

## Overview

Klebsiella is the second most common Gram-negative pathogen in clinical mastitis cases.

Spp: *k. oxytoca* and *k. pneumoniae*  
Both bacteria are easily destroyed by pasteurization.

## Diagnosis

Klebsiella cannot be diagnosed based on looking at symptoms in the cow. Milk must be collected from the infected quarter and cultured in a laboratory.

Klebsiella is often considered to cause only severe mastitis. Not true. About a third of the cases are mild (abnormal milk), a third are moderate (abnormal milk + swollen quarters) and a third are severe (systemic signs).

## Klebsiella vs E. coli

Similar to E. coli, Klebsiella is part of the coliform family. Both pathogens have the same endotoxin mechanism that causes severe symptoms. When an infection occurs in the mammary gland, the cow's immune system identifies the infection, sends white blood cells and other mediators to destroy it, and in the process endotoxins are released from the Gram-negative cell wall of the bacteria into the bloodstream. If there are enough bacteria present in the infected gland, the cow becomes sick.

However, unlike E. coli, Klebsiella allows the bacteria to deeply invade the secretory tissue of the udder—which means when systemic signs are visible in a cow, in most instances, this clinical case is the end stage of a persistent, long-term subclinical infection.

## Effect on Milk

### Production

As the Klebsiella pathogen deeply penetrates into intramammary tissue it destroys secretory cells, and therefore, has a long-term effect on milk production. Often, production never recovers to a normal level in the infected cow. On average, a ten pound reduction in daily milk yield persists across the rest of the lactation.

### Sources

Identifying the environmental sources and potential contagious transmissions are important in order to control the Klebsiella pathogen.

Klebsiella can be found in:

1. The feces of infected cows
2. Bedding, especially in wood by-products
3. Dirty udders

Klebsiella can also be shed in the milk of subclinically-infected cows and transmitted from cow to cow at milking time.

### Control

The critical control point is to reduce teat end exposure to potential sources of the Klebsiella bacteria.

1. Identify cows with subclinical infections to reduce transmission. Begin an on farm culturing program to identify cows early.
2. Implement effective milking procedures (pre- and post-milking teat disinfection) to improve udder hygiene.
3. Segregate chronically infected cows, milk them last and cull when necessary.
4. Evaluate types and usage of bedding.
5. Finally, use of the J-5 core antigen vaccine is recommended to reduce severity and limit infections.

## Treatment

### Mild and Moderate Cases

After a culture test indicates a positive case of Klebsiella, look at the cow's history of somatic cell counts. If the case has been preceded by one or more months of a SCC greater than 200,000 cells/mL or the cow has had proven cases of clinical mastitis in the past, then antimicrobial treatment is needed.

However, in the U.S. there are no intramammary products that are specifically labeled for Klebsiella infections. When an intramammary product is used to treat Klebsiella, it becomes an 'extra label usage' and must be supervised by a veterinarian.

### Severe Cases

Systemic signs of severe cases of Klebsiella include:

1. Fever
2. Off feed
3. Decreased milk production
4. In shock, recumbent, or close to death

In all of these instances, the cow needs to receive systemic treatment to ensure the bacteria does not spread throughout her body. Treatment includes:

1. Fluids to support her cardiovascular system
2. Anti-inflammatories
3. Systemic antimicrobial therapy

A treatment protocol should be developed with a veterinarian.

For more information  
[milkquality.wisc.edu](http://milkquality.wisc.edu)

