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Animal Health Perspectives

Business as usual (as possible) during COVID-19

By: Dr. Yanyun Huang, CEO and Anatomic Pathologist, PDS

"This will be the last travel of the year", half-jokingly remarked Dr. Betty Althouse, Saskatchewan's Chief Veterinary Officer, during an in-person meeting in Saskatoon in mid-March. During this meeting, Saskatchewan confirmed its first COVID-19 case and Dr. Althouse's prophesy came true as non-essential travel was strongly advised against.

All businesses, including Prairie Diagnostic Services (PDS) Inc., faced unprecedented uncertainties. As the new, inexperienced, anatomic pathologist-turned CEO of PDS, I seriously doubted why I signed up for the job. I had to comfort myself in thinking: "well, at least no one else has had experience or training for this".

PDS was deemed an 'essential service', as were all veterinary practices, and remained open. PDS continued to assist veterinarians and provided high quality diagnostic services during this time, while also protecting the PDS staff from possible COVID-19 exposure. For several weeks, a split shift policy was implemented to reduce the number of employees working at the same time. I am extremely proud that the PDS team were still largely able to meet the turn-around-times we promise our clients.

With the effective measures the government took to control the spread of COVID-19, and the great efforts by our fellow citizens, our curve is heading in the right direction. Now, **I am pleased to say that PDS has resumed regular operation hours and staffing levels. With things getting back to "normal", PDS is still here to be an extension of your practice.**

Although the response to pandemic planning took up a lot of energy, PDS was not, and will not be completely taken by the pandemic and distracted from our vision to be a leader in veterinary diagnostics. We have been actively reaching out to clients and other stakeholders to gather ideas to enrich our testing platform to meet changing needs. More than a handful of test development activities are happening behind the scenes. We are committed to conduct applied research that will directly give back to the industries. We are applying to, conducting and participating in more than 10 applied research projects in areas such as rapid *Salmonella* typing by sequencing, antimicrobial resistance, detection of emerging pathogens, bovine respiratory diseases and bovine diarrhea, just to name a few. Further, PDS, in collaboration with the four western provinces, is leading the development of the Western Canadian Animal Health Network (WeCAHN), which aims to turn individual diagnostic results to surveillance data. The data, in turn, will provide a context to connect laboratories, diagnostic experts, practicing veterinarians, industries, epidemiologists and policy makers for conversations and generation of meaningful intelligence. We believe all these efforts will greatly benefit animal health and One Health.

I wish I could provide more details about all the exciting developments in PDS. I'll save that topic for a future commentary. I am grateful that, at this time, that it is 'business as usual' at PDS. That is because of you…veterinarians, farmers, animal caretakers, who are also working hard during this unprecedented time. We truly are in this together – this, too, shall pass. More than that, we will all come out of this stronger because of our resiliency!

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Clinical Pathology Testing Update:

The PDS Clinical Pathology Laboratory will no longer be performing Osmolality testing. This testing will now be done by Royal University Hospital (RUH) Laboratory.

Sample requirements: Lithium-heparin plasma (preferred sample), serum, miscellaneous fluid and urine; 1 ml minimum requirement.

The cost of osmolality testing is $30.00 plus $12.95 for shipping and handling. The turn-around–time is 3 days.

Neonatal calf diarrhea diagnostics at Prairie Diagnostic Services: lessons learned over the last two decades

By: Musangu Ngeleka (Veterinary Microbiologist) and Dale Godson (Veterinary Immunologist/Virologist), PDS

