



A Guide to Good Horsekeeping

**Benefits for your horses,
your land, and you**

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January 14, 2008

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Texas Water Resources Institute Publication EM-107, Published December 2010

Forward

This informational booklet is meant to give owners and managers an overview of the importance of different management strategies concerning the impact horse operations have on watersheds. There are various publications in existence that are how-to guides and these more in depth articles and web sites are listed at the end of this booklet for those wishing to obtain more information on any particular topic.

Funding

The development of this publication was funded through a Clean Water Act §319(h) Nonpoint Source grant from the Texas State Soil and Water Conservation Board and the U.S. Environmental Protection Agency.

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Introduction

A wealth of knowledge exists regarding management of agricultural livestock, a category that includes horses in Texas. However, horses for the most part, are in a category that is neither livestock nor companion animal. Therefore, owners are left without access to the educational library traditional livestock operations use and they turn to companion animal information sources. While important, these sources tend to focus on management of the horse itself and not the land on which they are kept. This guide is intended to highlight issues often overlooked by horse owners (from breeding operations to horses kept for pleasure) and give them a choice of best management practices to decrease their impact on natural resources. For those interested in any particular best management practice, additional internet resources are listed at the end of each chapter with more detailed information on implementation.

A good percentage of people who involve themselves with horses do not start as professional horsemen and horsewomen. They start as parents granting the wish of their children, as adults who have access to discretionary income, or as absentee owners who invest in the industry. Horse ownership mandates a unique set of management solutions of which people who just loaded their first purchase in the trailer may not be aware.

Horse owners need to become proficient in the following list to do the best they can for their animals and the land they manage. Knowledge of these topics is important because horses kept for work or pleasure are not always the “free ranging” animal of the plains where they evolved. They are often kept in a restricted area, pasture, or pen where they can develop digestive and behavioral disorders, concentrate manure, degrade pasture quality, and can impact surrounding ecological areas and watersheds if care is not taken.



History of Water Quality Awareness

Water quality impacts all aspects of our lives including health, recreation, community, and industry. In Texas, the largest percentage of our water bodies are impaired due to excessive levels of bacteria. According to the Texas Commission on Environmental Quality (TCEQ) 2008 303(d) List, 57 percent of impaired waters in the state are due to fecal coliform bacteria. These bacteria naturally live in the digestive systems of all warm-blooded animals and are used as indicator organisms for fecal contamination of water bodies. Since horses are warm-blooded animals, mismanagement of a horse operation can have a potentially negative impact on surface water quality.

It is not only interesting, but important to be aware of the types of water pollution and the steps that have led us to the point where we have become specifically aware of their effects on surface water quality. The following information will raise awareness of how land management practices affect surface water quality.

Types of Water Pollution

There are two basic sources of water pollution: point source and nonpoint source.

Point Source Pollution

Point source pollution is the easiest to identify and address as it comes from a specific identifiable point. Examples of point sources are known facilities such as wastewater treatment facilities (WWTF), concentrated animal feeding operations (CAFO), and industry. These types of sources are usually heavily regulated and monitored by the U.S. Environmental Protection Agency (EPA) and TCEQ to prevent or severely reduce pollutants that are released into the environment.

Nonpoint Source Pollution (NPS)

The other type of pollution is nonpoint source pollution (NPS), which is a mix of urban and rural runoff containing roadway contaminants, lawn debris, chemicals, fertilizer, and manure. Usually NPS pollution becomes an issue after rainfall, as these pollutants are washed into water bodies by downpours. Due to its nature, NPS pollution is much more difficult to deal with as it originates from many different sources and poses varying levels of potential contaminants. A significant NPS pollution concern in Texas is bacteria from fecal contamination.

Federal Clean Water Act

The Federal Clean Water Act (CWA) was enacted in 1972 and has been amended several times. To regulate the discharge of pollutants into our waters, the act requires the implementation of pollution control programs, sets water quality standards for contaminants in surface water, and requires regulatory permits to discharge effluent from a point source. EPA is charged with implementing the CWA across the nation. In Texas, EPA has delegated the implementation of many components of the CWA to TCEQ. The CWA requires states to identify lakes, rivers, streams, and estuaries failing to meet or





Potential Sources of NPS Pollution: oil residues, horse manure, fertilizer

not expected to meet water quality standards and not supporting their designated uses (swimming, drinking, aquatic life, etc.). This list of impaired water bodies is known as the 303(d) list and must be submitted to the EPA for review and approval every two years.

Total Maximum Daily Load Program

The state must establish a Total Maximum Daily Load (TMDL) for certain water bodies identified on the 303(d) list. A TMDL defines the maximum amount of a pollutant that a water body can assimilate on a daily basis and still meet water quality standards. The pollution reduction goal set by a TMDL is necessary to restore attainment of the designated use of the impaired water body. The maximum amount of a pollutant is determined by conducting a detailed water quality assessment that provides the information for a TMDL to allocate pollutant loads between point sources and nonpoint sources. It also takes into account a margin of safety, which reflects uncertainty and future growth.

Based on the environmental target of a TMDL, an Implementation Plan (I-Plan) is then developed that prescribes the measures necessary to mitigate anthropogenic (human-caused) sources of the pollutant in that water body. The I-Plan specifies limits for point source dischargers and recommends best management practices (BMPs) for nonpoint sources. It also lays out a schedule for implementation. Together, the TMDL and the I-Plan serve as the mechanism to reduce the pollutant, restore the full use of the water body and remove it from the 303(d) list. EPA must approve the TMDL, but the I-Plan only requires state approval.

Water Quality Standards

Every two years TCEQ evaluates data on the quality of all water bodies in the state of Texas. In 2008, 925 bodies of water were assessed and 516 were impaired and placed on the *2008 Texas Water Quality Inventory and 303(d) List*. This list names impairments and levels of contaminants for any water body not meeting water quality standards.

Criteria for water bodies are based on contact and noncontact recreation, domestic water supply, oyster harvest, and aquatic life. The number of indicator organisms, which are usually harmless bacteria found in fecal matter, are measured periodically, and if found in sufficient numbers, the water body



will be placed on the 303(d) list. Because of differences in the ability of bacteria to survive in fresh water versus saltwater, different bacteria are used as standards for fresh and salt water. *Enterococcus* has the ability to survive in a saline environment and therefore is used as a saltwater indicator organism. *E. coli* are more susceptible in a saline environment, therefore are used as freshwater indicators. Oyster harvesting waters are treated differently because oysters are filter feeders and concentrate any contaminant in the water in their bodies. Compounding this trait of the oyster is that many people eat oysters raw, eliminating the chance that any harmful bacteria will be killed. These waters are held to the highest standards possible, and all fecal bacteria will be counted. On the other hand, contact recreation consists of uses such as swimming, wading, or other activities where people will be in contact with the water. The standards for contact recreation are an average of 126 *E. coli* per 100 ml of freshwater, 35 *Enterococcus* for 100 ml of saltwater, or 200 fecal coliforms per 100 ml of water. Secondary contact recreation includes boating, pier fishing, or activities where people will not be intentionally in contact with water.

Fecal Coliform Standards for Water Body Classifications

Oyster Harvesting	Contact Recreation	Non-Contact Recreation
14 cfu per 100 mL/water	200 cfu per 100 mL/water	2000 cfu per 100 mL/water

The standards for noncontact recreation are an average of 605 *E. coli* per 100 ml of freshwater, 168 *Enterococcus* per 100 ml of saltwater, or 2000 fecal coliforms per 100 ml of water. Oyster water standards are no more than 14 fecal coliforms per 100 ml of water on average.

