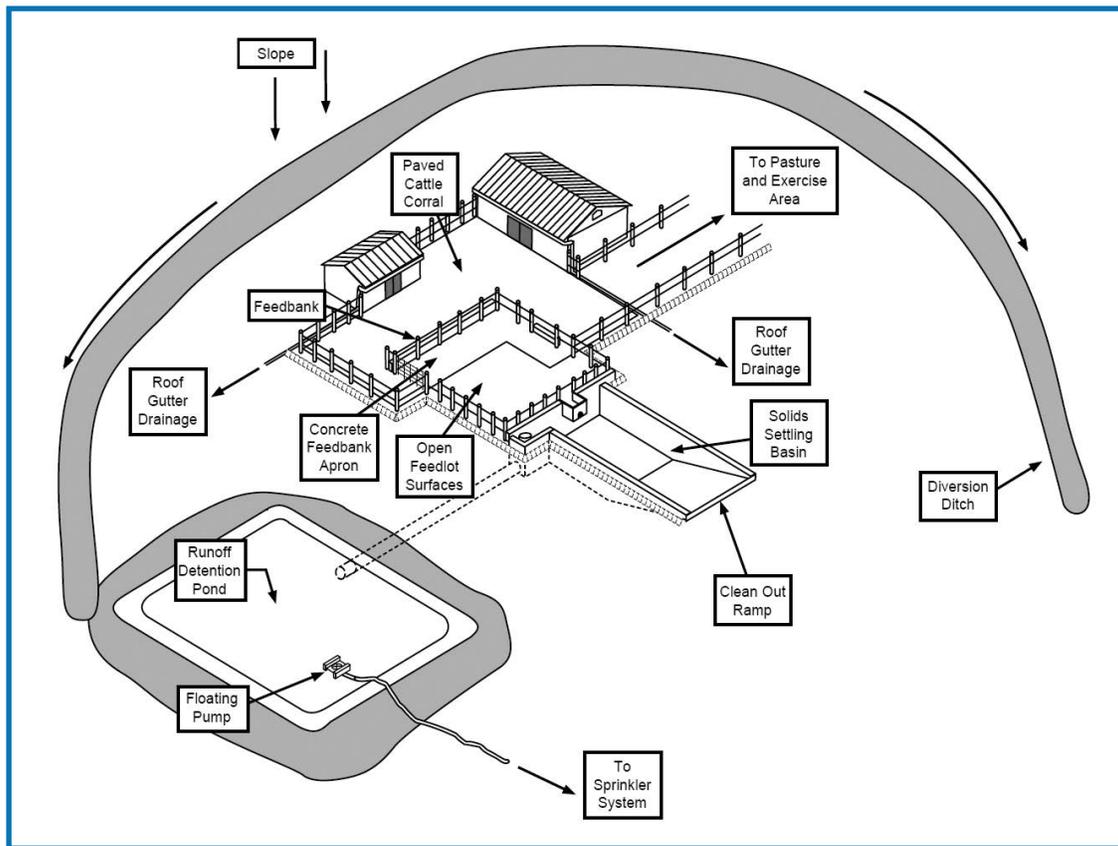


Figure 1. A runoff management system for a small livestock yard.

3. Do you have pens or open lots where surface and roof water runs through the yard?

One way to reduce water pollution from livestock yards is to limit the amount of clean water entering the yard. Several structures can help keep water out of the yard:

- Roof gutters, waterways, or small terraces
- An earthen ridge or diversion terrace built upslope from the yard
- If a diversion terrace is impractical, a catch basin with a pipe outlet installed above the livestock yard

4. Is the runoff from your livestock yard uncontrolled?

Contaminated runoff from an active feedlot may leach and threaten groundwater quality, especially on gravelly, sandy, or coarse-textured soils. Collect and store the runoff from holding pens until you can apply it to land at an appropriate rate.

Many operations install runoff control systems, which collect feedlot runoff, settle out manure solids, and direct the remaining runoff water to detention

ponds. Figure 1 illustrates a control system for an open lot surface.

All operations with more than 300 head of beef cattle or 200 head of dairy cattle should install a no-discharge system (holding pond and irrigation system), and all producers are advised to do so regardless of the operation's size.

5. Is your livestock yard cleaned and scraped less than once a week?

Clean and scrape the livestock yard regularly; at least once a week is best. Pens with heavy concentrations of animals may need to be cleaned more often.

