CVER

Annual Report

2014

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1. Message from the Director

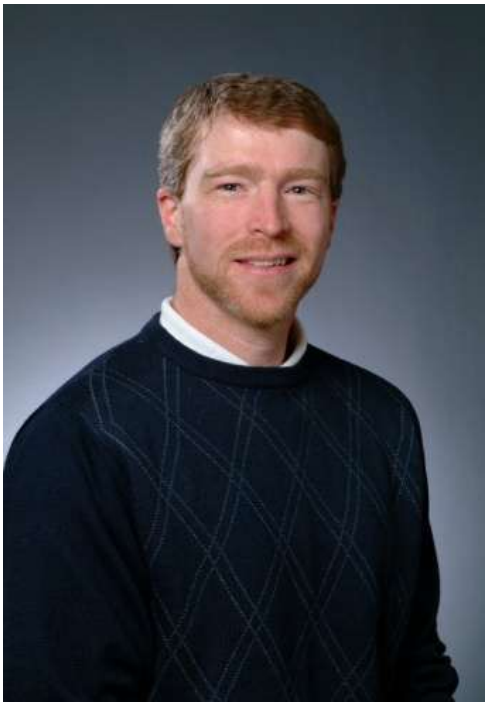
2014 marked another successful year for CVER with many of the details provided in subsequent pages. Highlights for 2014 were the completion of 2 successful Epi-on-the-Island courses. These included "Bias in Observational Studies" – instructed by CVER's Drs. Ian Dohoo and Henrik Stryhn, and "Bioinformatics for veterinary epidemiologists – from gene sequence to surveillance" - instructed by Drs. Peter Durr and Kim Halpin both of the Australian Animal Health Laboratory. During the Epi-on-the-Island courses, CVER also hosted the annual meeting of the Canadian Association of Veterinary Epidemiology and Preventive Medicine. The theme for this year's CAVEPM meeting was "*Observational studies in the era of bioinformatics" and c*onsisted of a series of 36 scientific oral paper presentations and 10 poster presentations. Drs. Simon Dufour, Stefan Widgren and Peter Durr were the host plenary speakers for the event.

We saw the hiring of Dr. Raph VanderStichel as a full-time research scientist within the Canada Excellence Research Chair (CERC) group – welcome Raph. We also welcomed a number of new CVER members as graduate students, and congratulated a number of CVER graduate students who completed their degrees and departed UPEI. We also welcomed Joan Marks to the team as an administrative assistant, who has done a superb job of assisting CVER faculty with their administrative needs. We had faculty members and graduate students receiving awards for their research and knowledge translation efforts, both near and far. It has been a very good year.

I would like to thank all CVER members for their talents and efforts to keep CVER an extremely strong brand within the veterinary epidemiology world. It is because of your commitment to research excellence and dedication to training/mentoring that we continue to be among the most successful Veterinary Epidemiology programs worldwide. With such an extraordinary CVER team, we will continue to grow and flourish. We hope you enjoy reading some details of our successes below.

Cheers!

John VanLeeuwen



2. Partners:

2.1. Canada Excellence Research Chair – by Dr. Ian Gardner

The CERC in aquatic epidemiology increased capacity in 2014 through the addition of 2 post-doctoral fellows in infectious disease epidemiology (Raju Gautam), and shellfish epidemiology (Ruth Cox) an e-learning coordinator (Daniel Lynds), and a part-time science writer (Bill Chalmers). Henrik Stryhn, an AVC biostatistician, also agreed to join the team because of his ongoing participation in CERC graduate student research and many other research projects. Joan Marks and Joe Lund continued in their valued roles helping guide project and administrative management of the program.

Post-doc Ruth Cox sampling sea lice on fish farm in Norway

The CERC program continues to grow with collaborative projects on both Canadian coasts. On the west coast, collaborations with the Department of Fisheries and Oceans and the salmon industry include work on pathogen exchange between wild and farm fish using real-time PCR assays for 45 microbes and on statistical and simulation modeling of sea lice in farmed salmon with a focus of management plans. On the east coast, the focus in salmon aquaculture has been epidemiologic studies of sea lice, infectious salmon anemia, and bacterial kidney disease. On PEI, the CERC has funded research on the production and health of oysters and mussels, including an assessment of risk pathways associated with the potential introduction and spread of Multinucleate Sphere X (MSX). Two CERC funded projects are investigating management strategies and the economics of green crab, an invasive species.

