Troubleshooting Bacteria Counts Case Study

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GEA Farm Technologies

System Design – Case Study A

Type of system: 2X6 Flat Barn Parlor
Number of units =12 Claw type: Universal Title Flow Claws
Shell and liner type: Universal Shells with 282 liners
Take-offs: Universal Advisor Stanchion Barn
Milk line diameter: 3 inch
Wash line diameter: 2 inch
Automatic washer type: Universal with Manual Chemical jars
Air injector type: Universal
Milk/wash valve type: plug
Are there restrictors on jetters or jetter hoses? No
Are there restrictors on added water line? Yes
Hole size = 5/8
Units plugged into wash manifold with AI on end.

Dairy Farm Investigation

- Identification of the Problem
- What are the issues surrounding the problem
  - “What got us there?”
  - “Who identified the problem?”
  - “Where is the data used to support first impressions?”
  - “How was the problem first treated?”
  - “Why is there still a problem?”
- Raise the questions and validate the responses
  - Not the time to be bashful
  - Cover all areas of management and operation
Avoid the “Shot Gun Approach”

- SLOW DOWN TO GO FAST!
- Look over situation
- Make measurements
- Get benchmarks
- Be complete with evaluation!

What Got Us There?

- The dairyman told me of high bacteria count concerns at a farm show and asked if I and the dealer could check out his washing system.

Dairy Farm Investigation

- Making Measurements
  - Milk quality reports
    - Bacteria counts
    - Lab Pasteurized Counts
    - Coliform Counts
    - Somatic cell counts

Where is the Data Used to Support First Impressions?
### Milk Quality Test Results

<table>
<thead>
<tr>
<th>Date</th>
<th>9-15-08</th>
<th>9-17-08</th>
<th>9-27-08</th>
<th>10-13-08</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPC</td>
<td>84,000</td>
<td>12,000</td>
<td>21,000</td>
<td>5,000</td>
</tr>
<tr>
<td>LPC</td>
<td>87</td>
<td>45</td>
<td>40</td>
<td>147</td>
</tr>
<tr>
<td>CC</td>
<td>150</td>
<td>1</td>
<td>150</td>
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</tr>
<tr>
<td>SCC</td>
<td>186,000</td>
<td>208,000</td>
<td>165,000</td>
<td>216,000</td>
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</tbody>
</table>

### Reality Checks

Investigations many times include individuals searching for a single cause of the problem.

"While driving to the farm, many times we hope and pray we’ll find something wrong so we can fix it."

Unfortunately this leads to a band-aid approach and seldom treats the cause of the problem.

### Milking Time observations

![Image of milking time observations]

### Coliforms

![Image of coliforms]
Common Problems

- Water Quality, Quantity, & Temperature
  - The concentration of cleaning chemicals may need to be adjusted for hard water
  - Adequate quantity of water so that the wash vat does not suck air.
  - Water temperature.

- Unit Flow Measurement in Milking Parlors
  - Look for uneven distribution of water to the milking units.

Water Quality and Quantity

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water hardness</td>
<td>1 GPG</td>
</tr>
<tr>
<td>Water iron content</td>
<td>&lt;0.5 ppm</td>
</tr>
<tr>
<td>Other Water test results</td>
<td>1000 PPM Buffers</td>
</tr>
<tr>
<td>Amount of water used per cycle</td>
<td>52 gallons</td>
</tr>
<tr>
<td>Is a water softener installed?</td>
<td>Yes</td>
</tr>
<tr>
<td>Is water softener charged and functioning?</td>
<td>Yes</td>
</tr>
<tr>
<td>Water Heater Temperature</td>
<td>167 F</td>
</tr>
<tr>
<td>Capacity</td>
<td>80 gallons</td>
</tr>
<tr>
<td>Wash sink capacity</td>
<td>60 gallons</td>
</tr>
</tbody>
</table>

Water Buffer Chart

On the pH scale, seven is neutral. Substances from zero to seven are acidic, substances from seven to 14 are alkaline.
Observation of CIP Procedures

• Evaluate if CIP procedures are being followed correctly.
• Check cooling performance by observing blend temperatures and cooling times
• Measure chemical concentrations
• Record temperature of the water returning to the wash sink at the beginning and end of each cycle
• Complete a sketch of the CIP system and flow circuit to document conditions for future reference and consultation

Observation of CIP Procedures

1. Does the sanitary trap valve close (trap-out) during the CIP procedure?
2. Is air drawn into units or wash lines at the wash sink?
3. Is the ball removed from the sanitary trap during washing?
4. Do more than 5 gallons of water drain from the balance tank after the wash cycle?
5. Does the milk pump run continuously during the wash cycle?
6. Is there any visible residue on system components?

