Windrowing Broiler Litter

MORGAN FARNELL, PH.D.
MISSISSIPPI STATE UNIVERSITY
POULTRY SCIENCE DEPARTMENT
Literature (Disclaimer)

- **Peer Reviewed Research**
  - **PubMed** – US National Library of Medicine and the National Institute of Health
    - *(< 5 PUBLICATIONS)*
  - **Agricola** – US Department of Agriculture – National Agriculture Library
    - *(1 PUBLICATION)*

- **Anecdotal, Personal Experience and Not Peer Reviewed**
  - Extension Articles and Presentations
  - Wikipedia, Allied Industry Websites
Definitions –

- **Windrowing** - forming a long low ridge of material

- **Composting** – utilizing aerobic *(oxygen loving)* microbes to decompose organic matter

- **Putrefaction** – utilizing anaerobic *(don’t need oxygen)* microbes to decompose organic matter

- **Ammonia Volatilization** – loss of nitrogen to the air

- **Pasteurization** – reducing microbes by heat, *not sterilized*
Why do we windrow?

- Reduce pathogenic microbes
- Reduce insects
- Reduce nematodes
- Will destroy some seeds (turf grass, domestic use, golf courses, parks)
- Re-use litter

- Total cleanout can be problematic
  - Bedding material is expensive and can have a high moisture content
  - May have environmental limitations such as a high soil phosphorus level
Litter Bacterial Counts
(Terzich, et al. 2000)

100 billion
General Bacterial Numbers
Already in the litter

Slide courtesy of Dr. Kenneth Macklin, Auburn University
Opportunity to treat darkling beetles
Windrowing Challenges

- Volatilizes ammonia, lose soil nutrient nitrogen, creates a waste gas
- Requires 30-35% moisture content
- Not enough carbon, such as wood shavings to get the correct Carbon : Nitrogen ratio
- Not enough time
Windrowing Basics

- Air
- Moisture
- Temperature
- Time
- Break down piles
- Ventilate
- Litter Amendment
Simple Implements Also Work Well

- Priefert 5’ or 7’ Litter Blade
- Priefert 5’ or 7’ Litter Saver
- Simple pivoting leveling blade
- Equipment doesn’t have to be fancy or expensive to be effective
Specialized Implement Dealers

- Big Chief
- Bobcat
- Brown Bear
- JPS Fabrications
- KMC
- Lewis Brothers
Step 1: Roll litter where pile is to be built to assure good mixing and aeration.
Windrowing

Step 2: Form windrows > 18” high
Be careful not to remove the pad
Moisture: $= 35\%$

- Need at least $25\%$ water content to compost
- Recommend $35\%$ moisture

- May be able to incorporate cake and hardpan to increase moisture content

However:
  - Could increase ammonia release
  - May still need to de-cake or pulverize afterwards
Moisture

- A broiler may consume 2-5 times more water than feed on a weight basis.

- Given: FCR = 2:1; Body Weight = 9 lbs; Temperature = 70°F; 22,000 birds/house; 1 gallon of H₂O weighs 8.34 lbs.

- Calculation: (2 lbs feed * 9 lbs bird * 2 fold H₂O * 22,000 birds) / 8.34 lbs

  = 94,964 gallons of H₂O (birds, litter, air)

  = or ~ 12 semi-tractor trailers of water per house!!!
Spring 2014 – MS Litter Samples

% Litter Moisture

Litter Samples

Percent Litter Moisture

25%
Temperature
> 130°F
Windrow Temperature Variation

- House 4 Pad Top
- House 4 Middle Top
- House 4 Pad Bottom
- House 4 Middle Bottom
- House 4 Fan Bottom
- House 4 Fan Top

turned
Spontaneous Combustion

- >190°F can result in a fire
- Don’t pile over 6’
- Don’t compact litter
- Don’t mix wet and dry litter
- Monitor temperatures
Time: 10-14 Days
Day 1 – Turn and windrow
Day 4 – Turn
Day 7 – Spread, decake, ventilate
Day 11 – Place chicks
Ventilate

- To remove ammonia
- To remove moisture

- Close all entry points
Windrowing Economics

<table>
<thead>
<tr>
<th>Positives</th>
<th>Negatives</th>
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<tbody>
<tr>
<td>Reduced pathogens</td>
<td>Equipment cost</td>
</tr>
<tr>
<td>Reduced disease challenge</td>
<td>Labor/contractor</td>
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<tr>
<td>Reduced carcass contamination?</td>
<td>More ventilation/fuel costs due to potential for higher ammonia</td>
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<tr>
<td>Reduced hardpan</td>
<td>Increase need for litter amendments to control ammonia</td>
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<tr>
<td>Bird performance?</td>
<td>Decreased litter particle size? = more caking</td>
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<tr>
<td>Better beetle control?</td>
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<tr>
<td>◇ Reduced damage to insulation, therefore save on fuel costs</td>
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<tr>
<td>Less caked litter produced</td>
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<tr>
<td>Extend useful life of litter? spend less on litter replacement?</td>
<td></td>
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<tr>
<td>Environmental benefits?</td>
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Summary

- More of an art than a science
- Must turn after windrowing to aerate and to incorporate cooler exterior
- Remove excessive cake and hard pan as needed
- Allow enough time for the process, 10-14 days
- May not be composting if the moisture low, carbon nitrogen ratio is off or the material isn’t properly mixed and aerated
- Use a long stem thermometer to evaluate the windrows
Thank you for your time