

Composting Design Guide for Small Farms

(Ag Nutrient Management Grant Program)

Why Compost?

Gardeners and organic growers know the value of composted manure for improving soil fertility, tilth, and moisture holding capacity. Horse stall compost has almost a perfect proportion of nutrients to organic matter for garden crops. Horse and small animal owners should consider composting for other reasons as well. (1) Composting reduces the volume of waste to be stored on the farm. (2) Composting is a clean alternative to storing manure and bedding in piles. (3) The high temperatures created during composting kills fly eggs, and well-composted cleanings will not attract adult flies.

Composting Basics

Composting is easy. However, there are a few things to remember to produce quality compost. The recipe to produce good compost from horse manure and wood shavings only requires adding water and mixing. If the manure you are composting comes from other animals (beef, sheep, goats, etc) with less bedding, then you may need to add additional *carbonaceous materials* such as: sawdust, wood shavings, grass clippings, leaves, etc to improve the composting process.

Composting typically takes place in three phases. It takes 6 to 8 months to produce cured compost from raw stall waste. The phases are:

- a) A short warm-up phase lasting a few days to a month.
- b) A hot composting phase lasting 3 to 4 months.
- c) A cool curing phase lasting another 3 to 4 months.

The following information provides additional suggestions for producing good compost:

1. Select a site for your composter bins that are easily accessible, level, and on dry ground. The bins should be at least 100 to 150 feet away from wells, ditches, streams, and lakes. Leave a buffer strip of taller grasses, wildflowers, and shrubs between the compost bins and any drainage way to filter stormwater runoff from the compost area. The compost piles should be covered to control and maintain proper moisture levels. A properly sized manure storage facility with roof could be used to compost manure. (Ex. A 12' x 12' bin under a roof with a center wall splitting the bin in half may be perfect for 6 months storage in each half allowing composting to take place in one half while storing manure in the other half.) A pile of the mixture on the ground with a tarp covering it can also work. Either way, management of the compost mixture with periodic turning is important.
2. Thoroughly mix the raw material with compost or several cubic feet of soil to begin the composting process.
3. Maintain 50% moisture content in the material by adding water as needed with a garden hose. (Squeezing moist compost should feel moist but not saturated with liquid.)
4. Start the process with enough material in the stack to insulate the hot compost. The pile should be at least 6 feet wide and 3 feet high.
5. 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 12 feet wide and 4 feet high.
6. Manure without bedding, or manure with sawdust or wood shavings may create a pile with too little air space. Measure air space using the "five-gallon bucket test" (see below). Add bulking materials, such as shredded wood, bark, or dry straw, to increase air space as needed.
7. Arrange and size the bins so they can be accessed easily for mixing and emptying. You will need a minimum of two bins to store and compost at the same time. Size each bin to store 6 to 8 months of produced waste. Bins can also be covered with tarps rather than a roof to control moisture.
8. Turning the mixture, mixes the pile's cooler outside layer with the hotter center and enhances the composting. After the pile is built, wait **7 to 28** days before turning it the first time so it can "cook". Try turning the pile again at **24, 72 and 120** days. **Three to seven** turns during the life of the pile are common. Base the turning schedule on the compost pile's materials, weather, and

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anticipated use of the compost. When mixtures have the right amount of moisture and air space, a temperature of 120 ° F or lower usually indicates the need to turn the pile so it can reheat.

9. The higher the bedding-to-manure ratio, the more likely it is that you will need supplemental nitrogen. If you have the proper amount of water and free air space and the mixture doesn't heat up, add one-third cup of a commercial nitrogen fertilizer to the pile each day until it begins to "cook".
10. Additional information for operating a composting facility is available from the Cooperative Extension or your local NRCS office. There is also a lot of information available on the World Wide Web.

Using Compost

Good quality compost should be applied only at recommended rates and to plants and soils that can use the nutrients. As a rule of thumb, good quality horse manure compost can be applied ½ to 1 inch thick and then mixed well into the soil. You will need to think about who will use the finished compost. Will you use it yourself, sell or give it to your neighbors, or market it in the local area. By using compost to grow plants we complete the organic matter cycle.

Five-gallon Bucket Test

Materials needed:

- Five-gallon pail
 - One-gallon pail
 - Typical mix of materials added to the compost mixture (horse manure, shavings, straw, etc)
1. Fill the five-gallon pail one-third full with the mixture of typical compost material. Drop the pail 10 times from a height of 6 inches onto a concrete floor or sidewalk. Be careful not to spill any of the compost material.
 2. Add more material to fill the five-gallon pail two-thirds full. Drop the pail 10 times from a height of 6 inches as before.
 3. Fill the five-gallon pail up to the top. Drop the pail 10 times from a height of 6 inches again. Fill the five-gallon pail to the top once again.
 4. Add water to the five-gallon pail, keeping track of how much you can fit in before it overflows. If you can add 2-1/2 to 3 gallons of water, you have adequate free air space. If not, you need to add more bulking material such as straw, coarse wood chips, or shredded bark.
 5. If you can add more than 3 gallons of water, you have too much free air space. The particle size must be reduced by shredding or grinding the compost materials or by mixing finer materials and/or manure into the compost.

Your Composting Operation

Composting is a balancing act. Providing ideal environmental conditions for microbial growth accelerates the process. Just enough water, air, carbon, and nitrogen getting piled, turned, and aged without contaminants makes for good compost.

You'll need to customize the process to fit your specific combination of manure, bedding, and other organic materials. You can find the best mixture by developing a clear understanding of the process, accurately measuring materials, and going through some trial and error. Mixing the compost pile is important to get good quality compost. Depending on the size of the pile, a tractor mounted front end loader works well to mix the pile in the bin. You may also need multiple bins depending on the amount of waste material produced to keep the maximum size less than 12'x12'. Several smaller widths are better than one large size.