Annual Report 2013

CPHAZ
Centre for Public Health and Zoonoses

Providing focus and leadership for research, education, and knowledge dissemination in animal-related aspects of public health

Welcome

Welcome to the 2013 Annual Report for the Centre for Public Health and Zoonoses! The past year has been a busy one. Our Annual Symposium in June was attended by almost 200 people from the University of Guelph and collaborations from animal and human public health organizations at all levels of government. CPHAZ student members were involved in a number of activities, from our annual "meet and greet the public health community" lunch to the MPH forum held in November. The CPHAZ research laboratories are being used by an increasing number of scientists to conduct cutting edge research. In this year's annual report, we have featured some of the work by CPHAZ members in the thematic area of surveillance, as well as highlighting some of our member's projects in other areas of animal and human public health research. Many of these initiatives involve collaboration with government scientists and collaborators from other academic institutions, and we look forward to continually expanding these networks. Further details of CPHAZ activities and member publications are available on our website (www.ovc.uoguelph.ca/cphaz). We hope that you enjoy this report and we look forward to continuing our efforts and to further building our networks and collaborations.

Sincerely,

Jan M. Sargeant

Director, 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.

CIHR Information Session

In February, CPHAZ hosted Dr. Nancy Edwards, Scientific Director of the Canadian Institutes for Health Research, Institute of Population and Public Health, to give a seminar about the opportunities for funding and programs in population and public health.

Rabies in the Americas

This year, CPHAZ hosted the annual event known as the longest running and largest conference specific to rabies in the world. The Rabies in the Americas (RITA) meeting provides unparalleled opportunities for learning the latest developments in the field of rabies, and for networking with colleagues from around the world.

CPHAZ, our local organizing committee, and parent organization RITA Inc welcomed over 250 attendees to Toronto, Ontario, Canada. Throughout the 5 days, there were over 60 speakers, 2 round table sessions, and close to 60 research posters. The speakers presented across 10 thematic areas including:

- Bats and Lyssaviruses: host and virus diversity
- Lyssavirus diagnostics and emerging technologies
- Epidemiology and Modelling
- Immunology and Vaccines
- Pathogenesis
- Human Rabies, Prophylaxis, and Treatment
- Cultural Aspects of Rabies - Past and Present
- Regional and Trans-boundary updates
- Wildlife and Domestic Animal Rabies
- Approaches to Rabies Control and Outbreak Response

CPHAZ members were also participants in the event, with **Zvonimir Poljak** giving a presentation "An evaluation of rabies vaccination rates among animals involved in biting incidents in the Wellington-Dufferin-Guelph public health unit" as well as serving as a member of the organizing committee. **Doug Campbell** was a member of the scientific committee as well as an attendee. Thank you to the sponsors, participants and volunteers who helped make this event a success.

Small Animal Infection Control

The first round of the Guelph Infectious Disease Seminar Series was held in September, with attendance of local hospital infection prevention and control personnel, hospital administrators and public health personnel. The meeting covered treatment of recurrent *Clostridium difficile* infection (**Scott Weese**), zoonotic influenza viruses (**Zvonimir Poljak**), multidrug resistant gram negative bacteria (**Patrick Boerlin**) and hand hygiene monitoring methods (**Maureen Anderson**).

Top to bottom: A participant listens to a presenter at the 2013 RITA conference, which was available in four languages; A dancer performs at the RITA conference gala; Winners of the interactive poster sessions at the 2013 CPHAZ symposium: PhD students, Mai Pham and Maureen Anderson with Dr. Jan Sargeant.

MPH Public Health Forum

In November of 2013, the fifth annual MPH Public Heath Forum was held at the University of Guelph. The event had 24 students presenting on their practicum projects in oral and poster presentations, and had over 90 attendees from the public health sector. Victoria Wells was the recipient of the newly named Robert Clarke OVC Alumni Award for the best poster presentation. As usual, the students were outstanding in presenting their information and were received well by the participants.

CPHAZ Public Health Symposium

In June, CPHAZ welcomed over 180 participants to Guelph for a full day meeting encompassing a range of public health research. Our key speakers, Dr. Jay Keystone discussed the threat of tropical disease and traveler's health, while Dr. Chelsea Himsworth gave an overview of her Vancouver rat project, and whether urban rats pose a health risk. Along with the 20 research presentations, 13 graduate students also presented their ongoing research through interactive poster sessions. Speaker summaries are available on the CPHAZ website, **www.ovc.uoguelph.ca/cphaz.**

Master of Public Health Program

The University of Guelph Master of Public Health (MPH) program was created in 2008 to respond to the need for trained professionals to work in the public health sector. As the program enters its fifth year, a program assessment grounded in the Core Competencies for Public Health in Canada and the Guidelines for MPH Programs in Canada was conducted by Program Coordinator, **Andrew Papadopoulos**.

Results showed that the University of Guelph MPH program remains in adherence with the Guidelines for MPH Schools in Canada and is being delivered as intended. The program provides a setting that is conducive to teaching, learning, research and service, which facilitates interdisciplinary communication, cooperation and collaboration across different sectors and departments.

