Best Milking Practices

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Milking is a complex interaction

AND not likely related to ONE factor alone

What is Mastitis?
• Bacterial infection of the udder
• 99% occurs when bacterial exposure at the teat end exceeds the ability of immune defense of the cow

• Subclinical Mastitis
  ✓ Milk appears normal but contains excessive number of inflammatory cells
  ✓ This milk can be sold for human consumption

• Clinical Mastitis
  ✓ Visual abnormalities of the milk
  ✓ Cannot be sold for human consumption

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**What are Somatic Cells?**

SCC is composed of white blood cells & occasional dead epithelial cells

- If present in milk indication of subclinical mastitis infections
  - There is no way of knowing how many cows are infected without doing an individual cow SCC Test

**Somatic Cells are NOT affected by:**

- Breed
- Milk Yield
  - Unless < 15 lbs/day
- Stage of Lactation
  - Unless there are more infected cows in later lactation
- Nutritional Management
  - Unless diet results in very loose feces and dirtier cows
- Other cow diseases
Somatic Cells **ARE** affected by:

- Management practices that expose teats to bacteria that causes mastitis
  - In milk that came from infected udders of cows
    - Exposure of contagious mastitis
  - In the environment that the cows live in
    - Exposure to environmental bacteria

Cows are calm

- Loud & Unusual Noises
- Sore teats & Udder Pain
- Unusual routine – Heifer in Parlor for 1st Time
- Memory of bad events
- Harsh Treatment – Yelling, Erratic Movement by Pusher, shock gates, prods

*Events 30 minutes before & during milking will negatively impact milk let-down*
Adrenaline has opposite effect of oxytocin

- Constricts blood vessels
- Blocks oxytocin action on myoepithelial cells
- Reduces milk flow and let-down

Strategies to Reduce Stressors

- Handle cows calmly – limited use of cattle prods, tail twisting, yelling
- Allow cows to move into the milking facility on their own or gently move if needed
- Move cows consistently and quietly **BY ALL**
- Move Fresh Heifers w- Cows - give Oxytocin injections only as last resort & for very limited time
Cow Cleanliness Impacts Milking

• Cleanliness impacts speed of prepping cows
  - Dirty cows doubled cow prep time & reduced parlor throughput [Reneau, 1997]
• Research shows rear udder & rear leg cleanliness is associated with risk of mastitis
  - Use scorecard or visual method to ensure <1% of cows are in categories 3 & 4.

Source: Cook, Univ. WI Vet School
Scorecard available through Pfizer

Additional Diagnostics to Assess Cow and Teat Cleanliness

• Check milk filter for cleanliness – signs of mastitis, dirt, manure, and bedding
• Alcohol test of teat ends following prep
• Knee test for bedding dryness & impact on udders, visible manure on beds
• Bacteria Culturing – Bedding, Towels, Cows, Bulk Tank
• Visual inspection – facility floor, units, cows as they come into the parlor (hygiene evaluation)
Grouping to minimize infection

- Minimize exposure of infected to non-infected cows
- Importance is highest when contagious organisms are present in herd

Dedicate milking units or inflations for 'infected' cows
- 6 units used for milking
- 30% herd is 'infected'
- 6 x 0.30 = 1.8 or 2 units reserved for 'infected'

Back flush units before moving from infected to non-infected cows

Recommended Procedure:
- Rinse unit
- Expose unit to 25 to 50 ppm iodine for at least 30-seconds
- Rinse w/ clean water
- Dry thoroughly

Remember – water aids bacteria entering teats!

Milking Procedure

• Prep Lag Time is a Key to Successful milking: Time from start of prep till machine put on cow (Goal: 60 to 120 sec)

Pre Dip
20 sec per cow

Teat Stimulation
(Striping, Cleaning, Drying)
30 to 50 sec per cow

Attachment Delay
(10-20 sec/cow)

Prep-Lag Time
60 to 90 sec/cow

New data shows 90 sec. best for late lactation – esp. 3X milking
Example of Poor Prep Milking

- **Milk Flow:** Lb/min
  - 15.4
  - 13.2
  - 11.0
  - 8.8
  - 6.6
  - 4.4
  - 2.2

- **Amount of Milk:** 31.55 lbs.

- **Alveolar Milk**
  - **Peak Flow Rate**

- **Good Massage & Attach within 60 to 120 seconds**
  - **35.50 lbs. milk**
  - **Rapid uninterrupted increase in flow to peak**
  - **High Milk Flow Rate**
  - **Rapid Milk Out**
Why Pre-Dip?

