Mastitis Management and SCC Control in Once a Day Herds

Don Crowley - Teagasc
What is a SCC?

- **Somatic cells (or “body” cells)** are a mixture of milk-producing cells shed from the udder tissue (about 2%) and cells from the immune system (the other 98%), known as leukocytes (also called white blood cells).

- High Somatic cell counts indicate infection.

- To understand a bit more about the cells and why they are found in milk we need to understand the function of leukocytes a bit better.
Leukocytes are the cells responsible for identifying bacteria and killing them.
Defence mechanism

As a somatic cell infiltrates the lumen, it pushes out a milk secretion cell making the alveoli less productive.

- Milk secreting cell
- Somatic cell
- Blood stream

- Alveoli (groups of milk secreting cells)
- Somatic cell

Milk duct
Inflammatory response
Once a Day Milking Risks

- Bacterial Challenge in the herd.
- Milking Frequency.
- Delay in Identification.
- Impact on Cure rate.
- Potential for infection.
- Duration of milking.
- Out by day in by night. (leaking on Beds)
Bacteria Gain Entry Through The Teat Duct
Assess Teat End Damage: Hyperkeratosis (scored)
Mastitis Control

- Mastitis Caused by Bacteria

- Clinical Mastitis
  - Clots Visible

- Sub Clinical Mastitis
  - No clots visible but have “High Cell Count”
  - This is Mastitis we cannot see
Mastitis Categories

- Contagious mastitis
  - E.g. Staph aureus, Strep agalactiae

Environmental mastitis:
  - e.g. Strep uberus, E.Coli
Staph Aureus and Strep Uberis

- Staph Aureus: Very important to control in once a day herds. Avoid under milking.
- If converting from twice a day need to cull heavy, no chronic cows.
- Sub clinical infections. Cluster dip or segregate, cure rates very poor.
- Prevent spread.
  
  For Strep uberis: Early detection crucial can have a very sick cow in 12 hours, dead in 24 hours !!!

- Environmental with contagious features
Main vectors for Contagious mastitis

Healthy udder

Infected quarter

Teat lesion

Hands

Cloths
Milking Parlour Issues
How does the action of the cluster influence milk quality?

1. **Liner compression**

2. **Liner Age**

3. **Rapid airflow towards the teat end (liner slips)**

4. **Ineffective pulsation or pulsation failure**

5. **Dr John Upton, Moorepark**
What is congestion

• Congestion is the accumulation of blood within the circulatory system
  • engorged capillaries in the teat-end during the b-phase of pulsation

• Oedema is the accumulation of fluids outside the circulatory system in extravascular tissues

• Oedema is a consequence of persistent and severe congestion and it takes longer to subside than congestion
Teat Tissue Congestion

Teat Barrel Congestion produced by Mouthpiece Chamber Vacuum - cannot be relieved by liner collapse

Teat-End Congestion produced by milking vacuum – can be reduced by Liner Compression (LC also contribute to hyperkeratosis)
The Keratin Lining

- The Keratin removal is influenced by liner compression
- The balance of keratin production and removal is important in maintaining teat integrity
When Liner Compression is too high

- Increased teat-end hyperkeratosis
- Excessive keratin removal from canal

Normal, smooth  

Hyperkeratosis, rough
Hyperkeratosis and New Infection Risk

- N = Normal
- S = Smooth
- R = Rough
- VR = Very Rough

New infection risk

Increasing Liner Compression

Teat-end condition
Optimize Compression of Liner

- Operating Vacuum of 46 kpa.

- Pulsation Ratio of 65:35 with D phase > 20

- If a high level of hyperkeratosis present consider triangle liners low compression.

- Improvement will be evident within 3 to 4 weeks.
Liner age

- Liner age influences milking performance and milk quality

- Max liner life is 2000 milkings.  
  e.g. 10 rows of cows 1.5 x daily =
  2000 / (10 x 1.5) = 150 days = 4.5 months

In once a day herds very important to stick to 2,000 milkings. May have to reduce if significant hot washing practiced.
2. Liner ageing

- Old liners depress milk yield and cause longer milking times. NB in once a day.
- Teat sinus closes off which causes under milking. Very NB
- Milking phase is shorter hence milking time is lengthened
- Longer milking times will lead to dissimprovement in teat end condition
3. Liner Slips

- Liner slips result in rapid airflow towards the teat end
- Can transfer bacteria from one quarter to another within a cow
- Slips can be minimised by using manufacturer recommended liners
- Removing clusters gently
- Watch cluster alignment !!!
Pulsation failure

- Where no liner compression is applied, congestion will develop quickly, followed by Oedema.

- Where congestion is the dilation of blood vessels (Quickly relieved when blood flow is restored via liner compression).

- Oedema is the pooling of circulatory fluid in extra cellular areas, which takes longer to recover.
Pulsation failure

- High levels of congestion result in a delay in the closure of the teat canal after milking – pathway for bacteria to enter the mammary gland.

Normal, closed orifice

Within one minute of cluster removal, the teat end orifice shows more than 2mm in wide or deep
Summary of Milking Parlours

1. Appropriate change of liners, e.g. 2,000 milkings max for once a day milking.
2. Operating vacuum of 46 kpa is adequate.
3. With reduced frequency adequate removal of milk is crucial. (Watch slow milkers).
5. Triangle liners an option low compression factor and easy on the operator.
Teat dip guidelines.