The outcome assessment revealed that graduates of the MPH program are very happy with their experience, and are confident in their knowledge and ability to enter the public health workforce. The core curriculum provides graduates with training in the core competencies to the expected level. Elective courses enhance the student knowledge of the core competencies, providing that they maintain a strong relationship to public health. The practicum experience is highly valued by program graduates. Two major themes for program improvement were identified based on graduate suggestions: filling in perceived knowledge gaps in the curriculum, and enhancing practice-based learning in the program. Enhanced learning opportunities (desired by graduates) included program evaluation, emergency preparedness, qualitative research methods and knowledge synthesis.

Moving forward, a graduate survey will be issued annually to new graduates. A baseline tool to measure proficiency with the competencies for incoming students should be considered, so that future evaluations examine knowledge gained by students. An in-depth analysis of the structure of the program in relation to the Guidelines for MPH Programs in Canada and the value-added components of the program should be undertaken and a review of the curriculum to maintain its currency and relevancy should be an ongoing process.

Biomedical Sciences

Midori Buechli
Christopher Charles
Tianning Deng
Emma Louth
Kayla Perkel
Khoa Tran

Pathobiology

Maureen Anderson
Monica Baquero
Lesley Berghuis
Katie Clow
Marcio Costa
Li Deng
Bryan Griffin
Gabriella Mallia
Devon Metcalf
Ariel Porty
Jason Stull
Darrick Yu

Master of Public Health

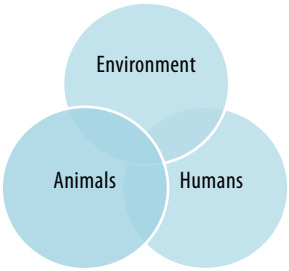
Janet Alsop
Angelina Bosman
Michelle Brown
Elizabeth Choi
Samantha Docherty
Alexandra Fournier
Sarah Garland
Karen Gowdy
Jennifer Irwin
Sana Khan
Melissa Kim
Nikhil Kitchlu
Steven Lam
Ayesha Lone
Mary Machnacky
Cristiane Mesquita
Chelsea Pyles
Alison Rothwell
Robbyn Sargent
Angela Smith
Kate Stechyshyn
Victoria Treister
Natalie Ward

Population Medicine

Gillian Alton
Andreia Arruda
Cathy Bauman
Colleen Best
Kate Bishop Williams
Kate Bottoms
Adele Carty
Bimal Chhetri
April Clyburne-Sherin
Melissa Cummings
Anne Deckert
Warren Dodd
Meredith Faires
Juliana Ferreira
Shiona Glass-Kaastra
Helena Grgic
Jill Hurd
Danielle Julien
Nathan Lachowsky
Kim Lambert
Erin Leonard
Ellen MacDonald
Taylor McLinden
Shannon Meadows
Colleen Murphy
Eric Nham
Sarah Parker
Mai Pham
Wendy Pons
Steve Ramkissoon
Jennifer Reynen
Tara Roberts
Steven Roche
Mackenzie Slifierz
Alexandra Swirski
Krysia Walczak
Lauren Wallar
Cynthia Weijs
Trisha Westers
Jessica Zaffino

RESEARCH by CPHAZ members encompasses a number of key thematic areas in animal-related aspects of public health. Extensive collaborations across disciplines, and with numerous animal health and public health organizations, allow our members to address complex topics and to disseminate results to a broad range of stakeholders. A sample of the 2013 research includes:

Scoping reviews are a type of literature review that provides an overview of the type, extent and quantity of research available on a topic. As they are a relatively new way of reviewing literature, PhD candidate **Mai Pham** (supervisors: **Scott McEwen** and Andrijiana Rajic) conducted a scoping review to determine how many scoping reviews have been conducted to date and how they were conducted. In essence, a scoping review of scoping reviews.



Taylor McLinden (advisor: **Jan Sargeant**) completed his MSc in Epidemiology (Summer 2013) in the area of cost-of-illness for foodborne illnesses. His work showed which costs are commonly incurred due to these illnesses and which may be the most important to consider when conducting a cost of foodborne illness analysis. He is currently a PhD student at McGill University continuing work in the area of infectious disease epidemiology.

The recent research of **Kate Bishop-Williams** (advisor: **Olaf Berke**) involves mapping the levels of heat stress during summer heat waves and control periods across Southern Ontario. She used Environment Canada data for the years 2010-2012 to create a prediction of the level of discomfort experienced by humans and livestock during periods of extreme heat. Currently, Kate is looking at how these heat wave predictors of heat stress can predict livestock mortality (particularly in dairy cows) and how it predicts emergency room visits in rural hospitals.

Recently at OVC, research on Johne's disease (JD) has focused on addressing JD control through the most important animal on the farm, the farmer. **Steven Roche**, a PhD student in the Department of Population Medicine, is evaluating how agricultural extension, education, and communication can be used to improve on-farm compliance of JD recommendations. He is also committed to taking part in the extension process by communicating his results, and facts about JD, through a novel video technique, called whiteboard scribing. Stevens' video follows Bob, a Canadian dairy farmer, as he shares his story about dealing with Johne's disease, the effects it had on one cow in particular, Belle, and the steps he took to try and control the disease on his farm. The link to the video is available on the CPHAZ website under CPHAZ Resources as well as here: http://bit.ly/HJhnjv.

