

Australian Government

Department of Agriculture and Water Resources

Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry

2019 Award Recipients



We thank our partners for their support and commitment to the 2019 Science and Innovation Awards











Wine Australia for Australian Wine















Welcome to the Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry

Recognising innovative scientific projects that will contribute to the ongoing success and sustainability of Australia's agricultural industries

The 2019 Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry are coordinated by the Australian Bureau of Agricultural and Resource Economics and Sciences, on behalf of the Department of Agriculture and Water Resources.

We thank the panel of judges for their significant contribution to the 2019 Science and Innovation Awards.

If you would like to learn more about the Science and Innovation Awards, visit **agriculture.gov.au/scienceawards**.

For information about ABARES, range of work and its publications, visit **agriculture.gov.au/abares**.

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From the Chief Scientist

Australia's primary industries have a strong tradition of being innovative and adaptive to new challenges. The outlook for our primary industries sector is strong, with the world's rising demand for food driven by population growth and calls for higher quality and greater variety of food.

One of the many ways our department is supporting primary industries is through the Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry. Now, I am pleased to introduce the recipients of the 2019 Science and Innovation Awards.

This year's recipients have demonstrated commitment to the future of rural and regional industries and shown in-depth knowledge of their chosen industry. Over the next 12 months, their projects will deliver informed research outcomes and benefits to improve industry sustainability and success.

I encourage you to read about each recipient and their project. The projects range from detecting cotton pests using eDNA; a new way to clean dirty water from abattoirs; determining eucalyptus variants for warming climates; using the community as an early warning system for exotic plant pests; real time decision support tools for assessing grape juice, airborne disease detection and nitrogen fixation; comparative genomics; automatic fencing trailer; oyster health; improving reproductive outcomes for sheep and cattle; bacterial causes of disease and growing bacteria on a large scale to develop a vaccine.

This would not be possible without the ongoing commitment and generous support of our Award partners. Partners provide their Award recipients with industry expertise and advice for project development, support to analyse the results, present seminars and extend those research results on-the-ground. Building these connections between industry, the tertiary sector, government and individuals is one of the essential objectives for the Science and Innovation Awards.

Congratulations to our deserving winners of the 2019 Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry.



Dr Kim Ritman Chief Scientist Department of Agriculture and Water Resources



About the Science and Innovation Awards

The Department of Agriculture and Water Resources, with our Award partners, presents the Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry. The Science and Innovation Awards are a competitive grants program that provides funding for innovative research projects to benefit Australia's rural industries.

Attracting applications from young Australians aged 18-35 years, the Science and Innovation Awards aim to:

- assist primary producers to develop more competitive, productive and self-reliant industries through attracting innovative research proposals that will lead to longer term innovation in the sector
- advance the careers of young scientists, researchers, producers and innovators through national recognition and funding of their research ideas
- encourage the uptake of science, innovation and technology in rural industries
- increase interaction between the Award recipients, the Award partners, the tertiary and government sectors.

The Science and Innovation Awards commenced in 2001 and have since provided grant funding for 250 individuals, supporting projects that demonstrate a fresh way of thinking about, and resolving issues for, agriculture. Recipients can build strong networks across their industry while gaining national and international exposure for their work by presenting at conferences and seminars, and publishing papers. Ultimately each has the chance to progress in their chosen career.

In 2019 there were 13 Award categories open to applicants, each generously supported by the leading research and development corporations and industry organisations.

Successful category Award recipients were then invited to apply for additional project funding to pursue their research ideas via an extended research project - the Minister for Agriculture and Water Resources Award.

Each of this year's recipients have been awarded funding to undertake their project over a 12 month period. The results from their research will contribute to the ongoing success and sustainability of Australia's primary industries. We look forward to sharing those outcomes with you.

Travis Allington



RECIPIENT OF THE Meat & Livestock Australia Award

Travis Allington's project aims to increase the survival of ewes and their twin or triplet lambs, by understanding ewe and lamb behaviours around the time of birth.

"Improving lamb survival is a significant issue facing sheep farmers and the meat industry at the moment" he says.

