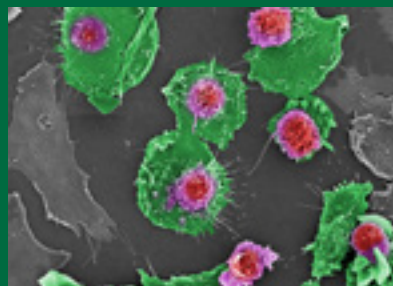
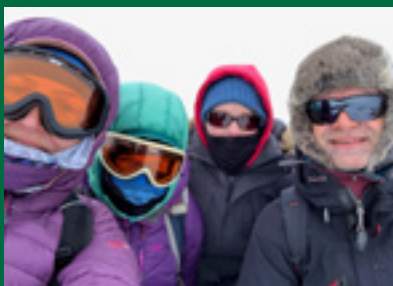
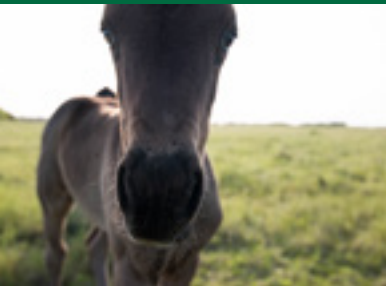




UNIVERSITY OF SASKATCHEWAN
**Western College of
Veterinary Medicine**
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WCVM Focus on Research | 2019-2020

Research and Graduate Studies

BE WHAT THE WORLD NEEDS

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Message from the Associate Dean, Research and Graduate Studies



Dr. Elisabeth Snead

Welcome to the first biennial report from the WCVM Research and Graduate Studies Office. When I began this role more than four and a half years ago, I never would have imagined that a global pandemic would lead to a province-wide shutdown.

COVID-19 has certainly made it challenging to conduct research, but I commend all of my WCVM colleagues who admirably met this trial head on and were “chomping at the bit” to safely resume their work by May 2020.

As directed by the Government of Saskatchewan, the University of Saskatchewan (USask) and the WCVM dramatically reduced its research activities in March 2020. Only COVID-19-related research or projects considered otherwise essential (such as ongoing research involving animals, surveillance and diagnostic-related research, or maintenance of critical cell cultures) were allowed to continue.

In May, USask allowed seasonal field research off campus to start with outdoor work deemed low risk. Next, prioritized

research in Stage 2 — studies involving graduate students at critical stages of their programs, time-sensitive seasonal field research, research where funding extensions were not possible, research programs for new faculty or where data was needed for large grant applications — was allowed to begin in June. In July, Stage 3 applications were allowed to continue. The studies included research that was less time sensitive and research involving graduate students early in their programs. All researchers developed COVID-19-related plans to ensure safety of personnel.

Our annual undergraduate research program went ahead in 2020, but most projects were converted to remote offerings such as surveys, retrospectives, data analysis and image analysis. For a few lucky students, animal-related projects were allowed to proceed with COVID-19 protocols in place.

During my tenure, I have produced many reports including an accreditation report for the American Veterinary Medical Association (AVMA) Council on Education and WCVM Advisory Board annual reports. We also concluded a report by our Research Task Force and created a Strategic Plan for the WCVM research program. Much of the data we have gathered over the last four years has been shared in these reports, but with this report, our goal is to provide a more frequent and more visual snapshot in time so we can celebrate our successes and identify opportunities for improvement.

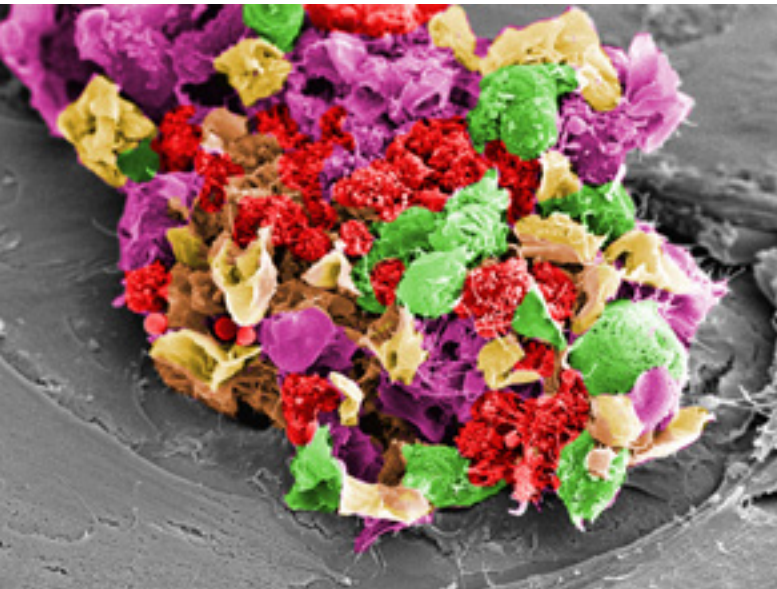
This report has been possible due to the contributions of so many. To our faculty and graduate students — thank you for your endless curiosity and your tireless efforts. To all of the technicians and managers who work in the college’s various research labs and units — thank you for your hard work and leadership. Thank you to Kevin Driscoll and Jaime Provo, our research office’s personnel, for their constant support. As well, thank you to all of our departments’ administrative assistants who help to gather the required data each year.

Without all of your combined efforts, this report would not be possible — thank you.

Dr. Elisabeth Snead
BSc, DVM, MSc, Diplomate ACVIM

USask is on Treaty 6 Territory and the Homeland of the Métis. We pay our respect to the First Nations and Métis ancestors of this place and reaffirm our relationship with one another.

Vision for the WCVM Research Program



The Western College of Veterinary Medicine (WCVM) strives to be a national and world leader in research related to the health and welfare of livestock, companion animals and wildlife. The college's involvement in multi-disciplinary and collaborative research leads to the creation of new knowledge that helps prevent and treat diseases in animals. These findings have a meaningful impact on public health, food safety, environmental stewardship and sustainability, and they are in accordance with our veterinary oath.



Build research capacity

- Leverage innovative funding opportunities to grow and maintain a rich educational and physical environment that supports research excellence and high-quality trainee experiences.

Grow Indigenous engagement

- Engage in research and increase awareness related to biotic and abiotic factors that contribute to wellness in northern and Indigenous communities.

Advance primary research areas

- Increase research intensity in the WCVM's primary research areas.

Enhance collaboration

- Nurture and grow a culture of collaboration that embraces participation and leadership in multidisciplinary research, highly qualified personnel (HQP) exchange programs, and national and international team science.

Support researchers

- Provide support, mentorship and development for trainees, research professionals and faculty throughout all stages of their careers.



Research themes

WCVM researchers are making internationally significant discoveries in a range of areas including basic and applied sciences, clinical sciences, comparative medicine, food safety, toxicology, public health and environmental health.

Animal health and management: Spanning a diverse range of species, animal health and management is a major research focus at the WCVM. We study everything from animal behaviour and reproductive biology to fine tuning surgical techniques in small and large animals. Our researchers are striving to gain a better understanding of infectious diseases — including illnesses that can be spread from animals to humans. They're also adding to the world's knowledge of antimicrobial resistance and how veterinary medicine can contribute to solutions in this critical area.

One Health interdisciplinary approach: Researchers at the WCVM are crossing the traditional boundaries of disciplines to create knowledge that will benefit humans and animals as well as the environments they inhabit. This includes investigations into infectious and zoonotic diseases, vaccinations, antimicrobial resistance, genetics and disease surveillance. It also encompasses studies using animal models to better understand environmental contamination or human diseases.

Basic sciences and biomedical research: By applying careful, experimental approaches to understanding the cause, prevention and treatment of diseases, WCVM scientists are conducting a range of work that spans whole animal investigations to research at the cellular and molecular levels. They're also adding to our knowledge of various species by asking questions about life processes and disease. By including animals in biomedical research, scientists can answer questions and develop new medical treatments that benefit both animals and people.

From bees to bison

The WCVM's numerous funded research activities cover numerous disciplines and species. The college's research program also covers areas including basic and applied sciences, clinical sciences, comparative medicine, food safety, toxicology, public health, environmental health and other aspects of One Health.