April Clyburne-Sherin is conducting her MSc research in spatial epidemiology (advisor: **Olaf Berke**). She is using geographic epidemiologic methods to describe the spatio-temporal dynamics of a historical cholera epidemic in Ireland from 1848 – 1850, during the second cholera pandemic. We are still not able to reliably predict where, when, or how the next cholera epidemic will appear and spread, so understanding past epidemics will help improve our ability to predict future epidemic dynamics.

ECOHEALTH CLUB

The Ecohealth Club provides a forum where students from all departments and academic levels can meet to discuss and explore the complex relationships between ecosystems, society, and the health and well-being of animals and humans.

The EcoHealth Club blossomed in 2013, hosting a number of successful events including a Student Panel Talk about EcoHealth Graduate Research, a display at College Royal which attracted over 200 students, more than 10 successful guest speaker events for our Lunch and Learn Talks, a display at the Many Faces of Population Medicine Conference and a very exciting website re-vamp!

If you are interested in receiving information on future Ecohealth Club events, or would like to assist the club executive in planning and organizing events, please e-mail ehc@uoguelph.ca or visit our website at www.uoguelph.ca/~ehc.

Claire Jardine and collaborators are continuing to investigate the epidemiology of several different pathogens in wild animal populations. Current projects include PhD student Kristin Bondo's research investigating Salmonella and antimicrobial resistance in raccoons and skunks, and MSc student, **Ariel Porty**'s project (co-advised with Dr. Albrecht Schulte-Hostedde at Laurentian University) investigating Coxiella in wildlife on goat farms.

Jason Stull (advisor: **Scott Weese**) completed his PhD in 2013 and is now an assistant professor at the Ohio State University College of Veterinary medicine. Jason's PhD work investigated how pet owners interact with animals and their knowledge of potential zoonotic risks. His study group included the general public and households with immunocompromised children. The results of these studies identified numerous opportunities for contact with potential pathogens and areas where knowledge was lacking. Educational efforts to address these areas can help to reduce the risks associated with pet contact.

The research of **Azad Kaushik** involves understanding the construction of the humoral immune system in health and disease across species and its application in disease prevention via development of novel vaccines, immunodiagnostics and therapeutics. Studies of the bovine antibody system revealed limited germline diversity that is compensated by novel antibody diversification strategies, for example, generation of exceptionally long CDR3H via genetic mechanisms (CSNS insertions together with long D-genes). These cattle antibodies are the largest known to occur in a species. Theses cattle antibodies are unique among vertebrates and especially suitable for the development of antibody based therapeutics and immunodiagnostics. In recent years, Azad and colleagues designed, constructed and expressed functional bovine antibody fragments, single chain Fv (scFv), in yeast that are capable of neutralizing Bovine Herpes Virus-1, an important cattle pathogen etiological agent of Bovine Respiratory Disease present in the environment.

PhD candidate **Warren Dodd** (co-advisors: **Cate Dewey** and Director of the International Development Studies Program, Sally Humphries) is conducting research in southern India with small-scale farming households. He is investigating the connections between labour migration, health, and food security and how agricultural and community development efforts can best support households in this context. This research is part of a larger multidisciplinary project funded through the Canadian International Food Security Research Fund. Warren was awarded an IDRC Doctoral Research Award and a CIHR Vanier Canada Graduate Scholarship.

Jan Sargeant, Annette O'Connor (Iowa State) and colleagues in Europe are conducting a series of workshops for the European Food Safety Authority (EFSA). Topics of these workshops include the process of systematic reviews, critical appraisal of systematic reviews, and meta-analysis. In the winter semester 2014, Jan and **Olaf Berke**, (with guest lectures by PHAC colleagues) will teach a graduate course at OVC on Systematic Reviews and Meta-analysis.

WWW.OVC.UOGUELPH.CA/CPHAZ

Visit the CPHAZ website to find useful resources such as factsheets on zoonotic diseases of wildlife, food safety in ethnic foods, as well links to written guidelines on infection prevention and control strategies.

While visiting the CPHAZ website you will also find more information about upcoming CPHAZ events, public health related publication listings and a link to the **Worms and Germs Blog**, which is not only a place to find further information on timely zoonotic disease issues, but also an incredible resource for zoonotic disease information for kids, adult pet owners, veterinarians and physicians (direct link: **www.wormsandgermsblog.com**)

Above: A DVM student shows the close contact we have with our pets and why it is important to be educated on zoonotic diseases and public health

Maureen Anderson (advisor: **Scott Weese**) completed a seminal video observation study of infection control practices in over 50 companion animal veterinary clinics in Ontario, with emphasis on hand hygiene practices. The results were presented at the ACVIM Forum in June, where one of her abstracts won the IDEXX/ISCAID prize for best oral student abstract presentation on infectious diseases of companion animals. Maureen's earlier video observation study of preoperative preparation practices in veterinary clinics was published in October 2013 in BMC Veterinary Research. It is hoped that these studies will increase awareness and generate discussion amongst veterinary personnel of issues surrounding infection control practices, and ultimately help to improve the infection control culture in veterinary medicine.

Above: Hand hygiene practices are the focus of PhD student Maureen Anderson's research. Source: CDC.

John Prescott and his laboratory, in Pathobiology, continue to work on understanding and immunization against *Clostridium perfringens* in poultry necrotic enteritis, as a way to reduce antibiotic use in broiler chicken production.

