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Notes from the field – Spring & Summer 2010: Manure Management
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Spring – Summer 2010: Manure Management

We survived the winter of 2009 and 2010! Construction on the O2 Composter was delayed but we finally finished the installation in late spring.

The importance of manure management on horse farms is often overlooked. Most of us clean our barns, go out the backdoor of the barn, hang a left, and dump the wheelbarrow. The pile is located for daily convenience, maybe with or without thought for accessibility for later spreading or removal. The size grows by the day and, unless you have a tractor with a bucket to stack the pile higher, it takes up more and more space. And it's a BIG issue. Each horse produces 45 pounds of manure per day which is 8.2 tons annually. If you have 5 horses, like many local farms, you have a 40 ton issue. Bedding from stalls increases the tonnage.

I like this statistic from the [O2 Compost](#):

The horse manure generated in U.S. could fill the Rose Bowl Stadium 22x each month – add bedding and the volume doubles or triples



Fairfax Water provided \$10,000 in grant funds to help us manage horse manure, *innovatively*



Rose Bowl Stadium

Most horse farms aren't collecting all the manure produced on the farm. Manure will be collected from stalls and should be collected from any dry lots or sacrifice area paddocks. A small-acreage horse farm with about 1 acre of grass per horse will collect about 60% of the manure produced or about 5 tons per year. The manure deposited in a well managed pasture

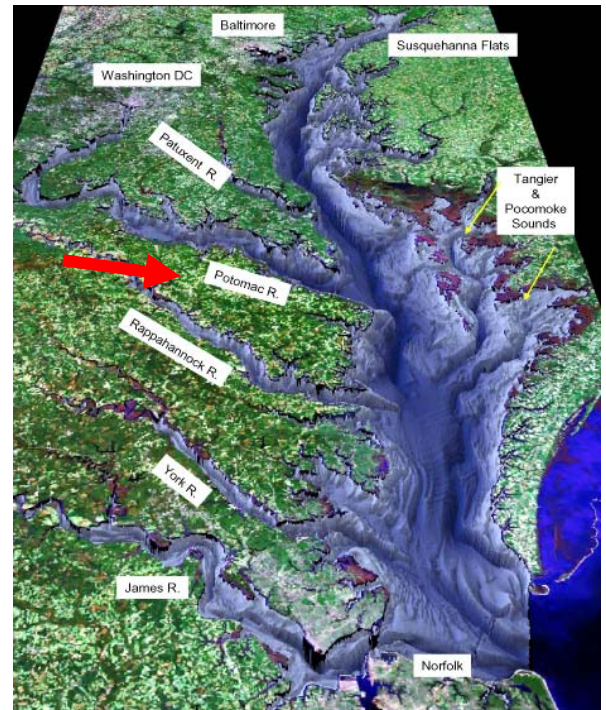
should be utilized by grasses. If your pasture is thin, unhealthy, compacted, and/or overgrazed the manure will likely runoff in rainstorms—this is one of the environmental issues. Another environmental issue is the potential of groundwater contamination from rainwater washing through your large manure storage pile. Some soils drain more quickly than others. You know this if you've ever made mud pies or spent time at the beach. When water moves very quickly through a particular soil type the soil is said to be highly leachable. If you have a highly leachable soil type on your property anything applied to the surface, including manure, fertilizers, and pesticides, have the potential of being carried through rainwater, into the soil, and into the groundwater. This is particularly bad news, if you or your neighbor drinks well water.



Clean drinking water is important to everyone

So, as we were designing the overall manure management plan for Oakwood Farm, we had a few key items to keep in mind:

- ✓ The four horses produce 20 tons of manure, to be collected
 - The other 12 tons deposited on the pastures should be utilized by the healthy stand of grass and any runoff will be filtered by our streamside buffer
- ✓ The volume of this manure is estimated at 2 cubic yards per month
- ✓ We wanted a storage facility rather than a meandering pile
- ✓ We wanted to experiment with alternatives to a roof
- ✓ We needed a storage sized to hold about 120 days of storage to make sure she could store her manure through times when grasses are not actively growing (all winter and periods of drought or dormancy)
 - Only actively growing plants can absorb/utilize nutrients
 - Nutrient-rich runoff is one of the biggest pollutants to the [Chesapeake Bay!](#)
- ✓ We needed to locate the storage so that it was accessible for daily use, for periodic cleanout, and/or eventual on-farm use
- ✓ We needed a storage system that could be managed without the use of heavy equipment, except at the time of cleanout
- ✓ We wanted to compost the manure/stall waste to kill fly and parasite eggs, and weed seeds, and to turn the stall waste into a desirable product



