Pet Food Processing
New Attention to Hygienic Design

Michele M. Evans, Ph.D.
Diamond Pet Foods
The Journey of Legacy Equipment to Hygienic Design

• Pet Food Industry Overview
• Major Challenges
  – Production practices
  – Legacy equipment
  – Equipment Design
  – Cleaning and Sanitation
• Journey Past, Present, Future
Pet Food Industry Overview

- Melamine - 2007
- Salmonella - 2008
- Zero Tolerance
- Risk
What is Risk?

- **Real risk**
  - 33,000 car crash deaths
  - 443,000 smoking
  - 36,500 drug overdose
  - 3500 drown
  - 75 lighting strikes
  - 20 shark attacks

- **Perceived risk**
  - Insurance company models
    - # of tickets
    - # of wrecks
    - Age
    - Gender
    - marital status
CDC Yearly Estimates of Foodborne Illness

4,423,310

- Produce: 2,117,442
- Meat & Poultry: 1,900,000
- Dairy & Eggs: 589,310
- Fish & Shellfish Petfood 2008-2012: <150

Emerging Infectious Diseases, Vol. 19 No.3 March 2013
CDC Yearly Estimates of Foodborne Deaths

- Meat & Poultry: 418
- Produce: 333
- Dairy & Eggs: 211
- Fish & Shellfish: 94
- Petfood 100 BC - 2012: 0 recorded

Risk: Real or Perceived?

Emerging Infectious Diseases, Vol. 19 No.3 March 2013
Pet Food Industry

• *Salmonella* Risk
  – REAL?
  – PERCEIVED?

• Does it really matter?
How to Control SALMONELLA?

• Keep it out of your plant!
• Prevent it from moving around.
• Prevent growth (multiplying).
• Locate it.
• Eliminate it.
Major Challenges

• Production practices
  – Separation
  – Air handling
  – GMP’s/Culture change
Lathrop Plant Separation
Major Challenges

• Legacy equipment

• Equipment Design
  – Sanitary design standards – non existent

• Cleaning and Sanitation
  – SSOP’s – how do we clean?
  – Establishing frequencies
  – C&S verification, validation
Cleaning and Sanitation SOP’s (over 100)
CLEANOUT SSOG #13
AREA: SHAKER SPOUT

NOTE: Before use of sanitation products employees must receive appropriate training in the safe and proper use of the product.

<table>
<thead>
<tr>
<th>Products</th>
<th>Equipment</th>
<th>Safety Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpet D2</td>
<td>White scraper</td>
<td>Safety glasses</td>
</tr>
<tr>
<td>Alpet D2 wipes</td>
<td>Rags</td>
<td>Pump cap</td>
</tr>
<tr>
<td>Persan</td>
<td>9/16&quot; wrench/socket</td>
<td>Ear plugs</td>
</tr>
<tr>
<td>Lactic acid</td>
<td>Scouring pads</td>
<td>Blue gloves</td>
</tr>
<tr>
<td></td>
<td>Microfiber pads</td>
<td>Face shield</td>
</tr>
<tr>
<td></td>
<td>Extension pole</td>
<td>Green gloves</td>
</tr>
<tr>
<td></td>
<td>Vacuum</td>
<td>Tyvek suit</td>
</tr>
<tr>
<td></td>
<td>Extension cord</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pump sprayer</td>
<td></td>
</tr>
</tbody>
</table>

Procedures:

NOTE: All equipment used on food contact surfaces must be sanitized with Alpet D2 prior to use, and re-sanitized if it touches anything that is a potential contaminant (i.e., anything not sanitized). This includes employee’s hands and arms.

1. Follow proper lockout procedure for shaker spout
2. Open shaker
3. QC pre-swab
4. Spray inside of shaker with lactic acid
5. Close shaker
6. Open shaker spout access door
7. Use scouring pad to remove buildup
   1. Use extension pole to reach as far as possible

Areas of Focus

Written by: Tracy Ferguson
Updated: 5/22/2013
Cleaning and Sanitization Strategies

• Cleaning and Sanitization: How and When??
  – Wet clean vs. dry clean
  – New technology
    • Dry fog
    • Ozone / Chlorine dioxide
    • Probiotics
  – New chemicals vs. old chemicals
    • Peracetic acid
    • Acidified Calcium Sulfate
    • Lactic Acid
  – New Monitoring Technology
New Science for Sample Collection

Collection & Sample Handling

Continuous

Traditional focus on detection

Shift focus to collection

Grab sampling
Statistics
Heterogeneous
Reproducibility
Selectivity
Specificity
Incubation
Speed
Detection limits
Concentration
Near Real-Time
Grab Sampling

Traditional “Grab Sample”

Positive Contamination

Negative Contamination?

1:100,000 Probability of detection
(based on statistical calculation by weight)
Separation / Collection / Hydrosolization

Aerosol dispersion 70-80%

Inner

Outer
# Cold Sterilants and Disinfectants

## Classification and Chemicals

<table>
<thead>
<tr>
<th>Microorganism</th>
<th>Difficulty to Kill</th>
<th>Low Level Disinfection</th>
<th>Intermediate Level Disinfection</th>
<th>High Level Disinfection</th>
<th>Sterilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial Spores</td>
<td>More</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mycobacteria</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Enveloped Viruses</td>
<td>Less</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fungi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gram Negative Bacteria</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gram Positive Bacteria</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enveloped Viruses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Types of Chemicals</td>
<td>Alcohol Phenolics</td>
<td>Hydrogen Peroxide</td>
<td>Formaldehyde Glutaraldehyde</td>
<td>Hydrogen Peroxide + PAA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Phenolics</td>
<td>Phenolics</td>
<td>Hydrogen Peroxide</td>
<td>EtO</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quaternary</td>
<td>Multi-Quat / High</td>
<td>Glutaraldehyde</td>
<td>Hydrogen Peroxide</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ammonium</td>
<td>Alcohol</td>
<td>Peroxide+ Peracetic Acid</td>
<td>Peroxide</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sodium</td>
<td>Sodium Hypochlorite</td>
<td>Sodium Hypochlorite</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hypochlorite</td>
<td>Peracetic Acid</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Phenomenon of Dry Fog

Small droplets bounce and do not burst upon collision. 7.5µ droplet evaporates to do a vapor phase disinfection.

Large droplets burst and make things wet.
What Are Probiotics?

- Commonly Used Strains
  - Lactobacillus
  - Bifidobacterium
  - Enterococcus
What Do Probiotics Do?

- Aid in digestive health
  - Competitive inhibition
  - Competitive exclusion
  - Receptor binding
  - Antagonistic behavior

- Secondary benefits
  - Antimicrobial characteristics in product

- Environmental Application
Journey Past, Present, Future

QUESTIONS ?