Post-doc Maya Groner sampling sea grass in Washington State, USA

Internationally, the CERC has contributed research and graduate student/postdoctoral funding to support sea lice research in Norway and Chile, salmon rickettsial syndrome in Chile (Gabriel Arriagada and Derek Price, graduate students), and aquatic epidemiology studies in China (Jia Beibei, PhD student).

In Vietnam, Annette Boerlage with the guidance of Jeff Davidson and Larry Hammell has established research projects documenting mortality and its possible causes in finfish in two parts of the country. Ian Gardner has set up collaborative projects in Brazil in tilapia health and in Australia on improvement in diagnostic methods for fish diseases.

Early career development awards were made to 2 post-doctoral fellows and 3 graduate students to facilitate participation in conferences, research workshops, and training in Denmark and Norway. Short-term research placements were made to 2 post-doctoral fellows to provide research opportunities and training in Vietnam and USA.

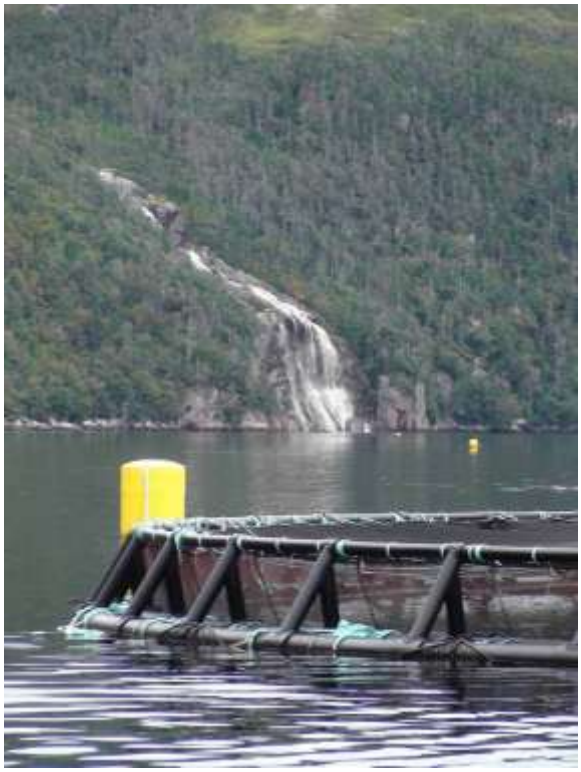
Finally, 10 seed grants (total of $194,000) were funded in July 2014 focusing on high-risk high-reward projects that have the potential to garner extramural funding and include mentoring of early-career scientists by UPEI faculty members.

2.2. Centre for Aquatic Health Sciences (CAHS) – by Dr. Larry Hammell

The Centre for Aquatic Health Sciences at the Atlantic Veterinary College is an academic center of expertise in finfish health research initially funded by the Atlantic Innovation Fund and research partners including several fish farming companies, provincial and federal government departments, and the supporting industries (private aquaculture veterinarians, pharmaceutical companies, vaccine companies, feed companies, etc.). The Centre continues to work in New Brunswick and Newfoundland, engaged in Pan-Atlantic clinical trials for vaccines, field and treatment trials for sea lice treatments, as well as a field data study to identify risk factors associated with Bacterial Kidney Disease (BKD) and Infectious Salmon Anemia (ISA). The data study was initiated in 2012, and included a focus on surveillance, risk factors, and control options BKD and ISA across the Atlantic Canada region for 2014.

The field trials of commercial vaccine options under Newfoundland and Labrador production conditions begun in 2012 were completed in late 2014. The final group of 6,000 Atlantic salmon which were implanted with PIT tags in a NL hatchery (January 2013) and later transferred to a NL marine site (June 2013) was harvested in late 2014. In March 2013, these study fish were randomized to 7 different vaccines; including vaccines for BKD and ISA which have recently been identified at some NL aquaculture sites. After these study fish were transferred to a NL marine site in June 2013, they were monitored by our group in collaboration with NL Department of Fisheries and Aquaculture. Two major sampling events occurred prior to the final harvest event, the first in the fall of 2013 and the second in early summer 2014. Data from this activity is being analyzed and will be shared with collaborators.

