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Animal Health Perspectives

WHAT'S INSIDE

Assisting the CFIA and AB/SK Ranchers in Bovine TB Outbreak

By: Carl Johnson, CEO, PDS

The reports of tuberculosis positive cattle and quarantined herds in southern Alberta and Saskatchewan has been a prominent news item of late. After the press has moved on, the reality of the situation has hit the ranchers hard, and continues to raise concern for western Canada cattlemen and beef industry. The CFIA has been tirelessly working to determine the extent of exposure, and to manage the labor intensive testing efforts.

Confirmatory TB testing of cattle is not a trivial exercise. Normally this is done in local abattoirs where arrangements are made to harvest lymph nodes and lesions from TB reactors in an efficient manner, followed by proper disposal of carcasses and disinfection of the premises. The facilities and cattle handling equipment are purpose designed; however, even in the best of circumstances this work is still labor intensive and it forces the local abattoirs to stop normal operations to accommodate the needs of the CFIA veterinarians.

The challenge that CFIA faces is when ranches aren't adequately equipped or willing to necropsy or dispose of reactor cattle on-site, and when time and space at abattoirs is limited, if available at all, then where do these cattle go? The short answer is nowhere! The herd stays quarantined until confirmatory testing can be conducted. The costs of carrying these animals for the ranchers while CFIA finds a solution is considerable. As the epidemiologic investigation expands and more screening tests are conducted, more reactor herds have been discovered, adding to the backlog of cattle for confirmatory testing.

To help manage this surge in confirmatory testing, the CFIA investigational team reached out to Prairie Diagnostic Services to help. A combined team of PDS personnel, Western College of Veterinary Medicine faculty, graduate students and staff, all supervised by CFIA veterinarians, participated in a weekend long effort on December 10th and 11th to harvest lymph nodes and search for lesions possibly associated with bovine TB. As a Risk Group 3 pathogen, *Mycobacterium bovis* has zoonotic potential and handling cattle that have turned up positive skin and blood screening tests requires certain personal protection precautions and following strict disposal and disinfection protocols.

Thanks to an amazing team effort internally, and great outside support in getting euthanized cattle to PDS as well as carcasses removed and disposed of in an efficient manner, the weekend campaign successfully necropsied and sampled 49 head of mature cattle. The process was slower due to some inexperience and having to search for lymph nodes in lateral recumbency rather than from a rail. Clean-up and disinfection went on long after the last cow was finished. Aside from the general exhaustion, sacrificing of holiday shopping and parties, and a few sore muscles on Monday experienced by most of us, the mission was accomplished and we're all back into our normal work routines.

So what did we accomplish? First, we helped CFIA significantly reduce the backlog in testing and helped ranchers in AB and SK get answers sooner and reduce their feed costs by getting cattle off the quarantined ranches. Second, we demonstrated to CFIA that in

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How efficient is that!

By: Lois Ridgway (Assistant Quality Assurance Officer and Area Supervisor, Necropsy, PDS) and Brian Zwaan (Senior Manager, Client Services and Customer Relation, PDS)

Imagine the Queen Elizabeth 2 cruise ship. Prairie Diagnostic Services (PDS) processes 264 tons of biological material annually. That is more than twice the mass of the QE2 in biological waste! Now consider the biosecurity hazard to the general public if this small mountain of waste was not efficiently processed. PDS's owners, the Province of Saskatchewan and the University of Saskatchewan have tasked PDS with the efficient operations of two digesters and processing the 264 tons of biological material that comes through our laboratory annually.

It is this efficiency of processing biological material that surprises many of our veterinary clients. Remains are gone 4-24 hours after being received! 98% of our biological material is primarily processed through "Aquamation" and secondarily with Saskatoon Processing or Lorass. The 2% that goes to cremation, gets lost in the sheer volume of material that is processed conventionally. The "Release of Remains" form is critical if PDS is to help you provide compassionate handling of a loved ones' remains for your clients.

