Milk Quality Online Course

Milk quality cow side evaluations

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Objectives

• Review the process or protocol for each cow side evaluation
• Analyze and interpret the results of the cow side evaluations
Outline

- Udder hygiene
- Teat end cleanliness
- Milking routine timing
- Milking unit alignment
- Strip yields
- Teat dip coverage

Thought process...

- In order to monitor or measure parlor performance, milking routine, milk quality goals, etc. it first must be defined
- Milking center performance focuses around four main areas
  - Cows
  - People
  - Equipment
  - Facilities
- Developing and managing synergies between cows, people, facilities and equipment is key to milk quality and milking center performance
- Are we interested in theory or reality in terms of achieving the stated goals of the dairy operation?
  - Theory: believe to be true or suggested to be
  - Reality: the true situation as it exists
- Need to be in the milking center, walk the pens, observe the cows and people to identify what is really happening
  - Numbers are only numbers without identifying what caused the number
  - One cannot manage a number, but one can manage what causes a number
How Many To Score?

- General rule is to score **80 cows** or **20% of the herd** whichever is greater

- Haphazard sample of the entire herd representing all lactations and a normal distribution of days in milk

Udder Hygiene Scoring System

- Cows scored 3 and 4 (dirty udders) were 1.5 times more likely to be infected with a major pathogen than cows scored 1 or 2 (clean udders)

- Increase in linear SCC with dirtier udders

- Schreiner and Reugg, 2003 (J. Dairy Sci. 86:3460-3465)
Common areas

The cows will tell you

Location of manure on cows

• What does it tell you when there is manure splatter on the bottom of the udder and the back side of front and rear legs?
  • Too much manure in common areas?
  • Cows moved too fast?
    • Cows need to be moved very slowly from their pen to holding area
      • Greatest manure load at pen level when moving cows to milking center
Udder Hygiene – interpreting manure build-up on udder

Short-term or splatter
- Cattle movement
  - When cows are moved from free stall to parlor the manure load in the housing environment is the greatest
  - Overcrowding
- Manure build-up in common areas
  - Around waterers
  - Exit area of parlor
- Cooling with water

Long-term
- Bedding management
  - Not enough bedding in stalls
  - Not cleaning stalls frequently enough
- Improper stall design
  - Cows too far forward in stall

Teat end cleanliness
- Evaluate as many teats as possible until milkers catch onto what you are doing
- Swab teat end with swab soaked in alcohol
- Record clean vs dirty teats
- Routine monitoring
  - Evaluate 10 teats
  - Goal 8/10 teats scored as “clean”
Teat end cleanliness

<table>
<thead>
<tr>
<th>Teat Cleanliness Scorecard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score Clean</td>
</tr>
<tr>
<td>Clean: No manure, dirt, or dip</td>
</tr>
<tr>
<td>Dip present: No manure or dirt</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Num of cows scored</th>
<th>30</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean</td>
<td>21 (70%)</td>
<td>23 (76%)</td>
</tr>
<tr>
<td>Dirty</td>
<td>9 (30%)</td>
<td>7 (24%)</td>
</tr>
<tr>
<td>Previous test</td>
<td>31 (80%)</td>
<td>23 (40%)</td>
</tr>
<tr>
<td>Previous test 2</td>
<td>54 (81%)</td>
<td>13 (19%)</td>
</tr>
</tbody>
</table>

How do we evaluate the milking center?

- Break down milking routine into its components or steps – procedures
  - How milkers move through the parlor
  - Evaluate each step of the routine
    - Consistency in each step versus drift in routine
  - Analyze the data
    - Timing
    - Electronic data
  - Determine if issues are human or machine/mechanical related
Milking procedures

Tasks
• Pre-milking udder prep
  • 15-30 sec/cow.
• Dry wipe
• Pre-dipping/foaming
  • 2-6 sec.
• Forestripping
  • 3-10 sec.
• Cleaning/drying
  • 4-12 sec