The CAHS-developed a decision support system used to monitor fish health and sea lice pest management programs in the Bay of Fundy reached it full deployment milestone with the completion of its implementation to the Atlantic Canada Fish Farmers Association and NB Producers. *Fish iTrends* has now been expanded to include the integration of aquaculture production sites in Newfoundland and Labrador. Researchers continue to develop the platform with enhanced capabilities, and upgrades to supporting software.



The Integrated Sea Lice Monitoring Project in NB has completed its fifth full year of study. The assessment of sea lice (an external crustacean parasite of Atlantic salmon) trends across the New Brunswick aquaculture industry and the effectiveness of chemical bath and alternative treatment options is on-going. Monitoring the effectiveness trends for bath and in-feed treatments is an important function within the *Fish-iTrends* platform and provide important evidence to support decisions on emergency release and eventual registration of chemo-therapeutic and pesticide products for use in the aquaculture industry. CERC-sponsored post-doctoral fellows are analyzing data generated from Fish-iTrends to inform policies for precise sea lice monitoring before and after treatments. They also contribute to the detection of sub-optimal conditions leading to further sea lice burdens at a site or area.

AVC-CAHS continued its program of audits of sea lice prevalence at active finfish production sites for the government of NB and NL in 2014. Results were similar to the 2012 findings, with producers continuing to demonstrate significant commitment to self-management and precise sea lice reporting.

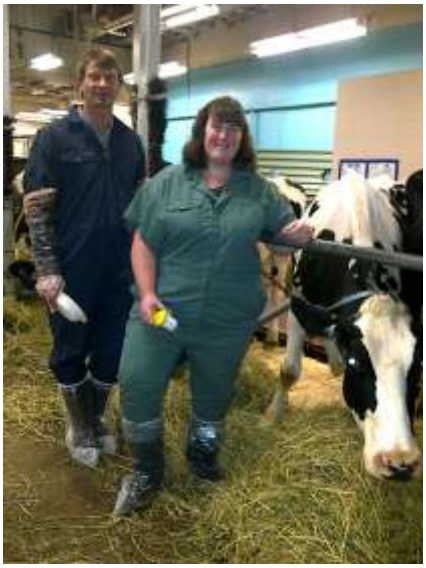
International Efforts

Also in 2014, two pilot studies of mortality in cultured fish species in Vietnam were undertaken by the AVC-CAHS team. These limited-scale projects were undertaken in collaboration with the Canadian Excellence Research Chair in Aquatic Epidemiology and in partnership with the Vietnam government institution Research Institute for Aquaculture No 1 (RIA-1.) in northern Vietnam, and Can Tho University for the southern provinces. The goals of both projects were to describe and quantify patterns of cultured fish mortalities and investigate the associations between mortality and basic production variables in the Vietnamese marine aquaculture environment. Surveys of production variables related to disease introduction risk were completed and daily mortality and growth data are being collected and analyzed through the collaborative efforts of CERC-sponsored post-doctoral fellows and Vietnamese partners. As a result of these successful collaborations in Vietnam, AVC-CAHS was recently selected by

the European Sustainable Trade Initiative (IDH) to partner with the organization and its Vietnamese collaborators to assess the factors associated with increased mortality and reduced productivity on small-hold shrimp farms. Data collected through this study will be hosted on the *Fish iTrends* platform. This field work will begin in May 2015.

2.3. Maritime Quality Milk (MQM) – by Dr. Greg Keefe

Maritime Quality Milk (www.milkquality.ca) is the dairy research and service program of the Atlantic Veterinary College for the Atlantic Canadian provinces. Maritime Quality Milk focuses on milk quality and infectious disease research. By integrating research and service capacity, MQM has become one of the leading dairy health centers in Canada.



