



Northern New York Agriculture Development Program
2019 Project Report

Determining the prevalence of *Salmonella* Dublin and its potential economic impact on Northern New York Dairy Farms.

Project Leaders:

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Collaborators:

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Cooperating Producers:

A total of 27 dairy farms from Jefferson, Lewis, St. Lawrence, Franklin, and Clinton Counties participated in this research project. Participating dairies were notified that their information and farm-specific results would be kept confidential given the sensitive nature of the data, but their herd veterinarian would be given a copy of the results.

Background:

Salmonella Dublin is a host-adapted bacteria that has the ability to greatly impact dairy cattle in the North Country. It generally shows up in young animals, specifically calves 6-8 weeks old, and it usually presents like pneumonia with calves having respiratory symptoms and a fever. In some cases, animals will have diarrhea, but this usually only occurs once the disease has progressed and the animal is critical.

Historically, *Salmonella* Dublin has only been considered a problem in the western states, but over the last few decades it has crept across the country with more outbreaks being reported in the Northeast and Eastern Canada. The Cornell University Animal Health Diagnostic Center has been working to better understand the prevalence and impact of *Salmonella* Dublin across NY state. The current strain of *Salmonella* Dublin was first detected in NY state in 2006. Since then, over 140 cases have been documented on dairy, veal, and beef farms across the state. While the

disease tends to be more prevalent on larger herds, it can show up on herds of all types and sizes. Previous testing has indicated that multiple herds in the North Country are already infected.

Salmonella Dublin is a very challenging disease; it's easily transmitted, hard to treat, and costly. The disease can be spread via fecal-oral, air, saliva and nasal discharge, and through colostrum and raw milk. Seemingly healthy adult cattle can be *Salmonella* Dublin positive and carriers that are actively shedding the disease. Making this disease even more frightening for dairy farmers is its ability to spread between species. Farm workers and family members can also become infected with *Salmonella* Dublin, making them very ill. Once infected, the disease is difficult to treat as it is multi-drug resistant and it's suggested that 75% of the strains are resistant to at least one antibiotic. Lastly, the economic losses as a result of *Salmonella* Dublin can be devastating. Treatment costs, calf losses, abortions, and reduced milk production can add up quickly and one study indicated potential losses of up to \$350 per stall in the first year following infection.

It is important for North Country dairy farmers to be aware of this disease, including its risk factors and challenges, and determine if its present in their herd. The goal of this project was to determine the prevalence of *Salmonella* Dublin on dairy farms in Northern NY, and understand the potential economic impacts it could have for individual farmers in this region.

Selection of Farms:

Dairy farms across the six-county region were contacted in various ways to enroll in this study including: in-person farm visits, phone calls, a newsletter article in the North Country Ag Advisor, through local CCE County staff, and through herd veterinarians. From these methods, a total of 27 dairy farms across five counties were enrolled and agreed to have bulk tank samples taken to test for the prevalence of *Salmonella* Dublin. These herds included both tie stall and freestall dairies, ranging from about 80 to over 3,000 milking cows per herd. While the original goal was to have more participating farms, the project leaders were happy with this group as it included five counties and was a relatively representative sub-set of North Country dairy farms.

Methods:

Herds were enrolled and agreed to participate and have their data shared with their herd veterinarian. Over the course of six months, four separate bulk tank milk samples were taken from each herd. Before each sample was taken, a letter was sent to each farm notifying them of the sampling date. A Quality Milk Production Services Technician then visited each farm to collect the bulk tank sample. All samples were shipped to the Cornell Animal Health Diagnostic Center in Ithaca, NY, for analysis. The test that was performed is an ELISA based test that measures the presence of antibodies to *Salmonella* Dublin in the milk sample. After each round of testing, the participating dairies and their herd veterinarian were sent a copy of their results.

Analysis:

After each round of testing, Quality Milk Production Services was sent a summary of the results indicating whether each participating herd tested positive or negative for the prevalence of *Salmonella* Dublin. After all four samples were taken, the results were compiled using Microsoft Excel. The results were analyzed to show the prevalence of testing positive as well as the frequency of positive tests over the four samples.

