A Guide to Good Horsekeeping
Federal Clean Water Act of 1972

Texas Commission on Environmental Quality Testing

Texas Water Quality Inventory and 303(d) List

Total Maximum Daily Load Program

Implementation Plan
Categories of Water Pollution

Point Source

Nonpoint Source
Copano Bay Watershed

ARANSAS

GOLIAD

BEE

REFUGIO

SAN PATRICIO

Source: Texas Commission on Environmental Quality
Fecal Coliform Bacteria

Don’t worry, they are **NOT** bad, and you actually could not live without them!

However, they **DO** indicate fecal contamination of the water.

*Indicator Organisms*
Fecal Coliform Standards for Water Body Classifications

- 14 cfu per 100 mL/water (Oyster Harvesting)
- 200 cfu per 100 mL/water (Contact Recreation)
- 2000 cfu per 100 mL/water (Non-Contact Recreation)
Why not just test for the pathogenic microorganisms?
Humans, cattle, horses, wildlife, and migrating waterfowl are contributors.
Community Involvement

- Ensure state government considers local perspective
- Promote accountability
- Improve quality/quantity of contributions
- Reduce probability that one group will dominate the process
- Lead to voluntary actions to decrease pollution
FEEDING MANAGEMENT
MINIMIZE WASTE

SAVE MONEY

↓ Don’t overfeed your horse
↓ Occasionally observe eating habits
↓ Keep a close eye on Body Condition Score
↓ Feed at least the minimum forage requirement
56 lbs
10 tons

MANURE MANAGEMENT
## Potential Effects of Contaminants

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrate</td>
<td>Health</td>
</tr>
<tr>
<td>Ammonia</td>
<td>Fish Kills</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>Algae Blooms</td>
</tr>
<tr>
<td>Bacteria</td>
<td>Health</td>
</tr>
<tr>
<td>Organic</td>
<td>O$_2$ Depletion</td>
</tr>
</tbody>
</table>
**COMPOST**

- Kills internal parasites, bacteria, and fungi
- Discourages pest colonization
- Kills weed seeds
- Reduces manure volume up to 50%
- Manure from one horse is equivalent to about $150 worth of fertilizer
Aerate
Moisturize
REMOVE

$ Easy
$ Expensive
SPREAD FRESH ON PASTURE

- Parasite eggs, bacteria, and viruses distributed
- Nitrogen depletion of soil when bedding broken down by microorganisms
- Extremely heavy application will kill forage
- Inadequate acreage for spreading
- Introduces weed seeds to your pasture
If horses are kept exclusively on pasture, periodically break up manure piles.
PASTURE MANAGEMENT
USE YOUR PASTURES AS MORE THAN A TURNOUT!

- Reduces hay costs by $60-100 per month
- Reduces fertilizer costs
- Aesthetically pleasing
- Less time spent cleaning stalls
- Reduces bedding costs

- Reduce erosion
- Nutrient recycling
- Groundwater recharge
- Filter surface water runoff
- Control dust and odor
THE SACRIFICE LOT
GRASS HEIGHT

Graze: 6-8 in.
Remove: 1.5-2 in.
OTHER CONSIDERATIONS

- Get a soil evaluation before doing anything else!
- Identify and control weeds early!
- Use a rotational grazing system!
- Choose proper species for your soil/climate!
I'M GONNA MAKE MY OWN SHAVINGS!!
“Keep Clean Water Clean”

Proper Building Sites

Gutter Systems

Natural Filters

Rainwater Harvesting
Making Every Drop Count

Installing a rainwater harvesting system can be more cost-effective than drilling a well.

Both sides of the roof are guttered. The first rainwater caught fills the groundspout pipe, shown here. In catch sediment and debris before starting to fill the water storage tanks. The downspout has a cap on the end to release the water with the debris each time after it rains. (Note) This simple system filters the water for drinking and then pumps it through existing water lines.

Looking for a new water source for the livestock at your barn? Look up. Horse owners confronted with a water shortage, or those just looking for an alternative water supply, might have an economical solution right at their barn. The roof, a horse barn or covered arena makes an excellent catchment system to harvest rainfall. The rain that falls on the roof eventually flows to storage tanks via gutters and PVC pipe, where it can be used as part of existing water lines. In most cases, installing a rainwater harvesting system is more cost-effective than drilling a well, and rainwater is superior in water quality.

While the installation of water catchment systems has really taken off in the past few years, the idea of catching rainwater is actually a return to our roots. For centuries before municipal water supplies and advanced well-drilling techniques existed, people relied on the rainwater they caught for household, garden and livestock needs. In areas where water was scarce, many early pioneers built homes with a cistern to catch runoff from their roofs.

