Handling Built-Up Litter Between Flocks

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Controlling Ammonia

- Combination of manure, moisture, heat and bacteria
- Cause blindness in young birds over 90 ppm
- Cause decreases in feed efficiency, growth over 50 ppm
- Creates susceptibility to respiratory illness
Objective

- Treat Litter between flocks to reduce pathogen level ammonia production, and caked litter
- Economize litter and ventilation expenses
- Prepare house for next flock
Methods

- In-House Sterilization of litter
- Mechanical Treatment of litter
- Flame Sterilization of litter
In-House Pasteurization of Broiler Litter

Water Quality Issues in Poultry Production and Processing

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Objectives

Our main objectives are to reduce pathogen content in broiler litter and to reduce ammonia levels in poultry houses

* Determine the optimum moisture content (of broiler litter) necessary for maximum pathogen reduction

* Determine the effect of pasteurization on pathogen content in broiler litter

* Determine the nutrient content of recycled broiler litter
## Temperature and Time for Pathogen Destruction

<table>
<thead>
<tr>
<th>Microbe</th>
<th>Temp(F)</th>
<th>Time (Minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salmonella typhosa</td>
<td>131</td>
<td>30</td>
</tr>
<tr>
<td>Salmonella sp.</td>
<td>131</td>
<td>60</td>
</tr>
<tr>
<td>Shigella sp.</td>
<td>131</td>
<td>60</td>
</tr>
<tr>
<td>Entamoeba histolytica cysts</td>
<td>113</td>
<td>2-3</td>
</tr>
<tr>
<td>Tanea</td>
<td>131</td>
<td>2-3</td>
</tr>
<tr>
<td>Trichinella spiralis larvae</td>
<td>131</td>
<td>2-3</td>
</tr>
<tr>
<td>Brucella abortis</td>
<td>145</td>
<td>3</td>
</tr>
<tr>
<td>Micrococcus pyogenes</td>
<td>122</td>
<td>10</td>
</tr>
<tr>
<td>Streptococcus pyogenes</td>
<td>131</td>
<td>10</td>
</tr>
<tr>
<td>Corynebacterium diptheria</td>
<td>131</td>
<td>45</td>
</tr>
<tr>
<td>Necator americanus</td>
<td>113</td>
<td>50</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>131</td>
<td>60</td>
</tr>
</tbody>
</table>
Procedures

Poultry litter is arranged into two windrows running lengthwise of the house
Procedures

If needed, water is added to the litter to obtain the desired moisture content.
Procedures

Windrows are monitored for 7 to 10 days

Thermometer stations record temperatures at 6” and 12” depths
Temperature and Moisture
Maximum Temperature vs. Moisture in Dewar Flasks

\[ R^2 = 0.975 \]

Target Moisture
Maximum average temperatures at 1 ft. and 6 inch depths at various moisture contents

Temperature (F)

Moisture

1 ft.
6 inch
Poly. (1 ft.)
Poly. (6 inch)
Average windrow and house temperatures during 10 days of in-house pasteurization of poultry litter at 28% moisture.
Average daily windrow temperature readings at 1ft. depth

<table>
<thead>
<tr>
<th>Day</th>
<th>Temperature (F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>21%</td>
<td>23%</td>
</tr>
<tr>
<td>60</td>
<td>80</td>
</tr>
<tr>
<td>140</td>
<td>160</td>
</tr>
</tbody>
</table>
Average daily windrow temperature readings at 6 inch depth

Day

Temperature (F)

21%
23%
26%
35%
Average daily windrow temperatures during 10 days of in-house pasteurization of poultry litter at various moisture levels

Temperature (F)

Day

- 35% Moisture, surface watered
- 26% Moisture, No added water
- 35% Moisture, Blended in
Sampling

Litter samples are taken “before” and “after” the pasteurization process

• Pathogens
• Nutrients
Sampling

Preliminary laboratory results indicate that there is a reduction in broiler litter pathogen levels following in-house pasteurization.
Chemical Litter Treatments

- Acidifying agents to reduce ammonia production
- Decrease moisture from litter
- Apply “positive” bacteria to competitively provide good environment for birds
- Apply enzymes or other compounds to bind up ammonia compounds and prevent release
Lewis Brothers Manufacturing, Housekeeper

- **Litter Treatment**
  - De-caking and conditioning machines
  - Remove moisture-laden, ammonia producing manure
  - Mixes and aerates litter material
  - Video
Litter Sterilizer

- Designed to treat bare floors and litter after flock removal and de-caking.
- Six Liquid Propane torches that put intense heat under a sturdy enclosed steel hood.
- Produces heat over 2000F and maintains approximately 1400 F which kills pathogens, insects and insect larvae or eggs.
- Video
Summary for Litter Treatment

- In-house sterilization
- Chemical treatment
- Mechanical treatment
- Flame treatment