HORIZON

FACULTY OF VETERINARY AND AGRICULTURAL SCIENCES

ALUMNI AND FRIENDS 2020/21

THE UNIVERSITY OF MELBOURNE

ANIMAL INSTINCTS
Forging a career in wildlife care

DOOKIE IMPACT
Immersive study reaps rewards

EMERGENCY MANAGEMENT
Holistic response to animal rescue

DEAN'S WELCOME

JOHN FAZAKERLEY
DEAN AND PROFESSOR OF VIROLOGY,
FACULTY OF VETERINARY AND AGRICULTURAL SCIENCES

It's an understatement to say that unforeseen crises have dominated 2020. A terrible bushfire season for Victoria preceded a global pandemic that has kept many of us isolating in our homes, not once, but twice. These events are the manifestation of risks that many medical, veterinary, agricultural and environmental scientists have long discussed as major threats to national and global stability and sustainability.

For the past five years, the Faculty of Veterinary and Agricultural Sciences has defined its role in terms of One Health – an approach that recognises the links between animal, environmental and human health. The current SARS-2 coronavirus pandemic has its origin in animals, making more people than ever before conscious of the risks some infectious diseases of animals can pose to us. Bushfires and droughts have increased in frequency and severity, particularly for our regional communities. Sustainable agricultural intensification and regenerative farming with focused environmental stewardship, enhanced by research and technology, will have an important role in mitigating fires, droughts and floods, and better-coordinated responses are required to enable our wild and domestic animal populations to recover.

The Faculty has contributed to solving major challenges for many years and 2020 has been no exception. Our veterinary staff have assisted bushfire responders and our U-Vet Werribee Animal Hospital and Equine Centre have continued to deliver an excellent standard of general and specialist care. Our epidemiologists are contributing to Victoria's COVID-19 response. Our food scientists are engaging with Indigenous agriculture to produce nutritious sustainable food. Our academic and professional staff have adapted quickly to the times and I am proud of the work they have done to rapidly move our teaching and research into a virtual space while maintaining excellence for our students.

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In this edition of Horizon, we show our alumni and researchers' capacity to address global challenges. Along with colleagues, I discuss how a One Health approach can help us reduce the risk of another pandemic. We learn how a newly formed Centre for Emergency Response will help protect Australia's animals in the next drought or catastrophic bushfire season. We share our food policy researchers' expertise on building resilient food systems and enabling a healthy diet for our society.

We hear from four Faculty alumni, whose stories highlight our work's value and the difference education can make in people's lives and careers. The exceptional work of Zoos Victoria is highlighted through the work of alumni, Drs Michael Lynch and Katherine Adriaanse. Dr Cathy McAuley shares how a PhD allowed her to maximise the possibilities created by her Bachelor of Agricultural Science. Michael Halverson, who now helps farmers embrace ag-tech at Agriculture Victoria, explains how the Dookie campus and the Diploma in General Studies opened new opportunities for him.

I'd like to acknowledge the extent to which the outstanding work of our students and staff is enabled by our generous donors, to whom we are most grateful. The Centre for Emergency Response is being supported by a significant donation from long-time supporters Dr Bill Holsworth and Carol Holsworth, and I am very grateful to them. Donors to our Dookie Fund supported Michael Halverson's study and many other agriculture students like him; thank you too to all these donors. Further information is enclosed should you also wish to make a lasting impact.

NEWS

Webinar Series

The Faculty of Veterinary and Agricultural Sciences commenced an interactive webinar series in 2020 to share topical research and informed commentary with alumni and friends of the Faculty in the areas of animal and human health, food security and sustainable agriculture. Two sessions were held in June and August, featuring discussion topics about Melbourne's fresh food supply and ultra-processed foods respectively.

