Food Safety Implications with Manure (FSMA)

Andy Bary

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Soil Amendments

- A soil amendment refers to any material added to the soil to improve its physical and chemical properties.

- With fresh fruit and vegetables, food safety concerns are most often associated with biological contamination by pathogens in manure based soil amendments.

Soil Amendments

- **Covered crops by the FSMA Rule Those that the FSMA rule pertains to. Carrots, broccoli lettuce etc.**

- **Crop not covered by the FSMA Rule**
- **Beets, potatoes, sweet corn etc.**

Biological Soil Amendment of Animal Origin

Consists, in whole or in part, of materials of animal origin, such as manure or non-fecal animal byproducts, or table waste, alone or in combination; and that it does not include any form of human waste.

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Untreated Biological Soil Amendment

A biological soil amendment of animal origin is untreated if it:

- Has not been processed to completion in accordance with the requirements of § 112.54;
- Has become contaminated after treatment;
- Has been recombined with an untreated biological soil amendment of animal origin;
- Is or contains a component that is untreated waste that you know or have reason to believe is contaminated with a hazard or has been associated with foodborne illness.

Manure
Categorizing Risks

Highest Risk to Lowest Risk:

- ***Fresh or Raw Manure*** – manure that has not been aged or compost.
- ***Aged Manure*** – manure that has aged for at least 6 months prior to application. Does not meet composting requirements
- ***Composted Manure*** – manure that has been properly composted.

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Using manure for covered crops

Using untreated manure for crop production

- 90 days waiting after application for eatable part doesn't touch the soil

- 120 days waiting after application for eatable part doesn't touch the soil

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Biological Soil Amendments Treatment Processes

Each of the following treatment processes are acceptable for a biological soil amendment of animal origin that you apply in the growing of covered produce, provided that the resulting biological soil amendments are applied in accordance with the applicable requirements of § 112.56:

Biological Soil Amendments Treatment Processes

(a) A scientifically valid controlled physical process (*e.g.*, thermal), chemical process (*e.g.*, high alkaline pH), biological process (*e.g.*, composting), or a combination of scientifically valid controlled physical, chemical and/or biological processes that has been validated to satisfy the microbial standard in § 112.55(a) for *Listeria monocytogenes* (*L. monocytogenes*), *Salmonella* species, and *E. coli* O157:H7; or

Biological Soil Amendments Treatment Processes

(b) A scientifically valid controlled physical, chemical, or biological process, or a combination of scientifically valid controlled physical, chemical, and/or biological processes, that has been validated to satisfy the microbial standard in § 112.55(b) for *Salmonella* species and fecal coliforms. Examples of scientifically valid controlled biological (*e.g.,* composting) processes that meet the microbial standard in § 112.55(b) include:

Microbial Standards

Listeria Monocytogenes

Not detected using a method that can detect one colony forming unit (CFU) per 5 gram (or milliliter, if liquid is being sampled) analytical portion.

