I am my great pleasure to introduce you to the first of many SSUS Annual Research Reports. Our Sydney School of Veterinary Science (previously Faculty of Veterinary Science) has been the architect and innovator of many research discoveries in veterinary science, veterinary education and more broadly to other disciplines for over 100 years. Our school researchers have a very broad spectrum of research interests that can be grouped into Animal welfare and ethics; Infectious disease and biosecurity; Wildlife health and preservation; Capacity building and education; Evidence based clinical practice; Food security; and Veterinary genetics and genomics. This research would not be possible without the generosity of philanthropic contributions from donors and the foundations and funding bodies that support this research. What we are most proud of, is the real-world impact of the research that we do, which benefits animals, people, communities and the environment.

We recognise and pay respect to the Elders and communities - past, present, and emerging - of the lands that the University of Sydney's campuses stand on. For thousands of years they have shared and exchanged knowledge across innumerable generations for the benefit of all.
Publications
Sydney School of Veterinary Science

With 1,188 publications released from 2018-2022¹, our innovative research across a range of disciplines enables us to better tackle the big, complex issues facing the world.

Total publications over 5 years

2018 2019 2020 2021 2022

197 237 243 273 238

We understand that research publications are invaluable as they facilitate the dissemination of our knowledge, enabling our researchers to share their findings and contribute to the collective understanding both within and outside the veterinary field, fostering innovation and progress. Our broad expertise is globally recognised, with our publications cited over 12,000 times². Our publications serve as a reliable and accessible resource for the scientific community and society, promoting transparency, informed decision-making, and the continuous advancement of knowledge.

“Investing in science education and curiosity-driven research is investing in the future.”
— Ahmed Zewail

¹Data retrieved June 2023 from Scopus search results for publications affiliated with Sydney School of Veterinary Science. [https://www.scopus.com]
²All articles included in the background of this page are referenced throughout this report.
Animal welfare
Exploring animal welfare science, ethics, and law

Researchers at Sydney School of Veterinary Science are exploring animal welfare science, ethics, and law to help current and future veterinary team members both in Australia and internationally. Studies have shown that veterinary team members commonly face ethical challenges in their work. These can be a source of moral distress, and even career attrition.

Dr Anne Quain, Senior Lecturer in Professional Practice, led a study evaluating virtual ethics rounds for veterinary team members, published in July 2021. “Ethics rounds is a bit like morbidity and mortality rounds – except instead of focusing on clinical aspects of a case, we focus on ethical challenges.” Ethics rounds establishes a psychologically safe, confidential forum where all veterinary team members – from animal attendants to veterinarians and practice managers – can participate. The study found that participating in ethics rounds had a positive impact on veterinary team members. According to Anne, “Veterinary team members really appreciated having a space to talk about things that had made them feel uneasy, or where they felt like their values had been challenged. They had a chance to discuss ethical challenges really frankly with their colleagues. People talked about feeling a sense that their load had been lightened.” After participating in ethics rounds, some veterinary clinic teams developed practice policies to deal with future ethically challenging situations of a similar nature to those which they discussed.

Job turnover and career attrition may be reduced when veterinary team members feel adequately supported. On the other hand, factors that negatively impact the well-being of veterinary team members, including ethical challenges, may contribute to veterinary team member morbidity and possibly even mortality. In Anne’s words, “In light of the current workforce shortage, it’s really important to maximally support good team members in order to retain them.”

Reducing moral distress among veterinary team members can improve job satisfaction, individual and team well-being, which leads to improved patient care. “Where we can better manage our own conflicted feelings, we’re in a better position to provide the best care.”

Anne’s passion for this research project was inspired by her own experiences as a veterinary team member: “I’ve experienced many ethically challenging situations as a veterinarian, and not always been certain of the best way forward.” This inspired Anne to help other veterinary team members find a way forward with these commonly experienced situations.

Anne’s research efforts have been internationally recognised, she has spoken at conferences such as the ECAWB (European College of Animal Welfare and Behavioural Medicine) and she was invited to discuss ethics rounds at the Australian Veterinary Association conference in Adelaide and the Veterinary Ethics conference in Vienna. She is undertaking a project-based residency with The Ethics Centre to develop an ethics rounds facilitator training manual.

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Capacity building and education
Focused on capacity building in veterinary education

Our researchers are improving the educational experiences of veterinary science students by creating meaningful and relevant learning opportunities that prepare them for the veterinary profession. We aim to enhance teaching and learning strategies that promote the development of evaluative judgment and learner self-efficacy in clinical skills.

