Animal Health Monitor

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Articles of Interest:

- ⇒ AHC AMR Reports
- ⇒ Monitoring BC Bats for WNS
- ⇒ *Neospora caninum* is the Leading Cause of Bovine Fetal Loss in BC
- ⇒ NEW—Calendar of Events

Inside this issue:

Avian Influenza Training Exercise by Dr. Jane Pritchard

British Columbia has had to mount a response to outbreaks of Notifiable Avian Influenza (NAI) 4 times in a span of 10 years between 2004 and 2014. Our poultry industry is centered in the Fraser Valley, which is also where multitudes of migrating and non-migrating waterfowl, the carrier of this disease, spend time. It is clear that we need to be prepared to face the possibility of another outbreak.

The response to the most recent outbreak in winter 2014-15 demonstrated how far we've come in our response preparation and actions since the first outbreak in 2004. The province has focused on building stronger relationships between industry, the CFIA and the BC Ministry of Agriculture, on improved and faster NAI testing at the Animal Health Centre, and with training in the operation of the Joint Emergency Operations Centre functions. Improvements have also been made by the industry with their higher mandatory audited biosecurity, mandatory premise id and also with training in the operation of the Joint Emergency Operations Centre functions.

A Rapid Response working group was formed after the most recent outbreak. This group has focused on instituting changes to try to shorten the time from the first diagnosis of NAI to the containment and depopulation of that first barn. Lessons learned exercises after each outbreak here in BC and also in the USA last year have indicated this to be critical for containing the spread of NAI. Due to the nature of the disease it has also been seen as supporting animal welfare to shorten the time that the birds are suffering from NAI. The Rapid Response working group targeted 48 hours from submission of birds to the destruction process. For changes in this process to reach that kind of efficiency, training and practice is required. In May, 2016 the BC Ministry of Agriculture partnered with the poultry industry and the CFIA to carry out such training in biocontainment and destruction on a Fraser Valley Poultry Farm to test ourselves.

The purpose and scope of the exercise was:

1. Review the complexities of the processes required to control an outbreak of Notifiable Avian Influenza.
2. Expand knowledge of destruction, biocontainment and OSH procedures.
3. Develop a team of trained BC AGRI and BC industry personnel on the use of CO_2 destruction equipment.
4. Develop a team of trained BC AGRI and BC industry personnel on biocontainment procedures.
5. Review and implement procedures for biocontainment, PPE, and safety for all personnel involved in on farm depopulation.
6. Review and implement the logistics of setting up and managing an on farm depopulation.
7. Increase local capacity to respond to a foreign animal disease

This training allowed for a practical test of sharing roles with other agencies. The training of local, diverse groups of individuals who are prepared to support an emergency response will greatly assist in the containment of this disease in future outbreaks.

Inside a Vacant Broiler Breeder Barn
(Unique traits are slatted floors and nest boxes; every barn will vary in construction, which is why producers need to be engaged in the process)

Cont'd: Avian Influenza Training Exercise

The week of May 16 was a noteworthy one for those involved in the commercial poultry industry. At the request of the BC Poultry Rapid Response Committee, which was formed after the last avian influenza outbreak, members of the CFIA provided training to poultry industry personnel and staff of the BC Ministry of Agriculture on how to set up the equipment needed for humane destruction of a commercial chicken barn using effective biocontainment measures, while maintaining necessary occupational health and safety (OSH) standards.

Monday was spent in the classroom training the destruction and biocontainment teams on the relevant CFIA Standard Operating Procedures. Tuesday included a larger group discussion on the principles behind the stamping-out policy for avian influenza and the response protocols. A reconnaissance visit to the farm was made in the afternoon by the destruction and biocontainment teams to assess the logistical needs of the operation; simulating the on-farm assessments that would take place in an actual response.

On Wednesday, a field exercise occurred on a farm with an empty barn, and a debrief of the events took place on Thursday.

