Other Gram-negatives: Serratia, Pseudomonas, Raoultella, Pastuerella

These Gram-negative organisms uncommonly cause mastitis, but when they do occur more frequently in a herd certain risk factors should be considered.

**Serratia**

*Serratia marcescens* is the most common *Serratia* species isolated from cases of bovine mastitis and is ubiquitous in the environment of dairy cows. While *Klebsiella* infections are typically more severe than *E. coli* infections, *Serratia* infections are typically less severe. Intramammary infections may be clinical or subclinical, but chronic, subclinical infection is more common than with some of the other Gram-negative pathogens. Experimental infection with *Serratia* showed a less robust immune response, and this may explain how these infections become chronic. Typically only one or a few cases may occur in a particular herd, however, chlorhexidine teat dip contaminated with *Serratia* was implicated in a multi-herd outbreak in New York. Infections are generally mild and associated with an increase in SCC, but no significant decrease in milk production. *Serratia* is resistant to most antimicrobials.

**Pseudomonas**

*Pseudomonas aeruginosa* is ubiquitous in the environment of dairy cows but rarely causes mastitis infection. Contaminated water sources, teat dips and intramammary infusion products or equipment have been implicated in causing outbreaks associated with Pseudomonas. Poor environmental hygiene, including the formation of biofilms in the milking parlor may also be a significant risk factor. The characteristics of infection are a result of the infective dose of *Pseudomonas* – repeated exposure to small numbers of bacteria (such as in contaminated water) is more likely to result in chronic, subclinical infection, whereas exposure to a large number of bacteria is more likely to result in severe clinical cases. In rare instances, *Pseudomonas* infection may result in systemic illness and death. *Pseudomonas* is resistant to antibiotics and therefore chronically infected cows should be managed separately or culled. In outbreaks, test water sources used in the milking parlor and teat dips, identify environmental water sources that udders may be exposed to, and review intramammary infusion technique.

**Raoultella**

These are a recently identified group of bacteria formerly classified as *Klebsiella* species. In one study, *Klebsiella* were most commonly isolated from rumen contents, feces and alleys, whereas *Raoultella* was more frequently isolated from soil and feed crops.

**Pastuerella**

*Pastuerella* species are found primarily in the upper respiratory tract of birds and mammals. Intramammary infection is rare and not well characterized, but is thought to be spread cow-to-cow or possibly hematogenously in cows with respiratory infection. Like other Gram-negatives, *Pastuerella* may cause severe mastitis, occasionally resulting in agalactiae or death. Treatment is often unsuccessful despite in vitro sensitivity to many antimicrobials.

References