



# Manure Management for Horse Owners

## Equine Water Quality Education Series

This fact sheet provides an overview of some good stewardship practices for horse owners and how they manage their manure. It focuses on three techniques for managing horse manure and bedding: direct application of manure, fertilizer nitrogen enhancement and composting.

### Manure Storage

The amount of manure from your barn will vary largely on the amount of bedding that you use. Heavily bedded stalls will generate more and frugal horse owners will keep the amount of bedding they buy to a minimum. On average, however, a 1,000-pound adult horse bedded with wood chips or sawdust will generate about 25 cubic yards of manure and bedding per year. To limit the environmental harm from runoff, manure should be stored at least 50 feet from any drainage way or water course.

Check with your local U.S. Department of Agriculture Natural Resource Conservation Service (NRCS) office or Conservation District for technical help on building good manure storage structures. In some cases, state or federal funds may be available to help with the cost of building manure storage structures.

### Direct Application of Manure

Horse manure (including urine, feces and bedding) contains the fertilizer nutrients of nitrogen (N), phosphorous ( $P_2O_5$ ) and potassium ( $K_2O$ ). Fortunately, plants need these nutrients to grow. Adding more nutrients than crops need, however, can pollute soils and water. In addition, manure contains disease-causing pathogens and parasites that also can pollute water systems. The trick is to put just enough manure on a field to help the crop grow and no more. If too much manure is applied, part of it may seep down and

pollute groundwater and wells. Part of the manure also may wash into surface water like ditches, streams and lakes, polluting them.

### How much manure is enough?

To determine how much manure is enough, follow the three steps discussed below and see the example in the box.

#### Step 1

Get a soil test for the field where you plan to spread the manure. This test will tell you the amount of fertilizer and manure nutrients that the crop needs. See your local LSU AgCenter extension agent for information on soil testing.

#### Example

**Step 1:** The soil test says each acre of your mostly grass pasture needs:

Pounds/Acre		
N: 60	$P_2O_5$ : 35	$K_2O$ : 80

**Step 2:** You have one 1,000 pounds horse. Its manure will have:

Pounds/Year		
N: 32	$P_2O_5$ : 40	$K_2O$ : 72

**Step 3:** Look at the N and  $P_2O_5$  numbers from the soil test

- The manure from the horse will have about one-half of the N needed for 1 acre pasture.
- However, the manure will have slightly more pounds of  $P_2O_5$  than 1 acre of pasture needs.
- Therefore, you will need at least 1 acre or pasture to spread the manure and use the nutrients.

**That is just enough.**

- You can use the same process for any number of horses or any other crops.

## Step 2

Estimate the amount of manure nutrients that your farm generates. You can test the manure pile, but it is very hard to get a good, well-mixed sample to send to the laboratory. Most people use book values, and that is OK. In general, a 1,000-pound horse will produce about 8 tons of manure per year. After accounting for storage and spreading losses, 1 ton of horse manure has around 4 pounds of N, 5 pounds of  $P_2O_5$  and 72 pounds of  $K_2O$  in a year. If the horse is on pasture half of the time and in a stall the other half, half of the total nutrients will be collected in the manure pile and spread on crops.

**Note:** Double these numbers for a 2,000-pound draft horse and cut them in half for a 500-pound pony.

## Step 3

Now look at the total amount of nutrients needed for the crop (step 1) and the total nutrients in the manure pile (step 2). Spread enough manure on the field to supply all of the crop's N or  $P_2O_5$  needs (whichever is less) and that is... "just enough."

## To Compost or Not Compost? That Is the Question

Horse manure mixed with straw, old hay or paper product bedding materials is very similar to other livestock manure. It can be used raw for crops. In general, these products are also easy to compost, which increases the number of disposal and use options.

Horse manure mixed with sawdust (Figure 1) or woodchips is a totally different story. When these mixtures are spread on farm fields, they often stunt crop growth. Since farmers do not want to stunt their crops, horse owners using these bedding products are left with few good options for disposing of the manure.



Figure 1. Stall cleaning

So why do sawdust and wood shavings stunt crops? These wood products have a lot of carbon that soil microorganisms use for energy but not enough nitrogen to build proteins. In other words, the microorganisms have an unbalanced diet and they need nitrogen. They find that nitrogen in the soil and collect it better than plants do. In fact, they do it so well that the plants growing in the soil cannot find enough nitrogen to grow properly. That is called an "induced nitrogen deficiency" and it stunts crops.

There are at least two very different ways to overcome this nitrogen deficiency problem. One option is a nitrogen enhancement system in which specific nitrogen fertilizers are added. The other option is to compost the materials.

## Nitrogen Enhancement System

This is a very simple system for the horse owner. The final product can be applied to crops; basically it acts like any other raw livestock manure in the soil. It should not be considered compost, however, because it lacks many of the desirable characteristics of composted manure.