The webinars are available to view online if you were unable to join us for the live sessions:

SUSTAINING OUR FOOD SUPPLY

View at go.unimelb.edu.au/25kj

Dr Rachel Carey, lead of the Foodprint Melbourne research project in the Faculty, discusses the actions we can take to build the resilience of Melbourne's fresh food supply. The conversation is facilitated by Faculty alum Dr Jennifer Henry (BAgr(Hons) 1990, PhD 2001) and covers:

- The characteristics that make up Melbourne's 'foodbowl' and a resilient food system
- What the shocks and stressors to Melbourne's food supply are
- Suggestions for policy makers to make our locally produced food system more sustainable
- Tips for each of us as consumers to help support local food producers and make our food system more resilient.

WHAT'S WRONG WITH ULTRA-PROCESSED FOODS?

View at go.unimelb.edu.au/h5kj

Associate Professor Gyorgy Scrinis, food politics and policy expert in the Faculty, provides insights into the responses of governments and food corporations to health concerns about the nutritional quality of processed foods. Key areas discussed with Dr Jennifer Henry include:

- The concept of ultra-processed foods and the average quantity of these foods we consume
- The latest research into the dietary and health impacts of ultra-processed foods in Australia and globally
- The food corporations that produce, distribute and market ultra-processed foods
- The regulation of ultra-processed foods to better protect public health.

Our next session will support the mental health and wellbeing of veterinarians, and contribute towards the Continuing Professional Development requirements of veterinary alumni that are registered to practise in Australia.

We send invitations to the webinar series via email, if you don't seem to be receiving these please send your latest email address to **fvas-alumni@unimelb.edu.au**.

A MEANINGFUL WAY TO THANK U-VET WERRIBEE ANIMAL HOSPITAL

The University of Melbourne U-Vet Werribee Animal Hospital attends to the needs of cherished pets every day with world-class expertise. A new program will give pet-owners the chance to express their gratitude to staff members and departments that have played meaningful roles in their pet's care through a donation. Community support will help U-Vet to continue providing Victorians with the best pet care imaginable. Every gift matters in the effort to deliver great vet care, fund research into safe and successful treatments, and provide a new generation of budding vets with the chance to work at one of Australia's leading vet hospitals.
For more information visit u-vet.com.au.

Animal instincts

Sharing a passion for our wildlife. By Muriel Reddy.

Fellow alumni Dr Michael Lynch, the Head of Veterinary Services at Zoos Victoria, and Dr Katherine Adriaanse, an Associate Veterinarian at Healesville Sanctuary, shared a keen interest in the eastern barred bandicoot, spared from near-extinction by the Zoo's captive-breeding program.
PHOTOS: ZOOS VICTORIA*
*Images taken prior to restrictions in Melbourne due to COVID-19.

Dr Michael Lynch's face lights up as he describes the brilliance and beauty of seals. He loves their athleticism, the way they power through the water with just one thrust of their fore flippers, and happily recalls his time spent among seal colonies observing these top-line predators playing in the waves or just chilling in the ocean as their cubs learnt to swim in nearby rock pools.

As the busy Head of Veterinary Services at Zoos Victoria, Dr Lynch (BVSc(Hons) 1989, MVS 1994) is not given to wistfulness. Even as he pedals to work, his head is filled with the tasks, clinical and administrative, that lie ahead of him each day. His work, he says, is challenging and surprisingly satisfying for someone who initially wanted to work with free-range wildlife rather than practise medicine with animals in captivity. That was before he discovered that Zoos Victoria could provide him with the best of both worlds.

"The Zoo offered me the opportunity to work close to captive animals from around the world in all their magnificence, and I saw that I could actually make a difference to the lives of those animals," he explains. "But the Zoo also gave me the opportunity to get involved in veterinary aspects of free ranging animals, and that also included working with the Zoo's threatened species programs."

