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CANADIAN EMERGING VETERINARY SCHOLARS SUMMIT

2022

UNIVERSITY OF
CALGARY

**FACULTY OF
VETERINARY MEDICINE**

Welcome to:

The 2022 Canadian Emerging Veterinary Scholars Summit

This annual forum brings the top DVM and graduate student researchers from each of the five Canadian veterinary colleges together to share their research projects and develop their scientific knowledge, research skills and professional networks.

The CEVSS is generously sponsored by Merck Animal Health.

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The Program

Thursday, November 3, 2022 | Hotel Aloft Calgary University

6:00-8:00 pm	Registration (Conference Room – Tactic 2)
8:00-9:00 pm	Opening reception

Friday, November 4, 2022 | University of Calgary, Foothills Campus, Theatre 3

8:55-9:00 am	Opening remarks (Dr. Renate Weller)
9:00-10:00 am	Plenary lecture (Dr. Maria Camila Cabelos Betancourt)
10:00-10:30 am	Break
10:30-10:45 am	Kathryn Mclellan (DVM, UCVM)	Cow- and calf-level factors associated with nursing behaviours in beef cattle during the 24-hours following an assisted calving
10:45-11:00 am	Anais Chancy (DVM, UM)	Standardization and validation of ATP luminometry as a diagnostic tool to assess the cleanliness of feeding equipment in pre-weaning calves
11:00-11:15 am	Brianna Forbes (DVM, AVC)	Assessing the impact of a hiding space on the behaviour and stress response of newborn dairy calves
11:15-11:30 am	Mostafa Farghal (Grad, UCVM)	Development and validation of a grimace scale for assessing pain in Angus beef calves
11:30-11:45 am	Benjamin Fouquette (Grad, UM)	Effects of sole ulcers and digital dermatitis lesions on dairy cows' productivity and longevity in Québec
11:45-12:00 pm	Mariana Fonseca (Grad, AVC)	Systemic use of antimicrobials and their association with resistance in Escherichia coli recovered from fecal samples from Canadian dairy herds: A cross-sectional study
12:00-1:00 pm	Lunch
1:00-1:15 pm	Ruina Bao (Grad, UCVM)	Use of antimicrobial peptides in control of Mannheimia haemolytica and prevention of bovine respiratory disease
1:15-1:30 pm	Eyesun Fajei (Grad, AVC)	Assessing impacts of two forms of PACAP-38 (pituitary adenylate cyclase-activating polypeptide) on infectious Nile tilapia (Oreochromis niloticus) immunophysiology
1:30-1:45 pm	Lauren Stoffregen (DVM, UCVM)	Investigating the seroprevalence of the causative agents of Equine Protozoal Myeloencephalitis in Alberta
1:45-2:00 pm	Maria Papapetrou (DVM, OVC)	Investigation of Neorickettsia risticii and Neorickettsia findlayensis co-infection in Potomac Horse Fever clinical cases from Eastern and Western Canada
2:00-2:15 pm	Simon Gagnon (Grad, UM)	Exploring the molecular and cellular impact of pharmacological immunosuppression in GI-parasite infections: Giardia and organ transplantation
2:15-2:30 pm	Arial Wei (DVM, WCVM)	Effects of tick feeding on the abundance of Borrelia burgdorferi in the tissues of infected mice

Friday, November 4, 2022 | *continued...*

2:30-3:00 pm	Break
3:00-3:15 pm	Jessica Sharpe (Grad, WCVM)	The EphB4 receptor tyrosine kinase regulates the invasiveness and tumorsphere formation of canine and human osteosarcoma cells
3:15-3:30 pm	Evelyn Harris (Grad, WCVM)	Investigating the EphA2 receptor as a potential therapeutic target for canine and human osteosarcoma
3:30-3:45 pm	Kaitlyn Simpson (Grad, OVC)	Elevated expression of miR-200c/141 in MDA-MB-231 cells suppresses MXRA8 levels, reduces proliferation and invasion in vitro, and impairs breast cancer growth and metastasis in vivo
3:45-4:00 pm	Mary Kaufman (DVM, AVC)	Preliminary investigation of exercise-induced pulmonary hemorrhage in draft pulling horses in Atlantic Canada
4:00-4:15 pm	Emma Robertson (DVM, OVC)	The effects of acute exposure to vapourized Δ9-Tetrahydrocannabinol in the Common Marmoset (Callithrix jacchus): A pilot study
4:15-4:30 pm	Stephanie Minkova (DVM, WCVM)	Dogs are great tick collectors: Off-leash dog parks as tick-sinks?
4:30-4:45 pm	Kerry Schutten (Grad, OVC)	Assessing plastic pollution ingestion in wild birds in Ontario
4:45-4:50 pm	Closing Remarks (Dr. Jocelyn Poissant)
6:30-8:30 pm	Student mixer (The Banquet)

Saturday, November 5, 2022 | University of Calgary, Spy Hill Campus

8:30 AM	Bus pickup at hotel (travel to Spy Hill Campus)
9:00-9:45 am	Study design workshop (Drs. Ning Cheng and Daniel Pang)
9:45-10:00 am	Break
10:00-10:45 am	Mental health workshop (Bethany Savoy)
10:45-11:00 am	Break
11:00-12:00 pm	Career panel (Drs. Samuel Wauer, John Gilleard, Daniel Pang, Jennifer Davies)
12:00-1:00 pm	Lunch
1:00-2:00 pm	Tour of Spy Hill Campus
2:00-5:00 pm	Field trip (Calgary Zoo)
6:30-8:30 pm	Merck Awards ceremony (Last Best Brewing & Distilling)

Speakers

Maria Camila Ceballos Betancourt
Assistant Professor, Faculty of Veterinary Medicine, University of Calgary

Dr. Maria Camila Ceballos graduated in Animal Science at the National University of Colombia. She received her Master's and Ph.D. degrees in Applied Animal Behaviour and Animal Welfare from the São Paulo State University (UNESP) in Brazil. Then, she started working at the University of Pennsylvania, USA, as a post-doctoral researcher. Currently, Maria Camila is an Assistant Professor in Beef Cattle Welfare and Behavior at the University of Calgary, Faculty of Veterinary Medicine. Her main research fields are evaluating and finding strategies to improve animal welfare, human-animal interaction, and cattle temperament.