Goal
• Sanitize the teat prior to milking
• Stimulation and observe for abnormal milk
• Clean the teat end and dry the barrel of the teat
• Safely and economically harvest high quality milk in the quickest and most consistent manner possible without negatively influencing udder health

Udder preparation - timing

1. forestrip
   3-10 sec

2. predip
   2-6 sec, 30 sec

3. Dry/Clean
   4-10 sec

4. Attach
   4-10 sec

let down

Lag time: > 90 seconds

Completing each task in the proper order and at the correct time is key - consistency for all

Routine is only okay when the SOP is implemented properly

Evaluating udder preparation is about determining what events have taken place that create a weak link in the routine
Where does the milking routine begin?

- First interaction with cows
  - Movement from pen to milking center
  - Getting cows up in tie stall
- Improper handling of cows will have a negative impact on milk letdown

Parlor Evaluation

- Time analysis of routine
  - entrance time
  - time to begin prep 1st cow
  - time to 1st cow unit on
  - time to all units on
  - time for 3rd to last cow to detach
  - time for 2nd to last cow to detach
  - time for last cow to detach
  - exit time
## Parlor performance evaluation

<table>
<thead>
<tr>
<th>Milking Parameter per parlor side</th>
<th>Goal</th>
<th>Potential Observations/issues</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Loading time</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>gate opening to prepping first cow</td>
<td>30 seconds + 1 sec / stall or 2 sec/stall – parallel 3 sec/stall - herringbone</td>
<td>Crowd gate use (training on crowd gate use) Demeanor of milkers and cow handling Entering of the holding area Promptness of getting to first cow (&lt; 15 sec after cow at 1st stall)</td>
</tr>
<tr>
<td><strong>First prep to attach</strong></td>
<td>90-120 seconds</td>
<td>Can measure prep-lag time Adequacy of routine Consistency of routine</td>
</tr>
<tr>
<td>time from prepping first cow to the first machine attachment</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lag time</strong></td>
<td>90 sec (2x) 90-120 sec (3x)</td>
<td>Can indicate problems in the routine (bimodal milk curves) Can indicate problems with milk flow and milking time</td>
</tr>
<tr>
<td>time from teat stimulation to machine attachment for 1st cow</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>All units attached</strong></td>
<td>4 – 6 minutes depending on routine and number of cows prepped</td>
<td>Full prep routine (forestripping) will be longer Depends on number of stalls / milker</td>
</tr>
<tr>
<td>gate opening to attaching the last unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Milking time</strong></td>
<td>10 minutes or less</td>
<td>Routine, letdown and milk flow Reattaches (&lt; 2%) Slow milking cows (&lt; 30 sec from 2nd last unit off to last unit off)</td>
</tr>
<tr>
<td>first unit attached to last unit removal</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>End of milking to exit</strong></td>
<td>less than 30 seconds</td>
<td>Efficiency of routine</td>
</tr>
<tr>
<td>last unit removal to cows being exited</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Exit to opening of entrance gate</strong></td>
<td>less than 15 seconds</td>
<td>Efficiency of routine Handling of equipment and gates</td>
</tr>
<tr>
<td>time from cows being exited to opening the gate for the next group</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Turn time</strong></td>
<td>12-15 minutes depending on throughput needs</td>
<td>Cows per hour Efficiency of routine</td>
</tr>
<tr>
<td>time to milk one side from gate opening to cows exited</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Cow entrance

- **Parallel**
  - 2 sec/stall
- **Herringbone**
  - 3 sec/stall
- **If not meeting goal.....**
  - Distractions in parlor
  - Improper use of crowd gate
  - Milkers entering holding area
Cow flow - shielding entrance and first stall

Management Tip: Bring milkers to the back of the crowd gate when it is used improperly

- How do cows end up facing sideways and backwards?
  - Improper use of crowd gate and constant entering of holding area when loading the parlor
  - Have employees been trained on proper use of the crowd gate?
  - If not then whose fault is it when cows are bunched up in the holding area?

