SQMI Annual Meeting: Mastitis Treatment Options

Michelle Arnold, DVM
Ruminant Extension Veterinarian
Veterinary Diagnostic Laboratory
University of Kentucky
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Mastitis-Treatment Options and Strategies
Treatment Strategies

1st Step: Determine Level of Severity

- Mild - Abnormal milk only
  - Between 60-90% of clinical mastitis cases
  - Plenty of time to culture
- Moderate - Abnormal milk, abnormal quarter
  - Between 10-30% of cases
  - Wait on culture results but watch closely
- Severe - Abnormal Milk + Systemic Illness
Severe Mastitis

- Veterinary Emergency. Immediate attention and treatment needed
- Systemic Signs: Fever, Increased heart and respiratory rate, dehydration (skin tent), decreased rumen strength, off feed
- Approximately 50% are due to Coliforms
Severe Mastitis

- Fluids and electrolytes are essential to save the life of the cow
- If still has rumen motility, 10-12 gallons of oral electrolytes are indicated
- Treat systemically with antibiotics 3-5 days (releases endotoxin)
- Anti-inflammatories, calcium, intramammary therapy
Why Culture?

Need to know which mastitis pathogens (disease causing bacteria) are infecting the cows in the herd and identify early so you can manage mastitis (not just treat)

- Stop an outbreak causing a rapid rise in SCC
- Stop a long term, slowly but steadily rising SCC
- Reduce and prevent new infections
- Know if treatment is warranted
Individual Cow Cultures

- New clinical cases (before treating)
- Fresh cows and heifers- CMT test 2-3 days post calving
- High SCC cows-esp. >200,000 on 1st test or >400,000 at dryoff
- Positive CMT cows
- Purchased cattle
Culture Based Therapy

- Higher cure rate, lower treatment cost
- Decreased drug use and risk of residues
- 50% of cases are treated unnecessarily
  - Treatment of “no growth”
  - Mild E. coli infections
  - Antibiotic resistance
    - Ineffectiveness
Steps to a Solution

- Define the Problem: Which cows and when
- Identify the Organism(s)
- Generate a list of possible causes and solutions
- Implement strategies to resolve problems—reduce new infections and shorten infection duration
- Evaluate and monitor progress (bulk tank, high risk cattle)
## Culture Report

<table>
<thead>
<tr>
<th>Bacteria Type</th>
<th><em><strong>Source of Infection</strong></em></th>
<th>Major Means of Spread</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strep agalactiae</td>
<td>Infected udder</td>
<td>Cow-to-cow in parlor</td>
</tr>
<tr>
<td>Staph aureus</td>
<td>Infected udder</td>
<td>Cow-to-cow in parlor</td>
</tr>
<tr>
<td>Mycoplasma</td>
<td>Infected udder (purchased cows and heifers)</td>
<td>Cow-to-cow in parlor In the air from resp. tract</td>
</tr>
<tr>
<td>Non-ag Streps &amp; Enterococcus</td>
<td>Environment</td>
<td>Wet teats, dirty bedding and lot, poor prep, liner slips</td>
</tr>
<tr>
<td>Strep uberis and Strep dysgalactiae</td>
<td>Environment</td>
<td>Wet teats, dirty bedding and lot, poor prep, liner slips, hot weather</td>
</tr>
<tr>
<td>Coliforms</td>
<td>Environment</td>
<td>Wet teats, dirty bedding and lot, poor prep, liner slips</td>
</tr>
<tr>
<td>E. coli, Klebsiella, Enterobacter, Citrobacter</td>
<td>Environment</td>
<td>Wet teats, dirty bedding and lot, poor prep, liner slips, hot weather</td>
</tr>
<tr>
<td>Staph species (Coagulase negative Staph)</td>
<td>Environment</td>
<td>Poor teat dip coverage, poor prep, old bedding</td>
</tr>
</tbody>
</table>
Culture Results

- Other Possibilities:
- Yeast, Nocardia, Prototheca
- Saprophytic organisms or nonpathogenic
- Less Common Bacteria: Enterococcus, Serratia, Corynebacterium, Pseudomonas, Arcanobacterium, Pasteurella, Proteus, Bacillus
Where is the Source?