Daniel Pang
Associate Professor, Faculty of Veterinary Medicine, University of Calgary

Dr. Daniel Pang is an Associate Professor of veterinary anesthesiology at the University of Calgary. He received his veterinary degree in 2000 from the University of Bristol and completed a MSc and residency in veterinary anaesthetics at the Université de Montréal after a year in small animal practice and an internship (University of Glasgow). He received his doctorate in neuroscience (molecular mechanisms of volatile anaesthetics) from Imperial College, London (2011). Dr .Pang teaches anesthesia at UCVM and has supervised numerous undergraduate and graduate students and his research interests include pain assessment perioperative safety and improving clinical practice.

Ning Cheng
Assistant Professor, Faculty of Veterinary Medicine, University of Calgary

Ning Cheng is an Assistant Professor at University of Calgary, Faculty of Veterinary Medicine. She completed her PhD training in neuroscience at the Johns Hopkins University School of Medicine. She did her postdoctoral training at the National Institutes of Health of the United States, focusing on neurological disorders. She started independent research at the University of Calgary in June 2021. The overarching goal of her research program is to elucidate the mechanisms and to identify potential therapeutics for autism and related conditions such as Fragile X Syndrome.

John Gilleard
Professor, Faculty of Veterinary Medicine, University of Calgary

Dr. John Gilleard is Professor of Parasitology at the University of Calgary Faculty of Veterinary Medicine. His research interests are in the field of anti-parasitic drug resistance and molecular diagnostics. His research group integrates parasitology, genetics and genomics to investigate the molecular basis, emergence and spread of anthelmintic drug resistance and to improve diagnostics. Dr. Gilleard's research program uses the small ruminant parasite Haemonchus contortus as a model and studies both livestock and human gastrointestinal nematode parasites in the field. Dr. Gilleard has been at the University of Calgary since 2008 and has held positions of Associate Dean Research, Faculty of Veterinary Medicine, University of Calgary (2012-2017, 2019, 2022-present) and President of the American Association of Veterinary Parasitology (2018). He is a Fellow of the Canadian Academy of Health Sciences.

Jennifer Davies
Associate Professor, Faculty of Veterinary Medicine, University of Calgary

Dr. Davies obtained her Doctor of Veterinary Medicine with Distinction at the Western College of Veterinary Medicine (WCVM) in 2001. At WCVM, she completed her Master of Veterinary Science in 2003 and her Senior Residency in Anatomic Pathology in 2004. Dr. Davies became a Diplomate of the American College of Veterinary Pathologists (Anatomic Pathology) in 2004. She has extensive diagnostic experience in private industry, in provincial diagnostic laboratories and in academia. Dr. Davies joined the University of Calgary, Faculty of Veterinary Medicine in 2011 where she is an Associate Professor (Teaching) and is the Director of the Diagnostic Services Unit. Her position at UCVM combines her passion for diagnostic pathology and teaching. In particular, she enjoys the challenge of leadership as the DSU team strives to meet the vision of becoming a center of diagnostic expertise and excellence in Alberta.

Bethany Savoy
Counsellor (Instructor), Student Wellness Services, University of Calgary

Bethany is a Counsellor (Instructor) with Student Wellness Services and the Faculty of Veterinary Medicine at the University of Calgary. Originally from New Brunswick, Bethany has a BSc (Psychology) and a BSW from Dalhousie University, and a MSW from the University of Calgary. As a Registered Social Worker for over twenty years, Bethany has practiced in a variety of fields, and she is also a sessional instructor in social work at the University of Calgary and Mount Royal University. Bethany is passionate about mental health and wellness for university students, staff, and faculty. Her interests include mindfulness, group therapy, insomnia, grief and loss, adult ADHD, and the development of personal/professional identities and communities of practice. Bethany's position is the first time that a counsellor has been directly embedded in a specific Faculty at the University of Calgary, and it was created to address the specific wellness needs of Veterinary Medicine graduate and undergraduate students.

Dr. Samuel Wauer
Merck Canada

Dr. Wauer obtained a Bachelor of Science in Agriculture Sciences from Cornell University prior to graduating from the Western College of Veterinary Medicine with a DVM in 2015. Following the completion of the Cornell Summer Dairy Institute training, Dr. Sam Wauer practiced as a beef and dairy veterinarian at Southwest Animal Health Centre in southwest Saskatchewan. Pursuing his interest in industry involvement and business management, Dr. Wauer returned to school to complete his Master of Business Administration (MBA) at the University of Saskatchewan. Since then, Dr. Wauer's breadth of experience has ranged from small business entrepreneur as co-founder of Alloy Equine Ltd., a medium-sized veterinary mixed practice manager, to joining the Canadian Veterinary Services Cattle team with global conglomerate Merck in 2020 as a technical services veterinarian. In 2022 he took on the role of Associate Director of Cattle Veterinary Services for Merck in Canada. Dr. Wauer is located in central Saskatchewan on a small commercial and purebred cattle operation: 6S Cattle Co.

A Composite Primarily Bioresorbable Customized Prosthetic with the Conception of Stem Cell Based Attachments to Treat Osteosarcoma in Dogs: Finite Element Biomechanical Analysis

- Hamed Yousefiroshan is with the Biomedical Engineering Department, University of Calgary, Calgary, AB, Canada.
- S.S. Hosseini Yazdi is with the Biomedical Engineering Department, University of Calgary, Calgary, AB, Canada
- S. Ghazizadeh is with the Biomedical Engineering Department, University of Calgary, Calgary, AB, Canada

Osteosarcoma is a common bone tumor in dogs. The common treatment is limb amputation, hence an appropriate prosthetic for locomotion is necessary. Current solutions and notable complications include metallic endoprosthesis (radius or metacarpal bone fracture, screw loosening, plate breakage), autografts (inadequate integration, limited donor sites, donor-acquired morbidity), allografts (infection, fracture, risk of disease transmission, and potential host rejection), cell therapy (the cost, time of treatment and size of regenerated bone).

