

Salmonella Dublin doesn't play by the rules

Angela Rowson for *Progressive Dairy*

AT A GLANCE

Seven steps to take if you suspect your herd might be infected with *S. Dublin*.

Salmonella are very contagious and pathogenic bacteria that can cause high mortality and economic losses in cattle. *Salmonella* Dublin (*S. Dublin*) is a specific kind of salmonella, known as a serotype, that is host-adapted to bovine. It is one of the most common serotypes of salmonella isolated from dairies across the U.S., and its prevalence is increasing.

S. Dublin infections occur when cattle, especially calves, ingest organisms shed by infected animals. These animals can shed the bacteria in their manure, colostrum, milk, nasal discharge, vaginal secretions and saliva. Upon ingestion, *S. Dublin* enters the gastrointestinal tract and quickly spreads to other organs such as the liver, spleen and lymph nodes via the bloodstream.

Outbreaks of *S. Dublin* can be linked to

stressors such as transportation, weaning, poor ventilation/air quality, overcrowding and diet changes. *S. Dublin* organisms are often resistant to most antibiotics commonly used in bovine medicine, making treatment of sick animals very challenging.

Dairy cattle infected with *S. Dublin* may become lifelong, subclinical "carriers" of the bacteria. These carriers remain healthy but shed the bacteria into the dairy farm environment on a continuous or intermittent basis. Carrier animals play a pivotal role in perpetuating *S. Dublin* infections on dairies.

Two common ways *S. Dublin* is introduced into negative herds are purchasing animals from a positive farm (this most often occurs during dairy expansion), and raising heifers off-site where they are commingled with animals from other farms. Like kids passing around germs at kindergarten, calves from *S. Dublin*-positive herds shed the bacteria, thereby infecting heifers from negative herds. When the newly infected animals return to their home farm, they readily spread the bacteria to their herdmates.



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Once *S. Dublin* is present on a dairy, infections are propagated through the continual exposure of newborn and young calves to the bacteria. This most often occurs via *S. Dublin* carriers shedding the bacteria in their manure, colostrum and milk. Key times for transmission are in the calving/maternity pen, through feeding raw colostrum or raw milk, and group housing and feeding of pre-weaned calves. Management strategies that close infection routes to youngstock must be implemented to break the transmission cycle. Preventing new infections and effective sanitation practices are crucial to controlling *S. Dublin*.

Clinical symptoms

Classically, cattle with salmonella infections develop diarrhea. However, *S. Dublin* most often presents as respiratory disease that responds poorly to treatment in young animals. Calves will have an elevated respiratory rate and high fever (104°F to 107°F) and appear depressed and lethargic. They may die suddenly after a very short illness. Two common ages when calves break with *S. Dublin* are young calves approximately 1 to 3 weeks old and post-weaning calves around 2 to 6 months old. Calves that recover are often "poor-doers"

Continued on back



Photo by Walt Cooley.

Salmonella Dublin doesn't play by the rules, cont'd from front

that look unthrifty and have scruffy hair coats.

Illness in adult cows is less common than in calves. Abortion is the most frequently observed clinical symptom in mature animals. It can occur at any stage of pregnancy but is more common during the last trimester.

Diagnosing *S. Dublin*

Unlike other serotypes of salmonella, *S. Dublin* can be difficult to diagnose in live animals because they don't consistently shed the bacteria in their feces. On a sick calf, the most reliable way to diagnose *S. Dublin* is through blood culture. To do this, your veterinarian will aseptically collect a blood sample from the ill animal and immediately place it into specialized media that will be cultured at a veterinary diagnostic laboratory.

If the calf is dead, a necropsy should be performed and tissues collected for analysis. Common findings on post-mortem exam include heavy, wet lungs; a swollen liver and gall bladder; and inflamed intestines with enlarged lymph nodes. Tissue samples from an aborted fetus and placenta as well as vaginal swabs from the dam that aborted can also be cultured for the bacteria.