Hugh Cai, and collaborators, continue to work on their project "Avian Chlamydophila and Coxiella Infection in Ontario: Molecular Diagnosis Method Development" and provide routine service testing and monitoring *Chlamydophila spp*., Coxiella and Giardia from animal samples.

Lauren Wallar's PhD research (advisor: **Andrew Papadopoulos**) aims to evaluate competency-based learning in public health. She will use curriculum mapping and competency prioritization to investigate competency-based learning in Master of Public Health programs. She will also examine competency-based learning opportunities for working public health professionals using surveys and focus groups. Enhancing competency-based learning will help to build human resource capacity to meet diverse and complex public health needs.

Lee Wisener and colleagues had two studies related to knowledge synthesis in food safety accepted for publication. One study investigated the evidentiary value of challenge studies (trials with deliberate disease induction) by evaluating whether they informed subsequent clinical trials on the same intervention. She found that challenge trials tended to report a higher treatment efficacy. Her second publication was a systematic review of the efficacy of direct fed antimicrobials to reduce fecal shedding of *E. coli O157* in cattle, which reported that cattle fed these probiotic products were approximately half as likely to shed the pathogen.

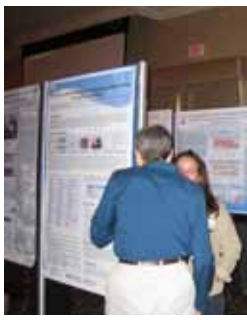
John Prescott was an editor of the 5th edition of "Antimicrobial Therapy in Veterinary Medicine", Blackwell Wiley 2013. He is Co-Chair of the Ad-Hoc Committee on Antimicrobial Stewardship in Canadian Agriculture and Veterinary Medicine that made an unsuccessful environmental petition in 2012-2013 to the Auditor General of Canada to close gaps in federal regulations relating to antibiotic use in animals.

Ameet Singh and **Scott Weese** are investigating factors associated with methicillin resistant *Staphylococcus pseudintermedius* (MRSP) surgical site infections (SSIs) following tibial plateau leveling osteotomy (TPLO) for the treatment of cranial cruciate ligament insufficiency in dogs. Despite TPLO being classified a "clean" surgical procedure, it is associated with a high SSI rate and further investigation is required. These researchers are also characterizing the biofilm forming ability of MRSP. A biofilm is a multi-layer bacterial community encased in a self-produced carbohydrate matrix adhered to a biological or non-biological surface. The ability to form biofilm is associated with chronic or persistent SSI in other staphylococci.

Above: PCR work in the CPHAZ lab.

Andrew Peregrine served as Vice President-President Elect of the American Association of Veterinary Parasitologists (AAVP). He collaborated on several educational articles regarding Giardia, *Echinococcus multilocularis*, Lyme disease and how to protect pets. As well as continuing his research on anthelmintic resistance within Ontario sheep farms.

SURVEILLANCE is important to identify emerging issues and to determine the frequency and trends over time for important public health pathogens and issues in various species. Recently CPHAZ members have been involved in surveillance research (both episodic and ongoing) of over 30 zoonotic or potentially zoonotic disease agents involving companion animals, food animals and wildlife. Some of these studies have been conducted in collaboration with provincial and federal partners or industry. Examples of some of these projects are described below:



Based on a concern that *Mycobacterium avium paratuberculosis* (MAP), the bacterium that causes Johne's Disease in dairy cattle, may be linked to Crohn's Disease in humans, **David Kelton** worked with the Ontario dairy industry to launch a control program in 2010. Over the last 4 years dairy producers have funded the testing of all milking cows on 2,153 farms (52% of Ontario dairy herds) for an antibody to MAP, using a milk ELISA test. Less than 1% of cows tested positive, and only 26% of herds had any test positive cattle. This is considerably lower than expected, and lower than other regions of Canada and North America. As part of the testing program a focused effort was made to identify cattle shedding MAP and to voluntarily remove these animals from the herd, while not moving them to other dairy herds or into the human food chain. The 4 year launch of the program is a great example of an industry initiated program aimed at protecting animal and human health.

The objective of a study by **Kate Bottoms**, **Zvonimir Pojak**, **Olaf Berke** and collaborators at the Wellington-Dufferin-Guelph Public Health Unit was to evaluate vaccination rates against rabies in dogs and cats involved in biting incidents within the Wellington-Dufferin-Guelph region. Data for this study were obtained from reports of animal bite incidents that occurred within the Public Health unit during 2010 and 2011. 718 bites were included; 54% of involved animals were up-to-date on their rabies vaccination, 32% were not, while the remaining 14% were of unknown vaccination status. The number of veterinary clinics and the proportion of urban area were significant predictors of the number of bite incidents, whereas no significant predictors of rabies vaccination rates could be identified.

The Public Health Agency of Canada estimates that each year about one in eight Canadians (or four million people) gets sick with a domestically acquired foodborne illness (Thomas et al., 2013, http://www.phac-aspc.gc.ca/efwd-emoha/efbi-emoa-eng.php). The 2013 estimate is more accurate than the 2008 estimate and due to the use of different methods for the 2013 estimate, the two estimates cannot be compared. The 2013 estimate provides details on which foodborne pathogens are causing the most illness in Canada; for example, norovirus, *Clostridium perfringens*, *Campylobacter* and *Salmonella* are the leading causes of known foodborne illness in Canada. This information will support food safety and public health efforts to ensure safe food for Canadians and to minimize the burden of foodborne illness in Canada.

