NEWSLETTER

Fall – 2022

Veterinary Diagnostic Laboratory

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IOWA STATE UNIVERSITY
College of Veterinary Medicine

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Veterinary Diagnostic Laboratory
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SALMONELLA SEROTYPING offered at the ISU VDL

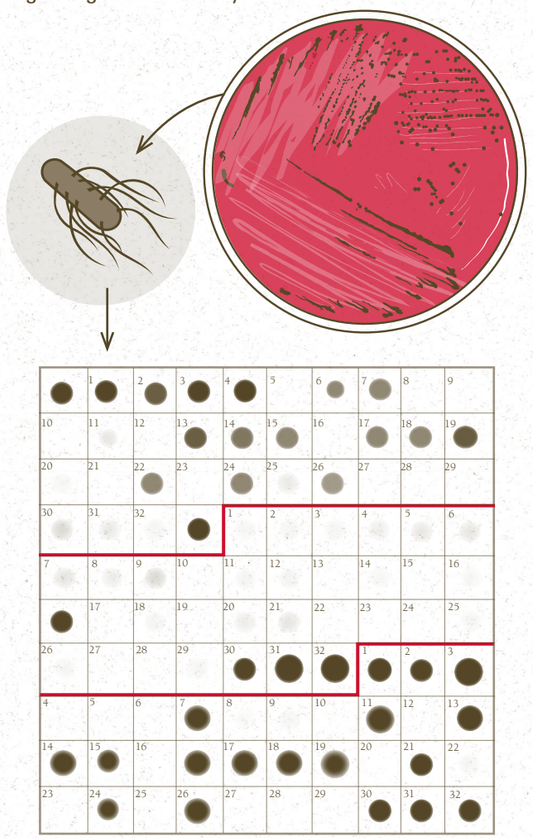
In an effort to improve timeliness of *Salmonella* serotyping, the Iowa State University Veterinary Diagnostic Laboratory (ISU VDL) has implemented the Check&Trace *Salmonella* assay through the molecular diagnostics section. The test is a commercial assay that employs highly specific DNA markers to allow accurate identification of the *Salmonella* serotype when present.

Serotyping (serological typing) is based on the long-standing observation that microorganisms from the same species can differ in the antigenic determinants expressed on the cell surface. Serotyping is one of the classic tools for epidemiological study and is applied to numerous species that express different serotypes such as *Salmonella* spp.

The technology of the Check&Trace *Salmonella* system is based on specific molecular recognition of DNA target sequences and subsequent amplification with universal primers based on a microarray platform. Each position on the microarray represents a specific DNA marker associated with a unique *Salmonella* target sequence.

This innovative method can discriminate over 300 serotypes due to the differences in their DNA sequences. This enables the test to confirm *Salmonella* presence and the serotype with a single test and allows the Check & Trace *Salmonella* assay to significantly decrease serotyping lead times. This is in contrast to previous processes that required submitting *Salmonella* isolates to NVSL and approximately 6 weeks to receive serotyping results.

The Check&Trace *Salmonella* test is only conducted on pure cultures of *Salmonella* spp. that are isolated through routine bacterial culture not clinical samples. **The test is conducted one time per week on Tuesdays with results reported the following day at a cost of $75 per test.** Please call the ISU VDL with questions regarding this new assay.



Katie Woodard
Client Services - Section Leader

I never dreamed I would find myself in the middle of Iowa.

The daughter of two native Louisianans, I grew up south of Houston, Texas. After a successful FFA show pig career, I moved to Baton Rouge to attend LSU (Geaux Tigers!). There I obtained my BS in Animal Science, met my husband, and started working at the LSU College of Veterinary Medicine. After spending several years educating, the students there on equine radiology positioning, restraint, and safety, I decide to attend Veterinary School myself. Always up for an adventure, my husband, our infant daughter, and I relocated to Grenada, West Indies to continue my studies. While there I continued to pursue my interests in swine and food animal medicine, which led me through several summers at various swine practices and ultimately brought me to Iowa. I completed my fourth year of veterinary school at Iowa State University and after much consideration decided to stay on after graduation in 2014.