• **Environmental Mastitis Control**
  - kills bacteria on teat end - quickly
    - Typical contact time 15-30 seconds (read the label)
  - Controls environmental Strep infections
  - Limited control with Environmental Staph (CNS) group of organisms

• **Coverage**
  - Cover ¾ up the teat (all the way around)
  - Keep dipper CLEAN- dip is neutralized by manure
  - Paper Towel Test

Why Fore-stripe?

1. **Stimulates Udder** for good let-down
   A. Evidence of importance for 3X and 2X milking
      a. Vigorous 3-4 streams per teat

2. **Reduces Bacteria on Teat End**

3. **Reduces Somatic Cells** in Teat Cistern
   A. 1st milk has highest SCC

4. **Check for Clinical Mastitis**
   A. Detect new cases sooner – quicker cure if diagnosed and acted on sooner

**If milking in stall barn DO NOT strip on beds!!**
**Teats are dry before milking**

- Most IMPORTANT part of disinfection process
  - Water aids bacteria growth
- Towels – cleaned and dried between uses
  - Cloth vs paper
    - Cloth more absorbent
    - Must use hot water with disinfectant
    - MUST dry towels after washing
    - COST!
- Towel Containers Clean
- Close to workers

**Unit Attachment**

- Use care not to admit air when attaching the milking unit
  - Increases the risk of unit fall-offs
  - Slows milking
  - Increases the chance of mastitis
- Squarely aligned under cow
  - Consistent milk out of all four quarters
Over- Milking

- When unit stays on the cow when she is ‘finished’ milking
- Causes of Over milking:
  - Cow Stress Pre-milking
  - Improper Prepping Procedure
  - People Knowledge of When to Remove Milking Unit
  - Detacher Settings – too dry!
  - Old school – Pulling Down on Units at End of Milking
- Result of Over milking – Damaged Teat Ends

Strip Yield Test

Evaluation of:
- Completeness of Milking
- Milking Procedures
- Detacher Settings
- Unit Handling by people

In general, ‘Wet’ Milking is preferred over ‘Dry’ Milking due to impact on teat health – most important w-3X milking; Essential for mastitis control!

- Check volume of milk in quarter immediately after unit comes off
  - Goal: 2 ounces per teat
Post Milking Teat Dip

- To provide protection between milkings
  - Leave film on teat for 'period' of time post-milking until teat sphincter closes
- Removes milk residue from teat
  - Aids in reduced spread of contagious mastitis
- Teat dips should be selected for emollient and conditioning properties in winter. Barrier properties in summer and wet weather
- Spray vs. Dipper

Use of Nitrile Gloves

- Very important to reduce spread of pathogens
  - Reduce transfer from infected to non-infected cows
  - Change gloves or disinfect/dry gloves after handling mastitis cows
  - Keep clean gloves in enclosed container till use
How to assess teat end damage?

- Teat end scoring used to assess the effects of:
  - Milking management
  - Milking equipment
  - Environment

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score 1 (N)</td>
<td>No Ring. The teat-end is smooth with a small, even orifice. This is a typical status for many teats soon after the start of lactation.</td>
<td><img src="image1.png" alt="Illustration" /></td>
</tr>
<tr>
<td>Score 2 (S)</td>
<td>Smooth or Slightly Rough Ring. A raised ring encircles the teat orifice. The surface of the ring is smooth or it may feel slightly rough but no fragments of old keratin are evident.</td>
<td><img src="image2.png" alt="Illustration" /></td>
</tr>
<tr>
<td>Score 3 (R)</td>
<td>Rough Ring. A raised, roughened ring with isolated fragments of old keratin extending a short distance from the teat orifice.</td>
<td><img src="image3.png" alt="Illustration" /></td>
</tr>
<tr>
<td>Score 4 (VR)</td>
<td>Very Rough Ring. A raised ring with rough fragments of old keratin extending out from the teat orifice. The rim of the ring is rough and may be cracked, often giving the teat-end a “flowered” appearance.</td>
<td><img src="image4.png" alt="Illustration" /></td>
</tr>
<tr>
<td>Score 5</td>
<td>Open Lesions or Scabs.</td>
<td><img src="image5.png" alt="Illustration" /></td>
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Causes of longer-term effects

- Hyperkeratosis
  - Udder prep
  - Teat end shape/size
  - Production level
  - Overmilking
- Check ATO’s
- Machine on time
- Amount of unit-on time when flow is < 1 kg/min
  - Genetic predisposition
  - Slow milking and high producing cows
  - High vacuum

Why do we care about our SCC?

