

2020

A YEAR IN REVIEW

ANNUAL REPORT

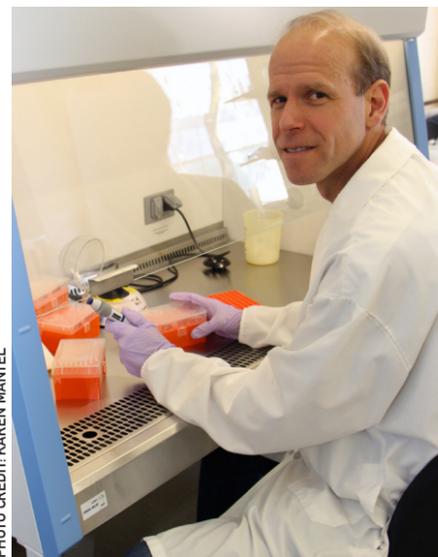


PHOTO CREDIT: KAREN MANTTEL

FROM THE DESK OF OUR DIRECTOR

DR. SCOTT WEESE

DVM, DVSc Guelph; Dipl ACVIM
Professor and Director of the Centre for Public Health and Zoonoses,
University of Guelph

It is understating the situation to say that 2020 was an unusual year. It is hopefully also understating the situation to say that 2020 highlighted the importance of public health and zoonoses. The COVID-19 pandemic was caused by a zoonotic virus that at times challenged, stressed, and overwhelmed public health systems. To me, this shows the importance of our area of focus. We need to understand zoonotic disease risks, from molecules to populations, locally and internationally, using diverse approaches. It should be apparent that traditional approaches need to be complemented with new approaches and that natural, physical, medical, veterinary and social scientists must work hand-in-hand.

The pandemic has shown us where we have strengths and has highlighted myriad

deficiencies. We must evaluate those and improve, and ensure that memories are not short term. While this sometimes called a 'once in a century' pandemic, pandemics don't tell time. The next major new infectious disease threat may emerge in 100 years, or 100 days. It will almost certainly originate in animals and how we respond to this pandemic in the longterm will play an important role in preventing and controlling the next inevitable threat. A pandemic can't be controlled by the efforts of one country, one approach or one field. A coordinated effort is required. Similarly, efforts to prevent, mitigate and control future infectious (and non-infectious) disease threats require multidisciplinary, coordinated and adequately supported responses.

These needs fit with CPHAZ's mandate. Our goal is to

bring people together from across the public health and zoonoses spectra, and bring new people with important skills into the area. While that has been our goal in the past, the COVID-19 pandemic has solidified the importance of this work and the role CPHAZ can play in bringing together people, fostering collaboration and communication.

We look forward to 2021 and beyond, for many reasons. Let's hope that the devastation that SARS-CoV-2 has brought will be accompanied by long-lasting improvements in medical research, public health, communications, scientific literacy, care of elderly and marginalized populations, increased thought about how we interact with animals and the environment, and myriad other related issues.

ABOUT THE CENTRE FOR PUBLIC HEALTH AND ZOOZOSES (CPHAZ)

CPHAZ VISION

Through our engagement in research, education, and knowledge dissemination, members of CPHAZ will identify and solve problems and implement solutions in public health at the human-animal-environmental interface, contribute to rapid response to new and emerging zoonotic diseases, and highlight the societal relevance of veterinary medicine in public health. CPHAZ will create and support productive and effective working relationships between researchers in diverse fields, advance education related to zoonoses and public health and will forge new relationships with human public health activities.

CPHAZ STEERING COMMITTEE

Drs. Katie Clow, Claire Jardine
Peter Kim, Andrew Papadopoulos,
Jane Parmley, and Zvonimir Poljak.

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THE UNIVERSITY OF GUELPH



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CPHAZ DIRECTOR



DR. SCOTT WEESE

Scott Weese is a veterinary internal medicine specialist with a focus on infectious diseases. In his roles as CPHAZ Director, a Professor at the Ontario Veterinary College and Chief of Infection Control for the Ontario Veterinary College Health Sciences Centre, Scott focuses on a range of infectious disease issues of animals and humans, including antimicrobial resistance, antimicrobial stewardship, emerging infectious diseases and infection control. He also writes and speaks extensively about infectious (and often zoonotic) diseases, particularly on Worms And Germs Blog.

CPHAZ STEERING COMMITTEE



DR. KATIE CLOW

Katie Clow is an Assistant Professor in One Health in the Department of Population Medicine. Her research focuses on the epidemiology and ecology of endemic and emerging vectors and vector-borne zoonoses in Canada. She places high value on collaborative research and sees CPHAZ as a strong leader in connecting researchers, students and other stakeholders to advance public health research and education. She is grateful for the opportunity to be part of the CPHAZ steering committee and have a role in planning the centre's activities and determining future priorities.



DR. CLAIRE JARDINE

Claire Jardine is an associate professor in the Department of Pathobiology and regional director of the Canadian Wildlife Health Cooperative for Ontario and Nunavut. Her research interests include rodent and vector borne zoonotic diseases, the ecology of zoonotic diseases in wild animal populations, and wildlife health.



DR. PETER KIM

Peter Kim's research focus is in gastro-intestinal diseases, in particular Clostridioides difficile infection (CDI). Using a novel fecal microbiota transplantation (FMT) treatment he aims to understand it's efficacy by sequencing patient metabolome, microbiome and virome pre- and post-FMT. Along with patient health surveys he wishes to understand the gut-brain axis pathway in clinical resolution of CDI using FMT.



DR. JANE PARMLEY

Jane Parmley is an associate professor in the Department of Population Medicine. Her research interests include antimicrobial resistance, animal health surveillance and the interconnections between human, domestic animal, wildlife and ecosystem health.



