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## Coliform/Gram-negative Bacteria

### Background

*E. coli* and other coliform species, such as *Klebsiella*, *Enterobacter*, and *Serratia*, are gram negative bacteria found in the environment.

### Source and Transmission

Coliforms are normally found in feces, soil, organic matter, and water. They often infect from fecal contamination of bedding and/or milking equipment. These bacteria will cause mastitis when they invade the udder through the teat end and travel into the mammary gland where they multiply quickly. The number of cases of coliform mastitis seems to increase during hot and humid conditions and early in lactation. Coliform mastitis is estimated to be as high as 70% of severe mastitis cases, and as high as 40% of mastitis cases in well managed herds.

### Disease

These gram negative bacteria release endotoxin when they are engulfed by a white blood cell which can cause fever, decreased appetite, weight loss, a decrease in milk production and exacerbate the inflammatory response. Coliform mastitis will lead to inflammation of the mammary glands and damage of the mammary epithelial cells. An increase in vascular permeability in the mammary gland can also result in watery or serous milk.

### Clinical Signs

- Watery with clots to serous milk (usually only one quarter is infected)
- Hot, hard or swollen quarter
- Decreased production
- Fever
- Depression
- Anorexia
- Dehydration
- Weight loss
- Decreased rumen contractility
- Diarrhea

- Recumbency
- Death

## **Treatment**

Mild to moderate clinical cases are often able to be cured by the cows immune system alone (it is common to get no growth on the culture because of this). Therefore, antimicrobial treatment of some coliform mastitis cases is not necessary and often ineffective. Cases in which antimicrobial treatment is warranted for coliform mastitis is *Klebsiella sp.*, as the cow is less successful at curing these infections. Cows suffering from chronic or recurrent infections will also benefit from antimicrobial treatment. Severe cases of coliform mastitis should be treated systemically. Systemic treatment should aim to control fever and restore fluid losses. IV or oral fluids, anti-inflammatories, steroids and systemic antimicrobials will be beneficial.

## **Prevention and Control**

Since coliform bacteria are spread by fecal contamination, the most important preventative measure is good hygiene. Prompt removal of feces and fecal contaminated bedding from stalls and walk ways at least 2-3 times per day, sanitary milking procedures and overall cleanliness cannot be over emphasized. Milking clean, dry teats will prevent contamination of the teat ends. Maintenance of the milking machine is vital in controlling the vacuum of the machine to prevent reverse jetting of contaminated milk into the mammary gland. Pre- and post-milking dipping will disinfect the teat and has proven to decrease coliform infections.

Cows most susceptible to infection are in early lactation (2 weeks before calving, peaking at calving, and decreasing throughout the lactation) and in the 2 weeks after dry-off. Be sure to maintain clean, dry stalls during this critical time period. A dry-off teat sealant is often beneficial at preventing infections during the dry-off period.

Vaccination with an *E. coli* bacterin product is beneficial at limiting the clinical signs associated with coliform infections. However, be advised that it will not prevent new infections from occurring.

## **References**

J Hagan, R Gonzalez, R Harmon, S Nickerson, S Oliver, J Pankey, and K Smith. Laboratory Field Handbook of Bovine Mastitis. National Mastitis Council, Inc. Revised 1999.

Using Bulk tank Milk Cultures in a Dairy Practice. National Mastitis Council, Inc.