Pollutants, which may come from horses, include bacteria, nutrients, sediment, and oxygen-demanding substances. This guide focuses on horses and their impacts to water quality due to bacteria in manure.

Texas Commission on Environmental Quality



TCEQ has general jurisdiction and primary responsibility over Texas' water quality program including water quality management planning, the issuance of permits for point source discharges, abatement of nonpoint source pollution other than from agricultural and silvicultural sources, and enforcement of water quality rules, standards, orders, and permits. TCEQ is responsible for establishing the level of quality to be maintained in, and controlling the quality of, water in the state (Texas Water Code §5.013 and 26.0136).

Texas State Soil and Water Conservation Board



The Texas State Soil and Water Conservation Board (TSSWCB) is the lead agency in Texas for planning, implementing, and managing programs and practices for preventing and abating agricultural and silvicultural (forestry) nonpoint source pollution (Texas Agriculture Code §201.026).



Community Involvement

TCEQ and TSSWCB work with watershed stakeholders to develop and implement TMDLs. Stakeholders are anyone affected by the implementation of the TMDL and can be a combination of landowners, business owners, and government representatives. The decisions made in your watershed have a direct impact on you and your business and there are many reasons for you to get involved in the process. A few reasons are:

- Ensure that state government considers the local perspective
- Promote government and community accountability
- Improve quality/quantity of ideas to the TMDL process
- Reduce the probability of one particular group dominating the process
- Lead to actions to decrease pollution

Websites of Interest

United States Environmental Protection Agency: Federal Clean Water Act

<http://www.epa.gov/emergencies/content/lawsregs/cwaover.htm>

Texas Commission on Environmental Quality: Total Maximum Daily Load Program

<http://www.tceq.state.tx.us/implementation/water/tmdl/tmdlprogram.html>

Texas Commission on Environmental Quality: Texas Water Quality Inventory and 303(d) List

http://www.tceq.state.tx.us/compliance/monitoring/water/quality/data/wqm/305_303.html

Texas State Soil and Water Conservation Board

<http://www.tsswcb.state.tx.us/>



Introduction

Horses have a unique ability to be detrimental to the land on which they are kept, leaving the owner with the responsibility of managing them so that they have the least impact on the surrounding environment. Considerable efforts have been made along the eastern and western coasts to stop surface water quality degradation, leading to mandatory regulations imposed on horse owners. It is our desire that these issues do not come to fruition in Texas and a proactive approach to preventing contamination makes regulation even more unlikely.

There are many ways runoff from equine operations can lead to surface water quality degradation, which can have a wide range of consequences for water bodies in a watershed. Most issues stem from manure that contains bacteria and nutrients, but sedimentation from erosion and the excessive use of fertilizers and pesticides also contribute to the problem.

Bacteria

Horses and other animals contribute to the degradation of water quality in different ways, but bacterial contamination is the concern for this guide. Bacterial pollution is the number one impairment of water bodies (lakes, bays, rivers, etc.) in Texas currently accounting for over half of water bodies tested according to the 2008 TCEQ 303 (d) list. The types of bacteria of concern are enteric bacteria. These are the natural bacteria that live in the digestive system of all warm-blooded animals and assist with digestion and immunity. Unfortunately, pathogenic organisms (bacteria, viruses, protozoa) such as *E. coli* O157:H7, *Salmonella*, and *Cryptosporidium parvum* inhabit our digestive systems as well. Testing for the pathogenic organisms is expensive and time consuming, therefore agencies that test water quality use indicator species to measure fecal contamination. Indicator species are bacteria such as *E. coli* and *Enterococcus* that naturally colonize in the digestive tract and are excreted in manure.



Copano Bay



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Fecal coliforms from fresh water



Horses can shed pathogenic organisms in their manure, and studies have found the following pathogens in horse manure (Quinn):

- *Clostridium tetani*
- *Cryptosporidium parvum*
- *Giardia duodenalis*
- *Campylobacter spp.*
- *Samonella spp.*
- *Escherichia coli*
- *Yersinia spp.*
- *Leptospira spp.*

Nutrients

Various nutrients, mostly from manure or fertilizer, run off into surface water and degrade water quality. These consist of nitrogen in the form of ammonia and nitrate nitrogen, phosphorus, and organic matter.

Nitrogen at high levels can be toxic to fish and a health concern for infants as it decreases the ability of red blood cells to carry oxygen (i.e. Blue Baby Syndrome).

Phosphorus is a natural fertilizer and when introduced to water bodies can cause a rapid increase in growth of aquatic vegetation and algae blooms. When the vegetation and algae die, the decomposition decreases the dissolved oxygen needed by fish to survive. Phosphorus increases algae growth leading to unsightly ponds and drops water temperature and sunlight.

Organic matter is undigested material that can include feed, bedding, and hay. As stated earlier, when these materials decompose in the water, dissolved oxygen is consumed, leading to fish kills and decreased water quality.

Erosion

Pasture health is of vital concern in preventing runoff of all varieties. As the grass is grazed down and eventually killed, what was a nice pasture is now a dirt lot, which will be washed away an inch at a time by each rain. As the topsoil is eroded from your property, aesthetic value declines and topsoil necessary for healthy plant growth is washed away. Increased sedimentation in water bodies is also a problem leading to increased turbidity, degraded water quality, and the dredging of tanks.

Pesticide Use

Pesticides include insecticides, herbicides, fungicides, and other poisons that kill and/or control unwanted pests. Our current way of life would be impossible without the judicious use of pesticides; however, if improperly used they can be very detrimental to the aquatic environment. Many pesticides are used on horse farms, including fly spray for the barn, herbicides for the weeds in the pasture, and fungicides/insecticides for the feed bin.



The proper use of these chemicals is very important for the health of your horse, your family, and aquatic life. There have been instances where improper amounts of insecticides were used to fumigate the feed bin, which resulted in horses being killed after eating contaminated feed. Small amounts of some herbicides can be lethal to fish and other amphibians in your stock tank. As stated before, pesticides provide safety and comfort if used properly, according to the guidelines below.

- Read all product labels and follow label directions
- Don't apply pesticides with conditions that promote runoff
- Store water pollutants away from water sources
- Don't spray pesticides on windy days
- Leave buffer zones around water bodies
- Don't dispose of excess materials down drains or on the ground
- Use low toxicity products



Pesticide spray nozzle

Copano Bay Watershed

An example of issues currently faced by horse owners is happening in the Copano Bay Watershed. Bacteria Source Tracking conducted by Texas A&M University–Corpus Christi determined that a slight majority of bacteria in the bay originated from horses. An education program is underway to educate owners on best management practices they can implement to reduce bacteria runoff. Similar measures will be undertaken in the areas surrounding all impaired water bodies to try to bring them back to their classified usage. Additionally, in an attempt to be proactive, we may be able to avoid the regulations being imposed on the east and west coasts.

The Copano Bay Watershed is approximately 1.4 million acres and includes significant portions of Aransas, Bee, Goliad, Refugio, and San Patricio counties. A watershed is an area of land that drains to a main water body, which in this case is Copano Bay. The management practices of homeowners, livestock owners, and businesses in these counties all contribute in varying degrees to the water quality in this bay. It is important to recognize factors that are beyond our control, such as the contributions of wildlife and weather fluctuations that impact the bay. While attempting to completely rid our waterways of every pollutant is an unattainable goal, we can take steps to minimize the impact of our practices that increase water pollution and degrade water quality.



