Animal Health Monitor

OCTOBER 2014

BRITISH COLUMBIA | Ministry of Agriculture

Articles of Interest:

- ***West Nile Virus in BC Horses***
- ***BC Rabies Control Program Contact***
- ***Discontinuing Johne's Disease Culturing at the AHC***

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Animal Health Centre Update by Dr. Jane Pritchard

My predecessors have generally provided editorials on this, the front page, of our Animal Health Centre Newsletter. I have not continued that tradition, but would like to take this opportunity to draw your attention to a few important items.

Dr. William Cox, who has served as our Poultry Health Veterinarian, will be retiring in early 2015. He has brought to the Ministry of Agriculture a depth of knowledge of regulated and unregulated poultry production in Canada. We will be filling his position with a Poultry Veterinarian with diagnostic pathology skills, along with an understanding of poultry industry practices. It is the intention to have the successful candidate overlap with Dr. Cox to learn the ropes before he retires. In the summer, we hired a second Veterinary Diagnostic Fish Pathologist, Dr. Hein Snyman, who is ACVP board-certified and has his PhD in anatomic pathology.

The new *Animal Health Act* passed the BC legislature in the spring of 2014 and will be brought into force with 6 accompanying regulations shortly. When that occurs, there will be as much communication as is requested or needed with veterinarians and producers on the changes that directly affect them. Stay tuned.

Animal welfare is increasingly a topic in the media, and with consumers. The National Farm Animal Care Council 'Codes of Practice' will become the standard for animal care in all provinces. If you are not familiar with them, please take the time to review them (https://www.nfacc.ca/codes-of-practice) in order to support your clients in meeting these standards.

Swine Delta Corona virus (SDCv), a virus related to Transmissible Gastroenteritis (TGE) and Porcine Epidemic Diarrhea virus (PEDv) has been detected in routine environmental sampling in Alberta and Saskatchewan this month. Significant efforts on swine biosecurity and surveillance for PED and SDCv have been going on in BC, but are now going up to a higher gear. Everything is focused on keeping these diseases out of BC, but if they are identified in any samples, that information will be shared with you.

The Animal Health Centre (AHC) is the only provincially-run veterinary diagnostic laboratory in Canada with accreditation through the American Association of Veterinary Laboratory Diagnosticians (AAVLD) that is not associated with a university. Ontario and Quebec animal health laboratories, both university-associated, are the only other labs in Canada with this accreditation. The standards are not easily met. The AHC was recently audited and the accreditation was renewed for 5 years. We are also in the middle of securing ISO17025 accreditation. When we provide a test a result, we have solid support behind us to be able to say that the result is valid and accurate.

Summary of BC Zoonoses Symposium by Dr. Brian Radke

The 13th BC Zoonoses Symposium was held August 13, 2014 at the Vancouver campus of UBC. This collaborative, interdisciplinary symposium provides an opportunity for professionals from across BC to gather, network and learn about disease issues affecting animals and humans. The symposium is a partnership of the BC Ministry of Agriculture and the BC Centre for Disease Control. The BCCDC Foundation for Population and Public Health was a gracious sponsor of the 12th symposium.

The symposia include presentations on a wide variety of One Health Topics. The symposium included information on zoonoses associated with a variety of wildlife species, ranging from marine mammals to rats, bats and skunks! Presentation topics also included zoonoses associated with domestic animals, BC veterinarians' needs for rabies information and Canada's partial ban of antimicrobials for growth promotion. A zoonotic food-borne outbreak case study was well-received as a way to stay awake following the free lunch. The agenda of the 13th Symposium is available at http://www.bccdc.ca/dis-cond/types/Zoonotic/13thZoonotic+DiseaseSymposium.htm. (Agendas and presentations from previous symposia are also available at that website.)

With over 90 attendees, the 13th symposium was well attended. The audience included public health inspectors, public health physicians, public health researchers, students and veterinarians. Likely as a result of holding the symposium in conjunction with the annual International Conference on Diseases in Nature Communicable to Man (INCDNCM), a number of attendees were from other provinces and countries, including Sweden and Brazil. Most of the attending veterinarians are engaged in public practice and a goal is to increase attendance by private practitioners and animal health technicians. Typically, there is no registration fee for the symposia, but registration is required for planning purposes. Historically, the symposia have been held in November. Details of the 14th BC Zoonoses Symposium will be included in future editions of the Animal Health Monitor.