Our departments and their research

Large Animal Clinical Sciences: Faculty research interests include antimicrobial resistance, beef cattle health, swine medicine and production management, animal ethology and welfare, theriogenology, epidemiology/public health, specialized livestock, immunology, infectious disease, nutrition, pharmacology, dentistry, equine rehabilitation and various aspects of equine internal medicine.

Small Animal Clinical Sciences: The department has an active research program in companion animals and wildlife species. Several faculty are involved in collaborative research teams in the WCVM, on the USask campus and with the Saskatoon Cancer Agency. WCVM faculty are making valuable One Health contributions to veterinary medicine and human medicine through their involvement in research teams that are exploring topics in dentistry, oncology, ophthalmology, advanced medical imaging and physiotherapy. In addition, there is an active focus of faculty conducting research in the field of veterinary medical education.

Veterinary Biomedical Sciences: Research programs range across disciplines and systems, with notable collaborative strengths in reproductive biology, toxicology, fish biology and physiology. Faculty members in the department have well-established, well-funded research programs and supervise graduate students, research associates and visiting scientists to sustain and enhance their research.

Veterinary Microbiology: Research programs span the spectrum from examining fundamental problems in microbiology and cell biology to finding solutions for specific diseases and addressing complex problems of emerging infectious diseases at the human-animal interface. Adjunct faculty members provide connections to associated organizations such as the Vaccine and Infectious Disease Organization (VIDO), Canadian Food Inspection Agency (CFIA) and Agriculture and Agri-Food Canada (AAFC). The department's research directly addresses the USask signature areas in One Health, Agriculture and Indigenous peoples.

Veterinary Pathology: Research interests include diagnostic pathology, pathogenesis of infectious disease in poultry and mammals, mucosal immunity, innate immunity and disease resistance, viral oncogenesis, hematologic disorders and wildlife diseases.



Our Research Chairs

As part of our ongoing mission to demonstrate a commitment to strong research output, the WCVM has worked to establish research chairs across its disciplines. The WCVM currently has six research chairs who are leading research in vital areas.



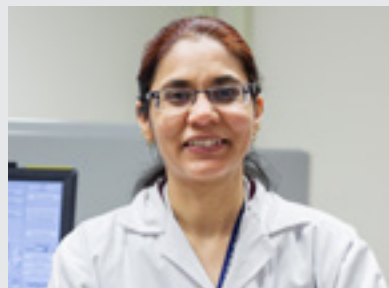
Dr. Cheryl Waldner
NSERC-BCRC Senior Industrial Research Chair in One Health and Production-Limiting Diseases



Dr. Yolande Seddon
NSERC Industrial Research Chair in Swine Welfare



Dr. Murray Jelinski
Alberta Chair in Beef Cattle Health and Production Management



Dr. Gurpreet Aulakh
Fedoruk Chair in Imaging Science



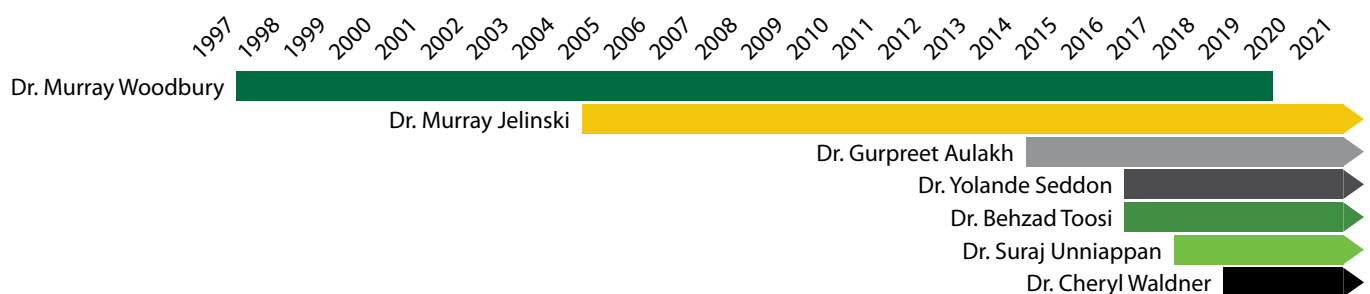
Dr. Behzad Toosi
Allard Research Chair in Oncology



Dr. Suraj Unniappan
USask Centennial Enhancement Chair in Comparative Endocrinology



Dr. Murray Woodbury
(Retired)
Canada-Saskatchewan Agri-Food Innovation Fund Chair in Specialized Livestock Research



Recent Research Highlights

A selection of research-related news briefs from 2019-20

For more WCVM research news, visit *WCVM Today* (wcvmtoday.usask.ca)



In July 2019, a multidisciplinary team led by WCVM professor Dr. Cheryl Waldner and Dr. Simon Otto of the University of Alberta School of Public Health secured more than **\$5.6 million** in funding for a large, multi-year project that could radically change diagnostic testing for livestock producers and greatly improve the use of antimicrobials (antibiotic drugs) to treat bacterial infections in cattle, swine, poultry and other food animals. Genome Canada is contributing \$2.5 million to the project. Additional partners include the Governments of Saskatchewan, Genome Alberta, Agriculture and Agri-Food Canada, and the Canadian beef industry.

In July 2019, Dr. Michael Wu, an assistant professor in the Department of Veterinary Biomedical Sciences, was awarded a Saskatchewan Health Research Foundation (SHRF) Establishment Grant worth **\$120,000** to kick-start his research in advancing knowledge of toxicity mechanisms of heavy metals. This research has a direct impact on the health of Saskatchewan residents and will help to inform policy-makers in their decisions about mining development in the province.

In January 2020, WCVM researcher Dr. Cheryl Waldner was appointed as the new NSERC/BCRC Senior Industrial Research Chair in One Health and Production-Limiting

Diseases. The Natural Sciences and Engineering Research Council of Canada (NSERC), the Beef Cattle Research Council (BCRC) and USask have provided **\$2.35 million** in support for this chair that targets improved health and productivity in beef cattle herds.

In February 2020, WCVM veterinary pathologist Dr. Elemir Simko was awarded **\$110,000** from Mitacs towards an Accelerate postdoctoral internship for Dr. Mohsen Sharafi. The overall goal of this study is to perform American foulbrood (AFB) disease surveillance in Saskatchewan and to develop risk assessment parameters for AFB outbreaks. This infectious disease results in high mortality of honey bees. Simko has had considerable success with student and postdoctoral fellow funding from Mitacs for his honey bee health research program.

In March 2020, WCVM professor Dr. Jaswant Singh was awarded **\$113,345** from the Sylvia Fedoruk Canadian Centre for Nuclear Innovation to optimize the PET-CT diagnostic procedures for companion animal imaging and to evaluate the benefits of PET-CT imaging in two companion animal models of cancer and infectious disease.



In winter-spring 2020, WCVM researchers Drs. Darryl Falzarano and Volker Gerdts, along with the Vaccine and Infectious Disease Organization (VIDO), received numerous federal and provincial grants in support of their team's work to develop a vaccine for the SARS-CoV-2 virus that causes COVID-19.

In May 2020, postdoctoral research fellow Dr. Emilio Velez received a prestigious postdoctoral fellowship through the Canadian Institutes of Health Research (CIHR). The CIHR fellowship provided Velez with a **\$45,000** stipend and a **\$5,000** research allowance over one year. Velez, who was part of Dr. Suraj Unniappan's Laboratory of Integrative Neuroendocrinology, was working to determine whether two recently identified bioactive peptides — nesfatin-1 and nesfatin-1-like peptide — are involved in the regulation of growth in mammals.

In May 2020, WCVM associate professor Dr. Tasha Epp received **\$295,000** from the Public Health Agency of Canada's Infectious Disease and Climate Change Fund for her research. Her project focuses on companion animal surveillance to assess human health risks in Western Canada.

In June 2020, WCVM virologist Dr. Kristen Conn received **\$120,000** from SHRF in support of her work targeting a herpes virus protein for new antiviral drugs.