"Australian farmers care for the welfare of their animals, and we are working on developing and facilitating the adoption of new management techniques to help them achieve this."

"My project will specifically look at the multiple-born portion of the sheep flock, which are most vulnerable under extensive grazing conditions."

Travis says farmers are anecdotally identifying paddocks that achieve better lamb survival year after year.

"But we don't necessarily know why those particular paddocks are a lot better and whether those paddocks are changing the ewe's behaviour" he says.

Travis will attach new sensor technology to sheep to capture the location and behaviour of ewes during lambing. "The project's a little bit of a proof-ofconcept to look at whether the sensor technology can be used to look at maternal behaviour of multiple bearing ewes on a larger scale" he says.

"So things like time of birth, the length of the ewe's labour, time at the birth site and interactions from other ewes to see how that is affecting lamb survival."

Travis has been around the sheep industry since he was a kid, growing up on a farm north of Perth.

He held research positions in Australia and the Falklands before returning to Murdoch University to do his PhD.

"Most of the research that I've done, and most of the research I'll do in the future, I'm trying to make it as useful to the farmer as possible" he says.

Travis believes the sensors have huge potential, and this project is just the tip of the iceberg.

"The potential in terms of measuring animal welfare on ewes and sheep in Australia is massive with these types of sensors, to increase both welfare and production" he says.



Meat & Livestock Australia



Meat & Livestock Australia Ltd (MLA) is a producer-owned, not-for-profit organisation that delivers research, development and marketing services to Australia's red meat industry. MLA strives to be the recognised leader in delivering world-class research, development and marketing outcomes that benefit Australian cattle, sheep and goat producers.

Working in collaboration with the Australian Government and wider red meat industry, MLA's mission is to deliver value to levy payers by investing in initiatives that contribute to producer profitability, sustainability and global competitiveness.

Visit www.mla.com.au

Dr Kateryna Bazaka



RECIPIENT OF THE Australian Meat Processor Corporation Award

Dr Kateryna (Katia) Bazaka is trialling a new way to clean up dirty water from abattoirs while producing value-added products along the way.

Water from meat processing is notoriously difficult to clean up because it is 'dirty' in many ways.

Conventional methods require one technique to get rid of big chunks of fat and protein, another technique to remove chemicals and the use of microbes to break down remaining waste.

"It's a fairly complex procedure before it becomes clean again, or at least clean enough to be discharged into any kind of aquifer" Katia says.

But Katia, a plasma scientist at the Queensland University of Technology, has a different idea.

She wants to zap the dirty water with plasma to break the waste products down—first to small molecules and then to carbon dioxide, water and other products.

Looking like the glow from the "Star Wars" blue light saber, plasma is an ionised gas in which electrons and ions co-exist. "We know it works because we have used different aspects of plasma treatment" Katia said.

"So far, we've done plasma decontamination of water, plasma breakdown of pesticides on fruit, as well as conversion of various waste products into useful materials using plasma.

"But we haven't actually used all of these aspects in one application and that's what this project is all about."

Katia says plasma is very common in fact, plasmas are the most common state of matter in the universe.

We encounter plasma more often than you might think—just think of a thunderstorm.

"In order to generate that kind of plasma you need to put in quite a bit of energy" she says.

"But by using solar panels to drive this plasma we are hoping to reduce the environmental cost and the economic cost of the setup."

The wastewater project caught Katia's eye because of the opportunity to create a device that was useful for industry and one she could be proud of.



Australian Meat Processor Corporation



The Australian Meat Processor Corporation (AMPC) is the rural research and development corporation that supports the red meat processing industry throughout Australia. AMPC's

mandate is to provide research, development and extension services that improve the sustainability and efficiency of the sector. We strategically invest red meat processor levies in research, development and extension programs aligned to targeted marketing initiatives. These programs deliver outcomes and benefits for the Australian red meat processing industry and the broader Australian community.

AMPC supports projects in processing technologies, environment and sustainability, food safety and meat quality, product integrity and meat science, social licence, supply chain management, and market access.

