On-Farm *Salmonella* Control Measures for Layers

Cleaning and Disinfection
Elements Of Cleaning

• Cleaning is key to pathogen reduction
• Clean, then disinfect
• Remove all organic material (feed, feces, feathers, etc.) prior to disinfection
• Surfaces must be clean for disinfection to be effective
Elements Of Cleaning

Pressure
• Brushes
• Brooms
• Blowers
• Water

Heat
• Burning of feathers and other debris aids cleaning
• Hot water makes soap more effective

Caution: Use appropriate equipment and follow proper procedures.
Elements Of Cleaning – Drying

- Thoroughly dry equipment before applying disinfectant
- *Salmonella* replicate outside of a host in damp environments
- In environments with high humidity and/or low temperatures, dry cleaning is a reasonable alternative to wet cleaning
  - Conditions may not allow for adequate drying after wet cleaning
Elements Of Cleaning – Drying Cleaning

• May be acceptable in houses with low rodent populations and low *Salmonella* spp. contamination
• Labor intensive
• May require longer downtime
• Blowing and light sweeping will dislodge organic material that is loosely attached to equipment
• Firmly attached organic material requires more scrubbing
• Protocol for Dry Cleaning
What Are Sanitizers?

- Sanitizers are cleaning reagents that may also disinfect
- Sanitizers may interact with disinfectants
  - Incompatible products can inactivate one another
- Some commercial disinfectants contain a compatible sanitizer
- If using a separate sanitizer and disinfectant, pick two with similar pH
  - Use acids with acids and bases with bases
What Are Disinfectants?

• Can kill disease-causing microorganisms
• Each class has unique characteristics that impact its suitability for on-farm *Salmonella* control
  – Chlorines
  – Iodines
  – Phenols
  – Quaternary Ammonias (Quats)
  – Chlorhexidine
  – Peroxygens
• Disinfection 101
Choosing The Right Disinfectant

- Will it be in contact with organic material?
- Does it need to have residual activity?
- Will it be used on metal or motors?
- Will it be used in wet or dry conditions?
- Is it compatible with soaps you use?
Choosing The Right Disinfectant

- Will birds be exposed to it?
- How will it be applied?
- Are there any safety concerns?
- How important is cost?
## Characteristics Of Common Disinfectant Classes

<table>
<thead>
<tr>
<th></th>
<th>Chlorines</th>
<th>Iodines</th>
<th>Phenols</th>
<th>Quats</th>
<th>Chlorhexidine*</th>
<th>Peroxygens</th>
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</thead>
<tbody>
<tr>
<td><strong>Toxicity</strong></td>
<td>Fumes are toxic</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td><strong>Corrosive</strong></td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Spectrum</strong></td>
<td>Bacteria, Viruses</td>
<td>Bacteria, Fungi</td>
<td>Bacteria, Fungi, Viruses</td>
<td>Bacteria, Fungi, Viruses</td>
<td>Fungi, Viruses</td>
<td>Bacteria, Fungi, Viruses</td>
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<tr>
<td><strong>Organic Material</strong></td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Some</td>
<td>--</td>
<td>Yes</td>
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<tr>
<td><strong>Residual Activity</strong></td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>--</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Not effective against *Salmonella* spp.
Disinfectants For Clean-out

• Necessary characteristics
  – Need residual activity
  – Some activity with organic material
  – Broad spectrum of activity for bacteria and viruses
  – Low toxicity
  – Inexpensive

• Good choices
  – Phenols
  – Quaternary Ammonias
  – Peroxygens

• Infrequent clean-out allows use of disinfectants that are too corrosive for daily disinfection of equipment
Disinfectants For Clean-out

As wood is organic, use disinfectants that retain activity in organic material. Poor choices for *Salmonella* spp. Include:

Chlorine:
- Little residual activity
- Toxic fumes
- Inactivated by organic material

Iodines:
- Little residual activity
- Inactivated by organic material

Chlorhexidine
- Not effective against bacteria
Equipment Disinfection

• Necessary characteristics
  – Residual activity
  – Broad spectrum of activity
  – Noncorrosive

• Good choices
  – Phenols
  – Quaternary Ammonias

• Manure trucks should be cleaned and disinfected between farms
Equipment Disinfection

- Poor choices
  - Peroxygens
    - Highly corrosive
  - Chlorines
    - Corrosive
- Metal trailer will corrode with frequent exposure to peroxynegens and chlorines
  - Plastic crates won’t be damaged
Disinfectants – Label Claims

• Use disinfectants that are active against *Salmonella* spp., Newcastle Disease and Avian Influenza

• Organisms killed by disinfectant are listed on label

• Conditions disinfectant faces in poultry houses are different than requirements for label claim
  – Label efficacy testing is performed on clean, dry stainless steel surface
What Disinfectant Would Be Effective Here?

You can’t disinfect manure!
Getting The Best Effect From Disinfectants

- All disinfectants work best on clean surfaces
  - Remove all organic material before application
  - Excess organic material neutralizes disinfectant activity
- Label use – dilution assumes disinfectant is applied to dry surface
  - If surface is wet, apply at a higher concentration
- Disinfectants work best on nonporous surfaces
- Disinfectants take time to work
  - Should be left on surface for maximum contact time
Complements To Disinfectants

- Sunlight in conjunction with drying and downtime helps kill viruses and bacteria
- Downtime is not equal to time between birds leaving building and new birds being placed
  - Downtime starts when all surfaces in the environment are clean, dry, disinfected and then dried again
- Disinfectants need contact time on clean, dry surface in order to help kill viruses and bacteria
Nonwetting Disinfectants

• Fogging products penetrate hard-to-reach areas
• Some fogging products are extremely effective against *Salmonella* spp.
• Formaldehyde is a powerful disinfectant, but subject to regulations and permits – check with regulatory officials in your area
• Manufacturers are developing dry disinfectants in a variety of classes
• Since dry and fogged disinfectants are not in solution, they do not require drying time and work well in a dry-cleaning program
Using Disinfectants Safely

• Avoid runoff
• Properly dispose of concentrates and containers
• Minimize use
  – Use proper dilutions
  – Use only on clean surfaces
  – Use personal protective equipment (PPE) if required
  – Use alternatives to disinfectants
  – Use equipment that measures out set amount of sanitizers and disinfectants
  – Using the right amount is best for the environment and budget
Disinfectants Are An Important Part Of *Salmonella* Control Programs

- Are not effective when used alone or improperly
- Proper disposal of mortalities will help reinforce success of cleaning and disinfection program