Treatment of Mastitis in Cattle

Erin Royster, DVM, MS[a], Sarah Wagner, DVM, PhD[b,*]

KEYWORDS

• Mastitis • Therapy • Antimicrobial • Evidence • Dairy • Cow • Lactating • Dry

KEY POINTS

- Treatment of mastitis is by common use of antimicrobial drugs in lactating and dry cows.
- Pathogen, cow, and drug factors should be considered when making mastitis treatment decisions.
- Evidence of clinical drug efficacy based on randomized, controlled clinical trials should be considered, if available, when choosing an antimicrobial drug for the treatment of mastitis.

INTRODUCTION

Drug treatment of mastitis during lactation remains common, as does treatment of cows at drying off. Our understanding of the disease, the causative pathogens, and the rationale for treatment or nontreatment under various circumstances continues to evolve. This article presents research-based evidence about the use or nonuse of drugs in cows with mastitis or at drying-off. Nondrug factors involved in decision making about mastitis, including cow characteristics and the epidemiology of mastitis, are also briefly discussed.

This article focuses on the use of antimicrobial drugs. Readers with an interest in the effects of anti-inflammatory drug treatment of cows with mastitis are referred to the excellent review by Leslie and Petersson-Wolfe, "Assessment and Management of Pain in Dairy Cows with Clinical Mastitis," published in 2012 in the *Veterinary Clinics of North America*.[1]

This article provides information that assists in the making of knowledgeable, evidence-based decisions about the therapy for mastitis. To that end, clinical trials of antimicrobial drugs for the treatment of mastitis in lactating and dry cows are presented and summarized. When reviewing this information, it is important to

The authors have nothing to disclose.

[a] Department of Veterinary Population Medicine, College of Veterinary Medicine, University of Minnesota, 225 Veterinary Medical Center, 1365 Gortner Avenue, Saint Paul, MN 55108, USA;
[b] Department of Animal Sciences, #7630, 1300 Albrecht Blvd., North Dakota State University, Fargo, ND 58108, USA
* Corresponding author.
E-mail address: Sarah.Wagner@ndsu.edu

Vet Clin Food Anim 31 (2015) 17–46
http://dx.doi.org/10.1016/j.cvfa.2014.11.010 **vetfood.theclinics.com**
0749-0720/15/$ – see front matter

remember that if a study is designed to detect treatment differences and fails to do so, this does not mean that the treatments are necessarily equally effective. For further discussion of this concept, see the article by Brian Lubbers elsewhere in this issue.

DETECTION AND DEFINITIONS

Mastitis is most frequently recognized in its clinical form, defined by the presence of visibly abnormal milk. Milk from a quarter with clinical mastitis may be watery or thickened and discolored with blood, pus, flakes, or clots (aka gargot). Cows with clinical mastitis may also experience swelling and redness or pain in the affected quarter and in some cases may become systemically ill with symptoms such as fever, dehydration, weakness, and inappetence. Clinical cases are designated as mild, moderate, or severe, corresponding to the presence or absence of local and systemic signs (**Table 1**). Recording the severity score of each case is helpful in evaluating prevention and detection practices, as well as treatment outcomes.

Although treatment of mastitis is mostly directed toward clinical cases, many cases of mastitis are subclinical, with no visibly detectable changes in milk. Subclinical mastitis infections are therefore identified by an elevated milk somatic cell count (SCC) in the affected quarter. An SCC in composite milk samples (milk from all 4 quarters) of greater than 200,000 cells/mL is commonly used to indicate that one or more quarters are infected. Cows with subclinical mastitis are often identified when the herd is tested through the Dairy Herd Improvement Association (DHIA), where milk SCC is measured in the laboratory, or by using an on-farm test to estimate the SCC. The most common cow-side test for subclinical mastitis is the California Mastitis Test (CMT). Identification and treatment of cows with subclinical mastitis may be a useful strategy to help reduce SCC in the farm bulk milk tank but is of equivocal economic benefit because of the costs of treatment and milk withdrawal and low treatment efficacy.[2–4] However, in herds in which contagious mastitis is an issue, identification and treatment of subclinically infected cows that are likely to respond to therapy may be advisable to decrease the risk of transmission.

It is important to evaluate the outcomes of any treatment or management action for mastitis to gauge success or failure. There are several outcomes following a case of mastitis that may be of interest to the practitioner or producer, including clinical or microbiological cure, days of milk withheld from sale, SCC, milk production, recurrence of mastitis, and retention in the herd.[5] Clinical cure is defined as a return to normal-appearing milk. The definition of microbiological cure varies considerably in the research literature depending on the method used to diagnose the causative pathogen (microbiological culture or other molecular diagnostic methods) and the sampling interval. Microbiological cure occurs when the organism originally identified as causing the infection cannot be isolated from the gland at some time point or points after treatment. Both these definitions of cure have strengths and weaknesses. Clinical cure is possible to evaluate on the farm and is one determinant of when milk can be returned to the saleable tank (the other being antibiotic drug withholding

Table 1
Severity scoring system for mastitis

Score	Description
1. Mild	Abnormal milk (eg, clots, flakes, watery)
2. Moderate	Abnormal milk and signs of udder inflammation (eg, heat, swelling, pain)
3. Severe	Systemic illness (eg, fever, dehydration, weakness, inappetence)