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CANADIAN
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SCHOLARS SUMMIT

2021

UNIVERSITY OF
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FACULTY OF
VETERINARY MEDICINE

The 2021 Canadian Emerging Veterinary Scholars Summit

This annual summit brings together DVM and graduate students in veterinary research from across Canada to share their research projects and take part in career development workshops on topics including social media in research, publishing, and validity and reporting in veterinary clinical research.

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The Program

THURSDAY, NOVEMBER 4, 2021

Zoom URL: https://ucalgary.zoom.us/j/91392510904 (Passcode: 874188)

4:00-4:15 pm	Welcome: Dr. Jacob Thundathil (University of Calgary)
4:15-4:45 pm	Self-Introduction by Participants
4:45-5:30 pm	Interactive game: Dr. Angelica Galezowski
5:30-6:15 pm	Plenary address: Dean Renate Weller (University of Calgary)

FRIDAY, NOVEMBER 5, 2021 | *Session 1*

Zoom URL: https://ucalgary.zoom.us/j/92003378913 (Passcode: 009348)

8:30-8:45 am	Opening Remarks: Dr. Hermann Schätzl (University of Calgary)
8:45-9:00 am	Stefan Gavriliuc (MSc candidate, UCVM): Molecular and computational tools for cost-effective, non-invasive genotyping data in feral horses
9:00-9:15 am	Flavio Freitag (Resident & DVSc candidate, OVC): Comparison of rostral spread of lumbosacral epidural volume calculated by body weight or length of the vertebral column in dogs – Preliminary cadaveric study
9:15-9:30 am	Brittany Munro (DVM student, UCVM): Assessing the concentration at which loss of righting reflex occurs during carbon dioxide (CO_2) exposure.
9:30-9:45 am	Break (15 minutes)
9:45-10:00 am	Landon Warder (PhD candidate, AVC): The relationship between antimicrobial use and energy balance in PEI dairy cows
10:00-10:15 am	Olivia Galeuzzi (DVM student, AVC): Novel Finding in Prince Edward Island: Echinococcus multilocularis in a Red Fox
10:15-10:30 am	Maya Kliewer (DVM student, WCVM): The EphA2 receptor: could it be targeted for therapeutic intervention of osteosarcoma in canines?
10:30-10:45 am	Juliette Raulic (Resident, UM): Evaluation of robenacoxib as a novel anti-inflammatory drug in fish
10:45-11:00 am	Part 1: Introduction to Canadian Veterinary Colleges
11:00-12:00 pm	Lunch (1 hour)

