

BEST MANAGEMENT PRACTICES FOR SMALL FARM/RANCH PROPERTY OWNERS

DESCRIPTION OF PROJECT:

This project will engage small farm/ranch property owners in the Granite Creek Watershed in the development and distribution of Best Management Practice (BMP) information. During 2002 and 2003, Prescott Creeks' volunteers identified at least 13 properties where livestock manure was entering our creeks. We will coordinate our BMP development and outreach efforts with both the Arizona Department of Environmental Quality (ADEQ) and Nonpoint Source Pollution Education for Municipal Officials (NEMO) group at the University of Arizona. In addition to passive educational materials such as a brochure and website information, Prescott Creeks will directly engage the small farm/ranch property owner community with at least one presentation to discuss the importance water quality, BMP project ideas and funding opportunities to protect and improve water quality in our already impaired waters.

REASON:

Granite Creek Watershed has a problem with low dissolved oxygen (DO) content in Granite Creek and Watson Lake. Beyond the DO problems the watershed has high levels of nitrogen, and algae growth in the lake. To be able to eventually address the core issues and improve the DO, Prescott Creeks needs to first understand the source of the problem. To gain a proper understanding we will investigate possible sources of organic matter that could be contributing to this problem.

POSSIBLE REASONS:

One potential contributing factor identified as part of Prescott Creek's research for the Creek Observation Guide in 2004 is livestock manure. Yavapai County has a large livestock population, especially equestrian. During our research more than sixty volunteers hiked and cataloged the features of all the creeks within the Upper Granite Creek Watershed. In this area there were approximately twelve locations identified where manure was visible in the creeks near equestrian properties.

In addition to the decay of organic matter possibly contributing to the DO levels, there is also a concern about bacteria contamination in the area creeks and lakes. Animal manure may contain pathogenic (disease-causing) microorganisms (bacteria, viruses) that can reduce water quality. Transmissible livestock diseases from these pathogens can infect humans. Since bacteria make up as much as 30% of the mass of manure, it is a potential source of the bacteria problems seen throughout the watershed.

Prescott Creeks had a previous discussion with ADEQ regarding a number of properties where manure was being introduced to the waterways. This usually occurs when manure is not properly disposed of and is either placed too close to the creek, or washed in during rains. During our meeting, the list of recently observed properties was delivered to ADEQ. As we discussed the issue there was consideration given to whether the property owners should be identified to the compliance department for follow up. However, it was determined that the best way to handle this problem was with a proactive approach. The

decision was made to develop and maintain positive relationships, rather than enforce compliance through legal channels. It will be more productive to provide education to creek-side property owners who have livestock. We need to inform them about Best Management Practices and how their actions could affect the health of the creeks around them. Currently there is not a Best Management Practices program designed for these homeowners to demonstrate how to properly care for their surrounding waterways.

OUTCOME:

As part of an effort to concentrate on manure issues, Prescott Creeks will work with livestock owners throughout the region to develop. We will help them develop Best Management Practices for livestock and manure that are relevant and easily understandable. These measures will include containment and filter areas. We will work with the ideas of grading the area to drain toward the containment/filter portion. We will discuss the creation of trenches, rock filter wraps, berms, basins, native grasses, and proper manure storage as well as the consequences to the streams and lakes.

Prescott Creeks will create a Best Management Practices brochure for homeowners with livestock. With an active and proud history of livestock and equestrian ownership in Yavapai County, there are many properties beyond those who were identified as having manure problems that keep various types of livestock. These property-owners would also benefit from a developed Best Management Practices program. Addressing these issues in a demonstration will be relevant not only to our area, but also throughout the state.

After the development of the Best Management Practices and the brochure for this project is complete, a demonstration viewing will be hosted for other creek-side homeowners with livestock. Property owners who have previously had problems with manure in their creeks will be invited to attend, as part of the education outreach previously discussed with ADEQ. The attendees will be introduced to the idea of Best Management Practices, and be able to see how attractive and cost effective these steps can be.