This past year has been another successful year for the program. In 2014, the Atlantic Johne's Disease Initiative (AJDI) continued to provide the region with support, in terms of testing, risk management and education, for strategically and cost-efficiently reducing the impact of Johne's disease on the dairy industry. A highlight for the program in 2014 was a two-day communications workshop led by Dr. Cindy Adams from the University of Calgary and attended by 20 regional AJDI certified veterinarians. The funding for the AJDI from 2011 to 2014 was provided by the 4 Atlantic Dairy Boards, the four regional ADAPT Councils (AAFC), and UPEI/AVC/MQM through the Innovation Research Chair program, for a total of 1.2 million dollars. In late 2014, funding was secured that will allow the AJDI program to run for an additional 3 years (2015-2018)

The many ongoing research projects within MQM continue to generate excellent outcomes as a result of the hard work of graduate students and technical staff. Dr. Omid Nekouei, PhD candidate, continues his study of Bovine Leukosis Virus (BLV) and has developed a cost-effective surveillance tool for predicting within-herd prevalence of BLV infection in dairy farms based on a bulk tank milk ELISA results. The research program for BLV is funded by the 3 Maritime Dairy Boards with partner funding by AAFC through ADAPT/CAPP program. Dr. Ibrahim Elsohaby is examining the use of infrared technology to determine the immunoglobulin content of bovine serum. The results of his work are very promising, indicating that the system provides rapid quantification of IgG with good accuracy and high specificity and sensitivity. MQM continues to work on an International collaboration with researchers from Colombia towards improving the quality of the milk produced in that country. High prevalence of *Streptococcus agalactiae* has a significant impact on milk quality in Colombia, and Dr. Julian Reyes, PhD candidate, is continuing his examination of the epidemiology of *S. agalactiae* in Colombian dairy herds.

In 2014, Dr. Emilie Laurin successfully defended herd PhD thesis on cow-level diagnosis of Johne's disease, with focus on MAP shedding patterns and the effects of stage of lactation and season. Dr. Marguerite Cameron also successfully defended her PhD in 2014. Her project validated a non-antibiotic based dry cow therapy protocol. Results of that project demonstrated that cows selectively treated with antibiotics at the end of lactation based on the results of an on-farm culture system had similar post-calving intramammary infection risk and produced the same amount of milk in the subsequent lactation as cows that received blanket antibiotic treatment.

MQM is a partner on 3 Dairy Farmers of Canada/AAFC Dairy Cluster program applications which were initiated in 2013 and have funding in place until 2018. MQM is leading a project on the identification of coagulase negative staphylococci species in bovine milk using Matrix-Assisted Laser Desorption/Ionisation Time-of-Flight Mass Spectrometry. In collaboration with colleagues from Laval, Guelph, and British Columbia, we are working on the validation of a cow comfort assessment tool in the Maritimes. In 2014, we've received a generous research grant from the Sir James Dunn Animal Welfare Centre to broaden the scope of the initial project to include the evaluation of a web-based benchmarking system for motivating dairy producers to achieve meaningful improvements in cow comfort on their farms. MQM is also a core member of the National Dairy Biosurveillance Study which is being led by the University of Guelph.

Following the success of the AJDI program, MQM has developed research proposals as part of a broader Atlantic Healthy Herds initiative. Changes to funding programs have delayed federal funding decisions for the proposals which cover 6 health issues within the Atlantic dairy industry: Johne's disease, BLV, Bovine Viral Diarrhea (BVD), calf health, lameness, and internal parasites. In the interim, MQM has secured alternate funding for BVD and calf health via research grants from Zoetis Canada. A BVD prevalence and diagnostic method validation study was conducted in the Maritimes in 2013 indicating that the disease is quite common in the region. In 2014, MQM received funding from Zoetis Canada to do a neonatal calf health benchmarking study in Nova Scotia and Newfoundland which will be launched in summer 2015.

MQM continues to maintain a web-based graphical analysis program which enables dairy farmers to view their farm's regulatory and payment data, either via computer or smartphone. Our MQM laboratory supports both research and service mandates and maintains USDA-proficiency accreditation for 5 Johne's disease testing methods.

2.4. The Canadian Regulatory Veterinary Epidemiology Network (CRVE-Net) – by Dr. Javier Sanchez

Led by CVER, the Canadian Regulatory Veterinary Epidemiology Network (CRVE-Net) links Canada's five veterinary schools, and contributes to the development of research and training

programs at the five universities. CRVE-Net started in 2009 and was renewed in 2014 for another three-year extension of funding from the Canadian Food Inspection Agency (CFIA) for a total of $450,000. Terms of reference outlining the governance of the network going forward has been created and approved by CFIA.

Six proposals related to "One Health" and zoonotic diseases have been approved for CRVE-Net activities across the five Canadian veterinary schools. CRVE-net is also working very closely with the CERC program to support surveillance and risk modeling activities of interest to CFIA in aquatic epidemiology.