View of the Chesapeake Bay

The 3-bin composting system is fairly common. On horse farms, a 3-bin system could be used a couple of different ways. The first way would be to “heap” compost, filling one bin at a time. Each bin would hold stall waste in various stages of decomposition. Another way to use a 3-bin system would be to fill the first bin then, move the contents to the second bin and later to the third bin. Eventually all 3-bins

would be full again, the contents would be in various stages of decomposition but, because the contents were moved from bin to bin the composting process would be more “active.” Moving the waste from bin to bin helps to aerate it.

Moisture and aeration are needed for the composting process. Stall

waste will “heap” compost over time without any management



Simple 3-bin system

using just rainfall for moisture but the process can take up to 18 months. That’s a lot of stored waste, if you don’ have a use (or removal plan) for the un-composted product.

In contrast, if you “actively” manage your waste, you can expect to have compost in a little as 3 months. Active management includes keeping the waste as moist as a rung out sponge and periodically turning, stirring, or fluffing the waste with the bucket on your tractor or a shovel to aerate it. Actively managed compost will reach a temperature of at least 140 degrees which has the added benefit of killing weed seeds and fly/parasite eggs.



Composting kills fly and parasite eggs

This compost is more desirable for use as soil amendment on your own pastures (based on soil tests, of course) or marketable to give away or perhaps even sell for gardeners or landscaping companies.*

*IMPORTANT NOTE – Some of the most horse-friendly pesticides used for weed control have a residual that travels through the horses’ digestive system (w/o harming them) and is passed out in the



How much do you know about your hay?

manure. The manure is then “contaminated” with the pesticide residual. The manure or



Pesticide residuals in horse manure can kill plants

compost will often damage or kill any broadleaf plants (including garden plants) on which it is applied. By “horse-friendly” I mean that often these are the pesticides that you can spray on your pastures and immediately allow the horses to graze. Don’t use pesticides? How much do you know about the hay you feed your horses? Did you purchase all the hay from one farmer? Did it come from one field or multiple fields? Was it purchased by your supplier in bulk from an auction? Do you ever purchase a few bales from a local feed or farm store? This might be more of an issue for you than you realize. A simple test that can be used to check for the residual is to take a small amount of compost and try to grow bean or tomato seeds. Pesticides to watch for include Grazon, Surmount, Crossbow, Milestone, Forefront, Redeem P&R, Remedy and Remedy Ultra, PastureGuard, and Curtail. For more information click here to read a publication from [NC State University](#) entitled “Herbicide Carryover in Manure and Hay: Caution to Organic Farmers and Home Gardeners.” Once the manure has been

contaminated, the residual can persist for years. This compost can safely be used on your pastures. It will damage broadleaf plants, not your grasses.

We decided to utilize a design and innovative technology from a company called [O2 Compost](#). Their designs include a blower system to aerate the stall waste without the need to manually turn the pile. Designs range from affordable “do-it-yourself” systems for up to four horses to much more expensive systems designed for larger boarding or breeding operations. Curtis Crawford of [Crawford Fencing](#) installed our composter.



A “do-it-yourself” O2 composter for up to 4 horses

We decided to test the technology, using grant funds from [Fairfax Water](#) installing a mid-range unit called a macro-bin system. Our design includes 3 bins, sized 8 feet x 8 feet x 4 feet tall. Each bin should hold the waste produced over a 4-6 week period and the whole system should store enough stall waste and compost so that compost does not have to be spread over the winter or other times when the grasses are dormant.

The composter is built with pressure treated wood. You may also consider the use of cinder blocks or even wood/plastic composite materials that are used for decks. Different materials affect the cost and longevity of the composter. Untreated wood will probably “compost” or rot along with your stall waste fairly quickly so cost of replacement should be considered.



Installing the PVC pipes for the blower in our system

The floor of our composter is elevated and a PVC pipe blower system is beneath the wooden floor boards. Small spaces between each floor board allow the air to travel up and into the pile. The blower is operated on a timer so that the pile is aerated at brief intervals throughout the day and

night.