In June 2020, four WCVM faculty members — Drs. Matheus Costa, Dinesh Dadarwal, Dylan Olver and Heather Wilson — were awarded **\$647,500** in financial support through the NSERC Discovery Grants Program, which supports ongoing programs of research with long-term goals. Three of the researchers (Dadarwal, Olver and Costa) also received an additional **\$12,500** through the federal agency's Early Career Researchers Supplemental Funds program.

In August 2020, WCVM scientist Dr. Matthew Loewen was awarded **\$437,310** from the NSERC Alliance Grants program for his project, "Application of genetic code expansion for development of biocatalysts to enable value-added bioprocessing." Loewen also collected an additional **\$225,280** in industrial cash contributions to support his team's research.

In August 2020, WCVM researcher Dr. Michael Wu was awarded **\$154,000** in funding from the Canada Foundation for Innovation's (CFI) John R. Evans Leaders Fund. Wu is developing an automated high content analysis and high content screening platform (HCA-HTS). This platform will be used to study the toxicity of environmental chemicals such as pesticides and search for therapeutic compounds that can enhance biological resistance toward chemical stress. Co-applicant, Dr. Robert Laprairie of the USask College of Pharmacy and Nutrition, will apply this new HCA-HTS system to improve knowledge of the biological effects of cannabis and to advance the development of future cannabinoid-based medicine. Wu also received **\$80,000** from Innovation Saskatchewan, **\$27,463** from Kanata Earth Genetics, **\$27,464** from the WCVM, and **\$5,000** from the USask College of Pharmacy and Nutrition.

In October 2020, WCVM researcher Dr. Cheryl Waldner received an NSERC Alliance Grant examining antimicrobial use and resistance in cow-calf herds. She was awarded **\$266,039** from NSERC as well as receiving **\$160,461** from her industrial partners.

In November 2020, WCVM professor Dr. Karen Machin was awarded **\$99,000** from Environment and Climate Change Canada to investigate the interactions among climate, contaminant exposure, stress, infection and survival in migratory waterfowl, as well as examining how future

scenarios of climate change — such as a warmer and drier climate in the Canadian Prairies in autumn or a warming Arctic climate — will affect the prevalence, distribution and impacts of infectious diseases in migratory waterfowl.

In October-November 2020, WCVM researcher Dr. Emily Jenkins received dual success for her work examining the potential for wildlife to act as a store for the SARS-CoV-2 virus. Jenkins received **\$100,000** from Environment and Climate Change Canada for her project, “Surveillance of potential wildlife and domestic animal reservoirs for SARS-CoV-2 in relation to COVID-19.” A **\$60,000** Mitacs Accelerate Fellowship was awarded to her postdoctoral fellow, Dr. Pratap Kafle, for their project, “Surveillance of potential wildlife and domestic animal reservoirs for SARS-CoV-2.”

In November 2020, the CFI confirmed funding of **\$6,765,155** in support of “Integrated ‘omics for sustainable animal agriculture and environmental stewardship (IntegrOmics),” a \$17-million project led by WCVM professor Dr. Gregg Adams. The multi-year project will work to conserve indigenous Canadian species through the creation of a bison genome biobank and to enhance the productivity and sustainability of commercial livestock for meat quality, animal health and food safety.



VIDO AT CORE OF CORONAVIRUS RESEARCH

As the world struggled to deal with the COVID-19 pandemic in 2020, the coronavirus quickly became a top priority for researchers at the Vaccine and Infectious Disease Organization (VIDO).

Based at the University of Saskatchewan (USask), VIDO has been at the forefront of Canada’s response to the COVID-19 pandemic — thanks to its 45 years of expertise in basic and applied research, along with its history of vaccine commercialization. VIDO was the first in Canada to isolate SARS-CoV-2, the first in Canada to develop a disease animal model, and the first Canadian university organization to have a COVID-19 vaccine in clinical trials.

In April 2021, the Government of Canada announced an additional \$59.2 million in funding to support the development of VIDO’s vaccine candidates and the expansion of its research facilities, including a National Centre for Pandemic Research.

The federal dollars are in addition to commitments made by the provincial government (\$15 million), City of Saskatoon (\$250,000), Saskatchewan Blue Cross (\$150,000) and private donors. The new centre will expand VIDO’s research capacity and help strengthen Canada’s response to emerging infectious diseases including future pandemics.

Part of the new funding will support new animal housing. In addition, VIDO is looking to upgrade areas of its containment level 3-agriculture facility to biosafety level 4. This upgrade will significantly increase Canada’s capacity for research and vaccine development on all infectious diseases. Construction will be completed over the next three years.

Disease Surveillance Programs

As a long-time member of Canada's animal health, public health, and food safety networks, the WCVM is leading large-scale disease surveillance initiatives and is part of collaborative surveillance efforts across the country.

The **WCVM Disease Investigation Unit (DIU)** is a long-established unit in the WCVM's Department of Large Animal Clinical Sciences. Supported by long-term funding from the Saskatchewan Ministry of Agriculture, the unit supports private veterinary practitioners in addressing complex and unusual animal health situations. It also enables the livestock industry to respond early and to reduce the economic impact of possible foreign animal disease incursions, emerging livestock disease or food safety crises.

The **Canadian Wildlife Health Cooperative (CWHC)** is a partnership linking Canada's five veterinary colleges and the Province of British Columbia's Animal Health Centre. The CWHC team provides a Canada-wide perspective on wildlife health while simultaneously helping to identify and assess emerging problems at a local level. White-nose syndrome, avian influenza, chronic wasting disease, West Nile virus and bovine tuberculosis are examples of wildlife-based diseases that are under surveillance through CWHC teams.

Western Canadian Animal Health Network (WeCAHN): Established in 2019, WeCAHN is an alliance between the four western provinces. Its mission is to provide regional leadership in animal health and welfare surveillance to veterinarians, livestock producers, animal owners and policy-makers about animal health concerns in Western Canada. Prairie Diagnostic Services (PDS), Saskatchewan's provincial veterinary diagnostic laboratory, and government partners in Saskatchewan are leading the development of this western network.

Saskatchewan tick surveillance: WCVM researchers Drs. Emily Jenkins and Maarten Voordouw are co-ordinating the passive tick surveillance program in Saskatchewan. The Saskatchewan Ministry of Health, USask and the Roy Romanow Provincial Laboratory (RRPL) have been involved in passive tick surveillance since 2008. In the past, the public could mail in ticks that they found on themselves or their pets to USask or the RRPL. In 2020, the group switched to eTick (etick.ca) as an online tool for managing passive tick surveillance in Saskatchewan and providing the public with more timely information.

The **Canadian Cow-Calf Surveillance Network** is a long-term surveillance network with the goal of creating an animal health surveillance network for the cow-calf industry in Canada. This network, which is led by WCVM researchers Drs. John Campbell and Cheryl Waldner, is a continuation of a previous Western Canadian Cow-Calf Surveillance Network project at USask. The network involves more than 150 cattle herds from across Canada and includes numerous researchers and veterinarians who are collaborating on the project.

The **Companion Animal Surveillance Initiative** aims to identify pathogens among dogs, cats and possibly other pets. Led by WCVM researcher Dr. Tasha Epp and graduate student Dr. Erica Sims, the project grew from an interest in how companion animal health concerns relate to potential public health incidents. Once the initiative is fully developed, participating western Canadian veterinary clinics can access an online portal to report cases of disease, fill in quarterly surveys and obtain feedback on detected trends.