Equipment Ready to be Taken into the Barn

During the exercise, the biocontainment team set up well-defined hot, warm and cold zones. The destruction team used the necessary equipment and supplies to seal the barn. The gas delivery manifolds and hoses were set up, and a tanker truck that would supply CO_2 was brought onto the premises and hooked up to the manifold for demonstration purposes. No birds were destroyed in this exercise.

Members of the Destruction Team Sealing a Door in the Barn

There were a number of observers, representing various roles in industry and government, in addition to the participants from the destruction and biocontainment teams. The observers had the opportunity to don the full personal protective equipment (PPE) necessary to enter the hot zone. Wearing full PPE can restrict movement, reducing the ability to carry out the work, increase fatigue, and cause considerable discomfort. The PPE must be removed carefully and in the correct sequence to reduce the possibility of contamination.

Disinfectant Spray is Applied to a Worker Coming out of the "hot" Zone at the Beginning of the Biocontainment Process, While Others Wait Their Turn

Media were also given the opportunity to attend the farm and were toured through the barn so that they could observe the set up of the manifolds, how the barn would be sealed, and how to don and doff the PPE needed in an avian influenza outbreak.

The exercise provided valuable insight into the logistics, equipment and coordination required to depopulate a poultry barn in the event of an avian influenza outbreak.

Optic Neuritis and Blindness Secondary to Severe Spheno-Palatine Sinusitis in a Horse

by Dr. Ann Britton

The Animal Health Centre was presented with a 4 year old gelding in May recently transported from the USA to the Vancouver area. Upon arrival, the horse was found to be blind with bilateral pupillary dilation. Ophthalmologist examination led to a tentative diagnosis of optic nerve damage. There was no history of cranial trauma. The owners elected for euthanasia due to poor response to treatment.

At necropsy, the horse was in good body condition with gross abnormalities restricted to the head. There was marked swelling of the optic chiasm. The floor of the cranial vault below the optic chiasm and the optic canal was friable, tissue paper thin and easily dissected with bone rongeurs. The underlying spheno-palatine sinuses were plugged with clotted blood intermixed with pale tan and pale grey foci.

On histopathology, the sinus exudate consisted of clotted blood, necrotic cell debris, mixed inflammatory cells dominated by neutrophils, huge mats of septate branched fungal hyphae with cone-shaped conidia and numerous bacterial colonies composed of gram positive cocci and gram negative bacilli. There was marked granulation tissue. Small bits of necrotic bone undergoing lysis were observed often with pigmented fungal hyphae along the surface. When present, the sinus wall exhibited intact epithelium with marked mixed inflammation dominated by plasma cells with transmigration of neutrophils across the epithelium. The inflammatory process extended to involve the meninges and epineurium of the optic chiasm and optic nerves with mild sub-meningeal inflammation. However, there was marked necrosis and lysis of the nerve tracts of the optic chiasm running along the optic nerves with decreasing severity to the globes.

Bacteriology culture isolated heavy growth of *Streptococcus equi* subspecies *zooepidemicus* and *Actinobacillus equuli* subspecies *equuli*. Fungal culture revealed *Aspergillus nidulans*.

Blindness caused by spheno-palatine sinusitis and optic neuritis is an uncommon condition which has been reported in both horses and humans. The presence of the spheno-palatine sinus below the brain at the back of the nasopharynx makes clinical examination difficult and MRI is necessary to detect the condition. Affected individuals may have a history of respiratory disease prior to the onset of blindness. Review of the veterinary literature reveals 3 variably aged horses with a similar history and evidence of bacterial spheno-palatine sinusitis and with pressure on the overlying optic nerves. These horses did not harbour fungal agents in the sinusitis. Spheno-palatine sinusitis should be a differential diagnosis for unexplained blindness in horses.

