CAVEPM ACEMPV

Canadian Association of Veterinary Epidemiology and Preventive Medicine Conference

Keeping Epidemiology Relevant in a One Health World

May 31 - June 1, 2023
University of Guelph

Conference Proceedings

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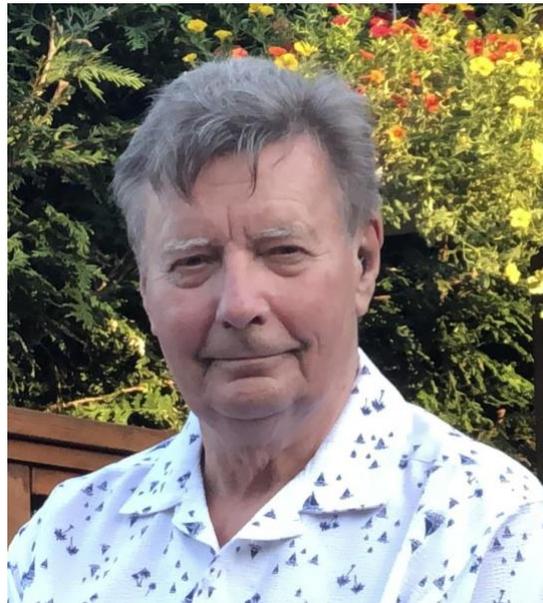Dr. Olaf Berke, Department of Population Medicine, OVC, University of Guelph
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CAVEPM Lifetime Leadership Award

At the 2023 CAVEPM Annual General Meeting in Guelph, **Dr. Wayne Martin** will be awarded the Lifetime Leadership Award in recognition of his outstanding contributions to the field of Veterinary Epidemiology through his research, teaching, mentorship, and leadership activities in Canada and around the world. The award ceremony will take place on May 31, 2023 at the CAVEPM lunch.

Wayne graduated with a DVM from the Ontario Veterinary College (OVC) in 1967 and an MSc in 1969. He then completed his MPVM and PhD at the University of California Davis under the supervision of Dr. Calvin Schwabe, famous for his contributions to the development of One Medicine/One Health concepts. Wayne returned to OVC in 1974 as Canada's first PhD in Veterinary Epidemiology and in 1987 became the first Chair of the Department of Population Medicine. As a mentor, he supervised and taught generations of veterinary epidemiologists who have prominent careers in academia and government around the world. Through his textbooks including Veterinary Epidemiology Principles and Methods (1987) by Martin, Meek and Willeberg, Veterinary Epidemiologic Research (2009) by Dohoo, Martin and Stryhn, and Methods in Epidemiologic Research (2012) by Dohoo, Martin and Stryhn, he has continued to influence generations of epidemiologists. His research has applied epidemiological principles to deal with a wide range of diseases in production, companion, and wildlife species, and he has frequently made use of One Health approaches. His significant contributions to understanding the epidemiology of tuberculosis in dairy cattle and badgers in Ireland was acknowledged through an Honorary Doctorate of Science Degree from the University College Dublin in 2015. Wayne's lifetime achievements have been recognized by various organizations including the Association of Veterinary Epidemiology and Preventive Medicine (AVEPM) and the International Symposium of Veterinary Epidemiology and Economics (ISVEE), and he was appointed as a Fellow of the Canadian Academy of Health Sciences. He has been a University Emeritus Professor at the University of Guelph since his retirement.

Keynote Speakers

Dr. Agricola Odoi

"Veterinary Medicine, Epidemiology, and One Health: Applications in Mitigating Geographic Health Disparities"

Dr. Agricola Odoi is a Professor of Epidemiology, Assistant Dean for Research and Graduate Studies, and Director of the Comparative and Experimental Medicine graduate program at the College of Veterinary Medicine, University of Tennessee at Knoxville (USA). He earned his veterinary degree from Makerere University (Uganda), MSc in Epidemiology and Animal Health Economics from University of Nairobi (Kenya) and PhD in Epidemiology from University of Guelph (Canada). Before joining the University of Tennessee, Dr. Odoi taught epidemiology, public health and veterinary preventive medicine at Makerere University. He was a Public Health epidemiologist, a Health Information Analyst and an Information Management Analyst with the Ontario Ministry of Health and Long-term Care in Ontario (Canada).

Dr Odoi's research focuses on the application of Geographical Information Systems (GIS) and Spatial Epidemiology in veterinary and public health research and practice. His work involves using GIS and spatial epidemiologic/statistical approaches to investigate/identify health disparities and the impact of place on health outcomes and access to health services so as to provide information to guide health planning, service provision, and policy decisions. These investigations have included studies of the epidemiology of prediabetes, diabetes, heart disease and stroke in humans. As a result of his contributions to this field, he was inducted a Fellow of both the American Heart Association and American College of Epidemiology. His research activities also extend to the epidemiology of antimicrobial resistance as well as COVID-19 and is a member of the Coronavirus-19 Outbreak Response Experts (CORE-19) team. He is a Diplomate of the American Veterinary Epidemiology Society in recognition of his contribution to Veterinary Epidemiology and One Health. He chairs a grant review panel for the American Heart Association and serves as a reviewer for grant funding agencies in the United States, Canada and the Netherlands.

Dr. Sherilee Harper

"Climate Change and One Health: Linking Local Research with International Decision-making"

Dr. Sherilee Harper is a Canada Research Chair in Climate Change and Health, Kule Scholar, and an Associate Professor in the School of Public Health at the University of Alberta. Her research investigates associations between weather, environment, and health equity in the context of climate change, and she collaborates with partners across sectors to prioritise climate-related health actions, planning, interventions, and research. Dr. Harper was a Lead Author on two Intergovernmental Panel on Climate Change (IPCC) reports; served on the Gender Task Group for the IPCC; was Lead Author on Health Canada's 2022 Climate Change and Health Assessment; and Co-chaired the Government of Canada's Health and Wellbeing Advisory Table for the National Adaptation Strategy.

CAVEPM Day 1: May 31, 2023 – in ECLA 1720

Time	Title	Speaker
7:45-8:45	**Poster set-up (Science Atrium)**	
9:00-9:30	**Welcome**	
9:30-10:15	**Keynote Presentation:** Veterinary Medicine, Epidemiology, and One Health: Applications in Mitigating Geographic Health Disparities	Agricola Odoi
10:15-10:45	**Break**	
10:45-12:00	**Quantitative Approaches to Companion Animal Health**	
10:45-11:00	Treated with love: Dog caregivers' perceptions, motivations, and behaviours for feeding treats	Shelby Nielson
11:00-11:15	Backyard chickens , assessing interest and risk among current and prospective owners in Ontario; 2019-2020	Katherine Paphitis
11:15-11:30	Raw meat feeding of young puppies in Canada and the US: a cross-sectional survey examining associations with dog breeder demographics and management	Quinn Rausch
11:30-11:45	Examining the differential use of a North American animal poison control center by veterinarians and the public	Keana Shahin
11:45-12:00	Rabies titres in dogs imported into Ontario, Canada (2021-2022)	Catherine Belanger
12:00-2:00	**Lunch (Science Atrium)**	
12:30-12:45	Presentation of the Lifetime Leadership Award	
12:45-1:45	Poster viewing	
2:00-2:45	**Keynote Presentation:** Climate Change and One Health: Linking Local Research with International Decision-making	Sherilee Harper
2:45-3:30	**Quantitative Approaches to Antimicrobial Resistance**	
2:45-3:00	Within sample variability in antimicrobial resistance and its impact on surveillance	Shivdeep Hayer
3:00-3:15	Antimicrobial resistance profiles of Campylobacter isolated from Canadian dairy, beef, swine, turkey, and broiler farms in 2019-2020.	Lauren MacNeil
3:15-3:30	Engagement of veterinary clinics to collect herd-level AMU data for the Canadian Dairy Network for Antimicrobial Stewardship and Resistance program	Daniella Rizzo
3:30-4:00	**Break**	
4:00-4:45	**Quantitative Approaches to Dairy Health (1)**	
4:00-4:15	Risk factors for *Salmonella Dublin* on dairy farms in Ontario, Canada	Katherine Perry
4:15-4:30	Adoption and decision factors regarding selective treatment of clinical mastitis on Canadian dairy farms	Ellen deJong
4:30-4:45	Short and long term effects of pre-weaning colostrum management practices on dairy cattle longevity	Elizah McFarland
4:45-5:00	**Wrap-up Day 1**	
5:00-6:00	**On your own…**	
6:00-10:00	**Dinner - Art Gallery of Guelph**	

CAVEPM Day 2: June 1, 2023 – in ECLA 1720

Time	Title	Speaker
9:00-9:15	**Welcome**	
9:15-10:15	**Spatial and Advanced Analytical Methods in One Health**	
9:15-9:30	Investigating effective mitigation measures for the Ontario swine industry in the event of production disruptions through dynamic modelling	Maggie Henry
9:30-9:45	Within-herd transmission of *Mycoplasma bovis* infection in 20 Dutch dairy herds	Marit Biesheuvel
9:45-10:00	Comparing control intervention scenarios for raccoon rabies in Southern Ontario between 2015 and 2025	Emily Acheson
10:00-10:15	How many more times: Another look at the p-value debate from a philosophy of science perspective	Olaf Berke
10:15-10:45	**Break**	
10:45-11:45	**Multi-method Approaches to Environmental Impacts on One Health**	
10:45-11:00	Are we prepared for health threats posed by vector-borne diseases in an evolving climate? A scoping review of Orthobunyavirus epidemiology in Canada	Michele Bergevin
11:00-11:15	Assessing demographic risk factors for *Ixodes scapularis* acquisition, compared to acquisition of other ticks, in Canadian dogs	Sydney DeWinter
11:15-11:30	Air Pollution Linked to Animal Farming as Risk Factors of COVID-19 Mortality in Ontario, Canada	John Mallare
11:30-11:45	Bacterial interactions and diversity patterns in the shell microbiome of American lobster (*H. americanus*) in Atlantic Canada	Krishna Thakur
11:45-1:00	**Lunch and AGM**	
1:00-2:00	**Qualitative Approaches to One Health**	
1:00-1:15	The adaptation of Canadians to ticks and Lyme disease may lead to negative mental health and social outcomes.	Natasha Bowser
1:15-1:30	Dairy producers' barriers to biosecurity in Ontario, Canada	Gillian Power
1:30-1:45	Sources of occupational stress and coping strategies among farmers in Ontario	Rochelle Thompson
1:45-2:00	One Health program evaluation: Assessing the alignment of institutional and program goals with One Health values	Carrie McMullen
2:00-2:30	**Break**	
2:30-3:30	**Quantitative Approaches to Dairy Health (2)**	
2:30-2:45	Assessing the frequency of sole ulcers according to housing system type in Québec dairy cows	Benjamin Fouquette
2:45-3:00	The biosecurity basket: using Association Rule Learning (ARL) algorithms to target recommendations more likely to be implemented by dairy farmers	Faustin Farison
3:00-3:15	Evolution of the within-herd prevalence status of bovine leukosis between 2017 and 2022 in Québec dairy herds	Karol Solano Suarez
3:15-3:30	Providing a rest period mitigates the impact of long-distance transportation on markers of energy status in surplus dairy calves	Hanne Goetz
3:30-4:00	**Student award presentations and wrap up**	

CAVEPM Pre- and Post-Conference Activities:

May 29, 2023

Time	Title	Instructors
9:00-4:30	Applied Geographic Epidemiology (with R/RStudio) - Day 1	Olaf Berke & Zvonimir Poljak

Workshop description: Geographic epidemiology should be considered a core competency for one health practitioners. Basic concepts and methods of geographic epidemiology will be introduced, and examples will be discussed to further our critical thinking. Practical examples illustrate software applications these range across the spectrum from descriptive map making and cluster detection to regression modeling. The 2-day workshop Applied Geographic Epidemiology is targeted at graduate students and faculty in the areas of veterinary epidemiology and one health. All data analysis is demonstrated using R and RStudio. Participants will be provided with the example data and R-code. Bring your laptop with R and RStudio installed to follow along or just lean back and enjoy – in any case we hope to make this an inspiring experience for all.

May 30, 2023

Time	Title	Instructors
9:00-4:30	Applied Geographic Epidemiology (with R/RStudio) - Day 2	Olaf Berke & Zvonimir Poljak
6:00-9:00	Registration and reception - at the Bullring *Please join us for a relaxed evening of snacks and drinks ahead of the conference*	All welcome!

June 2, 2023

Time	Title	Instructors
8:30-4:30	Introduction to Qualitative Health Research	Basem Gohar & Marianne Saragosa

Workshop description: This workshop will offer introductory knowledge in qualitative health research. Participants will learn about different qualitative methodologies applied in health research with ethical considerations. Furthermore, they will learn and practice interviewing and focus group facilitation. Finally, they will be introduced to data analysis, including coding, and generating themes. NOTE: This workshop is meant for individuals without prior knowledge of qualitative research. Moreover, this workshop is not meant to replace formal courses in qualitative research, as the primary objective is to demonstrate the importance of qualitative research in human and animal health.

