AUGUST 2018 • VOLUME 14 • ISSUE 3

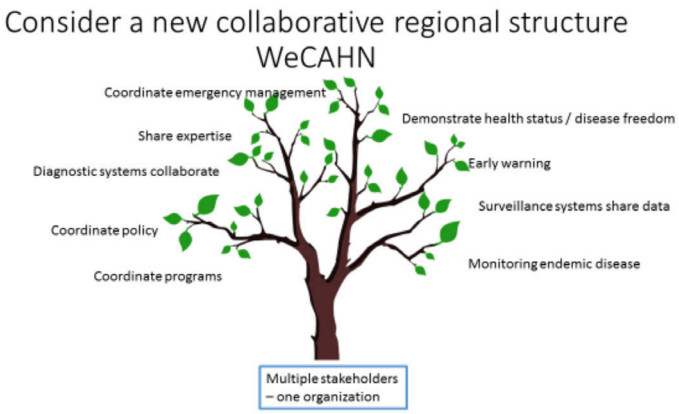
Animal Health Perspectives

WeCAHN – A Vision for a Collaborative, Comprehensive Animal Health Intelligence Network in Western Canada

By: Carl Johnson, CEO, Prairie Diagnostic Services, Inc.

Early warning of endemic disease threats, increasing zoonotic disease pressure, and animal and public health interests in general all stand to benefit from having a comprehensive inter-laboratory surveillance system across the western provinces. Enter "WeCAHN" – the Western Canadian Animal Health Network!

The vision for WeCAHN was an outcome of a meeting amongst the Canadian Animal Health Surveillance Network (CAHSN) Laboratories in February of this year. Representatives of CAHSN Labs, CFIA and interested veterinary epidemiologists from across Canada met in Vancouver to re-envision the future of animal disease surveillance. Numerous western Canadian initiatives and well-intended, but under-supported efforts, have been made in the past. Species-specific surveillance (swine, beef) programs, funded in part by producer associations, have been particularly successful but are limited in scope. In the western provinces, CAHSN itself has also had a fledgling surveillance program collecting data from livestock and poultry submissions from western laboratories enabling the tracking of disease incidence in the four western provinces. The existing CAHSN network has no funding, no dedicated resources and suffers from infrastructure limitations. We can do better than this in western Canada!



From: Lees, W., Johnson, C., Trokhymchuk, A., "Building a Collaborative Regional Animal Health Intelligence Network in Western Canada", presented at the 2018 CAHLN Annual Meeting, June 10-13, Winnipeg, MB

The Ontario Animal Health Network (OAHN) and the Réseau D'Alerte et D'Information Zoosanitaire (RAIZO) system in Quebec are well designed, comprehensive animal disease surveillance programs funded provincially. There is dedicated infrastructure and support, and active engagement from animal health stakeholders including veterinary practitioners and animal agriculture interests. In western Canada, the Canada-West Swine Health Intelligence Network (CWSHIN) is another successful model to learn from as we envision a more comprehensive and sustainable animal health intelligence network designed to meet the needs of animal agriculture and the veterinary profession in western Canada.

To be sustainable, WeCAHN needs dedicated funding, expertise and effective Laboratory Information Management Systems (LIMS) at contributing Labs. The vision as presented by Dr. Wayne Lees in his plenary presentation at the Canadian Animal Health Laboratory Network (CAHLN) Annual Meeting in Winnipeg in June, is to design an animal health intelligence network amongst the western provincial laboratories covering more than just swine health, selected beef cattle operations or be limited by provincial borders.

Western Canadian veterinary diagnostic labs have a treasure trove of test results and syndromic disease information from all animal species. The first challenge is mining this data in an efficient and timely manner, but also protecting premises and owner privacy. Efficient LIMS infrastructure at each laboratory setting can accomplish this and more, and can do so in near real-time speed. Rapid, effective early warning alerts when facing an endemic disease outbreak is extremely valuable information to have in protecting animal agriculture in western Canada. Furthermore, being able to routinely document a "disease free", high health status of Canadian herds and flocks is critically important to Canada's agricultural export interests.