Document Cleaning Cycles Used

<table>
<thead>
<tr>
<th>Location</th>
<th>Color</th>
<th>Texture</th>
<th>Acid Soluble</th>
<th>Detergent Soluble</th>
<th>Chlorine Soluble</th>
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</thead>
<tbody>
<tr>
<td>Receiver</td>
<td>White</td>
<td>tacky</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Neck of Receiver</td>
<td>Yellow/White</td>
<td>Slimy</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Receiver Gasket</td>
<td>Yellow/White</td>
<td>Slimy</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Gaskets by Milk Pump</td>
<td>Yellow</td>
<td>Slimy</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Neck of Receiver Jar by Probes

Crack in receiver jar cover

Bubbling in Receiver Jar

Gasket Needs replacing
Receiver jar

Pipeline Left of receiver

Use camera to see areas your head can not fit!
Milk Line Slug Flow Analysis

• Set air injector open time
• Check slug velocity and adjust air admission rate
• Set air injector closed (off) time
• Final vacuum recorder testing and unit flow tests
• Make sure you have enough water flow through meters & peripherals.

TriScan wash analysis before changes.

Loose fitting wash plug caused "blow by"

"Blow By"
• Very small 1 gallon trap jar.
• Needs to upgrade to larger trap jar to achieve the best slug.
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<td>138,000</td>
<td>104,000</td>
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1) Do a walk through after starting the wash cycle.

Have whomever starts the wash cycle stick around long enough to make sure:
• All the liners are plugged into jetters properly.
• Observe if water is running through all the units and meters.
• Listen to see if air injector is functioning properly.
• Observe if the milk pump is pumping adequately.
2) Temperature

Monitor Temperature:
- Monitor temperature charts. Benchmark the end wash temperature with the high temperature on the chart.
- Utilize wash vat temperature recorders when possible.
- Or simply keep a thermometer around and catch the ending wash temperature periodically.

3) Scheduled Maintenance before failure.

- Have replacement schedule for all rubber goods, diaphragms, wash vat drains, chemical peristaltic tubes, etc.
- Record replacing these items so that you can alter your changing schedule if items are wearing out before your regularly scheduled date.
- Clarify who is responsible for this.

4) Monitor Chemical Usage

- Mark detergent, acid, and sanitizer drums weekly so that you can see if chemicals are getting dispensed at your normal usage levels.
- Work with a route person that keeps good records and can recognize if your usage on these items is up or down.

5) Monitor Quality Counts

- Monitor SPC, LPC, PI, Coliform, and SCC counts.
- When they are high something is causing it.
- Use quality history and events at the dairy to troubleshoot high counts quickly.
**Requirements for C.I.P. Cleaning**

- Time
- Temperature
- Water Volume
- Chemical Balance
- Velocity
- Drainage

**Requirements for C.I.P. Cleaning**

<table>
<thead>
<tr>
<th>Cause</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Mechanics</td>
<td>45%</td>
</tr>
<tr>
<td>Water Temperature</td>
<td>35%</td>
</tr>
<tr>
<td>Water Quality</td>
<td>30%</td>
</tr>
<tr>
<td>Detergent Dosage/h</td>
<td>25%</td>
</tr>
<tr>
<td>Milking Hygiene</td>
<td>0%</td>
</tr>
</tbody>
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**Conclusions**

- Tools used in evaluation
- Dairy farm profiles
- Milk quality reports
- Equipment analysis & Benchmarked
  - Milking system
  - Washing performance

**Thank-you!**

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