Different 3D printable filaments with mixture ratios of Titanium (0% to 18%) and Poly Lactic Acid (PLA) (100% to 82%) were considered according to the biomechanical properties of the radius of small, medium, and large breeds of dogs. Customized virtual prosthetics were modeled based on dogs' medical images. Ends of the prosthetics were provided with a matrix for a growth factor injection to stimulate stem cell propagation and to eliminate screw implantations. Finite Element Analysis (FEA) were performed to assess the implants under the biomechanical loads; maximum stress, maximum strain and buckling safety factor parameters were analyzed.

The simulations show that the proposed implant offers similar biomechanical characteristics to that of a healthy radius and better than a recently clinically tested customized metallic implant. Contours of deformation, stress distribution patterns and buckling safety factors obtained from FEA results share similar trends compared to a healthy radius.

This work serves as a proof-of-concept for a reliable novel prosthetic to treat dogs' osteosarcoma that is primarily bioresorbable and feasible via 3D printing technology and cell therapy.

Presentation
Abstracts

The Effects of Acute Exposure to Vapourized Δ9-Tetrahydrocannabinol in the Common Marmoset (Callithrix jacchus): A Pilot Study

- Emma L. Robertson, MSc, Ontario Veterinary College, University of Guelph
- Rhonda Kersten, RVT, Schulich School of Medicine and Dentistry, University of Western Ontario
- Patrick McCunn, PhD, Schulich School of Medicine and Dentistry, University of Western Ontario
- Andrew Pruszynski, PhD, Schulich School of Medicine and Dentistry, Robarts Research Institute, University of Western Ontario
- Jibran Khokhar, PhD, Department of Anatomy and Cell Biology, Schulich School of Medicine and Dentistry, University of Western Ontario

Cannabis is one of the most widely used psychoactive substances around the world and has significant implications for both individuals and society given its legalization and high prevalence use in Canada. Cannabis use is associated with changes in cognitive dysfunctions including impaired memory, associative learning, and attention. While rodent models are used to study the neurological effects of the psychoactive components of cannabis, Δ9-tetrahydrocannabinol (THC), translation of these results to human clinical work is often difficult.

Non-human primates, such as the common marmoset (Callithrix jacchus), show high phylogenetic similarity to humans which makes them an important animal model for human neurological and psychiatric disorders. While the marmoset brain is lissencephalic, it shares similarities in brain architecture and function to humans.

In this pilot study, we optimized blood sampling techniques in awake marmosets in order to do pharmacokinetic studies of vapourized THC in plasma. Baseline plasma samples, MRI brain scans, and behavioural monitoring were collected pre-exposure to THC in 2 marmosets (Callithrix jacchus, 2-3 years, 340-410g, female). Following sample collection, marmosets were placed in a vapourizing cannabis chamber and exposed to cannabis flower (150mg x 3) for 15min. Plasma samples were collected at multiple time points (30min, 1hr, 2hr, 4hr) post-exposure and analyzed for THC concentrations. Video monitoring was used to observe behavioural changes post exposure (i.e. vocalizations, activity, pain response, ataxia). Once we have confirmation that the marmosets were exposed to detectable amounts of THC in the blood, further behavioural studies using touch-screen tasks and brain imaging can be investigated.

Development and validation of a grimace scale for assessing pain in Angus beef calves

- Mostafa Farghal, Faculty of Veterinary Medicine, University of Calgary
- Ed Pajor, Faculty of Veterinary Medicine, University of Calgary
- Maria Camila Ceballos, Faculty of Veterinary Medicine, University of Calgary

Considering the lack of an appropriate on-farm pain assessment tool for beef calves, with this study we aim to develop and validate a grimace scale for assessing pain in Angus beef calves.

Sixty-nine Angus beef calves 6-10 weeks old were enrolled in this study: 34 surgically castrated and 35 subjected to sham castration. Videos of the face and behaviour were recorded for all calves at different periods: before, during and after castration and sham castration. Then, still images for the face (front and side views) were extracted and cropped. To identify different facial action units (FAU) related to pain, to compose the pain grimace scale, 240 images from all periods (from 10 sham and 10 castrated calves) were used.

Seven FAU were identified: backward ear, orbital tightening, tense stare, tension above the eye, dilated nostril, strained chewing muscle and open mouth. Convergent validation will be executed using whole-body behavioural videos before and after castration by applying UNESP-Botucatu unidimensional pain scale and evaluating the association between the two scales.

The inter and intra observer reliability will be evaluated as part of the validation process with 4 to 6 observers. Moreover, the internal consistency, accuracy, sensitivity, and specificity of the scale will be assessed. A practical, field-based tool for fast and accurate identification of pain in calves is important for veterinarian and practitioners' pain mitigation decision. Therefore, a valid, feasible and reliable grimace scale would represent a good advance regarding pain assessment in beef calves.

Effects of sole ulcers and digital dermatitis lesions on dairy cows' productivity and longevity in Québec

- Benjamin Fouquette, Faculty of Veterinary Medicine, Department of Clinical Sciences, University of Montréal
- André Desrochers, Faculty of Veterinary Medicine, Department of Clinical Sciences, University of Montréal
- Luc Des Côteaux, Faculty of Veterinary Medicine, Department of Clinical Sciences, University of Montréal
- Marianne Villettaz Robichaud, Faculty of Veterinary Medicine, Department of Clinical Sciences, University of Montréal

Lameness and hoof lesions are one of the biggest challenges faced by dairy farmers. With 75% of Québec's dairy farms having tie-stall installations and most hoof health studies done in free stall barns in North America, research results and recommendations are less applicable in Québec's dairy operations. A hoof trimming data collection program has been running since 2015 with the participation of the Québec Hoof Trimmers Association.