Copano Bay Watershed
Source: TCEQ



Websites of Interest

Bacteria Source Tracking in Copano Bay: Phase II Final Report

<http://www.tceq.state.tx.us/assets/public/implementation/water/tmdl/42copano/42-bst-phase2finalrpt.pdf>

Bacteria Source Tracking on the Mission and Aransas Rivers

<http://www.cbbep.org/publications/virtuallibrary/0630final.pdf>

Texas Commission on Environmental Quality Sampling Data Query, Surface Water Quality Monitoring

<http://www.tceq.state.tx.us/compliance/monitoring/crp/data/samplequery.html>

National Livestock and Poultry Environmental Learning Center

<http://www.extension.org/animal+manure+management>

Texas Watershed Steward

<http://tw.s.tamu.edu/>

Texas Commission on Environmental Quality: Copano Bay, A TMDL Project for Bacteria in Oyster-Harvesting Waters

<http://www.tceq.state.tx.us/implementation/water/tmdl/42-copano.html>



Introduction

An understanding of basic feeding guidelines is an important component of on-farm nutrient management. Implemented correctly, these practices can increase horse health and decrease feed costs.

Horses eat approximately 1.5 percent to 3 percent of their total body weight per day, on average, depending on the type and quality of feed and the amount of work imposed on the horse. Many prepared feeds have the appropriate feeding directions on the back of the feed bag. Horse feeds are considered complete feeds if fed with the right amount of hay. No additional supplements should be necessary with commercially prepared horse feed.

The most important aspect of your horse's diet is proper forage intake. Horses naturally graze forage continuously so it is important to provide adequate amounts of long-stemmed forage spread throughout the day if possible. A minimum of at least 1 percent of the body weight in forage per day will usually meet their dietary requirements. The benefits of feeding adequate amounts of forage result in good dietary and mental health. Some adverse behaviors seen in horses without access to enough forage are listed below (Householder et al.).

- Chewing wood
- Eating bedding
- Eating manure
- Chewing manes and tails
- Cribbing

Before discussing the second most important aspect of your horse's diet, body condition scoring and classification of the horse based on use need to be reviewed. Understanding these two concepts is critical when determining if and with what grain to supplement your horse's diet.



Body Condition Scoring (BCS)

Body condition scoring is a way of determining the amount of fat on a horse by observing various areas of the horse's body. These areas are typically the back, ribs at midbarrel, neck, behind the shoulders at forerib, withers and tailhead (Householder et al.). When evaluating these areas, it is important not to confuse long hair coats and bulky muscles as fat. After observing the target areas, horses are assigned a number from 1 (emaciated) to 9 (obese), with 5 being an optimal condition for your horse. The following chart contains a description for each body condition score (Gibbs).

Score Description

1 Poor. The horse is emaciated. The spinous processes (backbone), ribs, tailhead, and hooks and pins all project prominently. The bone structures of the withers, shoulders, and neck are easily noticeable, and no fat can be felt anywhere.

2 Very Thin. The spinous processes are prominent. The ribs, tailhead, and pelvic bones stand out, and bone structures of the withers, neck, and shoulders are faintly discernable.

3 Thin. The spinous processes stand out, but fat covers them to midpoint. Very slight fat cover can be felt over the ribs, but the spinous processes and ribs are easily discernable. The tailhead is prominent, but individual vertebrae cannot be seen. Hook bones are visible but appear rounded. Pin bones cannot be seen. The withers, shoulders, and neck are accentuated.

4 Moderately Thin. The horse has a negative crease along its back and the outline of the ribs can just be seen. Fat can be felt around the tailhead. The hook bones cannot be seen and the withers, neck, and shoulders do not look obviously thin.

5 Moderate. The back is level. Ribs cannot be seen but can be easily felt. Fat around the tailhead feels slightly spongy.

6 Moderate to Fleshy. There may be a slight crease down the back. Fat around the tailhead feels soft and fat over the ribs feels spongy. There are small deposits along the sides of the withers, behind the shoulders, and along the sides of the neck.

7 Fleshy. There may be a crease down the back. Individual ribs can be felt, but there is noticeable fat between the ribs. Fat around the tailhead is soft. Fat is noticeable in the withers, the neck, and behind the shoulders.

8 Fat. The horse has a crease down the back. Spaces between ribs are so filled with fat that the ribs are difficult to feel. The area along the withers is filled with fat, and fat around the tailhead feels very soft. The space behind the shoulders is filled in flush and some fat is deposited along the inner buttocks.

9 Extremely Fat. The crease down the back is very obvious. Fat appears in patches over the ribs and there is bulging fat around the tailhead, withers, shoulders, and neck. Fat along the inner buttocks may cause buttocks to rub together, and the flank is filled in flush.

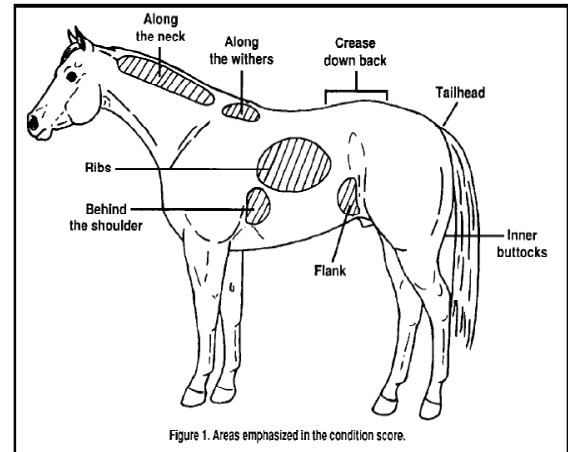


Figure 1. Areas emphasized in the condition score.

Source: Nutritional Management of Pregnant and Lactating Mares (Gibbs)



Horse Classification by Use

Classification of horses by use is extremely helpful when deciding nutritional requirements since horses in different stages of life and levels of competition have different needs. The following chart is a good starting point to combine with feed bag instructions when determining the amount of forage and grain to feed per day as a percentage of body weight (BW) (Householder).

Class	Forage (%BW)	Concentrate (%BW)	Total (%BW)
Mature (Idle)	1.5-2.0	0-0.5	1.5-2.0
Late Gestation (Mares)	1.0-1.5	0.5-1.0	1.5-2.0
Lactation (Mares)	1.0-2.0	1.0-2.0	2.0-3.0
Working Horses	0.8-2.0	0.5-2.0	1.5-3.0
Growing (Weanlings)	0.5-1.0	1.5-3.0	2.0-3.0
Growing (Yearlings)	1.0-1.5	1.0-2.0	1.8-3.0

Source: Feeding Management Points for Texas Horse Owners (Householder)

Concentrates

There are many concentrates to choose from when supplementing your horse's forage intake. The choice between sweet feed, pelleted, and "complete" feeds can only be compounded by further division into different percentages of crude protein and fat. Generally, mature idle horses can be maintained on 10 percent crude protein, but as physical demand on the horse increases so does the amount of protein that needs to be fed. Some horse owners choose to add fat to every feeding instead of relying on what is commercially prepared. The choice between sweet feed and pelleted feed is primarily personal preference or the preference of your horse, as some tend to be picky. Complete feeds are designed to contain all the concentrate and forage needs of the horse and are primarily marketed towards the geriatric horse. These horses need more fats and are able to digest pelleted feeds more efficiently. Additionally, they may have dental issues preventing the efficient consumption of hay, though it is important to allow access to forage even when feeding complete feeds.