Neonatal calf diarrhea (NCD) is one of the most common causes of pre-weaning calf morbidity and mortality in both beef and dairy operations. *E. coli*, *C. perfringens*, *Salmonella* spp., rotavirus (RV), bovine coronavirus (BCoV) and *Cryptosporidium* spp. are the common pathogens of NCD. Conventional methods for NCD diagnostics rely on: (i) bacterial culture for *E. coli*, *C. perfringens* and *Salmonella* spp.; (ii) RV and BCoV antigen detection using immunoassays such as fluorescence antibody test (FAT) or immunochromatography; (iii) detection of parasites using fecal flotation. In addition, *E. coli* typing for F5 fimbriae is performed using the slide agglutination test. These procedures were conducted at Prairie Diagnostic Services (PDS) until 2013. A retrospective analysis on approximately 1,500 NCD cases, submitted to the lab from 2000 to 2013, showed a diagnostic success rate (DSR) of approximately 32.7%, as defined by the detection of one of the pathogens mentioned above. Among these, *E. coli* F5 was detected in 4.4% of cases, *Salmonella* spp. (1%); RV and BCoV (22%); *Cryptosporidium* sp. (5.3%). In 2014, we introduced additional diagnostic approaches, which included: (i) PCR for *E. coli* genes encoding virulence factors detection (virotyping) for STa, Stx1, Stx2, F5 and Eae, and for RV and BCoV (ii) FAT for detection of *Cryptosporidium* spp. and *Giardia* spp. Subsequently, the DSR for potential NCD etiologic agents in 250 cases tested in 2014 and 2015 increased to approximately 60%. *E. coli* STa:F5 was detected in 1.8% of cases, *Salmonella* spp. (1.2%), RV and BCoV (28.2%), *Cryptosporidium* spp. (26.2%). In a concurrent pilot study conducted from 2013 to 2016, we tested for the different diarrhea-causing pathogens on fresh intestinal tissues collected from 105 calves with diarrhea and 100 without diarrhea. In addition, histologic examination on related fixed tissues was performed to assess potential pathogen-induced intestinal morphological changes in calves with diarrhea. The intestinal lesions were all observed in calves with diarrhea and were mainly associated with *C. perfringens* (11.4% of cases), *Salmonella* spp. (6.6%), *E. coli* STa:F5 (1%), RV and BCoV (52.4%), *Cryptosporidium* spp. (19.0%) and *Eimeria* spp. (1.9%). This study showed a DSR of approximately 77.5%. *E. coli* was not the major pathogen as commonly suggested; however, RV and BCoV were the most prevalent diarrhea-causing pathogens in calves, but detection of these viruses in some control calves indicates that NCD diagnostics should include advanced microbiology techniques as well as histologic examination for confirmation of infection in some cases.

Figures 1 and 2 show comparison between FAT and PCR testing for, and detection rate of RV and BCoV.

For additional reading materials, please see M. Ngeleka at al. PDS Animal Perspective August 2019, vol 15(3), or Journal of Veterinary Diagnostic Investigation 2019, vol. 31(4) 611-615.

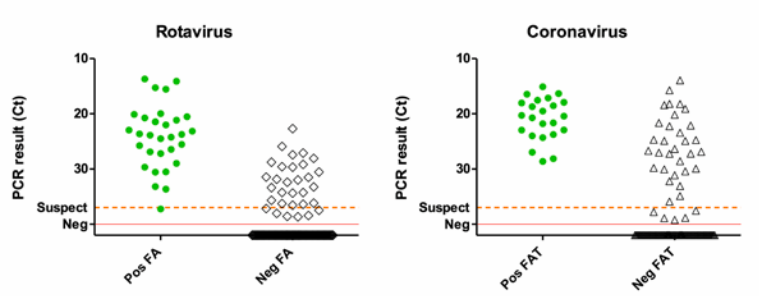


Fig 1 Comparing test methods for viral diarrhea in calves.

Approximately 135 intestinal and fecal samples were tested using both FAT and PCR for the presence of rotavirus and coronavirus in 2014 and 2015. All samples that were positive by FAT were also detected by PCR. All samples that were negative by PCR were also negative by FAT. However, there were some samples that were negative by FAT but were detected by PCR. The additional samples that were detected by PCR tend to have higher Ct values (lower concentration of virus), indicating the PCR test is more sensitive. Since these viruses can sometimes be detected in calves without diarrhea, testing multiple calves improves diagnostic evaluation by providing information on the prevalence of infection and the range of viral shedding in the herd.

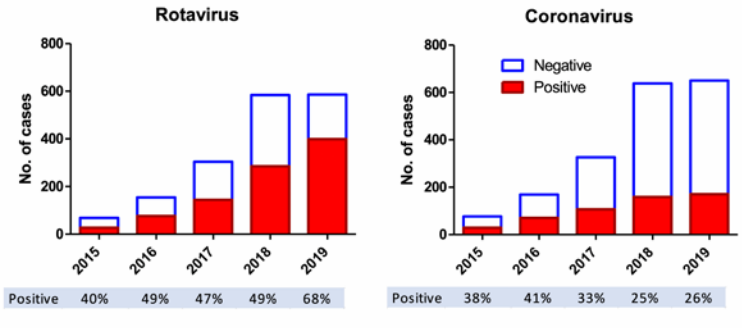


Fig. 2 Trends in calf diarrhea virus testing over the past 5 years.