In this system, the horse owner adds nitrogen fertilizer to the manure and sawdust (or wood shavings) mix. The added fertilizer feeds the soil microorganisms so they do not need to steal soil nitrogen from the crops. Use only ammonium nitrate fertilizer with an analysis of 34-0-0 or ammonium sulfate fertilizer with an analysis of 21-0-0. Other types of fertilizer (especially urea) can be lost into the air and do no good.

For a 1,000-pound horse, add about one-third pound (about one-half cup) per day of either fertilizer as the stalls are cleaned. Simply pick a stall clean with a manure fork, then add about one-half cup of fertilizer to the wheelbarrow or spreader. **Apply the ammonium nitrate or ammonium sulfate to the manure only after it has been removed from the stall.** Adjust the amount of fertilizer for much smaller or larger horses. For example, only about one-fourth cup is needed for a 500-pound pony. After the fertilizer has been added to the manure and sawdust or manure and wood chip mixture, it can be used immediately. It also can be stored for several months without losing the nitrogen. Then it can be spread when the field and crop conditions are best.



Figure 2. Fully composted manure.

## Composting Horse Manure

Composting has several advantages over the nitrogen enhancement system discussed earlier. In a properly operated compost system, the total amount of manure and bedding is reduced and the fertilizer nutrients are concentrated. Composting creates its own heat, and the high temperatures kill bacteria, parasites and insect eggs. Fully composted horse manure also will not attract adult flies (Figure 2).

Composting is easy. To producing good compost from horse manure and wood shavings, just add water and stir. The stall waste will compost on its own. Figure 3 shows the temperature and volume changes taking place in a compost pile made with stall waste from horses bedded on wood shavings.

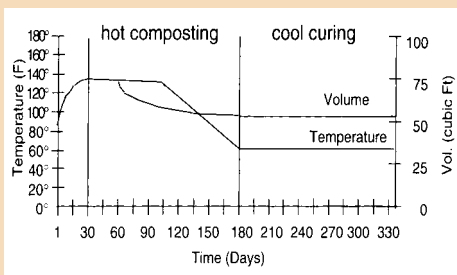


Figure 3. Temperature and volume changes in a static compost pile made with stall cleanings from horses bedded on wood shavings (Hamilton, 2002).

### Composting takes place in three phases:

- A short warm-up phase lasting a few days to a month
- A hot composting phase lasting three to four months
- A cool curing phase lasting another three to four months

Bacteria create the heat during the hot composting phase. Curing takes place at lower temperatures and it is the work of fungus, worms and other animals. Stall waste that has gone through hot composting makes good fertilizer, but the nitrogen and organic matter in cured compost are more stable than in uncured compost. Most gardeners want cured compost because adding this is like giving the garden an extra dose of fertilized soil. It takes six to eight months to produce cured compost from raw stall waste.

Composting is a simple process and is more than just a “manure pile,” but there are a number of things in to remember to produce quality compost:

- Thoroughly mix raw waste with hot compost.
- Maintain 50 percent moisture content in the first 6 feet of the bin. (Squeezing moist compost should yield just a few drops of liquid).
- Stack enough material in the bin to insulate the hot compost (Figure 4). The pile should be at least 6 feet wide and 3 feet high.

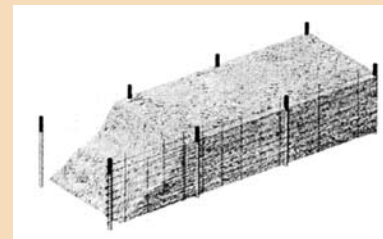


Figure 4. Horse manure compost bin.

- If the pile is too wide or too high, the flow of oxygen to the micro-organisms composting the mixture may be cut off.
- Make sure the bin is less than 10 feet wide and 5 feet high.
- Arrange bins so they can be reached from both ends.
- Choose the right number and size of bins for the number of stalls according to Table 1 (next page).

For more information on composting horse manure, get a copy of the *Composting Horse Manure for Environmental and Economic Benefits #3128 E* from the LSU AgCenter. Another good source of information is NRAES-54, *On-Farm Composting Handbook*, which can be ordered at <http://www.nraes.org>.

Table 1. Size and number of bins needed based on number of horses in stalls.

Number of Stalls	Number of Bins	Length of Bins (ft)	Number of Posts	Number and Length of Fencing Rolls
1 to 3	1	18	8	1 x 50'
3 to 5	1	30	12	1 x 75'
6	2	18	16	2 x 50'
1 to 8	2	30	24	2 x 75'
9	3	18	24	3 x 50'
10 to 11	3	30	36	3 x 75'

Hamilton, D. *Composting System for Small Horse Farms*. Oklahoma Cooperative Extension Service. F-1729.

## Points to Remember

- Horse manure contains fertilizer nutrients that can pollute the environment if the manure is mis-handled.
- Wood shavings and sawdust bedding can rob soil nitrogen. Follow the “nitrogen enhancement system” or compost these materials before applying them to the soil.
- Compost is a simple and natural way to treat manure.

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Pub. 3128-G (500) 7-09

Issued in furtherance of Cooperative Extension work, Acts of Congress of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. The Louisiana Cooperative Extension Service provides equal opportunities in programs and employment.