A commercially available test called an ELISA measures antibodies to *S. Dublin*. It can be used on serum or milk from individual cows or on bulk tank milk samples to determine exposure to the bacteria. Four bulk tank milk samples tested over five to 12 months yields a 95% sensitivity for detecting *S. Dublin* within a herd. Cows that are carriers of *S. Dublin* can be identified if they test positive on three consecutive samples collected over an eight-month period.

Keep people safe from *S. Dublin*

S. Dublin is zoonotic, meaning it can be transmitted from animals to humans. It can cause serious illness in people and has a high risk of hospitalization and death. Thus, it is important not to consume unpasteurized dairy products or undercooked ground beef and to practice proper hand washing after handling or treating sick cattle.

Steps to take if you suspect your herd might be infected with *S. Dublin*

1 Investigate the cause of illness and death in calves and abortions in adult cows.

This includes calves with high fevers and pneumonia that's not responsive to antibiotics, as well as animals that die suddenly. Your veterinarian can perform a post-mortem exam and submit samples to a veterinary diagnostic laboratory for bacteriological culture. Placenta and tissues from aborted calves as well as vaginal swabs from cows that abort should also be tested.

2 Determine your herd's exposure to *S. Dublin*.

Work with your veterinarian to develop a testing strategy that utilizes the commercially available ELISA. Serum or milk from individual animals and/or bulk tank milk samples can be analyzed for antibodies to the bacteria. This test can help determine your herd's *S. Dublin* infection status as well as monitor success in reducing new infections over time.

3 Prioritize maternity pen hygiene and management.

The calving pen is one of the most critical areas on the farm where *S. Dublin* transmission occurs. This is because large numbers of organisms are shed in the manure of carriers at the time of parturition and newborn calves have underdeveloped immune systems that render them highly susceptible to the bacteria. To reduce new infections, the maternity pen should be used only for calvings. No lame or sick cows should be housed in this pen. Avoid overcrowding and remove calves as soon as possible after birth. Completely clean and re-bed pens often.

4 Ensure that excellent colostrum feeding practices are executed.

The most important factors involving colostrum management are the quality and quantity of colostrum fed, the timing of feeding colostrum relative to birth and the cleanliness of the colostrum. Colostrum should be collected from cows within two hours of calving using clean equipment. It should be stored in clean, single-serve containers. Consider heat-treating colostrum to reduce the total bacterial count, including *S. Dublin* organisms. Avoid pooling colostrum as this increases

the risk of spreading *S. Dublin* to multiple animals.


5 Sanitation, sanitation, sanitation!

Excellent cleaning and disinfection protocols are key to preventing new *S. Dublin* infections. Pay particular attention to newborn holding pens, calf transport vehicles, feeding equipment (nipples, bottles, waterers, esophageal feeders), calf pens and livestock trailers. Avoid pressure washing as this can aerosolize *S. Dublin* organisms, which may contaminate the surroundings and infect other calves.

6 Support a healthy gastrointestinal tract and gut microbiome.

Feeding appropriate amounts of pasteurized milk or a high-quality milk replacer at consistent times and temperatures will help maintain calf health and immune function. It is important to support a healthy gastrointestinal tract as disruptions in gut integrity or its microbiome can enhance salmonella colonization. There are a variety of feed additives marketed to help support intestinal health, improve microbiome diversity and facilitate pathogen removal, including during salmonella challenges. Dairy producers should discuss these options with their nutritional consultant and veterinarian.

7 Consider vaccinating your herd against *S. Dublin*.

Both commercially available and custom-made autogenous vaccines are options for *S. Dublin* immunization. Vaccinating adult cows can help protect her and her calf via the transfer of antibodies in her colostrum. Vaccines can also be administered directly to youngstock. Dairy producers should consult their veterinarian to determine if vaccination is right for their farm and to develop appropriate vaccination protocols. 

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 **PROGRESSIVE DAIRY**

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