FRIDAY, NOVEMBER 5, 2021 | *Session 2*

Zoom URL: https://ucalgary.zoom.us/j/92003378913 (Passcode: 009348)
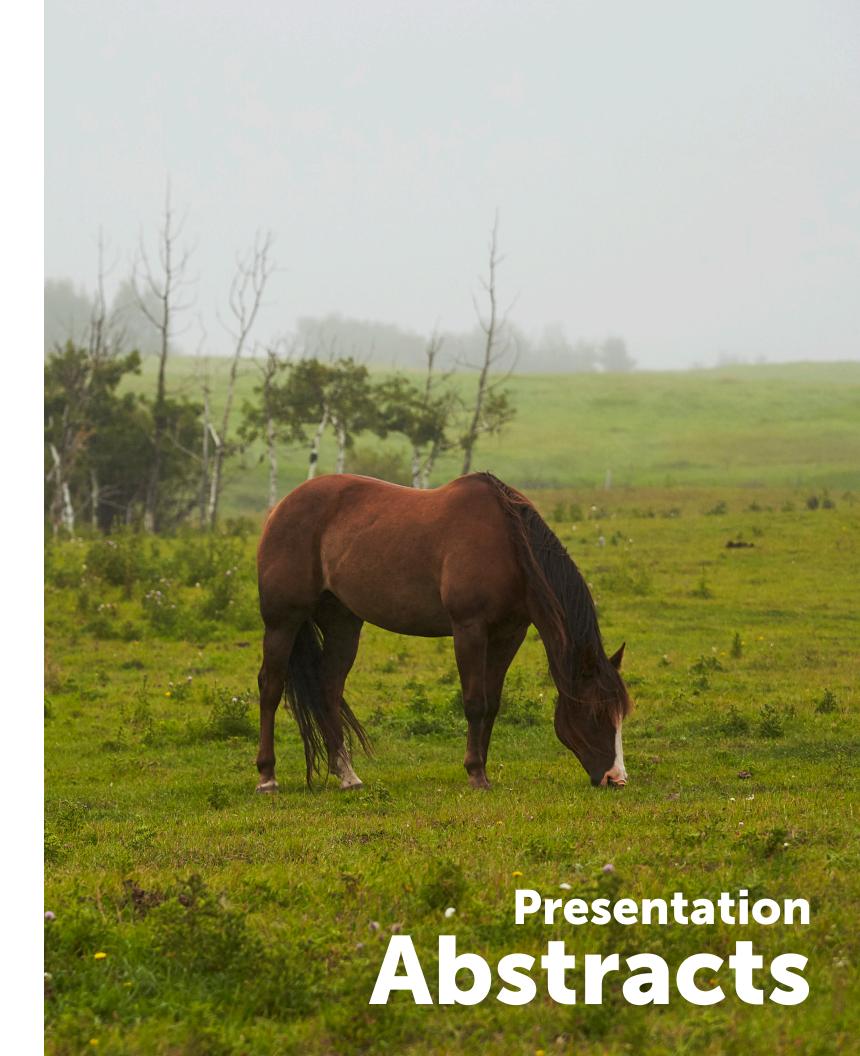
12:00-12:15 pm	Callan Johnson (DVM student, AVC): Relationship between personality traits, age, sex and physiological indicators of chronic stress in ring-tailed lemurs (Lemur catta)
12:15-12:30 pm	Jolene Giacinti (PhD candidate, OVC): Genetic characterization of canine distemper virus from wild and domestic animal submissions to diagnostic facilities in Canada
12:30-12:45 pm	Jaimie Warren (DVM student, UCVM): Evaluation of Genetic Basis of Degenerative Heart Conditions in Vancouver Island Marmot
12:45-1:00 pm	Maria Papapetrou (DVM student, OVC): Determining the association of equine parvovirus hepatitis virus (EqPV-H) with serum markers of liver disease and the prevalence of EqPV-H DNA in Ontario horses
1:00-1:15 pm	Part 2: Introduction to Canadian Veterinary Colleges
1:15-1:30 pm	Break (15 minutes)
1:30-1:45 pm	Miranda Zwiefelhofer (PhD candidate, WCVM): Production of live calves after transfer of vitrified in vitro- produced embryos in synchronized wood bison (bison bison athabascae)
1:45-2:00 pm	Tony Bruinjé (PhD candidate, OVC): Association between postpartum health and expression of estrus measured by activity monitors in dairy cows
2:00-2:15 pm	Marianne Parent (PhD candidate, AVC): The dispersal of sea lice in New Brunswick Atlantic salmon farms
2:15-2:30 pm	Kayla Strong (PhD candidate, UCVM): Antimicrobial Resistance Risk Factors in the Canadian Beef Cattle Production System: Exploring Epidemiology using Integrated Assessment Models
2:30-2:45 pm	Break (15 minutes)
2:45-3:45 pm	Career Panel (1 hour) Panelists: Dr. Jess McArt (Cornell University), Dr. Daniel Pang (University of Calgary), Dr. Holly Sparks (University of Calgary), Dr. Nicole Colapinto (Merck Animal Health) Moderator: Dr. Cameron Knight

Zoom URL: **https://ucalgary.zoom.us/j/91262203233** (Passcode: 657178)

9:00-9:45 am	Workshop 3A: *Don't believe everything you read: validity & reporting in veterinary clinical research.* Presenter: Dr. Daniel Pang. Moderator: Dr. Cameron Knight
9:45-10:00 am	Break (15 minutes)
10:00-10:45 am	Workshop 3B: *Media relations and research: get the media working for you.* Presenters: Collene Ferguson and Dean Parthenis
10:45-11:00 am	Break (15 minutes)
11:00-11:45 am	Workshop 3C: *Publish or perish?* Presenters: Dr. John Gilleard and Dr. Janet Hill. Moderator: Mason Stothart
11:45-12:00 pm	Break (15 minutes)
12:00-12:45 pm	Workshop 3D: : *Navigating the intersection between social media and research.* Presenters: Collene Ferguson, Dr. Jasmine Janes and Dr. Antoine Dufour. Moderator: Micky Ahn
12:45-1:00 pm	Awards and Prizes
1:00-1:15 pm	Closing Remarks: Dean Renate Weller (University of Calgary)

Presentation Abstracts

Molecular and computational tools for cost-effective, non-invasive genotyping data in feral horses

- Stefan Gavriliuc, Faculty of Veterinary Medicine, Department of Ecosystem and Public Health, University of Calgary
- Salman Reza, Faculty of Veterinary Medicine, Department of Ecosystem and Public Health, University of Calgary
- Chanwoori Jeong, Faculty of Veterinary Medicine, Department of Ecosystem and Public Health, University of Calgary
- Philip McLoughlin, Department of Biology, University of Saskatchewan
- Jocelyn Poissant, Faculty of Veterinary Medicine, Department of Ecosystem and Public Health, University of Calgary

Introduction
Genomic technologies have become increasingly widespread through their decreases in costs, but have remained inaccessible for wildlife and conservation genetics studies. The main impediment for applying genomics to these fields has been the high input requirements of DNA which entails invasive sampling. Recently, target enrichment approaches have been shown to yield genome-wide genotype data with minimal DNA input, but these methods have yet to be tested on sample tissue obtained non-invasively such as feces. Concurrent advances in genome imputation have enabled the inference of missing genotypes, increasing genotype density to the size of a reference population and in turn improving coverage and statistical power for genomic studies.

