

Understanding and Troubleshooting Mortality Composting

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The diagram shows a cross-section of a mortality composting bin. It features a permeable cover at the top, an absorptive base layer at the bottom, and a thick layer of insulating material in the middle. Arrows indicate air flow: blue arrows for oxygen entering (IN) and red arrows for excess water vapor exiting (OUT). A green arrow shows air being drawn into the bin, and a yellow arrow shows air being exhausted. Red arrows at the bottom indicate leachate being collected by the absorptive base layer.

By Dr. Tom Glanville, Department of Agricultural & Biosystems Engineering, Iowa State University, for Iowa Pork Industry Center Regional Conferences, February 2008.

Benefits of Swine Mortality Composting

- Low capital & operating costs
- Simplicity & reliability... no need for special equipment or materials
- Biosecurity & environmental protection
- Easy to construct or expand in emergencies

By Dr. Tom Glanville, Department of Agricultural & Biosystems Engineering, Iowa State University, for Iowa Pork Industry Center Regional Conferences, February 2008.

4 Keys to Successful Composting

The diagram illustrates the internal structure of a mortality composting bin. Key components and zones are labeled:

- Permeable cover material**: lets oxygen IN, excess water vapor OUT.
- Moist bio-filter zone**: adsorbs & degrades odorous byproducts.
- Thick layer of "insulating materials"**: surrounding carcasses ... sustains high temperature ... kills pathogens ... speeds decay.
- moist aerobic decay zone** and **anaerobic decay zone** are shown within the insulating layer.
- Absorptive base layer**: controls leachate.
- Air** flow is indicated entering from the left.

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Troubleshooting Mortality Composting Problems

- Most Common Problems
 - Leachate production
 - Poor odor retention
 - Slow carcass decay

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Troubleshooting - Leachate

- Cause #1: Excessive precipitation exposure during wet seasons
 - Solution: Reduce exposure
 - Roofed bin system, or
 - Install tarp over piles

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Troubleshooting - Leachate

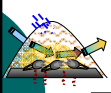
- Cause #2: Inadequate liquid absorption capacity
 - Solution: Use thicker envelope of absorptive material under, between, & over carcasses

The diagram shows a cross-section of a mortality composting bin with carcasses. The absorptive base layer is shown with specific dimensions:

- 6-12 inches between carcasses
- 12 inches cover (top layer)
- 6-12 inches between layers
- 9-12 inches from walls
- absorptive base
- 12-inch minimum base layer

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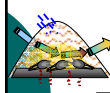
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Troubleshooting - Leachate


- Cause #3 : Overloading ... too many carcasses in one spot
 - Remember ... every 1000 lbs of carcasses contains 650 lbs WATER !
- Solution:
 - Carcasses should not touch each other (no room for absorptive material)
 - Avoid stacking of large carcasses (> 400 lbs)

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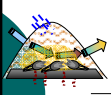


Troubleshooting - Leachate

- Cause #4: Use of envelope material that is too wet
 - Solution:
 - Use "squeeze" test to check moisture
 - Material should feel moist ... but yield only a few drops of water when squeezed (not saturated)
 - Store envelope material in dry location to avoid excessive moisture



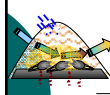
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Troubleshooting – Poor Odor Retention

- Cause # 1: Envelope material placed over carcasses too thin ... or too coarse
 - Solution:
 - Use at least 12 inches of envelope material over carcasses
 - Avoid use of extremely coarse envelope materials
 - Must grind coarse materials such as cornstalks or straw (use 2-inch screen)

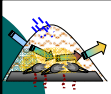
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Troubleshooting – Poor Odor Retention

- Cause # 2: Compost turned prematurely
 - Solution:
 - Don't turn compost too soon
 - "Too soon" varies with carcass size & seasonal temperatures
 - A few days for small pigs during warm weather
 - 8-12 weeks for large pigs during cold weather
 - Experience the best teacher
 - Stockpile extra envelope material ... be prepared to cap pile with more material if needed to suppress odor emissions

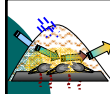
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Troubleshooting – Poor Odor Retention


- Cause # 3: Compost too wet
 - Prevents oxygen penetration ... pile goes anaerobic ... produces excessive odor
 - Often accompanied by leachate release
- Solutions: Same as for leachate ... easier to prevent than to fix after odor starts
 - Reduce exposure to excessive rainfall
 - Avoid overloading pile
 - Mix wet compost with drier cover materials
 - CAUTION ... likely to increase odor releases during mixing re-cap with thick layer of material to retain odor

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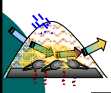
Troubleshooting – Slow Decay

- Cause # 1: Inadequate O₂ penetration caused by fine textured cover material
 - Solution: Use coarser cover material
 - Particles with 1/8th inch minimum dimension ... obvious pore spaces between particles (below right)
 - Avoid "soil-like" materials comprised of small particles with tiny pore spaces (below left)



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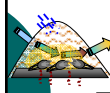
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Troubleshooting – Slow Decay

- Cause # 2: Inadequate O₂
 - Caused by excessive moisture
 - Often accompanied by leachate
 - Solution: Again ... similar to those for leachate
 - Reduce exposure to excessive rainfall
 - Avoid overloading pile with too many carcasses and too little absorptive material
 - Mix wet compost with coarser and drier cover materials
 - Time consuming, may not work if compost is too sticky to mix

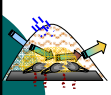
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Troubleshooting – Slow Decay

- Causes # 3 : Inadequate moisture
 - Typically occurs only during very dry weather
 - Solution:
 - Add water sparingly and turn (to mix)
 - May need to repeat several times
 - Proceed slowly ... very easy to over wet small sections resulting in odor and leachate

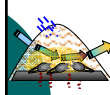
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Troubleshooting – Slow Decay

- Causes # 4 : Low temperature caused by inadequate heat production or retention
- Solution:
 - If material near carcasses is moist ... increase thickness of envelope material to improve heat retention
 - If material near carcasses is dry, add moisture to improve microbial activity & heat production
 - Note: do not put frozen carcasses into a composting system ... takes extremely long time for carcasses to thaw and produce heat

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For More Information

- *Composting Swine Mortalities in Iowa* (ISU Extension Publication Pm-1917)
- ISU swine mortality composting web site
 - www.abe.iastate.edu/pigsgone/

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