BC Rabies Control Program Veterinarian Contact

Dr. Jennifer Koeman studied veterinary medicine at the University of Saskatchewan (2004) and obtained a Masters of Public Health from the University of Minnesota (2010). She also trained as a Veterinary Public Health Fellow with the University of Minnesota and is board certified by the American College of Veterinary Preventive Medicine (DACVPM). She has worked as a Veterinary Liaison with the Canadian Food Inspection Agency (CFIA) and a contractor with the World Organization for Animal Health (OIE). Most recently, she worked as the Director of Producer, Public Health and Workplace Safety with the US National Pork Board.

As the new Public Health Veterinarian with the BC Centre for Disease Control, Dr. Koeman will assist with the development and support of the veterinary aspects of the BC rabies control program due to the transition of this program from the CFIA to the province this year. She will also work on other zoonotic diseases and animal health issues (e.g. food safety, AMR) to support the provincial public health mandate.

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Surveillance and Diagnosis of West Nile Virus in BC Horses by Dr. Brian Radke

Consensus exists among the scientific community on the diagnosis of West Nile Virus (WNV) in equines. This consensus is shared by: standard equine internal medicine texts, such as Equine Infection Diseases (2014) edited by Sellon and Long; the BC government; the CFIA; and the USDA. A confirmed diagnosis consists of clinical signs consistent with WNV infection and laboratory testing. BC's case definition for WNV, which is substantially representative of this consensus, is:

Compatible clinical signs[1] plus one or more of the following:

- isolation of WNV from tissues[2];
- an associated 4-fold or greater change in IgG ELISA testing or sero neutralization (SN) test antibody titre to WNV in appropriately-timed[3], paired sera;
- detection of IgM antibody to WNV by ELISA testing in serum or cerebrospinal fluid;
- a positive polymerase chain reaction (PCR) to WNV genomic sequences in tissues and appropriate histological changes;
- a positive immuno-histochemistry for WNV antigen in tissue and appropriate histological changes.

[1]Clinical signs must include ataxia (including stumbling, staggering, wobbly gait, or incoordination) or at least two of the following: circling, hind limb weakness, inability to stand, multiple limb paralysis, muscle fasciculation, proprioceptive deficits, blindness, lip droop/paralysis, teeth grinding, fever, acute death.

[2]Preferred diagnostic tissues from equine are brain or spinal cord; although tissues may include blood or CSF, the only known reports of WNV isolation or positive PCR from equine blood or CSF have been related to experimentally infected animals.

[3]The first serum should be drawn as soon as possible after onset of clinical signs and the second drawn at least seven days after the first.

Equine Infectious Diseases notes (page 224) the IgM response to WNV infections lasts approximately 6 weeks and the sensitivity and specificity of the IgM ELISA for WNV is 81% and 100%, respectively. Vaccination does not cause an IgM response; therefore, this test is specific for current infection. It is widely recognized that positive serological test results for antibodies to WNV such as SN titres or IgG ELISA could be due to vaccination or natural infection. For this reason, some case definitions do not include SN or IgG ELISA results from vaccinated horses. Interpretation of SN and IgG ELISA are made more challenging when the two tests do not have consistent results. These SN and IgG antibodies are noted to persist, therefore the standard requirement for a four-fold rise in antibody titres to support a clinical diagnosis of WNV infection. The existence of SN and IgG antibodies to WNV in BC horses is consistent with the historic publicly available provincial surveillance data indicating the confirmed presence of WNV in the province every year since 2009, with the exception of 2012 and to-date, 2014.

Sellon and Long also suggest confirmation of WNV consider whether the horse resides in an area in which WNV has been confirmed in the current calendar year in mosquito, bird, human or horse. This requirement is likely more appropriate for areas with higher rates of endemicity than BC. Yet it is a useful reminder to consider the regional epidemiology of WNV in BC when assessing the likelihood of a WNV diagnosis.

According to the BC Centre for Disease Control (BCCDC), the significant risk factors for WNV are the presence of the mosquito species (*Culex tarsalis* & *Cx. pipeins*) that are competent vectors of WNV and sufficient environmental conditions. The environmental conditions include precipitation and heat (measured as degree days) for mosquitoes to blood feed and to foster replication of the virus such that the infection can be further transmitted. As part the province's WNV surveillance system, public health conducted province-wide mosquito trapping and WNV testing from 2004 to 2007. In 2008, mosquito trapping in the northern two-thirds of the province was discontinued due to the low numbers of *Culex* vectors. Currently, mosquito trapping and WNV testing is limited to the central and south Okanagan because this is the only region where mosquitoes infected with WNV have been detected.