Pelleted feed (top) and sweet feed



Feeding Methods

It is important to follow some basic storage and feeding rules to maintain the safety and health of your horse (Householder).

- Protect stored hay and concentrates from moisture, insects, and rodents
- Do not store concentrates for more than one month
- Feed by weight and not volume
- Do not feed more than .75 percent of body weight in concentrate at one feeding
- Space multiple feedings equally throughout the day
- Feed at the same time every day
- Do not abruptly change amount or type of feed
- Check for feed that was not consumed
- Allow access to salt
- Do not mix commercially balanced feed (for example: oats and sweet feed)

Pasture Feeding

When feeding horses in the pasture, most of the rules above apply, but there are other guidelines as well. If more than one horse is being fed in the pasture at the same time, it is important to space feeders at least 10 feet apart. Some horses may require more space or removal altogether so that other horses may finish their feed. Horses tend to congregate at feeding time around their feeders, which can cause excessive trampling and erosion of pasture; therefore, if you notice the area around your feeders becoming damaged, moving the feeders to different locations periodically can assist in allowing the grass to recover. Feeding hay in a feeder instead of on the ground can also assist in preventing damage. This also has pasture health benefits, which will be discussed further in pasture management.



Trampled feeding area

Nutrient Management

Nutrient inputs on a farm consist of feed, animals, irrigation water, fertilizer, legume nitrogen, etc. Outputs are meat, milk, animals, crops, and manure. When inputs exceed outputs, losses will be present in feed or barnyard waste, in manure, and in field runoff (Westendorf). These losses can lead to wasted feed, money, and animal inefficiency.

Over-feeding your horse can lead to a multitude of physical effects for the horse, excess nutrients being shed in the manure, and wasted money on more feed than is necessary. The environmental effects of the nutrients will be discussed in the section on manure production and characteristics. However, an overview of the initial source of nitrogen and phosphorus is important to understand.



Protein is the chief nitrogen source in the diet, and nitrogen is the nutrient that we are most concerned with (Westendorf). If you have ever compared feed prices, you have noticed that as the percentage of crude protein increases, so does the price of the bag. A mature, idle horse can be maintained on a 10 percent crude protein feed, though feed companies market feeds up to 16 percent crude protein for certain other categories. By buying a feed with the correct percentage of crude protein for your horse, you will save money, and your horse will use the feed more efficiently with less nitrogen excreted in the manure.

Phosphorus management in horses has its own unique set of criteria, which requires a ratio of calcium to phosphorus of 2:1. Typical horse diets approach two to three times the required level of phosphorus, which can be detrimental to the environment (Westendorf). Due to the necessary calcium/phosphorus ratio, there are not many ways to effectively reduce the excess amounts of phosphorus in the diet. However, commercial feeds are still the best option for horse owners.

One other way to save money and improve efficiency is to make an attempt to cut the amount of feed wasted by the horse. Some of the ways horses waste feed and methods to prevent it include the following:

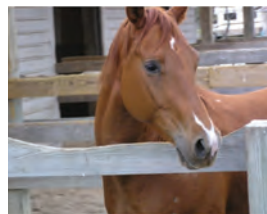
- Shoveling the feed onto the ground with their nose
Correction: Feed them from a steep-sided feed or water bucket
- Dropping mouthfuls of feed while they chew
Correction: Have an equine dentist check their teeth
- Turning over ground feeders
Correction: Feed from a feeder or in a bucket on the fence

Conclusion

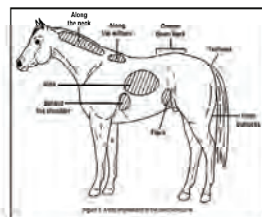
Many aspects need to be considered when feeding horses. The guidelines above are a place to start. Some horses are termed “easy keepers” and will manage to “get fat on a pasture of dead weeds” while others may need an alarming amount of concentrate just to keep weight on. The best strategy is to evaluate the classification and body condition score to determine where your horse is currently and where you would like him to be in the future. Then pick a plan to start with and periodically evaluate how your horse is gaining, losing, or maintaining his current weight and adjust accordingly.



Step 1. Hungry horse



Step 2. Evaluate BCS



Step 3. Identify class

Class	Forage (%BW)	Concentrate (%BW)	Total (%BW)
Mature (Idle)	1.5-2.0	0-0.5	1.5-2.0
Late Gestation (Mares)	1.0-1.5	0.5-1.0	1.5-2.0
Lactation (Mares)	1.0-2.0	1.0-2.0	2.0-3.0
Working Horses	0.8-2.0	0.5-2.0	1.5-3.0
Growing (Weanlings)	0.5-1.0	1.5-3.0	2.0-3.0
Growing (Yearlings)	1.0-1.5	1.0-2.0	1.8-3.0

Source: Feeding Management Points for Texas Horse Owners (Householder)

Step 4. Meet minimum 1% of BW forage requirement



Step 5. Choose type and amount of concentrate needed



Step 6. Periodically observe horse BCS for necessary adjustments to feed schedule

Websites of Interest

Texas A&M University: Department of Animal Science, Equine Science Web Page
<http://animalscience.tamu.edu/academics/equine/index.htm>

Rutgers: Equine Science Center
<http://www.esc.rutgers.edu/>



Introduction

Understanding the production and components of the manure your horse generates every day will help you develop a better understanding of why managing this “resource” is so important.

Production

An average 1,100-pound horse produces approximately 56 pounds of manure per day. Of those 56 pounds, approximately 85 percent is moisture, which results in eight pounds of manure per day, dry weight (Mukhtar). The numbers do not provoke much thought until you calculate how much manure is produced per year. In an average year, one horse produces approximately 10 tons of manure, or 1.5 tons on a dry matter basis.

Characteristics

The manure your horse generates every day contains many different components. Important chemical and biological elements that are components of manure include nitrogen, phosphorus, potassium, and bacteria. The horse excretes 99 pounds of nitrogen, 18 pounds of phosphorus, and 51 pounds of potassium per year (Mukhtar). Ammonia is excreted in urine and manure as a form of nitrogen. Fecal coliform production, according to the American Society of Agricultural Engineers, is 402 million bacteria per day.

Implications

You may have noticed that the nutrients nitrogen, phosphorus, and potassium (N, P, and K) in horse manure match those nutrients contained in the fertilizer you buy at the store. Managed correctly, your manure pile can be a very valuable asset, especially since you already paid for it. Mismanaged, those nutrients and bacteria can be very detrimental to the environment. The following chart contains the effects of excessive contamination of water bodies with manure (Sciarappa).

Nitrate		Health
Ammonia		Fish Kills
Phosphorus		Algae Blooms
Bacteria		Health
Organic		O ₂ Depletion

Potential Effects of Contaminants

Source: Adapted from environmental concerns with equine operations (Sciarappa)



Management

Managing your manure can range from maximum labor and costs to minimal labor, and costs. Our goal is to give you a variety of tools to find the choice that fits your needs and resources the best.

