

Manure Composting: Turning a waste product into a resource

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Why compost?

- Many animal owners do not have access to adequate land to spread manure or to apply it to crops
- A different option for managing manure
- Not as costly as having manure hauled away
- Minimizes fly problems associated with manure storage
- Degrades pathogens
- Minimizes odors

What happens in composting?

- Organic materials are rapidly broken down through a process of degradation by microorganisms
- Different types of microorganisms grow and flourish at different times during the process
 - High temperature organisms
 - Moderate temperature organisms
- Temperature of compost is high, and kills “bad” microorganisms

Recipes for successful composting

- Availability of air
- Appropriate moisture
- Particle size
- Temperature
- Pile size
- Nutrients
- Management-work! (just a little)



Pile size:

- Pile size must be at least 1meter x 1meter x 1meter to compost adequately
- Minimum size to hold temperature
- Minimum size to hold moisture
- In cold weather, pile must be bigger
- In hot, dry weather, pile must be bigger or you will need to add water
- Remember, piles will shrink as they progress

Importance of air:

- Air is needed for the microorganisms to do their job
- Air is supplied by turning, and having appropriate particle size
- Microorganisms that break down manure and other materials are “aerobic”, or air requiring
- Without adequate air, microbial processes will change or stop
- “Sour” odors will be present, and will NOT make the neighbors happy!

Appropriate moisture:

- Again, microorganisms will require the appropriate level of moisture
- If it is too dry, the microbial processes will stop, and no decomposition will occur
- If it is too wet, the pile will become anaerobic, or without air, and will not decompose adequately (and it will smell!)



Particle size:

- If particle size is too large, material will still compost
- It will take a long time to compost
- Material that is delivered from tree trimmers, for example will take a lot longer to compost than shavings

Temperature:

- Internal temperature is very important
- Will initially rise quickly, (up to 150 degrees or higher in some cases)
- Will slowly decline and become steady at around 110 to 120 degrees
- Outside temperature is important in management

Nutrients

- Appropriate C:N ratio is important for maximum composting
- Best if it is about 30:1, but anywhere between 30:1 to 60:1 will be adequate
- If there is too much carbon (woody material), add more manure or fertilizer. If there is too much nitrogen (manure), add more woody material-straw, shavings, etc.

Management

- Takes a little time to learn
- Need to get the “feel” of a good compost pile
- Need to treat it like a growing thing, or like a garden. Needs water, turning and maintenance

Getting started...



- What you need depends on number of animals
 - 2 horses: Need a shovel, hose, thermometer and a place to compost
 - 100 horses: need a larger area, a loader or compost turner (if you are lucky), an irrigation line, thermometer and something to do with it afterward

How to set up the piles:

- Horse and goat manure will compost just fine on it's own or mixed with the bedding when the stalls are cleaned etc. Chicken manure contains more moisture-needs some amendments to compost efficiently.
- When setting up the piles using mixed materials, layer bedding (carbon source), then manure (nitrogen source), then bedding, then manure. (Like lasagna!)
- Using the loader, shovel etc, turn the piles to mix the materials together
- Add water as you mix

How wet should the pile be?

- Easiest method is to grab a handful of composting material, and squeeze it
- Should be the consistency of a rung-out sponge, without water dripping
- Equates to about 50% moisture
- If it is too dry, add more water when you turn the pile
- If it is too wet, turn more often, and do not add water until it gets to the appropriate moisture level

Checking the temperature:

- Piles will heat up very quickly
- Within a day, the temperature can reach 135-140 degrees
- Use the thermometer to check the progress
- If the temperature is too low, the moisture level is probably not correct (most likely it is too low)



Turning the piles

- The first two weeks, turn the piles twice/week, adding moisture as needed. The temperature will drop when you turn the piles, but it will rise again quickly (temperature should be in the 135-150 degree range)
- The next four weeks, turn the piles once per week, adding water if necessary (temperature should be in the 120-130 degree range)
- The next two months if necessary, turn the piles once every two weeks to "cure" them. (temperature should remain steady at about 110 degrees)

Setting up a routine

- Start a new pile every two weeks or so, depending on number of animals
- In the meantime, store manure in an area where there will be no runoff problems
- If you continue to add fresh manure to an ongoing pile, it will never really "cure"
- You can use multiple piles (keep track of dates), constructed bins, or windrows
- Piles vs. rows vs. bins
 - Piles: do not cost anything to set up
 - Bins: (3 sides cinderblock, approximately 6 ft high) are very useful, contain the manure, and keep runoff to a minimum
 - Rows are long piles useful when you are using implements to turn, and when you have a large number of animals

What to do with the product?

- Use it on your garden/yard
- Give it away
- Sell it?
- Cannot be in the **business** of composting in an ag zone, means you are bringing in carbon or manure sources specifically for composting
 - If you generate the materials on site, it is ok
 - Check with the county regarding the amount of compost you can have on site at one time

Where to get the thermometers:

- ReoTemp-company in Sorrento Valley is quickest
- www.reotemp.com/compost
- Most useful tool in the process!

For More Information:

- www.cesandiego.ucdavis.edu
 - Animal Agriculture Self Assessments
 - Employee Training Information
- Water Quality Kiosks
 - Available soon for meetings and locations
 - Animal agriculture information