Mastitis

AVS 172
University of Idaho

Pictures courtesy of: Dr. H.D. Tyler, Iowa State University, Dr. M.A. Barnes, Virginia Tech, Dr. Mark Kirkpatrick, Tillamook Cheese, OR.

Mastitis

- Definition of the Disease
- $ Losses
- Causes and types
- Prevention & treatment

Mastitis

- What is it?
  - Inflammation of mammary gland due to bacteria or injury
- Signs/symptoms
  - Udder is hot, very hard, and tender
  - Increase in temperature, refusal to eat, dull eyes, rough coat
  - Inflammation
  - Infection
  - Change milk components

Mastitis: sources, cont’d

Essentially all mastitis is caused by pathogen invasion of the streak canal
- any condition which increases pathogen population or teat end exposure increases incidence of new mastitis infection

Estimated losses due to mastitis per year

<table>
<thead>
<tr>
<th>SOURCE OF LOSS</th>
<th>$ Loss/Cow</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced milk production</td>
<td>$121.00</td>
<td>66.0</td>
</tr>
<tr>
<td>Discarded milk</td>
<td>$10.45</td>
<td>5.7</td>
</tr>
<tr>
<td>Early cow replacement costs</td>
<td>$41.73</td>
<td>22.6</td>
</tr>
<tr>
<td>Extra labor</td>
<td>$1.14</td>
<td>0.1</td>
</tr>
<tr>
<td>Drugs</td>
<td>$7.36</td>
<td>4.1</td>
</tr>
<tr>
<td>Veterinary services</td>
<td>$2.72</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$184.40</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Current concepts of bovine mastitis, 4th ed., 1996
National Mastitis Council, Inc., Madison, WI
Mastitis; somatic cell counts (scc)

Somatic cell counts:
- SCCS 0-3 = < 142,000/ml
- SCCS 4-5 = 142 - 565,000/ml
- SCCS 6 = 565 - 1,130,000/ml

Maximum allowable:
- currently = 750,000/ml
- soon = 500,000/ml
- EU = 300,000

Coop incentives:
- < 200,000/ml
- ≈ $.20/ cwt incentive

Herd Loss $$$ from High SCC

Example:
200-cow herd (60 1st lact. cows)  
avg. SCCS = 4.0  
Avg. yield = 60 lbs./cow/d  
shipping: 4,380,000 lbs milk/yr

60 x 1.5lbs loss x 310d x 28,000  
140 x 3.0 lb. loss x 310d x 130,000  
milk loss = 158,000 x $15.00/cwt  
milk loss = $2,370,000/yr

incent. loss = $.20 x 43,800 cwt  
incentive loss = $32,460/yr

Total loss/yr = $26,140/yr (5% of gross)

Factors Affecting Mastitis

- Majority of new infections occur during:
  - First three weeks of dry period
  - Milk left in udder
  - First month after parturition
  - Immune system compromised
- Frequency of milking affects risk of infection
  - Pathogen load affects risk of milk more frequently

Mastitis; pathogens

Mastitis pathogens:
- Contagious
  - Strep Agalactiae
  - Staph Aureus
- Environmental
  - Strep non-aggs (Uberis, Dysgalactiae)  
  - Coliforms
  - yeasts, nocardia, mycoplasma, pseudomonas

MICROORGANISMS

- Contagious (cow to cow transfer)
  - Subclinical
  - Long duration
  - Shed in milk
- Environmental
  - <5%
  - Clinical

COMMON MASTITIS ORGANISMS

- 1. Streps – agalactiae*, uberis, dysgalactiae
- 2. Staphs – aureus*, epidermis
- 3. Coliforms - E. coli, klebsiella
- 4. Mycoplasma*
- 5. Yeasts
**Staph Aureus:**

1. Extremely infectious; subclinical or clinical cases increase SCC
2. Staph aureus produces many enzymes which retard ability to cure the infection:
   - *penicillinase* inactivates penicillin
   - *toxins* cause tissue necrosis

**The Staph Aureus Problem**

- a. Usually is infected in several quarters
- b. Suffers 30% milk loss / infected quarter
- c. Stays in the herd for at least one lactation
- d. Treatment is usually ineffective
- e. Extremely contagious; spread during the milking process

**MANAGEMENT PRACTICES**

- Use 1.0% iodophor dip on all teats
- Backflush between cows
- Washing hands
- Culture liners periodically to check effectiveness
- Segregate carrier cows; cull!