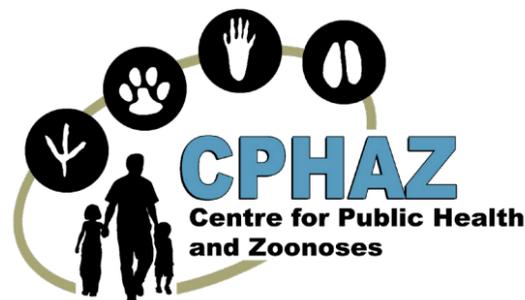
DR. ANDREW PAPADOPOULOS

Andrew Papadopoulos is a professor in the Department of Population Medicine and the coordinator of the Master of Public Health program. Currently, his research focuses on public health policy, interventions, and administration as well as student health.



DR. ZVONIMIR POLJAK

Zvonimir Poljak is an Associate Professor in the Department of Population Medicine. His research focuses on infectious diseases of production animals, with primary focus on swine health, viral diseases, emerging diseases and zoonoses.



CPHAZ STAFF



WELCOME TO OUR NEW PROGRAM COORDINATOR

Julia Luca has joined CPHAZ as the Program Coordinator in September 2020. In her role as Program Coordinator, Julia promotes and organizes annual events such as poster days, student mentorship events and symposiums, she helps foster communication between CPHAZ collaborators and stakeholders for ongoing initiatives, updates the website and social media platforms, ensures daily administrative and operational duties such as ordering, budgeting, lab maintenance, and student training is completed. Julia previously graduated from McMaster University with a Bachelor of Science degree and then went on to complete a Master of Science with a Neuroscience Specialization from the University of Guelph. She has always been fascinated about animal and human health and how they intertwine through a One Health approach. In her free time, she loves to explore new hiking trails and spend time outside with my boyfriend and 2-year-old German Shepherd/Bernese Mountain Dog mix named Raina.



HAPPY RETIREMENT TO JOYCE ROUSSEAU - CPHAZ LAB RESEARCHER

Happy Retirement Joyce! Joyce has been an integral part of Dr. Weese's lab for the past 18 years. Her dedication, hard work and extensive knowledge is missed every day. She had a profound impact on students, faculty, and anyone that had the pleasure of working with her. We wish her nothing but the best in this exciting new chapter in her life!



FUNDING IS PROVIDED BY THE ONTARIO MINISTRY OF AGRICULTURE, FOOD AND RURAL AFFAIRS THROUGH THE ONTARIO AGRI-FOOD INNOVATION ALLIANCE VETERINARY CAPACITY PROGRAM.

one health

An update on One Health Scholarship at the University of Guelph

by Peter Kelly



PHOTO CREDIT: ISTOCK.COM/DANEGER

The One Health Institute (OHI), established in June 2018, has a mission to enhance and promote academic, research and outreach programs to propel the University of Guelph to the forefront of One Health scholarship internationally. More specifically, OHI's mandate is to: 1. foster a community of practice for faculty engaged in One Health research and teaching 2. build the capacity of the university to deploy transdisciplinary research teams to solve pressing One Health problems, 3. generate and coordinate collaborations for multidisciplinary grants and research proposals, 4. promote the potential of One Health research to solve significant health challenges and inform public policy, and 5. build collaborations and graduate student opportunities between the University of Guelph and other academic institutions.

Community of Practice

There are over 150 affiliated One Health faculty members across all seven colleges of the University of Guelph listed on the One Health Institute website <https://onehealth.uoguelph.ca/>. Many faculty have delivered One Health research seminars that are available through the YouTube channel. Specific faculty profiles and short audio clips are described in short journalistic profiles written by Anna McMenemy and Marilyn Sheen. Some of these provided the focus for the virtual Royal Agricultural Winter Fair. On-going communications include the newsletter, web-site and active accounts on social media.

Collaborative Specialization in One Health

There are 16 students enrolled in the Collaborative Specialization in One Health (CSOH). These graduate students complete two required courses and conduct research that applies a One Health approach.

DVM/MPH (Doctor of Veterinary Medicine/Master of Public Health) combined degree program

This program enables DVM students to complete the requirements for the MPH degree in one year after they complete the DVM program. The first DVM/MPH students will start the MPH courses in 2022.

Undergraduate Curriculum

The proposed Bachelor of One Health Undergraduate program, led by Dr. Brian Husband from the College of Biological Science, has an anticipated start date of Fall, 2022. Students will select one of four areas of emphasis: Disease, Complexity and Health; Environment, Food and Health; Policy, Economics and Health; Culture, Society and Health.

One Health Core Competencies

Drs. Clow and Parmley (Dept. of Population Medicine) are spearheading development of core competencies to form the basis of program-level outcomes and course learning objectives at both graduate and undergraduate levels. These competencies are being developed with input from faculty from across Canada.

Introduction to One Health (ONEH*1000)

This course taught for the first time by Dr. Danielle Julien-Wright in the Fall of 2020. The course reached capacity within two weeks of being added to the course offerings. Fifty students across 5 colleges (CBS, CSAHS, OAC, OVC, COA) enrolled in the course.

Dr. Heather Murphy is an environmental engineer, One Health researcher, and associate professor. Currently, she is studying the ways enteric pathogens move through water and the environment, and proposed measures needed to protect human and animal health.

WELCOMING NEW expertise

Meet Dr. Heather Murphy

by Karen Mantel

A new Canada Research Chair in One Health at the University of Guelph's Ontario Veterinary College will focus on water and health challenges at the animal, human and environmental interface.

Dr. Heather Murphy, who joined OVC's Department of Pathobiology in September 2020, focuses her water and health research on reducing preventable waterborne diseases through applied research.

"I have been doing interdisciplinary work for many years and am excited to begin this position in the theme of One Health at U of G and broaden my research endeavours to work at the intersection of animal, human and environmental health with a focus on water," says Murphy.

She brings experience in water and wastewater treatment, water quality, drinking water distribution, risk assessment and environmental

health in both North America and abroad to her research on understanding and addressing water and health challenges in both developed and developing countries.

