

AABP FACT SHEET

GUIDELINES FOR THE THERAPY OF CLINICAL MASTITIS IN LACTATING DAIRY COWS



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Goals and Objectives of Clinical Mastitis Therapy During Lactation

The immediate goal of the producer in treating clinical mastitis (CM) is to reduce the illness and suffering of the cow and to return the affected quarter and milk to clinical normality. Other goals of clinical mastitis treatment are to promote a return to milk production, eliminate mastitis-causing organisms from the quarter, prevent further damage to the mammary gland, lower the somatic cell count (SCC), and reduce the risk of the spread of infection to herd mates. This must be done in a humane, cost-effective manner and without causing violative drug residues in milk or meat.

The cost-effectiveness of CM treatment is influenced by factors such as the etiologic agent, the cow's age, stage of lactation, and pregnancy status, previous mastitis history, milk yield, treatment costs, value of the cow as a cull, price and availability of replacement animals, and concurrent medical problems. Although treatments should be cost-effective, the goals of the owner and welfare of the cow must also be considered.

Prevention of Mastitis and Implementation of a Complete Udder Health Program

Prevention of mastitis is the cornerstone of improvement in the prevalence and incidence of mastitis infection. Therapy of CM is only one component of an udder health program.

In addition, a complete udder health program advocates:

- appropriate hygiene at milking time including pre and post teat disinfection,
- effective udder prep and efficient milking,



- a clean cow and heifer environment,
- milking equipment evaluation and maintenance,
- appropriate dry cow antibiotic therapy,
- targeted diagnostic culturing of milk samples,
- analysis of mastitis case records and SCC data,
- appropriate immunizations, and
- implementation of suitable mastitis biosecurity practices.

The Role of the Veterinarian in CM Therapy

The role of the veterinarian with regards to CM is to design rational, evidence-based disease management protocols that help cows recover, reduce economic loss to the producer, maximize animal welfare, and protect consumers from drug residues.

Most cases of CM will be detected and treated by dairy producers or their employees. Veterinary practitioners oversee this practice by providing written treatment protocols appropriate to each farm to assist in treatment decision making. Veterinarians train farm staff in treatment and diagnostic techniques and record keeping ensuring protocols are implemented correctly and revised as needed to suit changing CM disease patterns.

Considerations for Designing Treatment Protocols

Product Selection

Protocols for clinical mastitis therapy should use FDA approved products that are labeled for mastitis treatment when possible. Extra-label drug use (ELUD) may be indicated when on-label drug

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use has been determined (in scientific studies or by field experience) to be ineffective and the use of a product in an ELUD fashion is justifiable. The veterinarian will direct all extra-label treatment of clinical mastitis, by providing indications for use, appropriate dosages, routes of administration and corresponding withdrawal times for meat and milk.

Drugs that are banned from use in lactating dairy cows must not be used to treat clinical mastitis. Aminoglycoside antibiotics are not recommended for mastitis therapy because of the risk of prolonged drug residues in tissue.

Mixing of drugs in the same container and the use of multi-dose containers must be avoided. Homemade and multi-dose formulations are associated with a high risk of contamination by organisms such as yeast.

Incorporate Knowledge of the Pathogen into Therapy Recommendations

The veterinarian's treatment recommendations should be based on knowledge of the etiologic agents responsible for clinical mastitis in a cow or a herd. Severity of clinical signs and the appearance of the milk are not reliable indica-

tors of the causative pathogen. For example, coliform mastitis cases can exhibit mild to severe clinical signs. Ideally, treatment of a given clinical mastitis episode will be directed on the basis of the causative pathogen. However, when it is not practical to wait for test results, treatment should reflect knowledge of the previously established pathogen pattern in the herd and previous treatment outcomes. The relationship between in-vitro antibiotic susceptibility test results and the outcome of therapy has not been established. Antibiotic susceptibility testing should

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Template for Fulfilling the Guidelines for Therapy of Clinical Mastitis

Responsibilities of the Veterinarian

The veterinarian will:

- Recommend a diagnostic protocol for clinical mastitis. The diagnostic protocol will define how CM cases are detected and classified. The protocol will also describe how

the pathogens responsible for clinical mastitis will be identified.

- Work with the producer to develop practical treatment protocols for clinical mastitis, based on knowledge of clinical mastitis pathogens in the herd. Treatments should be evidence-based whenever possible; evidence may come from scientific reports or documented experience. Extra-label drug use should be avoided when effective on-label products are available. Treatment protocols should include well-defined case criteria and drug regimens (amount, route, frequency, and duration). Withholding times must be stated. Protocols should specify when to change treatments, when

to seek veterinary intervention, and when to exercise humane alternatives to treatment.

