Composting Poultry Manure and Mortalities

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Decomposition of organic materials by aerobic microorganisms under controlled conditions

The Composting Process

Organic Matter
Minerals
Water
Microorganisms

Raw Materials

Compost Pile

Finished compost

Oxygen

Water

Heat

CO₂

C:N ratio
H₂O content
O₂
Particle size
pH
Temperature

Reasonable ranges
20-40:1
40-65%
>5%
1/8-1/2in.
5.5-6.5
110-150F

Preferred ranges
25-30:1
50-60%
>5%
varies
6.5-8.0
130-140F

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.
C:N Ratio

<table>
<thead>
<tr>
<th>Material</th>
<th>C:N Ratio</th>
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<tbody>
<tr>
<td>Compost</td>
<td>15-25:1</td>
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<tr>
<td>Grass clippings</td>
<td>15:1</td>
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<tr>
<td>Laying Hens</td>
<td>6:1</td>
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<tr>
<td>Food wastes</td>
<td>15:1</td>
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<tr>
<td>Dairy manure</td>
<td>20:1</td>
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<tr>
<td>Broiler litter</td>
<td>15:1</td>
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<tr>
<td>Straw</td>
<td>80:1</td>
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<tr>
<td>Bark</td>
<td>115:1</td>
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<tr>
<td>Paper</td>
<td>170:1</td>
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<tr>
<td>Wood or sawdust</td>
<td>500:1</td>
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Moisture
- To dry microbes can’t move round and break down organic matter
- Too wet not enough O₂ for aerobic microbes and produce foul odors

Oxygen Management
The Biochemistry of Microbial Breathing

Aerobic & Anaerobic respiration

Effects of Particle Size and Porosity on Aeration

pH: Measure of Acidity or Alkalinity
- Bacterial decomposers prefer pH 6.0 to 7.5.
- Fungal decomposers prefer pH 5.5 to 8.0.
- Ideal range is 5.8 to 7.2.
- pH exceeding 7.5 can promote ammonia gas loss.

Pathogen Reduction (PFRP)
- Turned pile composting
  At least 15 days above 131°F with 5 turns
- Aerated Static piles or in vessel composting
  At least 3 days above 131°F
Pathogen Destruction

Heat
UV light
Desiccation
Competition
Toxicity

Which of these are at work during composting?

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

Turned Windrow Composting
Controls objectionable odors
Manage pile temperatures
Expedite active composting & curing
Changes PFRP times
Smaller piles
Easier to add water
Bigger composting footprint required
No electricity required

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

Finished Compost
Raw Feed Stocks
Porous material

Process to Further Reduce Pathogen Temperature Limit

Temperature, F

Days After Initiation

90 100 110 120 130 140 150 160

October

September

On Farm Compost

Chicken Manure Compost
Composting Mortalities

- Select a well drained site
- Determine your compost recipe
- Build the sandwich
- Make sure all carcasses are covered
- Monitor temperature
- Compost at least 3-4 weeks
- Deal with dropped manure and feathers

Diseases Controlled by Heat
- IB  Bronchitis
- NC  New Castle
- MG  Mycoplasma Gallisepticum
- IBDV  Infectious Bursal Disease Virus
- AI  Avian Influenza

Build the sandwich
Use adequate carbon source wood shavings, bedding, straw

Happy Composting
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