RESEARCH PROGRESS

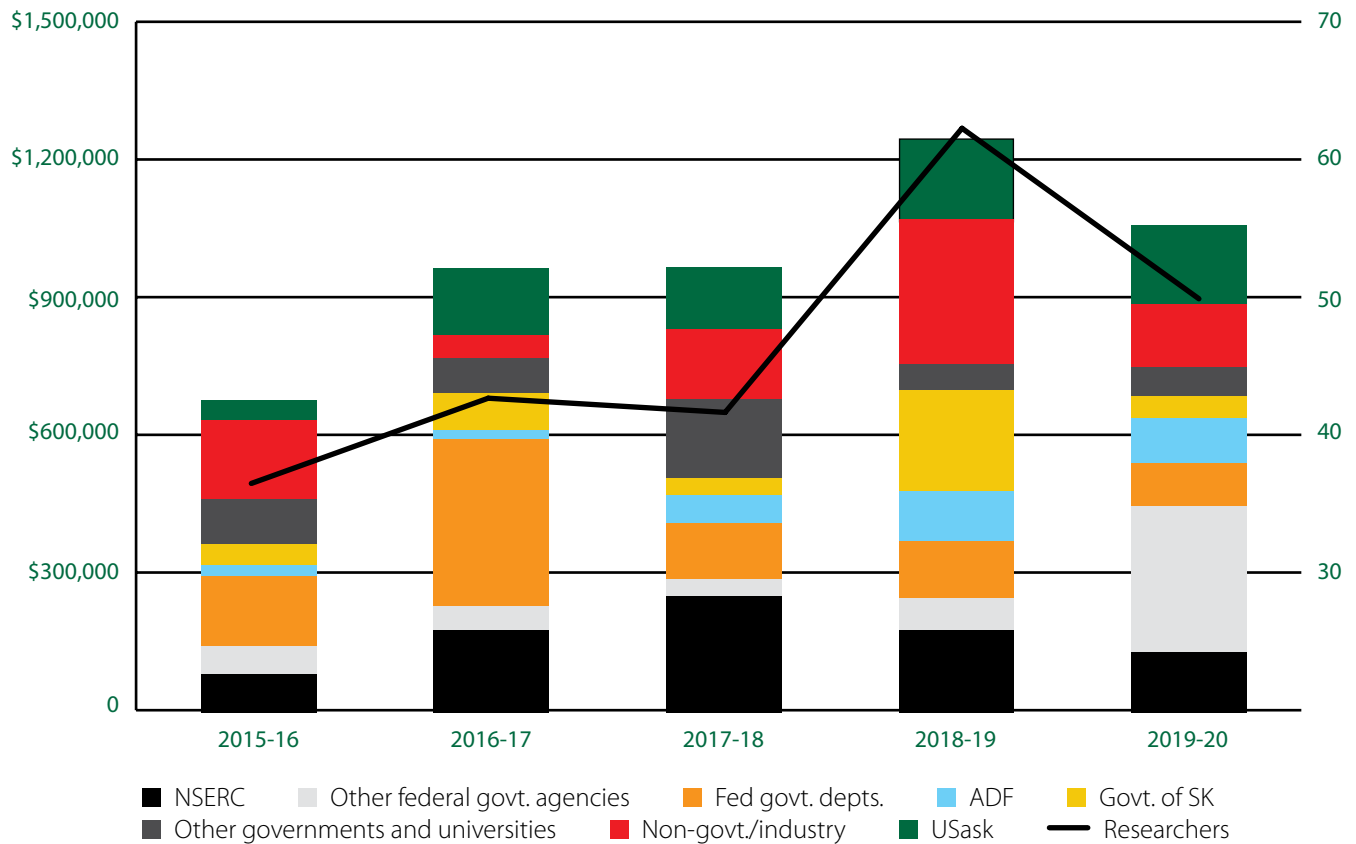
From 2015-16 to 2019-20, the following researchers and research groups received a total of 42 grants and research partnerships with values of \$250,000 or more.

Name	Year	Source	Amount
Dr. Gregg Adams	2017-18	NSERC – Discovery Grant	\$285,000
Dr. Trent Bollinger	2018-19	SK Ministry of Agriculture	\$360,000
Dr. John Campbell	2018-19	SK Ministry of Agriculture	\$300,000
	2018-19	SK Ministry of Agriculture	\$500,000
	2018-19	SK Agriculture Development Fund	\$348,000
Dr. Maud Ferrari	2016-17	NSERC – Discovery Grant and Accelerator Supplement	\$360,000
	2018-19	NSERC – E.W.R. Stacie Fellowship	\$430,000
Dr. Susantha Gomis	2015-16	Western Economic Diversification Canada	\$400,000
	2015-16	NSERC – Collaborative Research and Development Grant	\$273,000
	2017-18	NSERC – Collaborative Research and Development Grant	\$340,000
	2018-19	Canadian Poultry Research Council	\$690,000
Dr. John Harding	2015-16	PigGen Canada	\$954,013
	2016-17	Genome Prairie	\$250,000
	2017-18	SK Agriculture Development Fund	\$250,000
	2017-18	AB Ministry of Agriculture and Forestry	\$298,351
Dr. Janet Hill	2016-17	NSERC – Discovery Grant	\$300,000
Dr. Matthew Loewen	2016-17	Evonik Industries AG	\$270,000
Dr. Gillian Muir	2016-17	United States (U.S.) Department of Defense	\$304,743
Dr. Yolande Seddon	2017-18	NSERC – Industrial Research Chair	\$837,750
	2017-18	PIC North America	\$837,750
Dr. Elisabeth Snead	2019-20	SK Agriculture Development Fund	\$375,000
Dr. Craig Stephen/ Canadian Wildlife Health Cooperative (CWHC)	2015-16	Parks Canada	\$450,000
	2016-17	ON Ministry of Natural Resources and Forestry	\$253,000
	2016-17	Agriculture and Agri-Food Canada	\$348,003
	2016-17	Canadian Food Inspection Agency	\$500,000
	2017-18	Canadian Food Inspection Agency	\$250,000
	2017-18	ON Ministry of Natural Resources and Forestry	\$300,000
	2017-18	ON Ministry of Natural Resources and Forestry	\$300,000
Dr. Cheryl Waldner	2019-20	Genome Canada / Agriculture and Agri-Food Canada	\$2,699,298
	2019-20	NSERC – Industrial Research Chair	\$750,000
	2019-20	Canadian Cattlemen's Association	\$750,000
Dr. Lynn Weber	2015-16	SK Pulse Crop Development Board	\$305,377
	2016-17	NSERC – Collaborative Research and Development Grant	\$268,908
Patrick Zimmer/ Canadian Wildlife Health Cooperative (CWHC)	2015-16	Public Health Agency of Canada	\$479,998
	2016-17	Environment and Climate Change Canada	\$2,200,000
	2017-18	Environment and Climate Change Canada	\$550,000
	2018-19	Parks Canada	\$450,000
	2018-19	Public Health Agency of Canada	\$479,998
	2019-20	Canadian Food Inspection Agency	\$250,000
	2019-20	Environment and Climate Change Canada	\$275,000
	2019-20	Environment and Climate Change Canada	\$260,000
	2019-20	ON Ministry of Natural Resources and Forestry	\$272,500

*Data based on USask uView database and USask fiscal years.

Research Funding

Funding awarded by fiscal year and source, and number of faculty researchers receiving new awards (2015-16 to 2019-20)



*Data based on USask uView database and USask fiscal years.



FUNDING FACTS



WCVm research funding increased by nearly **94%** between 2015 and 2020

Total research funding awarded over five years
\$49 Million



Funding dollars supported **506** awards from over **100** different research funding sources.

Over 88% of WCVm faculty considered active in research (2015-20)

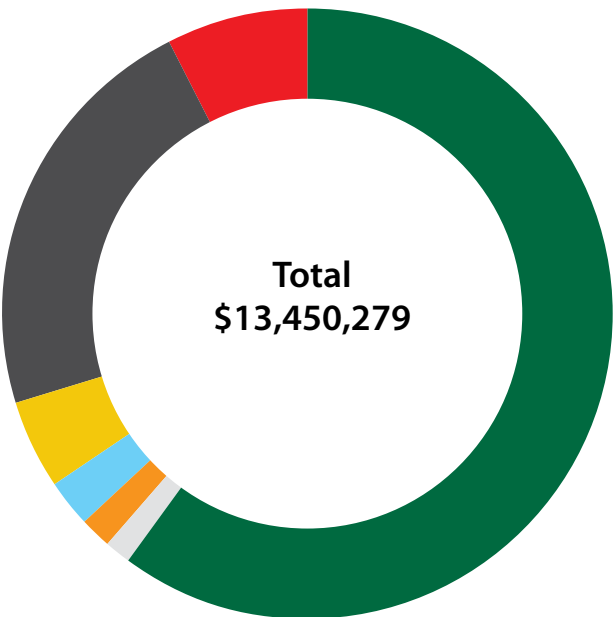


Federal Funding

Canada’s three main granting councils are the Canadian Institutes of Health Research (CIHR), the Natural Sciences and Engineering Research Council of Canada (NSERC) and the Social Sciences and Humanities Research Council (SSHRC).