Methods
Our goals were to 1) test whether a novel target enrichment method can provide genotype information comparable to the common standard of DNA microarrays and 2) whether genome imputation can further increase genotype density with high accuracy.

Results
We collected fecal swabs from a population of feral horses, and genotyped 48 swabs at 279 loci using the NuGEN Allegro Targeted Genotyping kit. Output genotypes were compared to the same set of loci genotyped using standard equine DNA microarrays for coverage and agreement. For imputation, we masked genotypes to random subsets (1000 – 20000) and varied the number of individuals in the reference population. Target enrichment a mean coverage and accuracy of 85% and >99% per sample, respectively, while genome imputation accuracy approached unity when using >10k SNPs.

Conclusion
This work serves as a proof-of-concept for non-invasive genotyping, helping enable large-scale genomics for natural populations.

Comparison of rostral spread of lumbosacral epidural volume calculated by body weight or length of the vertebral column in dogs – Preliminary cadaveric study

- Flavio Augusto Vieira Freitag / University of Guelph - Ontario Veterinary College - Department of Clinical Studies; Guelph, ON, Canada.
- Alexander Valverde / University of Guelph - Ontario Veterinary College - Department of Clinical Studies; Guelph, ON, Canada.
- Monica Jensen / University of Guelph - Ontario Veterinary College - Department of Clinical Studies; Guelph, ON, Canada.
- Andrea Sanchez Lazaro / University of Guelph - Ontario Veterinary College - Department of Clinical Studies; Guelph, ON, Canada.
- Diego Gomez-Nieto / University of Guelph - Ontario Veterinary College - Department of Clinical Studies; Guelph, ON, Canada.
- Craig Bailey / University of Guelph - Ontario Veterinary College - Department of Biomedical Sciences; Guelph, ON, Canada.

Introduction
Epidural injections are a common regional anesthetic technique used to provide analgesia of the pelvic limbs, pelvis and abdomen. The rostral spread of epidural drugs can be affected by gravity and friction forces, and the volume of injectate. The volume can be calculated based on body weight (mL/kg) or on the length of the vertebral column (mL/cm).

Methods
In a cadaveric model, 22 dog cadavers were paired for similar weights and length of the vertebral column, and within each pair, dogs were randomly assigned to receive a lumbosacral epidural volume based on weight (GW; 0.2 mL/kg) or length (GL; 0.05 to 0.11 mL/cm based on vertebral length), using dye (yellow tissue dye) mixed with contrast media (iopamidol) injected through an epidural catheter. The rostral spread was evaluated by anatomical dissection.

Results
In small (<10 kg) and medium size dogs (< 25 kg), the calculated epidural volume for GL is larger than for GW, and anatomical dyeing was also more rostral. For large (> 25, < 45 kg) and giant dogs (> 45 kg), there was no obvious difference in volume and rostral spread.

Conclusion
The results of this cadaveric study corroborate findings of a previous hypothetical mathematical model that predicts that the volume of injectate and rostral spread is larger in small and medium dogs when the volume is calculated based on length of the vertebral column, and similar for large and giant dogs.

Assessing the concentration at which loss of righting reflex occurs during carbon dioxide (CO_2) exposure.

- Brittany Munro: Veterinary Clinical and Diagnostic Sciences, Faculty of Veterinary Medicine, University of Calgary
- Dexter Merenick: Veterinary Clinical and Diagnostic Sciences, Faculty of Veterinary Medicine, University of Calgary
- Julia Gee: College of Engineering and Physical Sciences, Faculty of Engineering, University of Guelph
- Daniel Pang: Faculty of Veterinary Medicine, University of Calgary | Université de Montréal

Overdose with CO2 gas is a common technique for euthanizing laboratory rats. However, rats show aversion to CO2 at low concentrations, and it is unclear if pain occurs before loss of consciousness (LOC). Reported methods for determining LOC vary considerably resulting in a wide range of CO2 concentrations associated with LOC (21-39%). One outcome measure, loss of righting reflex (LORR), is strongly positively correlated with LOC in humans. This blinded, randomized study aimed to determine the CO2 concentration at which LORR occurs in adult rats using a standardized assessment method. Animals: 28 adult Sprague-Dawley rats (226-455g, 11 males, 17 females). A 3D-printed apparatus was designed and built to house a motor-driven rotating cylinder (3 rpm). CO2 in-flow was controlled with a flowmeter and calibrated CO2 analyzer, with concentrations increased stepwise. Dose response curves for LORR were generated with probit regression for the study population: EC50 = 30.2%, EC95 = 34.4% (n = 28). Separate curves were generated for each sex: males; EC50 29.3%, females; EC50 30.9% (p = 0.003, 95%CI 0.6 to 2.6%). Males; EC95 32.2%, females; EC95 35.1% (p = 0.01, 95%CI 0.7 to 5.0%). The EC95 for the study population (34.4%) falls within the CO2 concentration range associated with pain in humans. These data suggest a small difference in CO2 sensitivity between sexes and the potential for pain before LORR.