Since starting at the ISU Veterinary Diagnostic Laboratory, I have transitioned from a post-doctoral student into my role current as the Section Leader of our Client Service teams. It is a unique place within the lab as we are the outward facing section and work on behalf of the client. It is also a rewarding place to be as we are able to assist clients while also bettering the quality of submissions received by the lab. My professional interests focus around the intersection of informational technology and diagnostic data, specifically leveraging IT tools to make the client experience with their data more rewarding.

Since arriving in Iowa, my family has grown by two more kiddos and a beagle. When my husband and I are not attending kids sporting events, I spend my time gardening, hiking, camping, and of course, watching LSU football. **You can move the girl to Iowa, but you can't take away her football allegiance.**

STAFF HIGHLIGHT

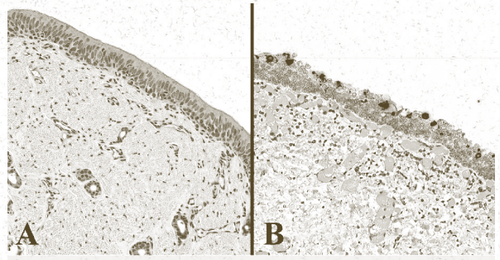
Bovine coronavirus respiratory disease in cattle

Dr. Michael Rahe and Dr. Chris Siepker

"You can observe a lot just by watching."
– Yogi Berra

In early 2019, several diagnosticians from the Iowa State University Veterinary Diagnostic Laboratory (ISU VDL) got together to talk about bovine coronavirus (BCoV). The conversation revolved around the fact that while bovine coronavirus is a well-known cause of enteric disease in calves, it was commonly detected in the lungs of calves with respiratory disease via PCR, and frustratingly, microscopic lesions are often subtle or often obscured by numerous other bacterial agents present in our diagnostic cases. Classically, this virus has been implicated in respiratory disease of the upper and lower respiratory tract. Determined to figure this out, ISU VDL diagnosticians performed a retrospective analysis of 87 bovine respiratory cases where BCoV was detected in the lungs of calves with a low PCR Ct (low Ct = more viral nucleic acid). The idea was that cases with high amounts of virus were more likely to have lesions consistent with BCoV infection. BCoV immunohistochemistry (IHC) was performed to identify BCoV antigen within lung sections (i.e., direct detection). Unfortunately, the lungs evaluated were affected by many other pathogens, with mild epithelial changes observed. Interestingly, many of the cases that were investigated had strong BCoV IHC positivity in necrotic debris within airways. Cue the Yogi Berra quote. To confirm this finding, they attempted another method of detection called *in situ* hybridization (ISH), which specifically targets the viruses' nucleic acid. This affirmed the initial observation; the virus wasn't in the lung tissue but in the cellular debris in the airways. The virus was either being inhaled down into the airways or was being coughed up out of the lung. Since the sections of lung didn't have infected cells in alveoli, the obvious next location to investigate was the trachea. Subsequent evaluation of cases that had included fixed trachea showed that 15 of 21 cases had virus within microscopic lesions in the trachea (Figure 1)[1].

Our investigation also showed that BCoV is rarely diagnosed as the sole pathogen detected in the lung. The most common pathogen detected with BCoV was *H. somni* (76.5%), *P. multocida* (70.4%), *M. bovis* (65.4%), *M. haemolytica* (43.2 %), BRSV (20.2%), BVDV (3.4%), and IBR (1.1%). From 2019-2022, BCoV was the 8th most commonly diagnosed respiratory etiology in the ISU VDL and the second most commonly diagnosed virus (Figure 1). Keeping this data in mind, it is important to recognize that detection does not equal disease and careful evaluation of microscopic changes by your ISU veterinary diagnostician are essential in filtering through these complex lesions to help aid in disease diagnosis. As diagnosticians, we welcome the opportunity to diagnose these clinical cases of bovine respiratory disease and help you work through your herd related issues that may arise.

