Sanitation in a Dairy Processing Plant

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Focus

- Understanding your Product
- Cleaning Process
- Sanitation Equipment
- CIP and COP Cleaning

Understanding your Product

- Organisms of concern
  - Listeria monocytogenes
  - E. coli
  - Salmonella
- Recalls 2019
  - Mecox Bay Dairy; Cheese; Listeria
  - Working Cow Homemade; Ice Cream; Listeria
  - La Granja Inc; Ice Cream; Salmonella
  - The Comfy Cow; Ice Cream; E. coli
Understanding your Product

• Components of Milk Products
  – Sugar (Lactose)
  – Fat
  – Protein
  – Minerals

Understanding your Product

• What is our Process

<table>
<thead>
<tr>
<th>Component</th>
<th>Low / Medium Pasteurization</th>
<th>High Pasteurization / UHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugar</td>
<td>Easy</td>
<td>Caramelization - Difficult</td>
</tr>
<tr>
<td>Fat</td>
<td>Easy to Difficult</td>
<td>Polymerization - Difficult</td>
</tr>
<tr>
<td>Protein</td>
<td>Difficult</td>
<td>Denaturation – Very Difficult</td>
</tr>
<tr>
<td>Minerals</td>
<td>Varies</td>
<td>Varies</td>
</tr>
</tbody>
</table>

Understanding your Product

• Removal of these Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Solubility in Water</th>
<th>Cleaning Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugar</td>
<td>Soluble</td>
<td>Warm / Hot Water</td>
</tr>
<tr>
<td>Fat</td>
<td>Insoluble</td>
<td>Alkali Solution</td>
</tr>
<tr>
<td>Protein</td>
<td>Insoluble</td>
<td>Alkali Solution</td>
</tr>
<tr>
<td>Minerals</td>
<td>Varies</td>
<td>Acid Solution</td>
</tr>
</tbody>
</table>
### Steps in Cleaning

1. **Remove Large Debris**
   - Scraping, drainage, or expulsion w/ water or air
2. **Prerinse**
   - Remove loose soil
3. **Cleaning with Detergent**
   - Dispersion of insoluble material

### Steps in Cleaning

4. **Postrinse**
   - Removes residual soils and cleaning compounds
5. **Sanitize**
   - Destroys residual microorganisms

### Sanitation Equipment

- Water Hose
- Brushes
- Scrapers, Sponges, Squeegees
- High-pressure spray
- Foamers
Water Hose

- Adequate length for cleaning
- Rapid-type Nozzle connection
- Adjustable spray head
  - Fan vs Direct

Brushes

- Bassine – very course
  - Heavy duty scrubbing
- Palmetto – less course for medium soils
  - Metal equipment and walls
- Tampico – fine fiber
  - Light duty / gentle brushing
- Nylon – varies
  - Strong flexible fibers; nonabsorbent

Scrapers, Sponges, Squeegees

- Scrapers
  - Tenacious deposits
- Sponges
  - Mainly used in small plants
  - Single use
- Squeegees
  - Remove puddling water

High Pressure Spray

- Supplement for hot water
- Considered inefficient
  - Large volumes of water and cleaning compounds
- Beneficial
  - Small equipment
  - Difficult areas to reach and penetrate
Foamers

- Cleaning compound mixed w/ air and water
- Clings to surface
- Increase contact time
- Centralized or portable

Clean-In-Place

- CIP – Clean in Place
- Depends on hygienic design
- Cost
  - Low labor
  - High Initial
- Best Used – enclosed systems
  - Pipelines, vats, heat exchangers, homogenizer
- Depends on recirculation

Clean-In-Place

- Steps
  - Prerinse, Wash, Sanitize, Final Rinse (optional)
Clean-Out-Place

• COP – Clean out of Place
• Requires disassembly of parts
  – Hoses, clamps, fittings, nozzles, trays, knives
• Manual mechanical action
• Soak tanks
• Circulating water

Clean-Out-Place

• Steps
  – Prerinse, Wash, Final Rinse