The objectives of this study are to evaluate the impacts of sole ulcers and digital dermatitis, two of the most common hoof lesions in Québec's dairy farms, on cows' milk production and longevity according to housing characteristics. The data collected includes trimming observations, such as hoof lesions, and farm characteristic. Twenty trained hoof trimmers participated in the on-farm data collection project using standardized lesions' definitions and the Hoof Supervisor tm software. The individual cow data is combined with Lactanet milk recording data.

Based on a previous study, we hypothesize that sole ulcers in free stall barn will have a greater impact on milk yield than digital dermatitis. Also, sole ulcers will cause a more negative impact on cows' longevity than digital dermatitis and in free stall barn. Statistical analysis will be produced to validate these hypotheses.

This study will hopefully lead to more research exploring this important database. It will also lead to better awareness on the importance of preventing these hoof lesions in all types of installation to improve dairy cattle productivity and well-being.

Assessing impacts of two forms of PACAP-38 (pituitary adenylate cyclase-activating polypeptide) on infectious Nile tilapia (Oreochromis niloticus) immunophysiology

- Fajei E, Department of Pathology and Microbiology, Atlantic Veterinary College, University of Prince Edward Island
- Cai WC, Department of Infectious Diseases and Public Health, Jockey Club College of Veterinary Medicine and Life Sciences, City University of Hong Kong
- Whyte SK, Department of Pathology and Microbiology, Atlantic Veterinary College, University of Prince Edward Island
- Despres B, Department of Pathology and Microbiology, Atlantic Veterinary College, University of Prince Edward Island
- Fast MD, Department of Pathology and Microbiology, Atlantic Veterinary College, University of Prince Edward Island

In teleosts, pituitary adenylate cyclase-activating polypeptide (PACAP) has been demonstrated to have direct antimicrobial activity against several aquatic pathogens, including those from the genus Flavobacterium.

Our goal was to assess the impacts of PACAP and possible favourable modification in immunophysiology of infectious Nile tilapia (Oreochromis niloticus) and determine whether this was impacted by the route of administration. Over the course of four studies, tilapia (416.1±116.7 g) randomly assigned to replicate tanks were administered with either PACAP-38 or a modified form of PACAP-38 via intraperitoneal injection, bath, nares flush, or gill flush, and compared to PBS controls. In the first two studies, following PACAP individual treatments, tilapia underwent a bath exposure (40 L tank for 45 min) to F. columnare (isolate ALG-00-530; at 2.1 x 108 CFU/ml) or sham exposure without the addition of the bacterial culture. Fish were sampled before exposure, 48 h after stimulation, at 1 day after the onset of mortality in exposed tanks, and resolution of mortality. Tilapia that received i.p. injection of PACAP-38 unlike modified form showed significantly lower mortality from F. columnare (10%) than those receiving PBS i.p. (25%).

Furthermore, PACAP-38 also induced inflammatory gene expression in the spleen, and eosinophilic granule cell aggregation in the nares, following flushing. These data suggest that PACAP-38 induces protection against infection and stress mainly with a reduction of IL1-B expression. Eventually, exposing tilapia to low temperature (15-17°C) for 30 minutes (cold shock), confirmed PACAP-38 capacity to reduce secondary impacts of stress, and we are currently examining these mechanisms.

Investigation of Neorickettsia risticii and Neorickettsia findlayensis co-infection in Potomac Horse Fever clinical cases from Eastern and Western Canada.

- Maria A. Papapetrou - Department of Pathobiology, Ontario Veterinary College, University of Guelph
- Luis G. Arroyo - Department of Clinical Studies, Ontario Veterinary College, University of Guelph
- Ashley Whitehead - Faculty of Veterinary Medicine, University of Calgary
- John D. Baird - Department of Clinical Studies, Ontario Veterinary College, University of Guelph
- Brandon N. Lillie - Department of Pathobiology, Ontario Veterinary College, University of Guelph

Potomac Horse Fever (PHF) is an acute colitis that affects horses seasonally. It causes fever, diarrhea, colic, laminitis, abortion, and death in 5-30 % of cases. Previously, Neorickettsia risticii was identified and widely accepted as the causative agent for PHF. A novel Neorickettsia spp., Neorickettsia findlayensis, with an 11.6 % genomic divergence from N. risticii, was shown to also be a causative agent for PHF in 2020. Molecular detection using PCR was performed on blood and fecal samples to identify the specific Neorickettsia spp. in 18 clinical cases from Eastern Canada (Ontario and Quebec), and 13 from Western Canada (Alberta). The goal was to identify the frequency of infection with N. risticii, N. findlayensis, or both, and compare the causative agent by location. qPCR was performed on DNA isolated from 31 blood samples and on DNA isolated from 26 fecal samples using a general Neorickettsia primer. If positive, additional PCRs were performed using primers specific to N. risticii and N. findlayensis. 12/31 blood samples were positive on qPCR using a general Neorickettsia primer; with 7/12 positive for only N. risticii, and 4/12 for only N. findlayensis, with 1 sample testing positive for both N. risticii and N. findlayensis. 8/26 fecal samples were positive using the general Neorickettsia primer; with 4/8 positive for N. findlayensis and 4/8 positive for both N. risticii and N. findlayensis. This study has established that co-infection with N. risticii and N. findlayensis is possible, and found in cases across Canada.

Dogs are great tick collectors: Off-leash dog parks as tick-sinks?