“...that the purpose of education is not to fill the minds of students with facts...it is to teach them to think, if that is possible, and always to think for themselves.”
— Robert Hutchins

Since her appointment in 2019 as an Education Focused Lecturer in Surgery, Dr Kate Mills has undertaken research to design and develop improved teaching of surgery skills to our Doctor of Veterinary Medicine students. Kate’s research is inspired by the question “how do you support the students to go from having been taught or shown a clinical skill once, to developing competence?”

Through the development of photo-guided instruction booklets, benchmark demonstration videos, online skills checklists of mandatory steps, and self-help quizzes, students can now engage in effective skills learning outside face-to-face teaching laboratories.

Kate has observed, “when students come prepared, and they understand the concepts, you can teach more efficiently and sustainably.” Since the development and introduction of these resources, students report an improved learning experience. Skills competencies have dramatically improved, with double the number of students achieving the desired skill performance standard in skills practical examinations from 2019 to 2021.

Our Doctor of Veterinary Medicine students gratefully state “the resources Kate has produced are phenomenal tools to ensure our successes.” Kate is the recipient of the University’s Faculty of Science Outstanding Early Career Teaching Award for the impact these research projects have had on student learning. Kate’s efforts have been internationally recognised with her invitation to present at the Australasian Veterinary Educators Symposium (Vet Ed Down Under Symposium 2023). In her interactive workshop, she modelled the use of skills resources that scaffold development of learner autonomy. Kate has presented the online surgery component of the Fiji National University Special Internships program and has since been approached by other educators and universities to provide her expertise.

Dr Kate Mills
Lecturer in Surgery

Evidence-based clinical practice
Livestock health, welfare and production

Our researchers’ achievements at UniVets Camden, our Camden Campus teaching hospital, not only improve the welfare and treatment of the animals under their care, but also provide valuable resources to assist veterinarians and farmers.

Veterinarians are often required to treat calves with fluid therapy. Creating advanced fluid therapy plans can be complicated and time consuming. Our UniVets Camden-based Senior Lecturer in Ruminant Medicine, Dr Sam Rowe, created an app to assist veterinarians to create a fluid therapy plan for calves, with a study published in September 2022 to validate its efficacy. “We often have to do a lot of calculations if we want to create a sophisticated fluid therapy plan that fixes the multitude of problems that the sick calf has. We know that vets and even paramedics have a lot of trouble making these calculations when they’re under time pressure, and so that inspired me to want to make a tool that’s useful for vets in the field.” The evidence-based app, callaid.com, has now been used in 52 countries including regular use in Australia, United States, Canada, China, New Zealand, Turkey, France, Uruguay, and the United Kingdom.

As our Doctor of Veterinary Medicine students had substantial involvement in piloting this app, they helped come up with the name callaid. Sam particularly enjoyed this milestone which helped bring all the research achievements together as “they are the future vets, and they’re the ones that are most likely to be using these sorts of tools in the future.” Callaid enables veterinarians to provide the best care for their patients. Saving the lives of these calves, which are the future of the farm, improves animal welfare and safeguards the livelihood of farmers and the communities who rely on them.

The use of antimicrobials is crucial for farmers and veterinarians to maintain the wellness of animals within their care. Although it is equally important to use antimicrobials responsibly, with antimicrobial resistance being a global health concern, Australia has lower antimicrobial usage, and lower antimicrobial resistance within the dairy industry compared to other countries, according to Australian Chief Veterinary Officer, Dr Mark Schipp.

Our Head of Livestock Veterinary Teaching and Research Unit, Associate Professor John House, has done extensive research in this area. “The issue with lack of new antibiotics being created is as we use the antibiotics we have, and as we select for resistance, then our choices get less. So, what we use, we have to preserve and be careful with.”

John worked with the Australian Veterinary Association (AVA) to produce the AVA Antimicrobial prescribing guidelines for dairy cattle. This resource, released in 2022, assists dairy cattle veterinarians by providing best-practice, evidence-based prescribing guidelines. John recognises that dairy cattle veterinarians want to practice responsible antimicrobial use, but the decision to prescribe or withhold antimicrobials may be hampered by a lack of evidence. “We try to achieve good outcomes for cows but are also trying to be responsible at the same time.”

John’s research, among the research of other AVA expert panel members including our Head of School and Dean, Professor Jacqueline Norris, has helped to create a resource that addresses core principles of appropriate use of antimicrobial agents, and many common conditions of dairy cattle and how various specific antimicrobials can be used.

