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Mastitis-Treatment Options and Strategies



Treatment Strategies

- 1st Step: Determine and Record Severity Score (Baseline)
 - Score 1: Mild-Abnormal milk only
 - Between 60-90% of clinical mastitis cases
 - Plenty of time to culture
 - Score 2: Moderate-Abnormal milk, abnormal quarter
 - Between 10-30% of cases
 - Wait on culture results but watch closely
 - Score 3: 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(4x more likely to be Gram – with severity score of 3)

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

Treatment Response?

- Clinical signs last 4-6 days on average
- Mastitis alternates between clinical and subclinical states
 - We detect inflammation, not infection.
 - Above 200,000 is subclinical mastitis-milk is normal but lots of cells
- Determination of successful treatment is difficult

Pathogens will Change

- Between seasons
- When new cows are added
- As a result of mastitis control strategies put in place
- 1980's: 87% of isolates Strep. ag and Staph. aureus;
- Last 10 years: Coliforms 24%, non-ag streps 14% & Coag neg staph 9%

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
- All 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



Making Treatment Decisions

- Treatment will be more successful in
 - Younger cows
 - Gram - cases
 - Cases later in lactation
- Successful treatment of cows with multiple/recurrent mastitis-Zero

Low Probability to Cure

- History of previous cases
- History of subclinical mastitis
- Stage of lactation: early lactation, greater chance of recurrence
- Age-Older cows (3+ lactations then less chance of clinical cure and more recurrences)
- Other existing diseases

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

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



What if don't treat?

- No growth-immune system has responded or below detection limit
- Treat E. coli? Some respond well without antibiotics
- Gram +: No treatment could result in chronic, subclinical, high cell count, high risk of recurrence
- Move to treatment pen to make decisions-can't tell type of bacteria by

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



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

Hopeless Species

- Mycoplasma
- Serratia
- Pseudomonas
- Arcanobacterium
- Nocardia
- Prototheca, Yeast, Fungi
- Mycobacterium



Antibiotic Use

Record proper milk and meat withdrawal times

Record treatments, severity score, quarter(s) affected, date

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
- Pirsue- 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

Species	Cure Rate
Streptococcus agalactiae	90-95%
Environmental Streptococci (i.e. Strep uberis and Strep dysgalactiae)	70-80%
Staph aureus, chronic cases	20-30%
Staph species (Coag negative)	50 to 60%
Coliforms	0 to 10%
Mycoplasma, yeasts, Nocardia	0%



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
- Pirsue-chemical nature allows it to penetrate mammary tissue

Staph aureus treatment success

- <3rd lactation
- ≤ 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 at 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;

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 (Hetacin K) treatment=80% cure rate
- [Label=Hetacin K, Pirsue, Spectramast]
- *Strep. uberis*: 5 days of treatment with Pirsue= 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. Spontaneous cure rate can be high. Different farms/different bugs
- Clinical Klebsiella-tendency to have a longer duration and may become chronic
- Spectramast is treatment of choice

Spectramast(ceftiofur hydrochloride)

- 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-include severity score
- SCC does not drop quickly. May take 3-6 weeks for improvement

Wait to treat

- Before treatment-check cow's history
- Is she 3+ lactation? Early lactation?
- History of clinical mastitis? Subclinical mastitis? Check her SCC
- Culture? Text a preliminary (Gram +/-)
- If yes-Consider:
- Extended duration therapy
- No treatment-dry off quarter, ship cow

Take Home

- Catch cases early by observation of foremilk
- Culture cases to achieve a diagnosis, especially first cases
- Submit milk to lab for rapid provisional diagnosis-readjust if necessary
- Don't continue to grab a tube and treat chronic cows

Take Home

- Don't treat all cases the same way
- Review the cow's history
- Culture milk before treatment or to modify treatment
- Decide on treatment duration based on pathogen and cow factors