Microbial Standards

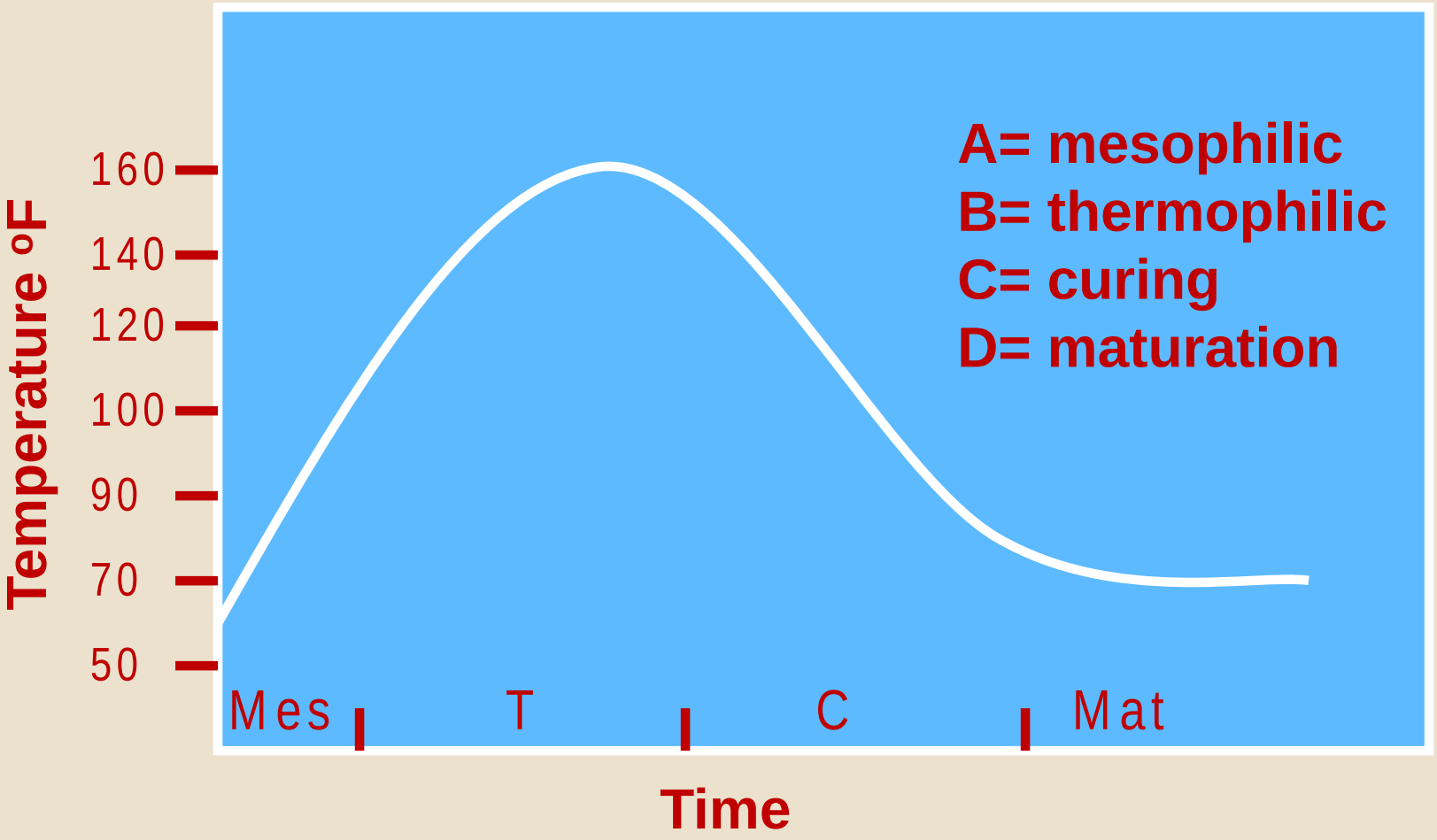
Salmonella species

Not detected using a method that can detect three most probable numbers (MPN) per 4 grams (or milliliter, if liquid is being sampled) of total solids.

Microbial Standards

***E. Coli* O157:H7**

Not detected using a method that can detect 0.3 MPN per 1 gram (or milliliter, if liquid is being sampled) analytical portion.