*All workshops will be in PABI 1812

Scientific Abstracts

Oral Presentations

Poster Presentations

Oral Presentations

Treated with love: Dog caregivers' perceptions, motivations, and behaviours for feeding treats

Shelby Nielson[1], Deep Khosa[1], Katie Clow[1], Adronie Verbrugghe[2]
[1]Department of Population Medicine, University of Guelph; [2]Department of Clinical Studies, University of Guelph

Treats are commonly fed by most dog caregivers and can constitute a significant proportion of a dog's diet, potentially contributing to obesity. Feeding aspects related to treats specifically, remain underexplored. An e-survey was voluntarily completed by 716 dog caregivers predominantly from Canada and the USA to identify and describe dog caregivers' perceptions, motivations, and behaviours surrounding treats, and information sources used when making decisions about feeding treats. Survey responses were analyzed using descriptive statistics, chi-square tests, and two-sample tests of proportions. Multivariable logistic regression analysis was performed to analyze frequency of feeding different types of treats with caregivers perceiving their dog as overweight/obese. Alongside training and sports activities, aspects relating to the human-animal bond were highly reported to influence decisions surrounding treats. Most respondents were motivated to provide treats because it makes their pet happy, and to strengthen the bond with their dog, and nearly 40% of caregivers frequently feed treats to show love to their dog. Human food and table scraps were frequently fed by 30-40% of caregivers, and such practices were predictive of caregivers perceiving their dog to be overweight or obese (OR=1.91 human food weekly; OR=2.11 table scraps weekly, p<0.05). Findings from this research offer new insights to caregiver feeding habits. These results can be used to inform veterinary counselling strategies and caregiver education initiatives to promote companion animal health and well-being, and advise future One Health applications surrounding shared eating habits between caregivers and their dogs.

Backyard chickens - assessing interest and risk among current and prospective owners in Ontario; 2019-2020

Katherine Paphitis[1], Devon Metcalf[1], Scott Weese[2]
[1]Health Protection, Public Health Ontario; [2]Department of Pathobiology, University of Guelph

Purpose: Backyard poultry are a natural reservoir for zoonotic pathogens such as Campylobacter and Salmonella bacteria. Their owners may be at increased risk of illness due to contact with poultry, eggs and bedding. We aimed to identify any knowledge, attitude or practice gaps among current and prospective backyard chicken owners as backyard chickens become more popular in Ontario. Methods: Responses were collected via an anonymous online survey from December 2019 – October 2020. Respondents were asked about household demographics, and whether they had or wanted backyard chickens. Backyard chicken owners were asked to report their flock size, reasons for having their chickens, and questions regarding poultry handling practices and awareness of associated zoonotic disease risks. Results: There were 325 responses. Most respondents (61.7%) currently or recently owned backyard chickens, with flock sizes ranging from <5 to ≥16 birds. Backyard chickens were wanted for their eggs, as pets, as a hobby, and/or pest control. Interestingly, 11.2% of current/prospective owners wanted backyard chickens for meat. Just over a fifth (21.1%) of current owners allowed the birds to come into their house, to interact with children (77.8%) or with household pets (62.7%). Just over 7% of respondents indicated rabies could be transmitted by backyard chickens. Conclusions: Many respondents had or wanted backyard chickens, including for food (eggs/meat), and companionship. Many owners reported interactions between chickens and people or pets that created opportunities for zoonotic disease transmission. There were misconceptions regarding diseases transmissible by chickens. Backyard chicken owners could benefit from educational resources.

Raw meat feeding of young puppies in Canada and the US: a cross-sectional survey examining associations with dog breeder demographics and management

Quinn Rausch[1], Lee Niel[1]
[1]Department of Population Medicine, University of Guelph

Although it is common to incorporate raw meat into dog diets, this feeding practice is associated with health risks. Bacterial contamination of the meat can lead to food-borne illness and transmission to other household members through saliva and feces. Young puppies are likely to be particularly vulnerable to infection and to spread bacteria to others, yet little is known about dog breeder practices around raw meat feeding. We examined relationships between raw meat feeding to puppies and breeder demographics and food management practices using a cross-sectional survey for Canadian and American dog breeders (n = 292) that included questions about demographics, nursing and feeding management practices and puppy behaviour. Logistic regression models examined factors associated with feeding raw meat to puppies. Twenty percent of breeders (60/292) reported feeding their puppies raw meat. Breeders from Canada had 5.8x higher odds of feeding raw compared to the US (p=0.001). Breeders who registered their last litter with a kennel club had 2.4x higher odds of feeding raw compared to those with unregistered litters (p=0.037). Breeders who allow the bitch to wean puppies naturally had 1.9x higher odds of feeding raw when compared with breeders who wean puppies earlier. Interestingly, raw meat feeding was not significantly associated with breeder age, gender or breeding experience or purpose. The high proportion of breeders feeding raw meat highlights the need for further studies to examine where breeders source raw meat, how it is handled and delivered and what influences breeder decisions to feed raw meat to puppies.

Examining the differential use of a North American animal poison control center by veterinarians and the public

Keana Shahin[1], Olaf Berke[1], Terri O'Sullivan[1], David Pearl[1]
[1]Department of Population Medicine, University of Guelph

Telehealth services are becoming increasingly common, they offer users the ability to receive credible health advice from licensed professionals in the comfort of their own home. In the field of veterinary medicine, telehealth services have been employed since the early 2000s but there has been little examination of how these services are used by callers. The objectives of this study were to explore how the use of an animal poison control center (APCC) varied between veterinarians and the public in terms of toxicant type, animal demographics, availability of veterinary services, as well as seasonal and secular trends. Data regarding dog poisoning events were obtained from the American Society for the Prevention of Cruelty to Animals' (ASPCA) APCC. We fitted a mixed logistic regression model with random intercepts for county and state. We identified statistically significant associations between caller type and the following: animal characteristics (i.e., age, weight, breed-class), type of toxicant, season, year, and access to veterinary services (i.e., veterinarians per capita in the county of the caller). We also found statistically significant interaction effects between season and both plant and pesticide toxicants and between year and access to veterinary care. Further investigations are needed to understand how the novelty of a toxicant and the severity of symptoms associated with a toxicant predict the type of caller, if pet demographics are associated with the caller based on medical issues or owner attitudes, and how access to veterinary care influences the use of this telehealth service.

Rabies titres in dogs imported into Ontario, Canada (2021-2022)

Catherine R. Belanger[1], Maureen E.C. Anderson[2], J. Scott Weese[3], Kelsey L. Spence[1], Katie M. Clow[1]
[1]Department of Population Medicine, University of Guelph; [2]Ontario Ministry of Agriculture, Food and Rural Affairs; [3]Department of Pathobiology, University of Guelph

Background: Vaccination of dogs against rabies is an important public health and animal health precaution in countries with endemic rabies. Currently, almost all dogs imported to Canada from any country not considered rabies-free must have a valid rabies vaccination certificate. Other countries also require serological testing of imported dogs to verify that their rabies antibody titres meet or exceed 0.5 IU/mL, in order to verify an immunological response to pre-importation vaccination. Objectives: Determine the prevalence of rabies antibody titres that meet or exceed 0.5 IU/mL in a convenience sample of dogs recently imported into Ontario, Canada following rabies vaccination abroad. Methods: Serum was collected from imported dogs upon arrival or through veterinary clinics and humane societies prior to administration of any rabies vaccine in Canada. Rabies antibody titres were measured using the Rapid Fluorescent Foci Inhibition Test (RFFIT). Results: Sixty-seven dogs arriving mainly from Egypt (n=46) and China (n=9) were sampled between October 2021 and September 2022. Thirty-two of 67 dogs (47.8%) had titres less than 0.5 IU/ml. Twenty-three had no detectable titre. Although all dogs would have required a rabies vaccination certificate at the time of importation, records could only be obtained for 21/67 dogs; of these, 11/21 had titres less than 0.5 IU/mL. Significance: Rabies vaccination status may be suboptimal in many imported dogs. Veterinarians should review vaccination history and consider revaccination of newly imported dogs. Adding a requirement for rabies titres in dogs imported into Canada may help prevent the entry of inadequately vaccinated dogs.

Within sample variability in antimicrobial resistance and its impact on surveillance

Shivdeep Singh Hayer[1], Javier Sanchez[2], Anne Deckert[3], Richard Reid-Smith[3], Elizabeth Jane Parmley[1]
[1]Department of Population Medicine, Ontario Veterinary College, University of Guelph; [2]Department of Health Management, Atlantic Veterinary College, University of Prince Edward Island; [3]Centre for Food-Borne, Environmental and Zoonotic Infectious Diseases, Public Health Agency of Canada

Different sampling strategies can potentially influence the determination of antimicrobial resistance (AMR) prevalence in animal populations. We evaluated within-sample AMR variation and how the number of isolates tested per sample influenced surveillance results. AMR was evaluated in 10026 *Escherichia coli* isolates collected from 3342 healthy, finisher pigs in Canada between 2008-14 through the farm component of the Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS). We generated sub-populations of bacterial isolates by subsampling one isolate/sample or two isolates/sample. We classified a sample as "resistant" if any of the isolates were resistant, or "non-resistant" if all isolates were non-resistant. Finally, we compared sensitivity, negative predictive value (NPV), prevalence estimates and temporal trends for resistance to each antimicrobial tested from these sub-populations relative to the resistance status determined by considering three isolates/sample. McNemar tests at individual antimicrobial level revealed that sub-populations generated by subsampling one isolate/sample were discordant. Sensitivity and NPV improved when 2 isolates/sample were selected. Selecting one or two isolates/sample underestimated the true prevalence of AMR, with percent error ranging between 15.4-56.3% and 8.86-37.82% depending on the AMR tested and if one or two isolates/sample were selected, respectively. However, overall AMR trends did not differ based on number of isolates selected per sample. Our results suggest that the current approach of using one isolate/sample might substantially underestimate the true prevalence of AMR, although changes in resistance over time may not be impacted. A cost-benefit evaluation of studying multiple isolates/sample should be considered.

Antimicrobial resistance profiles of *Campylobacter* isolated from Canadian dairy, beef, swine, turkey, and broiler farms in 2019-2020

Lauren MacNeil[1,2], Anne E. Deckert[1], Mariana Fonseca[2], Javier Sanchez[2], Luke C. Heider[2]
[1]Food-Borne Disease and Antimicrobial Resistance Surveillance Division, Public Health Agency of Canada; [2]Department of Health Management, Atlantic Veterinary College

The objective of this project was to compare antimicrobial (AM) resistance profiles of *Campylobacter* originating from the Canadian dairy industry to four livestock industries to understand phenotypic differences between commodities. In 2019 and 2020, pooled fecal samples were taken from five livestock industries respective of their major producing provinces, which represented seven provinces. A total of 1,195 dairy, 747 beef, 1,203 swine, 607 turkey, and 1,000 broiler samples were collected with *Campylobacter* recovery rates of 54.2%, 32.6%, 66.2%, 50.2%, and 22.2%, respectively. Predominant isolate species included *C. jejuni* for dairy, chicken, and turkey samples, and *C. coli* for beef and swine samples. Isolates were submitted for AM susceptibility testing to tetracycline (TET), ciprofloxacin (CIP), nalidixic acid (NAL), azithromycin (AZM), and erythromycin (ERY) using broth microdilution methods. TET was the most common AM profile with 33.5%, 44.3%, 26.1%, 23.6%, and 12.2% of isolates exhibiting it in dairy, beef, swine, turkey, and broilers, respectively. The most common multi-AM profile in all commodities was CIP-NAL-TET (7.0%-23.4%) with higher proportions in beef (23.4%) and turkeys (20.0%). CIP-NAL profiles were observed in all industries but were highest in chicken (6.8%) and turkey (10.5%). Within industries, smaller proportions of dairy (0.3%), broiler (0.5%), and turkey (0%) isolates showed resistance to 3 or more AM classes than beef (15.2%) and swine (25.3%) isolates. Our study will investigate production and management factors associated with AM resistance in these commodities.

Engagement of veterinary clinics to collect herd-level AMU data for the Canadian Dairy Network for Antimicrobial Stewardship and Resistance program

Daniella Rizzo[1], David F. Léger[1], Cassandra Reedman[1], Luke C. Heider[2], David F. Kelton[3], Simon Dufour[4], Javier Sanchez[2]

[1]Foodborne Disease and Antimicrobial Resistance Surveillance Division, Centre for Food-borne, Environmental, and Zoonotic Infectious Diseases, Public Health Agency of Canada; [2]Department of Health Management, Atlantic Veterinary College, University of Prince Edward Island; [3]Department of Population Medicine, Ontario Veterinary College, University of Guelph; [4]Department of Pathology and Microbiology, Faculty of Veterinary Medicine, Université de Montréal

In 2019, the Canadian Dairy Network for Antimicrobial Stewardship and Resistance (CaDNetASR) was implemented in 5 major dairy producing provinces (Alberta, British Columbia, Nova Scotia, Ontario, and Québec). This program has a requirement to provide herd-level estimates of antimicrobial use (AMU) for public health surveillance purposes. The objective of this work is to establish a surveillance framework to effectively monitor AMU in Canadian dairy herds. The aim of this study was to investigate the feasibility and logistics associated with the provision of herd-level veterinary dispensing data as a source of AMU data. A short questionnaire was developed with research ethics approval. It was emailed to all veterinary clinics servicing dairy herds enrolled in the CaDNetASR program with a response period of April 8 to June 7, 2021. Questions included identifying veterinary software used by clinics when dispensing drug products to dairy producers, the method of dispensation (direct vs pharmacy), the ability to extract and share herd-level dispensing information, and the willingness of veterinarians to share this information. The response rate was 47% (23/49 veterinary clinics). All participating provinces were represented by the respondents. 8 different veterinary softwares were identified, and 87% (20/23) of respondents indicated that they were willing to provide herd-level veterinary dispensing data to the program. This questionnaire process succeeded in laying the groundwork for veterinary clinic engagement across Canada to facilitate the provision of herd-level dispensing data. AMU estimates derived from these data will support enhanced antimicrobial stewardship and public health surveillance in the Canadian dairy sector.