**Streptococcus Agalactia**

1. Lives in the mammary gland
2. Antibiotic treatment is effective
3. It can be irradiated

**MANAGEMENT PRACTICES**

1. Controls centers around the milking parlor
2. Proper procedures for milking
   - Teat dip, milking hygiene, dry cow treatment
3. Quick treatment

**Coliform (Environmental)**

- *E. Coli*
  - Bacteria is in the cow’s environment
  - Watery milk
  - Severe loss of milk
  - Down cow
  - Can cause death!
**MANAGEMENT PRACTICES**

- Frequent milking, oxytocin injection
- Anti-inflammatory and antibiotics
- IV fluid
- Basic good hygiene
- Keep the stall clean, cow comfort

**Mycoplasma**

- Introduced to the herd by the new arrivals!
- Causes a lot of complications
- Antibiotics do not work
- CULL THE COW

**Subclinical Mastitis**

- Presence of bacteria without clinical symptoms
- **Increased somatic cell counts (SCC), associated with milk loss**
- Somatic Cells Count: Number of cell bodies in 1 mL milk
- Somatic cells: cell bodies

**Somatic Cell Counts (SCC)**

- a) SCC does not identify presence of pathogens
- b) But, as mean SCC increases, incidence of cows with major and minor pathogens increases
- c) Increase of 0.5 in SCC score on herd basis indicates a breakdown in mastitis program

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For each clinical mastitis case (Orange cow), there may be 15-40 sub-clinical cases (green cows)
### SCC Scores

<table>
<thead>
<tr>
<th>Actual SCC Range (x1000)</th>
<th>SCC Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-34</td>
<td>1</td>
</tr>
<tr>
<td>35-70</td>
<td>2</td>
</tr>
<tr>
<td>71-140</td>
<td>3</td>
</tr>
<tr>
<td>140-280</td>
<td>4</td>
</tr>
<tr>
<td>280-550</td>
<td>5</td>
</tr>
</tbody>
</table>

0 - 3  Majority cows pathogen free

4 - 4.5  Indicates subclinical mastitis

5 - 6.5  Indicates clinically infected cows in herd

7 - 9  Indicates severe problem, infected cows prevalent

- Milk loss to mastitis
  - a). Average loss = 1.5 lbs/cow/day for each increment increase in SCC score

- EXAMPLE:
  - Score 2 versus 5 = 1.5 lbs X 3 units = 4.5 lbs less milk/day
  - = 1372 lbs less milk/lactation

### Mastitis: clinical detection

- Strip cup:
  - ideal for detecting abnormal milk
  - allows detection of specific infected quarters

### Mastitis: subclinical detection

- DHIA Fossmatic machine:
  - uses optical density to detect somatic cell concentration
  - bulk of cells are PMN leukocytes (indicative of infection)
Mastitis: subclinical detection, cont’d

California Mastitis Test (CMT)

- detergent coagulates cellular DNA
- greater amount of coagulation = greater number of PMN leukocytes
- quick cow-side test - ID specific quarters

Mastitis: prevention & treatment

NMC 5-point mastitis control program:
1. Functional milking equipment
2. Dip all teats after milking
3. Treat clinical cases
4. Dry treat
5. Cull chronic cases:
   - some mastitis is incurable (staph aureus)
   - infected cows are potential pool of mastitis organisms

1. Use functionality: 1. Incorrectly attaching teat cups, 2. Poor milk removal, 3. Cause mastitis
2. Dip teats after milking with an effective product. 3. Sprayed teat dip

4. Cull chronic cases: 
- some mastitis is incurable (staph aureus)
- infected cows are potential pool of mastitis organisms
• New mastitis infections most prevalent at calving (early postpartum) and dry-off

• Dry treatment is most effective way to prevent new mastitis infections
  • Protect udder during dry period
  • Cure mastitis from previous lactation

The Routine

- Predip
- Strip
- Dry
- Attach
- Alignment
- Removal
- Postdip

The Secret to Mastitis Control

1. Reduce the bacteria load on the teat
2. Prevent the bacteria from getting into the udder
3. Fine-tune milking practices
<table>
<thead>
<tr>
<th>HERD SIZE</th>
<th>TOTAL LOSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>$9,250</td>
</tr>
<tr>
<td>75</td>
<td>$13,875</td>
</tr>
<tr>
<td>100</td>
<td>$18,500</td>
</tr>
<tr>
<td>150</td>
<td>$27,750</td>
</tr>
<tr>
<td>200</td>
<td>$37,000</td>
</tr>
<tr>
<td>400</td>
<td>$74,000</td>
</tr>
<tr>
<td>800</td>
<td>$148,000</td>
</tr>
<tr>
<td>1,600</td>
<td>$296,000</td>
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</tbody>
</table>

Losses from mastitis ($185 per cow)

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