Temperature ºF
160
140
120
100
90
70
50
A= mesophilic
B= thermophilic
C= curing
D= maturation
Mes
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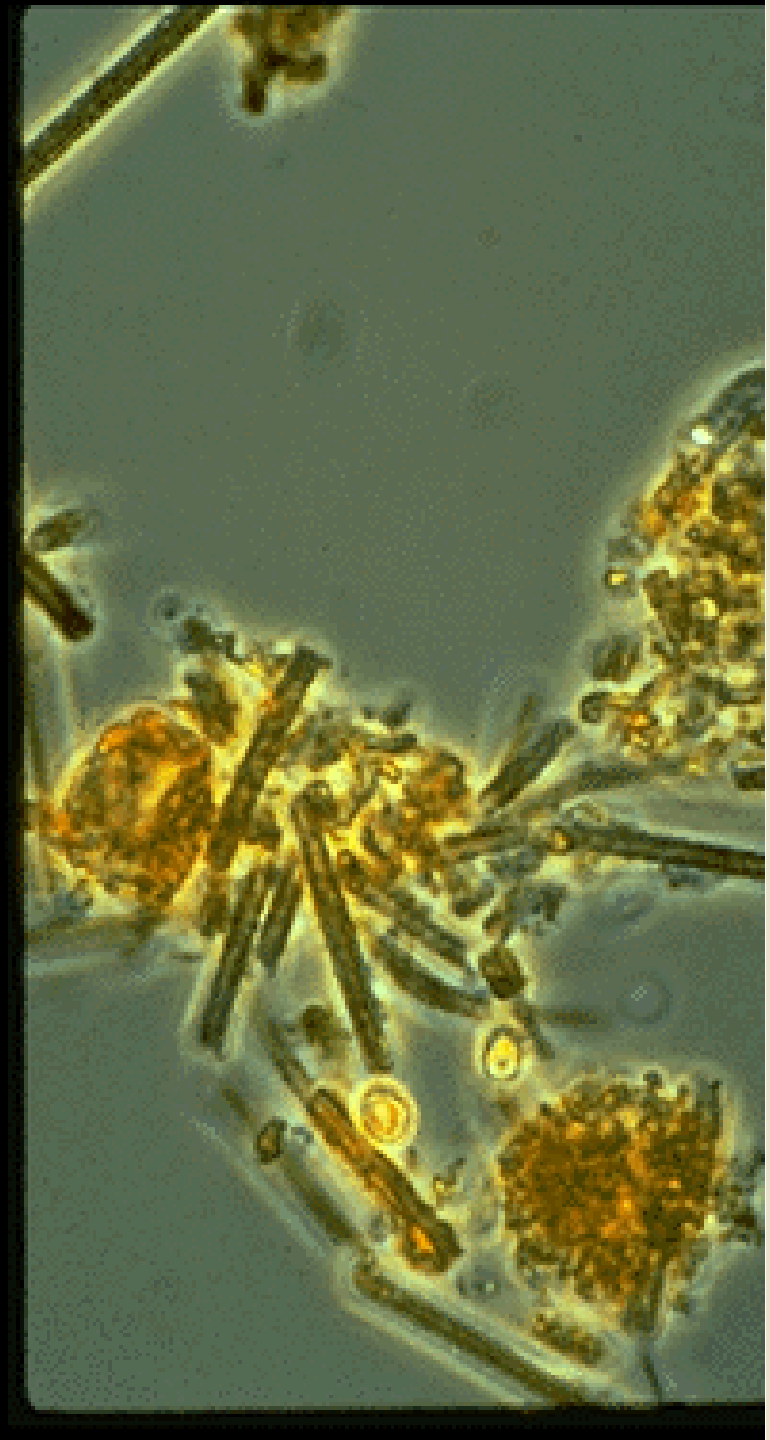
Mat
Time



Phases of Aerobic Composting

Mesophilic phase: moderate temps, lasts for a few days

Thermophilic phase, high temps. Lasts from a few days to several weeks

Curing and maturation phase, moderate to ambient temps. Lasts 1-2 months.

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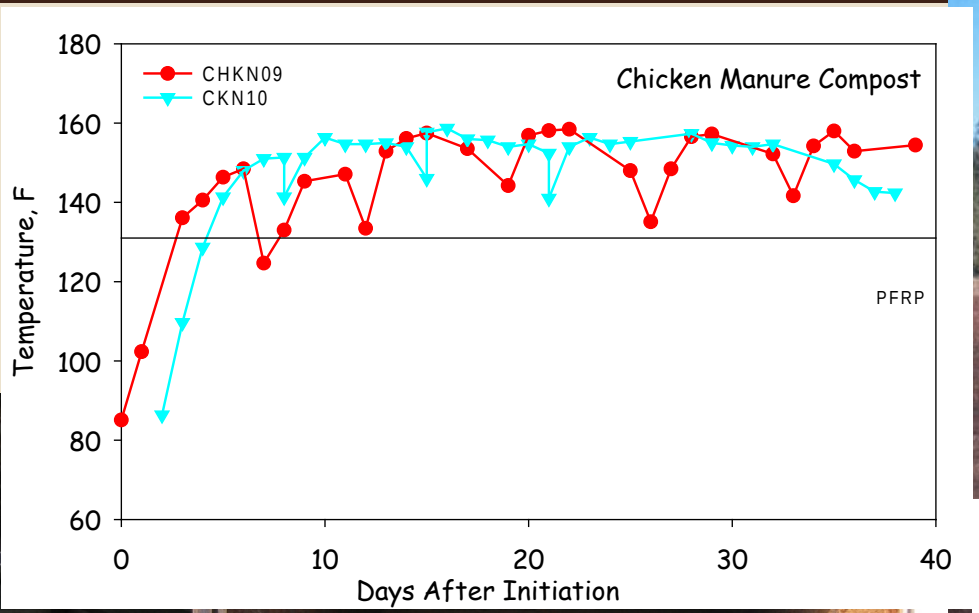
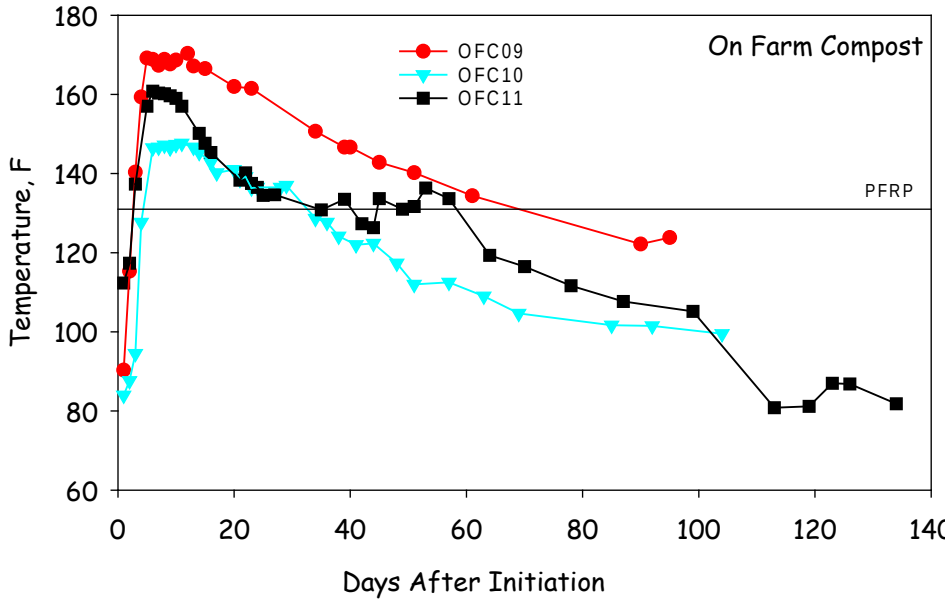
Composting Processes

