What are Somatic Cells

- White blood cells (immune cells) or mammary tissue (epithelial) cells
- Healthy mammary (< 100,000 SCC)
  - ↑macrophages and lymphocytes
  - ↓neutrophils and epithelial cells
- Infected mammary (> 1,000,000 SCC)
  - ↑neutrophils (95%)
  - ↔epithelial cells
Why reduce somatic cells in milk?

- Incentive formulas to pay for milk low SCC
- Low SCC milk yields more cheese and has longer shelf life
- Somatic cells are related to clinical and subclinical mastitis and lost production
- Management practices to reduce SCC decrease use of drug therapy and antibiotic residues in milk
- Legal maximum for marketable milk is on its way down (now at 750,000)
What causes high SCC?

“Because the elevation of SCC is a response to an insult to the mammary gland and is modulated by inflammatory mediators, the major factor influencing SCC is infection status. The effects of stage of lactation, age, season, and various stresses on SCC are minor if the gland is uninfected.”

R. J. Harmon, Univ. of Kentucky
## Milk Production Losses

(Raubertas and Shook, JDS 65:419)

<table>
<thead>
<tr>
<th>SCS</th>
<th>SCC (x 1000)</th>
<th>Milk Production Loss (lbs/305d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>12.5</td>
<td>-204</td>
</tr>
<tr>
<td>1</td>
<td>25</td>
<td>-408</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>-816</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td>-1224</td>
</tr>
<tr>
<td>4</td>
<td>200</td>
<td>-1632</td>
</tr>
<tr>
<td>5</td>
<td>400</td>
<td>-2040</td>
</tr>
<tr>
<td>6</td>
<td>800</td>
<td>-408</td>
</tr>
<tr>
<td>7</td>
<td>1600</td>
<td>-816</td>
</tr>
<tr>
<td></td>
<td>305</td>
<td>-2040</td>
</tr>
</tbody>
</table>
Factors that influence mastitis and SCC

- Age at calving
- Lactation number
- Stage of lactation
- Season / season of calving
- Breed
- Genetics
- Other stresses
  - stray voltage
  - milking fraction
  - Selenium and Vitamin E
## Effect of Cow Age and Infection Status on SCC

*(Eberhart et al. 1979 NMC Proceedings)*

<table>
<thead>
<tr>
<th>Age (yr.)</th>
<th>All Cows</th>
<th>None</th>
<th>Minor</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>232</td>
<td>126</td>
<td>190</td>
<td>614</td>
</tr>
<tr>
<td>3</td>
<td>314</td>
<td>149</td>
<td>218</td>
<td>661</td>
</tr>
<tr>
<td>4</td>
<td>390</td>
<td>148</td>
<td>233</td>
<td>753</td>
</tr>
<tr>
<td>5</td>
<td>564</td>
<td>180</td>
<td>308</td>
<td>977</td>
</tr>
<tr>
<td>6</td>
<td>544</td>
<td>194</td>
<td>322</td>
<td>880</td>
</tr>
<tr>
<td>7</td>
<td>654</td>
<td>251</td>
<td>320</td>
<td>986</td>
</tr>
<tr>
<td>&gt;7</td>
<td>868</td>
<td>113</td>
<td>519</td>
<td>1207</td>
</tr>
</tbody>
</table>

Minor = *Cornebacterium bovis*, coagulase-negative staph.

Major = *Staph. aureus, Strep. ag.*, coliforms, streps, and enterococci of environmental origin.
Genetic Selection for Lower SCS

- USDA evaluates bulls and cows for SCS
- Bull PTA SCS have a range of about one linear score
- A one unit decrease in PTA SCS predicted a 36% reduction of mastitis cases in daughters
- PTA of sires of cows with mastitis were higher in all herds
- Reducing PTA SCS by one unit meant an additional 3 1/2 months of productive life
Selection for Lower SCS

- Milk still pays most of the bills, so don’t go overboard on selecting for lower SCS
- Use Net Merit $ when purchasing semen
  - 10 production: 4 productive life: -1 SCS
- Buy herd bulls based on Net Merit $ of his sire (and Dam or MGS if known)
Management for Lower SCC

- Milk clean dry udders
  - the less water it takes to clean, the better
  - consider predipping teats
  - dry teats, preferably with single use towels

- Ensure proper function of milking equipment
  - avoid liner squawking
  - replace liners at indicated intervals
  - check vacuum levels periodically
Management for Lower SCC (cont.)

- Use proper milking procedures
  - regular time from first contact to putting milker on cow (80 to 90 seconds)
  - encourage cow comfort to increase milk let down
  - don’t over milk
  - milk treated or clinical cows last
  - wash hands often, especially with treated or sick cows
Management for Lower SCC (cont.)

- **Dip teats after milking**
  - only possible exception is when very cold
  - sprayers don’t work very well

- **Provide sanitary housing for cows and heifers**
  - keep free stalls or tie stalls dry
  - pastures are great, but it may be necessary to fence off muddy areas

- **Dry cow antibiotic therapy of all quarters**
  - work with vet for recommended products
Monitor Somatic Cells

- "If you don’t measure it, you can’t manage it!"
- Continuous monitoring of SCCs is necessary to manage the herd and individual cows properly
- Regular DHI Somatic Cell testing is a very useful tool
- Periodic testing is not a very good indicator of overall udder health
- At least record all cases of clinical mastitis and treatments