Risk factors for *Salmonella Dublin* on dairy farms in Ontario, Canada

Katherine Perry[1], David Kelton[1], Simon Dufour[2], Cynthia Miltenburg[3], Sebastian Umana Sedo[1], David Renaud[1]

[1]Department of Population Medicine, University of Guelph; [2]Department of Pathology and Microbiology, University of Montreal; [3]Ontario Ministry of Agriculture, Food and Rural Affairs

Salmonella Dublin (*S. Dublin*) is an emerging pathogen on dairy farms in Ontario, but its herd-level prevalence is unknown. The objective of this cross-sectional study was to identify management practices associated with *S. Dublin* herd positivity. A convenience sample of 100 Ontario dairy farms were visited once from April to August 2022 to collect blood samples from 20 heifers between 4 and 24 months old, sample bulk tank milk and administer an in-person questionnaire on management practices. An additional bulk tank sample was collected prior to the visit by milk transporters. Bulk tank milk and serum underwent ELISA testing. Overall, 25% of farms tested positive, meaning at least one serum or bulk tank sample was interpreted as positive (≥35%PP). Of the 1,990 heifers sampled, 44 (2.2%) were positive for *S. Dublin*. At least one seropositive heifer was identified on 24% of farms. Of bulk tank samples across both sampling periods, 4% of farms were positive for *S. Dublin*. Logistic regression analysis identified four factors that increased the likelihood that farms were positive for *S. Dublin*: introduction of purchased animals within the last two years, at least one animal leaving and returning to the premises within the last two years, addition of bedding material to calving areas less than once weekly and keeping 4 cows or more per pen in calving areas. Test positivity for *S. Dublin* among Ontario dairy farms sampled is high, and dairy producers should consider avoiding management practices associated with an increased risk of *S. Dublin* infection.

Adoption and decision factors regarding selective treatment of clinical mastitis on Canadian dairy farms

Ellen de Jong[1], Kayley D. McCubbin[1], Tamaki Uyama[2], Carmen Brummelhuis[3], Julia Bodaneze[1], David F. Kelton[2], Simon Dufour[4], Javier Sanchez[5], Daniella Rizzo[6], David Léger[6], Herman W. Barkema[1]
[1]Faculty of Veterinary Medicine, University of Calgary; [2]Department of Population Medicine, Ontario Veterinary College, University of Guelph; [3]Faculty of Veterinary Medicine, Utrecht University; [4]Faculty of Veterinary Medicine, Université de Montréal; [5]Department of Health Management, Atlantic Veterinary College, University of Prince Edward Island; [6]Public Health Agency of Canada, Centre for Foodborne, Environmental and Zoonotic Infectious Diseases

Comprehension of current on-farm clinical mastitis (CM) treatment practices is crucial in order to tailor interventions aimed at reducing antimicrobial use on dairy farms. Two questionnaires were conducted among 142 Canadian dairy farms during visits of the Canadian Dairy Network for Antimicrobial Stewardship and Resistance. Self-reported adoption of selective CM treatments was 64%. Use of a selective CM treatment protocol was not associated with farm characteristics. Via a cluster analysis, three subsets of farmers emerged based on their cow-level CM treatment decisions: those who based decisions almost exclusively on severity of clinical signs, those who used various udder health indicators, and farmers who also incorporated cow information. When SCC was considered, median threshold used was 300,000 cells/mL of the last DHIA test. When mastitis history was considered, most used a threshold to treat of >1 CM case in the current lactation. Veterinary laboratories were most frequently used for bacteriological testing. Test results were used to both start, change, and stop treatments. Regardless of protocol, antimicrobial treatment was sometimes withheld due to the cow being on a cull list, having a chronic infection, or being at end of lactation. If clinical signs persist after treatment, farmers indicated that they would ask veterinarians for advice, stop treatment, or continue with the same or different antibiotics. Results of this study can be utilized to design interventions targeting judicious mastitis-related antimicrobial use, and aid discussions between veterinarians and dairy producers regarding CM-related AMU.

Short and long term effects of pre-weaning colostrum management practices on dairy cattle longevity

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The average culling age of dairy cows in Canada is 5.4 years, which coincides with peak production during their third lactation. Multiple factors are involved in culling decisions, but the role of calf management practices and their effect on cow longevity is not as well understood. This study aims to: 1) identify the potential impacts of colostrum management practices on the length of time an animal remains in the herd and 2) investigate differences between early and late lactation culling, while accounting for an animal's genetic potential by using an animal's genomic parent average for direct Herd Life. Preweaning calf data were collected from a retrospective cohort study that enrolled 275 heifer calves from eight herds in New Brunswick, Canada, in 2014-2015. Discrete survival analysis was conducted on animals ranging from birth until the completion of the fifth lactation. The lactation period was defined as the time between calving to the day before the next calving. Each lactation was then split into early and late periods using 120 days in milk as a cut-off creating eleven time periods. First colostrum feeding practices, including time to first colostrum feeding, volume fed, and some types of colostrum were protective factors, while first colostrum feeding time coupled with colostrum type are a risk factor. By including genomic parent average for direct Herd Life in this analysis, we hope to provide a more accurate picture of how colostrum practices and pre-weaning health events may impact a cow's potential to stay in the herd longer.

Investigating effective mitigation measures for the Ontario swine industry in the event of production disruptions through dynamic modelling

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The SARS-CoV-2 pandemic highlighted the sensitivity of the local swine industry to disturbances caused by human disease and raised concerns as to the robustness of the Ontario and Canadian swine production system in the event of a foreign animal disease. The use of dynamic simulation modelling offers an efficient method to demonstrate how an industry may be impacted by interruptions by exploring several possible scenarios in a risk-free environment. The objective of this research was to construct a discrete event model to explore potential mitigation should the Ontario swine flow be disrupted. The model runs on a weekly basis, and contains three agents: a Sow Farm, a Pig Farm, and an Abattoir Farm. Each agent reflects a component of the entire swine flow system, where gilts enter the Sow Farm agent, produce offspring, and then return to breeding. The resulting piglets from each sow progress through the Pig Farm agent and are then processed within the Abattoir Farm agent. The model concludes with four possible abattoir routes which the pigs are sorted into, and these abattoirs reflect the current processing situation within Ontario. The model was validated at both the individual farm level and the provincial level, and scenarios including reducing the provincial sow herd and decreasing total production within the Ontario swine flow have been modelled. Preparation for emergency circumstances is essential to limit the impact of reduced health and welfare in both the human and pig populations in the event of disruptions to the current pork marketing situation.

Within-herd transmission of *Mycoplasma bovis* infection in 20 Dutch dairy herds

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Though *Mycoplasma bovis* is an emerging disease in Western Canada, causing recent outbreaks on dairy farms across Alberta, understanding outbreak dynamics remain limited. Quantified information about how *M. bovis* spreads is lacking, whilst being critical for outbreak control. We, therefore, aimed to estimate the within-herd transmission of *M. bovis* and the most likely transmission pathways using an age-stratified SIR-model and identify risk factors. Three cattle age-groups on 20 Dutch dairy farms with a clinical outbreak of *M. bovis* were sampled 5 times. Transmission from cows was associated with median reproduction ratios of 28 (IQR: 4 - 53), 27 (IQR: 4 - 30) and 29 (IQR: 4 - 41) secondarily infected cows, youngstock, and calves per herd. Transmission from youngstock with 7 (IQR: 2 - 22), 3 (IQR: 1 - 61) and 2 (IQR: 1 - 4) secondarily infected youngstock, calves and cows per herd, whereas transmission from calves with 8 (IQR: 2 - 35), 6 (IQR: 2 - 15) and 9 (IQR: 2 - 38) secondarily infected calves, youngstock and cows per herd. Mean outbreak durations ranged from 5.3 to 55 weeks across the 20 herds. Most important pathways were transmission from cows, calves to calves and youngstock, and youngstock to youngstock. Risk factors could be related to internal and external biosecurity, or indirect transmission. This study demonstrates that *M. bovis* can spread incredibly fast, with most transmission originating from cows. However, transmission to and amongst calves and youngstock should not be ignored, given their relevance in many on-farm outbreaks.

Comparing control intervention scenarios for raccoon rabies in Southern Ontario between 2015 and 2025

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The largest outbreak of raccoon rabies in Canada was first reported in Hamilton, Ontario, in 2015 following a probable translocation event from the United States. We used a spatially-explicit agent-based model called SamPy to evaluate the effectiveness of control programs in Ontario if control interventions were used until 2025, 2020, or never used. Calibration tests suggested that a seroprevalence of protective rabies antibodies 2.1 times higher than that suggested by program assessments was required in the model to replicate raccoon rabies cases detected in the field. Our simulations showed that if control interventions with an adjusted seroprevalence were used until 2025 or 2020, the probability of rabies elimination due to control intervention use was 49.2% and 42.1%, respectively. However, if controls were never used, the probability that initial rabies cases failed to establish a sustained outbreak was only 18.2%. In simulations where rabies was not successfully eliminated, using control interventions until 2025 resulted in 67% fewer new infections compared to only applying controls until 2020 and in 90% fewer new infections compared to no control intervention use. However, the model likely underestimated rabies elimination rates since we did not adjust for control strategies being adapted or extended past 2025 in response to changes in rabies case numbers and distributions. Our agent-based model will inform a cost-benefit analysis to determine the most cost-effective strategy for rabies control applications.

How many more times: Another look at the p-value debate from a philosophy of science perspective

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For decades the concepts of statistical hypothesis testing and the p-value have been criticized. The reproducibility crisis has put a new spotlight on the meaning of statistical significance and p-values in epidemiological research. The goal of this presentation is to clarify some relevant concepts, identify misconceptions, and advocate for a more reflective use of p-values and propose confidence intervals as an alternative. The history of statistical hypothesis testing is briefly traced back. The principles of statistical significance testing as part of study design is revisited and contrasted with typical arguments against its use in practise. With reference to scientific inference (inductive versus deductive) different types of test situations will be identified. The distinction is between exploratory and confirmatory statistical tests. Exploratory testing is common practice but meaningless. Tests provide an answer to a single decision problem in designed studies. Scientific progress is based on replication and triangulation and is a process. Tests contribute to this process but can not alone answer the fundamental question of cause-effect relations in epidemiology.

Are we prepared for health threats posed by vector-borne diseases in an evolving climate? A scoping review of Orthobunyavirus epidemiology in Canada

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Mosquito-borne Orthobunyaviruses endemic to, or emerging in Canada, are a public health concern. The reason is twofold, there are no vaccines or treatments, and climate change is facilitating habitat expansion for relevant reservoirs. Orthobunyaviral diseases are commonly underdiagnosed and in Canada, likely underreported as surveillance is passive. Consequently, the true disease burden of Orthobunyaviruses is unknown. A scoping review was conducted to describe the epidemiology of Orthobunyaviruses in Canada, and to identify knowledge gaps. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines method was used for literature searches in six databases and grey literature. The epidemiology of Orthobunyaviruses was characterized in the context of host species, vector capacity, spatiotemporal patterns, risk factors, and climate change impact. A total of 179 studies were identified from 1,734 citations from which 100 addressed host species, including humans, livestock/domesticated animals, or wildlife, and 96 examined vectors or viruses. Four Orthobunyaviruses of public and animal health concern were identified, and prevalence was widespread across vertebrate and vector species. Three Orthobunyaviruses were detected across Canada and the United States. The fourth Orthobunyavirus was reported only in the United States, predominantly the Mid-Atlantic and Appalachian regions, although related reservoirs and vectors are established in Canada. Disease incidence varied by Orthobunyavirus and was associated with age, environment, or livestock breeding schedule. The largest knowledge gaps were disease prevention and forecasting. In conclusion, additional surveillance and mitigation strategies accounting for climate change are needed for guiding future public health efforts in preventing Orthobunyavirus exposure and disease.