The relationship between antimicrobial use and energy balance in PEI dairy cows

- Landon Warder/Department of Health Management, Atlantic Veterinary College, University of Prince Edward Island
- Javier Sanchez/Department of Health Management, Atlantic Veterinary College, University of Prince Edward Island
- Luke Heider/Department of Health Management, Atlantic Veterinary College, University of Prince Edward Island

Antimicrobial use (AMU) in livestock is a major facet of strategies for reducing the risk of developing antimicrobial resistance in zoonotic, pathogenic bacteria. Ruminants get much of their nutrition from the bacteria in their rumen, and antimicrobials are indiscriminate about the bacteria they affect. These relationships make it important to consider the metabolic effects that antimicrobials can cause. This is particularly important in the dairy industry, where negative energy balance and ketosis bring about more AMU.

This study investigates the role that antimicrobials play in energy balance across the transition period of Prince Edward Island dairy cattle. Twenty-eight farms were enrolled, providing 133 animals in total. Blood samples were taken 1-3 weeks prepartum and 2-4 weeks postpartum for all animals. Prepartum samples were tested for non-esterified fatty acids (NEFA), and postpartum samples were tested for beta-hydroxybutyrate (BHB). Models determined the relationship between these markers and AMU, time from calving, and parity.

Total AMU was correlated with lower NEFA and BHB. Ionophore use was correlated with NEFA, as high and low usage farms had higher concentrations than medium use farms. Farms that used more penicillins tended to have lower BHB concentrations in their cows postpartum. Days from calving and parity were significantly correlated with NEFA. These results give evidence that AMU choices on farms can affect the energy balance of cows.

There is a clear relationship between farm-level AMU practices and energy balance in peripartum dairy cattle. It is important to consider these effects as AMU practices change.

Novel Finding in Prince Edward Island: Echinococcus multilocularis in a Red Fox

- Olivia Galeuzzi/Canadian Wildlife Health Cooperative, Atlantic Region, Pathology and Microbiology
- Will Robbins/Biomedical Sciences
- Kylee Graham/Canadian Wildlife Health Cooperative, Atlantic Region, Pathology and Microbiology
- Gary Conboy/Pathology and Microbiology
- Spencer Greenwood/Biomedical Sciences
- Melanie Buote/Pathology and Microbiology
- Megan Jones/Canadian Wildlife Health Cooperative, Atlantic Region, Pathology and Microbiology

The Red Fox (Vulpes vulpes), which inhabits Prince Edward Island (PEI), Canada, is host to various parasite species. The diversity and distribution of helminths within this wild canid on PEI has not been assessed since 2015. For instance, the French Heartworm (Angiostrongylus vasorum), which causes potentially fatal disease in dogs, has recently been identified in coyotes in Nova Scotia, a precedent for its likely spread to PEI. Additionally, in the last several years, sarcoptic mange has become an important emerging ectoparasitic disease and management challenge for foxes on PEI, and the potential relationship between helminth infection intensity and diversity, and risk of sarcoptic mange, has never been investigated.

The aims of this study were to describe the diversity and distribution of helminths in red foxes on PEI; perform targeted surveillance for Angiostrongylus vasorum; and investigate a possible relationship between helminth burden and incidence of sarcoptic mange. In order to identify and quantify helminth diversity, lung and GI parasite recovery procedures were conducted on trapper-sourced foxes (n=61) from PEI collected during the 2020-2021 trapping season. Key findings included the discovery of the zoonotic tapeworm, Echinococcus multilocularis, which has never been identified in Prince Edward Island, and the identification of Angiostrongylus vasorum.

Our investigation of the relationship between sarcoptic mange incidence and endoparasite load is ongoing and uses findings from a parallel mange study. Ultimately, this survey elucidates the diversity and distribution of helminths in red foxes on PEI while also highlighting serious public health concerns for the region.

The EphA2 receptor: could it be targeted for therapeutic intervention of osteosarcoma in canines?