- Stephanie L. Minkova, Department of Veterinary Microbiology, Western College of Veterinary Medicine, University of Saskatchewan
- Louwtjie P. Snyman, Department of Veterinary Microbiology, Western College of Veterinary Medicine, University of Saskatchewan
- Emily J. Jenkins, Department of Veterinary Microbiology, Western College of Veterinary Medicine, University of Saskatchewan

Ticks serve as vectors for a number of pathogens in North America and are a public health risk. In summer 2022 in Saskatchewan, we conducted passive and active surveillance to determine the risk of tick-borne illnesses and the potential for establishment of Ixodes scapularis, the principal vector for Lyme Disease. To date, this species has not been collected via active sampling, but 33 adult females were detected through e-Tick, 69% from dogs. Dermacentor variabilis and to a lesser extent, D. andersoni, are endemic to Saskatchewan and frequently feed on mammals, including humans and dogs. Off-leash dog parks are increasingly popular in cities, but may serve as a reservoir for pathogen transmission, including tick-borne pathogens. In this study, we compared environmental tick burdens using standardized dragging protocols in 2 off-leash dog parks with 3 urban green areas not frequented by dogs in the city of Saskatoon. Off-leash dog parks had lower abundance of ticks compared to conservancies and agricultural land. Dermacentor variabilis was the sole species found at all the surveyed sites except for one conservancy where dogs are not allowed, where D. andersoni was also present. In order to assess the potential for interspecies hybridisation, the second nuclear internal transcribed spacer was amplified and compared using electrophoresis. Additionally, all ticks collected from the sympatric population were screened to determine and compare the prevalence of Rickettsia species. Our findings suggest that off-leash dog parks have a lower abundance and diversity of ticks, which may pose important ecological and public health implications.

Preliminary investigation of exercise-induced pulmonary hemorrhage in draft pulling horses in Atlantic Canada

- Mary Kauffman
- Emily John
- Kathleen McMillan
- Jennifer Burns

Exercise-induced pulmonary hemorrhage (EIPH) is a well-documented disorder occurring in horses undergoing high-intensity exercise. EIPH occurs when capillaries in the lungs rupture, causing varying degrees of bleeding in the lungs. Well-researched in racing horses, this disorder has not been investigated in competitive draft pulling horses or how it may affect their performance, health, and welfare. This study is a preliminary investigation into EIPH prevalence in the competitive draft pulling horse population competing on Prince Edward Island (PEI). From May-September 2022, upper airway endoscopy was performed on 34 study horses approximately one-hour post-exercise at competitions throughout PEI. Participating horses were selected from a volunteer population recruited at competitions, and during endoscopy each horse was given a score for EIPH (scored 0-4), left laryngeal hemiplegia (LLH, scored 1-4), and tracheal mucus (scored 0-4). The data on these 34 horses shows a sampled EIPH prevalence of 26%, with LLH at a sampled prevalence of 35%. Considering only the horses with these factors present, EIPH scores had a median of 1 (mode =1, range = 1) while LLH had a median score of 3 (mode = 2, range = 2-4). The sampled median tracheal mucus score was 1 (mode= 1, range 0-3). Statistical analysis will be conducted to determine any associations between EIPH, LLH, and demographic and competition data at a later date. Based on the preliminary data, it appears that low-grade EIPH occurs in a subset of competitive draft pulling horses during competition.

Assessing the impact of a hiding space on the behaviour and stress response of newborn dairy calves

- Brianna Forbes, Atlantic Veterinary College, University of Prince Edward Island, Charlottetown, PEI
- Hannah Spitzer, Health Management, Atlantic Veterinary College
- Rebecca Meagher, Department of Animal Science & Aquaculture, Dalhousie University, Truro, NS
- Miriam Gordon, Department of Animal Science & Aquaculture, Dalhousie University, Truro, NS
- Sydney Rose, Department of Animal Science & Aquaculture, Dalhousie University, Truro, NS
- Kathryn Proudfoot, Health Management, Atlantic Veterinary College

When kept in a natural setting, newborn cattle will remain hidden for the first few days of life. It is unclear if dairy calves will perform this behaviour when housed indoors, and if expressing this behaviour may reduce stress. The objectives of this study are to: 1) describe the hiding behaviour of indoor-housed dairy calves kept with their dam and provided a space to hide in the first week of life, and 2) assess the effect of a hide on physiological indicators of stress in calves using heart rate variability (HRV). Twelve cow-calf pairs housed at the Dalhousie University's Ruminant Animal Centre were randomly assigned to a treatment with or without a calf hide (n = 6 per treatment). Continuously recorded video data from calves in the hide treatment were analyzed to assess the hide use of the calves over the first week of life. To assess stress, HRV data collected from Polar heart rate monitors on the calves in both treatments were assessed. It is hypothesized that calves will use a hide when provided one and will progressively spend less time in the hide over the week. Additionally, it is anticipated that calves provided a hide will have higher HRV, indicative of lower stress, compared to calves without a hide. This study will address the relationship between hide use and its effect on calf stress and will help guide producers on how to incorporate the allowance of natural behaviours to reduce stress and improve calf welfare.

Standardization and validation of ATP luminometry as a diagnostic tool to assess the cleanliness of feeding equipment in pre-weaning calves.

- Anaïs Chancy, Département des Sciences Cliniques, Faculté de Médecine Vétérinaire, Université de Montréal
- Débora E. Santschi, Lactanet, Sainte-Anne-de-Bellevue
- Éric Paquet, Département des Sciences Animales, Université Laval
- David Renaud, Department of Population Medicine, University of Guelph
- Édith Charbonneau, Département des Sciences Animales, Université Laval
- Mike Steele, Department of Population Medicine, University of Guelph
- Nicolas Barbeau-Grégoire, Département des Sciences Cliniques, Faculté de Médecine Vétérinaire, Université de Montréal
- Laura Van Driessche, Département des Sciences Cliniques, Faculté de Médecine Vétérinaire, Université de Montréal
- Sébastien Buczinski, Département des Sciences Cliniques, Faculté de Médecine Vétérinaire, Université de Montréal

