

## NON-NUTRITIONAL CAUSES OF DIARRHEA IN ADULT DAIRY CATTLE

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There are several important infectious causes of diarrhea in adult dairy cattle with salmonellosis being most important. In my opinion, salmonellosis is the most important infectious disease of adult dairy cattle, regardless of clinical signs! The number of herds with *Salmonella* spp. infected cattle is estimated to be as high as 40% (CEAH and NAHMS, 2009). Among infected cattle, clinical disease (diarrhea) can range from 0% to nearly 100% (epidemic) (Van Kessel et al., 2007). Epidemics usually occur when a new *Salmonella* serovar (often introduced from a newly purchased cow or from a feed source) is introduced into the herd. These epidemics may have a significant mortality, although most cows in the herd recover with supportive care within two weeks. Most recovered cows shed the organism in the manure in large numbers for three to four weeks and some become more chronic shedders. Farms that are endemically infected with a particular serovar may have sporadic diarrhea cases, often in periparturient cows or in cows with other medical conditions. A heavily contaminated maternity pen frequently serves as the source of infection for both cow and calf, and the stress of calving, early lactation, and other medical disorders enhance colonization of the pathogen in the intestinal tract resulting in clinical disease. Metritis is one of several clinical disorders (abomasal displacements, hepatic lipidosis) that seemingly predispose cows to salmonellosis (Cummings et al., 2010). Prevalence of *Salmonella enteritis* serovar(serotypes) in New York have changed over the past 30 years with *Salmonella typhimurium* most prevalent in the 1980s, followed by *Salmonella newport*, and currently *Salmonella cerro* being the most common serovar (Cummings et al., 2013; Cummings, et al., 2009). In my experience, *Salmonella cerro* seems to be less likely to produce severe clinical disease than the previous common serovars. *Salmonella dublin* is not common in adult dairy cows in the Northeast but it is a major concern because of its ability to invade internal organs, cause abortion, and prolonged shedding in milk (Nielsen et al., 2004).

Treatment of salmonellosis in adult dairy cattle is mostly supportive: predominantly fluid therapy when needed, transfaunation, B vitamin injections, and limited treatment with flunixin meglumine to combat fever and endotoxemia and improve appetite. I recommend using a lower-than-label dose (0.5 mg/kg) of flunixin meglumine as normal doses will have adverse effects on intestinal repair. Weak cows should be separated from the herd and housed on good "footing".

Cows with clinical disease are shedding heavily and the liquid consistency of the diarrhea will also enhance environmental contamination and spread to other cattle. Isolation of the diseased cow should occur and farm biosecurity enhanced when there is a clinical case on the farm.

Although a sporadic cause of diarrhea in adult dairy cattle, Johne's disease (*Mycobacterium avium paratuberculosis* [MAT]) is an important disease because the presence of a single clinical case on the farm is the "tip of the iceberg", suggesting the likelihood of many cows being infected. Subclinically infected cattle are associated with decreased productivity and early culling causing significant economic loss to the farm (Nielsen et al., 2004; Pillars et al., 2009; Ott et al., 1999). Clinically affected cows and nondiarrheic cows that are heavy fecal shedders should be quickly culled from the herd. The mean age for both the clinical case and nondiarrheic heavy shedders is similar, 49-50 months of age (Espejo et al., 2012). There is no approved treatment for cows with Johne's disease and previously used treatments that improved clinical disease did not stop fecal shedding. Management should be focused on early identification and elimination of heavy shedders and preventing exposure of young calves to the organism (Sweeney et al., 2012).

Coronavirus is the cause of winter dysentery in cows and this diagnosis should be considered with seasonal outbreaks of diarrhea in adult dairy cattle, especially when *Salmonella* is ruled out by culture. The manure can be hemorrhagic and may appear similar to outbreaks of *Salmonella typhimurium*. Winter dysentery morbidity is high but mortality is low, with affected cows recovering in four to six days and herd illness lasting 10 to 17 days. Although there is no proven genomic difference in the bovine coronavirus that causes winter dysentery versus coronavirus that causes calf diarrhea or pneumonia (Bidokkhti et al., 2012), our assumption is that it might be caused by a mutation or different strain. There is some evidence it may be introduced into a herd by the purchase of calves that are infected (Bidokkhti et al., 2012). Epidural analgesia may be needed for some cattle with either winter dysentery or *Salmonella* to prevent excessive straining (tenesmus).

Bovine viral diarrhea (BVD) is a rare cause of diarrhea in adult dairy cattle because of improved methods of detecting and eliminating persistently infected calves and good vaccination programs. Outbreaks may still occur in herds that are not vigilant in the above control methods or in herds that bring BVD (especially type 1b or 2) infected cows into the herd (Friedgut et al., 2011). In those situations, disease in recently fresh cows appears most common (Laureyns et al., 2011).

Malignant catarrhal fever (MCF), a gamma herpesvirus, has on rare occasion caused diarrhea in cows that have exposure to sheep (i.e., at a livestock fair) (Moore et al., 2010). Sheep can be inapparent carriers of the virus, spreading infection to cattle who are susceptible to clinical disease. Mortality rates vary among outbreaks, often depending upon if the disease is limited to the intestinal tract or if the nervous system is also involved.

Other organ system disorders (e.g., mastitis, metritis, peritonitis) may cause diarrhea in cattle due to generalized toxemia and the toxins (eg. endotoxin) effects on intestinal motility. Coliform mastitis and peritonitis (especially diffuse peritonitis) cause low volume, fetid diarrhea (Hill et al., 1979). This is generally considered a guarded-to-poor prognostic finding. *Staphylococcus aureus* toxin mastitis and associated exotoxins may

even cause diarrhea with “flecks” of blood. Treatment should be focused on the primary disease. Fecal culture should be performed on the cows as the primary illness may also predispose to salmonellosis.

Cows with bleeding abomasal ulcers may have low-volume diarrhea and treatment focus on the abomasal ulcers.

Two noninfectious, infiltrative disorders that are rare causes of diarrhea in adult cows are amyloidosis in older cows (>4 years) and eosinophilic inflammatory bowel disease (Johnson et al., 1984; Cebra et al., 1998). There is no proven treatment for amyloidosis but corticosteroids may be effective in treating eosinophilic enteritis.

Bovine lymphosarcoma and abdominal fat necrosis (more common in older jersey cattle) may cause diffuse pathology of the bowel and result in diarrhea.

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