- Work with the producer to devise a clinical mastitis recording scheme that includes permanent records. The recording scheme should include, at a minimum, the cow's ID, date of clinical mastitis, quarter affected, treatment(s) administered, and withholding times. All culture results should be documented. The recording scheme must be compatible with herd management practices and the overall record keeping system.
- Implement a monitoring program that will detect changes in the incidence, pattern of occurrence, or pathogens causing clinical mastitis in the herd.

The monitoring program should also provide a means of assessing treatment efficacy.

Responsibilities of Herd Personnel

The designated herd personnel responsible for mastitis therapy on the farm will:

- Detect and record clinical mastitis as directed by the veterinarian.
- Treat exactly as prescribed.
- Observe the full milk and meat withholding times as advised by the veterinarian.
- Report concerns to the veterinarian.



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not be done on bulk tank or pooled milk samples.

Clinical mastitis caused by *Streptococcus agalactiae* is uncommon and response to intramammary antibiotic therapy is good. Clinical mastitis cases where non-agalactiae streptococci bacteria are isolated also benefit from antibiotic therapy.^{1,2} The risk for a recurrence of a clinical mastitis case was lower when antibiotics were used. Clinical mastitis caused by *Staphylococcus aureus* may respond to intramammary antibiotics, but the bacteriologic cure rate during lactation is low. The duration of infection, age of the cow, quarter where the infection is located, number of quarters infected, the SCC prior to therapy and the susceptibility pattern of the pathogen (β-lactamase positive or negative) have been shown to influence the likelihood of a bacteriological cure of clinical *S. aureus* mastitis.³ Clinical signs usually resolve without treatment, even if bacteriological cure does not occur.

Currently available intramammary antibiotics are usually of minimal benefit in CM caused by Gram-negative organisms. Studies have shown little difference in outcome of mild and moderate cases of Gram-negative CM treated with intramammary antibiotics. While intramammary antibiotics are poorly distributed in the severely swollen gland common with Gram-negative CM, there is evidence that IMM therapy is beneficial in severe Gram-negative CM cases by producing improved bacteriological cure.⁴ Complete milk-out and supportive therapy, including anti-inflammatory drugs and fluid replacement, should be the basis of treatment. Cows with more severe systemic disease signs may benefit from both intra-mammary and systemic antibiotics.^{4,5} Although frequently recommended and practiced, benefits of

frequent milk-out or oxytocin administration have not been documented.⁵ Many therapies for Gram negative clinical mastitis will be extra-label and must be directed by a veterinarian.

Clinical mastitis episodes caused by non-responsive pathogens should not be treated with antibiotics. Examples of non-responsive pathogens are *Mycoplasma* spp., *Pseudomonas* spp., *Arcanobacterium pyogenes* (formerly *Actinomyces pyogenes*), yeasts, fungi, *Nocardia* spp., *Prototheca* spp., and *Mycobacterium* spp. In addition, cows with repeated episodes of CM in a given lactation are unlikely to respond to further antibiotic treatment. Alternatives to antibiotic treatment include segregation, culling, premature dry-off of the cow, dry-off of the quarter, or chemical inactivation of the quarter, depending on the pathogen and the cow's signs, and euthanasia. When repeated episodes of clinical mastitis occur frequently, the diagnostic and treatment protocol should be re-evaluated.

Incorporate Culture Diagnosis and Severity of Clinical Signs into Treatment Recommendations

Clinical mastitis should be classified according to severity, with consideration of systemic and local (changes to udder or milk) disease signs. Accurate and consistent evaluation of disease severity in conjunction with routine milk culturing allows for development of management and treatment protocols that address the varied needs of cattle with different levels of disease severity. For example, a cow with severe systemic signs of disease associated with Gram-negative CM would likely benefit from supportive therapy aimed at counteracting the effects of endotoxin. Fluid replacement, calcium, anti-inflammatory drugs and complete milk-out of the affected quar-

ter(s) may be indicated.

Mild cases of CM caused by coliform bacteria often resolve spontaneously without treatment. On the other hand, mild cases of CM caused by environmental streptococci require intramammary antibiotic treatment to achieve an acceptable rate of bacteriologic cure and prevent recurrence of clinical signs.

Record Cases of CM and Treatments Given, Assess Outcomes

Good records are a must for an effective CM therapy program and are required to document residue prevention efforts. Most computer herd health software programs have the ability to be customized to achieve these requirements. In addition, the AABP Milk Quality and Udder Health Committee has designed a set of forms for on-farm use, suitable for copying and distribution by veterinarians. These are available from the Milk and Dairy Beef Quality Assurance Program, AABP's website or by CD from AABP.

Even in the absence of definitive efficacy data for many commonly used CM treatments, veterinarians can help their clients by designing rational, herd-specific treatment protocols and monitoring the outcome of the treatments given. Veterinarians can assist producers in responsible drug use by selecting for treatment only CM cases that are most likely to respond to therapy and recommending appropriate route, dose, and duration of therapy and withdrawal times. All recommendations for mastitis therapy should be given in writing.

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References

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