



## ***Klebsiella* spp. – A practical summary for controlling mastitis**

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The implementation of control measures for contagious mastitis pathogens has successfully reduced the prevalence of these organisms in US dairy herds. However, the control of environmental pathogens still 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*. However, 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, thus the 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 the organic matter accumulates in the bedding material.

### **How can you prevent and control mastitis caused by *Klebsiella* spp.?**

The control of *Klebsiella* spp. includes the maintenance of a clean and dry housing environment and the implementation of **proper milking procedures**. At milking time, all quarters should be forestripped, which will begin the milk let-down process. Following forestripping, the use of an efficacious and proven pre-milking teat disinfectant is particularly important for this mastitis-causing pathogen. The pre-milking 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 60-120 seconds. This will allow the appropriate time for milk let-down. Following unit detachment, the application of an efficacious and proven post-milking teat disinfectant should be applied with coverage over at least 2/3 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**, are effective at reducing the bacterial load in the bedding. However, the activity of these products is short lived, and thus, frequent application is required. It is recommended that 2 lb 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 thus 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 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 and are at an increased risk for mastitis in the early dry period. 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. Thus, **intramammary antibiotic treatment is not a generally recommended practice for local infections**. However, in some cases, *Klebsiella* infections can become systemic, in which case, antibiotic treatment and supportive therapy are required. In recent years, there has been a 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 a focus on treatment.

### **Quick Notes**

- *Klebsiella* spp. are environmental organisms found commonly 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 *Klebsiella* spp.
- Proper milking procedures, including pre and post dip applications are extremely important in the prevention of these infections
- Use of antibiotics in local *Klebsiella* infections is not recommended

This project is supported by Agriculture and Food Research Initiative Competitive Grant no. 2013-68004-20424 from the USDA National Institute of Food and Agriculture.