2.5. Sir James Dunn Animal Welfare Centre (SJDAWC) – by Dr. Michael Cockram

The SJDAWC promotes animal welfare through research, service and education. The SJDAWC was successful in obtaining continued funding for the next 5 years from the Sir James Dunn Foundation. There will be a modest increase in project funding, a new webinar series, and a new annual animal welfare graduate student scholarship.

In October 2014, the 10th Annual Animal Welfare in Practice conference was held on mink farming (http://awc.upei.ca/mink-welfare-conference-october-2014). There were presentations on the health and welfare of mink.

A research grant was awarded toVanleeuwen J, Mckenna S, Gitau G and Aleri J. Research and training to improve stall design and management for better cow welfare and productivity on smallholder dairy farms in Kenya. Jacklyn Ellis graduated in May (PhD thesis title "Environmental enrichment to reduce stress in shelter cats"). Dr. Dania Villarnovo also graduated in May (MVSc thesis title "Enhancing animal welfare by potentially improving ease of predicting transfusion reactions in dogs, cats, and horses). In July, Cyril Roy successfully defended his PhD thesis titled "Welfare of horses transported to slaughter in Canada and Iceland: assessment of welfare issues and associated risk factors". Ketan Dulal's graduate student project continues on the transport of broiler chickens.

Cyril Roy presented work on his project on the transport of horses to slaughter at the 6th International Conference on the Assessment of Animal Welfare at Farm and Group Level, , Clermont-Ferrand, France.

Further details on all activities (including graduate students, publications and presentations) can be found at http://awc.upei.ca/files/awc/2014%20SJDAWC%20Ann%20Rpt.pdf

2.6. Shellfish Research Group (SRG) – by Dr. Jeff Davidson

In 2014, the Shellfish Research Group initiated and completed a number of research projects including: investigating decreased mussel productivity on PEI mussel farms during the autumn; the evaluation of New Zealand continuous socking and seed collection technology; identifying critical ecological thresholds for tunicate infestations on mussel farms; determination of *Crytosporidium spp.* oocysts in the Hillsborough River PEI; Irish moss – green crab interactions in Basin Head MPA; the impact of the non-native green crabs (*Carcinus maenas*) on the susceptibility of eelgrass (*Zostera manna*) to wasting disease; causes of the decreased abundance and quality of *Crassostrea virginica* in the Hillsborough Bay system; the development of testing procedures for Norovirus and Hepatitis A; an investigation into the decline of oyster production in the Hillsborough Bay; the characterization of shellfish movements in Prince Edward Island for risk simulation models; and assessing the fishing potential and nutritional value of the European green crab in PEI.

2.7. Smallholder Dairy Research Group (SDRG) – by Dr. John VanLeeuwen

The Smallholder Dairy Research Group has a dairy research, teaching and service program involving graduate students in epidemiology, veterinarians, veterinary students and other animal health professionals, and smallholder dairy farmers. The program has been a result of partnerships among Nairobi and CVER faculty members and students, two Canadian non-governmental organizations (Farmers Helping Farmers, and Veterinarians without Borders-Canada), and dairy farmer groups primarily in Kenya. University collaborators have also included faculty members from Dalhousie, Saskatoon, and Ryerson in Canada, and Egerton in Kenya. Research topics have investigated methods of enhancing milk productivity (through infectious disease control and dairy health management), and how dairy farming and higher milk production have improved sustainable livelihoods and quality of life.

The past year has again been a very successful one for the group. A trip to Kenya in winter achieved its objectives of teaching dairy health management to Canadian and Kenyan animal health professionals and smallholder dairy farmers. The trip was also utilized to check up on research project analyses and reports, and to disseminate research findings for knowledge transfer.

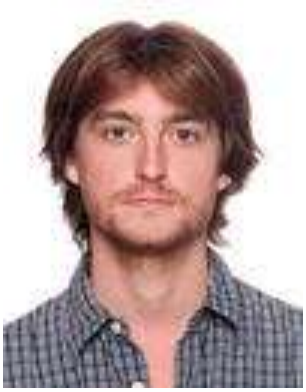
Research Team: Priscilla Kariuki, Shauna Richards, Nancy Brochu, Anika Mueller, Ephraim Mutahi on farm

A second trip to Kenya in summer completed phase three of randomized controlled trial studies on post-partum cow nutritional enhancement and neonatal calf nutritional enhancement involving 110 farms. The trip also began phase one of a randomized controlled trial study on cow comfort through improved stall design and management. A team of 3 Canadians and 2 Kenyans implemented these studies on farms, along with supervision from Drs. John VanLeeuwen, Shawn McKenna, Jeff Wichtel, Collins Kamunde, Fabienne Uehlinger (now at U of Saskatoon) and George Gitau (U Nairobi).

