

Prevention and control of *Salmonella* in dairy cattle

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■ Take Home Messages

- Salmonellosis is an important cause of disease in cattle and in humans, and is a major public health concern.
- In the last decade in Canada, the emergence of *Salmonella* Dublin has become a major concern for the dairy cattle industry.
- To help prevent and control *Salmonella* infections in cattle, the exposure to the bacteria needs to be minimized and the disease resistance needs to be maximized.
- In recent years, a significant proportion of the *Salmonella* strains that have been isolated were resistant to one or more antibiotics, particularly for *Salmonella* Dublin and *Salmonella* Typhimurium. Antimicrobial resistance is a major concern for animal health and public health.

■ *Salmonella* in Dairy Cattle

Salmonellosis is an infection caused by a bacteria called *Salmonella*. It affects most animal species and humans and is a major public health concern. There are more than 2,500 serotypes of *Salmonella*, but only a few of them are of clinical importance in cattle. In North America, the most frequently isolated *Salmonella* serotypes in cattle include Dublin, Cerro, Newport, Montevideo, Kentucky, Typhimurium and Muenster. Some of these serotypes, most notably Dublin and Typhimurium, are more virulent than others and will cause more severe clinical disease. The United States Department of Agriculture's National Animal Health Monitoring System Dairy 2007 study estimated that 40% of the dairy cattle herds had at least one cow positive for *Salmonella* on a fecal culture and that 14% of the cows sampled were positive.

As for many other enteric diseases, the usual route of infection is fecal-oral. In dairy cows, infection generally occurs when they ingest feed or water contaminated by feces. *Salmonella* may be introduced in a herd from purchasing infected cattle or contaminated feed. Birds and rodents are also sometimes identified as a source of introduction. When cattle are infected with *Salmonella*, the infections can range from subclinical to systemic. Clinically affected adult cows and calves will generally present with diarrhea, and sometimes with blood, fever, dehydration, and depression. In some instances, particularly in calves, when the bacteria enter the blood stream and cause a bacteremia, they can infect organs other than the intestinal tract and cause other clinical problems such as septicemia, pneumonia, arthritis, and meningitis. In adult cows, it can also cause abortions. More information on *Salmonella* in dairy cows can be found in Holschbach and Peek (2018).

For cattle with salmonellosis, supportive therapies, such as oral or intravenous electrolytes and fluids, are generally recommended. The use of antibiotics to treat salmonellosis is controversial and antibiotics should only be used when justified. For enteric salmonellosis, antimicrobial therapy is not justified, but it can be when the disease is more severe and systemic.

In the last decade in Canada, the emergence of *Salmonella* Dublin has become a major concern for the dairy cattle industry. When cattle are infected with *Salmonella* Dublin, the bacteria will more often than for other serotypes enter the blood stream and cause a bacteremia, and generally, a more severe clinical

disease. *Salmonella* Typhimurium is another serotype that can sometimes enter the blood stream and cause a systemic disease. The other major concern with *Salmonella* Dublin is that this serotype is host adapted in cattle, which means, in some cases, it can cause a lifelong infection. These chronically infected cattle will become asymptomatic carriers and will shed the bacteria intermittently in their environment. This can be challenging in terms of prevention and control of the disease.

■ **What Can I Do to Protect My Dairy Cattle Herd?**

Cattle with subclinical infections will shed low numbers of bacteria, whereas infected animals that are sick and are presenting clinical signs may excrete higher numbers in their feces. When a calf or adult cow is infected the factors that determine if the animal will become sick and show clinical signs include the virulence of the serotype, the dose of bacteria that the animal is exposed to, and the level of immunity of the animal. In other words, to help prevent and control *Salmonella* infections in cattle, the exposure to the bacteria needs to be minimized and the disease resistance needs to be maximized.

The following are good practices that can be implemented in a dairy cattle herd to minimize the exposure to *Salmonella*:

- ▶ Implement strict biosecurity practices to prevent introduction of *Salmonella* or other pathogens into the herd. These measures should be implemented for employees, visitors, vehicles, and equipment. For employees, biosecurity practices should be implemented when moving between groups of animals or other specific areas like the feed storage, the calving area, or the animal hospital.
- ▶ Place newly introduced animals in isolation or maintain a closed herd.
- ▶ Implement strict hygiene practices. Keeping the pens and alleys clean and dry is particularly important. When possible, clean and disinfect the premises periodically. Clean and disinfect equipment between use.
- ▶ Prevent contamination of feeds and water sources by feces of cattle, rodent, birds, and other animals. Implement a control program for rodents and birds.
- ▶ When a *Salmonella* infection is suspected or confirmed:
 - Place suspected or infected animals in isolation.
 - Clean and disinfect the premises, particularly the area where the infected animals were housed. Clean and disinfect equipment between use.
- ▶ Specifically for *Salmonella* Dublin:
 - Use serologic screening testing before introducing a new calf or cow into the herd. Ensure a negative serologic status from the herd of origin or, if not available, a negative serologic test from the individual animal.
 - Use serologic screening testing to identify asymptomatic carriers.
 - For a cow suspected to be an asymptomatic carrier, separate the newborn calf from the cow as soon as possible following calving and feed the calf with a colostrum replacer.

The following are good practices that can be implemented in a dairy cattle herd to maximize disease resistance:

- ▶ Maintain good general cattle health. Particular attention to the health of late gestation and early lactation animals is critical. The good health of calves is also important because they are more susceptible to severe systemic salmonellosis.
- ▶ Prevent herd stresses. Provide adequate comfort, temperature, animal density and feed.
- ▶ Ensure good colostrum management.
- ▶ Implement a herd vaccination program with the recommended core vaccines.

