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Klebsiella spp Mastitis

Klebsiella spp. are Gram negative bacteria similar to Escherichia coli. The bacteria are considered to be an opportunistic environmental mastitis pathogen. Soil, bedding, faeces and vegetable matter are the likely source of infection. Infected cow's shed large number of the bacteria in the faeces. It should be noted that some bedding materials, in-particular wood-based by products (such as sawdust) and recycled-manure, have been associated with high bacterial loads.

High moisture environmental conditions can allow the bacteria to persist for a long time. Infection is usually transmitted between milking's (generally not transmitted in the milking shed), however wet teats and poor hygiene during milking can also predispose to infections.

The *Klebsiella* bacteria penetrate the teat by propulsion, the bacteria do not colonise the teat orifice. Once it has entered into the udder the organisms proliferate rapidly, also increasing the number of inflammatory cells in the udder. These inflammatory cells kill the bacteria but in doing so, there is a mass release of lipopolysaccharide endotoxins (toxins). This process weakens the blood- milk barrier through increases vascular permeability and the endotoxins spread to the blood of the affected cow.

Due to the swift ability of the inflammatory cells to enter the udder (usually within 6-12 hours post infection) and therefore kill the invading bacteria, infections are usually brief. This means that clinical signs seen in the cow are not due to the *klebsiella* bacteria, they are due to the cow's inflammatory response and the endotoxins produced when the bacteria are killed (Bacterial number often significantly declined before clinical signs are seen). Severe toxaemia **(peracute coliform mastitis)** is a common presentation with *Klebsiella* mastitis (often more severe than *E.coli* mastitis).

This type of mastitis is unique in the fact that *Klebsiella* bacteria can invade deeply into the udder tissue and damage the secretory capacity of the gland. This means that some *Klebsiella* infections can become chronic and affected cows can experience long-term reduction in milk production.

The spontaneous cure rate for *Klebsiella* mastitis is less than that of other coliforms (estimated around 35%), and dairy producers may find it difficult to deal with these cases. With treatment, cure rates may only be as high as 50%. Examination of the SCC history of cows known to be infected with Klebsiella mastitis to determine whether treatment is warranted. Previous months with a SCC over 200,000 are likely evidence of a chronic infection.

The most appropriate antimicrobial treatment combination would be:

- Intramammary Cepravin LC*
- Intramuscular Tribactral.

*There is a greater risk of oxytetracycline resistance

General treatment protocols for *Klebsiella* mastitis infections:

Mild mastitis -Clots or wateriness that persists for more than 3 squirts of milk

- No intramammary or intramuscular antibiotics
- +/- anti-inflammatories

Moderate mastitis- Changes in the milk and/or a swollen quarter that is hard and warm to the touch (often painful)

- No intramammary or intramuscular antibiotics
- Anti-inflammatories

Severe mastitis- Changes in milk and/or swollen quarter, visibility unwell (reluctant to walk or is down) and a degree of dehydration (sunken eyed). These cows have a bacteraemia/ toxaemia (***Veterinary attention required***).

- Intravenous antibiotics
- Intravenous anti-inflammatory
- Intravenous fluid therapy
- Intramammary treatment
- Oxytocin in the muscle to aid in the cow letting down her milk
- Stripping the quarters out
- Down cow management- deep bedding, frequent rolling from side to side, lifting twice daily for 20 minutes (if she is willing to stand when lifted) and offering clean water and feed.

Control

- It is important to identify and manage cows infected with *Klebsiella*, since these cows may become chronic and subclinical carries, and therefore a potential reservoir of infection in the herd. Chronically infected cows should be separated, milked last and culled.
- Applying bedding conditioners, such as hydrated lime, is an effective method for reducing the bacterial load in the bedding.
- Avoiding the use of sawdust and recycled manure bedding if possible.
- The teat end of cows should be protected from dirt and manure by maintaining a clean, dry environment.
- Calve cows down in clean, grassed paddocks or dry bedding pens with no surface water.
- Milking dry clean teats – if washing is required best to dry with paper towel before cups put on.
- Appropriate teat disinfection- cover all 4 teats of all cows after each milking.
- Using internal teat sealant and an intramammary antibiotic at dry off (important to reduce mastitis post dry off).
- Ensure cows diet had adequate selenium being offered- this in important for the cow's immune system.

Reference material

Kleinhenz, M. D., Ydstie, J. A., & Gorden, P. (2019). Case report: Management of Klebsiella spp mastitis on a dairy farm. The Bovine Practitioner, 19-26.

Parkinson, T. J., Vermunt, J. J., & Malmo, J. (2019). Diseases of cattle in Australasia: a comprehensive textbook. New Zealand Veterinary Association Foundation for Continuing Education.

Petersson-Wolfe C, Mullarky I, & Currin J, 2019. Klebsiella spp.—A Practical Summary for Controlling Mastitis. Accessed 2nd July 2021, from: file:///C:/Downloads/4275-Article%20Text-4973-1-10-20200127.pdf

Pinzon el al. 2011. Decision tree analysis of treatment strategies for mild and moderate cases of clinical mastitis occurring in early lactation. J. Dairy Sci. 94(4):1873-1892

Saini, V., McClure, J. T., Léger, D., Keefe, G. P., Scholl, D. T., Morck, D. W., & Barkema, H. W. (2012). Antimicrobial resistance profiles of common mastitis pathogens on Canadian dairy farms. Journal of dairy science, 95(8), 4319-4332.

University of Minnesota College of Veterinary Medicine, 2014, Mastitis Pathogen Factsheet #2 Klebsiella Mastitis. Accessed 2nd July 2021, from: https://www.vdl.umn.edu/sites/vdl.umn.edu/files/klebsiella-mastitis.pdf