Cont'd Surveillance and Diagnosis of West Nile Virus in BC Horses

Among mosquitoes, birds, humans, and horses, all WNV cases acquired in BC to date have occurred in the central and south Okanagan, with the exception of one horse in the Fraser Valley in 2009. BCCDC risk modelling supports these regions as the high risk areas based on sufficient presence of the competent mosquito vector and sufficient heat for the mosquitoes to transmit the virus. The BCCDC website also has an interactive map of WNV surveillance https://maps.bccdc.org/wnv_general_js/wnv_general_js.html. including known WNV regions. All WNV cases in BC have been detected in the months of August and September.

The Ministry of Agriculture recognizes practitioners need to make clinical diagnoses for their patients and clients, and the potential constraints on performing diagnostic testing. We encourage diagnostic testing for WNV, including consideration of differential diagnoses. For example, one of the 2014 horses with a negative WNV IgM ELISA, and positive WNV SN titre and IgG ELISA, was also positive for equine herpes virus type 1. We strongly encourage that diagnostic testing of acute serum samples for WNV include IgM ELISA due to its high specificity and sensitivity, and because a convalescent sample is not required to confirm a case. IgM ELISA is widely recognized as the preferred serological test for the diagnosis of clinical cases of WNV. As noted, interpretation of WNV SN and IgG ELISA results is challenging, especially in vaccinated horses, and requires acute and convalescent samples. The Ministry encourages PCR testing of deceased suspect WNV horses while recognizing horse owners' potential reluctance to consent to necropsies.

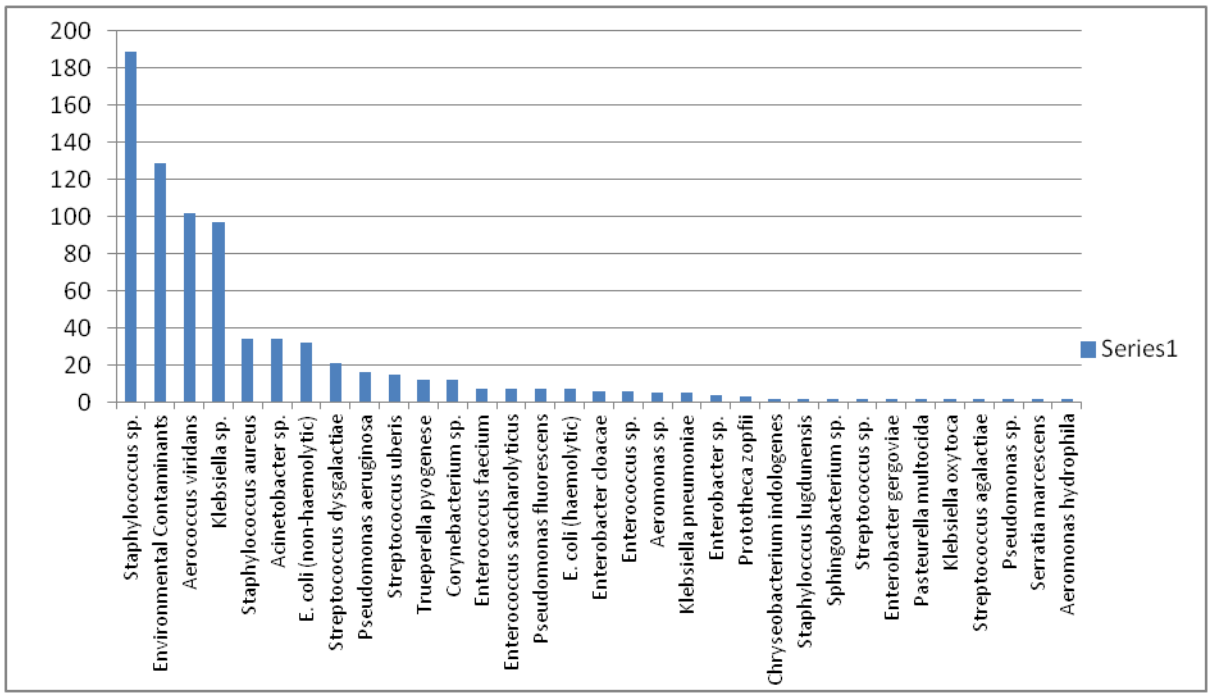
All confirmed BC cases of WNV in all species have occurred in the central and southern Okanagan and the Fraser Valley, the regions considered at highest risk for WNV. Horses, outside of these regions and as far north as Prince George, that are reported as unvaccinated and without a travel history, have been identified as having WNV antibodies indicating exposure to the virus. Continued testing of horses and other surveillance activities will help clarify WNV's geographical distribution in BC and in particular whether WNV is causing clinical illness in areas of the province that are considered lower risk for WNV and in which no confirmed cases have been detected. To facilitate testing, the Animal Health Centre is pleased to offer free PCR testing of equine brain for WNV and equine herpes virus 1 on BC horses with a positive IgM or IgG ELISA, or SN titre for WNV.