Animal Health Centre Antimicrobial Resistance Reports by Dr. Brian Radke

Two reports on antimicrobial resistance (AMR) generated using Animal Health Centre (AHC) data have been posted to the Centre's Veterinary Drug Licensing webpage (http://www2.gov.bc.ca/gov/content/industry/agriculture-seafood/animals-and-crops/agricultural-licences-and-forms/veterinary-drug-licensing). One report focuses on Animal Health AMR, that is AMR in bacteria with clinical relevance in food-producing animal species. The other report addresses AMR of importance to Veterinary Public Health. Both reports present data from samples submitted to the AHC between January 1, 2007 and December 31, 2015. Specifically, the Animal Health report includes: florfenicol, oxytetracycline, and trimethoprim-sulfa resistance in *Aeromonas salmonicida* and *Yersinia ruckeri* isolated from Atlantic salmon; resistance to various antimicrobials including ceftiofur in *Streptococcus dysgalactiae*, *Streptococcus uberis*, *Staphylococcus aureus*, coagulase-negative staphylococci and *E. coli* isolates from bovine milk samples; and penicillin resistance in *Staphylococcus* species from broiler sector isolates.

The Veterinary Public Health report includes: methicillin resistance in *Staphylococcus* spp. isolates; and ceftiofur, enrofloxacin, trimethoprim-sulfa and tetracycline resistance in *Salmonella* spp. and *E. coli* isolates. The bacteria and antimicrobials included in the reports were determined based on the size of the production animal sectors in BC, the AHC's case submission volume, and consultation with experts including practicing veterinarians.

Monitoring BC Bats for White Nose Syndrome by Dr. Glenna McGregor

In March 2016, a Little Brown Bat (*Myotis lucifugus*) found alive near Seattle, Washington was diagnosed with White Nose Syndrome (WNS), a devastating fungal skin disease of bats caused by the fungus *Pseudogymnoascus destructans*. WNS was first diagnosed in New York in the winter of 2006/2007 and has swept across eastern and central North America, killing over 6 million bats in 28 US states and 5 Canadian provinces, threatening several species of North American bats with extinction. The detection in Washington is concerning and puzzling as it marks a jump of more than 2000 km west of the previous westernmost confirmed case. For BC, it is disturbing while bat research and WNS surveillance efforts were ongoing, we expected years before the disease threat was on our door-step.

Since the confirmation of WNS in Washington in late March, the pressure has been on to get as many incidental bat mortalities into the Animal Health Centre as possible. The BC Community Bat Project, a network of 14 community bat projects across BC (http://www.bcbats.ca), is serving as the primary point of contact for the public through a toll free line; collecting mortalities, coordinating and shipping them to the lab, as well as educating and fielding calls from the public. Thanks to these efforts, in the last two months, 28 incidental mortalities and one wing swab, spanning 7 bat species, have been submitted to the lab, a significant increase over previous years. At the lab, a complete necropsy has been completed on every bat, as well as rabies testing (by immunohistochemistry) and testing for *P. destructans* (by PCR).

Happily, so far all cases are negative for WNS. In addition to screening for WNS, testing of incidental mortalities provides information on common causes of death, which can be used to guide efforts to mitigate other threats to bat populations. Among the bats submitted, trauma is the most common cause of death, accounting for the cause of death in 11 cases. The trauma is mostly predation, likely by domestic cats, and crushing trauma such as being run over by a car or stepped on. Emaciation and dehydration was the cause of death in 6 cases, and rabies was the cause of death in 2 cases. In 9 cases, the cause of death could not be determined, largely due to poor specimen preservation.

The most interesting necropsy finding so far is how common fungal skin infections are in WNS-negative bats in BC. Of the 19 bats that were examined microscopically, 11 had evidence of fungal infections on their nose, tail and/or wings. In all of these cases, PCR for *P. destructans* was negative, and in most the microscopic appearance of the fungi and the inflammatory response were very different than in WNS. The variety of the fungal infections was also quite surprising – among the 11 bats with evidence of some type of fungal infection, there were at least 5 morphologically distinct fungi involved. Almost nothing is known about non-WNS fungal infections in bats. Testing to determine the species' of these fungi is ongoing. It is unknown whether or not infection with these fungi had a clinically-significant impact on the bats, perhaps by rendering them more prone to trauma, or decreasing their ability to catch insects. Further testing in future years will be necessary to determine whether this is normal in the population, or if this is an unusual finding.

