

# Mortality Composting



MARY SCHWARZ – [MSP5@CORNELL.EDU](mailto:MSP5@CORNELL.EDU)

JEAN BONHOTAL – [JB29@CORNELL.EDU](mailto:JB29@CORNELL.EDU)

[CWMI.CSS.CORNELL.EDU](http://CWMI.CSS.CORNELL.EDU)



# Carcass Disposal Options

**Render** – best option, where available but rules and regulations have made this more difficult resulting in insufficient capacity

**Compost** – uses resources found on-farm, cost effective, minimizes farm and public exposure, can be done on-site

**Alkaline digestion** – environmentally friendly, expensive, insufficient capacity

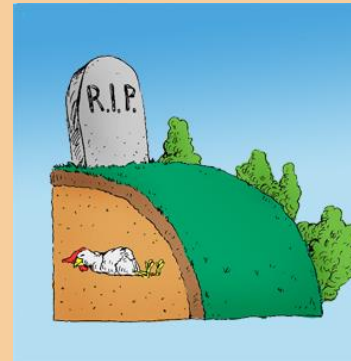
**Burial** – 6' closer to water table, no leachate control

**Incineration** – costly, inefficient, air pollution

**Landfill** – expensive, insufficient capacity, worker trepidation, may not be available

**Carcass left outside** for scavengers to decay – disease transmission risk, illegal

Low Risk



High Risk



# Goals of Carcass Disposal

---

FULFILLS REGULATIONS

CREATES POSITIVE PUBLIC PERCEPTION

REDUCES DISEASE TRANSMISSION

PROMOTES ENVIRONMENTAL SUSTAINABILITY

PRODUCES BENEFICIAL BY-PRODUCT

ECONOMICAL

PRACTICAL



# Why Should Farms Compost?

---

Pathogen kill in thermophilic composts

Can be done with equipment available on most farms

Odor reduction

All sizes of animals can be composted

Relatively low labor and management needed

Placental membranes and other tissue can be composted

Doesn't cost a lot of money

Neighbor relations





# What is composting?

It is the aerobic, or oxygen requiring, decomposition of organic materials by microorganisms under controlled conditions



Composting reduces both the volume and mass of the raw materials while transforming them into a valuable soil conditioner

# The Composting Process

Microorganisms consume oxygen while feeding on organic matter and as a result, give off heat.

---

Composting Process Variables:

- Micro- and macro-organisms
- Diet
- Air
- Moisture
- Shelter



By managing these factors you can speed up the otherwise slow natural decay process



# Aerobic composting and temperature

Active composting occurs in the temperature range of 90°F to 160°F

Pile temperature may increase above 160°F but this is too hot for most bacteria and decomposition will slow until temperature decreases again.



**Remember, Compost pile heat is the direct result of microbial metabolism!!!**





# The Composting Process

## Diet



Nitrogen comes from the wet material. Organisms use this as a source of protein to grow and reproduce.



Carbon comes from the dry material. organisms use this as a source of energy



# The Composting Process Diet

---

## What is C:N Ratio?

Supply of total carbon compared to total nitrogen in compost feedstock

If C:N is too high the compost process will slow

If C:N is too low, more likely to lose Nitrogen as ammonia gas or in leachate

Ideal initial C:N mixture range is 20 – 30:1.



# The Composting Process

## Air, Moisture and Shelter

### FEEDSTOCKS



### MANAGEMENT



### METHOD



# What Happens in Mortality Composting?

Nitrogen

The Diet is all wrong  
(C:N about 80:1)

Air flow occurs  
passively

Moisture comes from  
the carcass as it  
decomposes



Carbon



# What Happens in Mortality Composting?

---

Mortality composting does not follow the rules of starting with a “mix” with the right moisture and C:N ratio. Instead, the envelope of carbon material simply allows the natural process of decomposition to occur in a manner that will absorb the moisture and odors emitted when carcasses decay.