Composting

Composting is the controlled breakdown or degradation of organic material into a stable product known as humus (Auvermann). Compost can be used to enrich pastures and gardens by improving soil structure, fertility, texture, aeration, and water retention. It can also help control erosion and balance pH (Horse Outreach Workgroup). Additional advantages to choosing this method of manure management include:

- Kills internal parasites, bacteria, fungi in manure
- Discourages external pest colonization in manure
- Kills weed seeds in manure
- Will reduce volume of manure up to 50 percent
- Manure from one horse is equivalent to approximately \$150 worth of fertilizer per year (Blickle)

Some disadvantages to choosing this method are:

- Initial investment can be expensive
- Can require extra time depending on the intensity of your management choice
- Large numbers of horses require more resources



There are three important inputs in composting and the proper maintenance of all three is crucial to the process. Composting must be an aerobic process, use naturally occurring aerobic microbes to digest organic material, and be thermophilic, thus reaching temperatures between 130 and 160 degrees F, ensuring the neutralization of pathogens and weed seeds.

Maturity of your compost pile is an important endpoint to realize, depending on what you are going to do with the pile after composting. Compost that is done will not compete with plants for nutrients and will supply the plant with necessary nutrients that are needed to grow. Therefore, if you plan on marketing your compost to nurseries or avid gardeners, special attention needs to be given so that they receive a consistent and quality product. Temperature and commercial tests are good indicators of when a compost pile is ready for appropriate usages.





Composting temperatures



Proper composting barn

The correct mixture of moisture, carbon to nitrogen ratio, and oxygen saturation all play a big role in the success of your composting efforts. Moisture contents between 45 and 55 percent water usually suffice for efficient quality composting. An easy test for this percentage is the amount of moisture left after a handful of compost has been squeezed. Your hand should be left damp, but no water should come from your hand. Manure is generally this percentage when excreted, but will dry out over time; therefore, the compost pile will need to be watered as time passes. Optimal carbon to nitrogen ratios for composting ranges from 25:1 to 30:1 by weight. Most agricultural manure has a C:N ratio of 15:1 or 10:1 so wood chips or sawdust would be a good addition for the best compost. Keeping your pile oxygenated is crucial to success. This can be done actively by turning the pile weekly or every few weeks, or passively by inserting PVC pipes with holes into various places in the pile.

Keeping a temperature log of your compost pile will give you clues to how the process is going and a heads up for any troubleshooting that needs to be performed. Temperatures between 130 and 160 degrees F are optimal, but the pile will cool when it needs to be turned and immediately after turning. The temperature should be back up to the optimal range within 24 hours. When the compost is done, it will not heat up after turning again.

Since our overall goal is to improve the land on which we keep our horses and in a broader sense, the environment, you should keep in mind a few things if you choose to compost your horse manure. The size of your manure storage site is important and should be calculated carefully before implementing your plan. Most people who purchase one horse usually find that their herds multiply exponentially. Your holding structures should have some type of cover that will prevent runoff during rain events, and the storage site should not be close to any water body, water well, or drainage area. Always consider your storage site for placement of a compost pile because of the possibility that bacteria may enter a water body if placed too closely.

Removal from Premises

This choice is probably the most easily managed, provided you have the financial resources to pay for container rental and hauling fees. For example, waste from one horse picked up once a week would cost approximately \$310 per month. However, the major advantages are the limited number of times manure is handled and no need for disposal on your property.





Compost pile (straw bedding)

The disadvantage to this method of manure disposal is the landfill aspect. These facilities dispose of wastes that cannot be recycled and are buried. Since they are considered eyesores and bring down property values, it is in an operator's best interest to ensure the longest functional life possible. Therefore, if a waste can be recycled in any way instead of being dumped at the landfill, it will increase the longevity of that facility. Some establishments may even charge an extra fee for allowing disposal of manure.

Spread Fresh on Pasture (Not composted)

Spreading the manure fresh on a pasture is the most popular choice for manure disposal. It has some time management advantages, but unfortunately has some serious drawbacks on pasture, environmental, and herd health. The result of a recent study in Florida suggests that spreading unprocessed horse stall material on pastures can inhibit the productivity and quality of forage (Dilling). Some other disadvantages are listed below.

- Parasite eggs, bacteria, and viruses distributed on pasture
- Nitrogen depletion of soil (occurs during the breakdown of bedding by microorganisms)
- Extremely heavy application will kill forage
- Inadequate acreage for spreading
- Introduces weed seeds to your pasture

The important points above make it imperative that proper application of manure be followed. Many significant points should be considered before spreading manure on your property, such as proper application rates, pasture characteristics where application will occur, timing of application, soil/manure nutrient testing results, and record keeping.



Manure storage container



Manure spreader



According to the Natural Resources Conservation Service (NRCS) practice standards, application rates should be based on soil and manure (composted or not) nutrient evaluations. The amount applied should match as closely as possible to the nutrient uptake of the forage planted. Manure should only be applied to pastures that are flat or gently sloped and that are not close to any water body. Timing of application is an important consideration and should be done when plants are growing and not when plants are dormant, such as during winter. Manure should also not be applied during wet weather or when heavy rainfall is forecasted to occur in the next 24 hours, as this will contribute to runoff. To optimize the results of your manure-spreading venture, records should be kept for at least five years and include quantities distributed, soil test results, dates distributed, climate conditions on application days, and application methods.

Keeping Horses Exclusively on Pasture

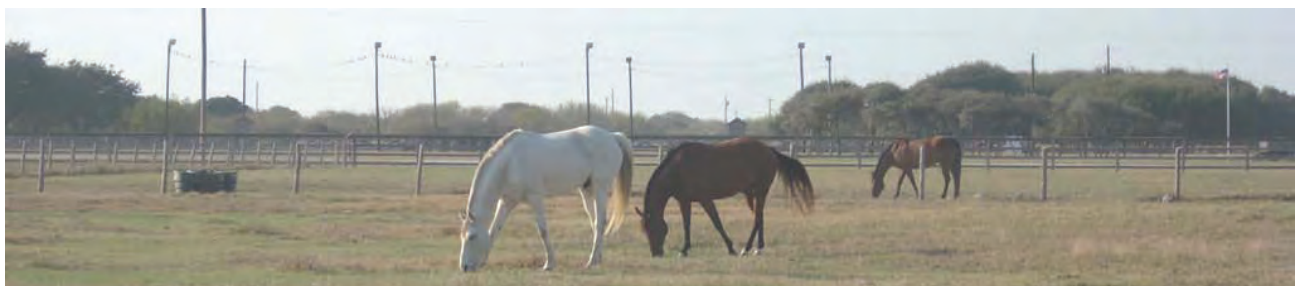
Just because you don't have stalls to clean does not mean you are absolved of responsibility for the manure generated on your land. If you have an ideal stocking rate on your property, you have less to worry about than those who are supporting more horses than the land is intended to support. Regardless of your stocking rate, it is a good idea to periodically rake, aerate, or disk your pastures to break up the manure piles. Doing so will allow the manure to decompose faster, kill pathogenic microorganisms more quickly, and supply nutrients to the soils that are readily available to growing forages.

Raking or harrowing your pasture on a periodic basis does not require an investment in expensive equipment. Any device that will aid in the destruction of manure piles will do. A few examples are listed below and can be pulled by hand, horse, four wheeler, tractor, or utility vehicle.

- A segment of chain link fence with weights on top
- An arena rake (will aerate the soil as well)

Conclusion

Horses produce a large amount of manure that contains a variety of components. In reviewing manure management choices there are advantages and disadvantages to any method you choose. The only constant of manure management is a steadily growing pile that you can't ignore and **will** have to deal with at some point.