Visit www.ampc.com.au

Dr Dean Brookes



RECIPIENT OF THE Cotton Research and Development Corporation Award

Scanning irrigation water from cotton to detect pest and pathogen DNA? University of Queensland research scientist Dr Dean Brookes is looking at a new way to quickly identify difficult-to-find cotton pests.

Dean wants to find out if irrigation water from cotton can be scanned for trace amounts of DNA left behind by pests and pathogens.

The approach could be used to complement traditional pest and disease surveys.

"DNA of various organisms is sitting out in the field, in the soil and on plant material" Dean says.

"As irrigation water runs through the field it's going to collect a lot of that material and—depending on the organism—we might be able to detect it by collecting that water and filtering it for their DNA."

This DNA is known as environmental DNA (eDNA), and finding it has proven popular in conservation biology as a highly-sensitive way of detecting organisms. "The most common use is in river systems where researchers take a sample of water to look at fish species diversity" Dean says.

"It's a great way to get information about the diversity of organisms that are in an environment without having to physically look for them.

"And because of the way cotton is irrigated there's a good chance that it'll be useful there as well."

The inspiration for the project comes from Dean's PhD research into a cotton pest that was difficult to find in the field during the drought.

It got Dean thinking about different ways of tracking pest species without having to actually spot them.

The project will start with two species whitefly and reniform nematode—in a proof-of-concept study.

If successful, the highly-sensitive technology could one day also be used as a surveillance method to help contain biosecurity incursions before they can devastate the industry.



Cotton Research and Development Corporation



CRDC COTTON RESEARCH AND DEVELOPMENT CORPORATION

The Cotton Research and Development Corporation (CRDC) invests in world-leading RD&E to benefit Australia's dynamic cotton industry. We invest in innovation and transformative technologies and programs to deliver impact.

We invest along the entire cotton supply chain—from growers to customers. One of our core strategic goals is building the adaptive capacity of the cotton industry: ensuring we are enhancing our scientific research capability, acquiring new talent and facilitating the local and global exchange of ideas.

CRDC has long been a supporter of the Science and Innovation Awards, and we continue our involvement to help support and reward young scientists for their exploration of concepts, and creation of new knowledge in the pursuit of scientific breakthroughs.

Visit www.crdc.com.au

Lewis Collins



RECIPIENT OF THE Grains Research and Development Corporation Award

Lewis Collins is working to help farmers reduce their crop losses due to distance, with an innovative device that can detect fungal diseases in the air.

As part of his Science and Innovation Award project Lewis is building a sampling instrument that can be placed on drones and tractors or in the field.

The devices are able to detect airborne fungal diseases before plants are infected, allowing farmers to protect their crops more effectively.

"The beauty of what we've done is we've designed the hardware to accept almost any airborne spore" he says.

"But the magic comes up in the software where we're using machine-learning algorithms to actually categorise those spores.

"So as long as we have examples of the disease, we can train our network to pick up anything."

Lewis' background is in healthcare, biomedical engineering and mechatronics.

"I've always been interested in automating processes that can benefit people's lives" he says. "Both my parents are from farming, agricultural backgrounds and so it was just a really cool marriage of the two."

While doing his PhD at the University of Sydney, Lewis and his supervisors decided they wanted to find a way to detect diseases in the air.

"We have no idea where and how airborne diseases move" he says. "This is a problem both in agricultural crops but also in hospitals."

While the project was initially designed to target wheat rust, Lewis hopes to apply the technology to other grain crops including barley and oats.

And he can't get there fast enough.

"We just got accepted into Blackbird's Startmate program, which is probably the biggest startup incubator in Australia" Lewis says.

"We're trying to bring this technology out of the lab and out of academia into commercial, real-world use."



Grains Research and Development Corporation



The grains industry plays a vital role in Australia's economy, representing 24 percent of total agricultural exports.

The Grains Research and Development Corporation (GRDC) supports the industry through investing in research, development and extension (RD&E) to create enduring profitability for Australian grain growers. The GRDC invests over \$198 million in around 700 RD&E initiatives to create enduring profitability for Australian grain growers across a broad range of research areas—from molecular biology to farming systems. Within their carefully balanced portfolio is a range of investments, from long-term, high risk, 'blue sky' research to short-term, outcome-focused applied research at the local level. The GRDC's investments deliver results and aim to continually break new ground for growers.