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- Evelyn Harris, Department of Small Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan
- Jessica Sharpe, Department of Small Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan
- Tim Strozen , Department of Small Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan
- Behzad Toosi, Department of Small Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan

Osteosarcoma (OSA) is the most common bone cancer in canines and is often accompanied by aggressive metastasis leading to poor patient outcomes. Current treatment methods include chemotherapy and limb-sparing surgery, but survival time post-treatment remains low at 1-year. Although targeted cancer therapy could be a better treatment option for OSA, identification of suitable molecular targets for this therapy is required. A novel target of interest is the EphA2 cell surface receptor which is a member of the erythropoietin-producing hepatocellular (Eph) receptors that are involved in regulation of cell-cell interactions. Upregulation of EphA2 expression and function has been associated with the aggressiveness of multiple human cancers but has been poorly studied in canine malignancies. The purpose of this study was to characterize the role of EphA2 in promoting the pathophysiology of canine OSA. Preliminary EphA2 gene expression analysis using Western blotting revealed EphA2 overexpression in multiple primary canine OSA cells when compared to normal canine osteoblasts. We investigated the function of the EphA2 receptor by using specific shRNAs to silence EphA2 in primary canine OSA cells. Cell proliferation, migration, and formation of scattered colonies were all decreased and sensitivity to cisplatin increased following EphA2 silencing when compared to non-silenced controls in culture. EphA2 silencing also reduced tumour formation and tumour growth rate in murine models of canine OSA. These original findings suggest important roles for EphA2 in promoting the progression of canine OSA and support development of conceptually new targeted therapies for canine OSA treatment based on the inhibition of EphA2.

Evaluation of robenacoxib as a novel anti-inflammatory drug in fish

- Juliette Raulic, DMV, ISPAV
- Claire Grosset, DMV, IPSAV, CES, DACZM
- Stephane Lair, DVM, DES, DVSc, DACZM
- Noemie Summa, DMV, IPSAV, DACZM
- Guy Beauchamp, PhD
- Marion Jalenques, DMV
- Francis Beaudry, PhD
- Wahiba Ait Youcef, PhD

Robenacoxib (Onsior®, Elanco) is a selective COX-2 inhibitor with a prolonged duration of action. The pharmacokinetics, duration of antinociceptive action, and potential adverse effects of robenacoxib were evaluated through two prospective randomized blinded trials in rainbow trout. Six healthy rainbow trout received a single intramuscular (IM) administration of robenacoxib (2 mg/kg). Blood samples were collected at predetermined timepoints for 5 days. Plasma robenacoxib concentrations were measured via high performance liquid chromatography-tandem mass spectrometry and non-compartmental pharmacokinetic analysis was performed. Ten additional rainbow trout received an injection of 0.05 mL of 2% acetic acid in the upper and lower lips following a previously validated nociceptive model. The treated group (n=6) received 2 mg/kg of robenacoxib IM and the control group (n=4) received an equivalent volume of saline IM. The behavior, appetite and opercular rate of the ten fish were evaluated once an hour for 5 hours, then once daily for 3 days. All 12 treated trout and 4 controls underwent histopathologic evaluation. Average maximum plasma concentration (Cmax) was 2.1 hours ±0.7 (329.9 ng/mL ±137.3), terminal half-life was 12.6 hours ±2.27 and area under the curve (AUC) from the first dose to infinity were 6655.5 ng/mL*h. Plasma levels antinociceptive in domestic carnivores were measured for 3 to 4 days. This dose resulted in a significant decrease in rocking behavior (p = 0.0017) during early phases of the experiment. No adverse effects were detected clinically nor on histopathology. This study presents a new therapeutic option to provide long-lasting antinociception in rainbow trout.

Relationship between personality traits, age, sex and physiological indicators of chronic stress in ring-tailed lemurs (Lemur catta)

- Callan Johnson / Department of Health Management, Atlantic Veterinary College, University of Prince Edward Island
- Hannah Spitzer / Department of Health Management, Atlantic Veterinary College, University of Prince Edward Island
- Henrik Stryhn / Department of Health Management, Atlantic Veterinary College, University of Prince Edward Island
- Lucia Améndola / Department of Health Management, Atlantic Veterinary College, University of Prince Edward Island
- Rebecca Meagher / Department of Animal Science & Aquaculture, Dalhousie University
- Kathryn Seeley / Ohio State University, College of Veterinary Medicine
- Kathryn Proudfoot / Department of Health Management, Atlantic Veterinary College, University of Prince Edward Island

Introduction: Personality has been linked to chronic stress in humans, which can contribute to poor health. Less work has understood the relationship between personality and chronic stress in non-human primates. The objectives are to 1) describe personality traits in ring-tailed lemurs under human care and 2) evaluate the association between personality trait ratings, age, sex and physiological indicators of chronic stress.

Methods: A total of 13 ring-tailed lemurs housed at the Duke Lemur Center, Durham, NC were included in the study. To assess personality traits, 10 keepers were given electronic surveys for each lemur including a 54-item Hominoid Personality Questionnaire. Chronic stress had previously been evaluated for each lemur using an "Allostatic Load Index" calculated using a combination of 6 biomarkers associated with stress (albumin, cortisol, DHEA-S, DNA damage, glucose and PGE-2).