Beyond the digital infrastructure needed, well-trained and dedicated veterinary epidemiologists, infectious disease experts and IT programming skills are needed to ensure not only the integrity of the data, but also to have data trends reviewed and communicated effectively to stakeholders. The importance of clinical interpretation and

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follow-on communication of findings, helps elevate a data-rich surveillance system like this to a truly meaningful animal health intelligence network.

Building relationships amongst stakeholders is the hidden benefit, whether they be practicing veterinarians, subject matter experts in academia, animal agriculture specialists in government service or decision-makers in the animal agriculture and health industries. What better than having relationships built through engagement over animal health information sharing, when there is an urgent need to respond to an impending disease threat? Outbreak preparedness hopefully begins with early warnings, but efforts end successfully when there are timely decisions and bold actions that have a positive impact. Sound, contemporary animal health data along with efficient interpretation and communication is therefore critical. This does not happen, nor do things go well, when people are not effectively networked either!

The WeCAHN concept has great promise but needs sustainable funding to become a reality. Contributing provincial laboratories individually do not have all the resources required to make this happen. While the IT infrastructure and epidemiologic expertise already exist in some labs, these resources are fully committed to achieving other lab objectives. To bring disease surveillance from a "side of the desk" effort, to become a fully supported and sustainable service, adequate funding is key. The best chance for success is a public-private funding model. Let's bring all interested parties together, not only to benefit from access to important animal health intelligence and the networking this creates, but also to share in its cost through grants or in-kind contributions. If done well, all stakeholders benefit and will see a return on their investment, as will western Canadian agriculture.

Keep an eye on this webpage for posting of the Proceedings from the 2018 CAHLN Annual Meeting (http://cahln-rctlsa.com/actes-et-presentations-anterieurs/). Dr. Lees's plenary talk: "Building a Collaborative Regional Animal Health Intelligence Network in Western Canada", is full of great information.

Ocular Fluid Submissions in Toxicology

By: Dr. Barry Blakley, Veterinary Toxicologist, WCVM.

Prairie Diagnostic Services has the ability to analyze a variety of tissues, feed and fluid matrices for investigative purposes. Occasionally ocular fluid concentrations of agents such as metals like magnesium, potassium or sodium are comparable to respective plasma or serum concentrations. Analysis of vitreous humor or aqueous humor is possible. Normal values are often available.

After death, animals may not be found for several days. The ability to collect blood, liver or other tissue samples may be compromised during the autolytic process. Frequently, ocular fluid may remain "preserved" for a longer period of time and provide useful diagnostic information. In many instances, chemicals, metals, etc. may readily diffuse into the eye, but are unable to diffuse outwardly in a rapid fashion. Consequently, detection in ocular fluid may be possible. Following death, metabolic processes, decomposition and bacterial growth may alter the presence of many agents in the blood or tissues. In the ocular fluid, many of these natural processes are delayed which may enhance the opportunity for detection.

The analysis of ocular fluid may be advantageous under certain physiological conditions with varying types of agents. Chemicals or minerals that are rapidly metabolized or denatured after death are potential candidates for analysis in ocular fluid. Small molecules or gases that are rapidly transported or diffuse across membranes are also possible agents that may be suitable for detection. Currently, PDS analyzes ocular fluid for nitrites. In dead animals, nitrites are readily oxidized by decomposition processes. These metabolic processes are significantly reduced in ocular fluid which will enhance detection. Altered physiological states associated with renal failure, dehydration, etc. may enable detection of "ante-mortem" body concentrations in ocular fluid. Examples may include, many metals and urea. Other agents that potentially could be detected in ocular fluid may include gases such as ammonia, cyanide, hydrogen sulfide or nitrogen oxides gases. Feed additives such as urea or monensin, theoretically, could be detected. A variety of drugs, antibiotics, or insecticides with typically short half-lives and appropriate chemical characteristics could also be detected in ocular fluid.