Assessing demographic risk factors for *Ixodes scapularis* acquisition, compared to acquisition of other ticks, in Canadian dogs

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Climatic and land use changes have contributed to shifts in the abundance, distribution, and activity patterns of tick species in Canada. These alterations have led to an increased risk of tick and tick-borne pathogen exposure for companion animals, with *Ixodes scapularis* being of specific concern. The objective of this study was to identify demographic risk factors for tick acquisition for dogs in Canada. Ticks were collected for one year (April 2019 - March 2020) from dogs at 94 veterinary clinics as part of the Canadian Pet Tick Survey. Each submission was accompanied by a short questionnaire containing owner-reported information on travel history, date and location of tick acquisition and animal-specific demographic factors. Ticks were identified morphologically using a stereomicroscope and standard keys. Mixed effect multivariable logistic regression models were built to explore the association between *I. scapularis* acquisition (versus other species) and canine demographic factors. Veterinary clinic was included as a random effect. Approximately 2300 submissions were received from clinics across Canada. Of these submissions, 1098 dogs were infested with I. scapularis, and 827 dogs were infested with tick species. Across eastern Canada, dogs of the herding, mixed breed (large and small), sporting, working, terrier, and toy breed groups, were found to have a higher odds of acquiring *I. scapularis*, compared to other tick species. Significant interactions were found between the age and sex of dogs. Generation of canine demographic risk factors for *I. scapularis* acquisition (compared to other species of tick), contributes to evidence-based veterinary recommendations for tick prevention.

Air pollution linked to animal farming as risk factors of COVID-19 mortality in Ontario, Canada

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Objective: To investigate regional variations in prolonged exposure to air pollution associated, among others, with livestock farming (e.g., particulate matter 2.5 ≤ μm, PM2.5; ammonia, NH3) as risk factors of COVID-19 mortality in Ontario, Canada. Methods: A longitudinal ecological analysis of 34 health regions was executed between January 2020 and June 2021, corresponding to three epidemic waves and 9,333 COVID-19 deaths. Principal component (PC) analysis was applied to fifteen covariates retrieved from human and environmental surveillance systems. An air pollution-epidemic wave interaction was evaluated to determine if the associations of PM2.5 and NH3 with COVID-19 varied over time. A PC negative binomial mixed model was built to analyze the data.
Results: Upon controlling for an additional fifteen covariates, a 1 μg/m3 increase in prolonged PM2.5 exposure corresponded with a 14% average increase in a health region's COVID-19 monthly mortality rate ratio (MRR = 1.14, 95% CI: 0.86 - 1.51) between the first and second epidemic waves (MRR = 1.06, 95% CI: 0.85 - 1.31). A salient decrease in the association between PM2.5 and COVID-19 mortality was observed during the third wave (MRR = 0.79, 95% CI: 0.64 - 0.98). There was a tendency for a minor inverse association between NH¬3 and COVID-19 mortality (MRR = 0.99, 95% CI: 0.92 - 1.06). Discussion: PC regression was deemed necessary, as the One Health approach amounted to a complex data structure. Fuel combustion was likely responsible for most of the observed PM2.5-related COVID-19 health association. Health regions with intensive livestock agriculture appeared to have had a reduced risk of fatal COVID-19 infections, as indicated by increased NH3 exposure, but this could have been due to confounding.

Bacterial interactions and diversity patterns in the shell microbiome of American lobster (*H. americanus*) in Atlantic Canada

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Due to knowledge gaps regarding the shell microbial community – a key factor in the proliferation of epizootic shell disease (ESD) – of lobster (*H. americanus*), this study aims to establish a baseline description and analysis of the shell microbiome of apparently healthy lobsters from four locations in Atlantic Canada. Over 150 lobster shell swab samples were collected from New Brunswick, Nova Scotia and Prince Edward Island (PEI). Long-read 16S rDNA sequencing (PacBio) and bioinformatic analyses in QIIME2 identified the shell-associated bacteria. Alpha and beta diversity metrics assessed the microbial community as well as differences in bacterial species abundance and composition based on sampling location and season. Correlation-based network analyses detected dependencies between members of the shell microbiome and mapped bacterial interactions. The overall microbial richness and diversity differed by sampling location and season but not by lobster sex or moult stage. The shell microbial composition also differed regionally and seasonally with samples showing a distinct bacterial composition in PEI as well as in winter and spring samples in Nova Scotia. Network analyses show differences in the interactome between sampling locations, with higher connectedness between microbial species in southern Nova Scotia. This study shows that environmental factors influence the lobster shell microbiome and that host factors such as sex, size and moult stage do not appear to have a strong impact on the microbial composition. Our results help to elucidate ESD risk factors by providing reference microbial data of lobsters in a disease-free state.

The adaptation of Canadians to ticks and Lyme disease may lead to negative mental health and social outcomes

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Lyme disease (LD) is the most frequently reported tick-borne disease in Canada. Tick bite prevention remains the most effective preventive measure against LD yet is not always adopted by at-risk individuals. The objectives of this study were to understand the facilitators and barriers to adopting tick bite preventive behaviours for at-risk individuals, utilising the COM-B model of behaviour change, and to explore whether adverse or unhealthy behaviours are developing among individuals living in LD endemic regions. Residents of LD endemic regions were invited through social media platforms (including governmental and health authority) to participate in virtual focus groups. In total, 96 individuals participated in 22 focus groups across five provinces of Canada (BC, MB, ON, QC and NS) from October 2021 to January 2022. Thematic analysis was conducted on the transcripts. Reported facilitators of preventive behaviours included awareness of LD symptoms and social prompts. Barriers included wanting to feel free in nature and concern over the use of acaracides and antibiotics. For many individuals, living in a LD endemic region negatively impacted mental health, changed how they recreate outside and/or disrupted social dynamics. Canadians are adapting to the presence of ticks and LD; however, these adaptations are not always consistent or positive. Barriers and facilitators were reported across all behavior sources of the COM-B model (capability, opportunity, and motivation). This study provides first evidence of the non-clinical impacts of ticks and LD on residents of endemic regions across Canada and highlights potential targets for future preventive interventions against tick bites.

Dairy producers' barriers to biosecurity in Ontario, Canada

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Biosecurity influences animal health, welfare, production, and public health, yet implementation in the Ontario dairy industry is variable. The objective of this qualitative study was to identify barriers to biosecurity implementation for Ontario dairy producers. Recruitment was done through snowball sampling and advertisements. Seventeen Ontario dairy managers and owners completed a demographic survey and recorded semi-structured, individual phone interview between July 2022 and January 2023. One researcher (GP) edited and coded the Zoom transcripts using NVivo informed by a constructivist paradigm and grounded theory approach. Participants were from Western (53%), Southern (35%) and Eastern (12%) Ontario and were mostly male (71%). They were mostly between 30-39 (41%) and 50-59 (29%) years old. Herd size ranged from 45 to 220 milking cows, and 46% used an automated milking system. All participants had an overall positive association with biosecurity, determined through current knowledge or a willingness to learn. Many producers related biosecurity to diseases entering the farm or food safety. Some barriers to biosecurity implementation included frustration from a lack of initiative from other industry members, perceived low risk of disease and lack of resources. Participants cited other dairy producers, veterinarians, salespeople, and additional industry personnel as causes for frustration. Commonly reported resources that were of concern were time, money, and facilities. Some suggested solutions were more digestible information, biosecurity training or peer meetings. Understanding these barriers is beneficial for veterinarians, researchers, and regulators to understand where resources should be allocated to improve biosecurity implementation.

Sources of occupational stress and coping strategies among farmers in Ontario

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Farmers' psychosocial stress has negative impacts on job strain, animal welfare, and productivity. Compared to the general population, Canadian farmers have scored more severely on measures of perceived stress. Although there is some investigation of farming stressors and coping strategies during extreme weather (e.g. drought in Australia), research on everyday farming stressors and farming-specific coping strategies is scarce, particularly in Canada. Objectives: This study aimed to describe 1) the occupational stressors experienced by farmers in Ontario, Canada and 2) the coping strategies they employ, with the overall aim to inform avenues to reduce stress and/or boost wellbeing for farmers. Methods: Qualitative data were collected from 75 in-depth interviews with farmers and industry professionals from Ontario, Canada in 2017-2018. Participants discussed their day-to-day farming stressors and coping strategies. Thematic analyses were conducted to identify farming stressors and coping strategies used by farmers in Ontario. Results: Four stressor themes and five coping themes were generated. Key stressor themes include perceived lack of control over day-to-day stressors, and the all-encompassing "lifestyle" of farming. Key coping themes include detachment from farming, tractor therapy and developing mindsets/mantras. Conclusions: The farmers in this study attributed stress to a variety of chronic and episodic stressors, which they described as complexly inter-related, cumulative, and overwhelming. They also described flexible coping strategies that could be implemented despite time and place constraints of farming. Existing avenues to reduce universal occupational stress may be inappropriate for use among farmers. Implications and focus areas for well-being promotion among farmers will be discussed.

One Health program evaluation: assessing the alignment of institutional and program goals with One Health values

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Objective: The objective of this research is to create an evaluation framework for One Health programs at Canadian universities that is grounded by One Health values. Materials and methods: A draft evaluation framework was developed based upon published program evaluation frameworks and outlined according to a conceptual model for the evaluation of antimicrobial use and resistance surveillance. Core competencies that are exclusive to One Health were identified from the One Health and climate change competencies framework and used as the underpinning areas of emphasis. This framework was validated in a series of focus groups with university faculty and teaching staff. Results: The framework identifies five stages of program evaluation: 1) One Health competency integration, 2) One Health inputs, 3) Student performance and interest, 4) Stakeholder perception and summative evaluation, and 5) Program impacts. These stages are aligned to the three main areas of emphasis of One Health values (with subcomponents in brackets), which are Healthy Animals, People and Ecosystems (depth and breadth of understanding); Interconnections and Working Together (transdisciplinarity, systems thinking, and Indigenous knowledge as a guiding principle); and Doing Better and Making Positive Change (equity, advocacy, action, and sustainability). Conclusions: Several recent initiatives have defined the One Health competencies; therefore, this innovative evaluation framework is needed for their assessment. The application of this evaluation will support program improvement, realization of the One Health competencies in students and graduates, and equip graduates to be innovators and leaders in solving complex problems at the human, animal, and environmental interface.

Assessing the frequency of sole ulcers according to housing system type in Québec dairy cows

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Most studies and recommendations on lameness and hoof lesions focus on free stall barns. In Québec, most dairy farms are tie-stall systems. Our objective was to evaluate the frequency of sole ulcers (SU) in dairy cows according to their housing system. Data on hoof trimmings performed between 2015 and 2022 were obtained from the database of the Québec Hoof Trimmers Association. Cow and herd data information were obtained from the local DHI. In total, 39,658 dairy cows (95% Holstein) from 357 herds (78% tie-stalls) were included based on the following criteria: having at least one lactation and one trimming session and having available information on housing system. The productive life of each cow was calculated as the difference between the culling date and its first calving date. Median productive life was 34.5 months (IQR: 34.6 months). Overall, no hoof lesions of any type were observed in 22,037 cows (55.6%; 95% CI: 55.1-55.6%) throughout their productive life. SU was diagnosed at least once in the productive life of 6,004 cows (15.1%; 95%CI: 14.8-15.5) and was more frequently observed in cows housed in tie-stall (n=4,273; 71.2%; 95% CI: 70.0-72.3) than free-stall farms (n=1,731; 28.8%; 95% CI: 27.7-30.0). This study shows that almost half the cows have at least one hoof lesion during their productive life. Frequency of SU lesions differ according to the housing type. Following steps include exploring the association between SU lesions and length of productive life while accounting for housing type.

The « biosecurity basket »: using Association Rule Learning (ARL) algorithms to target recommendations more likely to be implemented by dairy farmers

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Biosecurity measures prevent the introduction and spread of pathogens on farms. Information about their implementation is collected through risk assessment questionnaires (RAQ) like the one completed during the mandatory Dairy Farmers of Canada (DFC) proAction initiative. Our objective was to explore the usefulness of ARL, a non-supervised machine learning algorithm, to predict the biosecurity practices that will be more likely to be implemented by producers based on their responses to the RAQ. ARL has been widely used in marketing for consumer segmentation based on buying patterns and has the potential to help veterinarians to recommend biosecurity practices that are more susceptible to be adopted by dairy producers. In total, 3825 RAQ completed between 2018 and 2021 by Québec dairy producers through the DFC proAction initiative were analysed. Initially, 29 million rules (combination of practices most frequently applied) were generated by the algorithm. A rule is composed by a set of items (practices) forming an antecedent that is associated to a consequent. The 60 best rules were retained based on the frequency (support), strength (lift) and likelihood of the association (confidence). Of the 32 biosecurity practices initially assessed, the algorithm predicted 14 practices (consequents) with a confidence ≥70%. ARL is an interesting methodology to analyse information collected through RAQ and study the relationships between biosecurity practices on dairy farms. Since ARL identifies the practices more likely to be implemented by a given producer, it allows veterinarians to provide targeted recommendations that might improve producers' uptake of prevention and control programs.

Evolution of the within-herd prevalence status of bovine leukosis between 2017 and 2022 in Quebec dairy herds

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Our objective was to compare the change in the within-herd prevalence status (WHPS) of bovine leukosis (BLV) between 2017 and 2022 in Quebec dairy herds. Convenience sampling was done in 140 Quebec dairy herds for this descriptive longitudinal study, where bulk tank milk samples were collected on each farm in 2017 and 2022, and then analyzed by Lactanet using an ELISA test. The WHPS was categorized as low (LO: < 10%), medium (ME: 10-30%), or high (HI: > 30%). The proportions (95%CI) of herds changing their WHPS were described and compared using the Chi-square test (œá2). The proportion of LO herds slightly increased from 19% in 2017 to 20% in 2022, and of ME herds increased from 14% to 26%. Conversely, the proportion of HI herds decreased from 67 to 54% (P < 0.001). In general, 19% (13 - 27%) of the herds reduced their WHPS (2% from HI to LO, 14% from HI to ME, and 4% from ME to LO). Conversely, 7% (3 - 13%) increased their WHPS, either from LO to ME (4%) or ME to HI (3%). Finally, 74% of the herds remained the same. In conclusion, a moderate improvement of the BLV WHPS was observed in our study. Limitations of this study include using different ELISA kits in 2017 vs. 2022. Future work includes the validation of bulk tank milk ELISA results with the true within-herd prevalence.