It was through one of these programs that Dr Lynch became a mentor to Dr Katherine Adriaanse (DVM 2014, MVSc 2019), now an Associate Veterinarian at Healesville Sanctuary. You might say they bonded professionally over the eastern barred bandicoot, saved from almost certain extinction by the Zoos' captive-breeding program. Dr Lynch was deeply immersed in their conservation by the time Dr Adriaanse began investigating the risk of toxoplasmosis to the establishment of the bandicoots on Phillip Island as part of her Master's project. The nocturnal marsupial captivated her.

"They're little animals and they don't really have many methods of self-protection," she says. "But they are quite hardcore and will do well if you keep foxes away from them… They're little fighters."

> "They're little animals and they don't really have many methods of self protection."

They may be separated by 25 years of age and experience, but both vets began their careers on a similar path. Each completed a science degree first but for different reasons. When Dr Adriaanse, 32, graduated from the University of Adelaide with her first-class honours' degree, she was unsure about what to do next. She was interested in medicine but keen to work in the conservation space. A friend suggested veterinary science. She thought it was a great idea and was accepted into the first intake of students for the Doctor of Veterinary Medicine at the University of Melbourne.

If her trajectory was meteoric, Dr Lynch's was on a slow burn. He did not do particularly well in his final year of high school and fell short for a tertiary place in veterinary science, settling instead for a science degree studying zoology. It sparked a passion. "I guess it was like getting a religion for me because I decided this was the important thing in the world – the natural world and its preservation is a really important thing."

He never really looked back after that. He graduated with a Bachelor of Veterinary Science (Honours) from the University of Melbourne in 1989, completed his Master's five years later and his PhD in 2012. His achievements have not dulled his trademark modesty.

"I'm your example of a hard worker," he says. "I have obviously some natural intelligence but I'm more your hard-worker type and your persevering type." Others considering a career in wildlife care and conservation might be encouraged by his journey. He thinks so, too. "These are all team efforts and there are lots of places in a team. There are lots of places you can be, just persist and do something you enjoy."

No one listening to these vets would question their dedication to the job, their satisfaction in successful outcomes, their sadness in poor ones. And be in no doubt, there have been challenging moments. For Dr Adriaanse, it came during her 12-month stint with 'Free the Bears', working at a rescue centre in Luang Prabang in Laos.

She was on a team that was given rare permission to euthanise a bear because of a neurological disease, hydrocephalus, which was adversely affecting her quality of life. "In Laos, bears are a protected species, so you need government permission to do anything with them," she explains. "She was the first bear to be euthanised in the organisation for 20 years but the whole team felt it was the right step for that animal … That experience has stayed with me a long time. While none of us want to be in that position, as professionals our primary focus is an animal's quality of life. The decision to euthanase is never easy, but using a holistic welfare assessment framework to help reach that conclusion with the whole team is something I'm really proud of."

The images that confronted Dr Lynch at the triage centre in Mallacoota, established to treat animals – many of them koalas that had been rescued from the Victorian bushfires early in 2020 – will not be easily erased. "They were very long days," he recalls. "But having that first-hand experience helped me give good advice and be a relevant leader… Seeing the trauma to the animals is quite confronting as is their suffering and, in that environment, it can be quite overwhelming.

> "The natural world and its preservation is a really important thing."

"You want to be a good leader, but you are also trying to be a good vet and get across best ways of pain management, dressing choices, rehydration. It is an intensive-type medicine. Working in a team is really important because I'm not necessarily the best intensive care veterinarian in our team… but we all work together and share information and I'm certainly not so proud to be asking for advice to check what I'm doing is up to standard. As a vet, you always want to be doing better."

While Zoos Victoria has provided a gateway to the world of wild animals, the focus is still firmly on the animals in the Zoo. "When you work in a zoo, you have a responsibility to the animals in the zoo to do your best for them. Their lives and their welfare are very important, and I have never lost sight of the primary part of my job. It's super important what happens out there in the wild, but the primary part of my job is looking after these animals right here in front of me – their welfare, their nutrition, their parasite control, doing all the veterinary care of those animals and do it to the best of my abilities."