Results: Our preliminary findings suggest that there are a range of personality traits in lemurs, including conscientiousness, neuroticism, extraversion and dominance. Females showed higher conscientiousness and dominance compared to males as expected because ringtails have a matriarchal hierarchy. Males showed low dominance but high neuroticism and extraversion. Personality was related to age; younger animals were higher in conscientiousness and older animals were more neurotic. At this stage it's unclear how chronic stress is related to personality, as data collection is ongoing.

Conclusion: Our data is still preliminary but offers a promising area of future research to develop a better understanding of the link between personality factors and welfare of ring-tailed lemurs.

Genetic characterization of canine distemper virus from wild and domestic animal submissions to diagnostic facilities in Canada

- Jolene Giacinti, Department of Pathobiology & Canadian Wildlife Health Cooperative, Ontario Veterinary College, University of Guelph
- David Pearl, Department of Population Medicine, Ontario Veterinary College, University of Guelph
- Davor Ojkic, Animal Health Laboratory, University of Guelph
- G. Douglas Campbell, Canadian Wildlife Health Cooperative, Ontario Veterinary College, University of Guelph
- Claire Jardine, Department of Pathobiology & Canadian Wildlife Health Cooperative, Ontario Veterinary College, University of Guelph

Traditionally considered an agent affecting domestic dogs, canine distemper virus (CDV) is now known for an ability to infect a broad range of hosts. CDV has been regularly documented in Ontario wildlife. The potential for close contact between wildlife (e.g., raccoons) and dogs particularly in urban areas, leads to opportunities for CDV transmission. The recent isolation of CDV strains genetically distinct from vaccine strains highlights the importance of studying the molecular epidemiology of this virus. Therefore, our objective was to investigate the molecular identities of and genetic relationships between CDV sequences obtained from nondomestic and domestic animal submissions to diagnostic facilities in Ontario. Samples were opportunistically collected. RT-PCR was used to confirm CDV diagnosis, and the hemagglutinin gene was sequenced. Phylogenetic relationships were inferred, the geographic distribution of clades was visualized, and phenetic relationships between sequences were investigated. CDV sequences from ten species were characterized into seven distinct lineages, that overlapped geographically and temporally. The predominant lineage circulating in Ontario wildlife has not been previously described. This study also confirmed the presence of CDV from a lineage not found to be circulating in Ontario wildlife, in a domestic dog imported into Ontario. Therefore, travel and the trade of animals is an important avenue for the introduction of novel CDV lineages. It remains unclear whether and to what extent the genetic heterogeneity identified poses a risk to the efficacy of current vaccines. Increasing viral activity and antigenic drift resulting in partial protection or vaccine failure remains an area requiring continued surveillance.

Evaluation of Genetic Basis of Degenerative Heart Conditions in Vancouver Island Marmots

- Jaimie Warren; Faculty of Veterinary Medicine, University of Calgary
- Jocelyn Poissant; Faculty of Veterinary Medicine, University of Calgary
- Malcolm McAdie; Marmot Recovery Foundation
- Stephen Raverty; Animal Health Center, B.C. Ministry of Agriculture and Food
- Douglas Whiteside; Faculty of Veterinary Medicine, University of Calgary; The Calgary Zoo

Introduction: Vancouver Island marmots (Marmota vancouverensis) are Canada's most endangered mammal and are classified as critically endangered. As a result, a multi-institutional conservation breeding program was established in 1997. Within this program, degenerative heart disease has been diagnosed in over 45% of adult deaths. These cardiac changes include dilative cardiomyopathy (DCM) and fibrosis, which are rarely noted in deaths in wild individuals. Due to this high prevalence, several genetically valuable individuals are lost annually from the program. We hypothesized that there is a genetic basis for heart disease and its expression may be precipitated in combination with environmental factors.

Methods: To determine the potential heritability of these diseases, three pedigree-based animal models were run using the package MCMCglmm in R: one for DCM, one for fibrosis, and one combined model. Each model was composed of 10^6 iterations with a thinning interval of 100 and a burn-in period of 200,000 iterations with a chi-square prior.

Results: The posterior modes and their 95% credible intervals for the heritability of DCM, fibrosis and both traits combined were 0.0016 [3.87×10^{-9}, 0.42], 0.0032 [2.64×10^{-8}, 0.64] and 0.0015 [2.95×10^{-9}, 0.51], respectively.

Conclusion: The heritability values for these diseases are likely very close to zero and rather than having a heritable basis, could be due to environmental factors, fixed deleterious alleles, or cryptic inbreeding. Determining that these diseases are not heritable not only provides important insight into their basis but will also guide future research on Vancouver Island Marmots.

