



Cornell University  
Animal Health Diagnostic Center

P.O. Box 5786  
Ithaca, N.Y. 14852-5786  
t. 607.253.3900  
f. 607.253.3943  
e. diagcenter@cornell.edu  
w. diagcenter.vet.cornell.edu

*Animal Health Advisory*

## **Multi-drug Resistant *Salmonella dublin* in Cattle**

The Animal Health Diagnostic Center at Cornell University has isolated *Salmonella dublin* (Group D) from diagnostic samples submitted from multiple animals of 4 different cattle premises in either New York or Pennsylvania in the last 2 months. They have all shown the same antimicrobial susceptibility profile, being resistant to most antibiotics.

The USDA, APHIS, NVSL, VS laboratories in Ames, Iowa have confirmed that there have been over 287 cases of *S. dublin* disease reported in the USA from September of 2005 until September of 2006. Of those, 39 occurred in cattle in OH, NY, and PA.

It is unknown how and when multi-drug resistant *Salmonella dublin* strains emerged in the northeastern bovine industry, or how widespread they are. Selective pressure applied through non-therapeutic use of antibiotics is one factor suggested for the emergence of resistance in bacteria. Resistance attributes may also be shared between bacteria. At this point, the recent positive isolations at this laboratory have all been from sick calves with a clinical history of pneumonia. The age range of clinical illnesses reported with sample submissions has been from 7 days of age to about 4 months of age, in dairy or veal calves.

It is advised that cattle operations take steps to prevent the introduction and transmission of *Salmonella dublin* and other enteric pathogens. Illness associated with *Salmonella dublin* can be difficult to treat, may be fatal, and the environment, once contaminated, may be difficult to clean up. People, other livestock and companion animal species are also susceptible to infection and could suffer serious illness. Carrier animals can maintain the infection within a herd and may continue to shed organisms contributing to repeat exposure of healthy and sick animals. **Cattle owners and caretakers should be especially alert to cattle illnesses involving fever, diarrhea, abortions, and respiratory signs (especially in calves) including coughing and labored breathing. While pneumonia is not considered to be an unusual illness in cattle populations, all pneumonia associated with a high incidence or mortality rate should be investigated promptly by a veterinarian.** Blood cultures, nasal swabs, transtracheal washes, fecal cultures and other samples from sick animals can be submitted to the Animal Health Diagnostic Center at Cornell for *Salmonella* diagnostic testing and other infectious diseases.

Finally, *Salmonella spp.* **have the potential to infect people and can cause illness and death.** Notify a physician or the local Health Department if any animal caretakers show signs of serious illness, such as fever, delirium, vomiting, diarrhea with or without blood, and abdominal cramping. Individuals with weakened or suppressed immune systems,

pregnant women, and the very young and very old are most susceptible to infection and illness with *Salmonella* spp. **Consumption of raw milk is a high risk practice, especially from herds experiencing a suspected or confirmed outbreak of *Salmonella*.**

The Animal Health Diagnostic Center at Cornell's College of Veterinary Medicine is currently monitoring New York *Salmonella dublin* outbreaks. Veterinarians may consult with our microbiology and extension staff for diagnostic and surveillance advice. Physicians involved with bovine-associated human cases of salmonellosis are also encouraged to speak with our bacteriologists.

### **Background Information**

Salmonellosis is generally a disorder of the gastrointestinal tract. *Salmonella dublin* however, is a cattle host-adapted strain that usually presents as a respiratory illness, primarily in young stock less than 2 months of age (range 1 week to 6 months), although any age animal can be infected. Alternate clinical presentations include septicemia, abortions in pregnant mature cows, and/or diarrhea, especially terminally. As a host-adapted strain, infected, subclinical carriers are important in maintaining infection in a herd with shedding into feces and milk. Some animals may remain lifetime carriers of this infection. Stress resulting from overcrowding, poor air quality, coinfections with other pathogens, poor hygiene, transportation, or dietary inadequacies can result in clinical signs in infected carrier animals or recrudescence of shedding in latently infected animals. Recent introduction of *Salmonella dublin* into a population with no prior exposure might, under the right conditions, result in an explosive outbreak.

In the face of an outbreak of *Salmonella dublin* infection, exceptional calf management procedures must be instituted. These practices include maintaining clean maternity pens, prompt removal of calves from dams, fastidious colostrum management, milk and feed utensil sanitation, promotion of good air quality, and reduction of stress by providing clean, comfortable housing and proper nutrition. Feeding of raw milk should be avoided. Outbreaks of clinical illness in calves, in herds where the infection is apparently endemic, are reported to occur when there are breakdowns in management. Adult cattle susceptibility to clinical salmonellosis may be reduced by maximizing health and immune status. Excellent nutrition and management, especially surrounding the dry cow/fresh cow transition period, are essential to minimize the occurrence of all periparturient health problems.

Disinfection and other biosecurity practices must be utilized in order to prevent the introduction or the spread of this disease. Isolation of all introduced cattle, whether newly purchased or returning to the farm from other premises, allows for the detection of clinical illness prior to commingling with other cattle. In addition, co-mingling into a limited group may detect illness in the newly exposed animals if there is a carrier in the new arrivals, but may also limit the magnitude of spread on the farm. Cattle trailers should be thoroughly cleaned, disinfected and re-bedded prior to transport of healthy animals from different herds. Avoid contact with manure when visiting other facilities, and do not wear the same

clothing and shoes while visiting other facilities that you wear when caring for animals at your home facility. More information regarding salmonellosis and best management practices are outlined in the New York State Cattle Health Assurance Program, a program designed to promote herd health, care, and welfare. For more information regarding this program see the contact information listed at the end of this article.

Environmental cleanup involves the removal of all organic material (bedding, contaminated feed, manure), complete washing down of all surfaces including feed troughs, water buckets/tanks, and equipment with water and a detergent cleaner to remove remaining organic residues, and the application of an appropriate disinfectant for the proper contact time. Disinfectants used to combat *Salmonella* include halogens like dilute chlorine bleach, phenols, quaternary ammonium compounds, and oxidizing agents like Virkon-S. Scrapers, brooms, shovels and manure forks can spread the organism from contaminated areas to previously uncontaminated ones. Cleaned areas should be dried quickly by using fans and exposing the area to sunlight. Pressure washers should be avoided, unless all animals have been removed and the operator wears OSHA-approved respirator protection, as *Salmonella* organisms can be aerosolized and transmitted in this manner. Environmental sampling may be employed to determine the effectiveness of cleaning a contaminated environment.

Few well designed vaccine studies have been published evaluating *Salmonella* vaccines in adult cattle or calves. Published studies involving vaccines on the market in the US are equivocal. Some inactivated *Salmonella dublin* vaccines are available, as well as a newer vaccine which uses a technology that involves the incorporation of purified *Salmonella* newport siderophore receptor and porin proteins. Clinical and field trials have not been performed to evaluate the efficacy of protection in commercial cattle herds with endemic infection or recent introduction of *Salmonella dublin*.

For further information about the New York State Cattle Health Assurance Program (NYSCHAP) administered by the New York State Department of Agriculture and Markets/ Division of Animal Industry, visit the website: <http://nyschap.vet.cornell.edu/> or contact program coordinator Kathy Finnerty: [KDF2@CORNELL.EDU](mailto:KDF2@CORNELL.EDU) or 607-253-3910.