Results:

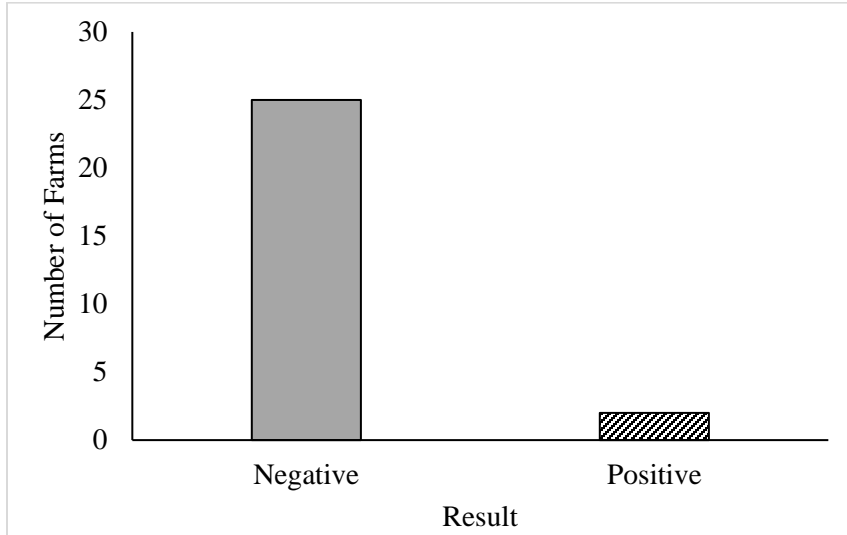


Figure 1. The number of herds testing positive and negative for *Salmonella* Dublin; Prevalence of *Salmonella* Dublin Project, NNYADP 2019-2020.

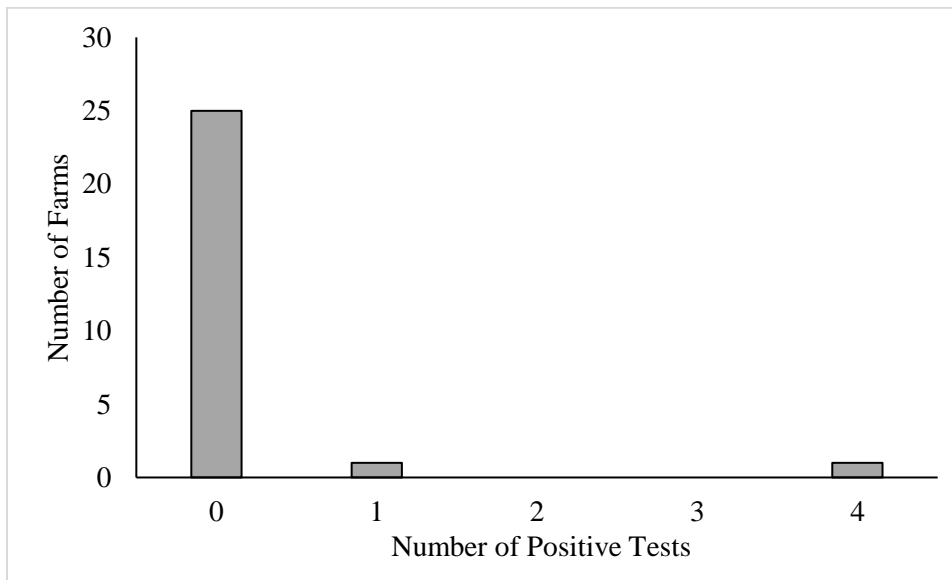


Figure 2. The number of times herds tested positive for *Salmonella* Dublin; Prevalence of *Salmonella* Dublin Project, NNYADP 2019-2020.