Determining the association of equine parvovirus hepatitis virus (EqPV-H) with serum markers of liver disease and the prevalence of EqPV-H DNA in Ontario horses

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- Brüggemann, Y. Department of Molecular and Medical Virology, Faculty of Medicine, Ruhr-University Bochum
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- Steinmann, E. Department of Molecular and Medical Virology, Faculty of Medicine, Ruhr-University Bochum
- Baird, J.D. Department of Clinical Studies, Ontario Veterinary College, University of Guelph
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Equine parvovirus-hepatitis virus (EqPV-H) has been associated with equine serum hepatitis (Theiler's disease), a common cause of acute hepatic failure. EqPV-H is most commonly transmitted via the administration of equine biological products contaminated with EqPV-H, but non-biological transmission has been reported. Although most EqPV-H positive horses are asymptomatic or subclinical, some develop clinical signs similar to Theiler's disease, including lethargy, anorexia, icterus, neurological signs, and/or death. This study investigated the molecular prevalence of EqPV-H and its association with serum markers of liver disease in mares and foals on a farm in Ontario, Canada as well as the prevalence of EqPV-H in horses across Ontario. 11 mares and their foals were sampled twice in 2019, 36 days apart after a mare developed peracute neurological disease associated with Theiler's disease, with 130 additional mares sampled across Ontario. DNA was isolated from serum and tested for EqPV-H using quantitative-PCR. The seroprevalence of EqPV-H in Ontario broodmares was 14.6 %. Seroprevalence of EqPV-H DNA on the farm was 77.2 %, with 17/22 of horses testing positive at least once, with viral loads ranging from 5.93 x 102-6.10 x 105 copies/mL. Serum biochemistry and bile acid panels were performed at the second time point to assess liver disease. Regression analysis between EqPV-H DNA copy number and serum parameters revealed no strong relationship between the presence of parvovirus and indicators of liver disease, with the highest correlation found with GLDH (R2 of 0.396). The role of EqPV-H in Theiler's disease remains unclear and requires further investigation.

Production of live calves after transfer of vitrified in vitro- produced embryos in synchronized wood bison (bison bison athabascae)

- Miranda L Zwiefelhofer / Department of Veterinary Biomedical Sciences, Western College of Veterinary Medicine
- Gabriela F Mastromonaco / Reproductive Physiology, Toronto Zoo
- Eric M Zwiefelhofer / Department of Veterinary Biomedical Sciences, Western College of Veterinary Medicine
- Gregg P Adams / Department of Veterinary Biomedical Sciences, Western College of Veterinary Medicine

Wood bison (Bison bison athabascae) are a threatened subspecies native to Canada. Reproductive technologies are being developed to establish a functional germplasm biobank for bison conservation. The objective was to identify factors that influence pregnancy after the transfer of in vitro produced embryos. We compared embryo stage (vitrified at different stages of development [morula or blastocyst] and on different days post-fertilization [7-8 days]; Experiment 1), and cryopreservation method (vitrified, frozen in glycerol, or fresh; Experiment 2). The study was completed in two consecutive years (n=28, Experiment 1; n=26, Experiment 2). A single embryo was transferred to recipient bison 7 days after ovulation into the uterine horn ipsilateral to ovulation. Pregnancy was diagnosed by transrectal ultrasonography at 30 and 60 days post-ovulation. Data were analyzed by Fisher's exact test. In Experiment 1, the transfer of morula-stage embryos resulted in a greater pregnancy rate at 60 days than blastocyst-stage embryos (3/7 [42.9%] vs 0/21 [0%]; P=0.01). Three calves were born in 2020, after a gestation of 264, 266, and 267 days. In Experiment 2, pregnancies were produced after the transfer of either fresh or vitrified embryos, but embryos frozen in glycerol produced no pregnancies (60-days; 4/9 [44.4%] vs 3/8 [37.5%] vs 0/9 [0%], P=0.4). Three calves were born in 2021 after a gestation of 266, 266, and 269 days. In conclusion, embryo vitrification resulted in a pregnancy rate similar to that after transfer of fresh embryos, and cryopreservation at the morula-stage may yield the best outcome for biobanking bison embryos.

Association between postpartum health and expression of estrus measured by activity monitors in dairy cows

- Tony C. Bruinjé / Department of Population Medicine, University of Guelph
- E.I. Morrison / Department of Population Medicine, University of Guelph
- R. Couto Serrenho / Department of Population Medicine, University of Guelph
- D. Renaud / Department of Population Medicine, University of Guelph
- E.S. Ribeiro / Department of Animal Biosciences, University of Guelph
- Stephen J. LeBlanc / Department of Population Medicine, University of Guelph

Introduction. Nearly half of dairy cows develop at least one clinical or subclinical health disorder in the early postpartum period. Although cows with a health disorder are at increased risk of infertility, the link between postpartum health and reproductive function is not fully understood. The objective was to investigate associations of postpartum health with estrus expression as detected by activity monitors in dairy cows.

Methods. Holstein cows (n = 1,214) from 2 dairy herds in Ontario were examined from 3 weeks before to 9 weeks after parturition. Serum total calcium, haptoglobin, and non-esterified fatty acids were measured at 2 and 6 d postpartum. Blood β-hydroxybutyrate (BHB) and metritis were assessed twice weekly until 15 d. Endometritis and purulent vaginal discharge (PVD) were assessed at week 5. Body condition and lameness were assessed throughout the study. Estrus was detected by activity monitors with minimal interventions until 75 d.