Identifying a release of remains request on the submission form and filling out the "Release of Remains" form available at www.pdsinc.ca is the most important instruction PDS requires from our Veterinary clients looking to return a loved companion's remains to its owner. Once this Alert is in place, PDS will provide an isolated necropsy to minimize possible contamination from Risk Group 3 pathogens that may be present in our Containment Level 2 facility. When an animal's remains are determined

to be free of RG3 pathogens, PDS will prepare the remains in an appropriate container for shipping to our subcontractor, Family Pet Crematorium Service, for cremation. The cremation services offered are separate from PDS services and contact by pet owner to the cremation facility is required for those final details. It is important for veterinarians to note that "Release of Remains or specimens from the Necropsy Facility" form indicates that although the form is completed there is no guarantee pet remains will be released for cremation. Necropsy findings and facility contamination may contraindicate this request. Primary processing of biological waste from WCVM/PDS and all other U of S affiliated generators of animal related biohazardous waste is through two tissue digesters that utilize patented Alkaline Hydrolysis Technology ® or Aquamation, for sterilizing and digesting biological and pathological materials. This waste decontamination process, is the "default" option utilized for all animal remains entering the PDS necropsy facility.

Aquamation with alkaline hydrolysis technology uses 90% less energy than conventional incineration and puts no greenhouse gases into the environment. Further value of alkaline hydrolysis technology is that it is approved by the CFIA to destroy Prion proteins (BSE / CWD) and all Risk Group 3 pathogens. To meet prion destruction requirements, the vessels are pressurized and use a thermo-chemical process to digest the pathological materials. The digesters are governed by customized computer software and a series of probes and load cells that ensure a **minimum temperature of 150° C is achieved and maintained for 3 hours at a vessel pressure of 400 kpa.** The addition of **Potassium hydroxide (KOH - 45% solution)** is also computer regulated. Addition of KOH at a rate of 11% w/w of the pathological tissue mass is added to the digester vessel. Finally, a mass of 12% w/w contaminated (laboratory) waste water is added to the digester vessel to create a caustic slurry. At this point, the heating and cooking processes are initiated.

A series of stainless steel mixing paddles stir the wastes after these CFIA processing parameters are met. They continue to stir and break down the wastes during the **Dehydration Phase**. This is the longest phase lasting 24-30 hours.

During the Dehydration phase, vessel pressures and temperatures are computer-controlled to facilitate water removal from the waste solution within the digester vessel. A final dehydration rate of 36% (of the original pathological waste mass) must be achieved before the final, **Cooling Phase**, will initiate.

There are two by products of alkaline hydrolysis:

1) an **ammonia rich aqueous solution** which is -

- stored in a stainless steel collection tank until the completion of the process
- a sterile by product permitted for release to sanitary sewer

2) **a solid waste product, digestate**, which is -

- contained within the digester vessel during the dehydration and cooling phase
- continuously stirred until the completion of the dehydration phase and
- then cooled to 70 °C prior to discharge by Operators into large metal bins
- rich in carbon and other nutrients suitable for composting
- sterile and permitted for release to a local compostable landfill.

This waste destruction process represents "green technology" -- both the aqueous and solid waste by products are sterile and well suited for composting.

In terms of daily operations in the Necropsy Facility, animal remains are disposed of and the work spaces decontaminated **immediately upon completion** of the necropsy examination. There is insufficient freezer space for retention of carcass material and the additional labor and consumables costs associated with implementing such procedures are contraindicated in a busy necropsy facility. A fast turnover of biohazardous waste is required to fulfill the provincial mandate of public health.

Being "Part of your Practice" means that PDS has to know at time of receiving what is to be done with remains. Help us, help you to provide the full range of medical diagnostics and compassionate handling of a loved ones remains because it is at times of great grief, that owners rely on professionals to help them look after the details.

Mycotoxin Update

By: Vanessa Cowan and Barry Blakley (Toxicology Centre and the Department of Veterinary Biomedical Sciences, WCVM)

Significant rainfall during the growing season and an early snowfall in 2016 have compromised feed quality and enhanced mycotoxin production in crops. Consequently, most livestock producers and feed companies are now fully aware of the mycotoxin problem. Routine feed analysis for mycotoxins through Prairie Diagnostic Services has expanded dramatically this fall to meet the increasing demand for sample analysis. The ergot alkaloid panel currently evaluates six alkaloids. In most animal species, feed concentrations in the 100-200 ppb (ug/kg) range are considered acceptable (total mixed ration; TMR).