Providing a rest period mitigates the impact of long-distance transportation on markers of energy status in surplus dairy calves

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Long-distance transportation can negatively impact energy status of surplus calves upon arrival at calf-raising facilities, pre-disposing them to future health challenges. A randomized controlled trial was conducted between September and November 2022 to determine if providing a rest period (RP) during transportation can mitigate these negative effects. Surplus calves (n = 64) from a dairy farm in Ontario were randomly assigned to one of two treatment groups: 1) continuous transportation for 16 h or 2) 8 h of transport, 8 h RP and then a further 8 h of transport to a single calf-raising facility. Calves that received the RP were given 2 L of milk replacer at the beginning and end of the RP. Blood samples were collected before loading, unloading, and on d 1-3 following unloading. Serum was analyzed for beta-hydroxybutyrate (BHBA), non-esterified fatty acids (NEFA), and glucose. Mixed models with repeated measures were used to evaluate the impact of the RP on these markers of energy status. Immediately following transportation, BHBA (-60.75 umol/L, $P = 0.001$, 95% CI -95.02 to -26.49) and NEFA (-0.19 mmol/L, $P < 0.001$, -0.26 to -0.11) were lower and glucose was higher (0.48 mmol/L, $P < 0.001$, 0.23 to 0.73) in calves provided an RP compared to continuously transported calves. These findings suggest that providing an RP can reduce the negative impact of long-distance transportation on energy mobilization in calves and improve their condition upon arrival at veal and dairy-beef industries.

Poster Presentations

Machine learning as a viral infection's host-range identification tool using viral genomes: a scoping review

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The prediction of the host range of viral infections is important for the understanding and control of viral outbreaks. Advancements in in-silico techniques have expanded the use of machine learning and bioinformatic approaches in the prediction of viral hosts. We conducted a scoping review that aimed to identify the scope of machine learning methods that have been applied to influenza virus and coronavirus genome data for the identification of potential reservoirs. Nine online databases were searched with relevant search strings. 1217 citations were obtained and screened in duplicate for English language primary in-silico viral infection host identification research published between 2000 and May 2022. 53 citations were identified as relevant and used in data charting. The breadth of research was extensive including 32 different machine learning algorithms used in combination with 29 different feature selection methods and 43 different genome data input formats. Most citations used influenza viruses (58%, n = 31), however, more recent citations tended to use more coronaviruses and other viruses in combination with influenza viruses (42%, n = 22). Human (n = 57), avian (n = 35), and swine (n = 28) were the most common hosts used in the analyses for the machine learning algorithm. In total, 53 different hosts were used with most citations using multiple hosts. The diversity and evolvement of approaches to viral host identification using machine learning is extensive.

A framework for depicting the impact of microclimate and microhabitat characteristics on the transmission of California serogroup viruses

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California serogroup viruses (CSGv) are mosquito-borne zoonoses that can cause neurological disease in infected humans and livestock. Current knowledge of environmental risk factors for their prevalence is sparse. We hypothesize that characterizing the microhabitat and microclimate of environments favorable for CSGv vectors and hosts will enable a more accurate depiction of their transmission mechanisms from a One Health perspective. In 2017, we launched a dual-designed six-year mosquito biodiversity and CSGv prevalence survey in rural and semi-urban sites within the South Nation River Watershed, Ontario. The first design, which ran from 2017 to 2019, covered a large spatial extent to capture possible CSGv prevalent sites. Results revealed several positive mosquito pools mostly detected in Aedes and Ochlerotatus species, suggesting the vectorial potential of these species. Prevalence peaked in late spring and early summer near wooded and riparian zones. To investigate this clustering, we undertook a second, higher-density trapping design, in 2021 with finer-scaled microenvironmental characterization focused on CSGv prevalent sites. In 2023, an additional field study will allow the measurement of the abundance of the main amplifying hosts, including small mammals and white-tailed deer, near mosquito collection sites. Beyond the preliminary results obtained, we will present the designs of the field studies to elucidate the issues and challenges we met. This complex multi-year and multi-target (vector and reservoir) field sampling design can serve as a reference point for future studies while aspiring for further exploration of zoonotic diseases from a One Health perspective.

Factors influencing Ontario dairy producers' management and care of down dairy cattle

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This objective of this cross-sectional study was to identify factors associated with how Ontario dairy producers manage down cows. An online survey was distributed to all dairy producers in Ontario, Canada (n = 3,367) from November 2020 to March 2021. Descriptive statistics were evaluated and two logistic regression models were built to explore factors associated with 1) relocating down cows with hip lifters and 2) assisting cows to stand within an hour after going down. A total of 226 Ontario dairy farmers responded which was a response rate of 7.4%. The first model found smaller farms (< 57 cows) were less likely to move down cows with hip lifters, compared to larger farms (> 129 cows) (Odds Ratio (OR) = 0.33; P = 0.04; 95% CI 0.11-0.97). Farms that used hip lifters to lift cows had a higher odds of moving down cows with hip lifters (OR = 12.96; P < 0.001; 95% CI 2.92-57.49). The second model identified farms using hip lifters to move cows had a higher odds of assisting a cow to standing within an hour (13.04; P = < 0.001; 95% CI 3.23-52.65). Additionally, producers who took more time to relocate a down cow (< 1 hr vs. > 1 hr) had a lower odds of assisting the cow to stand within an hour following recumbency (OR = 0.03; P < 0.001; 95% CI 0.006-0.129;). Data from this study will be helpful for exploring the barriers and motivations of producers regarding the management of down-dairy cows.

Escherichia coli in a One Health continuum: Investigation of genetic relatedness and antimicrobial resistance using whole-genome sequencing

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Many previous whole-genome assessments of antimicrobial resistance (AMR) carriage in *E. coli* have focused on clinical isolates or selected isolates based on resistance patterns of concern. However, a broader understanding of AMR transmission in a One Health context may require an epidemiological approach that considers the more numerous commensal and environmental *E. coli*. This study aims to assess the relatedness of generic *Escherichia coli* isolates within a One Health continuum using the genetic discrimination afforded by whole-genome sequencing. Further, it seeks to investigate if the genetic context of the isolates is associated with their carriage of AMR. Two hundred and eighty-eight generic E. coli isolates from feedlot and broiler chicken fecal samples, beef and chicken retail meat, post-treatment wastewater, and well water were selected by a stratified random sampling method with strata defined by source and class level phenotypic AMR. All samples were collected in Alberta, Canada, in 2018 or 2019. From short-read whole-genome sequencing assemblies, the serotype, sequence type, and genotypic AMR of each isolate were determined in silico and phylogenetic trees were inferred from core-genome single nucleotide polymorphisms within the sequenced population. There was a marked diversity in *E. coli* isolates from all sources. No obvious clustering of isolates based on source, species of origin (cattle or chicken), or carriage of AMR was noted on preliminary analysis. Individual resistance elements, including mobile genetic elements, will be investigated further as will other factors potentially influencing AMR carriage, such as ecological niche differentiation and virulence.

Canine leishmaniasis in imported dogs in Canada: Study design proposal

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Leishmaniasis is a zoonotic, parasitic disease caused by protozoa *Leishmania* spp. and transmitted by sandflies. Dogs are reservoirs for *Leishmania infantum*, which can cause significant disease in both canine and human hosts. *Leishmania* spp. are currently endemic in countries in South America, the Middle East, the Mediterranean, central Asia, and Africa, but dogs from these countries have been regularly imported into Canada. Since the latent period of the disease is long, these dogs may be imported before clinical signs are evident. The most common cases present as skin sores, called cutaneous leishmaniasis. In chronic cases, visceral leishmaniasis may manifest. This manifestation of leishmaniasis is often fatal if left untreated. Leishmaniasis is not a reportable disease and therefore the actual burden in Canada is unknown. The objectives of the proposed research are to (1) estimate the prevalence of Leishmania spp. infection in dogs imported into Canada from endemic countries, (2) identify lifestyle and medical risk factors associated with infection with *Leishmania* spp. and clinical disease among imported dogs, and (3) describe the clinical picture of imported cases of canine leishmaniosis. Prevalence, risk factors, and the clinical picture of canine leishmaniasis will be investigated through an interconnected prospective cross-sectional study, and longitudinal case-series study which will ascertain information regarding life history, health status, and clinical outcomes of dogs diagnosed with leishmaniasis. Study design and recruitment strategies will be presented for discussion and feedback.

Development of novel Competitive Enzyme-linked immunosorbent assays to detect SARS-CoV-2-specific antibodies in animals

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The Coronavirus infectious disease-2019 (COVID-19)-causing virus, severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), is a zoonotic pathogen that can infect wildlife and serve as a reservoir for future human and animal infections. The exposure of susceptible wildlife species to the virus is currently unknown, highlighting the urgent need to develop a single test that can be used to monitor multiple species for exposure to the virus. To address this need, a competitive enzyme-linked immunosorbent assay (cELISA) was developed to detect SARS-CoV-2 antibodies in mammals with >90% specificity and sensitivity. The cELISA was validated using sera from experimentally infected hamsters and compared with other tests. Rabbit antibodies, which are expensive and may cross-react with other mammalian antibodies, were initially used in the cELISA but were later substituted with IgY antibodies produced in hen eggs. Among the IgY antibodies, only the S2-IgY-based cELISA was specific and comparable with other tests. These newly developed cELISAs provide a valuable tool for surveillance programs investigating exposure to and transmission of SARS-CoV-2 in multiple domestic, captive, or wildlife species.

Barriers to recording calf data on Ontario dairy farms

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This cross-sectional study aimed to investigate barriers to recording calf illnesses and treatments on Ontario dairy farms. An online survey was completed by a convenience sample of 88 Ontario dairy farms in 2022. Multivariable models were built through backward stepwise elimination to assess associations between explanatory variables and the likelihood of making changes based on records analysis, factors that would increase the use of electronic recording methods, and whether farms did or did not record 100% of calf illnesses and treatments. Pearson's chi-squared test were also used to investigate associations between explanatory variables and why a calf illness or treatment might not be recorded. Farms were more likely to record 100% of antimicrobial treatments if they recorded using a computer software system compared to those that did not (OR = 3.45; 95% CI: 1.18, 10.14; P = 0.02). For supportive therapies, non-family employees were more likely to record 100% of treatments compared to owners (OR = 6.08; 95% CI: 1.18, 31.22; P = 0.03). Farms that kept records in the calf barn were less likely to report that illnesses were not recorded due to time constraints (P = 0.008) or because nothing is done with the data (P = 0.04). Additionally, farms recording calf treatments in a paper booklet were more likely to report that treatments were not recorded because nothing is done with the data (P = 0.04). Recording practices may be improved by ensuring records are in the calf barn and that recording methods allow for data analysis.

Rabies, racoons and skunks: Modelling the effects of habitat fragmentation on viral spread and spillover in a two-species system

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Rabies virus infection in raccoons and skunks is a public health concern due to the risk of transmission to humans. Considering that landscape structure, among other biological factors, could be involved in the transmission cycle of rabies, we aim to address if habitat fragmentation affects the geographical spread of rabies and the location and frequency of spillover events between two species. We implement the SamPy agent-based model (Python-based) to create a theoretical representation of two species with biological similitude to raccoons and skunks. We use a grid of hexagonal cells starting with two landscapes of equal resource distribution for each species. Resources will be estimated by assigning a carrying capacity (K) value to each cell (i.e., the average number of animals that the habitat in that cell can support). Habitats vary between high (K > 100), medium (K = 50) and low (K = 0) suitability. We then use neutral landscape models to randomly redistribute the carrying capacity across the cells for both species, and we also vary both intra- and interspecies transmission rates. As a result, we will measure the speed of disease spread as well as the location and frequency of spillover events. We expect that our study will offer insight into how habitat fragmentation affects infectious disease dynamics and spillover events, and help identify the biological characteristics of high-risk disease emergence areas.

Is there room for virtual care in companion-animal veterinary medicine? A qualitative approach

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The COVID-19 pandemic has called for an increased usage of telehealth platforms in both human and veterinary medicine. Virtual care carries a lot of potential in terms of accessibility of care and could cater to a specific demographic. However, the scientific literature regarding its usage and implications in veterinary medicine is sparse. The goal of this research was to explore veterinarians' perspectives of telehealth, and to potentially identify the opportunities and the challenges that virtual care poses for the veterinary profession from their own perspective. A series of semi-structured one-on-one interviews were conducted virtually with companion-animal veterinarians, accompanied by a brief electronic survey. In the survey, veterinarians were asked how likely they were to recommend virtual care to a colleague, allowing us to calculate a Net Promoter Score (NPS) for each participant. Using the value of their NPS, participants were grouped in a "promoter" or "detractor" group, with respect to their perspective of veterinary virtual care. A total of 10 detractors and 11 promoters were interviewed to allow us to explore both point of views. Preliminary results have shown hesitancy surrounding physical examinations performed virtually and the regulations surrounding telehealth. However, they have also suggested that virtual care could be a tool to increase access to care. In general, both promoters and detractors agreed that virtual care was viable when the benefits outweigh the risks. Final results will be presented.