- Product Quality!!!!!
- Injury to secretory cells reduces synthesis of lactose, proteins and fats
- Increased permeability of cells allow leakage of blood components into milk
- Reduced shelf life!!
Clinical vs. Subclinical

- What is the difference?
  - Clinical mastitis is characterized by visible abnormalities in the milk or the udder.
    - The most obvious abnormalities in the milk are flakes, clots and a watery appearance
  - Subclinical mastitis is inflammation of the mammary gland that does not create visible changes in the milk or the udder.
    - Although the milk appears normal, subclinically infected cows will produce less milk, and the quality of the milk will be reduced

Subclinical Mastitis

- Almost any pathogen can cause mastitis
- Host adapts to the bacteria
- Most cases are Gram Positive Bacteria
- **CAUSES CHRONIC COWS!!!**
- Must have an individual cow SCC test to find.
  - DHIA
  - CMT
California Mastitis Test (CMT)

- Cow side test for SCC
- Should be used on all fresh cows
- Helps decide which quarter should be cultured or treated on subclinical cows

<table>
<thead>
<tr>
<th>CMT Score</th>
<th>Somatic Cell Range</th>
<th>Gelling</th>
</tr>
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<tbody>
<tr>
<td>None</td>
<td>0 to 200,000</td>
<td>None</td>
</tr>
<tr>
<td>Trace</td>
<td>200,000 to 400,000</td>
<td>Very Mild</td>
</tr>
<tr>
<td>1</td>
<td>400,000 to 1,200,000</td>
<td>Mild</td>
</tr>
<tr>
<td>2</td>
<td>1,200,000 to 5,000,000</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Over 5,000,000</td>
<td>Heavy, almost solidified</td>
</tr>
</tbody>
</table>

Clinical Mastitis

- Clinical mastitis can be mild, moderate or severe.
- Easy to detect
- Easy to treat if caught early
- Pre-stripping is important in detection
How do herds achieve BTSCC <200,000?

- Goals for SCC
  - 80% of herd with SCC <100,000
  - <5% of cows develop new infection/month
- Cows with SCC >200,000 have 1 or more quarters with subclinical mastitis
  - Heifers should be <100,000
- Low SCC results for cumulative effect
  - Adopting BEST MILKING PRACTICES
- Low SCC herds make more MONEY

Contagious vs. Environmental

S. Aureus
- Reservoir is Udder
- Exposure is often during milking
- Can almost be completely eradicated

Env. Streps

Coliforms
- Reservoir is Environment
- Exposure is often BETWEEN milking
- Cannot be eradicated
Contagious Mastitis

- Consistently High BTSCC
- Greatest BTSCC is usually caused by the presence of cows infected with
  - Staph Aureus, Strep Ag., Mycoplasma Bovis
- Individual quarter cultures will help to determine a treatment protocol.

Key Mastitis Control Practices

- Effective Teat Dipping
  - 97% of farms dip, but may not do effectively (POST)
- Dry cow therapy of ALL quarters of ALL cows
  - Treats subclinical mastitis present at dry off
  - 70% of all cases can be cured during the dry period
  - Not necessary if you have a routinely LOW herd SCC
    - Selective dry treatment
- Appropriate treatments of clinical cases
  - Record all cases
  - Monitor outcomes
- Culling chronically infected cows
- Regular milking machine maintenance
Treatment of Subclinical Mastitis

• Its almost NEVER cost effective to solve subclinical mastitis problems through treatment during lactation
• WHY?
  o These animals are typically chronic
    • Lower chance of cure
    • Waste of antibiotics
• Except for Streptococcus Ag.

Options for Handling Chronic Mastitis

Treat, Segregate, Dry off cow, Dry off Quarter or Cull
Strategies to Reduce SCC

- Perform Bulk Tank Cultures to look for:
  - Staph aureus
  - Strep ag.
  - Mycoplasma
- Review monthly Individual cow SCC
  - ID all cows >200,000
  - ID Chronic Cows
- Culture ¼ samples obtained from CMP + quarters of cows > 200K
- Review clinical mastitis records
  - ID Chronic Cows
- Make a Milk Quality Plan based on the data found

Milk Quality Plan

- ALWAYS more cost effective to prevent than to treat
- The development of a Chronic cow is an indication of failure
  1. Prevention
  2. Detection
  3. Treatment
Solving Mastitis Problems

- Technically Easy
  - KEEP BACTERIA AWAY FROM TEAT
- Find Infected Cows
  - Decide what to do with them
    - Treat them or Eat them
- Determine WHY they were infected
  - What is the source of bacteria
    - Other cows or environment?????
- Decide how to stop new infections
  - What management changes need to occur??

Questions?