Sausage maker to food detective

Curiosity led Cathy McAuley into a career in food safety.

Making low-fat sausages for food research was not exactly her dream job but, for Dr Cathy McAuley (BAgrSc 1992, PhD – Agricultural Sciences 2017), it opened a door to a long career in food microbiology that has been both stimulating and satisfying.

She had just graduated from the University of Melbourne with a Bachelor of Agricultural Science and while she had no expectations on that first day at the Food Research Institute in Werribee, she was quietly determined to seize every opportunity that came her way. She did that with patience and purpose over the following 27 years.

Dr McAuley is a food microbiologist at CSIRO Agriculture and Food in Werribee and is one of the experts who ensures that the food we eat is safe.

"I really like figuring out bacteria and micro-organisms," she explains. "A lot of the work I have done is on pathogens – they are bacteria, like *Salmonella*, that can make people sick."

Dr McAuley works a bit like a detective. Consider the case of *Cronobacter*, a bacterium that was found in infant formula overseas and had caused death and serious illness. She was part of the team that carried out environmental samplings and genetic analysis to trace the origins of the bacterium in dairy factories and establish how it was able to flourish in certain environments. The work contributed knowledge to the isolation methodology for *Cronobacter* and influenced the International Standard for the detection of *Cronobacter* in infant formula.

The way she works has changed dramatically over the years.

"When I first started, we used traditional methods of microbiology – growing bacteria in Petri dishes," she recalls. "Genetic finger-printing was just starting. Now, we have whole genome sequencing and PCR (polymerase chain reaction) which multiplies bacterial cells to allow for genetic material analysis. It's a much more accurate way of identifying bacteria."

To thrive in food microbiology, Dr McAuley believes it's important to be curious and to be agile, to be prepared to explore alternative ways of doing things. "You need to be willing to change and to adapt," she says. Her personal journey speaks to those qualities.

She was 21 years-old when her parents decided to leave the harsh Canadian winters to build a new life in Geelong. Dr McAuley had completed more than a year of study for a science degree at the University of Guelph in Ontario but decided to switch to agricultural science when she enrolled at the University of Melbourne.

She also believes perseverance is a helpful characteristic for a career in food microbiology. It certainly proved useful to her as she juggled motherhood and the pursuit of her PhD. She wrote more than 60,000 words for her thesis on *Enterococcus*, a type of environmental bacteria that can lead to illness.

Earning her PhD made her feel more complete professionally. If the BAgrSc opened the door to her career, the PhD unlocked all its possibilities. "It gave me a lot more confidence," she says. "It gave me a sense of achievement. It took a lot of effort, but it was worth it."

Reaping what you sow

How Dookie and hard work are paying dividends.

Michael Halverson (DIGS 2016, BAg 2019) felt the first niggle of nervousness as he drove into the sprawling Dookie campus set on the rolling hills between Shepparton and Benalla in Victoria. He steadied himself, perhaps recalling the discipline he had learned as a promising young basketballer, and focused instead on the challenges that lay ahead of him.

He decided to study the Diploma in General Studies at the University of Melbourne's Dookie agricultural campus because it would ease him into university life and provide a natural pathway to the Bachelor of Agriculture. On paper at least, his education choice was curious.

Here was a student who had been in an elite basketball development program at Rowville Sports Academy until a knee injury ended any serious sporting future. On completing high school, he gained experience over nearly three years working in customer service, warehouse logistics and commercial glazing. He also spent a period backpacking through Europe and enjoying time with his family and grandparents. His road to a career in agriculture was long and winding.

Michael says his interest in agriculture was cultivated by his grandfather, Bob Halverson, a man who had enjoyed a full life as a distinguished air force officer, a politician (which included a term as Speaker of the House of Representatives) and as the Australian Ambassador to Ireland and the Holy See, before settling into retirement on a farm in Holbrook, NSW.