- Dr Dave Gleeson and Sarah Fitzpatrick PhD Student.
Guidelines when choosing a teat disinfectant

- Check if product is registered (PCS or IMB)- cross compliance check
- Pre/post or post disinfection products only
- Correct dilution and water quality may impact on disinfectant efficacy (hard water)- RTU best
- Adding additional emollients may impact on product efficacy
- Iodine products can lead to high iodine levels in IMF- never pre-spray with iodine
- Disinfectant products based on chlorine dioxide contain chlorates- potential issue for IMF
- Never spray/disinfect teats pre-milking without drying teats with paper- residues
New Research project on comparing efficacy of teat disinfectant products underway at Moorepark (WF ref: 2016054, project 0006)- initial results:

List of registered products on the market on Teagasc website- https://www.teagasc.ie/animals/dairy/milk-quality/
Method for evaluation of teat disinfectants

- **Disc Diffusion**
  - In lab test - Measures ability of antimicrobial agent to inhibit bacterial growth
  - Strains placed on agar plates
  - Discs soaked in teat disinfectant & applied to plate
  - Zones of no growth around discs measured to determine efficacy (mm)

- Strains tested from quarter milk samples:
  - *Staphylococcus aureus, Streptococcus uberis, Escherichia coli*
Before Growth

Teat disinfectant disc

Bacteria spread on agar

Agar media

Growth Time

~24 hours

After Growth

No bacterial growth (Zone of inhibition)

Bacterial growth
Results

- High concentration Chlorhexidine (6000ppm) product 18% better than iodine based product

- Lactic acid and chlorhexidine and Lactic acid and salicyclic acid products between 13-17% better than iodine based product

- 40% difference in efficacy between most effective and ineffective product

- Organic matter caused a 2% - 71% decrease in efficacy
Results

- Products containing Ammonium Lauryl Sulphate – most ineffective of all products tested
- High concentration Chlorhexidine and Lactic acid with Chlorhexidine or salicyclic acid products – most effective against a range of tested bacteria strains
- Best products had concentrations of
  - 5-12% lactic acid and 0.3-1.5 % chlorhexidine
  - 6000 ppm Chlorhexidine
Results/Conclusions

- Products react differently in the presence of organic matter (pre-spraying dirty teats)

- High concentration Chlorhexidine and Lactic acid with Chlorhexidine most effective against S. aureus

- Post dipping with barrier dips proving very effective.
What Records are required:

- Cell Check Farm Summary
- Mastitis incidence problem cow sheet.
- Farm summary sheet
- Mastitis records.
- Culture and Sensitivity,
Recording of cases of mastitis big weakness, text: cow id, mast to 089/4577663 (back of white pocket herd book).

First recording is crucial for this calculation, to often first recording to late i.e. end of April.

New infection and cure rate over dry period can be assessed here.
### 1. Production summaries

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of cows recorded</th>
<th>Average days in milk</th>
<th>Average SCC per lactation</th>
<th>Number of SCC&gt;200,000</th>
<th>Number of treatments if recorded</th>
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- Average SCC per lactation
- Number of SCC>200,000
- Number of treatments if recorded
  - Indicates potential contagious/Environmental mastitis

### 2. Comparative Herd Performance

#### Herd Performance (Fat & Protein %)

- Current Tests
- Past Tests
- Expected Trends

- Average SCC of previous 10 recordings
- Can identify trends over year
- Identify potential dry cow issue

### 3. Test day production history

#### Test Date

- 21-MAR13
- 06-MAR13
- 24-OCT13
- 13-SEP13
- 03-AUG13
- 26-JUN13
- 06-MAY13
- 11-MAY13
- 06-MAR13
- 11-NOV13
- 06-OCT13
- 14-AUG13

- Number of cows
- Milkkg
- Milkgallons
- Fat%
- Protein%
- Lactose%
- Fatkg
- Protein kg
- SCC

- 626 395 154 153 232 282 400 395 173 161 170

- Milk recording: Summary Farm Report
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<th>Cow ID &amp; Tag</th>
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<th>Days Test</th>
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<th>% SCC</th>
<th>% Herd SCC</th>
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- SCC ranked in order of % contribution to herd average
- SCC and milk yield taken into account
- Average SCC for previous lactation
- Shows number of tests > 200,000
- No. of mastitis treatments
  - Can identify potential dry cow/spring housing
3 Main areas to address

- 1/3 Milking parlour
- 1/3 Milking routine.
- 1/3 Infection control/housing/hygiene
PARLOUR ISSUES
Parlour tested and Voltage assessed

- Vacuum settings 48 Kpa
- Pulsation Ratio 65:35
- Pulsation rate 60 pulse per minute
- Liners change every 2,000 milkings.
Cluster Removers: ACR settings 2.5 to 3 seconds
Liners are they inline and good quality.
Liner Indicators:
Thumb Test Pulsation Ratio 65:35 or 68:32 and a pulsation Rate 60 pulse/min
Blocked Air Bleeds:
Air Shut Off Buttons:
Cluster Alignment and Cluster Removers
Length of Long milk tubes, Short Air tubes
Vacuum Clock: Vacuum settings between 46 and 48 Kpa.
Vacuum Fault
Regulator Blocked (Common Problem)
Accurate Culling Policy Crucial

- Must cull chronic cows
- 3 counts over 1 million.
- Repeat cases of clinical mastitis.
- Abnormal Quarter.
  - These cows will start well in recording.
Milking Routine

- Crucially important.
- Significant variation between farms.
- Multiple milkers.
- May have to recommend FRS milking course.
- Don’t under estimate impact.
Proper Dipping post application: 15 mls per cow per milking
CMT KIT/Early Milk Recording
Lock off cubicles for 30 minutes.
Thank You

Best of luck with the season ahead!