The blower on our system uses solar power. The solar powered unit was developed based on our request and is one of the first solar powered O2 in the U.S.—we heard another solar powered O2 composter is being installed for the White House gardens.



Solar panel for composter

Farm expense vs. potential farm income



We decided to try the O2 compost technology to see if it could be used as a chore-efficient way to turn stall waste into compost. Many area horse owners, myself included, work full-time off the “farm” and don’t have a tractor to use to aerate their stall waste. It would be great if our stall waste could become an asset to the operation and maybe even a source of farm income, as compost.

The placement of the composter, in the hillside, was another attempt to make filling the bins more chore-efficient. If you’ve never kept your stall waste in a structure you may not have thought about the logistics of filling the bins by the wheelbarrow load.



View of composte site from hayfield



Grading the site for our "top-down" composte

I have a composte built to the [Natural Resources Conservation Service](#) specifications. The bins are 5' tall (and no built-in aeration). When I dump my wheelbarrow each day in the bin, the manure builds up in multiple piles only about a foot tall. Every week or so, I have to manually shovel the waste up and back into the bin to fill the bin space. My bins are 5' tall and I'm almost that tall—you can imagine that this is very labor intensive and not my favorite chore.



Shovel or tractor required to fill bin

The composting system on Oakwood Farm was built into the hillside so that Edith Kennedy can fill the bins from above, utilizing gravity instead of machinery or manpower. If you don't have a means to manage the waste, and you have a hillside, you might want to consider what is called a top-down system, like ours.

Also in terms of placement, you should consider the path you take to clean your sacrifice area paddock(s) and stalls. Edith told us that she typically starts

her manure management chores by cleaning the mares paddock, at the northern side of the barn, cleans through the barn, and then finishes at the southern geldings paddock. The composte is located in the fence line between the gelding paddock and the adjacent hayfield.

The location of the hayfield was another factor in the placement of the composte. You should consider accessibility to the finished compost product. Will you use your compost on your pasture, or will you have it hauled away, or give it or sell it to gardeners? Depending upon your end-user, you may want to locate your compost next to the driveway for easy vehicle access. If Edith produces more compost than she can, or wants, to utilize, the farmer that grows her hay may use it on the adjacent hayfield.



Composte in fence line – paddock in foreground and hayfield in background

The composte is also located more than 100 feet away from the stream on the property and, since it's somewhat hidden by the hillside, it's not an eyesore for neighbors.



Rainwater can carry pollutants into groundwater

Location, location, location—it's important, even for a manure composters.

Another environmental consideration when designing your composters is impacts to groundwater. A roof will prevent rainwater from running through a compost pile and leaching pollutants from your waste through the soil and into the groundwater. A roof is effective but it is also expensive. We wanted to experiment with a cover called [ComposTex](#). This fabric covering sheds rainwater but also helps to maintain the moisture level in the

compost pile. Remember, that you need your stall waste to be as moist as a rung out sponge. We've been experimenting with ways to secure the fabric and will be able to provide feedback on its effectiveness over time.

Experimenting with ComposTex fabric



Finished compost will be removed from the downhill side by

removing the drop boards. These boards slide in and out of grooves on the front of the bin. The area adjacent to the drop boards has been surfaced using [Stable Grids](#). The Stable Grids were placed on the smooth surface that was graded with about 3 percent slope to drain rainfall toward the hayfield. The grids were backfilled with [bluestone dust](#). Our original plan was to backfill the grids with soil and plant grass in the area but we over-excavated the site and had to use bluestone dust to raise the surface area so it would be flush with the edge of

The drop boards that form one wall of the composters are removable



the front of the bins.



Stable Grids

We wanted to use the grids on the farm so we could have some firsthand experience with them to share with horse owners. We also thought that the grids, and similar products, might have other uses on the farm for stabilizing typically muddy

or high traffic sites like gates, water troughs, travel lanes and even for surfacing smaller sacrifice area paddocks. So far, we've found them to be easy to use.



Snapping together the Stable Grids

As of August 2010, we have just finished the first 30 days of aeration using the O2 composter and should have a finished compost product in another 60 days. Watch for updates or email for more information katenorris@pwsxcd.org.



The finished solar powered O2 Composter w/automatic aeration, CompTex cover, and Stable Grids/ bluestone dust pad



Standard government design w/manual aeration, full roof, and concrete pad



Finished compost...coming soon!