

Mortality composting

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What are we talking about?

- Mortality composting is the controlled microbiological decomposition of:
 - carcasses together with manure and other co-compost materialsunder aerobic and thermophilic conditions.
- Suitable for all farm animals



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The Washington Post

50 tons of whale carcass was a research gift. Then it was a disposal challenge.

Animals • Whales • Wildlife • Ecology • Zoology • Biology
7 Feb 2017 [15 min](#) BY CHRIS REEVES

In the wee hours of Sunday, Sept. 25, a handful of people on the streets of Portland, Maine, were treated to a sight that they may have had a hard time explaining when the sun came up: Around 3 a.m., a 43-foot, 50-ton whale drove by.

The chance to study a critically endangered North Atlantic right whale up close is a rare opportunity. When the carcass of a big female was spotted floating off

At 9 a.m. that Sunday, the whale lies strapped atop a logging truck at Benson Farm, a commercial composting facility in Gorham, Maine. I stand with a team of about 20 professionals and volunteers from eight research organizations from around the country, listening to Doughty recount the 18-hour effort to recover the carcass. I've helped dissect dolphins with the Marine Mammal Stranding Network in California, but this right whale is so much bigger. I'm trading my

chinery. Two front-end loaders — something like massive forklifts — and a large machine with a shovel arm, called an excavator, are at the team's disposal.

The loaders push the whale off the flatbed and onto the ground. The team begins taking data that will help determine the cause of death. (The scene brings to mind an episode of "CSI," except that the victim is a grossly oversized marine mammal.) Wraparound

make incisions along her up-turned flank. Most of the other volunteers surround the whale from the ground to cut the blubber into three-foot-wide sections using long kitchen knives. I reach

High above my head with both hands to cut into the whale's belly. It sounds like slicing wet Velcro. A Benson Farm employee uses the excavator's mechanical shovel to peel back strips of blubber as big as a grown man. To-



Tyler Frank, left, of Garbage to Garden, a composting service in Portland, Maine, and Antonio Arevalo of the Benson Farm com the bones of a right whale whose carcass had been brought to Benson Farm five week

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Body composting a 'green' alternative to burial and cremation

Posted Sun 26 Sep 2021 at 8:22am

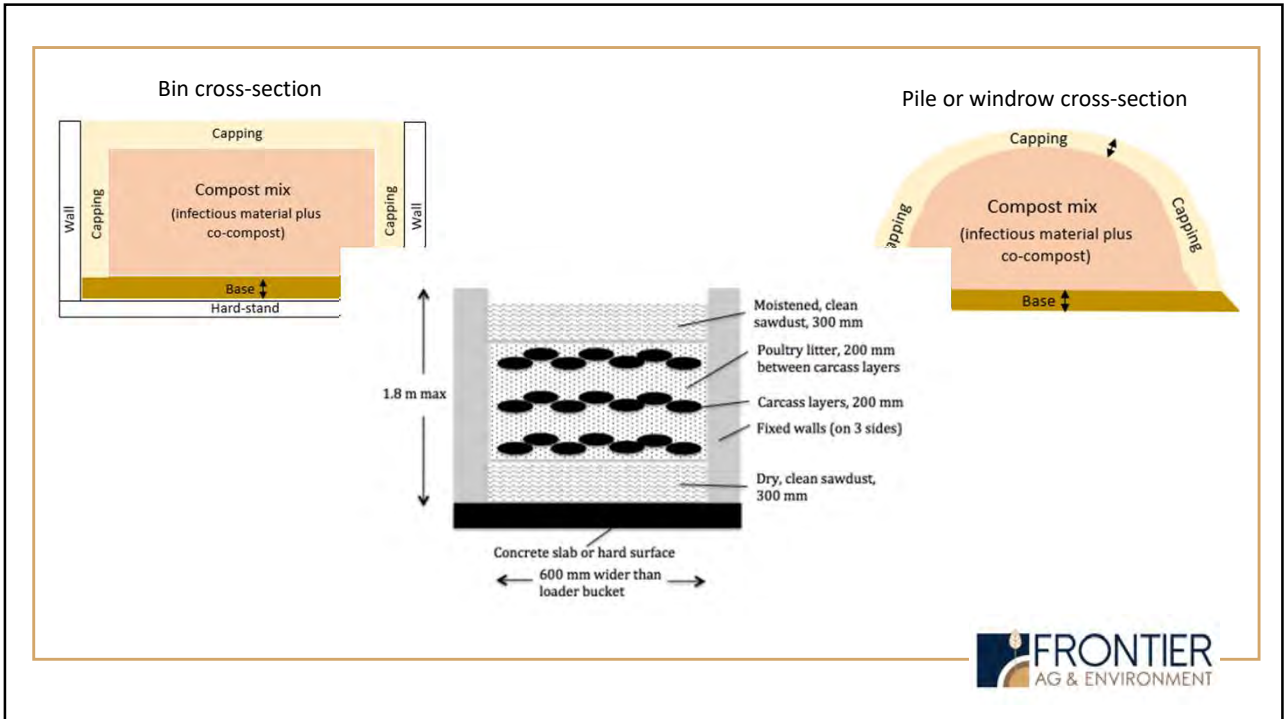


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General principles

- Usually described as having 2 stages:
 - Stage 1 – From set-up to the first turn. Key here is that carcasses are fully encased in clean high-C co-compost material.
 - Stage 2 – Begins with first turn after most soft tissue has decomposed. From here on, the compost pile is treated more or less the same as in conventional composting.