**Contagious-FIND the Infected COWS**
- Spreads between cows or quarters
- Transmitted mainly *in the parlor* during milking
- Infections can last weeks, months or years

**Environmental-FIND the BEDDING**
- Obtained through the environment
- Bedding (or where she lies down) exposes teat ends to a very
Culture Sampling Problems at the Farm Level

Mishandled Sample
- Samples not transported to the laboratory within 24-48 hours and/or too warm
- Containers broken or leaking during transport

Submission Problem
- Identification numbers on the containers are not legible/wrong/wiped off
- Forms not adequately filled out

Poor Sample Quality
- Udders and teats not cleaned properly
- Samples taken from cows on antibiotic therapy
After Culture

- Make individual treat/cull decisions with your veterinarian based on results. Treatment Protocol
- Segregate cows with contagious mastitis
- Make product choices
  - Antibiotic: susceptibility
  - Dry cow treatment
  - Teat dip-including application
  - Vaccines
- Determine best preventative management strategies
No Growth

Doesn’t mean the lab made a mistake

1/3 to 1/2 of cultures will come back as “no growth”

Could be improper collection-disinfectant

Periodic shedding of bacteria

Cow has handled infection already
AABP Guidelines for Mastitis Therapy

1. Immediate goal-return quarter and milk to clinically normal
   - Eliminate organism from quarter-bacterial cure
   - Prevent further damage to tissue
   - Sustain future milk production
   - Lower SCC
   - Cost-effective and no drug residues
Mastitis
Septic Mastitis
Septic Mastitis
Hopeless Species

- Mycoplasma
- Serratia
- Pseudomonas
- Arcanobacterium
- Nocardia
- Prototheca, Yeast, Fungi
- Mycobacterium
Use only Approved Drugs

FDA approved drugs

**OTC (over-the-counter)** - do not need Rx

**Prescription** (Rx)

⇒ adequate instructions for use cannot be printed on the label or the drug has significant potential for toxicity in humans or animals

⇒ “CAUTION: Federal law restricts this drug to use by or on the order of a licensed veterinarian.”
Antibiotic Use

Proper milk and meat withdrawal times
Record treatments
Bulk tank milk tested
Extralabel drug use
Illegal- farm will not be able to ship milk
Example- Baytril (used to treat pneumonia in beef cattle and dairy <20 months) in lactating dairy cows
Lactating Medications

- Amoxi Mast- Amoxicillin
- Dariclox- Cloxacillin
- Hetacin K- Ampicillin
- Spectramast LC- Ceftiofur
- US Vet Masti-Clear – Procaine Pen G
- Today-Cephapirin
- Pursue- pirlimycin
Extended therapy protocol

- Administering intramammary treatment (mastitis tubes used in the quarter) for 2 to 8 days consecutively. Only two products on the market (Spectramast® and Pirsue®) are labeled for and demonstrated effective with extended therapy. Both products are prescription only.
Benefits of Extended Therapy

- Higher proportion of bacteriological cure
- Reduced chance of relapse and treatment failure
- Decreased SCC
- Less risk of spread of contagious organisms
- Improved marketability of milk
Drawbacks of Extended Therapy

- Price of the medication (antibiotic tubes)
- Loss of milk due to long treatment duration
- Risk of residues in milk and meat
- Potential to cause more mastitis; especially with extended use of Pirsue®
Dry Cow Treatments

- Dry-Clox – Cloxacillin benzathine
- Orbenin DC- Cloxacillin benzathine
- Quartermaster- procaine pen g + dihydrostreptomycin
- Spectramast DC- Ceftiofur
- Albadry Plus- Novobiocin + Procaine Pen
- US Vet Go Dry- Procaine Pen G
- Tomorrow- Cephapirin Sodium
# Cure rates for Existing Infections-Antibiotic Therapy