The mycotoxin panel, which evaluates primarily mycotoxins produced the *Fusarium* molds, has been expanded to include Fumonisin B_1 and B_2. The panel now includes 14 individual mycotoxins. The Fumonisin mycotoxins affect most animal species, but horses and swine are the most sensitive of the domestic animals. Feed standards for these species are 1 ppm (mg/kg) and 10 ppm, respectively. For cattle and sheep, the standard is 30 ppm. To date, several submissions did contain Fumonisin mycotoxins, albeit beneath clinically relevant concentrations. In horses, leukoencephalomalacia is the primary clinical manifestation and may be fatal. In swine, respiratory and hepatic symptoms are observed. In ruminants, vague symptoms and poor performance are encountered.

During the past few months, T-2 Toxin, HT-2 Toxin, and deoxynivalenol (vomitoxin) are the predominant mycotoxins identified in samples analyzed by PDS. These compounds are members of the trichothecene class of mycotoxins. There is considerable regional variation in their prevalence. In beef cattle, the following standards are utilized: HT-2 Toxin (100 ppb), T-2 Toxin (1000 ppb) and vomitoxin (5000 ppb). Acetylated derivatives of vomitoxin may also be present. As all of these mycotoxins produce similar effects in animals, including feed refusal, immunosuppression, and abortion, it is important to sum the total concentrations of the mycotoxins in the total mixed ration. To simplify the "addition" of mycotoxins of different potencies, an online mycotoxin calculator is available through the Saskatchewan Ministry of Agriculture: http://www.agriculture.gov.sk.ca/mycotoxin-calculator

Mycotoxin contaminated feed is emerging as one of the major nutritional toxicology problems in Western Canada. Consequently, many producers are investigating other feed alternatives. To avoid ergot contamination, increased production of corn has occurred. Unfortunately, untimely rainfall has resulted in increased Fusarium mycotoxin production in certain corn varieties. HT-2 Toxin, T-2 Toxin, and vomitoxin are often observed at clinically relevant concentrations in corn. Grazing standing corn presents a unique problem. The contamination is almost exclusively in the cob. Since cattle graze the entire plant, submission of chipped plants including the cob is recommended. Animals that graze the less palatable stems and leaves preferentially suggests the cobs are heavily contaminated. The extent of mold growth is usually a poor indicator of mycotoxin contamination. Analysis is, therefore, critical.

This fall, many swathed crops remain uncombined. Consequently, swath grazing is common. Generally, the mold growth on the swathed crops occurred after swathing. This late season mold growth does reduce feed quality, but mycotoxin production is typically limited, although some risk is possible.

Most of the mycotoxins are heat stable and resist degradation. Feed processing techniques such as pelleting, silaging, etc., do not reduce mycotoxin concentrations significantly. There is anecdotal information suggested that processing may enhance bioavailability.

For the first time this year, ergot poisoning was observed on native pastures. The lush growth on these pastures enabled more of the grasses to head out which allowed for ergot infestation. In theory, although not reported, strip grazing may enhance ergot contamination of pasturelands. If annual rainfall continues to occur at high levels, the multifactorial mycotoxin problems will continue to happen and impact negatively on livestock and crop production.

On-Line Submission Now Available at PDS

Prairie Diagnostic Services' Laboratory Information Management System-CASEBOOK (LIMS-CASEBOOK) continues to evolve. CASEBOOK was introduced in June 2014 to replace the outdated hierarchical LIMS that PDS had used since 1998. The new relational based LIMS-CASEBOOK, allowed for a comprehensive management system to handle accessioning, reporting, lab process automation, surveillance, database queries and other functions. The latest improvement is on-line submission.

Clients are able to access diagnostic reports on-line, in real time thru Web Client (http://pdsserver.usask.ca/webclient). Web Client is a secure portal where all diagnostic reports since June 2014 are stored. Web Client allows viewing of diagnostic reports from 'Preliminary' through 'Final' versions. On-line submission will improve the ability to track and view progress of reports. There are a number of benefits for using on-line submission:

- Elimination of transcription errors on diagnostic reports.
- Pre-filled fields and drop down menus to speed up form completion.
- Generation of better histories with the aid of drop down menus to direct pathologists for focused interpretations
- All submission forms available at this site.
- Additional pages for surgical biopsies, necropsy, Release of Remains forms etc. are added automatically to submission as they are selected.
- Ability to attach photos to the submission form.
- Ability to transition to a "paperless" clinic format with client records.
- Tracking and status of submission from time of scanning into LIMS-CASEBOOK to completion.