With a background in engineering, Murphy's work has taken her around the world. "Through my work, the more I learned about drinking water and drinking water challenges around the world, the more I learned that many of us take water for granted."

Her research approach includes hands-on components with community partners, incorporating social implications for a One Health approach.

She leads the Water, Health and Applied Microbiology (WHAM) Laboratory, an endeavour split between OVC and the Department of Epidemiology and Biostatistics in the College of Public Health at Temple University.

"The laboratory primarily focuses on microbiological contamination of water supplies and the subsequent impacts on public health," says Murphy. "My lab team includes research fellows, graduate and undergraduate students interested in the field of water and health."

Her research has traditionally focused on four key areas related to microbial quality of water and public health: surface water quality and recreation; the impact of septic systems on private wells; microbial ecology of drinking water distribution systems; and water and sanitation challenges in resource limited settings. She is keen to broaden these areas at OVC to go beyond focusing only on water and looks forward to working on projects that have implications for animal health in addition to human health.

Her research has been funded by the United States Geological Survey (USGS), the National Institutes of Health, the Bill and Melinda Gates Foundation, UNICEF, Grand Challenges Canada, the Philadelphia Water Department, Drexel's Academy of Natural Sciences, the Pennsylvania Department of Health and The Department of Public Health for the City of Philadelphia.

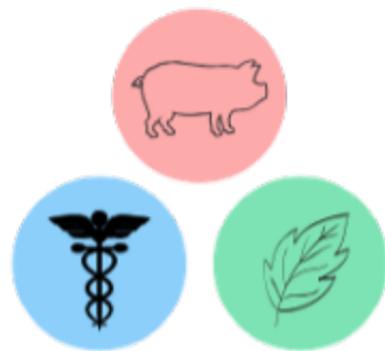
Murphy completed an undergraduate degree in biological engineering, and Masters degree in civil engineering at Dalhousie University in Halifax.

She followed this up with a PhD in environmental engineering from the University of Guelph in 2010 where she focused on appropriate household water treatment technologies in rural Cambodia.

Following her PhD, Murphy worked for the United Nations International Emergency Children's Fund (UNICEF) as a water, sanitation and hygiene specialist in Mali and Madagascar. While in Mali, she coordinated a \$25 million dollar Water, Sanitation and Hygiene (WASH) in Schools program, covering 1,000 schools, the largest program of its kind in the world.

She returned to academia in 2013 and completed a research fellowship with the Public Health Agency of Canada where she focused on quantifying the burden of waterborne disease on the Canadian population. Prior to joining OVC she was an assistant professor at Temple University for five years in their College of Public Health.

Dr. Murphy is one of three new Canada Research Chairs (CRC), along with the renewal of an existing CRC, announced at the University of Guelph on December 16, 2020.



ONE HEALTH

student committee

Submitted by OHSC

The One Health Student Committee (OHSC) is the University of Guelph's interdisciplinary, student-led organization in One Health (OH). With a governing body composed of undergraduate, graduate, and veterinary students, the OHSC provides those with interest in the world of OH with opportunities for education and engagement in the field. Our team of 23 is divided into subcommittees responsible for communications, fundraising and community outreach, and networking and student engagement. Primarily, OHSC aims to:

- Increase awareness of One Health both locally and beyond
- Provide opportunities for One Health education and experiential learning
- Promote multi-, inter-, and transdisciplinary studies and initiatives
- Encourage collaboration and mentorship between faculty and students in diverse fields
- Network with One Health champions internal and external to the University of Guelph
- Build relationships with One Health organizations and promote relevant opportunities
- Raise funds for scholarship opportunities and to give back to communities/charities

In 2020 we hosted a variety of events including our What is One Health Seminar, OH Coffee Houses, (Net)Working Wednesday's, facilitated several student OH internships, funded a World One Health Congress Scholarship, fundraised for the Iqaluit Humane Society, posted educational OH social media campaigns, participated in the CP-HAZ-OHI-OHSC joint #nOHvember campaign, conducted a townhall survey of student wants/needs, and much more.

Many of our members are actively involved in One Health-related research as well. Below are a couple of highlights:



SYDNEY PEARCE is a PhD candidate in epidemiology with a collaborative specialization in One Health from the Department of Population Medicine. Her work consists of a scoping review characterizing primary research using the OH approach, a qualitative study aiming to understand One Health perceptions among student practitioners, systematic review of the efficacy of an antibiotic alternative for preventing mastitis, and a knowledge translation project identifying effective dissemination methods for dairy antimicrobial stewardship best practices obtained via knowledge synthesis.



SIMON JEEVES is a fourth-year undergraduate student majoring in microbiology at the University of Guelph. Currently, he is working in the Department of Pathobiology under Dr. Claire Jardine and Dr. Sarah Robinson, a fellow OHSC member, researching zoonotic diseases carried by rats in urban Ontario environments. Specifically, Simon's work aims to investigate how land use variables and rat life history traits may be associated with pathogen prevalence and spread in Ontario cities.

STUDENT CLUB EXECUTIVE

Sydney Pearce - President and Founder
 Simon Jeeves - Jr. Vice President
 Grace Nichol- Jr. Vice President External
 Emily Robinson- Jr. Fundraising Team Lead
 Jamie Goltz - Communications Team Member

PHOTO CREDIT: ISTOCK.COM/LEZH



GRACE NICHOL is a MSc epidemiology student in the Department of Population Medicine and is enrolled in the Collaborative Specialization in One Health. She was drawn to this program after participating in research on the blacklegged tick and canine Lyme disease as an undergraduate student.

