

Manure Composting for Small Horse Farms¹

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Introduction

Horse manure management is a key part of owning and caring for horses. Every current or potential horse owner should have a plan in place when it comes to managing, storing, or disposing of horse manure. If you manage horses on at least two acres per horse and house those horses exclusively on pasture, you likely will not have to remove the manure from the pasture. This article will focus on manure management from horses confined to stalls or small turnout paddocks. Putting thought into a manure management plan prior to placing horses on a farm is ideal, because once the horses are there, the manure is a gift that keeps on giving.

A single 1000-pound horse produces 35 to 50 pounds of manure daily, which is approximately 9.1 tons per year. Manure is considered the raw waste that is excreted from the horse and also any spent bedding material that might be in the stalls where the horses are housed, such as pine shavings or straw. With this amount of manure and spent stall bedding being generated by a single horse, it is essential that small horse farms with multiple horses properly store and manage this waste. If the manure remains unmanaged or is not stored correctly, there can be consequences for the farm and the environment.

Manure contains nutrients such as nitrogen, phosphorus, and carbon, and in excess amounts, these nutrients can create ground or surface water pollution. This occurs as the

leachate from piles of stored manure runs off into nearby waterways. Excess nutrient pollution within waterbodies is referred to as eutrophication, and this process can lead to environmental issues such as excess algal growth, oxygen depletion in the water column, and eventually fish kills and overall water degradation. Implementing best practices for manure management will help prevent equine waste from becoming an environmental hazard.

The purpose of this document is to present the benefits of composting horse manure on small farms and to provide guidance on how to implement manure composting. This article is intended for recreational horse enthusiasts managing equine on small (<20 acre) farms. This document is the first in a two-part series. The second document in the series provides tips and how-tos for effective compost management. Both articles in this series complement an [older publication](#) on horse-manure composting by providing more up-to-date science, illustrations, and hands-on how-to advice for horse owners. Both articles also rely on information provided by the Florida Department of Environmental Protection (FDEP) but condense the longer [FDEP booklet](#) into a web- and mobile-friendly format with illustrative examples and instructions for maintaining and using compost.

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The Benefits of Composting Horse Manure

Manure management options on small-acreage horse farms are limited. There are a few manure-hauling companies statewide that will collect horse manure on a regular basis (similar to trash pickup services). However, fees for services may be cost-prohibitive for noncommercial equine operations. Manure can also be stored and managed on-farm. The latter option is the most cost-effective and widely adopted strategy.

Once the decision has been made to manage manure on-farm, considerations for the amount of waste generated and deposition of this material on-site are extremely important in order to avoid excessive accumulation. Composting horse manure offers a beneficial, low-cost, and feasible approach for manure management for small-acreage horse operations. There are numerous benefits to composting manure from an environmental and farm management perspective. Environmentally, composting manure in the appropriate location will minimize the potential for nutrient leaching into nearby water sources. From a farm-management standpoint, composting is a resourceful means for managing the inevitable mountain of manure even a single horse will produce. Additionally, once it is processed through composting, manure is a valuable product that can be later land-applied to provide a stable, slow-release form of nutrients both in pasture and in other areas on the farm. Horses producing manure is a recurring event on farms that can make for large, unsightly mounds of waste that attract flies, generate odor, and may lead to complaints. One of the primary benefits of composting is the overall reduction in manure volume achieved through active composting. As much as 40% reduction in volume can be expected from well-managed compost systems. While manure that has been successfully composted and land applied will not eliminate the need for commercial fertilizers, the use of finished compost as a soil amendment on pastureland has many benefits, from increasing soil organic matter over time to allowing for greater water- and nutrient-holding capacity.

Choosing a Location for Your Composting Site

The first step in the manure composting process is to determine the proper location for a compost system. While it may seem like an easy task for those that have a larger property, there are some key considerations to keep in mind. Selecting an improper site for composting manure

can lead to an increased risk of nutrient leaching and runoff; overly shaded conditions can slow the compost process, and choosing an area of inadequate overall size can be problematic when needing sufficient room to store and manage manure produced daily while actively composting amassed material. **Avoid** locating your storage pile:

- Close to any waterbodies or water reservoirs such as lakes, rivers, streams, wetlands, and springs.
- In a hilly area with a sloped or mixed terrain.
- At the bottom of a sloped terrain where water may tend to collect or pool.
- In flood-prone areas.
- Directly over loose or well-drained soil that would promote leaching.

The location of your manure storage pile should be chosen with the intention of preventing nonpoint source water pollution, nutrient runoff or leaching, and displeasing aesthetics caused by visibility or odors. The composting site should also be built in an area that will allow constant access to the manure storage pile and the composting bins. Therefore, a **good** location for your composting site will be one that is:

- On flat and dry ground that does not promote potential nutrient runoff into surface waters or leaching into groundwater.
- Near (but not immediately next to) barns or stables where the horses are housed to allow for easier transport of manure.
- In an area that will allow easy access both on foot and with machinery if needed.
- Away from any waterbodies on the property or separated from water resources by a **buffer zone/strip**. A buffer zone, or buffer strip, is a row of vegetation that lines a waterbody and protects the water resource from nutrient runoff, prevents erosion, and can act as a wildlife habitat.
- Not visible from any nearby public places and out of site from neighbors.

For more information about how much distance you should place between water resources and manure storage sites based on the type of water resource, review Table 3 on page 23 of the following publication: *Small Scale Horse Operations: Best Management Practices for Water Resource Protection in Florida*.