Visit www.grdc.com.au

Bethany Finger



RECIPIENT OF THE Dairy Australia Award

Bethany Finger is finding the best way to collect eggs from juvenile cows, so farmers can use them in IVF and maximise the offspring from an individual over her lifetime.

Reproductive technologies are commonly used in cattle, with 600,000 cattle embryos a year produced via *in vitro* fertilisation globally.

Currently, in vitro embryo production uses eggs from sexually mature cows.

This means there's a long lead time.

But it is possible to collect eggs from juvenile cows from as young as three months of age, in a process known as JIVET (juvenile in vitro embryo production and transfer).

"We know biologically that all females are born with all their eggs for their life," explains Bethany, a technical officer in reproductive biology at the University of Melbourne.

"So we know it's theoretically possible and we can do it at the moment—getting these JIVET embryos—but it's just at a much lower rate than we'd see in an adult. "We're hoping to adjust the normal IVF protocol and simulation to suit a juvenile cow and hopefully improve the rates."

If successful, producing embryos from juvenile cows could reduce the generation time by more than half, resulting in double to triple the speed of genetic gain with great advantages for industry.

Bethany grew up on an orchard with sheep and cattle at home but never planned to go into agriculture.

She studied biology and genetics at the University of Melbourne, which led her into the embryology world and then back to cows.

"I sort of ended up back where I came from" she laughs.

Bethany likes that her research has a direct application.

"If it works it will work really quickly and well" she says. "So I am really excited to develop the protocol that will be commercially viable and benefit people."



Dairy Australia



Dairy is Australia's third largest rural industry, with a \$4.27 billion annual farmgate value of production. The Australian dairy industry is recognised for its excellence in innovation, and has significantly increased dairy farm productivity and profits through improved pasture, feed, people and herd management and efficiency gains in manufacturing, distribution and exports. Dairy Australia is committed to building industry capability by investing in people, supporting promising and innovative individuals into rewarding and exciting dairy careers.

Dairy Australia is the industry-owned national service body, investing in essential research, development, extension and industry services to attain the best outcomes and profits for farmers, the dairy industry and broader community. This investment helps support and build a sustainable and internationally competitive industry.

Visit www.dairyaustralia.com.au

Elizabeth Hickey



RECIPIENT OF THE Australian Eggs Award

Elizabeth Hickey hopes to be the first person to grow large amounts of bacteria that causes spotty liver disease in chickens, all in the name of developing a vaccine.

Elizabeth works as a vaccine scientist for ACE Laboratory Services which makes autogenous vaccines—when bacteria collected from a farm is used to produce a vaccine specific to that property.

But she's taking on one of her toughest challenges yet with a vaccine against *Campylobacter hepaticus*.

It's the pathogen that causes spotty liver disease, a deadly condition that is one of the most common diseases in layer hens in Australia.

Elizabeth says the bacteria was first fully characterised by RMIT researchers in 2016, raising hopes for a vaccine.

"But unfortunately, this organism is really fastidious" Elizabeth says.

"They've managed to grow it in really small quantities and on agar plates, but if you need to produce a vaccine you need huge quantities of cells." Elizabeth's project is about trying to get this fussy bacteria to grow in a large bioreactor.

"One of the problems is that—from a biochemical point of view—growing something in one millilitre of media is very different than growing it in big hundred-litre vats," she says.

"So my project will be characterising the growth.

"What does it like? What nutrients does it utilise? What other growth factors can we add to make it grow well?"

If Elizabeth is able to grow enough of the bacteria, the next step is to use it to produce a vaccine.

Elizabeth finds it very rewarding to identify conditions causing suffering and fix them.

She loves being at the forefront of fighting disease.

"This is a completely new area, there's not much for me to go on, and I find that really, really exciting" Elizabeth says.



Australian Eggs



Australian Eggs is a member owned not-for-profit company providing marketing and research and development services for the benefit of Australian egg farmers.