The objective of this observational study was to standardize a reliable and repeatable technique using ATP luminometry to describe the cleanliness of various feeding equipment used for pre-weaning calves in dairy farms. A total of 7 Québec commercial dairy herds were selected. Following visual hygiene scoring, the cleanliness of every available feeding equipment was assessed using a direct surface swabbing for buckets and nipples with Hygiena UltraSnap swabs. A liquid rinsing technique was realized for esophageal feeders, bottles, and automatic milk feeders (AMF) with UltraSnap, AquaSnap, and MicroSnap swabs. Both intra- and inter-operator phases were performed to validate the technique, as well as a comparison with conventional bacterial culture. A total of 519 swab samples were obtained from 201 equipment. The median (interquartile range) contamination in RLU for a bottle, esophageal feeder, AMF, bucket and nipple was 2 (1;6), 2 (0;12), 52 (19;269), 886 (128;7,230) and 899 (142;6,928), respectively. The direct technique selected after the intra-operator phase showed an excellent correlation of the intra-rater reliability (intra-class correlation (ICC) = 0.93; 95% CI : 0.88 – 0.96). The inter-operator phase (2 sessions with 3 different operators) demonstrated a good reliability too. Luminometer values were positively associated with the visual score of esophageal feeders, AMF and buckets (P<0.05). A positive correlation between bacterial culture and direct swabbing of buckets was also found. This study describes a standardized and practical on-farm technique for assessing the hygienic status of feeding equipment by luminometry, which can be integrated in the management of pre-weaning dairy calves.

Systemic use of antimicrobials and their association with resistance in Escherichia coli recovered from fecal samples from Canadian dairy herds: A cross-sectional study

- Mariana Fonseca
- Luke C. Heider
- Henrik Stryhn
- J T. McClure
- Daniella Rizzo
- Simon Dufour
- Herman W. Barkema
- David F. Kelton
- David Renaud
- Javier Sanchez

Escherichia coli can be a reservoir of antimicrobial resistance (AMR) genes and are commonly used as indicators of AMR on farms. There is a debate on the role of the antimicrobial route of administration on AMR. The objectives of this study were to 1) investigate the phenotypic prevalence of AMR in E. coli, and 2) explore the association between the route of antimicrobial use (AMU) and AMR in E. coli.

Pooled fecal samples from 5 animals from each group (calves, heifers, lactating cows) and a manure storage sample were collected from 140 dairy herds. Antimicrobial use rate was calculated as a defined course dose per population time (DCD/100 animals-year) and separated into intramammary and systemic use. Antimicrobial susceptibility testing was conducted using microbroth dilution methods. A multivariate, multivariable logistic model was built with resistance to several antimicrobials as the outcome.

Overall, 24.5% (266/1086) of the E. coli isolates were resistant to at least one antimicrobial. Resistance to third-generation cephalosporins, fluoroquinolones, and carbapenems was 2.2, 1.4, and 0.1%, respectively. Twenty-seven percent of the isolates were resistant to tetracycline. The proportion of multidrug-resistant isolates was 15.0%. Median intramammary and systemic AMU DCD/100 animal-years were 79.9 and 22.7, respectively. Intramammary AMU was not associated with AMR, but systemic use was. For instance, for an IQR increase in the systemic AMU, the odds of AMR increased in 19%.

The resistance pattern was comparable to previous studies on dairy cattle in Canada. AMR was associated with the systemic AMU but not with intramammary administration.

Cow- and calf-level factors associated with nursing behaviours in beef cattle during the 24-hours following an assisted calving

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The objective of this observational study was to standardize a reliable and repeatable technique using ATP luminometry to describe the cleanliness of various feeding equipment used for pre-weaning calves in dairy farms. A total of 7 Québec commercial dairy herds were selected. Following visual hygiene scoring, the cleanliness of every available feeding equipment was assessed using a direct surface swabbing for buckets and nipples with Hygiena UltraSnap swabs. A liquid rinsing technique was realized for esophageal feeders, bottles, and automatic milk feeders (AMF) with UltraSnap, AquaSnap, and MicroSnap swabs. Both intra- and inter-operator phases were performed to validate the technique, as well as a comparison with conventional bacterial culture. A total of 519 swab samples were obtained from 201 equipment. The median (interquartile range) contamination in RLU for a bottle, esophageal feeder, AMF, bucket and nipple was 2 (1;6), 2 (0;12), 52 (19;269), 886 (128;7,230) and 899 (142;6,928), respectively. The direct technique selected after the intra-operator phase showed an excellent correlation of the intra-rater reliability (intra-class correlation (ICC) = 0.93; 95% CI : 0.88 – 0.96). The inter-operator phase (2 sessions with 3 different operators) demonstrated a good reliability too. Luminometer values were positively associated with the visual score of esophageal feeders, AMF and buckets (P<0.05). A positive correlation between bacterial culture and direct swabbing of buckets was also found. This study describes a standardized and practical on-farm technique for assessing the hygienic status of feeding equipment by luminometry, which can be integrated in the management of pre-weaning dairy calves.

Assessing the impact of a hiding space on the behaviour and stress response of newborn dairy calves

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When kept in a natural setting, newborn cattle will remain hidden for the first few days of life. It is unclear if dairy calves will perform this behaviour when housed indoors, and if expressing this behaviour may reduce stress. The objectives of this study are to: 1) describe the hiding behaviour of indoor-housed dairy calves kept with their dam and provided a space to hide in the first week of life, and 2) assess the effect of a hide on physiological indicators of stress in calves using heart rate variability (HRV). Twelve cow-calf pairs housed at the Dalhousie University's Ruminant Animal Centre were randomly assigned to a treatment with or without a calf hide (n = 6 per treatment). Continuously recorded video data from calves in the hide treatment were analyzed to assess the hide use of the calves over the first week of life. To assess stress, HRV data collected from Polar heart rate monitors on the calves in both treatments were assessed. It is hypothesized that calves will use a hide when provided one and will progressively spend less time in the hide over the week. Additionally, it is anticipated that calves provided a hide will have higher HRV, indicative of lower stress, compared to calves without a hide. This study will address the relationship between hide use and its effect on calf stress and will help guide producers on how to incorporate the allowance of natural behaviours to reduce stress and improve calf welfare.

Standardization and validation of ATP luminometry as a diagnostic tool to assess the cleanliness of feeding equipment in pre-weaning calves.

