



# LPES Small Farms Fact Sheets\*



Photos courtesy of USDA NRCS.

## A Horse Owner's Guide to Good Stewardship

By Randall James, Ohio State University Extension

### Summary

*This fact sheet provides a brief overview of some good soil and water stewardship practices for horse owners. It focuses on basic pasture and paddock management and on manure management. Two manure treatment options, composting and fertilizer nitrogen enhancement, are presented along with a method to calculate the proper manure application rate on pastures and crops.*

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\*Now available online at [www.lpes.org](http://www.lpes.org).



## Introduction

In terms of environmental stewardship, it is helpful to remember that horses are livestock and that horse owners and commercial stable managers face environmental challenges very similar to those faced by other livestock owners. They need to develop a manure management system that uses the fertilizer nutrients in the manure without polluting the environment. They need pasture and paddock management to keep soil and manure on fields and out of streams and ponds (Figure 1). Finally, they need to get along with their neighbors.



Figure 1. Poor paddock management.

Photo courtesy of Ohio State University Extension.

## Manure Management

Horse manure (including urine, feces, and bedding) contains the fertilizer nutrients of nitrogen (N), phosphorus ( $P_2O_5$ ), and potassium ( $K_2O$ ). Fortunately, plants need these nutrients to grow. However, adding more nutrients than crops need can pollute soils and water. In addition, manure contains disease-causing pathogens and parasites that can also 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 may also wash into surface water like ditches, streams, and lakes, polluting them.

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For more information, see the Small Farms fact sheet titled, "Manure on Your Farm: Asset or Liability?"

### 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 County Extension Office for information on soil testing.

#### 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 lab. Most people use book values and that is okay. In general, a 1,000-pound horse will produce about 8 tons of manure per year. After accounting for storage and spreading losses, a ton of

#### Example

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

Pound/Acre		
<u>N</u>	<u>P<sub>2</sub>O<sub>5</sub></u>	<u>K<sub>2</sub>O</u>
60	35	80

**Step 2:** You have one 1,000-pound horse.

Its manure will have:

Pound/Year		
<u>N</u>	<u>P<sub>2</sub>O<sub>5</sub></u>	<u>K<sub>2</sub>O</u>
32	40	72

**Step 3:** Look at the N and P<sub>2</sub>O<sub>5</sub> numbers from the soil test.

- The manure from the horse will have about 1/2 of the N needed for 1 acre of pasture.
- However, the manure will have slightly more pounds of P<sub>2</sub>O<sub>5</sub> than 1 acre of pasture needs.
- Therefore, you will need at least 1 acre of 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.

horse manure has around 4 pounds of N, 5 pounds of P<sub>2</sub>O<sub>5</sub>, and 9 pounds of K<sub>2</sub>O. So a 1,000-pound horse will produce about 32 pounds of N, 40 pounds of P<sub>2</sub>O<sub>5</sub>, 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, then 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.

**In general, a 1,000-pound horse will produce 8 tons of manure per year.**

### 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."

### Manure Storage

This varies widely depending on the amount of bedding

use. 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 runoff, manure should be stored at least 50 feet from any drainage way or water course and be surrounded by grass (Figure 2).

For more information, see the Small Farms fact sheet titled "Got Barnyard and Lot Runoff?"

Check with the USDA Natural Resource Conservation Service (NRCS) office or your local 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.



Figure 2. Horse manure storage structure.

Photo courtesy of Ohio State University Extension.



## Pasture and Paddock Management

The basic environmental goals of horse pasture management are fairly simple.

1. In a pasture, plenty of grass and other plants are **good**.
2. Bare soil is **bad** (Figure 3).
3. Brown water, from soil and manure running off of a bare pasture, is **very bad**.



Figure 3. Overgrazed paddock.

Photo courtesy of Ohio State University Extension.

Proper fertilization, fencing, and feed and watering station layout can all increase a pasture's productivity. Keep in mind that it is generally better to have several small pastures

than a single large one (Figure 4).



