

## **Escherichia coli: A Practical Summary for Controlling Mastitis**

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### **Introduction**

The implementation of control measures for contagious mastitis pathogens has successfully reduced the prevalence of these organisms in U.S. dairy herds. However, the control of environmental pathogens still remains a daunting task. *Escherichia coli* are Gram-negative bacteria, similar in structure to *Klebsiella* spp. *E. coli* mastitis is typically associated with a quick onset and often severe clinical signs.

### **Where Are These Organisms Found?**

These organisms are commonly found in **organic matter including bedding and manure**. *E. coli* is one of the most prevalent bacteria in manure, and exposure of the teat end occurs through dirty bedding. Poor udder cleanliness, inadequate stall management, and damaged teat ends are risk factors for *E. coli* infections in uninfected cows.

### **How Does *E. coli* Infect the Mammary Gland?**

*E. coli* will infect mammary glands through environmental contact. As with all environmental organisms, maintaining a **clean and dry environment** for bedding cows is of utmost importance. In particular, the use of inorganic bedding (sand) will reduce the environmental contamination with these bacteria. However, it is important to remem-

ber that recycled sand can still serve as a source of environmental contamination as the organic matter accumulates in the bedding material.

### **How Can You Prevent and Control Mastitis Caused by *E. coli*?**

The control of *E. coli* includes maintaining a clean and dry housing environment and implementing **proper milking procedures**. At milking time, all quarters should be forestripped, which will begin the milk letdown process.

Following forestripping, the use of an efficacious and proven premilking teat disinfectant is particularly important for this mastitis-causing pathogen. The premilking teat disinfectant should remain on the teats for 30 seconds prior to removal with either a paper towel or a single-use, clean and dry cloth towel. Following these guidelines, the time from start of manual stimulation (forestrip or wipe) to unit attachment should be in the range of 60 to 120 seconds. This will allow the appropriate time for milk letdown.

After unit detachment, the application of an efficacious and proven postmilking teat disinfectant should be applied with coverage over at least two-thirds of the teat barrel. In herds with a particular environmental mastitis problem, the use of a barrier teat dip is recommended.

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In addition, reducing teat end exposure between milkings by scraping the back of cow stalls (where the udder rests) and applying fresh bedding frequently is imperative. The **application of bedding conditioners such as hydrated lime** is effective at reducing the bacterial load in the bedding. However, the activity of these products is short-lived, making frequent application necessary.. It is recommended that 2 pounds be applied per stall, and it must be applied every other day.

The use of a **coliform mastitis vaccine** (J5 bacterin) has been shown to **reduce the severity** of clinical Gram-negative mastitis, which includes *E. coli*. It is important to remember that these vaccines do not reduce the incidence of mastitis. Vaccination administration schedules and the appropriate number of doses have been researched. Talk with your veterinarian before implementing a vaccination protocol.

### **When Is an *E. coli* Mastitis Infection Most Likely to Occur?**

New infections can occur at any time during lactation and may also occur during the dry period. However, cows in early lactation are at an increased risk for new infections due to the increased stress and immune suppression associated with the post-partum period.

Additionally, cows are also at an increased risk for mastitis immediately after drying-off. Following milk cessation, cows do not experience the daily flushing of the gland, which increases their risk. Cows with high milk production are not at greater risk than cows with low milk production.

### **How Likely Is an *E. coli* Infection to Cure?**

When *E. coli* bacteria die, a toxin is released; this toxin is the primary cause of the clinical signs observed in a local mastitis infection. Antibiotics act to kill bacteria and in the case of these infections, would then result in the toxin release. Therefore, **intramammary antibiotic treatment is not a generally recommended practice for local infections.**

However, in some cases, *E. coli* infections can become systemic, in which case antibiotic treatment and supportive therapy are required. In recent years, there has been discussion regarding the presence of chronic infections caused by *E. coli*. However, a mechanism for these infections becoming chronic is not yet known.

As a reminder, veterinary consultation is recommended prior to the start of any treatment protocol. Due to the nature of these bacteria, **emphasis needs to be placed on prevention** of these infections, rather than a focus on treatment.

#### **Quick Notes**

- *E. coli* is an environmental organism commonly found in manure and organic bedding.
- It is imperative to keep bedding clean and dry.
- Use of washed sand bedding that is properly dried will help reduce the environmental load of *E. coli*.
- Use of hydrated lime will reduce the bacterial load in the bedding, but application must be 2 pounds per stall and must be applied every other day.
- Proper milking procedures, including predip and postdip applications are extremely important in the prevention of these infections.
- Use of antibiotics in local *E. coli* infections is not recommended.