Currently, equine WNV is immediately notifiable to the CFIA, and the Ministry of Agriculture follows up on cases that come to its attention. A form for reporting equine cases of WNV is available at the Ministry's WNV website http://www.agf.gov.bc.ca/ahc/westnilevirus.htm. Information collected by the Ministry is shared with the BCCDC. The Ministry relies on the co-operation of practitioners in sharing information to inform BC's WNV surveillance system. It is anticipated in the future that reporting of equine WNV cases to the Ministry will be required.

In reviewing this article, Chris Berezowski DVM, DACT, DABVP (Equine), partner at Moore Equine Veterinary Centre, provided the following comments: "In my opinion, IgM is the best diagnostic test to use in most clinical cases. It is sensitive and specific. Also, the IgM spike is short which indicates recent exposure. In addition to being of short duration, it also doesn't increase much following vaccination, so even a recent vaccination does not confuse the results. When working up a neurological case WNV IgM is a standard test for us."

Milk Culture Results by Dr. Jane Pritchard

January 1—September 30, 2014—Results of milk cultures sorted by frequency of isolation.



* The following isolates were single occurrences during the period of January 1-September 30, 2014, and not included in the chart above: Aerococcus urinae, Alcaligenes sp., Candida krusei, Citrobacter koseri, Corynebacterium bovis, Enterococcus faecalis, Kodamaea ohmeri, Mannheimia varigena, Paracoccus sp., Proteus mirabilis, Proteus sp., Pseudomonas cedrina, Raoultella terrigena, Serratia sp., and Weeksella sp.

Between January 1 and September 30, 2014, 928 milk samples (199 submissions) were received for culture and sensitivity at the Plant and Animal Health Centre. Out of the 928 samples submitted, no bacteria was isolated in 359 samples.

Resistance by Isolate										
	amp	kf	ob	e	xnl	p10	pyr	sxt	tet	# of isolates tested
Staphylococcus sp.	5%	0%	5%	4%	1%	6%	7%	1%	6%	189
Aerococcus viridans	1%	1%	16%	3%	2%	2%	3%	6%	8%	102
Klebsiella sp.	73%	19%	72%	74%	12%	74%	74%	1%	9%	97
Staphylococcus aureus	3%	0%	0%	6%	0%	3%	3%	0%	6%	34
Acinetobacter sp.	9%	24%	32%	12%	3%	12%	32%	3%	12%	34
E. coli (non-haemolytic)	47%	44%	81%	81%	13%	81%	81%	16%	19%	32

amp – ampicillin	ob – cloxacillin	xnl – excenel	pyr – pirlimycin	sxt – sulfamethoxazole/ trimethoprim
kf – cephalothin	e – erythromycin	p10 – penicillin	tet – tetracycline	

Rickets in a Stranded Cetacean by Dr. Stephen Raverty

T D Redford[1], P Duignan[2,3], M Piscitelli[4], P Cottrell[5], and S Raverty[6]
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[2]College of Veterinary Medicine, University of Calgary, Calgary, AB
[3]Canadian Wildlife Health Cooperative, Calgary, AB and Abbotsford, BC
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[6]Animal Health Center, Abbotsford, BC

Metabolic bone disease (MBD) is a group of disorders characterized by abnormalities in bone growth, modelling, or remodelling. While this entity has been documented in a number of terrestrial and avian species, there are few reports of MBD in marine mammals. Fibrous osteodystrophy has been documented in a wild dolphin (*Delphinus delphis*) and there are multiple reports of rickets in captive-reared polar bear cubs (*Ursus maritimus*). However, to the best of our knowledge, rickets has not been reported in wild cetaceans.

On September 16, 2012, a newborn Dall's Porpoise (*Phocoenoides dalli*) was found stranded in Tofino, BC. The porpoise was moderately emaciated and the skin had extensive tooth rakes. The ribs were extremely pliable, multiple ribs were fractured, and the costochondral junctions of the ribs were rachitic. There were no abnormalities in other bones and no radiographs were taken. Histopathology revealed marked enlargement of the physeal cartilage, disorganization of chondrocytes in physeal cartilage, tongues of cartilage invading the metaphysis, and islands of chondrocytes surrounded by osteoid. There was also significantly thinner and less numerous trabeculae in the metaphysis, with seams of osteoid present, markedly reduced mineralization, and proliferation of fibrous tissue. Gross and histologic findings were most consistent with rickets, leading to secondary fibrous osteodystrophy. The cause of the rickets is unknown; possible mechanisms include inadequate nursing, insufficient vitamin D in the milk or an inherited disorder in vitamin D metabolism (such as Type 1 or 2 Vitamin D-dependant rickets). There is little information on MBD in marine mammals and heightened awareness of this disorder may contribute to further understanding of its pathogenesis.