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Nursing behaviour is essential following parturition to ensure transfer of passive immunity and the development of a strong cow-calf bond. One factor that could modify nursing behaviour is dystocia; however, little work has documented this effect. The objective was to characterize and identify cow- and calf-level factors associated with nursing behaviours in beef cattle for 24hr following an assisted calving. Cows and calves (n = 21 pairs) that required assistance at calving were enrolled and video recorded for 24hr to score maternal behaviours. Cow- and calf-level predictors of nursing behaviour (i.e., calf sex, parity, calving difficulty, calf presentation, measures of calf vigour, meconium staining, latency to first stand, time spent licking calf) were offered to general linear models. Median and interquartile range for latency to nurse was 6.0hr (1.85 – 17.5hr). On average (± standard deviation), calves spent a total of 43.4 ± 22.6min nursing and had 23.1 ± 14.8 nursing bouts over 24hr. Calves nursed earlier if they were born to a multiparous dam compared to a primiparous dam (P < 0.01), if they had an easy assist compared to a difficult assist (P = 0.04), if they stood earlier following birth (P < 0.01), and if they were licked by the dam within 1hr of birth (P = 0.02). Results from this study contributes to a growing body of literature on maternal behaviours in beef cattle and can be used to inform management decisions for supporting the health and welfare of cow and calves after an assisted calving.

Assessing plastic pollution ingestion in wild birds in Ontario

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Plastic waste has become one of the most ubiquitous and persistent pollutants in our modern environment. Plastic pollution presents many potential avenues of risk for wildlife, including entanglement in macroplastics, ingestion of microplastics, and exposure to plastic-derived chemicals or absorbed environmental contaminants. Understanding which species and environments are at highest exposure to plastic pollution is a critical first step in investigating the health impacts of plastic exposure, identifying conservation priorities, and informing waste management policy.

Between 2020-2022, deceased wild birds were collected across Ontario as part of routine passive disease surveillance through the Canadian Wildlife Health Cooperative. All individuals were necropsied, and data on location, morphometrics, demographics, co-morbidities, and cause of death were collected. The upper gastrointestinal tract (esophagus, proventriculus and ventriculus) were examined for visible plastics and other anthropogenic particles >2 mm in size, using standard techniques.

A total of 318 birds across 48 species were included in this analysis. Twenty-five individuals (% Frequency Occurrence = 7.9) contained visible anthropogenic particles in their upper gastrointestinal tract, with prevalence varying across species. Gulls and waterfowl were the most frequently represented species groups.

A variety of bird species ingest and retain anthropogenic particles in the wild, and species-level factors such as foraging technique, physiology, and behaviour are hypothesized to influence exposure and ingestion risk. Ongoing investigation will assess potential health impacts of plastic ingestion in Ontario bird species.

The EphB4 receptor tyrosine kinase regulates the invasiveness and tumorsphere formation of canine and human osteosarcoma cells

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Osteosarcoma is a highly aggressive bone cancer in canines and humans with a high rate of metastasis to the lungs and a poor prognosis. Advances in treatment options are limited and more effective therapeutic approaches need to be developed. The Eph receptors are the largest group of receptor tyrosine kinases, regulating many cellular activities including proliferation, survival, migration, and invasion. Recent evidence suggests that the EphB4 receptor is involved in the regulation of invasion and metastasis of various human cancers. However, the role of the EphB4 receptor in the fitness of human and canine osteosarcoma has been poorly evaluated. Due to the physiological and cellular similarity between canine and human osteosarcoma, we investigate the role of the EphB4 receptor in promoting osteosarcoma using a comparative approach.

We found upregulated expression of the EphB4 receptor in canine and human osteosarcoma cells as assessed by western blotting. EphB4 expression was silenced using specific shRNAs in multiple canine and human osteosarcoma cell lines. In both canine and human osteosarcoma, cells with silenced EphB4 reduced cell proliferation, migration, and invasion, increased sensitivity to cisplatin, and altered colony morphology in human osteosarcoma. Interestingly, both canine and human osteosarcoma cells with silenced EphB4 formed more tumorspheres suggesting an enhanced tumor-initiating potential.

The EphB4 receptor is overexpressed in both canine and human osteosarcoma and may regulate important processes in the development and invasiveness of the cancer. The similar results in both dog and human osteosarcoma emphasize the benefit of using a comparative oncology approach.

Use of antimicrobial peptides in control of Mannheimia haemolytica and prevention of bovine respiratory disease

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Bovine respiratory disease (BRD) is the leading cause of morbidity and mortality in cattle raised in North America. Upon feedlot arrival, cattle are usually subject to metaphylactic use of antibiotics to prevent and treat bacterial cases of BRD. Vaccination offers limited duration of immunity against M. haemolytica, the major bacterial causative agent of BRD. Emerging resistance to antibiotics has resulted in an urgent need for novel strategies to control members of the BRD bacterial complex.

The inhibitory effects of three antimicrobial peptides were evaluated against multi-drug resistant M. haemolytica isolates using microbroth dilution. Isolates from Alberta feedlots were screened for biofilm formation using the crystal violet assay. The most robust biofilm former, Mh330, was co-cultured with bovine turbinate (BT) cells to mimic infection conditions before an antimicrobial peptide, WK2, was added to inhibit attachment. Cytotoxicity of WK2 against bovine turbinate cells was assessed by the MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide) assay. To determine the inhibitory mechanism, the membrane integrity of Mh330 after peptide treatment was examined using NPN (1-N-phenylnapthylamine), and ONPG (o-Nitrophenyl β-D-galactopyranoside) assays.

Although all three peptides displayed inhibitory activity against M. haemolytica, WK2, a beta sheet peptide was bactericidal against strong biofilm former, isolate Mh330, at 8-16 μg/mL and decreased adhesion to BT cells by 3 logs at 32 μg/mL without cytotoxic effects. The NPN and ONPG assays determined that both inner and outer membranes were permeabilized. Conclusion WK2 may be a viable alternative to antibiotics for the control of M. haemolytica related cases of BRD.