For more information on how you can help BC's bats or to report dead or oddly-behaving bats, please see: http://www.bcbats.ca and http://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/wildlife/wildlife-health/wildlife-health-matters/bat-health.

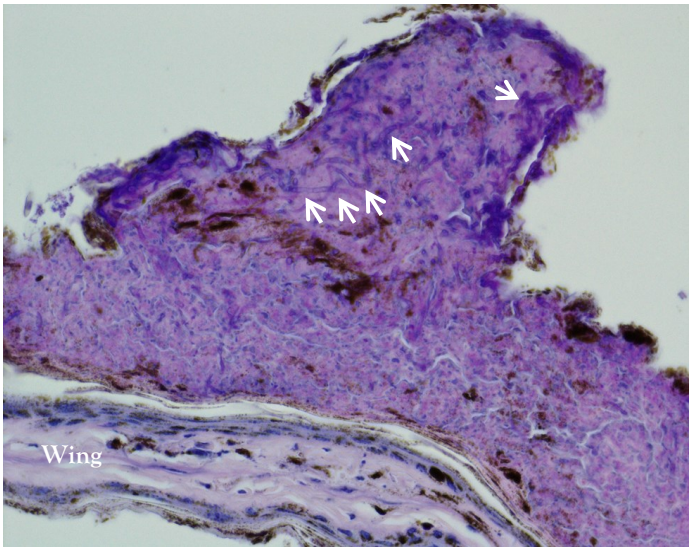
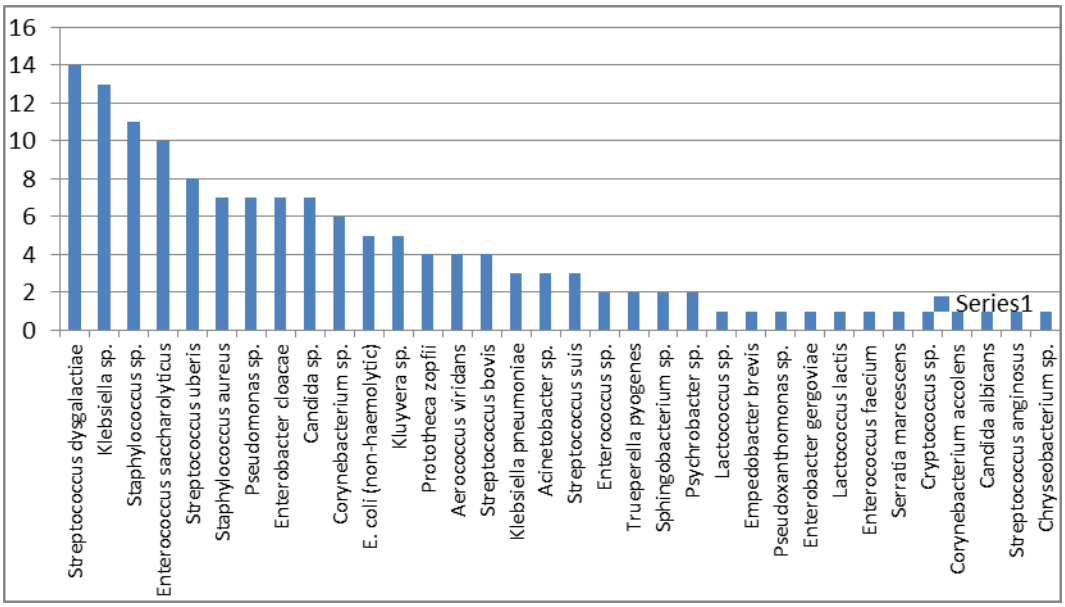


Figure 1: Bat wing from a WNS-negative bat infected with "Mystery Fungus 1". This fungus was common, affecting 6 out of 18 bats examined. Arrows indicate fungal hyphae penetrating through a large pustule within the epidermis of the wing. This lesion and the appearance of the fungus is very different from bats with WNS.