The implementation of the practices listed above should be discussed with the herd veterinarian.

■ What Can I Do to Help Protect Public Health?

Salmonellosis not only can cause disease in cattle, but also poses a significant zoonotic risk. In other words, this disease can be transmitted by animals to humans. Even though humans can be contaminated following direct contact with an infected animal or its environment, the most probable source of infection for humans is an exposure to contaminated meat or milk. These food-borne risks can be mitigated by proper handling and cooking of the meat and pasteurisation of the milk.

The recent emergence of *Salmonella* Dublin has also become an important concern for public health. As in cattle, the bacteria will more often than for other serotypes enter the blood stream and cause a bacteremia, and generally, a more severe clinical disease in humans.

As mentioned earlier, the use of antibiotics to treat salmonellosis is controversial and should only be used when justified. In recent years, a significant proportion of the *Salmonella* strains that have been isolated were resistant to one or more antibiotics, particularly for *Salmonella* Dublin and *Salmonella* Typhimurium. Antimicrobial resistance is a major concern for animal health and public health.

The following are good practices that can be implemented in a dairy cattle herd to help protect public health:

- Implement the good practices listed above to prevent and control *Salmonella* infections in cattle.
- Prohibit or limit visits of the herd by those most vulnerable to zoonoses, including pregnant women, young children, the elderly, and those with weakened immune systems.
- Implement basic biosecurity practices for employees and visitors:
 - Ensure that they wash their hands with warm water and soap before and after a visit of the herd, particularly after contact with animals and before eating or touching their mouths with their hands.
 - Ensure that they change their boots and clothes before and after a visit of the herd.
- Maintain high standards of milking hygiene. Most of the bulk tank milk where *Salmonella* is isolated is contaminated following indirect contact with contaminated feces during the milking process. When cattle are infected with *Salmonella*, the bacteria are rarely shed directly in the milk. Direct shedding in the milk is more often reported with *Salmonella* Dublin than for other serotypes.
- Consult the herd veterinarian when cattle are suspected or confirmed infected with *Salmonella* before initiating any antimicrobial therapy to ensure that it is justified.

■ References

Holschbach, C.L. and S.F. Peek. 2018. *Salmonella* in dairy cattle. Vet. Clin. North Am. Food Anim. Pract. 34:133-154.





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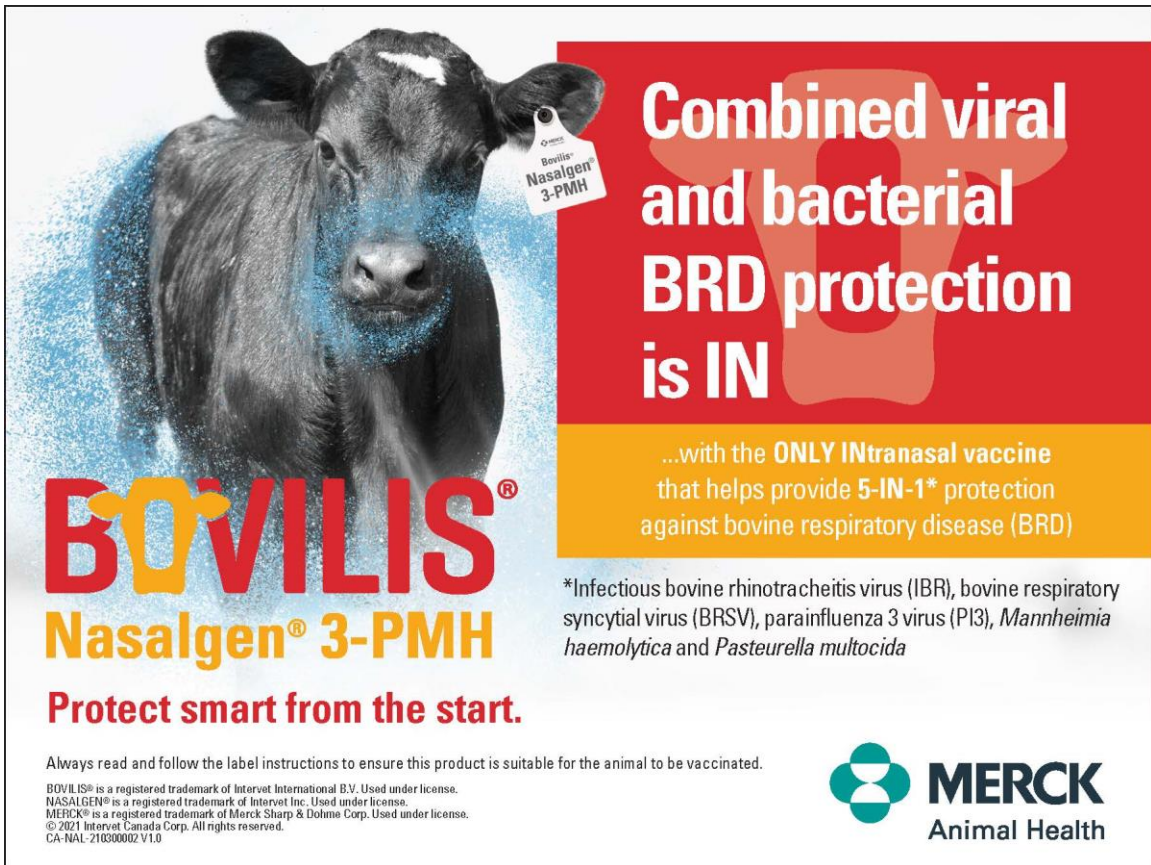
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