Dairy cattle veterinarians can now use this guide to assist them to make informed decisions around antimicrobial use, improving veterinary care, dairy cattle welfare, food safety, and promoting antimicrobial stewardship. By doing this, Sydney School of Veterinary Science assists in protecting the continued and lasting effectiveness of antimicrobials and contributes to the worldwide efforts to combat antimicrobial resistance.

Dr Sam Rowe
Senior Lecturer in Ruminant Medicine

Associate Professor John House
Head of Livestock Veterinary Teaching and Research Unit


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Evidence-based clinical practice
Small animal medicine

Companion animals play an important role in many households, and we recognise the strong bond between humans and animals. Our research focuses on developing strategies for identifying potential disease risks, ensuring early diagnosis, and monitoring treatment responses to prevent diseases and provide evidence-based care for pets.

Chronic enteropathy is a gastrointestinal illness which leads to discomfort and pain in animals, and can be a source of stress and frustration for owners.

Under the supervision of Associate Professor Craig Ruaux and Associate Professor Peter Bennett, PhD student Dr. Jane Yu has recently completed a proteomics study to assess differences in protein profiles in dogs and cats with Chronic enteropathy. The recent publication on this study identified candidate protein biomarkers associated with Chronic enteropathy.

A “significant difference” was found in proteins of healthy dogs compared with those with Chronic enteropathy, and although more research is needed to justify regular proteomic testing in cases presenting in veterinary clinics, the study identifies candidate biomarkers for further research that may enable early diagnosis and so earlier treatment.

Commenting on Jane’s work, Associate Professor Craig Ruaux explained that the information from Jane’s recent paper is important and groundbreaking on several levels. Chronic enteropathy is the name given to patients where we don’t have an immediate explanation for their signs after extensive investigations, but it is not a single disease. With Jane’s data we hope to start finding “fingerprints” from changes in multiple proteins that help identify the underlying cause of Chronic enteropathy in these patients. We also hope to identify patterns that tell us which treatment types are most likely to help the patient. Craig explains “as well as helping us to diagnose this disease better, the new information we have from Jane’s data will also help us better understand why the problem has come about in the first place and might even allow us to identify animals that are at risk for this problem earlier in life.”

During her time working at our University Veterinary Teaching Hospital, Jane collected samples of cats and dogs for these studies, and notes that owners are usually grateful to give consent for their pets to participate in such clinical research. When raising the topic of Chronic enteropathy and her research with owners, Jane has heard, “we are very lucky to see you today,” and adds that often owners are “actively willing to talk to you more” when she advises them of her research project. Most people appreciate being able to play a role in the research and advancing the veterinary industry, knowing their consent provided for sample collection is what helps make this research possible.

- Dr. Jane Yu
Veterinarian & PhD student
- Associate Professor Craig Ruaux
Small Animal Medicine
- Associate Professor Peter Bennett
Oncology & Small Animal Medicine

Veterinary genetics and genomics
Improving the welfare, health and conservation of animals

Our research focuses on understanding and improving the health and well-being of animals through the study of their genetic traits and characteristics. We are identifying DNA variations and developing tests for animal owners to make informed breeding decisions, and many of these conditions can serve as models for human diseases.

Although Bianca’s primary research interest is feline genetics, her passion for this project stems from her interest in applied genetics. Bianca notes: “I’m interested in inherited conditions, but inherited conditions that are of clinical relevance, so that when we find a genetic cause, we’re in a better position to improve welfare.”

Recently, Bianca collaborated on research with Resident in Feline Medicine, Dr. Emily Pritchard and Specialist in Feline Medicine, Dr. Lara Bound. They identified gene variants in Domestic Shorthair cats which cause Xanthinuria, a rare hereditary disorder which causes kidney or bladder stones to form. It reduces quality of life and potentially lifespan. Findings of the study released in 2023 identify a gene variant which may cause Xanthinuria. Bianca emphasizes that “our findings have now shown that not only do we have a candidate gene variant that we can test for, but the condition is probably more prevalent than we actually think it is.” In hope that these findings will have a positive impact on animal welfare, Bianca adds “if we can find and evaluate, and then confirm (genetic causes of Xanthinuria), then we can actually test animals and reduce this problem, or even eliminate it.”

Infectious diseases and biosecurity
Focused on control and prevention of infectious causes of disease

Our researchers aim to better understand infectious causes of disease, and to develop strategies to prevent and control these diseases, promoting health and well-being in animals, humans, and ecosystems.