Working together with the egg industry and the Australian Government, Australian Eggs strives to deliver value to industry and the public by investing in programs that increase egg consumption and ensure industry sustainability. All known Australian egg farmers are serviced by Australian Eggs, irrespective of their size, location or farming system.

Australian Eggs conducts R&D across a wide range of topic areas including:

- · feed and hen nutrition
- · flock health and disease management
- · environmental sustainability
- food safety and human nutrition
- animal welfare
- extension, adoption and technology transfer.

Visit www.australianeggs.org.au

James Kondilios



RECIPIENT OF THE Forest & Wood Products Australia Award

James Kondilios hopes to advise plantation managers on Eucalyptus variants that will thrive in a future warmer, drier climate.

James is studying *Eucalyptus globulus*, a species that represents 51 per cent of commercially planted hardwood in Australia.

He wants to figure out which genetic variants of *Eucalyptus globulus* should be planted now in preparation for the climate conditions of 2030 and 2050.

The research uses a "fancy modelling platform" that combines climate data with genetic information to work out the genetic variants that will be pre-adapted to the future climate.

James says it is important to him to collaborate on the project with the hardwood industry, which could suffer losses as a result of climate change.

ABARES predicts an 11 per cent decrease in hardwood productivity, resulting in an estimated \$123 million a year in loss for the industry by 2030. "Part of this project will be contacting plantation managers... and trying to get them on board while we're doing this study" James says.

"We actually want to have a major industry impact."

James is completing an undergraduate degree at the Australian National University in genetics but a knack for coding and statistical analysis has seen him gain a data scientist role at the ARC Centre of Excellence in Plant Energy Biology.

He is excited to be working on a project that will have a long-term impact and benefits for everyone.

"There will be a lot of jobs in this industry that are going to be lost if climate change reduces the yield" James says.

"It's a really big problem that humanity is going to face... I just want to be at the forefront of it."



Forest & Wood Products Australia



Forest and Wood Products Australia Limited (FWPA) is a not-for-profit company that provides national, integrated research and development services to the Australian forest and wood products industry.

We are committed to helping the forest and wood products industry to be collaborative, innovative, sustainable and competitive against other industries and products available in the marketplace. We support research and development that promotes internationally competitive and environmentally sustainable practices. We promote activities that enhance employment opportunities and contribute to growing Australia's reputation as an innovative producer of high-quality forest and wood products.

Our mandate is determined by our members, who comprise wood processors, forest growers, and Australian importers of forest products.

Visit www.fwpa.com.au

Dr Rocco Longo



RECIPIENT OF THE Wine Australia Award

Former winemaker and now researcher Dr Rocco Longo is taking the guesswork out of creating beautiful sparkling wines.

Rocco is building an instrument that will attach to a grape press and tell winemakers when it's time to stop squeezing the juice from the grapes.

It measures the amount of phenolics coming from the seeds and skin of the grape.

"The more you press, the more phenolics you are able to extract" Rocco said.

"Phenolics are good, from one side.

"From the other side, if you produce sparkling wine or white wine you don't want too much phenolics because they give you that gritty mouthfeel when you drink the wine."

To stop the pressing at just the right time, winemakers currently have to taste the juice at regular intervals.

And Rocco knows just how hard this can be.

"There are so many factors that can influence the winemaker's testing," he said. "Like if the winemaker is unwell that day how can they actually test the juice in a reliable manner?

"Or if it's too cold or too warm, this also can have an impact on the sensory test."

Rocco's device uses spectroscopy to determine the concentration of phenolic compounds in the juice.

This information is then fed back to the winemaker in real time.

Rocco grew up in Italy and studied viticulture and winemaking at the University of Turin before moving to Australia ten years ago.

He worked as an oenologist in Victoria's Alpine Valley for more than four years and is currently pursuing postdoctoral research in pinot noir provenance and sparkling wine at the Tasmanian Institute of Agriculture in Launceston.

Rocco's device will initially be designed for sparkling wines, and will be trialled in a commercial winery.



Wine Australia

Wine Australia for Australian Wine

Wine Australia supports a prosperous Australian grape and wine community by investing in research, development and extension (RD&E), encouraging growth in domestic and

international markets and protecting the reputation of Australian wine.