Milk Culture Results by Dr. Jane Pritchard

January 1—May 31, 2016 – Results of milk cultures sorted by frequency of isolation.



Between January 1 and May 31, 2016, 138 milk samples (49 submissions) were received for culture and sensitivity at the Plant and Animal Health Centre. Out of the 138 samples submitted, no bacteria was isolated in 21 samples.

Resistance by Isolate										
	amp	kf	ob	e	xnl	p10	pyr	sxt	tet	# of isolates tested
Streptococcus dysgalactiae	0%	0%	0%	0%	7%	0%	0%	0%	21%	14
Klebsiella sp.	92%	38%	100%	100%	15%	100%	100%	0%	15%	13
Staphylococcus sp.	9%	0%	0%	9%	0%	9%	27%	0%	9%	11
Enterococcus saccharolyticus	10%	10%	90%	20%	10%	0%	70%	0%	90%	10
Streptococcus uberis	13%	0%	75%	25%	0%	25%	13%	13%	13%	8

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

An Unusual Cancer Detected in a Stranded Adult Male Sea Lion (Zalophus californianus) Stranded in British Columbia

Stephen Raverty, (AHC), Martin Haulena, Karisa Tang and Abigail McClain (Vancouver Aquarium)

California sea lions main breeding areas include the Channel Islands in southern California and Mexican islands off the Pacific coast of Baja and in the Gulf of California. After breeding season, sub-adult and adult males migrate northward along the Oregon and Washington State coasts frequently as far north as Tofino on Vancouver island, British Columbia. Post mortem examinations of those animals that have previously stranded in the northeastern Pacific region have identified leptospirosis, past exposure to the harmful algal toxin Domoic acid and septicemia as prime contributors to morbidity and mortality. More recently, a urogenital carcinoma has emerged as a significant contributor to morbidity within affected animals. This condition is due to a herpesvirus which is widespread within the population and those animals which typically progress to cancer have elevated contaminant loads and inbreeding depression.

An adult male California sea lion recently live stranded in BC waters in very poor body condition and was presented to the Marine Mammal Rescue Center, Vancouver Aquarium for assessment and rehabilitation. Along the right and to a much lesser extent, left mandible, there was marked enlargement of the salivary glands. Cytology of axillary lymph nodes disclosed carcinoma. Due to progressive deterioration in overall condition and poor response to supportive care, the animal was humanely euthanized.

Post mortem examination confirmed generalized emaciation and revealed a mass within the right salivary gland which breached the capsule and invaded locally to the tonsils and regionally lymph nodes, as well as abutted the mandibular body and ramus. Microscopically, the mass was consistent with adenocarcinoma and was locally invasive. Molecular studies to screen the tumor and other tissues proved positive for universal herpesvirus and gene sequencing identified Californian sea lions herpesvirus. Close evaluation of the reproductive and urinary tracts did not reveal any discernible tumor involvement. Despite the positive PCR result, lack of urogenital involvement and identifiable viral inclusions within examined tissues suggested viremia with tumor development of the parotid gland. This is a rare tumor in stranded marine mammals and in this instance was likely spontaneous. The mass would have contributed significantly to impaired foraging and feeding, resulting in the decline in body condition. To date, only sporadic cases of urogenital carcinoma have presented in the northeastern Pacific, and this case may present a distinct and novel pathologic entity.

(Photo Courtesy of: Marine Mammal Rescue Center, Vancouver Aquarium)

Neospora caninum is the Leading Cause of Bovine Fetal Loss in British Columbia

Devon J Wilson [a,b], Karin Orsel [c], Josh Waddington [d], Malavika Rajeev [e], Amy R. Sweeny [e], Tomy Joseph [b], Michael E Grigg [e], Stephen A Raverty [b]

a. Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, Saskatchewan, S7N 5B4
b. The Animal Health Center, BC Ministry of Agriculture, 1767 Angus Campbell Road, Abbotsford, British Columbia, V3G 2M3
c. Department of Production Animal Health, Faculty of Veterinary Medicine, University of Calgary, Calgary, Alberta, T2N 4N1
d. Greenbelt Veterinary Services Ltd., 8451 Harvard Place, Chilliwack, British Columbia, V2P 7Z5
e. Molecular Parasitology Section, Laboratory of Parasitic Diseases, NIAID, National Institutes of Health, Bethesda, MD, USA