"I spent a lot of time with my grandfather on the farm," recalls Michael. "And we spent a lot of time discussing all sorts of issues like world hunger, governance and broader society. He taught me the importance of making some sort of contribution to the world, and emphasised that hard work was necessary to achieve this."

Michael Halverson: Dookie was "best decision of my life".

Michael decided he would try to make his mark in agriculture and was researching university courses when he came across the option of residential study at Dookie. "I decided to go with the Diploma in General Studies because it would be a stepping stone to a university degree," he reflects. "It was the best decision of my life."

He flourished at Dookie, delighting in its commercial working farm that is home to crops including canola and wheat, and 5,000 merinos pastured on 1,200 hectares of clover, lucerne and phalaris. He was also stimulated by Dookie's inherent focus on food security and climate change adaptation research, as well as its teaching of agriculture, natural sciences and technological adoption.

A key benefit that stood out to Michael during his time at Dookie was the deep connections formed between his peers, the college staff and onsite researchers, which created a supportive and nurturing environment for his residential study experience. While there, he also undertook a Certificate III in Agriculture.

For Michael, Dookie provided a unique window into a world of possibilities. By the time he enrolled in the Bachelor of Agriculture, he knew he had found his future, with that sense of place crystallising further through additional study at Dookie during his degree with the support of the Dookie Fund. The scholarship assisted with his return to Dookie and accommodation expenses, enabling him to gain further insights and practical foundations so as to fully harness his agricultural studies.

Now employed by Agriculture Victoria, Michael is working as the Project Officer for the Tatura SmartFarm, the centre of horticulture research and innovation within the Goulburn Valley. His role is to help educate students and industry about horticultural production and technology, while assisting on-site scientists to establish the best methods of production in growing the highest quality fruits, such as nectarines, peaches and pears.

"All production methods are being investigated and analysed with advanced digital sensing technology to determine the best growing conditions for fruit in horticultural production," he explains.

Still only 25, Michael hopes one day to own his own farm where he can experiment with different production techniques across horticulture, livestock, cropping and pasture improvement. "I am very interested in experimenting with alternative agricultural techniques and feel compelled to do things differently."

His grandfather passed away shortly after Michael was accepted into the Diploma in General Studies at Dookie in 2016. "He was thrilled and proud."

For more than 130 years, Dookie has played a central role as an agricultural college and experimental farm, contributing immeasurably to the richness of the Goulburn Valley and enhancing Australia's reputation as an agricultural leader. To provide a donation to support student success at Dookie please visit go.unimelb.edu.au/hf9j or call +61 3 8344 2071.

Centre for Emergency Response

Natural disasters are an increasing threat to Australia's rural economy, animal welfare, and human safety and wellbeing.

The bushfire season of 2019-2020 in Australia was one of the most devastating on record, taking a horrendous toll on native wildlife, livestock and companion animals. An estimated 1.25 billion animals died in the fires and their aftermath, with more than 130 threatened ecological communities being damaged. The destruction was exacerbated by wildlife carers and veterinarians working in an environment absent of national standards, governance and coordinating capabilities.

Multiple and ongoing reviews into the bushfire season (and its legacies) serve as reminders of the immediate need to enhance native wildlife health preparedness for future bushfire seasons.

The projected costs of Australia's current approach to disaster management are unsustainable and amplify the ecological and biological losses. The Australian Business Roundtable for Disaster Resilience & Safer Communities estimates that the current economic loss from natural disasters sits at $18.2 billion per year – a figure predicted to rise to nearly $40 billion per year by 2050. Devastation of livestock and lost income account for much of the estimate, with rural and semi-urban communities across Australia shouldering a disproportionate economic and emotional burden.

A targeted animal emergency response system will minimise some of these more drastic bushfire and natural disaster impacts. International best practice has proven that training first responders to manage animal emergency retrieval and care produces better outcomes for both human and animal health and wellbeing.