Above: Research projects such as those of Steven Roche and Dave Kelton help us learn and disseminate disease prevention and control methods.

The Animal Health Laboratory (AHL), Laboratory Services Division, University of Guelph (including **Beverly McEwen**, **Hugh Cai**, **Durda Slavic** and **Davor Ojkic**) routinely identify about 1000 cases annually of zoonotic pathogens from domestic and non-domestic animals. The pathogens include bacteria, viruses and parasites. An annual summary of selected zoonotic pathogens identified at the AHL is published in the March edition of the AHL newsletter and is available at **http://ahl.uoguelph.ca**.

Meredith Faires completed her PhD (co-advisors: **David Pearl** and **Scott Weese**) investigating methicillin-resistant *Staphylococcus aureus* (MRSA) and *Clostridium difficile* in community hospitals in southern Ontario. The prevalence of MRSA and *C. difficile* contaminated surfaces ranged from 2.5% - 11.8% and 2.4% - 6.4%, respectively, and high risk surfaces where identified. Molecular typing of isolates and spatial analysis revealed potential outbreaks that were not recognized by hospital personnel. Currently, Meredith is an epidemiologiest for the Regina Qu'Appelle Health Region.

PhD student Shannon Meadows, who is researching Q fever in goat herds.

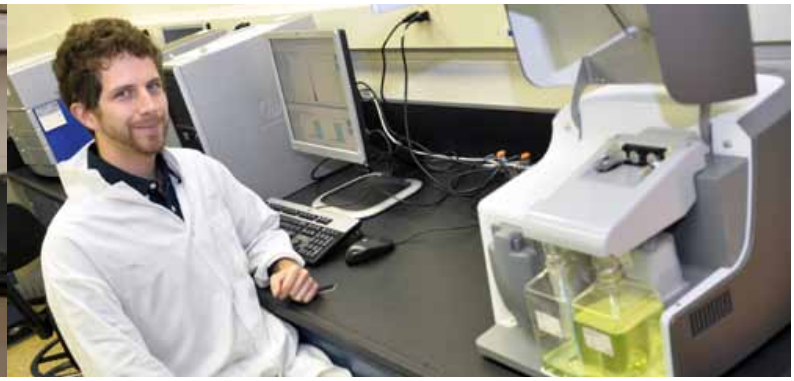
Shannon Meadows (Co-advisors: **Andria Jones Bitton** and **Paula Menzies**) is a PhD Candidate investigating the seropositivity and associated risk factors of *Coxiella burnetii* (Q fever) in sheep and goats as well as their farm workers and veterinarians. The results indicate seropositivity was common among all groups investigated. A number of risk factors have been identified which highlight the importance of hygiene and biosecurity. This information will support the development of prevention and control guidelines to reduce the risk of exposure.

Nathan Lachowsky's PhD research (co-advisors: **Cate Dewey** and Alastair Summerlee) is focused on national sociobehavioural HIV surveillance amongst gay, bisexual and other men who have sex with men in Aotearoa, New Zealand. Funded by a Rotary International Ambassadorial Scholarship and a CIHR Vanier Canada Graduate Scholarship, his work examines the upcoming generation of younger men's HIV testing and condom use behaviours as well as the practices of ethnicity categorization within public health data. The implications of his work are relevant to local health promotions efforts in New Zealand in terms of sexual health, but also more broadly to public health behavioural surveillance globally.

Kim Lambert`s MSc research (advisor: **Jason Coe**) is investigating reasons why people relinquish their pets. She conducted a systematic review / meta-analysis to quantify the reasons why pets are surrendered to shelters and a thematic exploration of the literature to explore stakeholder perspectives for reasons and solutions to relinquishment. Understanding causes and potential solutions will aid in reducing the number of animals surrendered to shelters and help to enhance the human-animal bond.

Dr. **Michele Guerin** and PhD candidate **Tara Roberts** are closing knowledge gaps in understanding the epidemiology of antimicrobial resistance in foodborne pathogens in the broiler chicken sector. This research includes a descriptive summary of antimicrobial use among conventional flocks using two metrics (mg of active ingredient/kg-bird produced, Animal Daily Dose/kg-bird produced); a comparison of conventional, antimicrobial-free, and organic production systems with respect to antimicrobial resistance of *Salmonella*, *Campylobacter*, and generic *Escherichia coli* isolates; and an evaluation of associations between antimicrobial use and antimicrobial resistance. The results have been presented nationally and internationally, and will guide industry in the development of control measures at the hatchery and broiler farm levels, thereby improving the safety of chicken products in Ontario. This research is funded by the Animal Health Laboratory Animal Health Strategic Investment, Public Health Agency of Canada, Chicken Farmers of Ontario, Chicken Farmers of Canada, and Natural Sciences and Engineering Research Council of Canada (NSERC).

Top to bottom: PhD student Marcio Costa is investigating at antibiotic use in horses; Participants look over the research posters on display at the CPHAZ symposium.