There are four other ongoing research projects among Kenyan smallholder dairy farms: 1) an observational study on the incidence rate of subclinical mastitis in post-partum cows; 2) an observational study on the incidence risks of infections with various neonatal calf diarrhea pathogens, along with how nutrition influenced the incidence and severity of the diarrhea and mastitis; 3) an observational study on cow comfort management and productivity/mastitis outcomes; and 4) a cohort study on infectious causes and risk factors of bovine abortion, and a case-control study on factors of bovine tuberculosis. There are currently 4 Kenyan graduate students and one Canadian graduate student working on these Kenyan projects.

The Smallholder Dairy Research Group has expanded its efforts and impacts into Ethiopia through a project conducted by Drs. Crawford Revie and John VanLeeuwen. Funded by the International Development Research Centre of Canada, the project is evaluating a smartphone app "VetAfrica" to improve diagnosis, treatment, and syndromic surveillance of 15 common cattle diseases in Ethiopia. Universities of Addis Ababa and Dalhousie, Vets without Borders Canada, and Cojengo Ltd. are partners on the project.

3. New People



Dr. Raph Vanderstichel began his veterinary career in a mixed-animal practice in England. His interest in research prompted him to return in 2007 to the Atlantic Veterinary College to pursue a PhD applying epidemiology to optimize the use of deworming to reduce costs while increasing milk production in dairy cattle. In 2011 he became a Research Associate in Health Management working in conjunction with CFIA to develop statistical models to establish freedom from disease in Canadian swine and increase foreign trade. Raph's main areas of professional interests are disease surveillance and spatial epidemiology as applied to production animals, wildlife and more recently, aquatic species. Since 2014, Raph has been a Research Scientist in the Canada Excellence Research Chair team lead by Dr. Ian Gardner, working on surveillance and transmission of pathogens affecting the aquaculture and shellfish industries. Applying his experience of veterinary medicine and spatial epidemiology, Raph has developed an extensive network of collaborations in the fields of aquatic epidemiology, wildlife health, and disease surveillance. A long time CVER associate member, Raph has taught workshops on spatial epidemiology with an emphasis on the utilization of open-source software in North America, Asia and Latin America and participates in the supervision of graduate students and post-docs. Welcome Raph!

Working under the CVER umbrella, Drs. Marguerite Cameron and Carrie Lavers started post docs with Dr. Greg Keefe and Maritime Quality Milk, after successfully completing their PhD programs at AVC in 2014. Marguerite graduated with her vet degree from AVC in 2007 and worked in mixed animal practice for two years in western PEI. She returned to the AVC in 2009 where she completed a residency in food animal production medicine in Farm Service while completing her PhD. Carrie graduated with her vet degree from AVC in 2002, and worked in private practice in Saskatchewan and PEI for 7 years prior to starting her PhD in 2009.

4. Special Guests

CVER was very delighted to welcome back Dr. Ana Alba Casals, a Doctoral Research Fellow from Spain in 2014. Dr. Casals works as a Veterinary Epidemiologist in Spain, and has a special interest in designing surveillance and contingency plans, health information systems, epidemiological data analysis, epidemiological training, and geographical information systems applied to animal health of different species, including livestock, wildlife, horses, and companion animals.

Dr. Ester Bartolomé Medina, Department of Agro-forestry Sciences, University of Seville, Spain was a visiting post-doctoral worker in June and July.

5. Awards and Recognition

Dr. Ian Gardner was presented with a Presidential Recognition Award of Merit for Scholarly Endeavours in May 2014 from Dr. Alaa Abd-El-Aziz, President and Vice-Chancellor of UPEI.

Dr. John VanLeeuwen was awarded a large 4-year research and training grant ($500,000) from the Community Foundations of Canada. The program is a partnership with Farmers Helping Farmers, University of Nairobi, Kenyatta University and Naari Dairy Group in Kenya. Dr. Jeff Wichtel is a co-investigator on the award.