Our long-term goal is for Australia to be recognised as the world's pre-eminent wine producing country, and our support of the Science and Innovation Awards is one example of our commitment to the development of the next generation of game changers, researchers, experts and leaders who will drive the Australian grape and wine community's future.

We are funded by grapegrowers and winemakers, through levies and export charges, and the Australian Government, which provides matching funding for R&D investments.

Visit www.wineaustralia.com

Dr Jessica Lye



RECIPIENT OF THE CSIRO Health and Biosecurity Award

Working in biosecurity got Dr Jessica Lye, Research Extension lead at sustainable agriculture research group cesar, thinking about how to stop exotic pests before they reach Australian farms.

Her solution? Teaching avid gardeners in urban areas to look for invasive species and raise the alarm.

Jessica says pests are most likely to arrive in cities, where the majority of ports are located.

"There's essentially a buffer zone between a port of entry and agricultural areas, where there could be more surveillance going on for exotic pests" she says.

Jessica wants to design a network of citizen scientists, such as people involved in community gardens, who can act as an early warning system.

The award will help her test how to attract and maintain those volunteers.

"Are they more attracted to the network if I go out and speak to a group of them face-to-face and explain the situation," she says. "Or are they more attracted if I use social media?

"Are they more willing to stay engaged in the network, and report, if they perhaps have a regular contact from the network coordinator, or if they receive training on a regular basis?"

It's an idea that stems from the US, where Jessica went on a month-long study tour thanks to an AgriFutures Australia Rural Women's Award.

"They've had this master gardener network running in each state for decades" she says.

"They're volunteers and they get training from the agriculture department and universities on how to garden and how to become horticulturalists, and as a part of that they become early detectors."

Jessica's project will be piloted in Melbourne, and at the end of it she hopes to have a blueprint for launching early detector networks in cities around Australia.



CSIRO Health and Biosecurity



With increasing global trade and greater connections, Australia is facing a larger challenge in protecting itself against biosecurity threats. Diseases, pests, invasive animals and plants

can inflict damage to our crops, livestock and farm profits, to our unique environment and occasionally on our human health.

CSIRO assembles strong multi-disciplinary research teams working to achieve optimal health for people, animals, plants, the economy and environment—to tackle major national and international biosecurity challenges. We are working with government and industry to assist in responding quickly to stop threats in their tracks and provide sustainable management strategies. We are exploring new technologies for detection, surveillance, diagnosis and response and we will continue preparing for the next human pandemic.

Overall we aim for a biosecurity system that is pre-emptive, responsive, resilient, and based on cutting edge surveillance, informatics and new technologies for integrated response.

Visit www.csiro.au/en/Research/BF

Hugh McKay



RECIPIENT OF THE Australian Wool Innovation Award

A dislike for fencing on his family farm in Henty inspired Hugh McKay to develop an automatic fencing trailer.

It's a project inspired by hours spent fencing on hot days.

"I always thought it was a very slow, tedious process, moving back and forth up the fence a number of times" Hugh says.

"It's probably my least favourite thing to do on the farm, especially in the middle of summer.

"A lot of effort goes into it and, at the end of the day, if you've done 200 metres, that's a good day's work. "

Hugh studied product design and engineering at Swinburne University, and previously worked for Adshel in Melbourne.

In need of a break, and with his parents glad of an extra pair of hands during the drought, he returned to the family farm a year ago.

But he couldn't help applying his product design background to the fencing trailer.

Using the Smart Fencer trailer begins with placing your phone or controller where you want the fence to start and end.

The system calculates how many posts to load up, depending on post spacing, length and distance.

"Once you've got all your posts in the machine and your wire spinner's set up, then you just drive to the beginning of the fence" Hugh says.

"It'll pull the fence posts out individually, bang them into the ground, tell you to go forward and build the fence as you drive along."

His Science and Innovation Award project will help Hugh develop a working prototype of his trailer and hopefully get it into production.

He estimates that investing in a fencing trailer would pay off within a few years for an average farm, and greatly reduce the time and labour needed for fencing.