(1) Static composting that maintains aerobic (*i.e.*, oxygenated) conditions at a minimum of 131 ° F (55 ° C) for 3 consecutive days and is followed by adequate curing; and

Composting Processes

(2) Turned composting that maintains aerobic conditions at a minimum of 131 ° F (55 ° C) for 15 days (which do not have to be consecutive), with a minimum of five turnings, and is followed by adequate curing.





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Turned Windrow Composting

Controls objectionable odors

Manage pile temperatures

- Expedite active composting & curing
- Changes PFRP times
- Smaller piles
- Easier to add water
- Bigger composting foot print required
- No electricity required

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Aerated Static Pile Composting

Maintains aerobic conditions

Controls objectionable odors

Manage pile temperatures

- Expedite active composting & curing
- Produce superior compost products
- Changes PFRP times
- Bigger piles
- Moisture needs to be right from the get go
- Potential for over aerating (heat and moisture loss)
- Disposable materials

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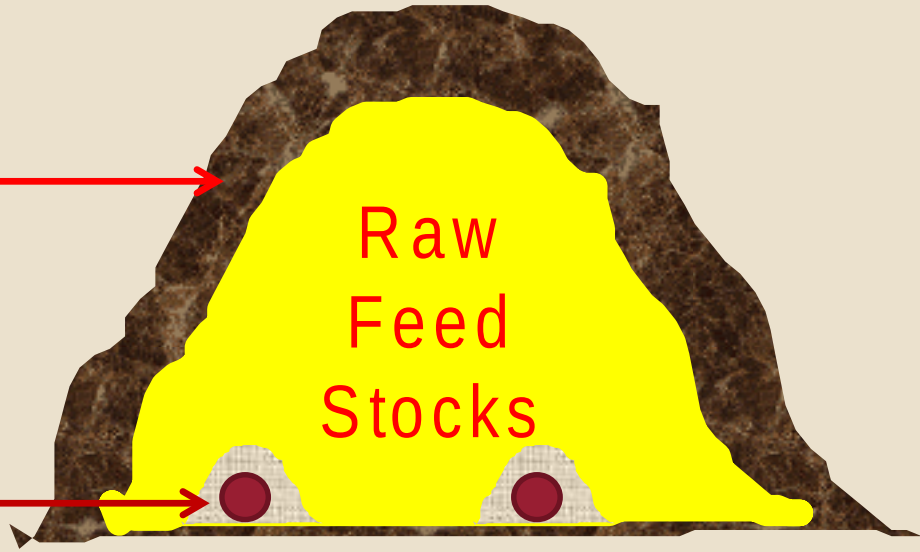
Insulating layer is needed because edges of pile are cooler than center