6. Graduate Program Highlights

In 2014, three CVER students successfully defended their PhDs:

Dr. Adel Alghafghuf completed his PhD under the supervision of Dr. Henrik Stryhn. His thesis was titled “Semiparametric hierarchical proportional hazards models with applications to animal health data.”

Dr. Maggie Cameron completed her PhD under the supervision of Dr. Greg Keefe. Her thesis was titled “Evaluation of a 3m Petrifilm On-Farm Milk Culture System For Use in Selective Dry Cow Therapy.”

Dr. Emilie Laurin completed her PhD under the supervision of Dr. Greg Keefe. Her thesis was titled "Study of shedding patterns of *Mycobacterium avium* subspecies *paratuberculosis* in feces, milk, and colostrum of dairy cows and the development of novel early detection methods for Johne's Disease."

CVER would also like to congratulate Drs. Shauna Richards, Karen MacDonald-Phillips and Omid Nekouei on passing their comprehensive exams for their PhD candidacies.

At the 2014 Graduate Studies and Research Days, a number of CVER students received awards. They included:

- G. Murray and Hazel Hagerman Scholarship - Shauna Richards
- The Zoetis Graduate Student Award - Shauna Richards
- Dr. E. Errol Hancock Scholarship - Shauna Richards
- The John and Carol MacLeod Award for Research Communication Excellence - Matthew Saab

A number of CVER students also won awards for their presentations at the GSR Days. They included:

- Gold Prize - Emilie Laurin in Section Three
- Silver Prize - Shauna Richards in Section Three
- Bronze Prize - Julian Reyes-Velez in Section Three
- Bronze Prize - Matthew Saab in Section One

Congratulations to Babafela Awosile who was awarded a scholarship to pursue the Integrated Training Program in Infectious Diseases, Food Safety and Public Policy (ITraP), funded by the Natural Scie

The Dr. Ian Dohoo award, which was initiated in 2012, is granted to a student currently registered in the graduate Epidemiology/Health Management discipline at the AVC. The award will help with travel expenses for the recipient's work at national or international conferences and was awarded to Emilie Laurin in 2014.

During 2014, CVER had 23 graduate students, 17 enrolled in their Phd and 6 students working toward their MSc.

7. Outreach - Some examples of these key initiatives are as follows.

Epi-on-the Island

CVER hosted its annual Epi-on-the-Island courses in June at the AVC. The popular courses had participants from Chile, Iran, Scotland, Nepal, Ireland, Spain, Columbia, Thailand, the USA, and even Saudi Arabia. The courses included "Bias in Observational Studies" – a 3 day course instructed by CVER's Drs. Ian Dohoo and Henrik Stryhn, and "Bioinformatics for veterinary epidemiologists – from gene sequence to surveillance" - a 3 day course instructed by Drs. Peter Durr and Kim Halpin both of the Australian Animal Health Laboratory.

In between the Epi-on-the-Island courses, CVER also hosted the annual meeting of the Canadian Association of Veterinary Epidemiology and Preventive Medicine. The theme for this year's CAVEPM meeting was "*Observational studies in the era of bioinformatics" and c*onsisted of a series of 36 scientific oral paper presentations and 10 poster presentations. Drs. Simon Dufour, Stefan Widgren and Peter Durr were the plenary speakers for the event.

International Teaching

Dr. Ian Dohoo, who retired in 2012 but who retains an affiliation with CVER, continues to be active in teaching and research. During 2014 he taught (or co-taught) courses in PEI, New Zealand, Estonia and Kenya, and continued his participation in a large sea lice meta-analysis project in Norway, and a project involved in evaluating the use of multiple imputation for dairy data in Sweden.