Australian Wool Innovation



Australian Wool Innovation Limited (AWI) is the research, development and marketing (RD&M) organisation for the Australian wool industry.

AWI is responsible for managing and investing levy funds received from over 55,000 levy payers

and matching eligible R&D contributions from the Australian Government.

AWI invests in RD&M across the supply chain to enhance the profitability, international competitiveness and sustainability of the Australian wool industry, and to increase the demand and market access for Australian wool.

Visit www.wool.com

Dr Elliot Scanes



RECIPIENT OF THE Fisheries Research and Development Corporation Award

University of Sydney marine biologist Dr Elliot Scanes wants to ensure future generations can enjoy an Australian icon—the humble oyster.

Elliot has partnered with the NSW Department of Primary Industries to investigate oysters' microbiota, or the bacteria, viruses, fungi and other single-celled animals that live within them.

All animals, be they oysters or humans, have microorganisms living inside them.

"These microorganisms are really important to our health and wellbeing" Elliot says. "But we're really only just discovering how important they can be."

Elliot says oysters might not have as strong an immune response as mammals.

This, combined with their exposure to changing environments, leaves them vulnerable to diseases and other pathogens.

"Microorganisms associated with oysters are really important in helping them fight disease, and also be healthy in general" Elliot says. Elliot's project has two parts; the first is looking at how climate change, especially the warming of the oceans, might affect the microbiota inside oysters.

The second is to see if existing techniques, such as selective breeding, can be used to improve that microbiota.

Elliot says it's an area of research that has only recently been opened up by new techniques and equipment.

"It's a clean slate, if you will, for us to begin to really explore these questions" he says.

Elliot has always loved the coast, and marine biology was a natural fit.

He enjoys research on oysters because it can both answer a lot of interesting questions in marine biology and improve food production.

"Oysters are a real cultural icon in Australia" Elliot says.

"We know that diseases are one of the biggest issues with oyster growing, so if we can wind that back a little bit, it'll be really rewarding to know that we actually helped the industry that way."



Fisheries Research and Development Corporation



The FRDC's vision is for Australia to have vibrant fishing and aquaculture sectors which adopt world-class research to achieve sustainability and prosperity.

The FRDC recognises that it is vitally important to support young people to develop the knowledge and capabilities to assist the fishing industry to reach its potential. Across fishing and aquaculture there are challenges, and opportunities where young scientists can make a difference, forging new frontiers and building a rewarding career.

In future Science and Innovation Award rounds, the person we are looking for to receive a FRDC sponsored award will have a great idea, and will be keen to use this opportunity to build their networks with other researchers, the FRDC and with industry.

Visit www.frdc.com.au

Dr Kirsty Short



RECIPIENT OF THE Australian Eggs Award

University of Queensland research scientist Dr Kirsty Short is sequencing the genome of a Western Australian emblem—the black swan—to help protect chickens from bird flu.

Black swans are very susceptible to bird flu, or avian influenza, Kirsty explains.

But a close relative known as the mute swan is more resistant to the disease.

Kirsty hopes that by comparing the two, she can determine which genes are responsible for the difference in susceptibility.

"Avian influenza in the black swan looks very much like avian influenza in the chicken" she says.

"The birds can die within 24 hours, the virus infects the cells that line the blood vessels and you get a lot of haemorrhaging.

"That doesn't seem to happen to other species of swans, and this is really interesting because most of the genes between different swan species are pretty conserved." If Kirsty can identify a gene that confers resistance to bird flu, it could be introduced to poultry through selective breeding or genetic modification.

Kirsty believes human and animal health are intrinsically linked.

"A disease outbreak in an animal species can have really important implications for human health and also vice versa" she says.

"Avian flu is a really perfect example of that, because avian flu is a massive problem for the poultry industry it causes millions of birds to be culled.

"But there is also a chance that those viruses could jump over to humans.

"And that's really concerning because often those strains have a very, very high mortality rate, so it could be up to about 60 per cent."



Australian Eggs



Australian Eggs is a member owned not-for-profit company providing marketing and research and development services for the benefit of Australian egg farmers.