The PCR tests for rotavirus and coronavirus were developed and validated in 2014/2015 and then offered as a diagnostic test in place of, or complementary to the FAT. In 2017, PDS developed a Bovine Diarrhea Panel, a suite of diagnostic tests for simple and comprehensive assessment of diarrhea cases. The PCR tests were included in the panel, becoming the primary tests for coronavirus and rotavirus. Thus, the number of PCR tests increased in 2018 and was similar in 2019. The frequency of detection of rotavirus tended to be in the 40% to 50% range over most years, but was higher in 2019, while the coronavirus detection rate was a bit lower (25%) over the past two years compared to 30-40% in previous years.

Infectious Laryngotracheitis (ILT) in Small Farm Flocks; Uptick in Saskatchewan Cases in 2020

By; Shelagh Copeland, Veterinary Pathologist, PDS

Images courtesy of Dr. Erin Zachar, Veterinary Pathologist, PDS

Figure1: Dried discharge around eyes, nose and mouth

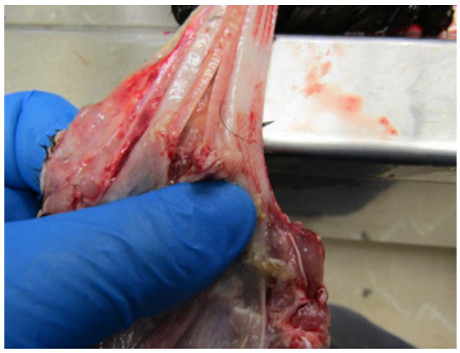


Figure 2: Acute form with hemorrhagic larynx and upper trachea

Figure 3: Subacute form with caseous material in mouth, larynx and upper trachea with wasting

In the first 6 months of 2020, four small farm flocks were found with ILT. From 2014 -2019, the average was one case/year (0-3/year). This is a significant concern as the disease can cause considerable losses from death and decreased egg production. It is a hardy virus and flocks may be infected by contaminated material including shoes, clothing, egg boxes, and used equipment. It is a herpes virus causing latently infected birds, which are also a common source of infection. **If the virus gets into Saskatchewan commercial flocks the infection can be devastating as they do not vaccinate against ILT.**

Chickens, pheasants, and peafowl are susceptible to ILT. At PDS, cases are usually seen in the spring, fall, and early winter. Birds are often 6 months or older though one case involved ~ 3-week-old chicks, which is the youngest usually affected. The virus attacks the upper respiratory tract and conjunctiva. Signs described by owners include sneezing, wheezing, discharge from nose and eyes, mouth breathing, panting, coughing, swollen eyelids (one or both) to swollen heads, bubbly sore eyes, gummed up eyelids, decreased egg production, depression, and death (see Figure 1). Some flocks experienced disease within a week of new birds being introduced while others did not develop the disease until a few to eight months after the introduction of new birds. The source in these cases may be from reactivation in latent carriers or introduction by contaminated material. In one case, the flock had a recurring problem for 4 years. Signs caused by ILT are similar to those caused by Avian Influenza, Newcastle Disease, Infectious Bronchitis, and Wet Pox; necropsy and additional testing are required to confirm the cause.

References describe hemorrhage as a sign in the coughed up exudate but PDS submissions did not describe this. On post mortems at PDS tracheal changes ranged from hemorrhagic membranes (see Figure 2), caseous yellow exudate to mucopurulent material (see Figure 3). In chronic cases, only roughened slightly congested trachea were seen. A few birds with more subtle changes were also tested and found positive for *Mycoplasma synovia* and *gallisepticum*. In chronic cases, the viral inclusions may also not be seen. PDS is nearing validation of a PCR for the virus (*Gallid herpesvirus type 1*; GaHV-1) which is very helpful to confirm the cause, especially in these chronic cases.