- Pen size vs. holding area
- **Not used to push cows**
- Cows should be facing the parlor
Milking routine timing example

- Dip + FS + Dip X6
- Clean x 6
- Attach x 6
- Record first and last or first, middle and last cow for each step to identify drift in routine

Milking routine – Oct 2019

<table>
<thead>
<tr>
<th></th>
<th>Entrance</th>
<th>Time from stall 1 to prep</th>
<th>Drying time</th>
<th>Dip contact cow 1</th>
<th>Dip contact cow 8</th>
<th>Lag time 1</th>
<th>Lag time 8</th>
<th>Time to attach all units</th>
<th>Wait time 2nd last unit off</th>
<th>Wait time 2nd to last to last unit off</th>
<th>Wait time last unit to 3rd to last unit off</th>
<th>Time to milk one side</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;0:15</td>
</tr>
<tr>
<td><strong>Min</strong></td>
<td>0:10</td>
<td>0:00</td>
<td>0:06</td>
<td>0:16</td>
<td>0:33</td>
<td>0:02</td>
<td>0:02</td>
<td>3:12</td>
<td>0:03</td>
<td>0:12</td>
<td>0:19</td>
<td>10:54</td>
</tr>
<tr>
<td><strong>Max</strong></td>
<td>0:32</td>
<td>0:01</td>
<td>0:38</td>
<td>1:25</td>
<td>1:45</td>
<td>2:36</td>
<td>1:38</td>
<td>5:12</td>
<td>1:05</td>
<td>11:31</td>
<td>12:11</td>
<td>21:30</td>
</tr>
<tr>
<td><strong>Goal</strong></td>
<td>&lt;0:48</td>
<td>&lt;0:15</td>
<td>&gt;0:30</td>
<td>1:30 - 2:00</td>
<td>4:00</td>
<td>&lt;0:15</td>
<td>&lt;0:30</td>
<td>&lt;0:30</td>
<td>12:00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Lag time is short
- Dip contact time is excellent (> 30 seconds)
- Drying time 8 seconds – good
- Short lag time will lead to long milking unit on-time and increased bimodal milk curves
Milk Letdown Reflex

Nerve Impulse

Oxytocin Release

Stimulation: Touch, sound of milking machine, and or sight of a calf

Milk Flow - Lactocorder

Rapid uninterrupted increase in flow to peak

High Milk Flow Rate

Rapid Milk Out

Rick Wa
Udder Hygiene, Milking Routine, Unit Alignment
Low Milk Flow

- Bimodal milk curves
  - lower average milk flow
  - lower peak milk flow
  - increases milking unit on-time
  - Longer time in low flow (< 2 lbs/min)

Milk Flow Rate Analysis

- Lactocorder® graphs provide excellent visuals

- 90 seconds longer to harvest same amount of milk
**DC305**

- Parlor\P
- Always look at milking reports before Parlor\O
  - Rule out equipment issues from the data in front of you

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**PARLOR\O**

Choose All or and Individual Milking shift

Choose All pens or individual pens

Choose Items to Graph
Milk in First Two Minutes

• A measure of the pounds of milk harvested in the first two minutes of unit on time
• In PARLOR\O as 2 minute milk
• Excellent way to evaluate flow rates at the start of milking and therefore the effectiveness of current routine
• Goal
  • 15 lbs of milk in first two minutes
  • May further break this down to:
    • 15 lbs for 3x herd
    • 17 lbs for 2x herd
  • These are achievable goals

Milk in First Two Minutes

- Milk in first two minutes = 21 lbs
- Milk in first two minutes = 5 lbs
• Two minute milk – last 12 months
  • Variation over time but no sustained trend
  • Below the goal of 15 pounds

Milk Flow Rates by Intervals

• These are the flow rates in pounds or kilograms per minute for each segment

• Divided into the following segments
  0-15 s  15-30 s  30-60 s  60-120 s

• Allows detection of a bimodal milk letdown pattern for the herd as a whole
Milk Flow Rates by Intervals