The Melbourne Veterinary School is leading this charge. It is establishing a national emergency response training and research centre equal to the best in the world, such as those provided in the United States (through University of California Davis, Texas A&M and Louisiana State University) and the United Kingdom (through the British Animal and Rescue Trauma Association).

The Centre for Emergency Response – operating from the Melbourne Veterinary School at Werribee – will coordinate and oversee training standards to deliver world-leading disaster management capability.

The Centre will draw upon the spectrum of capabilities and expertise available at the University of Melbourne, providing specialised understanding of animal emergency response that is based on international best practice adapted to Australia's environment.

The outcomes will be immense for animal emergency response. The Centre will commission research that eliminates knowledge gaps impairing current response capability, and it will be the point of reference for all those involved in incidents and disasters involving animals in Australia. The Centre will also address the gaps in the current emergency responses legislative frameworks present throughout Australia, which generally omit any reference to emergency animal response.

The Centre for Emergency Response will be a unique coordinating body, convening critical community, hospital, zoo and agency support in the goal of better animal emergency response practice. Training courses and modules will be diverse in size and scope, catering for community groups and volunteers, through to emergency services and veterinary science professionals. This will ensure training that is tailored to various levels of technical expertise and which will be aligned to the range of responsibilities required of first responders.

The lessons learned through a better, more coordinated animal emergency response system will have benefits that extend beyond safe animal retrieval and rescue. There will be complementary or transferable practices for other domains of disaster management, enabling a coordinated and consistent response to the threats that national disasters pose to the Australian way of life.

The Centre for Emergency Response at the Melbourne Veterinary School will deliver a world-leading practice through the following enhanced capabilities:

APPOINTMENT OF A CHAIR IN EMERGENCY RESPONSE

The Chair in Emergency Response will be responsible for the development and implementation of specialist courses in emergency response management. This academic leadership includes establishing a research program catering for post-doctoral fellows, PhD candidates and current postgraduate trainees (including students in the University's Doctor of Veterinary Medicine). The Chair will also coordinate and promote the University's educational opportunities to those in need of emergency animal response training, many of whom (such as community volunteers) have had no prior formalised training in this area.

INCREASED SCHOLARSHIP OPPORTUNITIES FOR VETERINARY STUDENTS

Modules for the University's Doctor of Veterinary Medicine will cover the essential elements of animal response and recovery, while providing students with the required accreditation levels to work alongside emergency responders. These short courses will also be available to students from other Australian universities, providing the nation with a critical mass of specialised animal emergency responders. They will maximise use of the University's revitalised Werribee campus (including the U-Vet Werribee Animal Hospital), and the rural facilities available at the Faculty of Veterinary and Agricultural Sciences' Dookie campus.

TRAINING MODULES FOR VOLUNTEERS, VETS, FIRST RESPONDERS AND COMMUNITY ORGANISATIONS

Individual animal emergency response occurs frequently in both urban and rural areas, yet many responders and bystanders are unaware of the risks involved in animal rescue. The Centre for Emergency Response plans to develop and deliver a suite of programs tailored to a range of individuals and organisations. These include recognised emergency services personnel, through to local citizens concerned with their own preparedness in cases where animal rescue and retrieval are needed.

Modules on selected rescue management issues will include containment, restraint, sedation, safe removal, treatment and haulage. Open online courses in animal emergency response will provide the micro-credentialing necessary for the many people in need of upskilling who do not have the time or need for more extensive accreditation.

JOIN US

To find out more about this exciting initiative and become involved in supporting a holistic response to animal rescue in Australia, please contact Jill McKenna on +61 3 8344 2071 or jill.mckenna@unimelb.edu.au.

Loyal supporters attracted by animal response crisis

Australia has had little regulation or precedent regarding safe animal retrieval. Thanks to a generous Bendigo couple in regional Victoria, we are now a step closer to revolutionising animal emergency response.