To understand where the disease is in the province, **ILT was made an immediately notifiable disease**. When detected in Saskatchewan, one must inform the province's Ministry of Agriculture within 24 hours; this is done by PDS if the birds are submitted to us. The veterinarian is contacted by the Ministry and provided recommendations. The current recommendation is to depopulate the flock by humane euthanasia and to dispose of the birds in a biosecure manner that will not spread the disease. This will help prevent the spread of disease to other flocks. It will also prevent further suffering of affected birds. Slaughter or euthanasia of the birds can be difficult for owners who have them more for pleasure than as a business. The Humane Slaughter Association has a very good article on how to handle and humanely kill animals for consumption (https://www.hsa.org.uk/downloads/publications/hsa-practical-slaughter-of-poultry.pdf. **ILT is not a zoonotic disease and healthy birds can be eaten.** For sick animals or birds not going to be eaten, they can be heavily sedated first by an injection into the breast muscle followed by a lethal drug such as a barbiturate overdose into the heart. For some owners, this may be an option to consider. The premises can be cleaned as described at https://thepoultrysite.com/articles/technical-update-infectious-laryngotracheitis-ilt.

Western Canadian Animal Health Network (WeCAHN) launch: Joint announcement of the Chief Veterinary Officers for Manitoba, Saskatchewan, Alberta, and British Columbia and Prairie Diagnostic Services Inc.

By: Yanyun Huang, Chief Executive Officer and Veterinary Pathologist, PDS (on behalf of the WeCAHN partners)

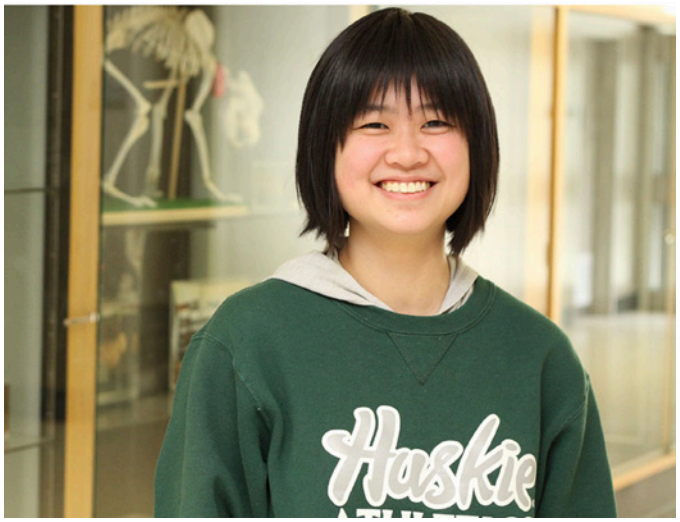
We are pleased to announce the launch of Phase 1 of the development of the Western Canadian Animal Health Network (WeCAHN). This project is a collaboration of the four Western Canadian provinces, in partnership with the Regional Collaborative Partnerships Program, and funding support under the federal Canadian Agricultural Program Framework Agreement. WeCAHN Phase 1 will be facilitated by Prairie Diagnostic Services, which will serve as the project home base and provide administrative and technical oversight of the project.

WeCAHN will coordinate and strengthen sectoral networks to enhance animal health and welfare outcomes, policy, and programs in Western Canada, and will coordinate the efforts and the communication of the existing regional surveillance efforts that are in place. Acting as a counterpart to the Ontario Animal Health Network, Quebec RAIZO, and the proposed Atlantic Animal Health Network, WeCAHN will be an active contributor to the Canadian Animal Health Surveillance System (CAHSS) under the leadership of the National Farmed Animal Health and Welfare Council.

Dr. Barbara Wilhelm has been appointed as a WeCAHN coordinator and will be reaching out to all Western Canadian stakeholders to initiate the network activities. Dr. Wilhelm can be contacted for any questions, suggestions, and additional information at barb.wilhelm@pds.usask.ca.

New Face at PDS

PDS is excited to welcome Mengying Liu to PDS. Mengying finished her veterinary program at the China Agricultural University (BAgr, Vet Med) in 2016. In the summer 2015, Mengying came to WCVM for an internship sponsored by Mitacs in a poultry lab and worked with Dr. Susantha Gomis (Head, Dept of Veterinary Pathology, WCVM). Welcomed by this warm and snowy city, Mengying returned to Dr. Gomis' laboratory right after completing her veterinary studies and started her MSc program on vaccine development against variant Infectious Bursal Disease Virus. Mengying has broad interests from painting to computer programming. In January 2020, Mengying worked part time for PDS as an automation research associate and started working full time after the successful completion of her MSc defence. Mengying is currently working on automation of various workflows in PDS.



READERS' FEEDBACK

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Submit your comments or concerns to Dr. Moira Kerr (email: moira.kerr@pds.usask.ca) and they will be forwarded appropriately.