MASTITIS CASE MANAGEMENT

The 2nd University of Minnesota
China Dairy Conference
Hohhot

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&
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OVERVIEW
Mastitis case management

- Introduction
- Treatment of clinical mastitis
- Treatment of subclinical mastitis
- Reasons for treatment failure
- Conclusions
OVERVIEW

Mastitis case management

- Introduction
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- Conclusions
10 POINT PROGRAM

1. Excellent milking technique
2. Well-functioning milking machine
3. Excellent comfort and hygiene
4. Correct treatment of subclinical and clinical mastitis
5. Culling of chronic cases
6. Optimal dry-cow management
7. Excellent heifers management
8. Excellent animal health / immunity
9. Improved breeding policy
10. Monitoring/evaluation

Appropriate action for Existing infections (E)
Prevention of New infections (N)

Farmers’ motivation
Advisors’ communication
10 POINT PROGRAM

1. Excellent milking technique
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Treatment **clinical** mastitis

- Causes of clinical mastitis
  - Gram-positive bacteria
    - *Staphylococcus aureus*
    - *Streptococcus uberis*
    - *Streptococcus dysgalactiae*
    - ...
  - Gram-negative bacteria:
    - *Escherichia coli*
    - *Klebsiella* spp.
Treatment clinical mastitis

- Many reasons for treatment
  - To prevent mastitis from getting any worse [i.e. cow gets severely sick (fever, less appetite, shock, dead, ...)]
  - To restore the productivity of the cow, thereby allowing the milk to be delivered again
  - To reduce the probability of recurrent cases
  - To avoid long-term and possibly irreversible udder damage which would have a deleterious effect on milk yield and milk quality (i.e. ↑ somatic cell count)
  - To prevent the spread of infection to other cows
  - To improve overall cow health and welfare
Treatment clinical mastitis

- Aims of treating cows with clinical mastitis
  - **Clinical cure**: absence of symptoms
  - **Bacteriological cure**:  
    - No recurrence of the clinical symptoms  
    - Consistent low somatic cell count after treatment
Treatment clinical mastitis

- Immediate treatment of clinical mastitis cases
  - ↑ Probability of bacteriological elimination > “self-cure” (= without antibiotics)
  - ↓ Probability of chronic recurrent cases
  - ↓ Extent of milk yield depression
  - ↑ Rapid return to saleable milk

! Take milk sample first
Treatment **clinical** mastitis

- Treatment
  - Based on a “Herd treatment plan”
    - Milk culture & susceptibility testing
    - Insight in housing, management, ...
  - Fast & long
  - Systemically & locally

**Bacteriological culture essential to guide advise**

**Responsible use of antimicrobials**
OVERVIEW
Mastitis case management

Introduction
Treatment of clinical mastitis
Treatment of subclinical mastitis
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Treatment subclinical mastitis

- Causes of subclinical mastitis:
  - Gram-positive bacteria
    - *Staphylococcus aureus*
    - *Streptococcus uberis*
    - *Streptococcus dysgalactiae*
    - ...
  - Gram-negative bacteria:
    - *Escherichia coli*
    - *Klebsiella* spp.
Treatment *subclinical* mastitis

- Many reasons for treatment
  - To restore productivity of the cow
  - To restore low (bulk milk) somatic cell count
  - To prevent the spread of infection to other cows
  - To prevent from clinical flare up
  - ↓Probability of losing premiums or penalties
Treatment _subclinical mastitis_

- **Treat** cows with subclinical mastitis when _likely_ to cure
  - Low SCC – Parity 1 or 2 - Recent IMI - One quarter - _S. aureus_ not involved - ...
- **Cull** cows with subclinical mastitis when _unlikely_ to cure
  - High SCC - Older - Chronic IMI - >1 quarters - _S. aureus involved_ - ...

Also: cull cows with recurrent clinical mastitis cases
Treatment subclinical mastitis

- Decision is based on
  - Cow-level information
  - Pathogen-level information

Bacteriological culture essential to guide advice

Responsible use of antimicrobials

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### Tools

**Treatment module:** Treatment of subclinical mastitis caused by *Staphylococcus aureus*

<table>
<thead>
<tr>
<th>Number of lactations?</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of elevated somatic cell counts (See Dairy Herd Improvement records)?</td>
<td>3</td>
</tr>
<tr>
<td>Number of infected quarters?</td>
<td>1</td>
</tr>
<tr>
<td>Is one of the infected quarters a hind quarter?</td>
<td>No</td>
</tr>
<tr>
<td>Number of days in lactation?</td>
<td>250</td>
</tr>
</tbody>
</table>

[Calculate]
## Tools

**Treatment module:**
Treatment of subclinical mastitis caused by *Staphylococcus aureus*

<table>
<thead>
<tr>
<th>Question</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of lactations?</td>
<td>1</td>
</tr>
<tr>
<td>Number of elevated somatic cell counts</td>
<td>3</td>
</tr>
<tr>
<td>(See Dairy Herd Improvement records)</td>
<td></td>
</tr>
<tr>
<td>Number of infected quarters?</td>
<td>1</td>
</tr>
<tr>
<td>Is one of the infected quarters a hind quarter?</td>
<td>No</td>
</tr>
<tr>
<td>Number of days in lactation?</td>
<td>50</td>
</tr>
</tbody>
</table>

[Calculate]
Tools

Treatment module:
Treatment of subclinical mastitis caused by *Staphylococcus aureus*

Number of lactations? 3

Number of elevated somatic cell counts
(See Dairy Herd Improvement records)? 3

Number of infected quarters? 1

Is one of the infected quarters a hind quarter? No

Number of days in lactation? 50

Calculate
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Treatment failures

- Acquired antimicrobial resistance: e.g. *Strep. uberis*
Treatment failures

- **Virulence**: e.g. biofilm
Treatment failures

- Choice of drug
  - Gram-positive versus Gram-negative spectrum
  - Bactericidal and bacteriostatic (rely on host immune response to interact)
  - Solubility in milk
  - ...