Dr. Crawford Revie was invited to make the keynote address to the 2014 Society of Veterinary Epidemiology and Preventative Medicine (SVEPM) Conference in Ghent, Belgium. He chose as his topic, *Hype and Hysteria: Should veterinary epidemiologists really care about Big Data?*"

8. Peer-Reviewed Journal Publications

1. A. Seigneur, S. Hou, R. A. Shaw, **J. T. McClure**, H. Gelens, and C. B. Riley. Use of Fourier-transform infrared spectroscopy to quantify Immunoglobulin G concentration in canine serum. *Vet Immunology Immunopathology*, 2015 Jan 15; 163(1-2):8-15. doi:10.1016/j.vetimm.2014.10.011
2. Anderson A., Shwiff S.A., Chipman R., Atwood T., Blanton J., Borse B., Cozzens T., Fillo F., Hale R., Maki J., Recuenco S., Rhodes G., Rees E., Rupprecht C., Tinline R., Vercauteren K., and Slate D. (2014). Forecasting the spread of raccoon rabies using a purpose-specific group decision-making process. Human-Wildlife Interactions. 8(1)
3. Arriagada G., Stryhn H., Campistó J-L., Rees E.E., Sanchez J., Ibarra R., Medina M. and St-Hilaire S. (2014) Evaluation of the performance of pyrethroids on different life stages of Caligus rogercresseyi in southern Chile. Aquaculture. 426-427:231-237.
4. Bundi RM*, Gitau GK, Mulei C, **VanLeeuwen JA.** Mastitogenic bacteria isolated from dairy cows in Kenya and their antimicrobial sensitivity. J *S Afric Vet Assoc* 2014; 85(1):1-8. http:// dx.doi.org/10.4102/jsava. v85i1.950.
5. Burns J, Hou S, Riley CB, Shaw RA, Jewett N, **McClure JT**. Use of Fourier-Transform Infrared Spectroscopy to Quantify Immunoglobulin G Concentrations in Alpaca Serum. *J Vet Intern Med*, 28:639-645, 2014.
6. Cameron M, McKenna SL, MacDonald KA, Dohoo IR, Roy JP, Keefe GP. 2014. Evaluation of selective dry cow treatment following on-farm culture: Risk of post-calving intramammary infection and clinical mastitis in the subsequent lactation. J Dairy Sci. Jan;97(1):270-84.
7. Cox R, McIntyre KM, Sanchez J, Setskorn C, Baylis M, Revie C. Comparison of the *h* - Index Scores Among Pathogens Identified as Emerging Hazards in North America. Transboundary and Emerging Diseases n/a–n/a. doi:10.1111/tbed.12221.
8. DÓREA, F.C., LINDBERG, A., REVIE C W., SANCHEZ, J. Syndromic surveillance using aboratory test requests: a practical guide informed by experience with two systems. Preventive Veterinary Medicine , doi:10.1016/j.prevetmed.2014.04.001.
9. DORJEE, S., REVIE, C.W., POLJAK, Z., MCNAB, B.W., SANCHEZ, J. One-Health Simulation Modelling: A Case Study of Influenza Spread between Human and Swine populations using NAADSM Transboundary and Emerging Diseases. doi:10.1111/tbed.1221.
10. Dorjee S, Sanchez J, Poljak Z, McNab WB, **McClure JT,** , Revie C. One-Health Simulation Modelling: Assessment of Control Strategies against the Spread of Influenza between Swine and Human Populations using NAADSM. *Transboundary and Emerging Diseases*. Article first published online: 15 SEP 2014 | DOI: 10.1111/tbed.12260.
11. Drolet D., Locke A., Lewis M.A., Davidson J. (2014) User-friendly and evidence-based tool to evaluate probability of eradication of aquatic non-indigenous species. Journal of Applied Ecology, doi: 10.1111/1365-2664.12263.
12. Ellington E.H., Bastille-Rousseau G., Austin C., Landolt K., Pond B.A., Rees E.E., Robar N., and Murray D.L. Using multiple imputation to estimate missing data in meta-analysis. 2014. Methods in Ecology and Evolution. DOI: 10.1111/2041-210X.12322.

13. Elsohaby I, Riley CB, Hou S, **McClure JT**, Shaw RA, and Keefe GP. Measurement of serum immunoglobulin G in dairy cattle using Fourier-transform infrared spectroscopy: A reagent free approach. *Veterinary J*, 2014 Dec; *202(3)*,510-515; 2014. http://dx.doi.org/10.1016/j.tvjl.2014.09.014
14. FALZON L*, MENZIES P, SHAKYA K, JONES-BITTON A, **VANLEEUWEN JA,** AVULA J, JANSEN J, PEREGRINE A. Pilot project to investigate over-wintering of free-living gastrointestinal nematode larvae of sheep, in Ontario, Canada. *Canadian Veterinary Journal* 2014;55(8):749-56.
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