Mycobacterium avium subspecies *paratuberculosis* (MAP) testing at the Animal Health Centre by Dr. Tomy Joseph

Animal Health Centre (AHC) is discontinuing the culture method of detection and identification of *Mycobacterium avium* subspecies *paratuberculosis* (MAP) (bacteria that causes Johne's disease) effective June 30, 2015 due to lack of sufficient demand.

AHC currently uses commercially available real-time PCR tests for the detection of MAP in clinical samples. Although these PCR tests are validated only in cattle, it appears to provide reliable results in other animals as well.

AHC also offers Johne's ELISA validated for use in cattle, sheep and goats for antibody testing. Please contact Dr. Tomy Joseph, tomy.joseph@gov.bc.ca, for more information on Johne's PCR, ELISA and sample submission.

The Animal Health Centre will be discontinuing Johne's disease culturing effective June 30, 2015.

Beekeepers Meet in Richmond by Paul van Westendorp

The BC Honey Producers Association (BCHPA) held its annual meeting in Richmond on September 25, 2014 followed by a Symposium the next day. The symposium included presentations by some of the most recognized apiculture researchers today. Highlights included:

Dr. Marla Spivak of Minnesota
During the last 20 years, Dr. Spivak developed a line of honey bees selected for hygienic behavior, a genetic social trait that helps bees fight off diseases and parasites. Her latest research has focused on how honey bees keep themselves healthy, and in particular, on the role of propolis, the plant-derived resins that provide bees with another form of social immunity to a wide-range of microbial agents.

Propolis has been used for thousands of years for wound dressings and embalmment. In modern times, it has also been used to control oral herpes, sore throats and tooth aches. In recent studies, propolis has shown anti-HIV properties (Gekkar, Peterson, Spivak, 2005).

Propolis is the result of foraging bees collecting resins from leaf buds by scraping the resins off the surface with their mandibles and transferring the sticky material to their hind legs. The resins are mixed wax to form a putty-like material. Resin collection has a high energy requirement while not offering a nutritional reward. Bees obviously collect resins for a collective purpose in the hive.

Inside the hive, bees deposit propolis near the entrance, as well on the inside walls of the nest cavity. Studies have shown that the colony raises more brood successfully when the nest has been provided an envelope of propolis deposits versus a colony without any propolis deposits. Field observations indicate that honey bee colonies "self medicate" by increasing propolis production following infection by *Paenibacillus larvae*, the causal agent of American Foulbrood disease, and *Aescosphaera apis*, a fungal agent that mummifies larval bee brood.

Dr. Shelley Hoover, Alberta Agriculture, Lethbridge Research Center
Since the introduction of Varroa mites in Canada, the honey bee disease profile has become complicated in many parts of Canada. Together with parasitic mites, a host of viral agents have also been introduced. Long-term use of veterinary antibiotics has resulted in resistant bacterial strains that cause American Foulbrood disease, while the introduction of a competitive species of the microsporidian *Nosema* has resulted in increased colony mortality of wintered colonies. To mitigate the impact of these different diseases and pests, great research efforts have been directed for over 20 years to develop bees with greater innate disease resistance.

Traditional bee breeding programs involved preliminary selections of stock from different sources that have been reported to superior to other strains. Subsequent selections of this selected stock required time-consuming and costly programs of rearing and evaluating multiple generations. Dr. Hoover, in collaboration with researchers across the country, initiated a large Bee IPM Breeding Project. The project involved the multiple generational selections of honey bee queens whose performance and disease resistance was determined through Field Assay Selection (FAS). These results were compared to a parallel study involving proteomics where specific protein levels of selected stock were assessed, and identified as Marker Assisted Selection (MAS).

It was concluded that at F3, FAS assessments were very effective and correlated strongly to MAS assessments. This positive correlation allows for further development of MAS-based diagnostic tools in the selection of honey bee breeding stock with disease resistant traits at a fraction of the time and cost compared to traditional FAS-based selection processes.

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http://www.agf.gov.bc.ca/ahc/AHMonitor/index.html

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