Under the supervision of Dr. Katie Clow, her MSc research focuses on the range expansion of *Dermacentor* species ticks in the western Canadian provinces. *Dermacentor* ticks collected by veterinary clinics as part of the Canadian Pet Tick Survey will undergo species testing and pathogen testing. The spatial distribution of the tick submissions will be mapped to visually represent the expanding ranges of these tick species. Using public provincial records of land use and climate

data, mathematical models will be created to examine the role of environmental factors on tick distribution. The information collected about tick range expansion for this project could be useful in examining the potential spread of other tick species in Canada, such as the invasive Lone Star tick. Grace's research project will utilize a One Health approach, as many tick species are vectors for pathogens of human and animal health significance and considering the role of environmental factors on tick range expansion is critical in risk assessment.

EMILY ROBINSON The blacklegged tick, *Ixodes scapularis*, a vector for *Borrelia burgdorferi*, the causative agent of Lyme disease. Lyme disease is a serious health issue for humans, dogs, and horses, and the risk of Lyme disease has increased due to ongoing *I. scapularis* range expansion.



Wildlife host species help facilitate the spread of *I. scapularis*, contributing to the Lyme disease transmission cycle. Environmental factors, including climate change, are crucial to the spread of blacklegged ticks and *B. burgdorferi*. The three One Health pillars are represented and interconnected in this research; therefore, a One Health approach will be applied. The research objective is to examine spatial and temporal patterns of *I. scapularis* and its pathogens from 2017 to 2019 in southern, eastern, and central Ontario. It is hypothesized that ongoing range expansion will be detected in Ontario over the three-year period. In 2017 to 2019, tick dragging was conducted at 38 to 46 sites each year. Blacklegged ticks were identified and tested for *B. burgdorferi* and other tick-borne pathogens at the National Microbiology Laboratory. Spatial patterns projected using ArcGIS and assessed using space, time, and space-time analyses in SaTScan have shown ongoing *I. scapularis* range expansion in Ontario from 2017 to 2019. Regression models will help determine factors influencing tick and pathogen invasion. Assessing spatial and temporal patterns of blacklegged ticks can allow for further evaluation of how *I. scapularis* and its pathogens spread to provide invaluable information to public health. These findings may enhance primary prevention methods to reduce possible blacklegged tick exposure to help minimize tick-borne pathogen transmission.

ONE HEALTH STUDENT RESEARCH



JAMIE GOLTZ Jamie's project aims to describe the relative contribution of the animal food production pathway to other pathways that can expose Canadians to resistant bacteria, in particular extended-spectrum beta-lactamase-producing Enterobacteriaceae (ESBL-PE). It is part of a larger initiative called 'Integrated Assessment Modelling of Antimicrobial Resistance' (IAM.AMR) coordinated by Public Health Agency of Canada, which was created to quantify Canadian exposure to antimicrobial-resistant bacteria from select agri-food production systems.

This project will apply a One Health approach to create a concept map that characterizes and acknowledges the potential transmission pathways of ESBL-producing bacteria. The resulting transmission map will address the complexity of how ESBL-PE affect and are affected by different human, animal, and environmental reservoirs. The map will also highlight the exposure pathways that directly and indirectly influence human health.

This project also examines the burden of ESBL-PE on human health by characterizing the routes of exposure for humans. A scoping review is being performed to identify factors that influence the risk of being colonized or infected with an ESBL-PE. Data about the factors identified in the scoping review will be extracted and modeled using the IAM.AMR framework to estimate ESBL-PE exposures from different sources (human, animal, or environment). By improving our understanding of avenues for exposure and subsequent risks for colonization or infection with resistant bacteria, this project will contribute to prioritization and development of interventions and guidelines that aim to reduce the impact of antimicrobial resistance on Canadians.

ONE HEALTH Poster Day

by Julia Luca

1.

SARS-CoV-2 can be transmitted from infected people to their pets

Dorothee Bienzle, David. Marom, J Scott. Weese

INTRODUCTION

- SARS-CoV-2, the cause of COVID-19, is of animal origin.
- Human-animal transmission can occur but not be well studied.
- Household pets are of concern because of their potential susceptibility to SARS-CoV-2 infection and their close contact with people.
- The objective of this study was to evaluate human-pet transmission of SARS-CoV-2.

METHODS

- Oral, nasal and rectal swabs were collected from dogs, cats and ferrets from households with active human COVID-19. Samples were tested by real time qPCR targeting N1 and N2
- Serum was collected from dogs and cats with previous human COVID-19 and tested for anti-S1 IgG and IgM

	PCR	ELISA
Dogs	1/21 (4.8%) Rectal swab, Ct 31-32 1 dog inconclusive (serology pending)	2/10 (20%) IgG+ 0/10 IgM+
Cats	0/21 1 cat inconclusive (seropositive)	6/10 (60%) IgG+ 2/10 (20%) IgM+
Ferrets	0/1	NA

Table 1: PCR and serological testing results

DISCUSSION

- Presumed human-pet transmission of SARS-CoV-2 was identified.
- Detection of SARS-CoV-2 was less common than detection of antibodies.
- PCR-based testing will likely underestimate infection because of the relatively short shedding period in dogs and cats, and logistical challenges to rapid sampling in households with COVID-19. It is suspected that some animals had been infected but cleared the infection by the time of sampling.
- Anecdotal information about disease in pets at the time of human COVID-19 indicates a need to better investigate potential health impacts in pets.

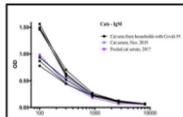


Figure 1: Feline IgM serological results



INTRODUCTION

- The blacklegged tick, *Ixodes scapularis*, is the vector for *Borrelia burgdorferi*, the causative agent of Lyme disease, as well as several other pathogens of human and animal health significance [1].
- Each year, millions of blacklegged ticks are introduced into Ontario on migratory birds. In order to survive and reproduce, these ticks require suitable climate, habitat and hosts [2].
- Rising temperatures associated with climate change have made more areas of Ontario climatically suitable for *I. scapularis* survival [3].
- Range expansion of *I. scapularis* has been detected in Ontario over the past two decades and continues to occur on an annual basis [3] (Figures 1 and 2).

