Treatment Protocol for Intramammary Infections in Early Postpartum Dairy Cows

Based on CMT Positive Results

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Introduction

- Purpose of the study:
  - Evaluate the effectiveness of IM treatment protocol based on a positive CMT results within the first 3 days post calving
  - Effect of early ATB therapy on cure rates, linear somatic cell score (LS) and milk production for the first 3 DHI tests post calving was assesed

Material and methods

- September 2000 to April 2001
- Commercial dairy herds from southwestern Quebec (n=14), central Ontario (n=2) and NY State (n=8)
- Canadian herds ranged from 35 to 160 cows
- NYS herds ranged from 40 to 1500 cows
- All herds enrolled in regular DHI testing

Total of 561 cows - 1861 quarters

Material and methods

- Dairy producer performed the CMT on foremilk quarter samples for each postpartum cow 1-3 DIM
- Scored CMT reaction according to established scoring method
- Quarter milk samples were aseptically collected according to the NMC guidelines

Scoring method

- 0 = no reaction
- 1 = trace reaction
- 2 and 3 = positive CMT reaction

Material and methods

- CMT were alocated to one of two treatment groups

- Random assignment

  - 1st group: treatment with Cefa-Lak® (200mg cephapirin sodium 2X in 12h interval)

  - 2nd group: no treatment

Material and methods

- **In group 1:**
  - If only one quarter is positive - treat only that quarter
  - If two or more quarters are positive - treat all quarters
  - All CMT positive cows had quarter milk samples aseptically collected for bacteriology on two more occasions (10-16 DIM and 17-23 DIM)

Bacteriological procedures

- **Frozen samples shipped to Mastitis Research Laboratory - Guelph University or to QMPS - Cornell University**
- **Laboratory staff blinded to treatment**
- **Inoculum of 0.01ml of milk plated on Columbia base agar containing 5% sheep blood**
- **Incubation at 37°C - examined for bacterial growth at 24 and 48 hours**

Bacteriological procedures

- Colonies were identified as:
  - staphylococci
  - streptococci
  - coliform
  - other pathogens

  based on colony growth, morphology and appearance, pattern of hemolysis, catalase reaction and Gram staining

Bacteriological procedures

- **For each positive quarter the number of CFU per 0.01 ml milk was reported in 4 categories (1-5, 6-10, 11-50 or ≥ 50 CFU)**

- **Quarter was considered infected with CNS if ≥11 CFU per 0.01 ml were isolated**

- **Isolation of CNS was reported when the organism grew with another pathogen**

Bacteriological procedures

- A sample was considered contaminated if three or more colony types were present on a plate

Results

Percentage of quarters sampled:

- – day of calving - 16.6%
- – 1st day - 51.0%
- – 2nd day - 21.7%
- – 3rd day - 8.9%

Results

Parity %

- 1st lactation   - 37.0%
- 2nd lactation   - 29.7%
- 3rd and greater   - 33.3%

Results

Sample population %

- Holsteins   -89.0%
- Ayrshires   - 7.2%
- Jersey   - 3.8%

Results

Distribution of CMT scores %

- score 0   - 74.8%
- score 1   - 10.6%
- score 2   -   8.1%
- score 3   -   6.4%

Results

Bacteriological samples (0-3DIM)

- Microorganisms from 73.1% of the samples
- 16.4% yielded no growth
- 9.4% samples were contaminated

Results

Most common bacterial pathogens:

- CNS   - 42.7% (minor pathogen)
- Env.Streps   - 23.1% (major pathogen)
- S. aureus   - 11.1% (major pathogen)
- E. coli   -   5.7% (major pathogen)
- Klebsiella   -   4.7% (major pathogen)

Results

Overall for major pathogens

- sensitivity   - 57.6%
- specificity   - 85.3%

Results

- **Effect of IMM antibiotic treatment of CMT positive quarters on cure of pathogens**

  - 165 quarters received IMM treatment
  - 190 quarters untreated control

  logistic regression modeling

Results

Major pathogens
- Infected quarters - 77.3% cured after treatment on follow up cultures
- No treatment group 63.5% spontaneous cures

- NOT STATISTICALLY DIFFERENT (P=0.07)

Results

Minor pathogens

- Infected quarters - 77.9% cured after treatment on follow up cultures

- No treatment group 82.6% spontaneous cures

- NOT STATISTICALLY DIFFERENT (P=0.42)

Results

Environmental streps:

- – Infected quarters - treated - cured 86.8%

- – Infected quarters - non treated - spontaneous cured 68.2%

Tendency towards significance (P=0.06)

Results

Milk production analysis

- Every unit increase in lnSCC there was a reduction in milk production on third DHI test (P=0.01)

- As the mean CMT score at calving increased cows produced 2.1kg less milk on the third DHI test (P=0.01)

Results

- First and second parity cows had significantly less milk than the third and greater parity group
- Cows also produced less milk on the first test date compared to the third test date (P=0.001)
- Breed differences in milk production were also significant

Results

- **IMM antibiotic treatment - no significant effect on milk production**
- **No significant effect of treatment between different trial sites**
- **Curing a major pathogen no significal difference on milk production**

Results

Factors that influencing lnSCC in CMT positive cows were evaluated

- Cows that cured major pathogen - significant decrease in lnSCC ($P<0.05$)

- Mean CMT score at calving did not affect test day lnSCC

- Differences in SCC varied widely among herds

Results

- **Significant differences in milk production between two study sites USA↑, Canada↓**

- **Effect of treatment on mean CMT scores – tested but not significant**

Conclusion

- Valuable addition to this treatment protocol for fresh cows would be a rapid inexpensive test to identify the major pathogen group that would be used in CMT positive quarters

- For major pathogens - no significant difference in early IMM treatment compared to no treatment

Conclusion

There was a tendency toward significance in cure rates for environmental streptococci

Curing a major pathogen resulted in a decrease in lsSCC by the third test date

Treatment of CMT positive quarters had no significant effect on milk production

Every one point increase in the mean CMT score at calving - 2.1kg of milk per test date

Conclusion

- **There still remains the need for economic analysis of the IMM antibiotic treatment protocol of CMT positive quarters**

Thank you!