# Composting Methods

---



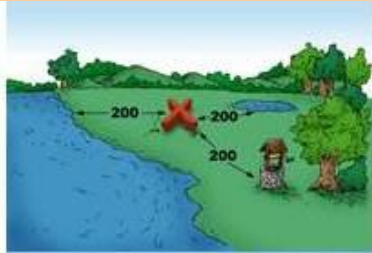
Static Pile – Passively  
Aerated OR  
Turned Windrow



In-Vessel – buildings,  
bags, cylinders



# Carcass Composting Steps



- Select Site



- Prepare base



- Place animal and cover

- Layer young and/or small animals



- Let sit 4 to 6 months

- Use the composted material

- Reuse bones/un-composted material



# Carcass Composting Steps

## 1 Select a site

Water

Air

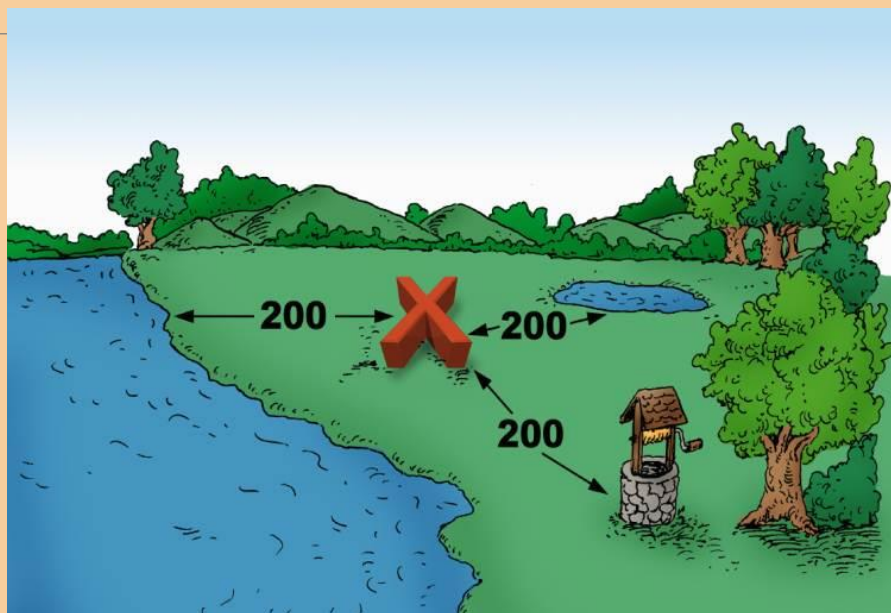
Slope, soil conditions

High and dry

Amount and storage of  
feedstock

Access to work on pile

Population density



Make sure you are not close to wells, streams, water bodies. Check depth to groundwater. Look for plants that indicate wet areas.





# Carcass Composting Steps

## 2 Prepare a Base

---



Lay 24-in bed of bulky, absorbing organic material containing some sizeable pieces, preferably woodchips



# Carbon/Feedstocks



Not all carbon sources are created equal



# Carbon/Feedstocks

Fine Carbon



Coarse Carbon



Mixed Carbon



Very Coarse Carbon





# Carbon/Feedstock Characteristics



# Potential Farm Feedstocks for Cover\*

---

ANIMAL BEDDING  
WASTE FEED  
MANURE  
STRAW  
SPENT FEED

\*Base material should be chunky (i.e. woodchips)