OBJECTIVE

- To assess the spatial and temporal patterns of the blacklegged tick and *B. burgdorferi* in southern, eastern and central Ontario from 2017 to 2019.
- Summary data are presented in Table 1.
- SARS-CoV-2 was detected by PCR on one dog (4.8%), a healthy dog from a household with four infected people. The other dog in the household yielded an inconclusive PCR result (Ct 38.28).
- One cat that had recently had respiratory disease also yielded an inconclusive result.
- All seropositive dogs/cats were reported by owners to have been sick ~ the time of owner illness.
- Serological testing suggests that human-pet transmission is more frequent than detected by PCR.
- Feline IgM serological testing dilution curve is presented in Figure 1.

DISCUSSION

- Presumed human-pet transmission of SARS-CoV-2 was identified.
- Detection of SARS-CoV-2 was less common than detection of antibodies.
- PCR-based testing will likely underestimate infection because of the relatively short shedding period in dogs and cats, and logistical challenges to rapid sampling in households with COVID-19. It is suspected that some animals had been infected but cleared the infection by the time of sampling.
- Anecdotal information about disease in pets at the time of human COVID-19 indicates a need to better investigate potential health impacts in pets.

Assessing the spread of the blacklegged tick, *Ixodes scapularis*, and its associated pathogens, in Ontario, Canada

Emily Robinson¹, Claire Jardine¹, Curtis Russell², Jules Koffi³, Katie M. Clow¹
¹University of Guelph, Public Health Ontario, ²Public Health Agency of Canada

INTRODUCTION

- The blacklegged tick, *Ixodes scapularis*, is the vector for *Borrelia burgdorferi*, the causative agent of Lyme disease, as well as several other pathogens of human and animal health significance [1].
- Each year, millions of blacklegged ticks are introduced into Ontario on migratory birds. In order to survive and reproduce, these ticks require suitable climate, habitat and hosts [2].
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OBJECTIVE

- To assess the spatial and temporal patterns of the blacklegged tick and *B. burgdorferi* in southern, eastern and central Ontario from 2017 to 2019.

FIELD WORK

- Field sites were selected based on baseline field data collected in 2014 & 2015 [3]. Additional sites were added in subsequent years based on the findings from the previous year.
- Sites were visited once or twice each year during the spring and summer on dry days.
- At each site visit, tick dragging was conducted by dragging a flannel cloth attached to a wooden stick or plastic pipe through the environment for three person-hours (Figure 3).
- Ticks were removed from the cloth, placed into a collection vial and stored in 70% ethanol.

LABORATORY ANALYSES

- Ticks were identified to species using standard identification keys [7].
- All blacklegged ticks were analysed at the National Microbiology Laboratory for *B. burgdorferi* using polymerase chain reaction (PCR) [3].

PRELIMINARY RESULTS

Year	2017	2018	2019
# of sites visited	36	45	46
Total # of collected <i>I. scapularis</i> ticks	307	304	130
# of sites with <i>I. scapularis</i> presence	11	33	21
# of sites with <i>B. burgdorferi</i> presence	6	4	4
# of collected <i>I. scapularis</i> with <i>B. burgdorferi</i>	18	36	10
# of sites with new <i>I. scapularis</i> presence	13	15	3
# of sites with new <i>B. burgdorferi</i> presence	6	0	1

DISCUSSION

- Preliminary results illustrate the ongoing range expansion of *I. scapularis* and the emergence of *B. burgdorferi* at sites across Ontario.
- Future analyses will assess spatial and temporal patterns of expansion and emergence.
- The number of sites with new *I. scapularis* populations versus the number of sites with *B. burgdorferi* emergence may differ due to initial range expansion of tick populations prior to pathogen emergence [8].

ACKNOWLEDGEMENTS

Appreciation is extended to the Public Health Agency of Canada for providing financial support for the research. We thank the Department of Population Medicine for providing stipend support for J. Robinson.

REFERENCES

3.

Using a One Health approach to address the challenges posed by Rabies to animals and people in rural areas in Victoria Falls, Zimbabwe

Ryan LaPenna, Isaac Moyo, Jessica Dawson, Claude Sabeta, Chris Foggin, Francisco Olea Popelka

BACKGROUND

- The COVID-19 pandemic created uncertainty and new challenges, subsequently impacting mental health.
- Modelled predictions have anticipated a rise in suicides.

ONE HEALTH APPROACH

Data Analysis

- Additional Feature of Data Analysis: Type of Cause, Age, Sex, Geographic Location.
- Scientific & Grey Literature Review

THREE MAIN OBJECTIVES

- Evaluate and compare suicide rates in Ontario for 2019 to the baseline data (2017-2019)
- Identify literature related to the 'human-animal' bond and the environment as it pertains to mental health and suicide
- Identify key stakeholders who are improving mental health at the human-animal-environmental interface

RESULTS

- We received 323 survey responses.
- Most respondents (n=206, 61.7%) currently or recently owned backyard poultry.
- Most respondents without current backyard (68.7%) were considering obtaining these.
- Primary reasons for having/raising backyard were for eggs, as a hobby and/or pet.
- Just over 11% of respondents wanted poultry.
- Most (64.7%) respondents consider backyard pets.
- Several current flock owners (21.1%) allowed chickens to enter their house, and most (77.8%) allowed chickens to interact with children or household pets (62.7%).
- Awareness of zoonotic disease risks: Fewer than half of respondents correctly identified *Campylobacter* or *E. coli* as risks.
- 7.3% of respondents reported that rabies could be transmitted from backyard chickens to people.

CONCLUSIONS

- Many individuals may have or want backyard poultry.
- Some behaviors may increase the risk of disease transmission from poultry to humans.
- Educational resources for backyard poultry owners could reduce the risk of disease transmission associated with poultry.