In one recent case, the ocular fluid from a cow that died unexpectedly was evaluated for nitrites. Pathological examinations indicated the cow had inhaled an irritating gas. Further investigation determined the cow had been exposed to nitrogen oxide gases resulting in irritation, pulmonary edema and death. The analysis of tissues for the gases is diagnostically a challenge. The nitrogen oxide gases are small molecules that rapidly penetrate all tissues including the eye. After death, the gases are rapidly released or metabolized in most tissues excluding the eye. In the "sheltered" environment in the eye, the nitrogen oxide gases are converted to nitrite. Detection of high concentrations of nitrite in the ocular fluid in the presence of lung damage due to irritation is consistent with a diagnosis of nitrogen oxide gas inhalation and acute death.

Ocular fluid analysis may have some useful application in the oil and gas industry. In some instances feed companies may also identify useful applications. Further development would be necessary to validate these diagnostic strategies for routine use. Currently, PDS only provides analysis for nitrites or minerals in ocular fluid.

Rodenticide Poisonings in Western Canada

By: Dr. Barry Blakley, Veterinary Toxicologist, WCVM.

Non-target poisonings with rodenticides continues to be a problem in a variety of animal species. Historically, strychnine was the most common agent involved in many instances. Reduced sales and more restrictive regulatory requirements have reduced non-target poisonings by more than 50%. The occurrence of poisonings with the anticoagulant rodenticides, in particular, the second generation products has increased substantially. With effective treatment options, many animals do survive poisoning episodes. Non-target poisoning with fluoroacetate and cholecalciferol are rarely encountered.

In recent years, a new single-dose rodenticide, bromethalin is now available. Many retail outlets carry this extremely potent and effective rodenticide. This neurotoxin is extremely toxic to non-target species such as dogs or cats. Bromethalin is rapidly absorbed and has a half-life at about 5-6 days. It is excreted primarily by biliary excretion. Treatment, may be, in part, focused on reducing biliary excretion. In spite of its rapid absorption, clinical manifestations are delayed for 10 hours to 3 days, depending upon the dose.

Bromethalin uncouples oxidative phosphorylation in the CNS resulting in reduced mitochondrial energy production (ATP), which ultimately impairs NA/K ATPase activity and sodium transport resulting in cerebral edema and increased CSF pressure. Clinical manifestations are observed at dosages of about 1.67mg/kg, BW. Death is observed in dogs at about 4.7 mg/kg, BW. Cats are more susceptible to poisoning. Due to the delayed onset and development of cerebral edema, acute and chronic manifestations may be highly variable and dose-dependent. Acute poisoning is associated with hyper-excitability, muscle tremors, seizures, hind limb hyper-reflexia, mydriasis and CNS depression progressing to coma and death. Chronic poisoning is often more typical resulting in vomiting, depression, tremors, opisthotonus, nystagmus, abnormal posture, fore limb extensor rigidity, lateral recumbency and paresis.

Cerebral edema and spongy degeneration of white matter of the brain and spinal cord may be present. Diffuse vacuolation of white matter may also be evident. Clinically, increased CSF pressure and electroencephalogram activity may be detected. Bromethalin can be detected in the fat, brain and liver of affected animals. PDS does not currently run the analytical testing. If the animal is known to have been exposed, emetics may be helpful. The administration of mannitol to reduce cerebral edema and dexamethasone may provide some improvement. Diazepam administration is often recommended. The daily administration of activated charcoal for several days will reduce enterohepatic recycling of bromethalin.

In spite of timely treatment, the prognosis is often guarded at best. Recovery, may require several weeks with prolonged anorexia. The non-specific manifestations of bromethalin poisoning in association with the poor response to treatment and the lack of confirmatory testing make this disease problem clinically challenging.

SNAP 4DX test in horses

By: Dale Godson, Microbiology Lab (Virology/Immunology), PDS

Because studies have shown some mixed results in using the SNAP 4Dx as a test for horses, our policy was to recommend referred-out tests over the SNAP test. However, I noticed in a recent case that IDEXX is now using the SNAP test as their method. Thus, I would recommend the following testing policy:

1. The SNAP 4Dx can be used in horses as an initial screening assay for both diseases.

2. If clients ask about testing options, referred-out tests are available for complementary testing or as follow up to the SNAP test result.