# Carbon Sources

## Contact List for Sources of Carbon and Bulking Materials

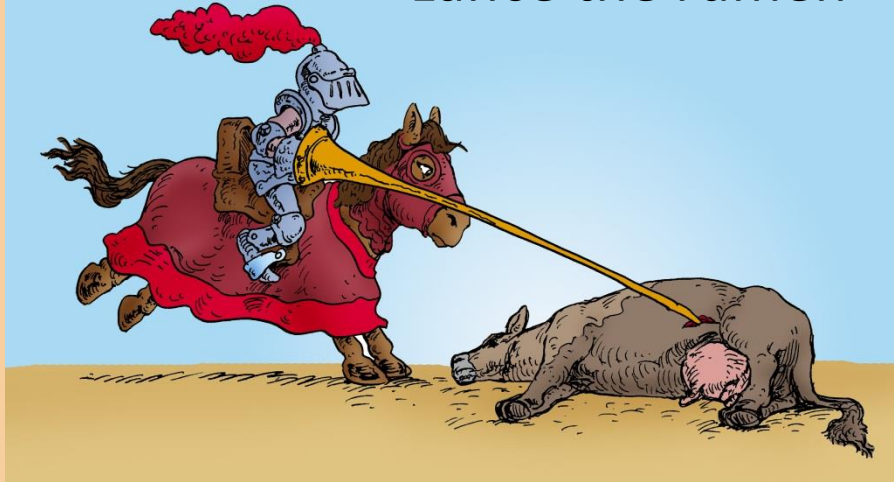
Entity	Information
Tree Service Company (such as Asplundh)	Contact: _____ Phone: _____ Fax: _____ E-Mail: _____
Local (Town/Village) Highway Department	
County Highway Department	
State Highway Department	
Utility Company (Telephone, Electric, Cable)	
Landscapers	
Logging Companies	
Arborists	
Sawmill/Lumber yard (non-pressure treated only)	
Local Parks Department	



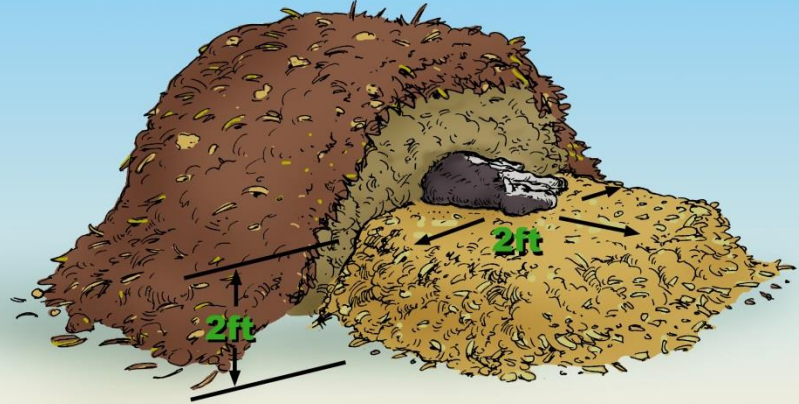
# Carcass Composting Steps

## 3 Place Animal and Cover

Lance the rumen



Place the animal



Cover with dry, high-carbon material





# Carcass Composting Steps

## Layer young or small animals

Base Layer (24" woodchips/carbon)