REFERENCES

2.

Assessing the spread of the blacklegged tick, *Ixodes scapularis*, and the agent of Lyme disease, *Borrelia burgdorferi* in Ontario, Canada, using a One Health approach

Emily Robinson, Claire Jardine, Curtis Russell, Jules Koffi, Katie M. Clow

INTRODUCTION

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- Rising temperatures associated with climate change have made more areas of Ontario climatically suitable for *I. scapularis* survival [3].
- Range expansion of *I. scapularis* has been detected in Ontario over the past two decades and continues to occur on an annual basis [3] (Figures 1 and 2).

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- To assess the spatial and temporal patterns of the blacklegged tick and *B. burgdorferi* in southern, eastern and central Ontario from 2017 to 2019.

FIELD WORK

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- Sites were visited once or twice each year during the spring and summer on dry days.
- At each site visit, tick dragging was conducted by dragging a flannel cloth attached to a wooden stick or plastic pipe through the environment for three person-hours (Figure 3).
- Ticks were removed from the cloth, placed into a collection vial and stored in 70% ethanol.

LABORATORY ANALYSES

- Ticks were identified to species using standard identification keys [7].
- All blacklegged ticks were analysed at the National Microbiology Laboratory for *B. burgdorferi* using polymerase chain reaction (PCR) [3].

PRELIMINARY RESULTS

Year	2017	2018	2019
# of sites visited	36	45	46
Total # of collected <i>I. scapularis</i> ticks	307	304	130
# of sites with <i>I. scapularis</i> presence	11	33	21
# of sites with <i>B. burgdorferi</i> presence	6	4	4
# of collected <i>I. scapularis</i> with <i>B. burgdorferi</i>	18	36	10
# of sites with new <i>I. scapularis</i> presence	13	15	3
# of sites with new <i>B. burgdorferi</i> presence	6	0	1

DISCUSSION

- Preliminary results illustrate the ongoing range expansion of *I. scapularis* and the emergence of *B. burgdorferi* at sites across Ontario.
- Future analyses will assess spatial and temporal patterns of expansion and emergence.
- The number of sites with new *I. scapularis* populations versus the number of sites with *B. burgdorferi* emergence may differ due to initial range expansion of tick populations prior to pathogen emergence [8].

ACKNOWLEDGEMENTS

Appreciation is extended to the Public Health Agency of Canada for providing financial support for the research. We thank the Department of Population Medicine for providing stipend support for J. Robinson.

REFERENCES

Using the One Health Approach to Examine Human, Animal, and Environmental Factors Related to Suicide Rates in Ontario Pre- and Post-COVID-19 Pandemic

Gemma Postill¹, Francisco Olea-Popelka¹, & Mark Daley^{2,3}
¹Department of Pathology, ²Department of Psychology, ³Department of Computer Science, Western University
⁴Canadian Institute for Advanced Clinical Research

BACKGROUND

- The COVID-19 pandemic created uncertainty and new challenges, subsequently impacting mental health.
- Modelled predictions have anticipated a rise in suicides.

ONE HEALTH APPROACH

Data Analysis

- Additional Feature of Data Analysis: Type of Cause, Age, Sex, Geographic Location.
- Scientific & Grey Literature Review

THREE MAIN OBJECTIVES

- Evaluate and compare suicide rates in Ontario for 2019 to the baseline data (2017-2019)
- Identify literature related to the 'human-animal' bond and the environment as it pertains to mental health and suicide
- Identify key stakeholders who are improving mental health at the human-animal-environmental interface

RESULTS

- We received 323 survey responses.
- Most respondents (n=206, 61.7%) currently or recently owned backyard poultry.
- Most respondents without current backyard (68.7%) were considering obtaining these.
- Primary reasons for having/raising backyard were for eggs, as a hobby and/or pet.
- Just over 11% of respondents wanted poultry.
- Most (64.7%) respondents consider backyard pets.
- Several current flock owners (21.1%) allowed chickens to enter their house, and most (77.8%) allowed chickens to interact with children or household pets (62.7%).
- Awareness of zoonotic disease risks: Fewer than half of respondents correctly identified *Campylobacter* or *E. coli* as risks.
- 7.3% of respondents reported that rabies could be transmitted from backyard chickens to people.

CONCLUSIONS

- Many individuals may have or want backyard poultry.
- Some behaviors may increase the risk of disease transmission from poultry to humans.
- Educational resources for backyard poultry owners could reduce the risk of disease transmission associated with poultry.

REFERENCES

4.

Backyard Poultry - Assessing Interest and Risk Among Current and Prospective Owners

J Scott Weese, Katherine Paphitis, Devon Metcalf

Backyard Poultry – Assessing Interest and Risk Among Current and Prospective Owners.

JS Weese^{1,2}, K Paphitis^{1,3,4}, D Metcalf^{2,4}
¹ Centre for Public Health & Zoonoses (CPHAZ), ² Department of Pathology, ³ Department of Population Medicine, ⁴ Health Protection, Public Health Ontario

BACKGROUND

- Backyard poultry are increasingly popular.
- Backyard poultry flocks are available for seasonal or long-term rent from various companies.
- Poultry are a natural reservoir for zoonotic pathogens such as *Campylobacter* and *Salmonella* bacteria.^{1,2}
- Backyard poultry owners may be at increased risk of zoonotic illness due to contact with poultry, their eggs and handling.^{1,2}
- Companies offering poultry rental services typically only provide information on animal husbandry, and not on steps people can take to prevent illness from handling poultry.

OBJECTIVES

- Identify knowledge, attitude or practice gaps among current and prospective backyard poultry owners.
- Inform development of educational resources to address identified knowledge gaps and reduce the risk of zoonotic infections associated with backyard poultry.