- The easy goal to remember is that each interval should have a higher flow rate than the previous interval.
- The 0-15 interval should be >2.2 lbs/min (1 kg/min).
- The 60-120 interval (“peak flow rate”) should be > 8 lbs/min (3.6 kgs/min).
• Flow rate intervals – last 5 months by milking shift

Milking unit alignment scoring

- 2 category scoring system
  - Proper (goal > 80%)
  - Improper (goal < 20%)
- Score within first 2 minutes of milking
- Do not score:
  - ¾ cows
  - Poor udder conformation
**Milking unit alignment scoring**

- Poor unit alignment
  - Increases the risk for liner slips
  - Influences milking speed of individual quarters
  - Increases the risk of teat damage
    - Unequal milkout – overmilking some teats because of under milking on other quarter
  - Decreases parlor efficiency
    - Prolonged unit on time
    - More chance of reattach
Milking unit alignment scoring

Notice the improper unit alignment caused by the hose twisting the claw.

Close-up picture showing different weight on LH vs RH.

Milking unit alignment scoring

Notice the milk left in the RH quarter due to poor unit alignment.

Rick Wa
Udder Hygiene, Milking Routine, Unit Alignment
**Milking unit alignment scoring**

Notice the LH quarter on this poorly aligned unit and how a liner slip is happening.

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<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Total unit alignment scores</td>
<td>362</td>
<td>429</td>
<td>548</td>
<td>≥ 20% of herd</td>
</tr>
<tr>
<td>Proper alignment</td>
<td>32%</td>
<td>77%</td>
<td>82%</td>
<td>≥ 80%</td>
</tr>
<tr>
<td>Improper alignment</td>
<td>68%</td>
<td>23%</td>
<td>18%</td>
<td>≤ 20%</td>
</tr>
</tbody>
</table>

Same herd without and then with a hose support.
Hose supports

Strip yields

- Hand stripped each quarter for 15 seconds
  - Direct milk into a measuring cup
- Stop if no milk on a quarter – document
- Recorded total milk from all four quarters
  - Document if the majority of milk is from one quarter
  - Record stall ID if there is a concern that there is a parlor stall with a faulty detacher
- Goal: 80% of cows have 5 – 8 oz.
  - Complete at least 30 strip yields
Strip Yields

- QMPS guidelines
  - 80% (24 cows)
  - b/w 150 – 250 ml
  - b/w 5 – 8 fl oz
  - b/w ½ – 1 cup

Teat dip coverage

- Towel test
  - Wrap towel around teat after dip is applied
  - Document head and tail of cow so you know which “sides” of the teats there are issues with dip coverage
  - No coverage on back side of teat when spraying
    - Example is from parallel parlor
  - Entire teat covered with dip when using a dip cup
Dip coverage

- There is no dip on half the teat
  - No dip on side of teat facing the head
- No skin disinfectant
- No skin conditioners

- Ability to provide feedback on how to improve spraying

Towel test – automated spraying
- Wrap towel around teat after dip is applied
- No coverage on right side of teat
- Back of the teat had the best coverage
Foam – teat coverage

- Foam should cover the entire teat surface.
- Foam missing from an entire side of the teat means that the foamer cup was rubbed against the teat.
- When the foamer cup comes in contact with the teat, it prevents foam from being applied to the contact area.

Discussion

- Complete cow side evaluations, analyze numbers and implement management changes to improve the numbers.
  - Udder hygiene – short or long-term build-up.
  - Teat end cleanliness – udder hygiene and some or all milkers.
  - Milking routine timing – is it human or machine causing milking center inefficiency.
  - Milking unit alignment – no unit alignment device or not using device properly.
  - Strip yields – overmilking, unequal milkout.
  - Teat dip coverage – covering entire surface of teat, teat skin condition.
Cow side evaluations - Summary

- What is the goal? - Has to be defined
- How will the goal be measured or monitored?
- Who will measure the goal?
  - Is the goal the same and measured in the same manner by ownership, management, consultants?
- What is the level of intervention?
- What is the follow-up plan?
- Values are obtained from software but goals are measured by observations
  - Cows
  - People
  - Equipment