Building Your Own Manure Composting Station

After you have decided on a location for your composting site, the next steps are to design and construct an appropriate structure. Ideally, the manure will be stored on an impervious or semi-impervious surface such as concrete or a hard-packed clay base. The construction of a roof over the compost system is optional, although temporary means of covering the pile such as a large tarp are recommended during heavy rainfall events to prevent saturation of manure/stall waste piles and runoff of nutrients. Once you've selected a spot on your property for your manure storage pile, you will want to:

1. Level the ground and add an impervious layer of flooring.
 - a. For flooring that is less permanent, a thick layer of well-compacted soil with a clay base would also work.
2. To help contain the manure/stall waste, use wood materials or concrete to create three walls around the pile while leaving one side open for access.
 - a. Allowing the walls to have some open spacing provides airflow, which can improve the composting process. An example might be using wood boards and allowing a 2–3 inch gap between each board or using a type of wood lattice to construct the walls.
3. Select a proper cover for your storage pile.
 - a. For a smaller pile, it may be suitable to simply use a tarp or a piece of plywood to cover the pile.
 - b. For larger manure piles, it is recommended to add a permanent slanted roof to the structure to prevent rain from washing away any manure.
 - c. Keep in mind times of the year when additional moisture might be needed. A cover is helpful when too much rain is expected, but you might need to add a sprinkler system or manual method of applying water should the pile become too dry.

Once you've constructed your manure storage pile, it is up to you to decide if you need separate composting bins specifically for composting or if your storage pile will also act as your composting bin. For horse farms with just one horse, it may be possible to use your storage pile as your composting pile because there is a smaller amount of manure being generated. Keep in mind that you will still

need to add bedding materials, such as spent hay, pine needles, and leaves, for efficient composting results.



Figure 1. A tractor unloading or loading material.
Credits: UF/IFAS Photo by Sally Lanigan



Figure 2. Compost bins.
Credits: Caitlin Bainum, UF/IFAS

For horse farms with more than one horse, it will be more beneficial to construct separate composting bins in your composting site. For example, for a farm with 2–3 horses, having at least two composting bins is recommended. These composting bins will be built the same way as the manure storage pile, and their size will depend on the number of horses owned and the number of months the compost is to be stored. Note that there should be easy access to the top of the compost pile.

Here are the steps to calculate the appropriate size of each compost bin for your farm:

1. Determine the total volume of manure and bedding that your farm produces each day.
 - a. **REMEMBER:** You must also include the volume of bedding that is to be added to the compost bin in this calculation.
 - i. The volume of bedding added should at least match the volume of manure each horse produces. (For example, 1 cubic foot of bedding per 1 cubic foot of manure generated.)
 - b. A mature 1000-pound horse produces approximately 1 cubic foot of manure per day on average.
 - c. To calculate, multiply the number of horses you own by 2 cubic feet. The 2 cubic feet represents the 1 cubic foot of manure produced per horse, plus the 1 cubic foot of bedding to be added.
2. Determine the total volume of manure and bedding that will be generated throughout your storage period.
 - a. The length of time you choose to store your manure compost should be between 4 and 6 months to ensure optimal processing and successful conversion into reliable compost.
 - b. To calculate, multiply the total volume of manure and bedding generated per day (calculated in step 1) by the number of days you plan to store your compost in the composting bins.
 - i. The recommended number of storage days is 120–180 days.
3. Determine the correct size for the compost bins based on the number of bins you are choosing to construct.
 - a. Divide the volume you calculated in step 2 by the number of compost bins you are planning to construct.
 - i. This gives you the appropriate volume of each compost bin.

- b. In order to find suitable dimensions for each bin, there are a few options:
 - i. Calculate the cube root of this volume to see what the exact dimensions of the bins would be if they were cubes and work from there.
 - ii. If you have a particular dimension that you favor for one of the sides (e.g., height must be 4 ft), divide the bin volume by this number and see what the options are for the other two dimensions.
- c. **REMEMBER:** When you multiply the length, width, and height that you've chosen, this volume **must** be equal to **or** greater than the volume that you calculated in step 3a. The calculation in step 3a gives you the *minimum* volume that each compost bin should have for your farm's needs.

Once you have constructed your composting site, you will be ready to learn how to properly manage and tend to the composting bins to ensure that the manure successfully transforms into finished compost. To learn how to effectively manage your compost system, continue to the next article in this series, which details proper manure-composting techniques and the different elements that go into manure processing.

Additional Guidance

A newly available resource, the UF/IFAS Equine Best Management Practices (BMPs) website provides access to multiple educational materials focused on recommended BMPs for small-acreage equine farms and equestrian properties. Website resources include guidance on adoption of structural (e.g., designing manure storage and manure compost structures) and nonstructural (e.g., managing fertilization and grazing practice) BMPs to promote environmental stewardship and water resource protection. The website also features a Virtual Assessment Tool survey, which allows equine property owners to assess their current farm management practices. The Virtual Assessment tool provides feedback and directs the user (as appropriate based on submitted responses) to relevant resources for improved implementation of manure management practices and other helpful farm management strategies. More information for how to access and utilize the Virtual Assessment Tool is provided by visiting the [Equine BMP website](#) and clicking on the button labeled “Go to survey” on the home page or the Virtual Assessment Tool tab located on the main menu bar.

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