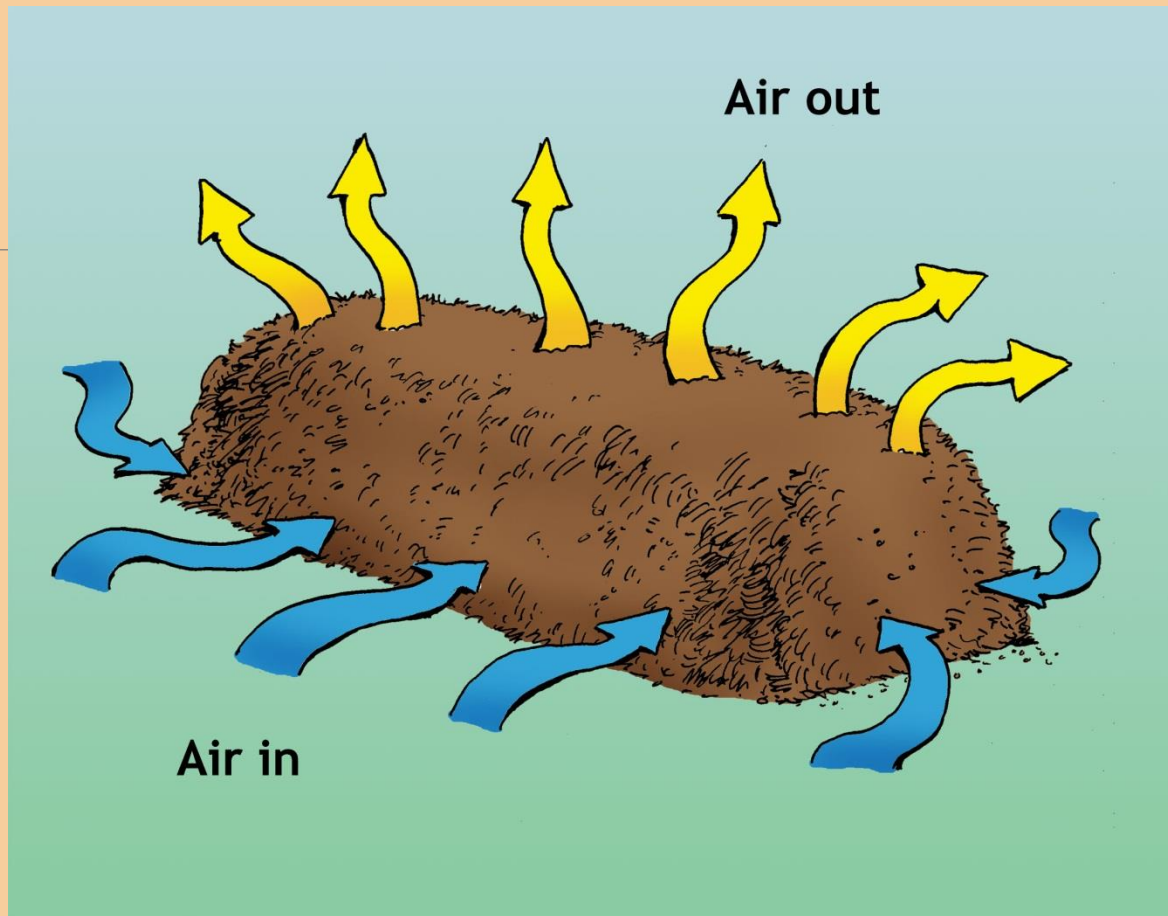
Cover the layer with 12" carbon

Two feet of carbon all the way around the birds. Additional base material at the end to extend the windrow



2-3 layers depending on the height. Cover with a 2-foot cap of carbon





Thermal air movement and diffusion in a well-built passively aerated static pile



# Some Best Management Practices

---



Incorporate dead stock in a timely fashion



# Some Best Management Practices

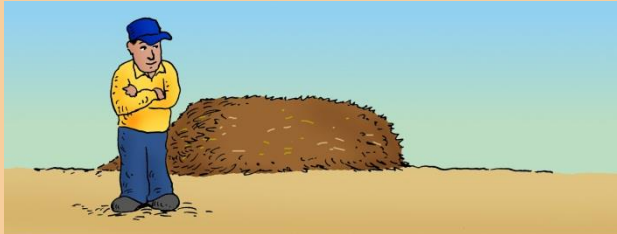


Keep piles/windrows about 10-16 feet wide and 5-8 feet tall. Large, poorly shaped piles restrict air flow and are not efficient