Investigating the EphA2 receptor as a potential therapeutic target for canine and human osteosarcoma

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Osteosarcoma is a highly metastatic and lethal bone cancer in canines and humans. Even with an aggressive treatment consisting of amputation and chemotherapy, the average duration of survival is one-year post-treatment for dogs and only 60% of human patients survive longer than 5 years post-treatment. This study aims to better understand the pathophysiology of osteosarcoma with a focus on the role of the EphA2 receptor tyrosine kinase (RTK). EphA2 is one of nine members of the EphA RTK family and in the search for new targeted cancer therapies, EphA receptors are emerging as promising regulators of tumor development, invasiveness, and drug resistance. However, the expression and functional roles of EphA2 in canine and human osteosarcoma have not been investigated.

Our research has revealed an increased expression of EphA2 in canine and human osteosarcoma cells lines using Western blotting. To evaluate the functional relevance of overexpressed EphA2 in osteosarcoma cells, we silenced the expression of EphA2 using a specific shRNA. Silencing of EphA2 resulted in reduced proliferation, migration, and invasion of osteosarcoma cells in culture when compared with non-silenced control cells. Our results also revealed that after EphA2 silencing, osteosarcoma cells showed an increased sensitivity to a common chemotherapeutic drug, Cisplatin, in culture. EphA2 silencing also reduced tumor growth rate in a mouse xenograft model of dog osteosarcoma.

These data suggest that increased EphA2 function is a major driver of the malignant behavior of canine and human osteosarcoma and a promising target for the development of new therapies.

Exploring the molecular and cellular impact of pharmacological immunosuppression in GI-parasite infections: Giardia and organ transplantation

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Diarrheal disease is the most common cause of illness in North America and worldwide, being the second leading cause of death in children under five years of age, according to the WHO. Giardia duodenalis is a zoonotic agent frequently isolated, with a high burden of disease, ranking in the top three provincially and nationally reported enteric infections. Of note, recent studies have found that long-term Giardia infections, which are not monitored in immunosuppressed patients, cause several intestinal and extraintestinal sequelae related to an altered immune system.

In this context, our project aims to study the relationship between the immune response and the parasitic infection in immunosuppressed patients following transplantation. We hypothesize that infection by G. duodenalis, either before or after organ transplant could impact the immune response of the patient, leading to an increase in the risk of graft rejection.

To better understand the impact of this parasite and evaluate our hypothesis, we have set two main aims: i) to evaluate the impact of Giardia (inflammation, antiparasitic response, maintenance of the integrity of the epithelia barrier and control of oxidative stress) on a co-culture of intestinal Caco-2 cells and Giardia, in the absence and the presence of mycophenolate mofetil (MMF); ii) to determining the potential mechanism of toxicity of MMF by analyzing the proteomic meltome of Caco-2 cells and Giardia in the presence of this drug.

Our results could lead to the implementation of novel practices in parasite detection in patients, as well as to modification of immunosuppressive strategies.

Effects of tick feeding on the abundance of borrelia burgdorferi in the tissues of infected mice

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In response to vector feeding, some vector-borne pathogens increase their abundance in the host tissues to enhance their transmission. This effect has not been investigated for the spirochete, Borrelia burgdorferi, which causes Lyme disease. The purpose of this study was to determine whether feeding by competent (Ixodes scapularis) or incompetent (Dermacentor variabilis) tick vectors affects the abundance of B. burgdorferi in the tissues of infected mice.

36 female C3H/HeJ mice were infected with 1 of 9 strains of B. burgdorferi via tick bite (4 mice per strain); 8 female mice were used as uninfected controls. At 35 days post-infection (PI), females were assigned to 1 of 3 treatments: infestation with I. scapularis larvae (n = 18), infestation with D. variabilis larvae (n = 9), and no larval infestation (n = 9). Mice were euthanized at 42 days PI, and mouse tissues were harvested. DNA was extracted from the mouse tissues and qPCR was performed to quantify the spirochete load.

The mean spirochete load in the mouse tissues in the I. scapularis groups was ~70% higher compared to the D. variabilis group (p = 0.063), but neither of these groups were significantly different from the non-infested control group. Comparison of the spirochete load in the right ear before (day 34 PI) and after (day 42 PI) the larval infestation found a six-fold decrease in all mice including the non-infested control group. We conclude that larval feeding had no effect on the abundance of B. burgdorferi in the mouse skin.

Elevated Expression of miR-200c/141 in MDA-MB-231 Cells Suppresses MXRA8 Levels, Reduces Proliferation and Invasion In Vitro, and Impairs Breast Cancer Growth and Metastasis In Vivo

- Dr. Roger Moorehead
- Katrina Watson

Claudin-low breast cancer cells, a subset of triple-negative breast cancer, exhibit mesenchymal characteristics and express remarkably low levels of the miR-200 micro-RNA family. Therefore, this research examines the cellular and functional impact of restoring miR-200 expression in a human claudin-low breast cancer cell line MDA-MB-231. MDA-MB-231 cells were stably transfected with the miR-200c/141 cluster (MDA-231c141) or a control vector (MDA-231EV). The overexpression of the miR-200c/141 cluster in the MDA-231c141 cells reverted cell morphology to a more epithelial phenotype and significantly reduced cell proliferation and migration in vitro. Additionally, injection of MDA-231c141 cells into the 4th mammary gland of NCG mice resulted in significantly impaired tumor growth than MDA-231EV produced tumors. Furthermore, RNA sequencing identified MXRA8 as being downregulated in MDA-231c141 tumors. Subsequently, qRT-PCR and Western blotting confirmed that MXRA8 expression was significantly higher in mammary tumors induced by MDA-231EV cells compared to those induced by MDA-231c141 cells and immunohistochemistry revealed that the levels of MXRA8 remained high in metastatic tumor cells found in the lungs. Therefore, our data suggests that miR-200s reduce proliferation and migration of claudin-low mammary tumor cells in vitro and inhibit growth and metastasis in vivo through downregulating MXRA8 expression.

NOTES

THANK YOU
FOR ATTENDING