Ontario horse owner perceptions and attitudes towards biosecurity at equine facilities

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The horse industry is not immune to disease outbreaks which can pose a threat to horse welfare and the economic health of the industry. Horse owners' perceptions and understanding of their role in disease prevention are not understood. This study aims to explore horse owner perceptions, attitudes, and experiences relating to on-farm biosecurity using virtual, semi-structured interviews. Recruitment utilized social media snowball sampling where equine and veterinary organizations shared advertisements with horse owners. Interviews were recorded, transcribed, and analyzed using reflexive thematic analysis. A common theme among the 14 horse owners interviewed was an overreliance on vaccinations to prevent disease outbreaks. Other measures, such as quarantining and handwashing, were typically used as reactive measures. Perceptions and knowledge of biosecurity were often an extension of measures used at the facility where owners boarded their horse, which was considered "good enough" biosecurity. Horse owners were reluctant to practice additional biosecurity measures beyond what was practiced at the barn to avoid being labeled as overly cautious. Horse owners described a desire to fit in with their peers, indicating that social pressures in the horse industry influenced the use of biosecurity. The findings suggested that horse owners who took proactive steps to learn more had a better understanding of biosecurity. The results from this study indicate horse owners need improved access to and engagement with educational initiatives that emphasize the importance and purpose of all biosecurity measures. Improved biosecurity education and awareness can help to normalize proper use of biosecurity and remove social barriers.

Biosecurity practices and perceptions at Ontario horse facilities

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Recent outbreaks of equine contagious diseases have emphasized the need for ongoing investigations into how well biosecurity is being implemented on Ontario horse facilities. This information is crucial to understanding how prepared the horse industry is to manage disease outbreaks, large or small, and potentially identify gaps. The objective of this study is to explore biosecurity implementation at Ontario horse facilities and socio-cognitive barriers that may be hindering it. Horse owners were invited to complete a survey on Qualtrics via a recruitment poster which was circulated on social media sites such as Facebook. While the survey is still ongoing, preliminary results have been collected from over 270 participants. More than half of horse owners (59%) reported having a biosecurity plan at their facility, which often included quarantining sick (72%) and incoming horses (58%). Core vaccines (i.e., Rabies, Tetanus, WNV, EEE/WEE) were commonly required (75%) while risk-based vaccines (i.e., Strangles, EI, EHV-1&4) were commonly recommended (53%). The most common barriers to implementing biosecurity on horse facilities included a lack of appropriate quarantine facilities (13%), not knowing where to start when undertaking biosecurity (6%), and the fear of being labeled overly cautious (5%). Future analysis will include investigating associations between socio-cognitive factors and biosecurity uptake. This study will provide insight into horse owners' use of biosecurity measures at equine facilities and indicate potential gaps in usage. This information can be used to improve learning initiatives and target areas of concern related to biosecurity.

Investigating gross composition and microbial quality of Ontario goat milk

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The objective of the study was to establish benchmark values for milk quality factors such as protein, fat, and lactose, as well as identify an association between somatic cell count (SCC) and bacterial count (Bactoscan) in lactating does. Province-wide sampling was conducted on 20 licensed Ontario dairy goat farms. For the animal to be sampled, the producer had to be actively milking one or both halves and the animal was excluded if they were not contributing to the bulk tank for a variety of reasons. A composite milk sample (half from each half) from each eligible doe was collected into three 40mL vials and stored in a chilled container until it could be refrigerated at 2°C at the University of Guelph. The vials remained refrigerated until testing was performed at the Agriculture & Food Laboratory (University of Guelph). The samples were tested for: 1) milk composition by the MilkoScan [Foss, Hillerød, Denmark] analyzer, 2) SCC analysis performed by the Fossomatic [Foss, Hillerød, Denmark] instrument, and 3) bacterial count performed by the Bactoscan [Foss, Hillerød, Denmark], all of which utilize a flow cytometry technique. Preliminary results were computed using R/RStudio [R Core Team] for the 3173 samples collected to date, some of which can be seen below. A correlation coefficient between the bacterial count and the other parameters was also calculated. Quality Factor being assessed. | Mean value observed (range) | Correlation coefficient. Bactoscan (ibc/mL) x 1000 | 250.93 (0.0-117238.0) | - SCC (scc/mL) x1000 | 1835 (0.0-23921) | 0.61

Pet owner preferences for information during veterinarian-client-patient interactions

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Objective - To determine veterinary client stated preferences in veterinary-client communication regarding decision-making relating to veterinary care in three decision-making contexts: a) preventative care, b) general problems (e.g., illness or injury), c) urgent/emergency cases. Materials and Methods - A cross-sectional descriptive study using discrete choice analysis methods to quantify the stated preferences of pet parents. Data will be collected during February and March of 2023. Utility scores will be evaluated using hierarchical Bayesian modeling. Client-level demographics will inform latent class analysis of participant choices. Contrasts between appointment-type decision-making scenarios will be distinguished. Results - Preliminary results will be presented. Clinical Relevance - Findings will be used to inform the priorities and preferences clients have regarding decisions made for their pet in veterinary practice. Furthered understanding of decision-making preferences will support veterinary professionals in reducing knowledge barriers surrounding access to veterinary care. Communication within veterinarian-client-patient interactions has an important role in supporting pet owners informed decisions and supporting the provision of veterinary care for their pets.

Canadian hunters' preferences for behavior change based on perceived risk of tuberculosis and brucellosis from wood bison

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Many isolated Indigenous communities depended on wood bison for millennia; however, wood bison declines have compromised food security. Zoonotic diseases in half the wood bison population, particularly in and around Wood Buffalo National Park (WBNP), have limited species recovery. Wood bison management has often focused on limiting spillback into the Canadian cattle population rather than rightsholders' and stakeholders' needs. The Canadian government has been pressured to address bison health and include rightsholders in management decision making. Our research aims to understand bison health management attitudes of rightsholders and stakeholders to inform future policy. Preliminary results from more than 150 respondents in Western Canada to questionnaires and small focus groups indicate that a person' beliefs regarding effectiveness of a management strategy is the strongest predictor of strategy support (r2 = 0.50-0.65). Additional predictors of support (e.g., knowledge, perceptions of risk) for a management strategy change across informants (e.g., hunters vs. non-hunters) and the strategies themselves (e.g., vaccination vs. depopulation). Different strategies also show different potential for conflict within and between rightsholder and stakeholder groups (e.g., support differs widely for eco-management, suggesting greater potential for conflict). Additional responses are forthcoming from communities around WBNP with particular focus on the views of rightsholder groups around WBNP. These results will provide a more complete picture of how management attitudes develop and strategies that may be divisive or unifying across rightsholders and stakeholders. Understanding such predictors of support can identify most preferred policies and inform preferred cooperative and communication aspects of the policy formulation process.

Temporal and regional variations in antimicrobial resistance in *E. coli* and *Salmonella enterica* isolates collected from pigs in Canada (2009-21)

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Antimicrobial resistance (AMR) has emerged as a quintessential One-health problem. Food animals (including pigs) are considered potential reservoirs of resistant bacteria that can infect humans and be shed into the environment. Therefore, it is imperative to continuously monitor AMR in animals, humans and the environment. The objective of this study was to estimate regional and temporal changes in AMR in generic *Escherichia coli* (indicator bacteria, n=14072) and *Salmonella enterica* (pathogenic bacteria, n=1735) isolated from healthy finisher pigs in Canada between 2009-2021. Data collected by Canadian Integrated Program for Antimicrobial Resistance Surveillance and FOODNET-Canada was used. Resistance to 11 antimicrobials of human and veterinary importance was tested. Trends and regional variations were evaluated using generalized linear models with resistance to individual antimicrobials as binary, dependent variables, and year (continuous) and province (categorical) as independent variables. Farms, multiple isolates per sample (*Escherichia coli*), and serotypes (*Salmonella*) were accounted for as fixed- or random-effects depending on the model fit. There was a statistically significant increase in resistance to amoxicillin-clavulanic acid, cefoxitin and gentamicin and decrease in tetracycline resistance in *Salmonella* isolates over time. There was a statistically significant increase in resistance to ceftriaxone and decrease in chloramphenicol, tetracycline and sulfisoxazole resistance in *Escherichia coli* isolates over time. Resistant to some antimicrobials was higher in Quebec and Ontario as compared to Prairies. These temporal and regional differences can be potentially explained by antimicrobial usage, farm demographics, regional disease incidence and genomic data, which we plan to incorporate in future models.

Spatio-temporal description of patterns of health and mortality events of farmed Atlantic salmon (*Salmo salar L.*) in British Columbia

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Introduction: Elevated mortality of farmed Atlantic salmon is detrimental to salmon farmers and triggers further investigation and regulatory actions from fish health agencies. Compromised disease mitigation measures have been reported to have an antagonistic effect on mortality reduction. Objective: This study aims to describe the spatio-temporal patterns of health and mortality events and identify the clusters of these events in farmed salmon in British Columbia (BC) at different times. Materials and methods: We used the publicly available health and mortality events data reported by the aquaculture companies in BC to the Department of Fisheries and Oceans Canada (DFO) from 2016-2022. We summarized the frequencies of probable causes of mortality events and laboratory diagnoses of health events across fish health management zones. We will use scan statistics to identify the spatiotemporal clusters of the above events. Results: Three companies from 9 different zones reported mortality events. Top three probable causes of mortality events were low dissolved oxygen (29.3%), sea lice mitigation (24.4%), and algal bloom (21.2%). Five companies from 10 different zones have reported a total of 15 different health events. Among reported health events, mouth rot was reported the maximum number of times (59.2%), followed by salmonid rickettsial septicemia (13.6%). Conclusions: Our preliminary findings indicated that the environmental factors (low dissolved oxygen and algae bloom) and sea lice mitigation are associated with most mortality events in BC Atlantic salmonid aquaculture. The outcome of this research will be informative to the BC salmon industries, prioritizing site-level disease mitigation measures.

Measures of positive mental health in graduating veterinary students: findings from baseline data collection

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In recent years, the role of positive psychology has been increasingly discussed in veterinarian mental health, but current knowledge is still limited. The potential to improve mental health and the retention of veterinarians in the profession is especially of interest when considering the present demand for clinical veterinarians. The results presented in this abstract are a component of an ongoing longitudinal survey following veterinarians up to 2 years after graduation from a Canadian veterinary school. The baseline questionnaire was distributed in April 2022 to graduating veterinary students. Validated psychometric scales were used to measure factors including resilience (CD-RISC-10), well-being (Ryff's PWB Scale), emotional intelligence (TEIQue-SF), and life satisfaction (SWLS). The baseline survey results (n = 104) revealed that the graduating veterinary students had an average TEIQue-SF score of 4.91 (95%CI = 4.75 - 5.06) and an average PWB score of 186.54 (95%CI = 180.65 - 192.44). The graduating veterinary students' average resilience (27.52, 95%CI = 26.55 - 28.49) was lower than CD-RISC-10 referent scores (32.1 and 31.8). Further, the cohort of graduating veterinarians' average life satisfaction (24.36, 95%CI = 23.03 - 25.68) was marginally higher than the standard SWLS value (20 - 24 = average life satisfaction). This report provides baseline measurements for factors suspected to influence mental health in early-career veterinarians and uncovers opportunities to strengthen these factors.

Staphylococcal intramammary infections in dairy cows: prevalence, incidence and persistence over the dry period

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The dry period is a critical "non-lactating" period for the acquisition and elimination of intramammary infections (IMI) in dairy cattle. Furthermore, cows with existing IMI may clear this IMI over the dry period or carry it into the next lactation. The objective of this study was to describe the species-specific staphylococcal IMI prevalence, incidence and persistence around the dry period in dairy cows. Quarter-milk samples were aseptically collected from each recruited cow on five dairy farms. All cows were sampled twice between prior to dry-off, and twice at early lactation. Staphylococcal species were identified in milk samples using bacteriological culture followed by MALDI-TOF mass spectrometry. In total, we obtained the results for 1762 quarters of 447 cows around dry-off. Most frequently isolated species at dry-off were *Staphylococcus chromogenes* (7.3 %, 95% CI 6.0-8.7%), *S. epidermidis* (3.9%, 95% CI 3.0-5.0%), *S. haemolyticus* (3.9%, 95% CI 3.0-5.0%), *S. hominis* (1.5%, 95% CI 0.9-2.2%), and *S. aureus* (1.4%, 95% CI 0.9-2.2%). The species with the highest IMI incidence were *S. chromogenes* (1.9 new IMIs/100 quarters) and *S. epidermidis* (1.4 new IMIs/100 quarters). Proportionally, *S. aureus* (33.3 %, 95% CI 14.6-56.9%), *S. xylosus* (27.3 %, 95% CI 6.0-60.9%), *S. chromogenes* (22.1 %, 95% CI 14.6-31.3%), *S. simulans* (17.7 %, 95% CI 3.8-43.4%) and *S. epidermidis* (11.8 %, 95% CI 4.4-23.9%) were more likely to persist over the dry period. Our study highlights that some staphylococcal IMI are often present at dry-off and that many of these may survive over the dry period.