Concrete surfaces are easier to clean than are earthen lots. To avoid scraping off the top layers of the soil base, wait to clean earthen yards until they are dry. Earthen yards might be cleaned only once or twice per year.

A tractor-drawn box scraper collects manure while leaving a well-graded, uniform manure surface that sheds water and dries out quickly.

6. Are your livestock holding facilities overstocked?

Using a combination of yard surfaces will offer the most flexibility in adjusting to weather conditions. You can move the livestock according to the condition of the yard surface—on concrete in wet conditions and on an earthen surface in dry weather.

Because concrete dries faster, it needs much less surface area than do earthen lots. To determine the size of the concrete surface area, balance the needs for traffic on the lot with resting area for the animals.

Pave the surface if porous soils or fractured bedrock are close to the surface of your livestock yard.

7. Does your manure and wastewater management plan focus only on disposal and not on efficient use of the resource that manure nutrients offer?

A manure management plan should consider the storage of manure and process-generated wastewater for use as fertilizer. For more information, see *Animal Manure Storage to Protect Groundwater*, available from the Texas A&M AgriLife Bookstore at <https://www.agrilifebookstore.org/>.

Collect the runoff from holding pens and manure from pad cleaning for future land application. Apply the nitrogen and other nutrients in these materials to meet crop needs.

When managed properly, the nutrients in manure can be substituted for commercial fertilizers to save money and protect water resources. Have the soil, manure, and effluent tested to determine the appropriate application rates.

8. Do you have any abandoned livestock yards on your property?

In active feedlots or yards, the surface layer of manure mixed with soil covers another layer of compacted soil through which water moves very slowly. Nitrate and bacteria are unlikely to leach through the surface seal to groundwater beneath the yard.

However, contaminants may leach from abandoned yards as the manure pack breaks up from lack of traffic. If you have a permanently abandoned yard:

1. Collect all the manure on the surface and 3 to 6 inches of the soil underneath.
2. Spread the manure and soil combination on fields at an appropriate rate based on plant nutrient needs and soil and manure test results.

3. Refill the former yard with clean soil.
4. Till and plant the yard with a crop that consumes a large amount of nitrogen.

Also remove manure from a feedlot that will not be used for an extended period. Otherwise, cracks may develop on the surface and allow leaching.

Contaminants may be odorless, tasteless, and invisible to the naked eye, yet still be present in well water. Annual testing of your water well is recommended, and analysis for specific constituents should be undertaken whenever you suspect water quality has been compromised.

Any significant surface water or groundwater contamination can result in an imposed fine by the TCEQ and could require corrective measures. Contact the local Natural Resources Conservation Service office or your county Extension agent for information about local ordinances, state regulations, and other pertinent matters.

Summary

The following management practices help to reduce the risk of groundwater contamination by livestock yards:

- Locate your livestock yard at least 150 feet downslope from any water well.
- Choose a site for your yard based on soil characteristics—depth, permeability, texture, and drainage capacity.
- If your soil drains excessively or is highly permeable, pave the yard or relocate the operation.
- Divert clean rainwater away from the yard with gutters, waterways, terraces, or catch basins.
- Capture and store water that has moved through the yard for land application according to appropriate rates.
- Clean the livestock yard regularly.
- If fractured bedrock is near the ground surface, pave the yard.
- Collect animal manure and wastewater for application to fields at rates based on the results of soil, manure, and effluent tests.
- At permanently abandoned yards, remove the manure and surface 3 to 6 inches of soil and apply the mixture to fields. Refill the old yard with clean soil and plant a crop.
- Remove any manure from a yard that will not be used for a while and apply it to the land at recommended agronomic rates.

For more information

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Texas Ground Water Protection Committee: <http://www.tgpc.state.tx.us/index.php>.

Texas Well Owner Network: Texas Well Owner's Guide to Water Supply. By K. Uhlman, D. Boellstorff, M. L. McFarland, B. Clayton, and J. W. Smith. 2013. Texas A&M AgriLife Extension publication B-6257, 96 pp.

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Texas Well Owner Network: <http://twon.tamu.edu/>.

USDA–Natural Resources Conservation Service 101 South Main, Temple, TX 76501. Phone: 254.742.9800. <http://www.tx.nrcs.usda.gov/contact/>.

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