To assist clinics looking to adopt

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Assisting in Bovine TB Outbreak

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this first-ever request for bovine TB necropsy and sampling at a veterinary diagnostic lab of this many cattle at one time, that PDS and WCVM were willing and able to re-arrange teaching, research and diagnostic testing commitments to help out. Third, that PDS could effectively manage the stringent identification, sampling and disinfection processes. Lastly, but most importantly, we collectively learned a lot as veterinarians and technicians, and benefitted as an organization from start to finish. Call it knowledge sharing, a lesson in bovine anatomy and infectious disease, getting to know our colleagues better, understanding our strengths and weaknesses when faced with a mountain of work, or simply call it team building, we have finished strong and gained much along the way.

Are we ready to do this again? Well, that probably depends upon whom you ask, but those I've talked to are ready to go! Will we do this differently next time? You bet! We've learned what has worked well and what could be improved, and we'll get better. Will CFIA need this testing surge capacity in the future? We hope not, but if they do, we'll be ready. Granted, our facility is not ideally designed for this extreme use, and the effort is costly, but our team is well trained and ready to handle Risk Group 3 pathogens.

A sincere thank you to all that willingly participated from the early planning stages through to last person showering out and turning off the lights on Sunday evening. The support and acknowledgement from the Dean of WCVM, the SK Ministry of Agriculture, and of course, the CFIA has been outstanding.

On-Line Submission

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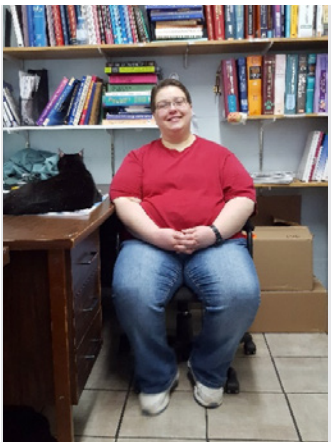
on-line submission into their workflow, PDS has developed a series of YouTube videos to aid clients in upgrading clinic software to download the submissions and to demonstrate how to fill out the forms (https://www.youtube.com/playlist?list=PLE08oM2cfAsfsl-GL7xjG-9j6CXqJlvtNe).

4 of 5 phases have been implemented for accessing the on-line submission forms. Phase 1 was beta testing of the forms themselves. Two clinics were selected in August to test and critique the large animal forms and companion animal forms. Phase II commenced in September with a select group of SK clinics that were personally validated to be able to download the submission forms on their clinic computers. Potential problems were identified for Phase IV instructional materials during this development stage. Phase III was a "load test" where 100 clinics accessed the on-line form. In November Phase IV expanded the number of clinics to 145 and self-help instructional material provided to assist clinics in accessing, downloading and filling out submission forms. Phase IV instructional material consists of YouTube videos, Frequently asked Questions brochure and a detailed instruction pamphlet. Phase V is scheduled to roll out in February to all PDS clients.

On-line submission forms will continue to evolve. Future plans for test selection and pricing, species specific test selection, etc. are being considered. On-Line submission compliments new clinic software that moves to a paperless office format. On-line submission is an exciting development for LIMS-CASEBOOK and PDS plans to focus programs to maximize adoption of on-line submission forms.



New Face at PDS:

We are pleased to announce that Dr. Erin Zachar joined PDS, as an anatomic pathologist, on January 9th, 2017. Dr. Zachar is a 2007 WCVM graduate, a Saskatchewan local, and a member of a veterinary family. After about 6 years of mixed and small animal practice, she returned to WCVM and received a MVSc degree and completed a senior residency in veterinary anatomic pathology. Dr. Zachar's clinical experience and skills in pathology, as well as her wonderful approachable nature will be a great addition to PDS, and to the animal health profession in western Canada. She can be reached by email (erin.zachar@usask.ca) or by telephone 1-306-966-2168. Please join us in welcoming Erin to PDS

READERS' FEEDBACK

The **Animal Health Perspectives** editorial team (Dr. Moira Kerr, Brian Zwaan and KathrynTonita) invite readers' comment on material published in the newsletter or questions on material submitted by contributors.

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

To be added to the distribution list for the electronic link, email: brian.zwaan@pds.usask.ca