Vet-ing for victory: Navigating veterinary care access for Ontario bison producers

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Farmed bison in Ontario are an under researched emerging food source. They are becoming increasingly popular as a food animal due to the health benefits of bison meat and the reduced costs and environmental impacts of farming. However, there are significantly fewer veterinarians in Ontario who are comfortable treating farmed bison compared to other bovine species. This reduced access to veterinary care can have negative impacts on bison health and welfare and limit the ability of producers to seek cost-effective care. This study aims to explore the current access to veterinary care for bison producers, identify barriers to accessing veterinary care, and determine the impact on bison health and management practices. Bison producers will be contacted through the Ontario Bison Association and virtual focus groups of 4-6 producers will be conducted. The focus groups will be used to determine the level of veterinary care that producers have access to and its impact on production. Qualitative data analysis techniques such as content analysis and thematic analysis will be used to identify key themes and patterns. The findings of this study will provide a basis for policymakers and industry stakeholders to create future initiatives aimed at improving bison producers' access to veterinary care and support the growth of the bison industry in Ontario.

Identifying changes in *Leptospira* prevalence and serovars in wildlife reservoirs in Ontario

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Leptospirosis is an endemic zoonoses of growing concern for animals and humans in North America. Lack of routine surveillance has left large gaps in knowledge about *Leptospira* prevalence, distribution and serovar occurrence essential for disease mitigation. As wildlife reservoirs can act as sentinels for disease in both animals and humans, our goal was to describe, and identify changes in, *Leptospira* prevalence and serovar occurrence in Ontario wildlife in urban and rural areas and compared to domestic animals. We tested 617 raccoon and skunk serum samples obtained from the Ontario Ministry of Natural Resources and Forestry rabies surveillance program from 2016, 2017, and 2019 at the Animal Health Laboratory (AHL) using the Microscopic Agglutination Test (MAT). Diagnostic MAT results for domestic animals (canine, porcine, bovine and equine) from the same period were also obtained from the AHL. Seroprevalence varied between years for raccoons (33% (66/200) in 2016, 72% (43/60) in 2017 and 45% (89/200) in 2019) and skunks (46% (21/46) in 2016 and 20% (16/81) in 2019) and was higher in urban areas for both species. Serovar occurrence in wildlife varied between urban and rural locations, years and species, which may change disease risk to domestic animals and humans. These findings illustrate the potential benefits for cross-species disease surveillance and the need to further understand the wildlife-domestic animal interface for cross-species serovar maintenance and transmission. Further analyses will be performed to examine correlations, significance of associations and to consider the influence of factors such as sex, age and environmental conditions.

Investigating, developing, and evaluating institutional-level interventions to facilitate well-being within veterinary academia

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Elevated levels of stress, depression, and burnout are reported amongst employees in the veterinary profession and in academia. To date, research has focused on how workplace and psychosocial stressors are linked to poor mental health and well-being. Less is known about evidence-informed solutions to facilitate well-being on an institutional-level. Insight into the perceived well-being needs of the veterinary academic population is needed to reduce ill-being effects on individuals themselves, while mitigating downstream effects related to employee and student engagement and retention, client adherence and satisfaction, and patient safety. Our objective is to investigate and address ill-being at the institutional-level at a Canadian veterinary academic institution and characterize prominent psychosocial demands and well-being facilitators at work during COVID-19. Our study employs mixed methods, informed by participatory action approaches to investigate institutional-level interventions to facilitate well-being at the OVC. To date, twenty-eight interviews and seven focus groups were conducted with OVC employees - clinical and non-clinical faculty and staff - and students. An in-depth thematic analysis is being conducted to further illuminate themes characterizing OVC members' perceived well-being needs, and the types of resources required to address them to inform short, medium, and long-term tailored intervention(s). Anticipated results may illuminate key themes related to well-being needs like employee recognition and appreciation, formal leadership training, intern/resident equity, consultation/communication flow, and building a culture of well-being. Results may contribute to diverse and equitable well-being policy frameworks, which could be used to guide similar veterinary academic institutions seeking to support employee well-being during COVID-19 and thereafter.

Fido's tick fight: Uncovering pet guardians' thoughts on tick risks

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Tick bites and exposure to tick-borne pathogens are a growing health concern for dogs and cats. Increasing temperatures associated with climate change are facilitating the range expansions of several tick species of animal health concern. As the risk of tick bites and exposure to tick-borne pathogens increases, the use of tick preventative measures, such as tick checks and parasiticides, are more important for protecting the health of dogs and cats. We currently have limited knowledge on factors that influence pet guardians use of tick preventative measures. The objective of this research is to explore factors influencing the adoption of preventative measures for tick bite and tick-borne pathogens among dog and cat guardians in Ontario, including perceptions, key factors in decision making regarding adoption of preventative measures, and differences in uptake between dog and cat guardians. This projects' quantitative phase uses a questionnaire to collect data on current knowledge, attitudes, and practices of dog and cat guardians towards tick preventative measures. The questionnaire will consist of close-ended questions regarding the participants demographics, pet characteristics, guardian knowledge of tick-borne diseases and perception of the utility, efficacy, safety and accessibility of tick preventative measures. Questionnaire data will be analyzed using hierarchical cluster analysis to group participants by similarities in current adoption of tick preventative measures resulting in clusters of guardians who implement preventative measures with varying levels of frequency. Factors influencing tick prevention can be shared with pet guardians and veterinarians to enhance uptake of preventative measures for tick bites and tick-borne pathogens.

Understanding meaningful work: conversations with early-career veterinarians across Canada

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Compared to the general population, early-career veterinarians have demonstrated a higher risk of adverse mental health outcomes. With much of the current research focusing on the quantitative analysis of negative outcomes, there is a need to use qualitative approaches and explore positive psychology concepts. Meaningful work is a concept that describes one's relationship with their career, often providing a sense of purpose and fulfillment. Previous research has demonstrated that meaningful work was associated with positive mental health outcomes, however, the concept itself is difficult to comprehend without context. Using qualitative research methods, the purpose of this study was to explore 1) how veterinarians perceive meaningful work; and 2) how veterinarians' mental state impacts their views of meaningful work. Using a semi-structured interview guide, qualitative interviews were conducted with early-career veterinarians. Interviews were analyzed using thematic analysis. Overall, the interpretation of meaning varied amongst participants. While many participants joined the veterinary industry to find meaning through human-animal interaction, they recognized that working with humans (e.g. clients, animal owners) is a critical factor. Some early-career veterinarians embraced working with humans, while others have found it a struggle to find meaning in human-human interactions. Additionally, the concept of meaningful work remains generally positive even when early-career veterinarians experienced difficult events. If we can connect veterinarians with meaning in both human-human and human-animal interactions, we may be able to utilize meaningful work as an intervention to increase positive mental health outcomes.

Vaccination protocols recommended by veterinarians in Québec dairy herds

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The objective of this study was to describe the current vaccination practices of Québec dairy producers. A cross-sectional study using the electronic data collected as part of a mandatory biosecurity program (proAction) and describing the farm's vaccination procedures was realised. A total of 3825 standardized vaccination procedures performed between June 2018 and January 2021 were analyzed. Results indicate that at least one vaccination target was recommended in 90% of dairy herds. Eighty-eight percent of producers were recommended to vaccinate against respiratory disease and/or embryonic mortality, 22% for mastitis, and 18% for calf diarrhea. The basic vaccination protocol most frequently recommended by veterinarians (528 herds; 14%) included solely a live vaccine for the following pathogens: bovine viral diarrhea (BVD) viruses type 1 and 2, bovine respiratory syncytial virus, para-influenza virus 3, and infectious bovine rhinotracheitis. Actually, 2802 (73%) of producers had a vaccination plan based on these latter vaccinal targets, to which various other targets were added. The most frequent complements were to add: inactivated leptospirosis vaccinal targets (241 herds; 6 %), inactivated BVD1 or BVD2 targets to subpopulation of the herd (186 herds; 5 %), an *E. coli* mastitis target (142 herds; 4 %), or inactivated vaccinal targets for BVD1, BVD2, bovine respiratory syncytial virus, para-influenza virus 3, infectious bovine rhinotracheitis, and leptospirosis to the basic live targets plan (122 herds; 3 %). This study provides useful and interesting information on veterinary recommendations for vaccination in Québec dairy herds. Avenues for improvement to better prevent infectious diseases were identified.

The distribution of *Dermacentor* species ticks in southern British Columbia, Canada

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Objective: Several species of *Dermacentor* ticks are present in Canada and pose a risk to human and animal health. Historically, the range of *Dermacentor variabilis* included the area from eastern Saskatchewan to the Atlantic provinces, while *Dermacentor andersoni* was found from British Columbia (BC) to western Saskatchewan. Recently, submissions of suspected *D. variabilis* have been found in BC. It is unknown if these are adventitious submissions or represent established populations. It is also unknown if they are *D. variabilis*, and thus illustrate westward range expansion, or *D. similis*, a new species from a genetically distinct population of *D. variabilis* on the west coast of the United States, thus representing northward range expansion. This study aims to describe the geographic distribution of *Dermacentor* spp. in BC. Methods: Field sites across southern BC were selected based on previous submissions from animal hosts. Tick dragging was conducted at sites by pulling a flannel cloth along the ground and surrounding vegetation. Environmental factors hypothesized to influence tick habitat suitability and activity such as soil temperature and moisture, canopy cover, and weather conditions were recorded. Species identification will be determined via Sanger sequencing of 16S rRNA. Results: Tick dragging was conducted at 33 sites, with a total of 122 *Dermacentor* spp. collected from 10 sites. DNA extraction has been completed, with Sanger sequencing occurring in February 2023. Conclusions: This study will assist in understanding the current distribution of *Dermacentor* spp. in BC. The collected data will be incorporated into Maxent models to predict tick distribution.

Pecking out the early bird special: Determining the early disease dynamics of Highly Pathogenic Avian Influenza (H5N1) in Canada

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Highly pathogenic avian influenza (HPAI) H5N1 is currently causing multiple disease outbreaks in poultry across Canada. While often asymptomatic among waterfowl, infection with HPAI viruses may result in severe illness and death in poultry. Since the first detection in early 2021, HPAI H5N1 has affected over 7 million birds, across 9 provinces in Canada, with many farm cases being the result of spillover events from wild birds to poultry, usually from indirect contact via contaminated clothing, equipment, manure and litter, feed and water. We hypothesize that these HPAI spillover events are associated with a specific combination of environmental factors in the weeks prior to detection.
A case-crossover study design will be used to determine the acute effects of transient environmental exposures in the 2 weeks prior to HPAI case notification (at the farm level). We will specifically examine the association of temperature, precipitation, wind-speed, and humidity with HPAI poultry farm cases, identified as spillover events (N=76) across 6 affected provinces (MB, ON, QC, NB, NS, NL). The preliminary results of this study will be presented for discussion and can be used to aid poultry producers in determining when environmental conditions may warrant enhanced biosecurity measures to limit the risk of HPAI introductions into poultry farms from wild birds. With the continued detections of H5N1 in wild birds across Canada, efforts are urgently needed to understand the drivers of HPAI spillover events into domestic poultry and identify potential mitigation steps to help prevent further economic consequences to the Canadian poultry industry.

Describing the WHO, WHAT, WHERE, WHEN, WHY, & HOW of One Health primary research: A scoping review

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One Health (OH) is a holistic approach that can be used to tackle complex problems. But even experienced OH practitioners, including veterinarians and physicians, find it difficult to clearly describe what it means to apply a OH approach. Our objective was to conduct a scoping review of OH research applications to characterize (1) the who, what, where, when, why, and how (5Ws & H) of primary research articles identifying use of OH, and (2) the OH definitions included in them. A search of databases in 2021 using the term "One Health" yielded 11,441 records. Following eligibility screening, 252 primary research articles were included in the review. Results were organized based on the 5Ws & H. WHO: The most common disciplines included were human health/biology (n=198), animal health/biology (n=157), food/agriculture (n=81), and environment/geography (n=80). WHAT: Infectious disease was the most common research topic (n=171), but diversity increased over time. WHERE: First authors most often had European (n=101) and North American (n=70) affiliations, but data collection location was more globally distributed. WHEN: Eligible articles started in 2010 and approximately half were published since 2020 (130 / 252). WHY: Studies were conducted for the benefit of humans (n=187), animals (n=130), physical-environments (n=55), social-environments (n=33), and plants (n=4). HOW: Quantitative observational study designs were most common (n=174). DEFINITIONS: Common terms used to describe OH were "multi/cross/inter/trans-disciplinary" (n=77), "collaborative" (n=54), and "interconnected" (n=35). This work improved our understanding of published OH primary research, current gaps, and showed a diverse body of OH applications.