MATERIALS AND METHODS

- Data were obtained from respondents via an anonymous online survey created using Qualtrics.
- The survey was disseminated via social media and community partners.
- Current and prospective backyard poultry owners were asked a series of questions, including reasons for having/raising backyard poultry, and the nature/extent of interaction with poultry by household members and other individuals.
- Respondents were asked to identify diseases they thought could be transmitted from backyard poultry to people.

RESULTS

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- Most respondents (n=206, 61.7%) currently or recently owned backyard poultry.
- Most respondents without current backyard (68.7%) were considering obtaining these.
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CONCLUSIONS

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- Some behaviors may increase the risk of disease transmission from poultry to humans.
- Educational resources for backyard poultry owners could reduce the risk of disease transmission associated with poultry.

REFERENCES

why do **RATS** matter?

by Sarah Robinson

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Department of Pathobiology
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University of Guelph

Rats. They scamper and scurry in the streets and in homes. They contaminate food, damage infrastructure and spread disease. Despite control campaigns in cities across the world, rat populations continue to thrive. So, what risks do rats pose to human health here in Ontario? How can we mitigate those risks and coexist with these tenacious, little creatures?

Norway and black rats are among the most ubiquitous rodents in the world – they colonize all major habitat types and are found on every continent except Antarctica. Rats are exceptionally well suited to close cohabitation with people and it is suggested that they are obligate pests, as they appear to require humans to sustain their populations.

As anyone that has dealt with a rat infestation can attest, rats have a rapid growth rate and tremendous reproductive capacity. After reaching sexual maturity at just 3 months of age and with a gestation period of only 3 weeks, a female Norway rat can contribute up to 55 offspring per year to the population. While rats may reproduce like crazy, they have a short lifespan. The probability of dying is 90-95% per year, meaning most rats do not survive beyond 1 year of age.

If the environment is stable, a rat population size will be stable. Natural phenomena or human activities, such as demolitions and construction, may disturb the environment and alter population size. Intensive trapping or poisoning of rats may alter the size of a rat colony; however, once these activities stop, the population may rapidly return to pre-intervention size. Rats live in colonies with relatively small home ranges. Home range depends on many factors, including the availability of food and proximity of the burrow to food sources. In urban areas, the distribution of rats is strongly influenced by

not only the suitability of the environment, but the presence of barriers to rat movement like city streets, which tend to separate rats into isolated populations with a home range being limited to a city block. This separation of rat ranges also means that there can be major differences in disease risks from rats even within the same city.

Rats are classified as an urban exploiter species, species that thrive in built environments near urban centres and subsist on food and habitat associated with human presence rather than naturally occurring resources. These urban exploiters are particularly important when we consid-

If the environment is stable, a rat population size will be stable. Natural phenomena or human activities, such as demolitions and construction, may disturb the environment and alter population size.

er the rate of urbanization that is occurring worldwide. According to the United Nations 55% of the world's population lives in urban areas, a proportion that continues to increase. In North America, 82% of the population currently lives in urban areas. Since cities provide an optimal habitat for rats where they live in close proximity to humans, there is increasing concern regarding the role of rats in zoonotic diseases.

Rats carry a number of zoonotic pathogens that can cause severe illness and death in people worldwide. The most notorious example is *Yersinia pestis*, the causative agent of

bubonic plague, which is transmitted through rat fleas and killed 40 % of the European population in the 14th century. Some are pathogens for which rats are the natural host, such as *Leptospira interrogans*, the causative agent of leptospirosis, which is considered the most widespread zoonosis in the world and Seoul hantavirus, the causative agent of hemorrhagic fever with renal syndrome. Rats can also be colonized with pathogens present in their environment and could serve as a reservoir for these organisms. For example, *Clostridioides difficile*, the main cause of infectious diarrhea that develops in human patients after hospitalization and antibiotic treatment and methicillin-resistant *Staphylococcus aureus* (MRSA), a leading cause of human bacterial infections ranging from minor skin infections to fatal pneumonia. Other pathogens are considered potentially zoonotic, such as Hepatitis E virus, a cause of acute hepatitis in people. The prevalence of zoonotic pathogens in rat populations is highly variable among cities and even within cities on a very small geographic scale. Little is known about them in Ontario.

Given the unprecedented rate of urbanization, the importance of rat-associated zoonoses is expected to increase as more people come into contact with urban rats. As part of Dr. Claire Jardine's research group, I am working to understand the ecology of rat-associated zoonoses in urban rats in Ontario. This research aims to determine the prevalence and distribution of these pathogens in urban rats from different Ontario cities and investigate factors associated with infection to estimate the potential health risks posed by urban rats and develop informed and effective strategies to monitor and potentially mitigate those risks.



PUBLIC health

An update on Public Health Scholarship at the University of Guelph

by Dr. Andrew Papadopoulos

The Master of Public Health (MPH) program was created at the University of Guelph in 2008, in response to societal need and government reports that called for increased graduate-trained human resources in public health. The program was developed in compliance with the Core Competencies for Public Health and the Guidelines for MPH Schools, as published by the Public Health Agency of Canada. It was accredited by the Ontario Council for Graduate Studies in January 2009, as was the Type 3 Graduate Diploma in Public Health. The objective of this program is to ensure students are well prepared for employment in the public health sector.

Contained within the Ontario Veterinary College, the MPH program is seen as the leader in infectious and zoonotic disease in MPH education across Canada. The MPH enjoys a close geographical relationship with two Public Health Agency of Canada (PHAC) offices and the main office of the Ontario Ministry of Agriculture, Food, and Rural Affairs. The Centre for Public Health and Zoonoses (CPHAZ), and Laboratory for Foodborne Zoonoses also offer research collaboration.