Websites of Interest

Texas A&M University System: Texas Animal Manure Management Issues
<http://tammi.tamu.edu/pubs.html>

Composting Horse Manure
<http://tammi.tamu.edu/pdf%20pubs/compostinghorsemanure.pdf>

Composting: Recycling the Feed You Have Paid For
ftp://ftp-fc.sc.egov.usda.gov/CT/kmrc&d/heap_composting.pdf

Manure Storage: Containing the HEAP
ftp://ftp-fc.sc.egov.usda.gov/CT/kmrc&d/heap_storage.pdf

Manure Utilization: Conquering the HEAP
ftp://ftp-fc.sc.egov.usda.gov/CT/kmrc&d/heap_utilization.pdf

Rutgers: Equine Science Center, Stable Management Publications
<http://www.esc.rutgers.edu/publications/management.htm>

Natural Resources Conservation Service Practice Standards
<http://www.nrcs.usda.gov/technical/standards/nhcp.html>



Introduction

Most horse owners who have the illusion that grass will not die under any circumstances lack an adequate knowledge of proper pasture use and maintenance. While initially a daunting subject, pasture management is a skill that must be learned and practiced so that your horses and your land stay optimally productive. The following are all important topics in pasture management.

- Stocking rates
- Soil evaluation
- Weed control and identification
- Forage cultivation
- Grazing management



Pasture Importance

Pasture is important to horses for many reasons that sometimes are lost in our, “feed them twice a day and ride for an hour” mantra. Horses naturally graze continuously and the effects of attempting to adapt their needs to our convenience are often seen. A good quality pasture alone will maintain a mature idle horse and contains carbohydrates, fats, proteins, vitamins, minerals, and water (Williams). Effectively using your pastures will allow your horse to spend time in his natural habitat while having a positive effect on your budget as listed below. Horses should consume at least one percent of their body weight daily in long stemmed forage regardless of whether they are in pastures or stalls. This practice decreases the incidence of colic, gastric ulcers, and boredom. The pasture is also a place where horses can socialize and exercise, which decreases the incidence of numerous vices we try so creatively to eliminate.

Additional benefits in allowing your horses to graze pasture are listed below (Williams).

- Reduces hay costs by \$60-100 per month
- Reduces fertilizer costs when spreading manure (if composted)
- Aesthetically pleasing for horse owners and neighbors
- Less time spent cleaning stalls
- Reduction in bedding costs
- Reduce parasite problems such as worm and fly infestations (if composted)

What more can a good pasture do? Plenty! A pasture plays many roles in environmental health as well (Williams).

- Reduction in erosion
- Nutrient recycling
- Groundwater recharge
- Filter surface water runoff
- Control dust and odor

Stocking Rates

One of the complexities encountered while raising/owning horses is the emotional attachment most of us experience. This makes it difficult to part with the older “starter” horses or foals that were bred as an “investment.” Consequently, we may end up with a stocking rate that is less than ideal.

The stocking rate can be affected by your geographic region, soil type, management practices (past and present), total acreage, average rainfall, and forage variety (Hanselka). After land purchase, the only aspect mentioned above in your control is management practices and forage variety that will be discussed as we proceed. In general, the U.S. Department of Agriculture recommends seven acres per animal in excellent condition to greater than 19 acres per animal in extremely adverse conditions.

These guidelines can be manipulated by more intensive management however; this usually leads to higher costs elsewhere. Since there are a variety of soil types and geographic regions compounded by the unpredictability of rainfall amounts, finding the perfect stocking rate can be a daunting task. It will require close monitoring of your pasture conditions and addressing any adverse reactions that occur before the pasture is permanently damaged. The last chapter of this guide discusses various organizations that can provide free expertise relative to your area.

Soil Evaluation

Think of soil as an equivalent to the 50-pound feed sacks or bales of hay you cart to the barn every week. Similar to the way that feed and forage supplies your horse with essential nutrients, the soil provides essential nutrients to the grasses you want to keep healthy. A soil evaluation is a necessity before fertilization or deciding to plant new forage species. This low cost test can save you thousands in wasted time and money in the event of a failed re-seeding.

$$\text{Stocking rate} = \text{Acres per horse}$$



All that needs to be done is to take multiple samples from the pastures you want tested and put the mix in a bag along with a completed questionnaire. More specific instructions may be obtained from the testing laboratory. In one to two weeks the results of the test are returned along with detailed instructions for fertilizer application if needed. These tests can be obtained from your county extension agent or from the Texas A&M University Soil, Water & Forage Testing Laboratory.



Soil sample collection

Weed Identification and Control

Weed control ties very closely to soil fertility and stocking rate. Weeds are opportunistic, meaning they usually move in during adverse conditions. If you have overstocked your pastures and all the forage has been removed, resulting in a change in soil pH and bare spots, you have just handed out an invitation for weed invasion. In addition to decreased nutrition and palatability, some weeds can be toxic to your horse and have a wide variety of effects on your animals.

Identification

The ability to become proficient at undesirable plant identification will save a lot of time, aggravation, and money. If you wait until a weed has taken over three-quarters of your pasture before trying to eliminate it, it's too late. On the contrary, if you identify the presence of a weed while it only inhabits one square foot of your pasture, you can spot spray or dig it up, which costs significantly less than applying herbicide to your entire pasture. There are several weed and toxic plant guides available in addition to your county extension agents or NRCS field staff to assist in identifying what is growing in your pasture.



Plant identification

Control

Methods for control of weeds can be offensive or defensive. Taking an offensive stance on weed control is less costly and aggravating than being forced into defense. Some methods considered to be offensive are just good management practices and are as follows:

- Don't over or under graze your pastures
- Select forage species recommended for your area
- Use early weed control



Methods to be taken once spot control is no longer an economically viable option can include:

- Mechanical – mowing, disking, or burning
- Chemical – herbicides
- Biological

The importance of plant identification plays a role in control as well. Herbicides can be selective or can kill anything the spray might land on. Carefully read the label and make sure you know what you are trying to eliminate before spraying to avoid disastrous consequences. If you plan to graze your animals or cut the pasture for hay, you also need to pay careful attention to the restrictions to determine when it will be safe to do so. Restrictions can range from weeks to no time restriction for allowing livestock back on the pasture or cutting hay. In addition, the classification of animals as lactating may also have an impact on restriction time for grazing on treated pasture.

Forage Cultivation

The purposes for cultivating forages, according to the NRCS practice standards, are as follows.

- Establish adapted and compatible species for forage production
- Improve or maintain livestock nutrition and health
- Balance forage supply and demand during low production times
- Reduce soil erosion and improve water quality

Many considerations need addressing when deciding to renovate or improve a pasture. The plant species selected depends on your particular climate, soil condition/type, and resistance to disease or insects that may be prevalent in your area. After deciding on the species, proper planting is essential and seeding rates, time of planting, depth of planting, and the necessity of fertilizer use are key to your success. Remember that livestock must be removed during renovation or improvement and not allowed back on the pasture until plants are well established.

The most important aspect of forage cultivation is choosing the plant species that grows best where you intend to grow it. For instance, some owners like to feed their horses alfalfa, but your attempt to grow it in South Texas probably will not be successful. Contact your county agent or seed store for assistance in choosing the right forage and establishment plan for your area and livestock goals.



Mechanical weed control



Chemical weed control



Grazing Management

Importance

We have talked about the things that pastures do for us and our horses. Improperly managing the animals' access to this resource can have deleterious effects in a very short time that can take a very long time to recover. Different management techniques can be employed to optimize the health of the pasture and the access horses have to it.