These funding bodies represent the gold standard in quality review of research applications, and recipients of their awards and the proposals that receive funding are regarded as having been “well vetted.” Increasing Tri-Agency success (CIHR and NSERC in the case of the WCVN) is a priority for the WCVN as it recognizes the quality of the veterinary college’s researchers.

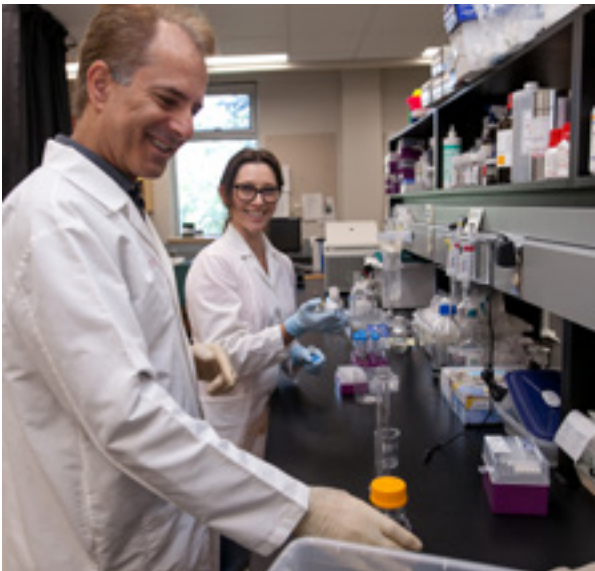
Funding from the Government of Canada’s major agencies (2015-16 to 2019-20)



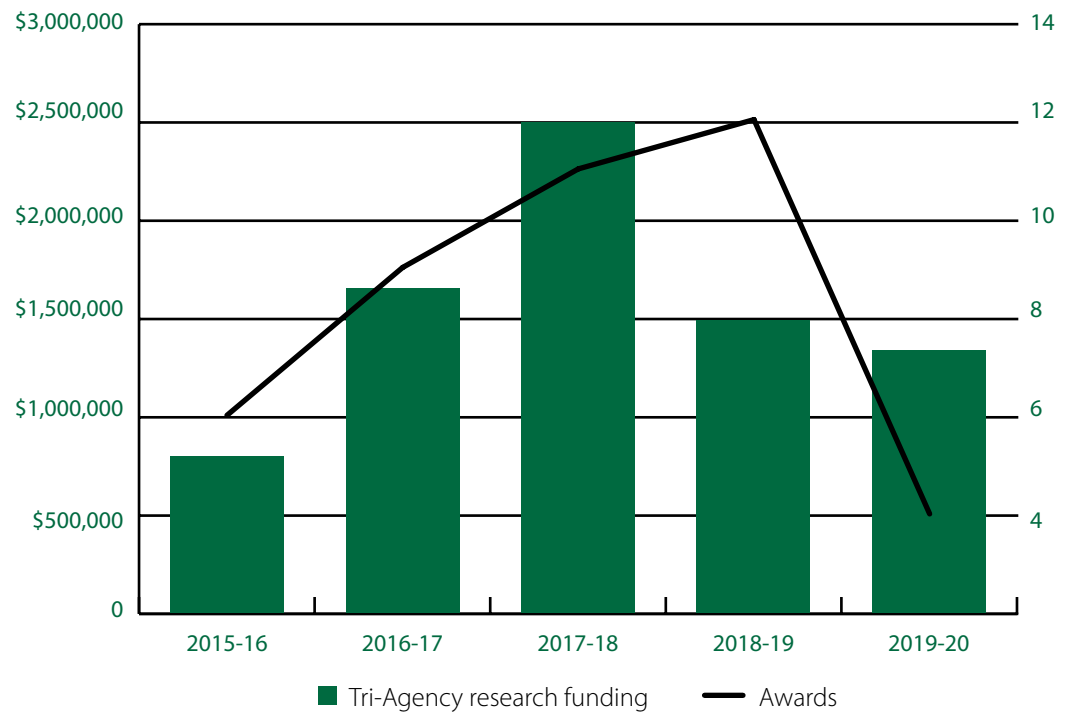
- NSERC \$8,076,684
- CIHR \$211,613
- NCE \$199,851
- CFI \$358,333
- Mitacs \$614,500
- Genome Canada \$2,989,298
- CRC \$1,000,000

NSERC (Natural Sciences and Engineering Research Council of Canada) | CIHR (Canadian Institutes of Health Research) | NCE (Networks of Centres of Excellence) | CFI (Canada Foundation for Innovation) | CRC (Canada Research Chairs)

*Data based on USask uView database and USask fiscal years.



New Tri-Agency research funding and numbers of new grant awards received, 2015-16 to 2019-20



*Data based on USask uView database and USask fiscal years.

*Tri-Agency funding is presented as total award amounts upon receipt, which results in a cyclical representation of awards.



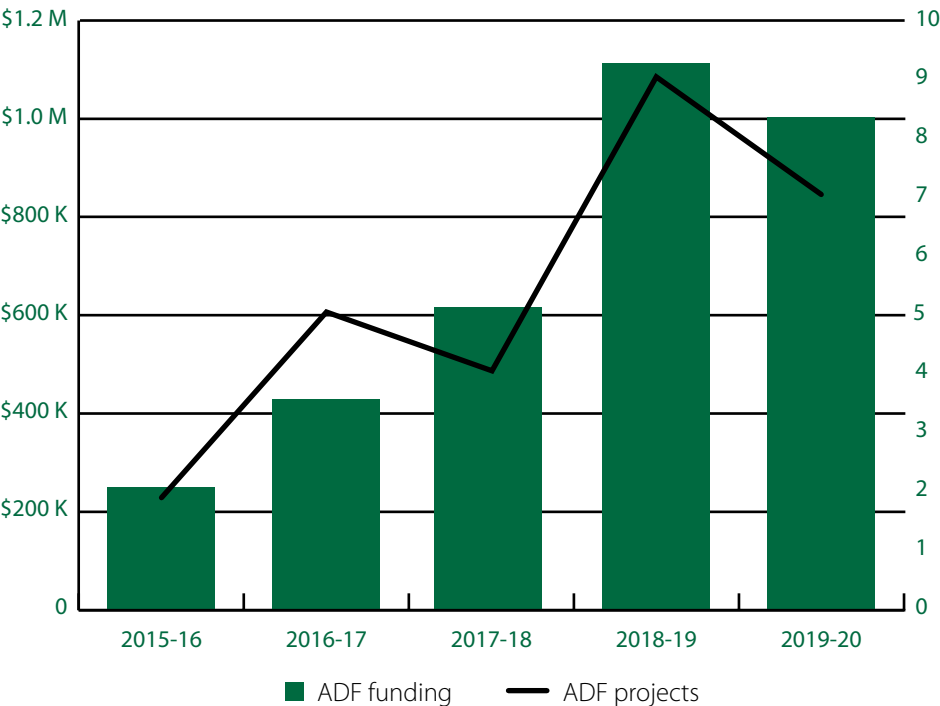
Government of Saskatchewan Agriculture Development Fund

The **Agriculture Development Fund (ADF)** supports the growth of the agriculture industry in Saskatchewan and is a key source of research funding for our researchers. From 2015-16 to 2019-20, 18 different WCVM faculty members received ADF new project funding. Our five-year total for 27 projects reached \$3,375,028.

Of particular note, the WCVM received \$375,000 in 2019-20 from the ADF to support student research projects over five years. This project, titled “Experiential discovery and learning through research in food animal veterinary medicine,” builds upon a successful program built with previous ADF funding awarded in 2014. Overall, the ADF’s support has been instrumental in enhancing our comprehensive summer research program for veterinary students. Specifically, the ADF’s support has enabled the WCVM to provide funding for 77 summer research students’ projects involving food-producing animals.