Role of the environment in antimicrobial resistance dissemination in different settings in Canada

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Antimicrobial resistance (AMR) is an environmental, agricultural, and public health problem that is impacting the health of humans and animals. AMR is a complex, One Health crisis. The role of the environment as a source of and transmission pathway for antimicrobial resistant bacteria and antimicrobial resistant genes is a topic of increasing interest. This study aims to identify the sources and pathways contributing to AMR dissemination through bioaerosols (air and dust), water, and soil in Canada using a scoping review methodology, systems maps, and different modelling approaches. Here I present preliminary results from the scoping review and systems maps, representing the occurrence and relationships between sources and pathways for AMR dissemination through water, soil, and bioaerosols. There is a lack of studies in bioaerosols, and the majority are related to AMR in water or soil sources. Most of them have been done in wastewater treatment plants and concentrated animal feeding operations, and looking for ARG, having these elements most of the interactions in the systems map. Data extracted from the literature will be used to populate an existing Integrated Assessment Model that investigates the relative exposure to AMR in humans and through the food chain. Additional models using alternative approaches will also be developed to better characterize the environmental pathways and their complexity. The results of this study will help identify points of intervention for AMR mitigation, provide evidence for public health policy implementation to help minimize exposure to AMR through the environment and determine key areas for future research.

Veterinarians' barriers to communication with Ontario dairy producers

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The objective of this study was to understand veterinarians' barriers in communicating in general and specifically relating to biosecurity with Ontario dairy clients to improve knowledge translation and transfer. Recruitment was through snowball sampling and the Ontario Association of Bovine Practitioners listserv. Participants completed a demographic survey using Qualtrics before their recorded semi-structured, one-on-one interview (n=18). Interviews with veterinarians were conducted between September 2022 and January 2023. One researcher (GP) edited and coded the Zoom transcripts using NVivo, informed by a constructivist paradigm and grounded theory approach. The participants were mostly female (61%) and between 30-39 years old (50%). Additionally, most veterinarians had been in practice between 5-9 years (44%), with others practicing for <14 or >20 years. These veterinarians practiced in all regions of Ontario and did not exclusively work with dairy clients. Common themes surrounding communication barriers were a lack of resources, the perceived low importance of the veterinarian's advisory role, and consistency within and between farms. Specific resources of concern included time and money. Consistency within the farm focused on with whom veterinarians spoke with during calls, whereas between farms was about shifting the conversation based on the producers' mindsets. When specifically discussing preventive intervention, many veterinarians cited that those conversations would occur after the client had an issue. Understanding the barriers between Ontario dairy veterinarians and dairy producers while communicating will lead to practices to minimize the barriers and encourage veterinarians to lead more effective discussions.

Standardization of veterinary drug dispensing data for public health antimicrobial use estimation in Canadian dairy herds

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Herd-level veterinary dispensing data provide a surrogate measure of antimicrobial consumption in an industry sector. The Canadian Dairy Network for Antimicrobial Stewardship and Resistance (CaDNetASR) will provide herd-level estimates of antimicrobial use (AMU) derived from veterinary dispensing data. There is no established standard as to how drug products are listed in veterinary practice inventory management systems, which results in significant diversity in product identification when comparing dispensing data. The objective of this work is to describe the establishment of methods for data standardization of veterinary dispensing data, and to facilitate linkage to antimicrobial active ingredient (AAI) level data necessary for AMU quantification. Elements of the Drug Product Database (DPD), Health Canada, were extracted and merged to create a cattle-specific DPD, the backbone for data standardization. The DPD includes AAI information for all approved products. To link DPD AAI information to veterinary dispensing data, the product name and format size of antimicrobial products dispensed to farms were extracted as a concatenation (Python 3.9). To ensure correct product-AAI linkages for the different clinic product references, a "thesaurus" of product concatenations was built from submitted trial data. The creation of a thesaurus of veterinary dispensed products facilitated accurate linkage to AAI information held in the DPD, resulting in a dependable data standard. These data contribute to the derivation of indicators of AMU, and temporal and spatial trend analyses for these parameters. Information on industry trends in AMU will support enhanced antimicrobial stewardship in the Canadian dairy sector and contribute to public health surveillance.

Mosquito madness: Tracking the Great Canadian Mosquito Invasion amid climate change

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Zika, dengue, yellow fever, and chikungunya viruses are all pathogens predominantly transmitted by mosquitoes, specifically *Aedes aegypti* and *Ae. albopictus*. As we continue to experience climatic shifts, changes in precipitation, humidity, and temperature may all increase climatic suitability and establishment of mosquitoes in areas of Canada. *Aedes albopictus* was previously unable to survive Canada's cooler climate, however it is now established in Southern Ontario. Currently, the viruses of interest (Zika, dengue, chikungunya, yellow fever) are endemic in Asia, South America, and Africa; regions which are involved in trade with Canada and frequented by Canadian tourists. This presentation will introduce a scoping review to describe the current state of knowledge on the pathogens of interest, the current distribution of *Ae. aegypti* and *Ae. albopictus* and how they interact with their environment, and the current climatic conditions suitable for these vectors/pathogens. There will be a particular focus on the impact of climate change on the introduction and establishment of these pathogens and vectors in Canada. The scoping review will review articles published from 2000 to 2022, written in English, with no geographic restrictions. The results from the scoping review will include a comprehensive and updated review on importation of diseases modelling techniques, risk factors for the importation of diseases, and a summary of the vectors/pathogens of interest that can be used by researchers creating their own models. The scoping review design and protocol will be presented for discussion.

A missing piece to the One Health approach to AMR: Investigating companion animal AMR in the US using lab susceptibility testing and dashboards

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Antimicrobial resistance (AMR) is a global health concern that affects all aspects of the One Health Triad, including human, animal, and environmental health. Companion animals, including cats and dogs, may contribute to the spread of AMR through their close contact with humans and the frequent prescription of antimicrobials. However, research on AMR in companion animals is limited, and there are few surveillance measures in place to monitor the spread of resistant pathogens. We aim to explore the practicality of using secondary data from commercial laboratory antimicrobial susceptibility testing (AST) services for epidemiological analyses of AMR in companion animals. This study analyzed data from over twenty-five million individual AST results from cats and dogs submitted to national diagnostic laboratories in the USA between 2019 and 2021. We found that resistance to various antimicrobials was common in both *E. coli* and *S. pseudintermedius* strains, which are the most commonly isolated samples in canine and feline infections. These results highlight the need for ongoing surveillance of AMR in companion animals and the potential usefulness of AST data for epidemiological purposes. Because AMR is a wicked problem, which can be approached in a variety of different drug-pathogen combinations, it can be difficult to produce comprehensive epidemiological reports. Dashboards, which played a large role in the COVID-19 pandemic have several unique benefits that can be applied to AMR surveillance efforts. Here, we develop a prototype to demonstrate the functionality of these tools.

An integrated assessment model on antimicrobial resistance postmortem: Why the beef enterococci model component doesn't work (yet)

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Introduction: Integrated assessment modelling is suited to One Health, providing a structured synthesis of complex data from multiple fields into easily interpretable information. It can also identify key knowledge gaps. This study adapted the core structure of the Integrated Assessment Model on Antimicrobial Resistance (iAM.AMR), to model AMR in *Enterococcus* species along the Canadian beef farm-to-fork continuum. Enterococci are widely used as gram-positive indicator bacteria and are opportunistic pathogens in humans. Methods: A scoping review identified articles reporting factors associated with antimicrobial-resistant enterococci in cattle. Some reported an unadjusted odds ratio (OR) or had sufficient information to make this calculation for use as model factors. The core iAM.AMR model was adapted, incorporating key stages of beef production. A baseline prevalence of antimicrobial-resistant enterococci was factored into the model and adjusted by factor ORs to estimate the prevalence antimicrobial-resistant enterococci in retail beef. Results: Seventeen articles contained sufficient information to estimate ORs, and included 29 factors (e.g. tylosin treatment) with data on 149 phenotypic or genotypic resistance outcomes (e.g. tetracycline resistance in *E. hirae*). Unadjusted ORs were extracted. Confounders and sample sizes were not considered. Limited factor data, compounded by differing intrinsic resistance among enterococci species and differing accuracy of factors, prevented broader comparisons. Discussion: Integrative approaches are needed to understand One Health AMR risks. This model has the technical capability to be effective; however, it is currently limited by the paucity of published data with the requisite specificity and format. Identification of key data gaps will aid future modelling efforts.

Successes and challenges of investigating multi-jurisdictional outbreaks of enteric zoonotic diseases in Canada

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Pets are important members of Canadian households, but they can also be a source of enteric zoonotic diseases. Since 2019 there have been four multi-jurisdictional enteric illness outbreaks in Canada associated with animals and/or animal foods, including outbreaks of *Salmonella* linked to exposure to pig ear dog treats, hedgehogs, and reptiles and feeder rodents, and *Escherichia coli* linked to exposure to raw pet food. When the source of illness in an enteric outbreak is a food product for human consumption, there are comprehensive protocols for investigating and managing the outbreak. However, when the source of an outbreak is suspected or confirmed to be contact with animals or animal food, the roles and responsibilities around lab testing, traceback, and recall activities are less clear, making it more challenging to investigate and control these outbreaks. A One Health approach of collaboration with partners involved in animal health, food safety, and public health can aid in the investigation, control, and prevention of outbreaks of enteric zoonotic diseases. Successes in past outbreak investigations include issuing public communications to promote proper hygiene practices and raise awareness of the risks associated with animals and animal food, and collaboration with pet industry partners for expert insight and dissemination of educational materials. Work is ongoing to build upon these successes for future outbreak investigations, and a guidance document is being developed to detail roles and responsibilities for investigating multi-jurisdictional enteric outbreaks associated with animals and animal food.

A hospital-based case-control study of neighbourhood socioeconomic status and canine epilepsy requiring tertiary care

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Objectives: 1) Describe the relationship between neighbourhood socioeconomic status (SES) and canine epilepsy requiring tertiary care (CEC) in Ontario and 2) assess the suitability of dogs presenting with anterior cruciate ligament tears (CCL) as controls to quantify the association between neighbourhood SES and CEC in a case-control study. Methods: CEC cases referred to the Ontario Veterinary College Health Sciences Centre (OVC HSC) were identified from 2017-2021 (n=419). Six-digit postal code information for CEC cases were matched to Census socioeconomic data. Descriptive statistics were used to describe socioeconomic distribution. Using CEC (n=113) and CCL records (n=82) from 2018, geographic distribution of cases and controls was compared visually and by road distance travelled from place of residence to OVC HSC. Results: Three types of epilepsy were observed (CEC n=419): Idiopathic (39.9%), unknown cause (36.8%), and structural (23.2%). The average age of CEC was 6.2 ± 3.8 years and the average age of seizure onset was 4.9 ± 3.8 years. There was a positive, unadjusted trend between neighbourhood SES and CEC. CCL are suitable controls: Mean and median road distance travelled did not significantly differ between cases and controls (p>0.05) and visual location plots appeared similar. Conclusions: This study identified a useful control group (CCL) to investigate for associations between SES and CEC requiring tertiary care in Ontario. An unadjusted positive trend between SES and CEC was identified, warranting further study. A hospital-based case-control study design will be used to quantify this association and control for canine confounding variables.

Social and environmental risk factors for canine leptospirosis: a scoping review

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Leptospirosis is an underrecognized zoonotic disease causing global morbidity and mortality in most mammalian species, including livestock, companion animals, and humans. Dogs play a crucial role in the transmission of leptospirosis to humans and other animals due to their frequent interactions with the natural environment and humans. Despite this, risk factors for canine leptospirosis are poorly understood. The purpose of this study is to identify and describe the current evidence for social and environmental risk factors for canine leptospirosis. We are conducting a scoping review of academic and grey literature to summarize evidence for social and environmental risk factors for canine leptospirosis at global and regional levels. The review follows Joanna Briggs Institute and PRISMA guidelines for scoping reviews. A comprehensive search strategy, including MeSH terms and keywords related to dogs and leptospirosis, was applied to MEDLINE, Web of Science, ScienceDirect, and Cabi Global Health. Title and abstract screening are currently in progress by two reviewers. We will then perform a full-text screen and summarize the results using tabular and graphical formats. This work importantly uses a One Health approach to summarize evidence for associations between canine leptospirosis and social and environmental risk factors in domestic and international contexts. Identifying region-based trends is important for understanding disease transmission patterns in varying contexts. The knowledge gained will support future research to model established risk factors and predict the impact of changing climatic factors on the risk of leptospirosis in dogs.

Putting One Health into practice: Piloting a framework for collaborative resolution of One Health issues in Ontario

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One Health is an integrated and collaborative approach to improving human, animal, and environmental health. This project aims to apply a new One Health collaborative management framework, developed through the Canadian Animal Health Surveillance System, to a current issue in Ontario: zoonotic abortion causing diseases in Ontario sheep. This issue occurs at the intersection of wildlife, farmed animal, and human health. The repercussions of the sporadic recurrences of this group of diseases are felt acutely by farmers and farm workers even though the prevention of these diseases requires far more than just on-farm intervention from this group. The framework is intended to help guide the collaborative management process, since issues that arise at the human-wildlife-livestock interface are often challenging and difficult to resolve. Current methods often fail to engage impacted stakeholders adequately leading to inequity in solutions and continued division between groups. Using qualitative data collected through interviews, a focus group, and a survey, the project aims to demonstrate the real-world applicability and feasibility of this One Health tool and provide further commentary and refinement for its future use.