Finished Compost



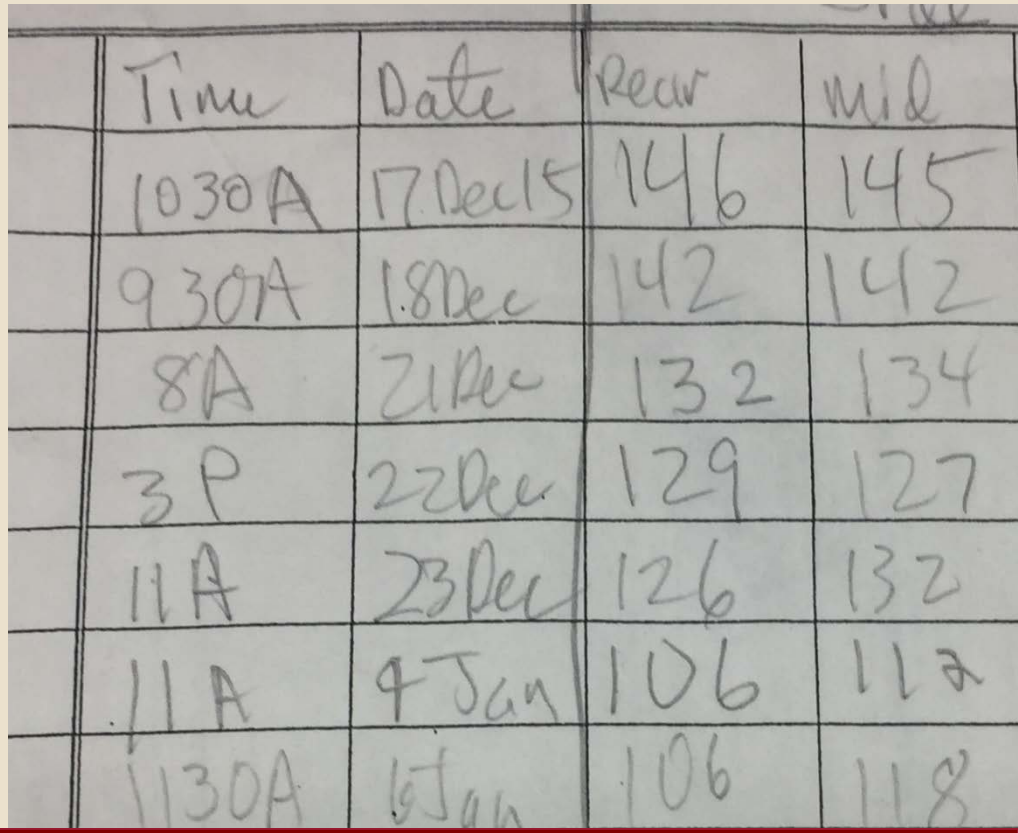
Porous material

Manure or compost application records

- Amount used
- Place of application
- Date of the application
- Method of application
- Person responsible for the application

Manure or compost application records

- What's in the compost
- Dates and times of temperatures of pile demonstrating that you've met time turns, and temperature requirements



	Time	Date	Rear	Mid
	1030A	17Dec15	146	145
	930A	18Dec	142	142
	8A	21Dec	132	134
	3P	22Dec	129	127
	11A	23Dec	126	132
	11A	4Jan	106	117
	1130A	6Jan	106	118

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Manure Application Summary

- Do not assume any manure is ‘clean’.
- <u>Incorporate, Incorporate, Incorporate</u>
- Absolutely NO SIDEDRESSING with fresh manure.
- Know manure source and how it was handled

Avoiding Cross Contamination

Set up water drainage and traffic patterns for employees and equipment to avoid cross contamination between manure, compost, and crops

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Incorporate Manure Into the Soil

- **If the 90/120 day waiting period is not feasible, such as for short season crops like lettuce or leafy greens, apply only properly composted manure.**

Choose Appropriate Crops

- Avoid growing root and leafy crops in the year that manure is applied to a field.
- Apply manure to grain or forage crops.
- Apply manure to perennial crops in the planting year only. The long period between application and harvest will reduce the risks.

Manure
Handling of Manure and Manure Products

Manure Storage and Treatment Sites:

- **Furthest Practical Distance from Fields**
- **Adequate Practices and Physical Barriers to Prevent Contamination from Run Off, Leaching, Wind**

Questions?

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Pathogen Reduction (PFRP)

Turned pile composting

At least 15 days above 131ºF with 5 turns

Aerated Static piles or in vessel composting

At least 3 days above 131ºF