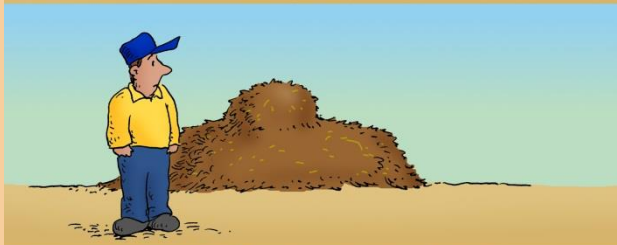




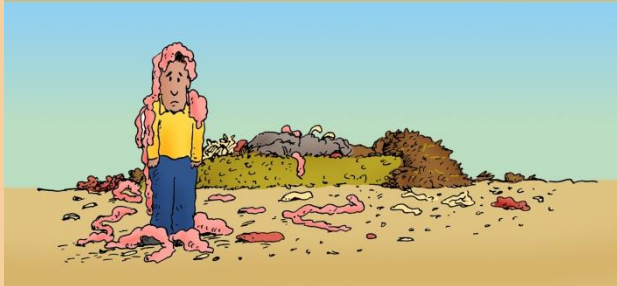
# Troubleshooting



Not enough cover



Forgetting to lance the rumen



Avoid driving on the pile/base



# Carcass Composting Steps

## 4 Let sit 4 – 6 months

Well stacked piles should heat up in 12 – 24 hours

**Month 1 – Cooked Meat**



**Month 2 – Meat is Digested**

**Month 3-4 – Clean Bones**





# 5 Use the Composted Material



Reuse Bones and  
Un-composted Material



# Research on Mortality Composting


- Pathogens are deactivated via high temperatures, microbial degradation, pH and other factors
- Using a static pile method reduces the volume of leachate and soil filtration reduces concentrations of contaminants, limiting the risk of groundwater contamination.
- When managed properly, composting will deter domestic and wild animals from scavenging on treated carcasses while they contain the highest drug concentrations providing an effective means of disposal of euthanized livestock.
- On-farm composting reduces the potential for farm-to-farm disease transmission with the benefit of a usable product





# CWMI Resources



<http://cwmi.css.cornell.edu/mortality.htm>



*Cornell Waste Management Institute*

About CWMI   Composting   Farm Waste Management   Sewage Sludge   Soil Quality   Health and Safety   Resources


[CWMI Home](#) > Mortality Composting



### Mortality Composting

Materials address composting as a method to manage livestock mortalities (including mass mortalities resulting from avian influenza), butcher wastes and road killed animals. Also developed is a searchable map of [US Mortality and Butcher Waste Disposal Laws](#).

search CWMI go



### Horse Mortality: Carcass Disposal

- 8p illustrated [fact sheet](#) "Horse Mortality: Carcass Disposal Alternatives" addressing disposal options for your horse. 2012.
- 5-minute video "Natural Rendering for Horses - Composting Horse Mortality" shows how to properly compost a dead horse. [Download](#) or [view](#) on YouTube. 2012
- "Quantification of Sodium Pentobarbital Residues from Equine Mortality Compost Piles" a paper written for presentation at the [4th International Symposium: Managing Animal Mortalities, Products, By-products and Associated Health Risk: Connecting Research, Regulations and Response](#). 2012

### Natural Rendering: Composting Livestock Mortality & Butcher Waste

- 12p illustrated [fact sheet](#) describing the process, cautions, problems, biosecurity issues, economics and more. 2002.
- 20-minute video describes mortality and butcher residual composting featuring eight operations. [Download](#) in [English](#) or [Spanish](#). 2002.
- A set of 3 posters (English and Spanish) has been developed for educators:
  - Key Points of Static Pile Butcher Residual Composting. (English [PowerPoint](#) or [PDF](#) and Spanish [PowerPoint](#) or [PDF](#)). 2002.
  - Key Points of Static Pile Carcass Composting. (English [PowerPoint](#) or [PDF](#) and Spanish [PowerPoint](#) or [PDF](#)). 2002.
  - Potential Environmental and Biosecurity Risk of Dead Animal Disposal. (English [PowerPoint](#) or [PDF](#) and Spanish [PowerPoint](#) or [PDF](#)). 2002.
- A How-To On Livestock Composting. [Article](#) published in Northeast DairyBusiness, 10(11):18-19. 2008.
- Are Your Deadstock Piles and Disposal Costs Causing Your Farm Nightmares? [Article](#) published in Country Folks, Section B: 21-23. 2009.
- Natural Rendering: A Natural Solution for Mortality and Butcher Waste. [Article](#) published in Small Farm Quarterly, Fall 2003.
- On-Site Composting of Meat By-Products. 15p [final report](#) of a project exploring the economic viability and technical obstacles to on-site composting of meat by-products. 2001.
- [The Space It Takes - Footprint Calculator for Composting Butcher Waste](#). 8pg document. 2010.

### Composting Road Kill

- 12p illustrated fact sheet (PDF) on the "how to" of composting road kill deer. 2007.



# Questions?

---

Mary Schwarz – [msp5@cornell.edu](mailto:msp5@cornell.edu)

Jean Bonhotal – [jb29@cornell.edu](mailto:jb29@cornell.edu)

[cwmi.css.cornell.edu](http://cwmi.css.cornell.edu)