The University of Guelph Master of Public Health program prepares public health students and professionals for careers in which they will address the present and future needs of public health in Ontario, Canada, and internationally. We are committed to applied public health science and research, relevance of curriculum, lifelong learning, and issues of local relevance and international significance. Our graduates will emerge as influential local, national, and international leaders committed to improving quality of life by protecting and promoting the health of their communities and by anticipating and preventing disease from both a policy and a science perspective.

MPH Program Health Forum

The MPH Program held its 12th Annual Public Health Forum in November 2020. Due to the COVID-19 pandemic, this year's Forum was held virtually for the first time. The day began with four

breakout sessions where 30 students presented their summer practicum work. This was followed up with two sessions of 15 students each presenting their posters in two-minute segments. As usual, the Dr. Robert Clarke Poster Award sponsored by the OVC Alumni Association was awarded. This year's winner was Robyn Haas, with Brianne Kinahan, Taylor Colengeli, and Sarah Martone finishing second, third, and fourth respectively.

Summer Practicum

During the summer of 2020, many students had their practicum placements interrupted due to the COVID-19 pandemic. Some students had their placements cancelled which resulted in many scrambling to find alternate work for the summer. The MPH program was able to work with the students and find suitable replacement work so that they could complete the requirements of the practicum placement. Many of the students engaged in research projects with faculty or external partners.

Class size

The targeted class-size for each MPH cohort is 25 students. The past two years have seen student acceptance rates increase which has resulted in classes of approximately 30 students each year. This is coupled with the ever-increasing number of applications to the MPH program.

Other Public Health Graduate Programs

The Department of Population Medicine added the field of Public Health to their PhD and MSc degrees. This field allows students to pursue research in the area of public health policy, public health interventions, health communication, and other areas that concentrate on improving population health. There has been one graduate from the PhD program with many enrolled in both PhD and MSc streams.

PHOTO CREDIT: ISTOCK.COM/FEVERPITCHED

EXPERIENTIAL LEARNING IN PUBLIC HEALTH



PHOTO CREDIT: ISTOCK.COM/NARVIKK



SARAH MARTONE. The University of Guelph Master of Public Health program provided me with the opportunity to complete a summer practicum placement where I applied my knowledge in a professional public health setting. I completed my placement at the Canadian Wildlife Health Cooperative (CWHC), under the supervision of Dr. Claire Jardine. My main practicum project focused on microplastic pollution in Canadian freshwater ecosystems, and I was able to present my research in a written recommendation report and a visual factsheet. Working with the CWHC allowed me to collaborate, and network with researchers in a wide variety of fields,

allowing me to further explore my interest in wildlife and environmental health. Through networking at the CWHC, I was able to secure a second practicum with Environment and Climate Change Canada, where I am currently working in the Ecotoxicology and Wildlife Health division. Both placements have given me the opportunity to expand my skill set and determine what role I see myself filling as a public health professional.

MPH ALUMNI: WHERE GRADS GO

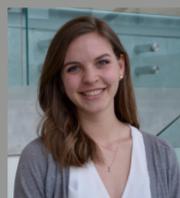


My name is **CRISTIANE MESQUITA** and I work for Ontario Pork Producers' Marketing Board as the provincial coordinator for the Canadian Pork Excellence (CPE) program, a national platform that governs three on-farm programs: food safety (PigSAFE), animal care (PigCARE) and traceability (Pig-TRACE).

The main objectives of the CPE program are to prevent, and control hazards affecting the safety of pork and promote the production of safe food while respecting animal welfare. Certified pork producers demonstrate compliance with national standards by keeping and maintaining on-farm records, documents and standard operating procedures (SOPs).

I am also co-responsible for the technical review of Ontario Pork research calls and liaison with the internal Research Committee, researchers, and other stakeholders. The Research Committee reviews and selects proposals that support industry priorities and outcomes responsive to the needs of pork producers. Based on the Committee's recommendations, the Board of Directors approves expenditure from the research fund.

The interaction of human and animal health has always fascinated me. When choosing an MPH program, the University of Guelph's MPH program drew my attention because of its strong connection to the Ontario Veterinary College and its emphasis on the One Health approach. The program also selects a diverse group of students from different academic and professional backgrounds, which creates a unique and rich learning environment. The MPH program provided the foundation to develop skills and expand knowledge in a variety of topics such as: communications, knowledge translation and transfer, multidisciplinary group work, project management, epidemiology, and diseases. In addition to the professional experience, the practicum was an opportunity to deepen understanding the livestock industry and establish connections that led to my current position.



MADISON WIMMERS. Since graduating with my MPH from UoG in 2019, I have been working at the World Organisation for Animal Health (OIE) in Paris, France as an Animal Health Information Officer. In this role, I work collaboratively with colleagues who have many different educational and professional backgrounds (although many are vets!). My daily work is varied and ranges from data analysis and verification to knowledge transfer and communications. Coursework and discussions with professors and peers during my MPH provided an exceptional background for problem-solving, analytical approaches, and interdisciplinary thinking. These skills, including those gained during my practicum at OMAFRA, provided the necessary experience to begin my

public health career. With its focus on One Health concepts and expertise in the animal health sector, the MPH at the University of Guelph was the ideal program for my current job and future professional interests.



ABOUT THE CENTRE FOR PUBLIC HEALTH AND ZOOSES

The University of Guelph has a strong tradition of excellence in research and education related to public health at the human-animal-environmental interface. Additionally, the university is located in close proximity to, and has close collaborative relations with numerous animal health and public health agencies and organizations. In recognition of these unique strengths, the Centre for Public Health and Zoonoses (CPHAZ) was established in 2006.

Through our engagement in research, education, and knowledge dissemination, members of CPHAZ will identify and solve problems and implement solutions in public health at the human-animal-environmental interface, contribute to rapid response to new and emerging zoonotic diseases, and highlight the societal relevance of veterinary medicine in public health. CPHAZ will create and support productive and effective working relationships between researchers in diverse fields, advance education related to zoonoses and public health and will forge new relationships with human public health activities.

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