The protozoan parasite *Neospora caninum* is recognized cause of infectious abortions in cattle worldwide. To evaluate the impact of this parasite in dairy and beef herds in British Columbia (BC), past case submissions of bovine abortions to the Animal Health Centre were retrieved and assessed to identify the impact of neosporosis, alongside other causes of fetal loss in BC.

Review of pathology records of bovine fetal submissions to the AHC from January 2007- July 2013 identified 182 abortion cases (passive surveillance) and between July 2013 and May 2014, a more targeted active surveillance program of dairy farms in the Upper Fraser Valley, British Columbia identified an additional 54 abortion cases. Of the 236 fetal submissions analyzed, *N. caninum* was diagnosed in 18.2% of cases, and based on comparison with other diagnostic findings, infection with this parasite was the most commonly identified infectious agent associated with fetal loss. Bacteria associated with fetal losses included Trueperella pyogenes, mixed microbial infections, Leptospira spp, Streptococcus spp, Escherichia coli, Listeria monocytogenes, Pseudomonas aeruginosa and Salmonella Dublin. Rare cases of Mycoplasma bovis and Ureaplasma diversum were also reported. Bovine herpesvirus was the most commonly identified viral pathogen with sporadic cases of bovine viral diarrhea and there were rare cases of fungal infections and congenital anomalies.

During active surveillance, *N. caninum* was associated with 41% of fetuses submitted compared to 13.3% during passive surveillance ($P<0.001$) which may suggest a higher rate of infection than previously appreciated. Breed of dam was significantly associated with *N. caninum* diagnosis, with a higher prevalence in dairy versus beef breeds, and fetuses of 3-6 months gestational age had the highest prevalence of *N. caninum*. There was no significant association with dam parity. *Neospora caninum* was diagnosed in every year except 2009 and cases were geographically widespread throughout the province. Furthermore, the active surveillance program demonstrates that *N. caninum* is highly prevalent in the Upper Fraser Valley and is a major causal agent of production losses in this dairy intensive region.

Dr. Tony Redford is Back at the AHC for the Summer

Tony is here for the summer as an auxiliary veterinary pathologist covering back-up for the Avian Pathologist position.

Tony is originally from Kamloops, BC, but has been out in Saskatoon completing the veterinary medicine program at the Western College of Veterinary Medicine, and will be finished his master's in anatomic pathology this summer.

He plans on returning to WCVM at the end of the summer to complete a one year senior residency, which will help him to prepare for the pathology board exams.

Calendar of Events

"Keeping Your Sheep and Goats Healthy Workshops"

Sessions will focus on health, nutrition, disease and biosecurity related to sheep and goat flocks.
For more information contact:
Glenna.McGregor@gov.bc.ca or Lori.Vickers@gov.bc.ca

Cranbrook
Saturday, Sept 17, 2016 - 8:30–4:30
Exact Location: TBA

Penticton
Saturday, Oct 22, 2016 8:30–4:30
Exact Location: TBA

Thompson Area (100 Mile House or Kamloops)
Saturday, Oct 29, 2016 8:30–4:30
Exact Location: TBA

BRITISH COLUMBIA Ministry of Agriculture

Animal Health Centre
1767 Angus Campbell Road
Abbotsford BC V3G 2M3

Toll free (BC only):
1-800-661-9903
Phone: 604-556-3003
Fax: 604-556-3010

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Send correspondence to:

Rosemary Pede
Email: Rosemary.Pede@gov.bc.ca
Phone: 604-556-3065
Fax: 604-556-3015

To receive this newsletter electronically, contact Lynette.Hare@gov.bc.ca