Results. Between 50 and 75 d, 71% of cows were detected in estrus. The probability of estrus detection was reduced in cows with haptoglobin $\geq$ 0.6 g/L at d 6 (64 vs. 74%), BHB $\geq$ 0.7 mmol/L at d 15 (65 vs. 73%), endometritis (64 vs. 74%), PVD (66 vs. 73%), and with $\geq$ 0.5-point (1-5 scale) loss of body condition (63 vs. 75%).

Conclusion. Early identification of cows that are less likely to be detected in spontaneous estrus based on their health status could allow producers to selectively employ interventions, optimizing reproductive management.

The dispersal of sea lice in New Brunswick Atlantic salmon farms

- Marianne I. Parent and Henrik Stryhn: Atlantic Veterinary College, University of Prince Edward Island
- Raphaël Vanderstichel: College of Veterinary Medicine, Long Island University

Introduction: Atlantic salmon farms in the Bay of Fundy, New Brunswick, are challenged by the salmon louse, Lepeophtheirus salmonis. In 2018, approximately $10.8 million CAD (based on an estimate of 4 % of production costs), was spent on mitigation strategies and management of sea lice by the NB aquaculture industry. The Fish-iTrends data management system is a web-based program for the aggregation of sea lice counts and treatment data. The Fish-iTrends system enables the evaluation of sea lice modelling techniques to investigate regional dispersal patterns of sea lice.

Methods: Data from 2009 to 2018 were utilized to indirectly estimate dispersal distance of sea lice among salmon farms using external infestation pressure (EIP: a measure of the dose of exposure of parasitic sea lice which could result in the infestation of a new fish host at a neighbouring farm). The EIP was calculated using a spatially weighted Gaussian kernel density estimate for bandwidths ranging from 1 to 60 km.

Results: The EIP with a bandwidth of 10 km had the best fit as determined with the Akaike's Information Criterion in a multivariable linear mixed model for the abundance of adult female L. salmonis.

Conclusions: This study concluded that sea lice can infest neighbouring sites at 10 km and synchronized treatment of sea lice among farms may improve management of sea lice in the Bay of Fundy, NB.

Antimicrobial Resistance Risk Factors in the Canadian Beef Cattle Production System: Exploring Epidemiology using Integrated Assessment Models.

- Kayla Strong, University of Calgary, Faculty of Veterinary Medicine | AMR - One Health Consortium
- Jesse Invik, University of Calgary, Faculty of Veterinary Medicine
- Richard Reid-Smith, AMR - One Health Consortium | Public Health Agency of Canada | University of Guelph
- Cheryl Waldner, University of Saskatchewan, Western College of Veterinary Medicine
- Simon J. G. Otto, AMR - One Health Consortium | University of Alberta, School of Public Health
- Sylvia Checkley, University of Calgary, Faculty of Veterinary Medicine | AMR - One Health Consortium

Background: When Antimicrobial Resistance (AMR) develops, antimicrobials lose their therapeutic effectiveness. Hitherto treatable infections become more costly and challenging to treat. There remains uncertainty about the extent of transmission between beef products and people and the impact of cumulative risk factors. This research seeks to identify measurable factors associated with increased or decreased AMR in the Canadian Beef Industry using enterococci as an indicator. Novel analyses will use an integrated assessment model (IAM).

Methods: A double-blinded scoping review identified published risk factors. Reported interventions and measured outcomes were extracted into a standardized iAM.AMR research database. Odds ratios were calculated from the database and inserted into an Analytica IAM model (Lumina Decision Systems) that is adapted from the iAM.AMR methodology.

Results: 1188 articles were screened and 29 articles qualified for inclusion in the database. 30% of included studies were published since 2019, and all included factors related to antimicrobial use. There are no factors specific to transportation or abattoirs. Currently identified factors have shown a minimal positive increase in resistance and are influenced by their frequency and temporality.

Conclusions: This IAM is an exploratory tool to examine the directionality and magnitude of risk factors and the impact of future interventions and stochastic uncertainty. AMR measurements were difficult to incorporate in a model given differing sample time frames, and statistical methods when presenting results. The model provides a transdisciplinary platform for investigating AMR in a One Health context, at the intersection between human, animal and environmental health.

Important ZOOM information

Thursday, November 4
Zoom URL: **https://ucalgary.zoom.us/j/91392510904**
Passcode: 874188 | Meeting ID: 913 9251 0904

Friday, November 5
Zoom URL for both sessions: **https://ucalgary.zoom.us/j/92003378913**
Passcode: 009348 | Meeting ID: 920 0337 8913

Saturday, November 6
Zoom URL: **https://ucalgary.zoom.us/j/91262203233**
Passcode: 657178 | Meeting ID: 912 6220 3233

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