MANURE COLLECTION:

Confinement Housing (Stalls, Drylots, and Runs). Daily maintenance of horses in a confinement setting requires intensive labor. Horses housed in stalls and sheds require soft absorbent bedding. The most common bedding sources in Colorado are pine sawdust (80 percent), pine wood chips (17 percent), and straw (2 percent). Some other sources are shredded newsprint, peanut shells, peat moss, rice hulls, etc. Remove manure and soiled bedding on a regular basis and handle appropriately to prevent fly infestation and disease transmission.

Potential Best Management Practices:

COMPOSTING:

How: Compost management activities include tarping, turning, and watering. Like all living things, the micro-organisms which break down the manure and bedding require air and water. Too much or too little of each can cause problems.

Cover each of your bins with a tarp to prevent your manure piles from becoming soggy in the winter and too dried out in the summer. A tarp also prevents the nutrients you are trying to save from being washed out and contributing to surface and ground water contamination.

Turning the piles allows oxygen to get to the bacteria and organisms which break down the manure into a soil-like substance. How often the pile is turned, determines how quickly the compost will be ready. However, you have access to a small tractor, or have a strong back, turning the pile can be difficult. Air will permeate through the pile to a depth of about 3 feet. An easy way to get air to the center and avoid turning the pile frequently is to build a couple of 4 inch pre-drilled PVC pipes into the center of the pile. The pile will still need to be turned occasionally to get the manure on the outside into the center so the heat from the composting process can kill parasites and weed seeds, and to achieve a more completely composted product.

Compost manure to produce a valuable resource. Composting has many benefits. It may reduce a manure pile to half its original size, produce a stable fertilizer, and kill animal parasites. For effective composting, build the pile dimensions to at least 3 feet tall by 3 feet wide, aerate the pile by turning it or inserting perforated pipes through the center, and water the pile until it is moist, but not saturated. You should not be able to wring water from a handful of compost. These steps should raise the temperature up to 131° F for at least three days in a row to kill worm eggs. Finished compost will smell earthy and feel cool to the touch.

Why: Composting livestock manure is an excellent manure management technique for small farm owners. Collecting manure on a daily or weekly basis from paddocks, stalls, and confinement areas for composting has several benefits:

- it provides the owner with a free source of compost for the yard, garden, pasture, or gardening neighbors that slowly releases nutrients and won't burn plants
- it reduces flies by eliminating their breeding ground
- it reduces the possibility of parasite re-infestation of your animals- the heat generated in the composting process kills parasite eggs
- it reduces the chance of manure contaminated runoff from your property contaminating surface and ground water
- it reduces the amount of mud in your confinement area, and increases the life of organic footing material
- it prevents the introduction of foreign weeds by sterilizing weed seeds found in the manure

STORAGE:

Store and cover manure to keep nutrients from leaching away. If you have few animals, you may only need a watertight tarp to go over and under a small manure pile. Locate the pile on a site that's high and dry. If you have many animals, you may want to install a roofed storage structure with a watertight floor. The manure stack should have two to three walls to hold leached materials and to ease manure handling. Storage facilities should be located more than 100 feet from wetlands, streams, or ditches and above floodplains.

STOCKPILING:

Stockpile manure during the fall and winter. The storage area should be big enough to store all the manure until it can be used as a fertilizer. Six months of storage, from October to April, will allow you to stockpile manure when soils are saturated or frozen and the potential for runoff is high. You can then spread manure in the spring, when plants are growing and can use the manure nutrients. See "Manure Storage Needed Per Animal" below for general guidelines on storing manure.

Manure is commonly stockpiled prior to use. Adequate storage area allows for greater flexibility in timing of manure use. Therefore, be sure you have a large enough storage area to accommodate the manure produced. Over time, the manure shrinks from decomposition and moisture loss.

Proper site selection for the storage area is important to safeguard against surface and groundwater contamination. Place stockpiles at least 150 feet away from surface water (creeks and ponds) and wells. Establish and maintain grass buffer strips between water bodies and manure piles. Construct a perimeter ditch or berm around the storage area, if needed, to prevent runoff onto or off of the area.