This year in the CPHAZ research laboratories, we have continued to expand, reaching over 30 students, and 15 faculty from mutiple departments collaborating on animal and human public health research that brings together colleagues from government, academia, and industry from national and international organizations. CPHAZ continues to fulfill our mandate through cross-cutting research involving companion animals, food animals, wildlife, laboratory animals and humans, at both individual and population (farm, community, veterinary hospital, human hospital, animal shelter) levels.

DVSc student Evan Crawford (advisors **Ameet Singh** and **Scott Weese**) is investigating gene expression during biofilm formation in methicillin resistant *Staphylococcus pseudintermedius* (MRSP) as it occurs on a variety of surfaces including stainless steel, titanium, suture material and bone cement. Biofilm formation of MRSP is suspected to be a major factor in the rapid emergence of this bacterium as the leading cause of skin and soft-tissue infections, along with surgical site infections, in dogs.

Clostridium difficile accounts for approximately 25 000 deaths each year in Canada and whilst the majority are cases are acquired within hospitals there is an increasing trend of community acquired infections. Previous research has demonstrated that although foodborne carriage and zoonotic transfer are possible the contribution to infections is negligible. Therefore, on-going research is investigating the potential routes by which *C. difficile* can be disseminated into the environment. Studies by **Keith Warriner** have been undertaken to determine the incidence of toxigenic *C. difficile* in sewage and survival during sewage treatment, in addition to dissemination in effluent/ biosolids derived from the process. Results indicate that toxigenic *C. difficile* (especially ribotype 078 implicated in community associated infections) is highly prevalent in sewage, survives the anaerobic digestion process, and can be readily recovered in effluent and biosolids released into the environment. *C. difficile* spores survive for extended times in soil although this has been found to be dependent on soil type. Thus, effluent and biosolids may represent a significant source of *C. difficile*.

PhD candidate **Mackenzie Slifierz** (advisor: **Scott Weese**) is investigating the prevalence of zinc resistance in methicillin-resistant staphylococci and whether high levels of zinc in swine feed may be contributing to the persistence of these bacteria in swine production systems.

The objective of a study by PhD candidate **Helena Grgic** (co-advisors: **Bob Friendship** and **Eva Nagy**) was to determine which variants of influenza viruses circulate in Ontario swine. Twenty one swine farm with recent outbreaks of respiratory disease were visited during 2012, nasal swabs were collected and tested for influenza virus using MDCK cells and PCR. Within-herd prevalence of shedding ranged between 2% and 100% and detected viruses were fully genetically characterized.

MSc student Alim Nazarali (advisors **Ameet Singh** and **Scott Weese**) is investigating the relationship between timing of administration of antimicrobials during elective orthopedic surgery in dogs and surgical site infections (SSIs). He is also conducting a multicentre study that is prospectively evaluating the association between methicillin resistant *Staphylococcus pseudintermedius* colonization and SSIs in dogs undergoing elective orthopedic surgery.

The Centre for Public Health and Zoonoses research laboratories is the product of a one million dollar grant from Canada Foundation for Innovation, with matching funds from the Ontario Research Fund under the Ministry of Economic Development and Innovation. The facility opened in late 2011 and is used for zoonoses and other public health related research.

This biosecurity level 2 facility includes laboratories for bacterial and molecular characterization, computer laboratories for disease modeling and surveillance research as well as a zoonotic disease isolate biobank, sample processing and space for field collection equipment storage. Culture facilities provide basic equipment as well as a Sensititre MIC system to determine antimicrobial resistance.

Separate molecular labs are available for different procedures including initial sample handling, pulse field gel electrophoresis, DNA/RNA extraction, and PCR assembly and running. The available equipment includes high throughput instrumentation such as the MagnaPure DNA/RNA extraction system, LightCycler 480 systems and microarray equipment. The Roche Flex Jr and Qiagen Pyromark Q96 ID systems are available for short and long base pair sequencing.

Two complementary computer laboratories are part of the infrastructure. One is located in the Department of Mathematics and Statistics and focuses on infectious disease modeling. The other, located in the new CPHAZ lab area, is designed for quantitative analysis of molecular data and surveillance data. A variety of specialty software is available in both laboratories, including Applied Maths' BioNumerics, Geneious, Palisade Decision Tools, Mathworks' MATLAB and XJ technologies' Anylogic.

The facility also include a cryostorage service to allow researchers to begin to build a bank of zoonotic disease isolates and samples. Isolates of zoonotic disease agents can be used to identify virulence factors, conduct molecular studies, develop and validate diagnostic tests, and develop vaccines. This information in turn becomes the foundation for the conceptualization of new applied research studies. As isolates are characterized by new methodological testing, the continued addition of data to an isolate database will create, over time, a unique and innovative resource that can be used to address new research questions. In 2013 we acquired the software for our biobank and began storing samples for our members. We look forward to expanding this service in the coming years.

The new CPHAZ facility is open for use by CPHAZ members, their graduate students and collaborators. We encourage cross-disciplinary research and look forward to research in public health and the prevention and control of zoonotic diseases through this facility. We are purely a cost-recovery research facility and not a diagnostic service (**any diagnostic service requests will be directed to the Animal Health Laboratory). If you are interested in the CPHAZ facility for your research please contact **cphaz@uoguelph.ca**. You can also visit our website for more information, **www.ovc.uoguelph.ca/cphaz**.




