Management of Clinical Mastitis

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Mastitis

- Bacterial infection of the udder
- 99% occurs when bacterial exposure at teat end exceeds ability of immune defenses of cow

Subclinical mastitis
- Milk appears normal but contains excessive numbers of inflammatory cells
- SCC > 200,000 cells/ml

Clinical mastitis
- Visual abnormalities of milk
- Must be detected and discarded

Changing Expectations About Antibiotic Usage

- Consumers perceive risk but...
  - Detected residues are declining
  - Detection limits for residues appear to be far below level of harm to humans
- Farms are microbiologically dirty
  - Does acquired resistance give them a competitive advantage?
  - Transference to humans via pasteurized milk is unlikely

Objective

Briefly review principles of treatment of clinical mastitis on modern dairy farms

This ain’t your Grandfathers Mastitis

- Mastitis pathogens have evolved faster than treatment protocols
- Staphylococcus ag is not an important mastitis pathogen
- Treatment is a matter of control of Staph aureus
- 25-40% of cases are Culture Negative

Mastitis is Based on Detection of Inflammation NOT INFECTION

The difficulty is determining when the use of antibiotics is needed to result in a successful cure
Few Mastitis Cases Are Medical Emergencies
(622 cases from 52 farms)

48% Mild 37% Moderate 15% Severe

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Do some countries have better mastitis success than others?

• There is no evidence that outcomes vary by country
• Therapeutic innovations have been very limited
  – Almost all drugs are β-Lactams
  – Directed at Staphs and Streps
• Most treatments are administered without knowledge of etiology

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Popular IMM Mastitis Treatments Vary Widely

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<th>Active Ingredients</th>
<th>USA</th>
<th>Argentina</th>
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Treatments for Mastitis in US
589 cases on 51 WI Dairy Farms

• Almost 70% of mastitis cases are treated using IMM products
  – no drugs are labeled for systemic treatment of mastitis
  – No combination products are approved
  – Common extralabel systemic treatments
    • Ceftiofur & Ampicillin

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IMM Products Used by Pathogen
52 Wisconsin Dairy Farms

The most common IMM treatment was 3rd generation cephalosporin for 5-day treatment of a mild culture negative case

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Can we justify these treatments?
Responsible Mastitis Treatment: 1

- **Base Treatment on Diagnosis**
  - On Farm Culture or Vet Clinic Culture
  - Train milking technicians:
    - Early identification of clinical mastitis
    - Classify cases
      - Mild (Grade 1) - abnormal milk only
      - Moderate (Grade 2) - abnormal milk + swollen quarter
      - Severe (Grade 3) - sick cows - treat immediately
    - Take aseptic milk sample
    - Don’t treat Grade 1 & 2 until presumptive diagnosis is made at 24 hours
    - Begin treatment and stop or change duration or compound after diagnosis

- **Proposed antimicrobial Treatment**
  - **E. coli**
    - Severe: 11% No Systemic
  - **Klebsiella sp**
    - All: 5% No IMM (mild/mod) & systemic (severe)
  - **Enterobacter sp**
    - All: 3% No None (mild/mod) or systemic (severe)
  - **Strep spp.**
    - All: 13% Yes Extended duration IMM
  - **Enterococci spp**
    - Mild & mod.: 2% No Immunolaryngitis??
  - **CNS**
    - Mild & mod.: 6% Yes Short duration IMM
  - **No Growth**
    - Mild & mod.: 29% No None
  - **Yeast**
    - Mild & mod.: 3% No None
  - **Staph. aureus**
    - All: 3% In some cases Yes Cull cow or dry quarter
  - **Truperella pyo.**
    - Mild & mod.: 2% No Cull cow or dry quarter
  - **Other Gr. Neg.**
    - All: 5% No None (mild/mod) or systemic (severe)

- **Extended duration IMM therapy should not be the routine treatment for ALL cases of mild and moderate clinical mastitis**
  - Unnecessary antibiotic usage
  - Increased risk of new infections
  - Reduces capacity of the hospital pens

- **Extended duration IMM therapy should be applied to specific cases**
  - Cows infected with Staph. aureus or Strep spp.
  - Cows with poor risk of cure??
  - Cows with recurrent cases??

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Responsive Mastitis Treatment: 2

- **Before treatment**
  - Check the medical history of the cow
  - Is she 3+ lactation?
  - Is she in early lactation?
  - Does she have a history of clinical mastitis?
  - Does she have a history of subclinical mastitis?
    - Check her SCC
  - If yes
    - Make your treatment decision based on prognosis
    - Options
      - Watchful waiting & discard
      - Use when antibiotics are not expected to be useful
      - IMM Therapy
        - Short duration
        - Long Duration
        - Segregation, culling or dry off quarter

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Responsive Mastitis Treatment: 3

- **Parity is Associated with SCC Reduction**

  - **Non-severe cases received IMM therapy only**
History of Previous Cases Increases Recurrence

- No Previous Cases
- 1 Previous Case
- ≥ 1 Previous Case

Etiology of Current Case

Gram neg (n = 279)
Gram pos (n = 219)
No Growth (n = 211)

Oliviera & Ruegg, 2013

Responsible Mastitis Treatment: 4

- Do not administer antibiotics to cows who will not benefit
  - Chronic Staph aureus
  - Mycoplasma bovis
  - Multiple infected quarters
  - Damaged teats
  - Other serious metabolic disease
  - Repeated previous treatment failures
  - Long history of chronically high SCC

Responsible Mastitis Treatment: 5

- On many farms, the use of antibiotics to treat cows with mild E coli mastitis isn't necessary
  - Opportunistic bugs
  - Rapid response by cow's immune system
  - Adds costs & residue risks without adding benefit
  - Can be treated with "watchful waiting"

- However...
  - Some cows have risk factors that indicate that their immune systems may not be as responsive
  - Some Gram negatives have additional factors that make them behave differently
  - How can you tell which?
    - Look at SCC before the case
    - >2 months elevated?
    - Try treatment?
    - Look at cow risk factors

Responsible Mastitis Treatment: 6

- Be involved in
  - Developing protocols
  - Monitoring outcomes

- Most important outcomes
  - Recurrence within 60 to 90 days
  - SCC reduction
  - 60 days

Effects of Pathogens

- Duration of subclinical phase varies among pathogens
- Bacteriological cure is reduced for more persistent cases
  - Except for E coli

KPI for Clinical Mastitis on 36 WI Dairy Farms, 2010

- Incidence
- Prop. Recurrent
Conclusions

- Veterinarians should be involved in developing and implementing mastitis treatments protocols.
- Symptoms of inflammation do not indicate that therapy is necessary.
- We can improve our treatments:
  - Seek to get a diagnosis
  - Before treatment or to modify treatment duration
- Review the medical history of the cow:
  - Decide on treatment duration based on pathogen & cow factors.

For more information:
http://milkquality.wisc.edu