Rotational Grazing

The management system of rotational grazing involves a few rules of thumb. You should graze your animals when the grass is 6 inches to 8 inches high and rest the pasture when it is 1.5 inches to two inches high (Horse Environmental Awareness Workgroup). This is not always possible and depends on the forage being grown, so if all you can manage is one pasture and a sacrifice lot, that will be better than one pasture that is turned into a sacrifice lot. It is also important to remember that recovery times for pastures grazed down can range from ten to 60 days, depending of course on the amount of available water. Before you start calculating the expense of fence per foot, remember that electric fencing is cheap and portable!

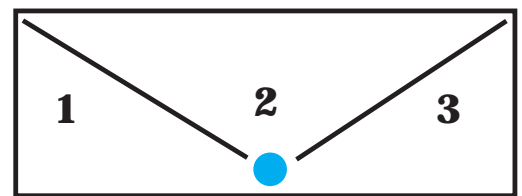
Sacrifice Lot

Sacrifice lot is an important management option you can choose if you have a high density-stocking rate and involves fencing off a section of your property, knowing that pasture quality will be reduced or destroyed. The idea of the sacrifice lot was developed to protect pastures from overuse at critical times such as winter, summer, periods of heavy rainfall, rejuvenation time, preventing over-consumption, drought, and managing horses that don't get along (Connecticut Horse Environmental Awareness Program).

Keep in mind that this is not where your horses will primarily be living, so being generous in size with a sacrifice lot will defeat the purpose. A minimum size for a sacrifice lot will allow for at least 600 square feet or a 20'x 30' foot area per horse (Horse Outreach Workgroup). Remember, this area does not have to be totally sacrificial: it can double as an arena, turnout, or storage area when not in use.

Mowing

Not all parts of grazing management involve your grass-powered animal, and occasionally you will have to get out your gas-powered animal! Some horses tend to mark out one portion of the pasture as the communal manure pile where the extra fertilization of that particular area results in healthy growth that is never grazed. However, this trait can become frustrating when you notice the area 3 feet away is chewed down to the dirt. Mowing your pastures occasionally will prevent weed seeds



The figure above is an example of a rotational grazing system that utilizes one common watering system.



Sacrifice lot



from coming to a head, discourage weed growth, spur new grass growth, encourage horses to eat in a more uniform fashion, and prevent grass from becoming too mature.

Burning

Before discussing the benefits of burning pastures, it is imperative that any plans to burn are only conducted by those who have the experience and knowledge necessary to maintain the safety of people involved. There are many reasons to burn pastures, including control of undesirable vegetation, prepare for harvesting or seeding, control plant disease, reduce wildfire hazard, improve wildlife habitat, improve plant production, remove debris, and enhance seed production.



Example of manure concentration

A plan should be in place before the burn ever begins and should include the location/description of the burn area, pre-burn vegetation cover, management objectives, required weather conditions, notification list, equipment list, personnel assignments, post burn evaluation criteria, firing sequence, ignition method, and all necessary approval signatures.

Conclusion

Each of the topics discussed have their own impact on the horses and land on which they live. Proactive management will save time and money when compared with reactive management.

Websites of Interest

Horse Pastures for Texas

<http://animalscience.tamu.edu/images/pdf/equine/equine-horse-pastures-texas.pdf>

Stocking Rate: The Key Grazing Management Decision

http://repository.tamu.edu/bitstream/handle/1969.1/86995/pdf_1417.pdf?sequence=1

Reading Your Landscape: Are Your Pastures Healthy (Publication#E-107)

<http://tcebookstore.org/>

Do You Have Enough Forage?

<http://cnrit.tamu.edu/ganlab/docs/EnoughForage.pdf>

Know Your Plants to Protect Your Watershed (Publication #E-105)

<http://tcebookstore.org/>

Common Range Plants of Texas

<http://essmextension.tamu.edu/plants/>

Testing Your Soil: How to Collect and Send Samples (Publication #L-1793)

<http://tcebookstore.org/>



Introduction

Your barnyard area has the potential to be environmentally harmful if proper management measures are not taken. For this section, we will include barns, sacrifice areas, pasture shelters, manure storage areas, watering areas, and feeding areas in our definition of a barnyard. Animals tend to concentrate or spend a significant amount of time in these areas, and consequently, tend to have more manure deposition and greater forage destruction leading to increased runoff of pollutants. Facilitating good drainage away from heavy-use areas to keep water clean is a key management practice when attempting to reduce the effect of a barnyard on the environment. A few ways to facilitate drainage include the following (Sciarappa):

- Building location
- Gutter systems
- Harvesting rainwater
- Natural filters

Building Location

If you have the luxury of planning your facility from the ground up, you should keep in mind a few things when planning the location of your barns, storage areas, and compost piles. It is best to place these structures on higher topographical areas with well-drained soils and avoid building close to streams, ponds, and wetlands (Banka). All efforts should be made to direct stormwater away from the structures toward filter strips or vegetated water retention systems by constructing berms, terraces, and grading.



Rainwater harvesting system

Gutter Systems

Placing gutters on the buildings in your barnyard and on your pasture shelters is an effective way to divert large amounts of water away from high-use areas where large amounts of manure is deposited and there is lots of bare ground. However, it is important not to allow the water to run out at the base of your structure as it does in traditional gutter systems. It is best to continue diverting the water underground, past the high-use area to a common filtration site such as a rain garden or vegetated buffer. Water can also be retained and stored for later use by horses or their owners.

Rainwater Harvesting

Horses typically drink three to eight gallons of water per day. When you factor in water used for baths, cleaning water buckets, landscaping, or other activities, a large amount of water is used on your farm

every day. A great way to conserve water and prevent runoff from traveling through your barnyard is to harvest rainwater. For instance, one inch of rain can yield .6 gallons of water for every square foot of collecting surface. The roof of a 2,000-square-foot house can collect 1,200 gallons of water from a one-inch rain and can be stored and used as needed.

There are many different designs of rainwater harvesting systems ranging from small wildlife watering structures to roof catchments with filters and treatment systems for uses throughout the whole home or barn.

Natural Filters

Rain Gardens

A rain garden is an aesthetically pleasing and artistic version of a bio-retention system. A bio-retention system is a scientific name for a depression that catches and filters water. The depression is about six inches deep and landscaped with a variety of plants that catch contaminated water runoff and filter it naturally. This type of system is best implemented on the down-slope of sacrifice areas, manure storage areas, arenas, or other areas where there is bare earth and heavy animal congregation.

Vegetative Buffer Strips

Vegetative buffer strips are natural filters. A California study showed that a 15-foot-wide vegetated buffer strip can remove 74 percent of the total suspended solids, which are organic and nonorganic solids that bacteria and other nutrients can adhere to. However, the NRCS stipulates that filter strips should have at least 20 feet of flow length. This type of natural filter is not a bio-retention system or landscaped; it is just a strip of grass. It should be placed where runoff will be distributed evenly over the buffer strip. If runoff does not flow uniformly, gullies will form and the buffer strip will become useless. If you choose to implement a vegetative buffer strip around your barnyard, the horses will not understand its significance and probably think it is more valuable as a snack, so fencing is also a key consideration. It is important that the filter strip not be used as a traffic lane for livestock or heavy equipment and that you choose plants and vegetation wisely. Some species can be toxic to horses and others may be harder during drought conditions.