This program has served an important role in providing students in the Doctor of Veterinary Medicine (DVM) program with experiential learning in agriculturally-important species. This program not only enhances the education of future veterinarians, but it inspires practitioners to pursue post-graduate training and specialization in species that will benefit the agriculture industry.

ADF project funding, 2015-16 to 2019-20



*USask fiscal years
*Data is based on USask uView database

The ADF has provided research funding for projects involving the following species and areas:

-  **cattle**
(21 projects)
-  **pigs**
(14 projects)
-  **sheep**
(three projects)
-  **bison**
(three projects)
-  **horses**
(22 projects)
-  **honey bees**
(six projects)
-  **llamas**
(one project)
-  **poultry**
(one project)
-  **fish**
(one project)
-  **other agriculture-related projects**
(five projects)

Internal WCVM Research Funding



From 2015-16 to 2019-20, the WCVM provided over \$3.4 million in internal research funding, and these funds were managed through various targeted programs. Popular research funds include:

- Companion Animal Health Fund (CAHF)
- Townsend Equine Health Research Fund (TEHRF)
- Mark and Pat DuMont Equine Orthopedic Research Fund
- Mark and Pat DuMont Equine Research Fund (DuMont Equine)
- Dubé/Ryan Veterinary Health and Research Fund
- Wildlife Health Research Fund (WHRF)

In addition, the college provides funding through supports and matching commitments to new faculty, research chairs, large grant programs and *ad hoc* funding requests.

The **Companion Animal Health Fund** (\$403,683 in awards from 2015-2019) supports specialized veterinary training, innovative research and the introduction of new technology at the WCVM. Each year, the fund provides WCVM faculty and graduate students with funding to support a range of companion animal health research studies. As well, the fund contributes to the specialized training of graduate students through the annual Dr. Michael Powell Award of Excellence and tuition awards.

The **Townsend Equine Health Research Fund** (\$363,576 in awards from 2015-2019) has had a tremendous influence on the quality of horse health care that's available in Western Canada and around the world. The research fund has also played a major role in making the WCVM a national centre for horse health research and specialized training.

Other research funds supporting WCVM equine research programs from 2015-16 to 2019-20 include the **Mark and Pat DuMont Equine Orthopedic Research Fund** (\$271,069), the **Mark and Pat DuMont Equine Research Fund** (\$196,631), and the **Dubé/Ryan Veterinary Health and Research Fund** (\$80,223).

The **Wildlife Health Research Fund** (\$65,673 in awards from 2015-2019) was created in 1981 to encourage and support applied research and training in health and disease of free-ranging wildlife. The expertise and knowledge gained through the fund is applied to wildlife conservation and management, public health and food safety in Western Canada and elsewhere.

Fund	Principal investigator	Research title
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Funded projects in 2018-19

CAHF	Dr. Adrien Aertsens	Biochemical comparison of fibreglass cast and thermoplastic orthotic for temporary tarsal immobilization.
CAHF	Dr. Barbara Ambros	Is preoxygenation beneficial in birds?
CAHF	Dr. Bianca Bauer	Genetic investigation of golden retriever cystic uveal disease.
CAHF	Dr. Melanie Craven	Investigating a role for pathogenic infection in the pathomechanism of anal furunculosis in dogs, using in situ molecular methods.
CAHF	Dr. Tanya Duke	The accuracy of three capnograms with different technologies in estimating arterial CO ₂ in animals weighing less than four kilograms.
CAHF	Dr. Valerie MacDonald	Evaluation of insulin-like growth factor-2 receptor (IGF2R) expression in canine osteosarcoma.
CAHF	Dr. Monique Mayer	Measurement of inter-observer variability in axial size of canine mandibular and retropharyngeal lymph nodes on computed tomographic and magnetic resonance imaging.
CAHF	Dr. Sally Sukut	Inter-fractional variation in canine head position using a head re-positioning device with or without cone-beam computed tomographic guidance.
CAHF	Dr. Danielle Zweste	The effect of irrigation technique on temperature within the vertebral canal during a hemilaminectomy.
DuMont Equine	Dr. Claire Card	Iodine and thyroid hormones in musculoskeletal health in horses.
DuMont Equine	Dr. James Carmalt	The impact of temporomandibular joint inflammation on equine performance.
TEHRF	Dr. James Carmalt	Biomechanical evaluation of novel suture patterns for equine tendon repair.
TEHRF	Dr. Kristen Conn	Characterization of equine herpesvirus lytic chromatin accessibility.
TEHRF	Dr. Tanya Duke	Histamine concentration in unmedicated horses, and following penicillin and guaifenesin.
TEHRF	Dr. Elemir Simko	Mass spectrometric identification of biomarkers for the detection of eradication of infection in equine septic arthritis.
TEHRF	Dr. Bruce Wobeser	Value of equine endometrial biopsy as a diagnostic tool.
WHRF	Dr. Emily Jenkins	<i>Echinococcus multilocularis</i> in wildlife, domestic animals and people in Western Canada.
WHRF	Dr. Karen Machin	Development and validation of a non-invasive fecal metabolomics technique to identify stress in mallard ducks (<i>Anas platyrhynchos</i>).

Funded projects in 2019-20

CAHF	Dr. Shannon Beazley	Incidence of peri-anesthetic arrhythmias in young, healthy cats.
CAHF	Dr. Anthony Carr	The effects of oral administration of Yunnan Baiyao on whole blood aggregometry in healthy dogs treated with low-dose aspirin.
CAHF	Dr. Ryan Dickinson	Evaluation of the effects of an apoptosis solution (A-VD-Oph) on preserving canine neutrophil function at ambient temperature and 4 C: a pilot study.
CAHF	Dr. Jerome Gagnon	Evaluation of 18F-FDG PET-CT and its role in detecting lymph node metastasis in canine mast cell tumours.
CAHF	Dr. Stephanie Osinchuk	Expression analysis of EphA receptor tyrosine kinases in canine and feline ocular melanoma.
CAHF	Dr. Elemir Simko	Genetics for the canine dilated cardiomyopathy.
CAHF	Dr. Behzad Toosi	Evaluation of the expression and function of the EphA2 receptor in canine osteosarcoma.
CAHF	Dr. Suraj Unniappan	Canine and feline nesfatin-1 radioimmunoassay development.
TEHRF	Dr. Elemir Simko	Transcriptomic analysis of synovial fluid to identify potential messenger RNA markers for the eradication of infection in equine septic arthritis model.
WHRF	Dr. Emily Jenkins	Identifying vectors, sentinels and wildlife reservoirs for tularemia in the region of Karrak Lake, Nunavut.
WHRF	Dr. Maarten Voordouw	Variation in life history strategies among strains of the tick-borne pathogen <i>Borrelia burgdorferi</i> in the white-footed mouse (<i>Peromyscus leucopus</i>).

Our Research Output and Impact

From the diversity of our departments and their faculty members comes a wide range in research expertise and thrusts. The standard means of measuring research intensity of university faculty is through analyses of the research articles published by WCVM faculty members. Their work resulted in an average of over 260 peer-reviewed research articles per year.

The top five journals in which WCVM researchers published during this five-year period (2015-19) were the following:

- *Canadian Veterinary Journal*
(121 articles, h index = 55, SJR = 0.33)
- *Environmental Science & Technology*
(46 articles, h index = 373, SJR = 2.7)
- *Scientific Reports*
(46 articles, h index = 179, SJR = 1.34)
- *Chemosphere*
(37 articles, h index = 228, SJR = 1.53)
- *PLoS ONE*
(37 articles, h index = 300, SJR = 1.02)

Additional notes:

- The h index expresses the journal's number of articles (h) that have received at least h citations. It quantifies both journal scientific productivity and scientific impact.
- The SCImago Journal Rank (SJR) is a size-independent prestige indicator that ranks journals by their "average prestige per article." With SJR, the subject field, quality and reputation of the journal has a direct effect on the citation.

New faculty support

As part of our constant emphasis on excellence in research and teaching, the WCVM has been increasing its emphasis on research. Over the past five years, the WCVM has provided \$685,000 in recruitment and retention, start-up and graduate student support to 12 new faculty members.