<table>
<thead>
<tr>
<th>Species</th>
<th>Cure Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streptococcus agalactiae</td>
<td>90-95%</td>
</tr>
<tr>
<td>Environmental Streptococci (i.e. Strep uberis and Strep dysgalactiae)</td>
<td>70-80%</td>
</tr>
<tr>
<td>Staph aureus, chronic cases</td>
<td>20-30%</td>
</tr>
<tr>
<td>Staph species (Coag negative)</td>
<td>50 to 60%</td>
</tr>
<tr>
<td>Coliforms</td>
<td>0 to 10%</td>
</tr>
<tr>
<td>Mycoplasma, yeasts, Nocardia</td>
<td>0%</td>
</tr>
</tbody>
</table>
Staphylococcus aureus Treatment

- Difficult because drugs can’t penetrate abscesses, the bacteria can hide in the WBCs, and antibiotic resistance
- Treat promptly, esp heifers, to minimize tissue damage
- Pursue-chemical nature allows it to penetrate mammary tissue
Staph aureus treatment success

- $< 3^{rd}$ lactation
- $\leq 2$ infected quarters (front $>$ rear)
- 2 or less test day SCC $> 200,000$ cells/ml
- SCC $< 1000000$
- Extended therapy may be successful
Pirsue (pirlimycin hydrochloride)

- Pirsue® is labeled for the contagious organisms *Staphylococcus aureus* and *Streptococcus agalactia*, and the environmental organisms *Streptococcus dysgalactiae* and *Streptococcus uberis*.

- Infuse one syringe into each affected quarter and repeat the treatment after 24 hours. Daily treatment may be repeated for up to 8 consecutive days.
Pregnant Heifers

- Up to 1/3 of infections at calving or early lactation are due to Staph. aureus
- If untreated, can reoccur and spread
- Can use dry cow or lactating cow treatment before calving-work with your veterinarian for your best option
Environmental Mastitis

**Gram (-) Bacteria**
- Large immune response
- Brief period of illness (may be severe illness)
- Rapidly clears the pathogen
- SCC usually falls rapidly

**Gram (+) Bacteria**
- More host adapted so case appears to resolve but actually returns to a subclinical state
- Immune system continues to be stimulated so prolonged high SCC
- Hard to know if a clinical cure or a bacteriological cure. Need to culture 14 days post treatment; repeat 14 days later
Environmental (Non-ag) Streps

- Streptococcus and Enterococcus species (non-agalactiae streps) include Streptococcus uberis and Streptococcus dysgalactiae. 12-35% of cases

- Frequently occur during the dry period especially during the first 2 weeks following dry off and 2-3 weeks prior to calving

- These bacteria may cause mild, moderate, or severe mastitis
  - Clinical mastitis with abnormal milk, Swelling of the gland, Fever
  - Subclinical mastitis with no apparent signs
  - High SCC

- 1st objective-Bacterial cure. Without treatment: 20-30% cure. With: 60%

- Some environmental strep. infections (18%) will become chronic and poorly responsive to treatment
Treatment of Environmental Streps

- S. dysgalactiae: 3 days of beta lactam treatment = 80% cure rate
- Strep. uberis: 5 days of treatment = 70% cure rate
Gram (-) Coliform Mastitis

- Major cause of clinical mastitis; 80-90% are clinical (10% severe)
- Mild to Moderate case due to E. coli—no treatment needed. Cure rate is the same.
- Clinical Klebsiella—tendency to have a longer duration and may become chronic
- Spectramast is treatment of choice
Spectramast®LC is labeled for three environmental organisms: 1) coagulase-negative staphylococci, 2) *Streptococcus dysgalactiae* and 3) *Escherichia coli*.

Administer one syringe into each affected quarter and repeat this treatment in 24 hours. Once daily treatment may be repeated for up to 8 consecutive days.
So, What Should I Do?

- Culture cows-especially history of high SCC and repeat cases
- Treat most cases of mastitis if you don’t know the cause
- Chronic Staph. aureus cows are the main exception to that rule
- If the mastitis is caused by gram-negative bacteria (i.e. coliforms), antibiotics should only be used in very sick cows
- Keep records of treatments used in clinical cases of mastitis
- SCC does not drop quickly. May take 3-6 weeks for improvement
Questions?