Overall, only two of the 27 herds tested positive for *Salmonella* Dublin during the bulk tank sampling. Of these two herds, one tested positive only once (and had three negatives), and the other tested positive in all four bulk tank samples. Both of the herds that tested positive were not surprised as they have tested positive in the past with their own sampling via bulk tank or individual animal blood tests. Also it should be noted that both herds that tested positive reported that they had used a vaccine specific for *Salmonella* Dublin in non-lactating heifers. Due to the fact that the test we used was an antibody detection test, it is possible that the bulk tank positive

test was only picking up vaccine induced antibodies. Unfortunately, there is no easy way to distinguish between antibodies due to natural exposure versus from a vaccine.

Conclusions/Outcomes/Impacts:

The goal of this project was to determine the prevalence of *Salmonella* Dublin on dairy farms in Northern NY and the potential economic losses associated with this disease. The project addressed this objective and, overall, it was promising to see that only 7% of the dairies that participated tested positive for *Salmonella* Dublin. Further, during the course of this project, neither of these two positive herds experienced an outbreak that required additional testing or resources.

While having more than 27 herds participate would have been ideal, the herds that did participate made up a representative sample across five counties in the North Country. Taking bulk tank samples is a relatively simple and cheap way for dairies to continually monitor for *Salmonella* Dublin on their herds. This project reinforces that farms need to take four bulk tank samples to more accurately determine if they have a positive (compared to only doing a one-off sample).

The finding of 7% positive herds in this study is higher than a previous study in NY state by Cummings et al. (2018) that found only 1% positive. However, while the previous study tested all herds in NY (over 4,000), only one bulk tank sample was taken in 2013, which may have only picked up 35% of the actual cases. Another reason for the higher number in the current study is likely due to the further spread of the disease across NY state due to increased herd consolidation and animal and personnel movement between herds. Also as noted above, it is possible that these herds tested positive on this round of bulk tank samples solely due to vaccine-induced antibodies secondary to previous management strategies to deal with an outbreak of *Salmonella* Dublin.

During herd enrollment, several dairies indicated they had never heard of the disease and were unaware of what warning signs to look for and what resources are available. This project was successful in raising awareness with local dairies about *Salmonella* Dublin as well as the risk factors for disease transmission. Also, the outreach efforts helped extend the reach of this project by sharing this information with a larger audience across the North Country. After a presentation during one of the outreach programs, a producer commented, "I'm so glad you presented on *Salmonella* Dublin because it scares me!"

Given that so few herds tested positive, economic impacts in the North Country as a whole are most likely currently minimal. Previous research from Denmark, however, indicates that once the disease becomes more common on herds, the impacts could be devastating. Financial loss can be attributed to both reduced income (reduced milk production and calf death) as well as increased costs (treatment costs, carcass disposal, and abortions). Using modelling to show the outcomes under different scenarios, Nielsen et al. (2013) concluded that the greatest losses would be during the first year after the herd was infected, and the losses could be felt for up to ten years. Further, they indicated that poorly managed herds would see larger economic losses compared to herds that were well managed with a range in gross margin losses from \$50 to \$350 per stall on herds in the first year.

In conclusion, only two herds tested positive to *Salmonella* Dublin, and they are currently working with their management teams and herd veterinarian to manage this challenging disease. While the prevalence is currently low on North Country dairies, continued education and monitoring is needed to help producers better understand and successfully manage *Salmonella* Dublin when it shows up on their herd.

Outreach:

- The results of this project were presented at the following programs:
 - CCE Dairy Day, St. Lawrence/Franklin County, Moira, NY; January 3, 2020.
 - CCE Dairy Day, Lewis County, Lowville, NY; January 22, 2020.
 - CCE Dairy Day, Jefferson County, Watertown, NY; January 24, 2020.
- Each participating farm will receive a project report summarizing the data and their farm-specific data.
- A newsletter article will be published in the March edition of the North Country Ag Advisor Extension newsletter.

Next Steps:

- The project results will be reviewed with each participating farm and to highlight the summarized data and their farm-specific results.
- A newsletter article summarizing the project and results will be published in the North Country Ag Advisor newsletter to ensure more exposure of the information for producer and industry representative across the six-county region.
- An on-going next step will be to continue talking to local producers about *Salmonella* Dublin, and the risk factors and best management practices associated with this disease.

Acknowledgements:

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For More Information:

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