Milking equipment function & parlor management
Milking is a complex interaction

AND not likely related to ONE factor alone
Goal of milking time...

Harvest as much milk as possible and efficiently as possible while avoiding teat end and teat skin damage
Signs of poorly functioning equipment

- Liner squawks
- Cow behavior in the parlor
- Teat end condition
- Teat skin condition

Conversely...
Properly functioning equipment

- Udder health
- Bulk tank SCC
- PI count
- In turn…. ↑ $$$
Principles of milk removal

- Vacuum is needed for efficiency
- Keep unit on
- But….vacuum is stressful to tissue
Understanding the principles

- All systems MUST have vacuum set properly
- Accounting for inflation in use
- All other settings set to optimize machine-on-time
Parlor evaluation

- Milking procedures
- Teat end scoring
- Claw vacuum
- Pulsator function
- Air flow capacity
Role of proper milking procedures

- Milk clean, dry, properly prepped teats
- Every milking, by every milker, every day
- Milking procedures can have profound effect on milk quality
- Shorter machine-on time
- ↑ milk yield
- Healthier cows
Proper milking procedures
30 s kill-time
Proper milking procedures

90 s delay time
Proper milking procedures

● Equipment to examine milk flow curves
  – Unit on time
  – Time to peak milk
    • 60-90 seconds
  – Time required to harvest 50% of milk
    • 2-2.5 minutes
Proper milking procedures

- Properly prepped
- Improperly prepped
Interactive software

iPrep for Android and iPhone users
What happens if procedures are bad?

- If dip contact time < 30 seconds
  - environmental mastitis risk
- If prep-delay < 60 seconds
  - Dry milking
  - Teat end damage from vacuum with little milk
- If prep-delay > 120 seconds
  - Lost full effect of oxytocin and teat end damage
How to assess teat end damage?

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

- Indicator of the risk for new IMI
<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" alt="Illustration" /> <img src="image2" 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="image3" alt="Illustration" /> <img src="image4" 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="image5" alt="Illustration" /> <img src="image6" 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 test-end a “flowered” appearance.</td>
<td><img src="image7" alt="Illustration" /> <img src="image8" alt="Illustration" /></td>
</tr>
<tr>
<td>Score 5</td>
<td>Open Lesions or Scabs. Not pictured.</td>
<td><img src="image9" alt="Illustration" /> <img src="image10" alt="Illustration" /></td>
</tr>
</tbody>
</table>
Interactive app for scoring
How to score teats

- Score all 4 teats
- Herds up to 80 cows – score all teats
- 80-400 – randomly select at least 80 cows
- Herds > 400 – score 20% of cows
Guidelines for concern

- Teat end hyperkeratosis:
  - > 20% rough and very rough (≥ 3)
  - > 10% very rough (≥ 4)
If there is concern...

Start to examine

- Milking procedures
- Milking equipment function
  - Vacuum
  - Pulsation
- Cluster alignment
Role of pulsator function

- Cyclically opening and closing the liner to create pressure difference
- Easily become dirty and air inlets plug
- Wear of components affect movement
- Reduced teat end health
- Poor milk out & performance

- Common ratio is 60:40
  - Range from 55:45 to 70:30
Pulsation data

- Collected in short air tube
- Conditions in pulsation chamber
What happens with bad pulsators?

- Milk phase too long
  - Teat end damage
  - Increased risk for IMI
- Milk phase too short
  - Increased machine on time
  - Reduced milk yield
- Long transitions (A and C phase)
  - Reduced massage and milk out
Testing pulsators

- Check all 4 phases of pulsation cycle
- Make sure D phase is at least 20% during milking
- All pulsators should be within 2% of each other
- If split ratios, make sure front to rear are correct and not reversed
Role of vacuum

- Milk removal
- Claw vacuum ≠ pump vacuum
- Difference depends on restrictions from
  - Milk line sizes
  - Milk tube sizes
  - Milk flow sensors
  - Milk flow volume
- Vacuum level at claw is what counts
Testing vacuum within system

- Attach Digimet to test ports
  - Vacuum header pipe above trap
- Static vacuum level should not vary > 0.2” Hg anywhere
- Testing claw vacuum during peak flow
Do we have enough pump capacity to milk cows?

Pump capacity

- system leaks
- pulsators
- milking units
- regulator usage
- auxiliary components

= Pump capacity left over for milking
a.k.a. **True Effective Reserve**
Quick and dirty way:

- Attach Digimet to port
- Turn vacuum on with all units in off position
- Single unit drop off test (≤ 32 units) or two unit drop off test (≥ 32 units OR two milkers)
  - If drop nears 0.6” Hg, then investigate air flow further
  - If drop > 0.6” Hg, then system is inadequate for milking
  - If drop is < 0.5” Hg, then system is ok
System evaluation

- Full parlor evaluation done twice/yr
- ALL pulsators
- Teat end vacuum at peak flow
- Drop off test - ability to maintain vacuum
- Air flow capacity
- **MUST BE DURING MILKING**
  - Static testing (no milk flow) is not good indicator of problems
Rubber components

- Necessary to replace ALL rubber components
  - Conventional rubber ~ 1200 cow milkings
  - Silicone parts last longer
  - Unless wearing/cracks/holes seen sooner
Points to remember

- Good and consistent milking procedures critical for teat end and udder health
- Teat scoring is a great way to get an overview of how well procedures and equipment are working
- Teat end vacuum and fluxuation are important components of teat end health
- Pulsator function will affect amount of massage, MOT, total MY, and teat end health
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Questions???