Houstoria, Texas-based horse trainer Chris Littlefield installed a rainwater harvesting system at his barn last summer when his existing water well couldn’t keep up with livestock and household demands. “I thought about drilling another well,” Littlefield said. “But it was going to be expensive, and even if we did hit water, it didn’t look like I would get much better results than I had with my existing well.”

Someone suggested putting gutters on the roof of his horse barn to catch the rainwater. After looking into it a little further, he decided the roof of his stall barn might just be the perfect receptacle for the 30 inches of rain that fall in an average year at his north-central Texas location.

Barns and covered arenas make an excellent choice for a water catchment system because of their large roof size. For every inch of rain that falls, a rainwater harvesting system can collect approximately 0.62 gallons of water per square foot of roof area. However, there is always some loss due to first flush, evaporation, splash-out, overflow from gutters and possible leaks. Most users experience an 85 percent efficiency rate. Using these calculations, if a one-inch rain fall on a 10,000-square-foot roof, approximately 5,270 gallons could be captured and stored (10,000 x .62 x .85).

A typical rainwater harvesting system will generally cost between $8,000 and $10,000, depending on how many storage tanks you install. The single largest cost in a rainwater harvesting system is the storage tank. The cost of a tank depends on its size and construction material. On a per-gallon basis, this cost can range from about $50 for a fiberglass tank to more than $4 for a welded steel tank. Other components such as gutters, downspouts, pumps, filter system and pressure tanks will add to the cost of the system.

An advantage of this type of system over a well is that it can be installed or expanded on a “pay as you build” basis. When Littlefield first had his system installed, he only had four 3,000-gallon fiberglass storage tanks installed next to his barn. He has since added two more storage tanks and now has the capability of storing 18,000 gallons of water. The roof’s drainage area is a little over 3,000 feet, allowing Littlefield to capture nearly 100,000 gallons of water in a year with average rainfall. He tied the rainwater system into existing lines at his barn and uses the rainwater primarily at the barn, while his well serves household needs. However, he does have the ability to switch the rainwater to the house if necessary, or switch back to using well water in his entire watering system. The rainwater is rendered safe for human consumption through a relatively simple filtration process, using sand and charcoal filters that Littlefield replaces on a regular basis.

“The security and flexibility this system provides have been the biggest advantages I’ve seen,” Littlefield said. “It has also helped me expand my horse capacity, which was limited using only well water.”

The tanks storing the rainwater can be buried or left above ground. Most tanks are above ground, making it easy to expand them if necessary. While aesthetically pleasing, in-ground storage tanks tend to be more expensive than above-ground tanks. Screens can be installed on the gutters to prevent large debris and sediments from entering the storage tank. Pumps are installed to force overflow water through the filtration system and to supply adequate pressure. A pressure tank reserves enough water to provide adequate pressure to the building and retains a large enough volume to prevent the pump from running excessively.

Some states and homeowners’ associations have building codes that must be adhered to when developing a rainwater catchment system. Also, some states consider rainwater harvesting a water management strategy that has to be considered by regional water planning groups for their plans. So before you have one installed, be sure to check any local or state laws and codes regarding rainwater catchment systems.

You are interested in installing a rainwater harvesting system at your barn, visit the American Rainwater Catchment Systems Association Web site, www.arcas.org or the Texas AgriLife Extension Web site at http://rainwaterharvesting.tamu.edu.

Reach Deen Ann Littlefield at raclittle@tamu.edu.
One inch of rain can result in 1200 gallons of water off of a 2000 square foot roof.
For the small acreage landowner...

Proper management is the most critical.
Your role as an agricultural ambassador.
HELP!

Texas AgriLife County Extension Agents
Natural Resources Conservation Service
Soil and Water Conservation Districts
Texas State Soil and Water Conservation Board
Related Research Projects

- Effect of grazing practices on the number of bacteria in surface water run off.
- Cattle grazing behavior in the watershed
- Bacteria Source Tracking for feral hog contribution to contamination
- Ongoing Bacterial Testing
Effect of Grazing Practices on Bacteria in Run-off
Cattle Grazing Behavior in the Watershed
Ongoing Bacterial Testing
Do you practice any of the following?

**Manure Management**
- Composted
- Hauled Away

**Pasture Management**
- Soil Evaluation
- Weed Control
- Sacrifice Lot
- Rotational Grazing
- Mowing
- Dragging

**Facilities Management**
- Rainwater Harvesting
- Rain Gardens
- Vegetative Buffer Strips
http://copanobay-wq.tamu.edu/

Hosted by Texas Water Resources Institute