- Lyme disease: Multiplex antibody test (Cornell)
- Anaplasma: CBC with examination of blood smear, PCR (Idexx, Manitoba Veterinary Diagnostic Services Laboratory)

Background

The SNAP® 4Dx® was successfully used to detect antibodies to *B. burgdorferi* and *A. phagocytophilum* in infected horses (Chandrashekar et al., 2008; Veronesi et al., 2014), but the test performed less well in a population of horses with a low prevalence of disease (Schvartz et al., 2015a; Schvartz et al., 2015b)

The SNAP® 4Dx® also compared favourably with the Cornell multiplex test for detection of antibodies to B. burgdorferi (Wagner et al., 2013)

References:

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Wagner, B., Goodman, L.B., Rollins, A., Freer, H.S., 2013. Antibodies to OspC, OspF and C6 antigens as indicators for infection with Borrelia burgdorferi in horses. Equine Veterinary Journal 45, 533-537.

Congratulations!

Dr. Yanyun Huang (PDS Veterinary Pathologist) won the prestigious Canadian Animal Health Laboratory Network Laboratorian of the Year Award for 2018. The award was presented to Yanyun at the gala banquet at the CAHLN Annual Meeting in Winnipeg (June 2018). Nominations come from across Canada and reflect: "Any scientific worker who has made a significant contribution to animal health laboratory medicine in Canada. A nominee might be an outstanding diagnostician, educator, researcher, mentor of future laboratorians, or other contributors to the field."

Yanyun is truly deserving of this recognition for a number of reasons: 1) diagnostic expertise and heavy, diverse caseload (>1000 cases in 2017); 2) research (a recipient of 2 research grants totaling more than $320K); 3) teaching and mentoring (PhD co-advisor, teaching support for WCVM veterinary students and Department of Veterinary Pathology graduate students); 4) outreach (invited speaker at international and Western Canadian veterinary conferences, co-author of 6 peer-reviewed papers, Canada West Swine Health Intelligence Network advisor); 5) business development initiative (built the business platform and network for remote diagnostic work-ups for clients in China), and 6) leadership contributions for our Diagnostic professional team and PDS Leadership Team. Please join me us in congratulating Yanyun!

Presenting at the 2018 CAHLN Annual Meeting were: Anatoliy Trokhymchuk, Musangu Ngeleka, Yanyun Huang and Rambod Movasseghi. Also, Dr. Wayne Lees, a member of the PDS Board of Directors, presented on our vision for a Western Canadian Animal Health Intelligence Network (WeCAHN).

Dr. Chris Wojnarowicz Retires

Dr. Chris Wojnarowicz retired from PDS at the end of May after 41 years in the veterinary profession. Chris obtained his DVM in 1977 from the University of Warsaw and practiced large animal medicine in Poland, the USA and Denmark. After immigrating to Canada in 1984, he worked as a veterinary pharmaceutical sales representative in Saskatchewan for Rogar/STB Inc. and passed the NEB examination in 1987. Chris went on to join the Meat Hygiene Division of Agriculture Canada and remained in the federal force for ten years, initially in Winnipeg and then in Greater Vancouver. In 1997, Chris entered in the Master of Veterinary Science program in the Department of Veterinary Pathology at WCVM. He completed his residency in anatomic veterinary pathology in 2000 and joined PDS, Saskatoon in July 2001. In 2006, he earned Poultry Board Certification. With his expertise in pathology, his broad professional background and a willingness to help whenever he could, Chris was a valued member of the pathology team at PDS and a valuable resource for all clients. We wish Chris and Barb all the best in this new phase of their lives. Szczęśliwa emerytura!!

READERS' FEEDBACK

The **Animal Health Perspectives** editorial team (Dr. Moira Kerr, Brian Zwaan and Kathryn Tonita) 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.