

***Klebsiella* spp.: A Practical Summary for Controlling Mastitis**

Christina S. Petersson-Wolfe, Assistant Professor, Dairy Science, Virginia Tech

Isis K. Mullarky, Assistant Professor, Dairy Science, Virginia Tech

John Currin, Associate Professor, Virginia-Maryland Regional College of Veterinary Medicine

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 remains a daunting task. *Klebsiella* spp. are Gram-negative bacteria, similar in structure to *Escherichia coli*. The most common, mastitis-causing species are *Klebsiella pneumoniae* and *K. oxytoca*, but treatment and control is similar for all species of *Klebsiella*.

Where Are These Organisms Found?

These organisms are commonly found in organic matter, including bedding and manure. *Klebsiella* spp. are naturally abundant on the forest floor, so their presence in sawdust is common. Therefore, cows bedded on fresh sawdust are at an increased risk for mastitis caused by *Klebsiella* spp. Loads of sawdust containing high counts of *Klebsiella* spp. have been linked to herd outbreaks of *Klebsiella* mastitis. Poor udder cleanliness, inadequate stall management, and damaged teat ends are risk factors for *Klebsiella* infections in uninfected cows.

How Do *Klebsiella* spp. Infect the Mammary Gland?

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

How Can You Prevent and Control Mastitis Caused by *Klebsiella* spp.?

The control of *Klebsiella* spp. 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.

After 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.

Following unit detachment, the application of an efficacious and proven postmilking teat disinfectant

www.ext.vt.edu

tant 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.

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.

Another key control procedure for reducing *Klebsiella* spp. infections is to **avoid the use of sawdust and recycled manure bedding**. In situations where sawdust bedding must be used, the use of a kiln-dried product is suggested. This process essentially eliminates the *Klebsiella* spp. entering the farm from the forest floor and will help reduce the bacterial load in the clean product.

The use of a coliform mastitis vaccine (J5 bacterin) has been shown to reduce the severity of clinical Gram-negative mastitis, which includes *Klebsiella* spp. 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 Are *Klebsiella* Infections 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 postpartum 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 Are *Klebsiella* Infections to Cure?

When *Klebsiella* bacteria die, a toxin is released; the 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**.

In some cases, *Klebsiella* 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 *Klebsiella* spp. 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 on their treatment.

Quick Notes

- *Klebsiella* spp. are environmental organisms commonly found in manure and organic bedding.
- It is imperative to keep bedding clean and dry.
- The use of washed sand bedding that is properly dried will help reduce the environmental load of *Klebsiella* spp.
- Proper milking procedures, including predip and postdip applications, are extremely important in the prevention of these infections.
- The use of antibiotics in local *Klebsiella* infections is not recommended.