Opposite page L-R: Graduate students working in the CPHAZ research laboratories; Shaun Pinder working in the sequencing area within the CPHAZ laboratories; Below L-R: PhD student Mackenzie Slifierz accessing isolates in the cryostorage area; graduate student Fahad Bazaid working in the CPHAZ bacteriology laboratory.

Faculty Members

Paula Barata
Psychology
Public Health Policy

John R Barta
Pathobiology
Zoonoses: Livestock & Wildlife

Chris Bauch
Mathematics & Statistics
Public Health Policy, Synthesis Research

Olaf Berke
Population Medicine
Synthesis Research, Zoonoses: Wildlife & Companion

Herman Boermans
Biomedical Science
Food Safety, Risk Assessment

Hugh Cai
Animal Health Lab
Food Safety, Zoonoses: Livestock

David Calvert
Computing & Info Science
Surveillance & Disease Outbreak

Doug Campbell
Canadian Cooperative Wildlife Health Centre
Zoonoses: Wildlife

Catherine Carstairs
History
Food Safety, Environment, Public Health Policy

Jason Coe
Population Medicine

Valerie Davidson
Engineering
Food Safety, Risk Assessment

Rob Deardon
Mathematics & Statistics
Risk Assessment

Jim Fairles
Animal Health Lab
Zoonoses

Robert Friendship
Population Medicine
Antimicrobial Resistance, Zoonoses: Livestock

Daniel Gillis
Compuer Science
Public Health Policy

Amy Greer
Population Medicine
Food Safety

Michele Guerin
Population Medicine
Food Safety

Marc Habash
Environmental Biology
Water Safety, Environmental, Antimicrobial Resistance

Sherilee Harper
Population Medicine
Environmental Health; Water & Food Safety

Robert M Jacobs
Pathobiology
Comparative Medicine

Candace Johnson
Political Sciences
Public Health Policy

Andria Jones
Population Medicine
Zoonoses: Wildlife, Companion & Sporting

Azad K Kaushik
Molecular and Cellular Biology

David Kelton
Population Medicine
Water Safety, Environment, Zoonoses: Livestock

Kerry Lissemore
Population Medicine
Zoonoses: Livestock

Bonnie Mallard
Pathobiology
Comparative Medicine

Grant Maxie
Animal Health Lab
Zoonoses

Brian McBride
Animal & Poultry Science
Food Safety, Environment

Beverly McEwen
Animal Health Lab
Antimicrobial Resistance, Zoonoses: Surveillance

Scott McEwen
Population Medicine
Water & Food Safety, Synthesis Research, Antimicrobial Resistance

Paula Menzies
Population Medicine
Zoonoses: Livestock & Surveillance, Antimicrobial Resistance

Karen Morrison
Population Medicine
Environmental Health

Lucy M Mutharia
Molecular and Cellular Biology
Food Safety

Eva Nagy
Pathobiology

Nicole Nemeth
Pathobiology
Zoonoses: Wildlife

Lee Niel
Population Medicine
Companion Animal

Davor Ojkic
Animal Health Lab
Zoonoses: Surveillance and Disease Outbreak

Andrew Papadopoulos
Population Medicine
Public Health Policy

Jane Parmley
Canadian Cooperative Wildlife Health Centre
Zoonoses: Surveillance and Disease Outbreak

David Pearl
Population Medicine
Antimicrobial Resistance, Zoonoses

John Prescott
Pathobiology
Antimicrobial Resistance, Zoonoses

Jan Sargeant
Population Medicine
Water & Food Safety, Synthesis Research

Shayan Sharif
Pathobiology
Food Safety

Ameet Singh
Clinical Studies
Zoonoses: Companion Animal

Durda Slavic
Animal Health Lab
Zoonoses

Dale Smith
Pathobiology
Zoonoses: Wildlife

Henry Staempfli
Clinical Studies
Zoonoses: Livestock, Companion and Sporting

Patricia Turner
Pathobiology
Food Safety

Keith Warriner
Food Sciences
Food Safety

Ashley Whiteman
Centre for Public Health and Zoonoses
Program Coordinator

Janet Wood
Molecular and Cellular Biology
Water & Food Safety

Sarah Wootton
Pathobiology

Post Doctoral Fellows

Lowia Al-Hussinee
Maria del Rocio Amezcua
Prithy R. Babu
Andres Diaz
Hakimeh Mohamammadi
Victoria Ng
Chika Okafor
Kathleen Thompson
Lee Wisener

Retired CPHAZ members

Ian K Barker
Pathobiology
Risk Assessment, Zoonoses: Wildlife & Surveillance

Patricia Shewen
Pathobiology
Zoonoses: Livestock

Ken Leslie
Population Medicine
Water & Food Safety, Zoonoses: Livestock

Gordon Hayward
Engineering
Zoonoses: Wildlife & Surveillance

David Waltner-Toews
Population Medicine
Water & Food Safety, Environment, Zoonoses

New Members

CPHAZ is excited to welcome faculty members with research focused in zoonotic disease and public health areas:

Nicole Nemeth joined the Department of Pathobiology as an assistant professor in zoo and wildlife pathology in July 2013. Prior to her arrival to Guelph, Nicole earned a DVM and PhD at Colorado State University, with research focused on avian pathogenesis and immunity to West Nile virus (WNV). She also worked on other arboviruses, including St. Louis encephalitis, Japanese encephalitis, and Chikungunya viruses. Also during this time, she was a Research Fellow at the U.S. Centers for Disease Control & Prevention, while working on WNV surveillance and research in birds and mammals. Following graduate school, she was a Science fellow at the U.S. Department of Agriculture, National Wildlife Research Center, and performed research focusing on low pathogenicity avian influenza viruses in birds and rodents. Finally, she completed a residency in veterinary and wildlife pathology at the Southeastern Cooperative Wildlife Disease Study at the University of Georgia, where additional research focused on high pathogenicity avian influenza and swine influenza viruses in birds.