Example of a rain garden



Example of a vegetated buffer strip with pasture on one side and a creek on the other side of the trees.



Conclusion

Keeping drainage from going through the high-use areas on your farm is a key management system to reduce nonpoint source pollutants and can be accomplished with the methods described above. Remember, grazing management and associated cross fencing is a key part of success with your natural buffer systems.

Websites of Interest

Rutgers: Equine Barnyard Management

<http://www.esc.rutgers.edu/publications/stablemgt/FS618.htm>

Slowing the Flow With Vegetated Buffers

ftp://ftp-fc.sc.egov.usda.gov/CT/kmrc&d/heap_buffers.pdf

Keeping Clean and Dry With Water Diversions

ftp://ftp-fc.sc.egov.usda.gov/CT/kmrc&d/heap_diversions.pdf

Texas AgriLife Extension Rainwater Harvesting Website

<http://rainwaterharvesting.tamu.edu/>



Small Acreages

Overview

Unfortunately, small acreage tracts are some of the most overused lands in Texas (McGinty). The most prevalent reason is overgrazing, which usually results from overstocking. An understanding and implementation of the best management practices in this guide are crucial if you have a limited amount of land. Small acreage properties collectively comprise a significant portion of land in Texas and mismanagement of most small acreages can have huge impacts on the environment, especially when these small acreage properties are clustered near water bodies.



A small 20-acre farm

Another inadvertent consequence of small land ownership is your new role as agricultural ambassador to the urban population. These small pockets of agriculture might be the only example of farming or livestock an urban dweller may see. Therefore, it is extremely important that you uphold your responsibility as an animal owner to provide for their basic needs, including food, shelter, health, and welfare (McGinty). Well-kept facilities with healthy horses are considered aesthetically pleasing and will be welcomed or, at the very least, met with less opposition from a community.

Websites of Interest

Managing Small-acreage Horse Farms

<http://extension.oregonstate.edu/catalog/pdf/ec/ec1558.pdf>

Livestock and Poultry Environmental Stewardship Curriculum: Small Farm Fact Sheets

http://www.extension.org/pages/Livestock_and_Poultry_Environmental_Stewardship_Curriculum



Technical Assistance

Many agencies are available to you for consultations on issues you may be facing or plans you would like to implement. These agencies also routinely conduct short courses and seminars at little or no cost on current information and management practices in agriculture. They include the Texas AgriLife Extension Service, Natural Resources Conservation Service, Texas State Soil and Water Conservation Board, and your local Soil and Water Conservation District.

Texas AgriLife Extension Service

Texas AgriLife Extension Service has many responsibilities in the state of Texas, all based on community education. Each county has one or more county agents in the areas of agriculture/natural resources, family/consumer sciences, community development, and 4-H/youth development. These agents oversee programs that concern research, Better Living for Texans, the vast 4-H program, Master Gardeners, The Urban Rancher, and many more.

Texas State Soil and Water Conservation Board

The Texas State Soil and Water Conservation Board (TSSWCB) is the state's leading agency for the planning, management, and abatement of agricultural and forestry nonpoint source pollution. The agency is steered by two governor appointees and five elected landowners from across the state of Texas. 216 soil and water conservation districts (SWCD) across the state obtain technical assistance from the TSSWCB regarding nonpoint source pollution. A certified Water Quality Management Plan (WQMP) is the first line of defense against nonpoint source pollution. These plans include appropriate land treatment practices, production practices, management measures, and technologies.

Natural Resources Conservation Service

The Natural Resources Conservation Service (NRCS) is an agency of the U.S. Department of Agriculture (USDA), which assists landowners and land managers with conserving soil, water, and other natural resources. Service centers in each county provide technical assistance to owners in initiating and maintaining various conservation practices. Two main programs that may be available to horse owners are the Environmental Quality Incentives Program (EQIP) and the Conservation Reserve Program (CRP).

Environmental Quality Incentives Program

The Environmental Quality Incentives Program (EQIP) is a more flexible, short-term contract that helps agricultural producers who have issues with the quality of soil, water, air, or other natural resources on their land. The goal of EQIP is to provide a voluntary conservation program for farmers and ranchers that promotes both agricultural production and environmental quality. The amount of funding available for EQIP can vary from county to county. To be eligible for this program, you must



be involved in livestock or agricultural production and develop a plan of operations. This plan defines the objective by the conservation practice proposed and a schedule of practice implementation. Applications will then be ranked by environmental benefits achieved and the cost effectiveness of the proposed plan.

- Grassed Waterways
- Filter Strips/Riparian Buffers
- Manure Management Facilities
- Capping Abandoned Wells
- Nutrient Management
- Integrated Pest Management
- Wildlife Habitat Management



Manure storage area

Conservation Reserve Program

The Conservation Reserve Program (CRP) is administered through the USDA Farm Service Agency (FSA). This program helps agricultural producers safeguard environmentally sensitive land through practices that improve the quality of water, control soil erosion, and enhance wildlife habitat. Owners of large ranches close to sensitive water bodies or owners interested in restoration of degraded land should consider this program. After enrollment, the FSA will pay an annual per acre rental rate and provide up to 50 percent cost share assistance for practices that accomplish the above goals. The portions of property to be submitted to the program will be under contract for 10 to 15 years and cannot be grazed or farmed. To be eligible for the program, you must have owned or leased the land for one year prior to application. In addition, the land submitted for the program must be suitable for the following practices.



Wildlife

- Riparian Buffers
- Wildlife Habitat Buffers
- Wetland Buffers
- Filter Strips
- Wetland Restoration
- Grass Waterways
- Contour Grass Strips
- Salt-Tolerant Vegetation
- Shallow Water Areas for Wildlife



For the Small Acreage Landowner

Acreages less than 10 acres generally have problems receiving funding. These problems can be because of a variety of logistical issues. When improving pasture, you will need to remove livestock. However, many small acreages have nowhere else to put them for the time required to establish growth. For professionals who have the equipment for re-seeding and brush control, it may not be cost effective to take on small acreages. These are a few reasons small landowners may not be able to receive financial assistance for property improvements that will beneficially impact the environment.

Websites of Interest

Natural Resources Conservation Service

<http://www.nrcs.usda.gov/>

Texas State Soil and Water Conservation Board

<http://www.tsswcb.state.tx.us/>

Texas AgriLife Extension

<http://texasextension.tamu.edu/>



Conclusion

Texas is projected to have exponential population growth in the near future. Concurrently our water supply is projected to decline, making water conservation and protection all the more important. As the population increases, more development and fractionation of large tracts of land is expected. This trend will contribute to runoff and decrease the ability of our land to filter it effectively. Increasing numbers of bacteria will continue to find a way into our surface waters as more livestock are applied to the land whether for recreational or commercial purposes.

This guide is primarily focused on the equine contribution to nonpoint source pollution, but there are other sources such as wastewater treatment facilities, failing septic systems, and urban runoff that contribute to water quality impairments as well. This confirms the need to educate all aspects of society on the importance of maintaining and conserving the quality of water necessary for good health.

As we have discussed, there are many important aspects to horse care that extend beyond having your hands directly on the horse. Procuring feed, managing manure, and maintaining pasture and facilities can take a considerable amount of time and effort. The collective impact of mismanagement of equine facilities can be environmentally harmful. The management practices that minimize these impacts will result in a farm that is healthy, saves money, and is aesthetically pleasing.



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