Peer-reviewed research

41%

Percentage of WCVM peer-reviewed research articles in the top 10 per cent of the most cited journals within their field/discipline.

9%

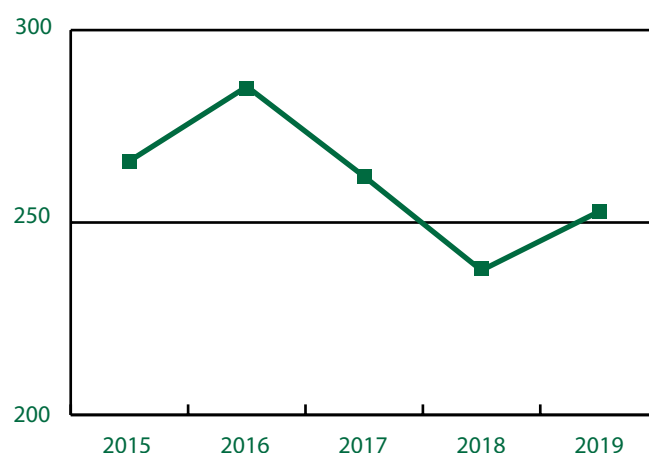
Percentage of WCVM peer-reviewed research articles in the top one per cent of the world's most cited journals.

PUBLICATION FACTS

WCVM	USask
publications	
1,304	12,701
40% open access	
citations	
13,594	148,043
citations per publication	
10.4	11.7
Field-weighted citation impact ratio*	
1.13	1.36

*Field-weighted citation impact is the ratio of citations received relative to the expected world average for the subject field, publication type and publication year.
*Data is based on SciVal/Scopus databases.

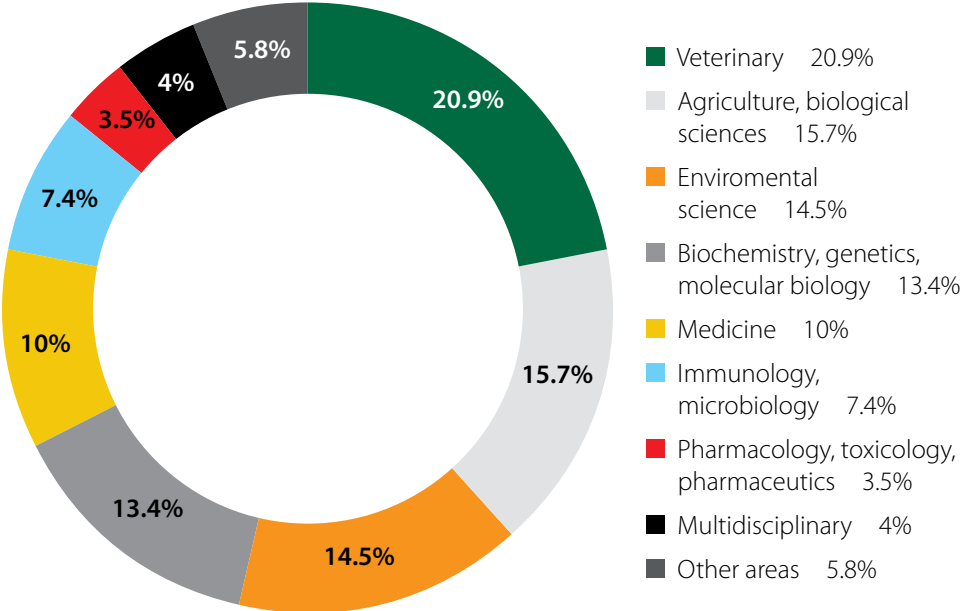
Published journal articles



*Research articles are identified based on the calendar years in which they were published.

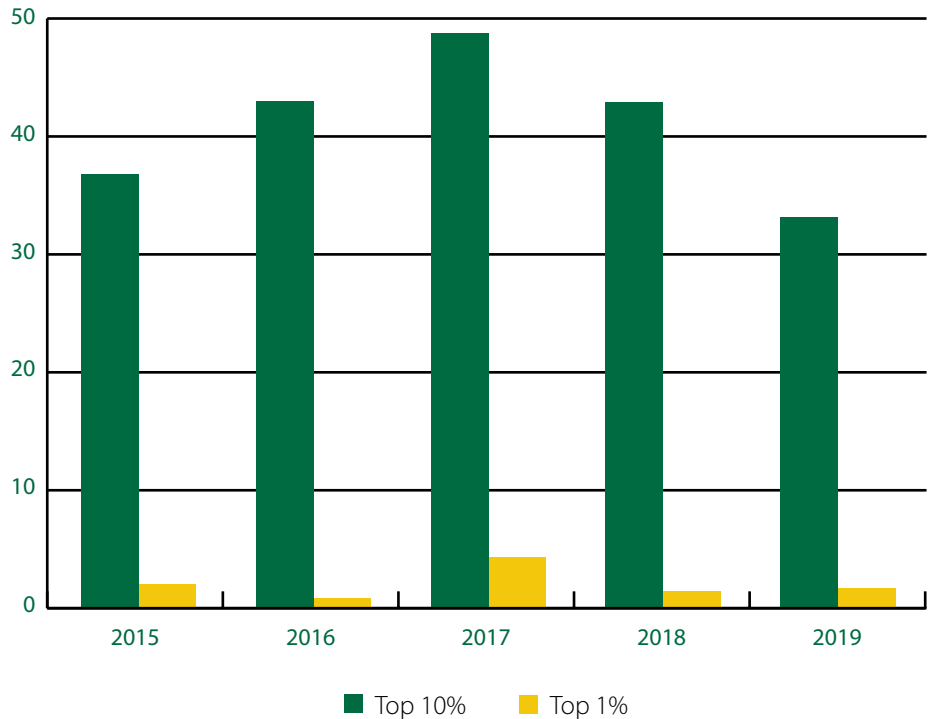
*Data is based on SciVal/Scopus databases.

Publications by subject area, 2015-2019 (percentage of total)



*Research articles are identified based on the calendar years in which they were published.

Publications in top-cited journals



*Research articles are identified based on the calendar years in which they were published.
*Data is based on SciVal/Scopus databases.



Active Student Participation in Research



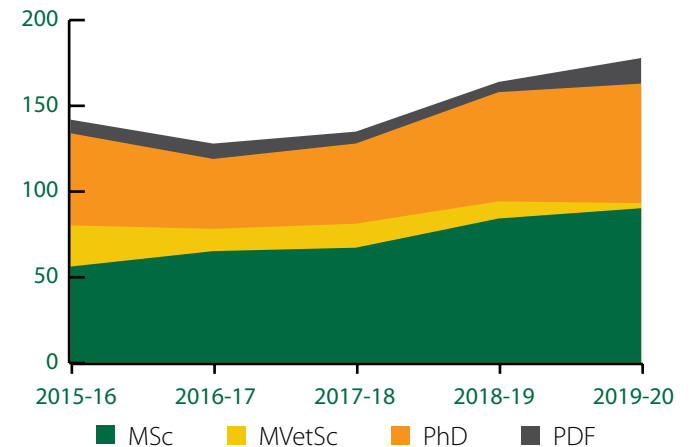
Participation in research activities plays an important role in the development of WCVM students, whether they plan to become practicing veterinarians or continue on to other careers.

Over the past number of years, the WCVM has placed an emphasis on increasing the number of students involved in the research process, both at the undergraduate and graduate levels.