Transboundary diseases in animals can be devastating for affected communities. African Swine Fever, a deadly virus causing severe haemorrhagic fever in pigs and wild boar, has caused a significant loss of livelihood for the people of Lao People’s Democratic Republic in southeast Asia (Lao PDR). Professor Michael Ward, Chair of Veterinary Public Health & Food Safety at Sydney School of Veterinary Science, completed research with a study published in 2022 to evaluate the factors driving the spread of African Swine Fever, in collaboration with PhD student at the time, Nima Matsumoto. Much of this region is affected by poverty, and many families rely on their pig herds as their only source of income. Prevention and management strategies of African Swine Fever are essential and depend on research to prevent catastrophic and tragic effects locally, and for surrounding countries.

Following widespread infections in Europe from 2014 onwards, in 2018 African Swine Fever spread rapidly across China and other regions in Asia, and Papua New Guinea. Michael notes this rapid disease spread was remarkable. “It’s like ink on blotting paper; it just spread, and no one could stop it.” This led to Michael’s passion for understanding why this is happening, to allow the implementation of better control programs. As transboundary diseases often have underlying similarities in the way they spread, Michael said this research gives a better understanding of how this control and surveillance plan for African Swine Fever can be applied to other disease outbreaks: “understanding these basic disease spread mechanisms, gives us better understanding to control transboundary diseases.”

Wildlife health and preservation

Improving disease treatment to help preserve wildlife

Our research contributes to the management and treatment of diseases in Australian wildlife through advanced techniques and multidisciplinary expertise. We focus on supporting wildlife conservation and welfare in the face of environmental change to foster the health and prosperity of shared ecosystems. Our research informs wildlife management policy and action; including clinical interventions and targeted population and ecosystem management.

Our Project Lead of the University of Sydney Koala Hub, Associate Professor Damien Higgins, research interests in ecoimmunology and disease ecology are inspired by the question, "how does what (humans) do, impact wildlife health and conservation?" Looking at early warning signs such as changes in the population's immune systems before they decline means that researchers and organisations can identify vulnerable populations and act to provide support and measures to prevent further damage. Damien adds, "the better we understand their diseases, the better we can prevent them."

Koala populations are severely declining. Without intervention, koalas in many areas are facing extinction due to various threats such as habitat loss, disease, and climate change.

Damien recently led a national program including the first National Koala Disease Risk Analysis (NKDRA). His research forms the basis for koala health management in Australia. The report, released in 2022, assessed all koala diseases and the risks they pose and provides evidence-based information to develop health and disease prevention recommendations which integrate with the National Recovery Plan for the koala.

Damien notes the "key to achieving a good outcome" with NKDRA was through extensive, cross sector collaboration and a partnership with Wildlife Health Australia and International Union for Conservation of Nature (IUCN). The collaborative research program helped to address many key knowledge gaps for koala disease management. Damien states, "one of the great things about this program is the collaboration we generated" and emphasises the importance of this. "The more great minds that you've got to work on a project, the further you can take it."

Associate Professor
Damien Higgins
Pathobiology and Wildlife Health

Funding
A glance at 2022

We are grateful for the invaluable support and generosity of our funders. Your unwavering commitment and belief in our mission makes a profound difference in the lives of animals and the people who care for and depend on them. Through your contributions, we have been able to achieve remarkable milestones and create positive, lasting change. Your partnership has been instrumental in enabling us to pursue our vision with passion and dedication. We extend our appreciation to our funders for their trust, support, and ongoing commitment to animal health and welfare. Together, we are making a meaningful impact and transforming lives.

$10.624 million
Received in research grants and philanthropic funds

Dalara Foundation
Department of Regional NSW
Dr Marie Rowe and Mr David Rowe
Dr Pamela Guha
Dr Ramune Cobb
Emeritus Professor Richard Andrew LeCouteur
Estate of the late Christine Margaret Streeter
Estate of the late Janicee Elizabeth Neiley
Estate of the late Ronald Bruce Anstee
Estate of the Winifred Violet Scott Charitable Trust (John Poole, Trustee)
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Sydney Institute for Infectious Diseases (SydneyID)
Sydney Southeast Asia Centre
Sydney Vietnam Institute
The BactiVac Network
The Cat Protection Society of NSW
University of Sydney USA Foundation
Virbac (Australia)
Wildlife Disease Association - Australasian Section

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To discuss the impact you could have on animal health and welfare research, please contact:

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