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Step 1

- Base layer – typically 300-600 mm deep
- Old straw used in this picture
- Ideally want some coarse particles to promote aeration

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Step 2

- Layer carcasses
 - up to 3 layers for smaller animals
 - 1 or 2 for larger ones
- Apply other co-compost material between layers
- Water as necessary



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Step 3

- Cap with co-compost material
 - >400-mm straw being used here
- Ideally, capping material is less coarse than base material



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Step 4

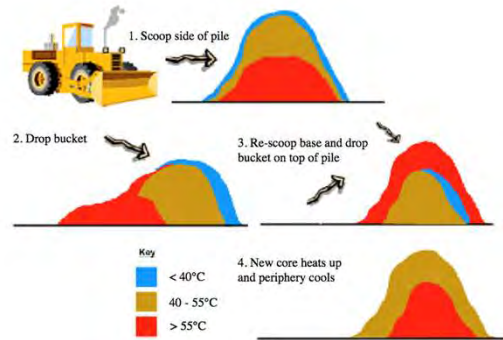
- Stage 1 begins for a batch when the last carcass is added
- Stage 1 usually complete in 14-21 days (poultry) up til 90-120 days (cattle)
- Monitor process with temperature probe



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Step 5

- Stage 2 begins with the first turn
 - In Aus usually we want 5 turns
 - Seek $>55^{\circ}\text{C}$ for 3 consecutive days between each turn
 - For small carcasses, 5 turns could be completed in quick succession (approx. weekly)



Source: Recycled Organics Unit (2003)

Process monitoring

- We monitor temperature to:
 - Establish if the process is working as it should
 - Assist with decision making and troubleshooting
 - Determine when temp x time criteria are met

Is the process working as expected?

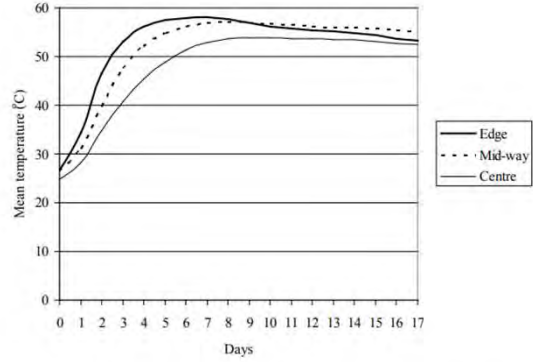
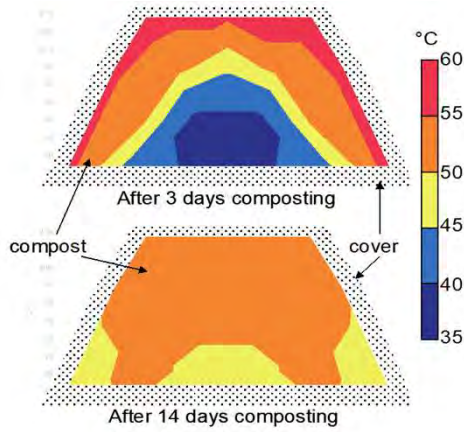


Figure 21. Average daily temperatures in three positions in all windrows: Edge—just under the cover layer; Mid-way—between the edge and centre; Centre—in the middle of the compost.

Daily averages were calculated from 27 probes per windrow recording temperature on an hourly basis.

Process Variations



Photo courtesy of Matt Cotton



"Composting 107 Hogs" https://www.youtube.com/watch?v=U9kw0A9_oCM





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In-vessel systems operating in Australia for mortalities



<http://www.robustbiodrum.com/>



<https://ecodrumcomposter.com>



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Mass mortality composting



Simultaneous grinding of pig carcasses and co-compost material (Flory, 2022)

- For catastrophic events
 - Emergency animal disease outbreaks
 - Natural disasters
 - Infrastructure failure



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Biosecurity – main points

- Separation of production areas and equipment from composting
- Site and personal hygiene standards
- Generally we use *E. coli* and *Salmonella* as 'indicator' species for validating pathogen reduction standards
- Must be careful to minimise "thermophilic bypass" and bacterial regrowth
- Spore-forming bacteria (e.g., *Bacillus anthracis*, *Clostridium botulinum*) and transmissible spongiform encephalopathies are less reliably controlled by composting



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Survival of pathogens

Effect of composting treatment on temperature recordings above 45°C for the first 17 days of Stage 1 composting.

Co-compost	Construction	Hours >45°C per probe		% probes <24 h at >45°C
		Mean	Min	
Green waste	Mixed	338	0	1.3
	Layered	295	0	6.3
Sawdust	Mixed	312	0	1.3
	Layered	254	0	1.3
Shavings	Mixed	321	0	1.3
	Layered	296	0	5.4
Means				
	Mixed	324	0	1.3
	Layered	282	0	4.3
Green waste		317	0	3.8
Shavings		309	0	3.3
Sawdust		283	0	1.3

Main points:

- Avian viruses prob killed <1 d @ 45°C
- This 'threshold' level is met many times over for the vast majority of temp probes



Wilkinson et al. (2014). Biosecurity of mass poultry mortality composting.

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Conclusion

- Mortality composting, when done properly, is a very effective and biosecure process for carcass disposal
 - "Done properly" does not mean the process is necessarily complicated
 - There are many different methods and technological approaches
- Has great potential for use in emergency animal disease response



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Thank You!

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