Dr Bill Holsworth and Carol Holsworth have personally funded hundreds of university students to undertake wildlife research projects during the past 30 years. It is part of a longstanding relationship that the Holsworths have with the University of Melbourne. Their passion for wildlife rescue and veterinary science is now focused on animal emergency response – a targeted system that coordinates and oversees training standards for the safe retrieval and removal of animals in disaster settings.

These settings can be widescale (such as bushfire, flood or other environmental catastrophes) or be focused on individual animal retrieval. The research and teaching in animal emergency response is coordinated through the Melbourne Veterinary School's Centre for Emergency Response – the first centre of its kind in Australia.

The Holsworths' generosity to the Centre for Emergency Response is in addition to their ongoing generosity to students. They are all too aware of the number of quality projects and students missing out on funding. Dr Holsworth said that an additional motivation for giving is to ensure that students are equipped with the necessary knowledge and skills to prosecute the case for sustainable environmental practices.

"We live on the earth for a short time and should leave the world a better place," he said. "If we don't manage our world properly, then we have got a big problem for humanity. Education, research and leadership are vital if we, and subsequent generations, are not to repeat past mistakes."

Professor Anna Meredith, Head of the Melbourne Veterinary School, thanked the Holsworths for their recognition and generous support to the Centre for Emergency Response. "This is a critical area in dire need of a nationally recognised training standard, which when implemented will greatly reduce risks to rescuers and the animals rescued," she said.

"This donation means that we have been able to take the first step to improving the outcomes for those directly affected by natural disaster, such as livestock, wildlife and the devasted communities left behind."

THE interconnectedness of human, animal and environmental health

All of the systems on our planet are interconnected. The One Health approach brings together human, animal and environmental health experts to tackle some of our biggest issues.

By Nathan Fioritti

Many diseases are spread from animals to humans by bloodsucking insects like flies, mosquitoes and ticks.

The COVID-19 pandemic probably began with a single transmission of virus from an animal to a human.

The tragic consequences highlight the relationship between public, animal and environmental health.

There are many ways in which these areas are interconnected, from the overuse of antibiotics on farm animals leaving us more vulnerable to superbugs, to climate change giving diseases new opportunities to spread or the need to maintain balanced and viable ecosystems to protect our health.

WHAT IS ONE HEALTH?

"A One Health approach is where people in human, animal and environmental health sectors are working together to find solutions that optimise the health of all sectors," says Dr Trish Campbell, Research Fellow at the University of Melbourne and Doherty Institute for Infection and Immunity.

"It can be the sharing of data and knowledge or sharing of resources," she says.

A current example of One Health is veterinary epidemiologists studying animal diseases who are working with the Department of Health to support the COVID-19 response.

For some time, there has been an increased focus on One Health approaches to public health.

Outbreaks like severe acute respiratory syndrome (SARS) in 2003, Middle East respiratory syndrome (MERS) in 2012 and recurring outbreaks of Ebola, as well as epidemics of influenza and concerns for food safety, have led to greater cross-disciplinary collaboration.

SARS and MERS, like COVID-19, are zoonotic diseases – infectious diseases transmitted from animals to humans. Both originated in bats, with SARS passing from civet cats to humans, and MERS from camels to humans.

It's currently thought that COVID-19 also originated in bats and passed to humans through another animal, but it is not yet known which animal served as the intermediary.

In a recent interview, Professor Kanta Subbarao, Director of the WHO Collaborating Centre for Reference and Research on Influenza at the Doherty Institute, said: "There is an enormous reservoir of pathogens in animal hosts, and if we take away their habitats and live in much closer proximity, that's a problem."

With emerging infectious diseases on the rise and over 60 per cent originating in animals, a One Health approach is important to prevent and respond to future outbreaks.

A DIFFERENT APPROACH

Dr Campbell's research involves modelling and analysing infectious diseases to understand what is likely to happen if control measures like vaccinations are introduced.