Sherilee Harper joined the Department of Population Medicine as an assistant professor in ecosystem health in December 2013. Prior to joining the faculty, Sherilee was a PhD student (and CPHAZ student member). In her recently completed graduate work, Sherilee (supervisors: **Scott McEwen** and Victoria Edge) investigated acute gastrointestinal illness (AGI) in two Inuit communities (Iqaluit and Rigolet) in the context of climate change. Guided by an ecohealth approach and using participatory data collection methods, the research found that AGI was three times higher in Iqaluit and Rigolet compared to other Canadian regions, and the highest reported in the international AGI literature. Furthermore, AGI healthcare utilization rates were lower than other regions in Canada. Statistical risk factors for AGI included food, water, animal exposure, and socio-economic conditions; while community members believed hygiene, retail food, tap water, boil water advisories, and personal stress were important risk factors.

Infectious disease outbreaks pose significant health and economic risks to Canadians. Well-planned interventions could prevent or minimize these disruptive outbreaks. However, the effectiveness and cost-effectiveness of novel strategies to prevent outbreaks is unknown. **Amy Greer** recently joined the Department of Population Medicine, and works to develop mathematical computer simulation models that facilitate the analysis of "what-if" scenarios to identify the most effective and cost-effective surveillance and control strategies. The models represent individuals within their simulated environment and their interactions, movements, decision-making, and related health states. These "simulated" populations allow Amy to evaluate the potential impact of novel intervention strategies for pathogens including pandemic influenza, and food-borne diseases like *E. coli O157*. Model outputs are able to identify the health and economic benefits of different control strategies and strengthen existing public health planning. Simulation allows us to optimize infection control practices so that we can allocate resources that are limited while at the same time minimizing disease transmission. Disease modeling is an important addition to the public health response and effective planning is the cornerstone of disease prevention.

Farm-To-Fork.ca began as a classroom project on food insecurity in the School of Computer Science at the University of Guelph. Led by co-founders **Dr. Daniel Gillis** and Danny Williamson, students created Farm-To-Fork.ca – a website which allows emergency food providers to communicate their needs directly to donors registered in the system the day they go grocery shopping. In this way, Farm-To-Fork.ca was designed to increase the quality and quantity of food donations. Students are currently developing the Farm-To-Fork mobile app that will use location-based technologies to notify donors as they enter a grocery store. For more information, check out **Farm-To-Fork.ca**.

Above: The photo was taken by UofG's Susan Bubak. L-R: Dan Gillis, Lee-Jay Cluskey-Belanger, Danny Williamson, Justin Tempelman, Corey Alexander, Neil St. Amour, Benjamin Katznelson, Chris Alderson, Oliver Cook.

In Memoriam:

JAMES HARLAN STEELE

The One Health community was saddened to hear of the death of one of the most influential persons in the field of One Health. James Steele passed away in November 2013 at the age of 100. Throughout his career, Dr. Steele aspired to improve the quality of life for people and animals around the world. His work in zoonotic disease control and veterinary public health were seminal. His leadership in, and contributions to One Health will be missed.

James Steele (seated), accepting the Calvin W. Schwabe Award for Lifetime Achievement in Veterinary Epidemiology and Preventive Medicine (presented by the Association of Veterinary Epidemiology and Preventive Medicine), 2005.

CPHAZ Steering Committee

Our steering committee members represent a range of interests and expertise in animal-related aspects of public health. Their participation and dedication to CPHAZ is fundamental to our success as part of the public health community.

Andrew Peregrine is an associate professor of parasitology in the Department of Pathobiology. His research interests include the epidemiology of parasitic infections and development of parasite control programs to reduce drug resistance.

Zvonimir Poljak is an assistant professor in the Department of Population Medicine. His research focuses include examining the spread of infectious diseases in swine using a variety of quantitative methods.

Claire Jardine is an assistant professor in the Department of Pathobiology. Her research interests include rodent and vector borne zoonotic diseases, the ecology of zoonotic diseases in wild animal populations and wildlife health.

Cate Dewey is a professor of epidemiology and the Chair of the Department of Population Medicine. Her research interests are in the areas of human and swine diseases using ecosystem approaches to health.

Scott Weese is an associate professor in the Department of Pathobiology. His research focuses on multi-drug resistant bacteria (particularly mRSA), bacterial gastrointestinal disease, and transmission of infectious agents between animals and humans.

Patrick Boerlin is an associate professor in the Department of Pathobiology. His research focuses on molecular epidemiology and population diversity of commensal and pathogenic bacteria from animals (mainly *E. coli* and *C. perfringens*) or of agents of zoonoses.

CPHAZ
Centre for Public Health and Zoonoses

University of Guelph
Changing Lives Improving Life

Ontario Veterinary College
Opus Veterinum Civibus

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