Figure 4. Small paddocks in a suburban setting.

Photo courtesy of USDA NRCS.

It is also important to fence horses out of streams and ponds and to carefully plan any necessary stream crossings (Figure 5).



Figure 5. Well-designed stream crossing.

Photo courtesy of USDA-NRCS.

Depending on feeding goals and the region of the country,



the recommended amount of pasture needed per horse ranges from about ½ acre to 2 acres. If you do not have ample pasture, you may need to limit the amount of time that the horses are allowed out.

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A small “sacrifice paddock” where the horses exercise when they cannot be on pasture is an excellent management tool. Better yet, ask your local office of the USDA NRCS or Conservation District for help in designing a “horse exercise lot” or “heavy-use pad” for an all-weather horse exercise area.

For more information, see the Small Farm fact sheet titled “The ABCs of Pasture Grazing.”

### Manure Treatment: To Compost or Not to 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 6) or wood-chips 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 6. Sawdust bedding.

Photo courtesy of Ohio State University Extension.



Horse owners using sawdust or wood-chips have few good options for manure disposal.

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.

### The 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 1/3 pound (about 1/2 cup) per day of either fertilizer as the stalls are cleaned. Simply pick a stall clean with a manure fork, then add about 1/2 cup of fertilizer to the wheelbarrow or spreader. Adjust the



amount of fertilizer for much smaller or larger horses. For example, only about  $\frac{1}{4}$  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 can also be stored for several months without losing the nitrogen. Then it can be spread when the field and crop conditions are best.

**After fertilizer has been added to a manure and sawdust or manure and wood chip mixture, it can be used immediately.**

For more information on the nitrogen enhancement system, get a free copy of the Ohio State University Extension fact sheet AGF-212, "Horse Manure Management:

The Nitrogen Enhancement System" at their website, <http://ohioline.osu.edu/agf-fact/0212.html>.

### 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 7).

**In a properly operated compost system, the total amount of manure and bedding is reduced and the fertilizer nutrients are concentrated.**



Figure 7. Fully composted manure.  
Photo courtesy of USDA NRCS.

However, composting takes some planning and management. It is more than just a “manure pile,” and it generally takes at least six to eight months to make fully cured compost. Finally, if too much sawdust or wood shaving bedding is used, the induced nitrogen deficiency problem discussed earlier may still show up even though the manure looks “composted.”

**It generally takes at least six to eight months to make fully cured compost.**

For more information on composting horse manure, get a copy of the Oklahoma

Cooperative Extension Service fact sheet F-1729, “Composting for Small Horse Farms” at <http://osuextra.com/>.

Another good source of information is NRAES-54, “On Farm Composting Handbook,” which can be ordered from MWPS at 1-800-562-3618 or through the NRAES website at [www.nraes.org](http://www.nraes.org).

### Points to Remember

- Horse manure contains fertilizer nutrients that can pollute the environment if the manure is mishandled.
- Several smaller paddocks are usually better than one large one.
- Do not overgraze or overstock pastures and paddocks.
- Fence horses out of streams and ponds.
- Wood shavings and sawdust bedding can rob soil nitrogen. Follow the “nitrogen enhancement system” or compost these materials before applying them to the soil.



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## **For More Information**

### **Educational Resources**

<http://www.lpes.org/>—To view the Livestock and Poultry Environmental Stewardship (LPES) curriculum resources

<http://www.reeusda.gov/1700/statepartners/usa.htm/>—To obtain state Cooperative Extension contacts

### **Environmental Regulations Related Resources**

<http://www.epa.gov/npdes/afo/statecontacts/>—To obtain state environmental agency contact

### **Small Farm Resources**

USDA-CSREES Small Farm hotline—1-800-583-3071

### **State-Specific Resources**

The local contact for your land-grant university Cooperative Extension program is usually listed in the phone book under “Cooperative Extension” or “*(county name)* County Cooperative Extension.

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