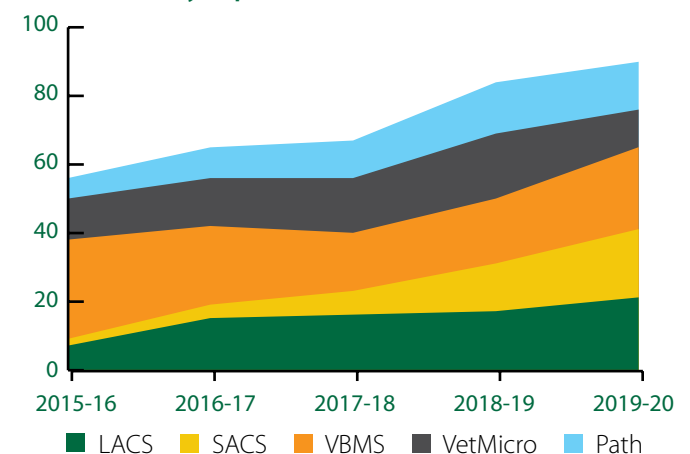
During 2019-20, there were 15 funded postdoctoral fellows, 163 fully funded graduate students and 35 funded undergraduate research students. The graduate students are funded through the Interprovincial Graduate Student Fellowship Fund, the Professional Earning Pool, the Graduate Student Scholarship Fund and faculty research grants. WCVM graduate students received almost \$2.4 million in scholarships and travel awards in 2019-20. An additional \$291,000 was awarded through summer student and veterinary student scholarships.

The WCVM highlights student research involvement through annual graduate and undergraduate student poster competitions. As part of their summer research experience, undergraduate students also develop research news articles that are posted on *WCVM Today* (wcvmtoday.usask.ca), the veterinary college's news site, and shared with other partner organizations.

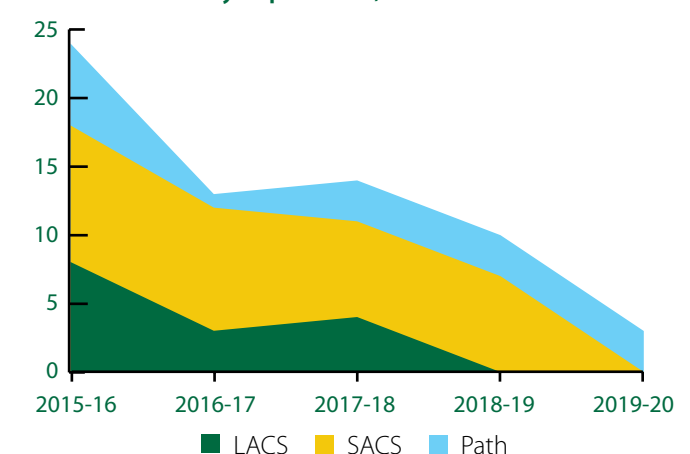
Graduate students and postdoctoral fellows by degree program, 2015-16 to 2019-20



MSc students by department, 2015-16 to 2019-20



MVetSc students by department, 2015-16 to 2019-20




Boehringer Ingelheim (BI) has sponsored WCVI students through scholarships, awards and summer research funding. In 2019, four WCVI summer research students participated in the BI Veterinary Scholars Program, which included an invitation to participate in the 2019 national symposium at Tufts University's Cummings School of Veterinary Medicine — the host institution. In 2020, the WCVI was again successful in its application to the BI Veterinary Scholars Program, and the funding supported two summer research student positions at the WCVI. In August 2020, these students virtually attended the 2020 BI national symposium, which was co-sponsored by the U.S. National Institutes of Health and the Association of American Veterinary Medical Colleges (AAVMC). Previous WCVI attendance at the BI Veterinary Scholars Program includes four students travelling to Texas A&M University in 2018, and four students attending the symposium in Washington, D.C., in 2017.

STUDENT RESEARCH FUNDING

\$

\$2.4M

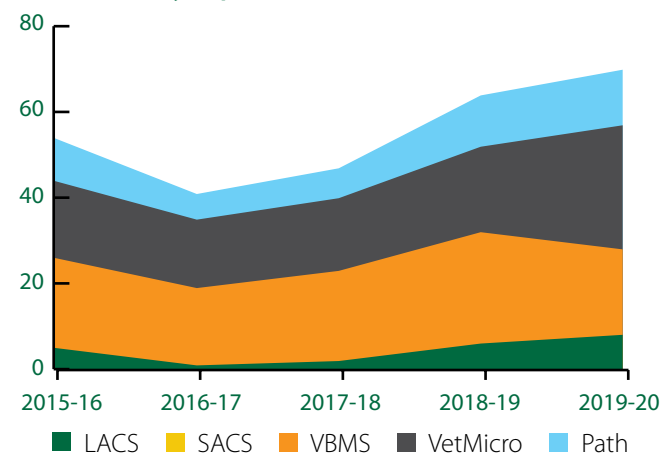
The amount that WCVI graduate students received in scholarships and travel awards in 2019-20.



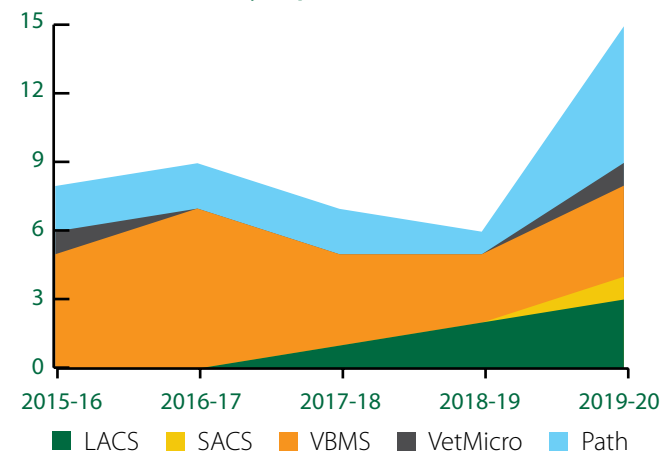
\$291K

The amount awarded through summer student and veterinary student scholarships in 2019-20.

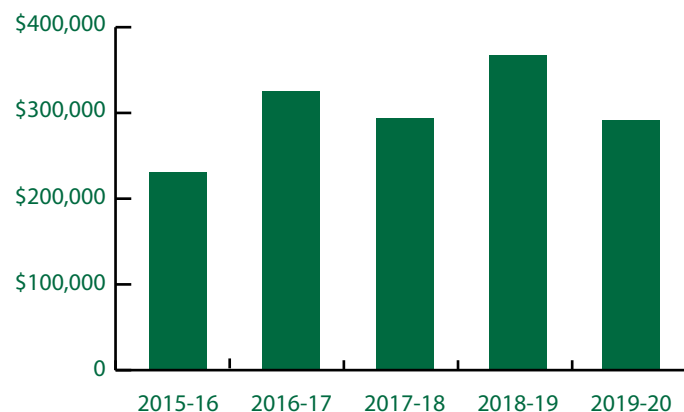
PhD students by department, 2015-16 to 2019-20



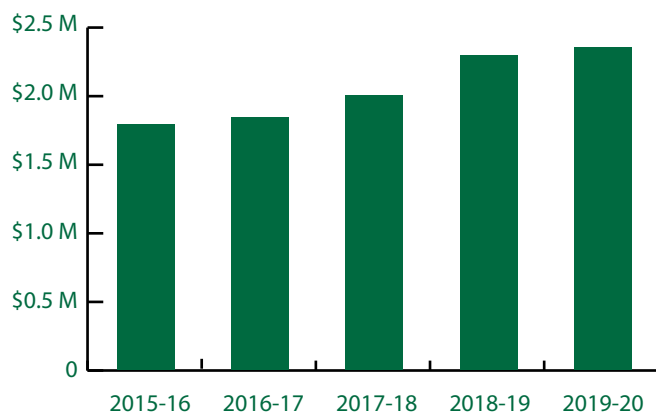
Postdoctoral fellows by department, 2015-16 to 2019-20



Summer Student and Global Vets scholarships, 2015-16 to 2019-20



Graduate student scholarships and travel awards, 2015-16 to 2019-20



The **Emerging Leaders of the Americas Program (ELAP)** was established by the Canadian government to support the development of the next generation of leaders in the Americas while strengthening the links between post-secondary institutions in Canada, Latin America and the Caribbean. ELAP provides scholarships to students from Latin America and the Caribbean for short-term exchange opportunities to study or conduct research in Canada at the college, undergraduate and graduate levels. In the past three years, our researchers have hosted nine graduate and two undergraduate students.

Emerging Leaders of the Americas Program (ELAP)

Graduate students		Undergraduate students	
2019-20	Peru = 1	2018-19	Ecuador = 1
2018-19	Brazil = 3 Colombia = 1	2017-18	Colombia = 1
2017-18	Brazil = 4		





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