SPREADING:

Spread manure during the growing season. Spread manure or compost for use as a fertilizer on growing plants during the growing season. You'll need a tractor and manure spreader or a pickup truck and rake to spread manure. See "Acreage Needed Per Animal" for general guidelines for spreading manure.

Manure management in pastures depends primarily on getting good distribution of manure across the pasture. To avoid manure concentration in isolated spots in a pasture, distribute grazing evenly. Rotational grazing is one of the best ways to achieve this goal; however, horse owners don't usually have large enough pastures for rotational grazing.

On the other hand, pastures can be split, and the horses moved back and forth between both parts of the pasture to distribute the manure more uniformly. Availability of several watering facilities and moving feeding facilities periodically will encourage better manure distribution.

Avoid grazing during rainy periods when soils are saturated, to avoid soil compaction and manure runoff. Restrict access to streams to avoid manure deposition in or near water bodies. This can be done by fencing or providing shade away from the streams. Refrain from excessive stocking rates that lead to overgrazing. Damaging the grass stand increases manure runoff potential from pastures.

HAULING:

Manure and compost are sometimes landfilled, dumped in gullies and used to repair roads. These are not recommended practices due to high runoff and leaching potential from gullies and roadways. If the areas are not vegetated and are waterways for storm runoff, the potential for runoff of manure nutrients into creeks and ponds is high. When excessive nutrients exist in surface waters, plant and algal growth becomes extreme, the oxygen supply is depleted, and fish can be killed.

You may already be practicing proper mud and manure management. Good for you!
Here are some examples of good management:

- Manure pile is moved into a covered facility for winter storage.
- Animals are fenced away from the stream. A buffer of shrubs and trees planted next to the stream helps to filter animal yard runoff.
- Water tanks are located in each paddock and away from the stream.
- Roof gutters, downspouts, and a tile divert rainwater away from the animal yard and into the stream. Muddy areas are replaced with an installation of road fabric and gravel.
- Uphill drainage is diverted away from the animal yard and into the stream.

Horse Manure Management

by J.G. Davis and A.M. Swinker¹

Quick Facts...

- An average 1,000-pound horse produces 9 tons of manure a year containing valuable fertilizer elements.
- Horse owners have a responsibility to manage the manure that is a byproduct of their industry.
- Manure is commonly stockpiled prior to use. Adequate storage area allows for greater flexibility in timing of manure use.

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Composting produces a relatively dry end-product that is easily handled and reduces the volume of the manure (40 percent to 65 percent less volume and weight than the raw manure). Composting at proper temperatures can kill fly eggs and larvae, pathogens and weed seeds. Compost has less of an odor compared to raw manure and is more easily marketed. Composted manure acts as a slow release fertilizer and an excellent soil conditioner.

To be done right, composting requires an investment of time and money. Machinery required includes a tractor, a manure spreader and a front-end loader. Some ammonia-nitrogen is lost during the composting process, and an ammonia odor may result for a short period. When composting is done on a large scale, additional land and machinery requirements exist.

Microbes that drive the composting process require optimum conditions of temperature, moisture, oxygen, and carbon:nitrogen (C:N) ratio. The C:N ratio should be between 25:1 and 30:1; horse manure has an estimated C:N ratio of 50:1. With the addition of bedding material (high carbon content), the C:N ratio will be even higher. Therefore, N has to be added to the manure for it to compost properly. The addition of grass clippings, hay, or fertilizer [25 to 30 pounds N/ton of manure (75 to 90 pounds of ammonium nitrate or 50 to 65 pounds of urea)] should bring the C:N ratio into the optimum range. When microbes work properly, the compost temperature will be between 120 and 160 F. Cooler temperatures result from a lack of N. When the composting process is complete, the temperature will cool naturally.

It is important to have the right balance of moisture and air for the microbes to process the manure. The compost should be moist but not soggy, and may need to be watered or covered with plastic to maintain moisture. Aerate the compost by turning it regularly. The manure and bedding particles should be about one-half inch to one and a half inches in size. Composting does require effort, but the result is a more easily used and economically valuable fertilizer.