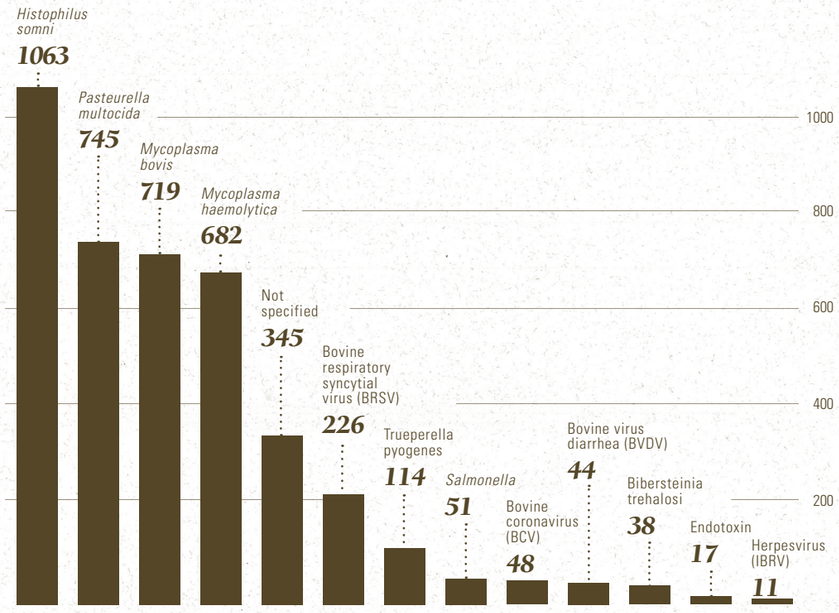


▲ **Figure 1.** A) Normal tracheal mucosa[2]. B) BCoV tracheitis with detection of nucleic acid by ISH[1]

This story is important for the bovine practitioner and diagnostician for two reasons:

1. It highlights the necessity of submitting fresh and fixed trachea in cases of respiratory disease. Often, we, diagnosticians included, get too focused on the lung and forget about the large tube that allows for the transfer of air between the head and the lungs.

▼ **Figure 2.** Detection of respiratory pathogens in bovine respiratory cases submitted to the ISU VDL 2019-2021



ANNOUNCEMENTS:

Upcoming University Holidays:

Thanksgiving — Thursday, November 24th
Friday, November 25th

Christmas — Monday, December 26th

HATS will be closed on Thanksgiving Day, but will be receiving drop-offs until 3pm on Friday, November 25th for PRRS and PEDV/PDCoV/TGEV testing.
HATS will be receiving drop-offs until 12:00 PM on Saturday, November 26th for PRRS testing.

HATS will closed on Christmas Eve and Christmas Day, but will be receiving drop-offs on Monday, December 26th until 3pm for PPRSV and PEDV/PDCoV/TGEV testing.

Beginning Q1 2023, the ISU VDL Newsletter will also be distributed electronically via email.

Bovine coronavirus respiratory disease in cattle (continued)

2. The findings showed that BCoV does cause respiratory disease. Additionally, a recently published BCoV challenge study reproduced respiratory disease (rhinitis and tracheitis) in calves[2]. Clinically, these calves displayed fevers (103≥F°), nasal discharge, and coughing. While clinical disease with BCoV infection is not likely to be as severe as that observed with BRSV or IBR (BoHV-1), BCoV should remain an important differential for calves displaying the previously mentioned clinical signs. Nasal swabs pooled in groups of five and submitted for PCR can be diagnostically useful in these cases.

REFERENCES

1 Saif LJ. Bovine respiratory coronavirus. Vet Clin North Am Food Anim Pract. 2010 Jul;26(2):349-64. doi: 10.1016/j.cvfa.2010.04.005. PMID: 20619189; PMCID: PMC4094360.
2 Rahe MC, et al. Bovine coronavirus in the lower respiratory tract of cattle with respiratory disease. J Vet Diagn Invest 2022;34:482-488.
3 Soules KR, et al. Bovine Coronavirus Infects the Respiratory Tract of Cattle Challenged Intranasally. Front Vet Sci 2022;9:878240.

Questions?
Please contact ISU VDL Client Services
515-294-1950 — isuvdl@iastate.edu