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## Treatment failures

- **Treatment duration**

<table>
<thead>
<tr>
<th>Manifestation</th>
<th>Compound</th>
<th>Short treatment</th>
<th>Extended treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Days</td>
<td>Cure(^1)</td>
</tr>
<tr>
<td>Subclinical</td>
<td>Pirlimycin</td>
<td>2</td>
<td>3 to 56% (n = 146)</td>
</tr>
<tr>
<td>Subclinical</td>
<td>Pirlimycin</td>
<td>2</td>
<td>13.3% (2/15)</td>
</tr>
<tr>
<td>Subclinical</td>
<td>Penicillin</td>
<td>2</td>
<td>48.9%</td>
</tr>
<tr>
<td></td>
<td>Penethamate</td>
<td></td>
<td>62.7%</td>
</tr>
<tr>
<td></td>
<td>Methicillin</td>
<td></td>
<td>24.4%</td>
</tr>
<tr>
<td></td>
<td>Tameticillin</td>
<td></td>
<td>20.0%</td>
</tr>
<tr>
<td>Clinical</td>
<td>Various</td>
<td>3–4</td>
<td>29% (26/91)</td>
</tr>
<tr>
<td>Clinical</td>
<td>Various</td>
<td>2</td>
<td>48% (31/64)</td>
</tr>
<tr>
<td>Dry cow treatment</td>
<td>Spiramycin</td>
<td>1</td>
<td>14% (2/14)</td>
</tr>
</tbody>
</table>
## Treatment failures

- **Route of administration**

<table>
<thead>
<tr>
<th></th>
<th>Milk/ducts</th>
<th>Udder tissue</th>
<th>Cow</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Strep. agalactiae</em></td>
<td>+ + +</td>
<td>- - -</td>
<td>- - -</td>
</tr>
<tr>
<td>Other streptococci</td>
<td>+ + +</td>
<td>+</td>
<td>- - -</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>+</td>
<td>+++</td>
<td>- - -</td>
</tr>
<tr>
<td>Coagulate-negative staphylococci</td>
<td>+ + +</td>
<td>- - -</td>
<td>- - -</td>
</tr>
<tr>
<td>Coliforms</td>
<td>+</td>
<td>--</td>
<td>+++</td>
</tr>
</tbody>
</table>
Treatment failures

- Chronicity infection

![Treatment module: Treatment of subclinical mastitis caused by *Staphylococcus aureus*](image)

- Number of lactations: 3
- Number of elevated somatic cell counts: 3
- Number of infected quarters: 1
- Is one of the infected quarters a hind quarter? No
- Number of days in lactation: 50

High theoretical probability of cure

![Tools](image)

Low theoretical probability of cure
Treatment failures

- **Immunity cows:**
  - Metabolic disorders:
    - Negative energy balance in early lactation
    - Milk fever
    - (Sub-) clinical rumen acidosis
  - Viral infections (BVD, IBR)
  - Deficiencies in vitamins/minerals
  - ...

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Treatment failures

- New infections established during treatment period
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Prevention is key

- Less mastitis cases to be treated

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1. Excellent milking technique  N
2. Well-functioning milking machine  N
3. Excellent comfort and hygiene  N
4. Correct treatment of subclinical and clinical mastitis  E + N
5. Culling of chronic cases  E + N
6. Optimal dry-cow management  E + N
7. Excellent heifers management  N
8. Excellent animal health / immunity  E + N
9. Improved breeding policy  N
10. Monitoring/evaluation
Monitoring is key

- Use all available data on farm
- Record all useful data on farm
  - Clinical mastitis cases
  - Hygiene score
  - Body condition score
  - ...

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Appropriate action for Existing infections (E)
Prevention of New infections (N)
10. MONITORING/EVALUATION

**Step 1:** Somatic cell count analysis + clinical mastitis cases

**Step 2:** Milk sampling high SCC cows + clinical mastitis cases

**Step 3:** Bacteriological culturing
- Gram-pos. versus gram-neg.
- Major and minor
- Contagious versus environmental

**Step 4:** Making decisions SCM
→ treating
→ re-sampling
→ waiting
→ culling
Treatment plan CM

- Adapt prevention and control
- Revise the aims
10. MONITORING/EVALUATION

COW level analysis

**STEP 1: IDENTIFY**

Show chart

**Overall** 1

Show SCC history chart

<table>
<thead>
<tr>
<th>Current test-day</th>
<th>Previous test-day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herd milk SCC</td>
<td>160 000</td>
</tr>
<tr>
<td>Heifer milk SCC</td>
<td>127 000</td>
</tr>
<tr>
<td>Early lactation</td>
<td>44 000</td>
</tr>
<tr>
<td>Mid lactation</td>
<td>139 000</td>
</tr>
<tr>
<td>Late lactation</td>
<td>139 000</td>
</tr>
<tr>
<td>Cow milk SCC</td>
<td>191 000</td>
</tr>
<tr>
<td>% High SCC</td>
<td>24% 000</td>
</tr>
<tr>
<td>Heifer</td>
<td>25% 000</td>
</tr>
<tr>
<td>Cow</td>
<td>24% 000</td>
</tr>
</tbody>
</table>

Herd milk SCC: 160
Clinical mastitis: 13%

n = 33

**TREATMENT**

- Pasture
- Administration/monitoring
- Heifers
- Dry cows
- Calving area
- Nutrition
- Nutrition
- Lactating cows
- Milking parlour

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10. MONITORING/EVALUATION

HERD level analysis
Thank you