This requires examination of potential spread caused by the interaction of human, animal and environmental factors.

"I'm trying to capture the underlying mechanisms that spread disease, and these can come from any of the three sectors. We don't need to build all into every model, but some diseases require a One Health approach," says Dr Campbell.

Dr Richard Bradhurst, a Research Fellow at the Centre of Excellence for Biosecurity Risk Analysis, develops epidemiological models to address the spread and control of disease in livestock.

The centrepiece of his work is the Australian Animal Disease Spread model (AADIS), developed with the Department of Agriculture, Water and the Environment.

AADIS has been used to study foot-and-mouth disease, invasive environmental pests and insect vector-borne viruses and is being adapted for African swine fever.

"The epidemiological interface between animals and humans is complex and sometimes unpredictable, and this can be challenging for scientists and policy makers," says Dr Bradhurst.

"While my focus is animal health, the AADIS model switches from simulating disease in livestock to disease in humans to environmental pests by changing the underlying data and configuration files."

ADDRESSING VECTOR-BORNE DISEASES

Many diseases are spread from animals to humans by bloodsucking insects like flies, mosquitoes and ticks. This accounts for over 17 per cent of all infectious diseases in humans, causing over 700,000 deaths annually.

Professor John Fazakerley, Dean of the Faculty of Veterinary and Agricultural Sciences and Professor of Virology at the Doherty Institute, researches infectious diseases transmitted by mosquitoes and ticks.

"When we have heavy rains, which we're going to have more frequently as adverse weather events increase with our changing climate, we will have more floods and higher mosquito populations," says Professor Fazakerley.

"Large mosquito populations in South Eastern Australia generally result in increased cases of Ross River fever, because mosquitoes spread the virus from kangaroos and wallabies."

This shows how environmental changes can contribute to disease spread.

"Another thing that is promoting the transfer of infectious diseases is the loss of habitat. This forces animals to move into different ecological niches which may move infectious diseases around between animals and between animals and humans," says Professor Fazakerley.

"Climate change and forestry clearance for agriculture are causes of that, but humans are also encroaching on animals' territories because cities are ever-expanding."

Another important factor is globalisation and the resulting increase in trade.

The spread of the Asian tiger mosquito (*Aedes albopictus*), has contributed to the transmission of diseases from animals to humans, including dengue fever and chikungunya.

"The mosquito vectors of these diseases have been spread by mosquito eggs laid in lucky bamboo plants or used tyres that are moved around the world," says Professor Fazakerley.

"There are clear implications for human health if zoonotic and vector-borne diseases are misunderstood as a result of not adopting a One Health approach," says Dr Bradhurst.

THE IMPORTANCE OF AN INTERDISCIPLINARY APPROACH

"There may be even greater consequences if scientists and policymakers do not have a holistic outlook that takes into account human, animal and plant health, and the environment."

"We'd be well advised to understand these diseases, what the ecosystem drivers of their emergence or re-emergence are, where they are most likely to come from, how they are transmitted and how they can be prevented," says Professor Fazakerley.

"The more that I learn in this field, the more I realise that all of the systems on our planet are interconnected and we don't necessarily understand how all those links work," says Dr Campbell.

"If we don't take an interdisciplinary approach, we might meet the aims of one sector at the expense of another, and that can in turn end up being harmful to all."

Professor Fazakerley is developing a One Health strategy with a broad, cross-discipline approach, and Dr Campbell has been involved in the co-creation of two undergraduate breadth subjects called 'Our Planet, Our Health'.

"Guest lecturers talk about topics including mosquitoes, poultry systems, dairy farming, multi-species care and Indigenous knowledge," says Dr Campbell.

"We've taken a One Health approach to educating the next generation."

This article was first published on pursuit.unimelb.edu.au.
Read the original article at go.unimelb.edu.au/4unj.

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