Working together with the egg industry and the Australian Government, Australian Eggs strives to deliver value to industry and the public by investing in programs that increase egg consumption and ensure industry sustainability. All known Australian egg farmers are serviced by Australian Eggs, irrespective of their size, location or farming system.

Australian Eggs conducts R&D across a wide range of topic areas including:

- · feed and hen nutrition
- · flock health and disease management
- · environmental sustainability
- · food safety and human nutrition
- animal welfare
- extension, adoption and technology transfer.

Visit www.australianeggs.org.au

Anne Watt



RECIPIENT OF THE Australian Pork Limited Award

During her PhD research at the University of Melbourne, Anne Watt was part of a team that discovered a completely new bacteria causing respiratory disease in Australian pigs.

But at the end of Anne's studies, a lot of questions remained.

Is the novel *Glaesserella* species she found common or uncommon? How we can treat it? And could we be missing other diseases out there?

Anne, now a research fellow at the University of Melbourne, is hoping to answer some of these questions to help Australian pig producers manage respiratory disease in their herd.

Her Science and Innovation Award project will examine the presence of the new *Glaesserella* species, as well as *A. pleuropneumoniae*, *G. parasuis* and *A. indolicus*, in the lungs of pigs.

If the diseases are common, Anne also wants to help producers weigh up treatment options such as antibiotics, vaccines or better management of animals on the farm. "I was really excited to be able to design a project that's going to attempt to answer some of these questions" she says.

"I'm lucky that it was a project that I really enjoyed and I now have the opportunity to carry that on."

Anne has always loved animals, often visiting family in rural Victoria as a child, and is driven by wanting to improve the health of production animals.

This project is a meeting of three areas she loves—animals, disease and microbiology.

"If I can be doing research that is making animal systems better... it's great for the farmers" Anne says.

"And it ultimately helps the animals to make them as healthy and happy as possible."



Australian Pork Limited



Australian Pork Limited (APL) is the national representative body for Australian pork producers, and is located in Barton, Canberra.

APL is a producer-owned not-for-profit company delivering integrated services that enhance the viability of Australia's pork producers. APL delivers integrated marketing, innovation, and policy services through the pork supply chain, in association with key industry and government stakeholders, and aims to address five core objectives:

- growing consumer appeal
- building markets
- driving value chain integrity
- leading sustainability
- improving capability.

APL is primarily funded through statutory pig slaughter levies with additional research-specific funds provided by the Australian Government. All levy paying producers are entitled to free membership with APL and those who aren't required to pay levies can apply for associate membership.

Visit www.australianpork.com.au

Ashlea Webster



RECIPIENT OF THE AgriFutures Australia Award

NSW Department of Primary Industries technical officer Ashlea Webster is building a small, portable device and a novel test to tell farmers whether their inoculants are working without having to leave the field.

Ashlea's Science and Innovation Award project aims to develop a fast, accurate and cost-effective method to identify active strains of rhizobia in legume crops.

Rhizobia are a type of bacteria that form a symbiotic relationship with legume plants.

The rhizobia fix nitrogen from the air, effectively producing a free, natural fertiliser for the plant.

The relationship contributes billions to Australian agriculture each year, and is boosted by farmers applying rhizobia inoculants to their crops.

Unfortunately the inoculants don't always work as well as they could this is where Ashlea's test comes in.

She plans to sequence the genomes of 21 strains of rhizobia and develop a molecular assay to determine if they're present in legume crops.

Ashlea already has access to a "very small, very cute" PCR machine that can run diagnostics using power from a car battery or a solar panel.

Once the test has been developed, Ashlea hopes it can be taken to a farm or a field day on the back of a ute.

"My project is to take technology that would usually just be available in the lab, and create something that you can actually take out in the field and use," she says.

Ashlea's research career spans from human bacterial infections to animal viruses and fungal infections in plants.

She started at the Australian Inoculants Research Group in NSW Department of Primary Industries, last year.

"Having come from a background where most of the material I was looking at was pathological infections that had a very negative affect on the host, it's been really fascinating looking at the rhizobia and how much they can actually improve the growth of legume hosts" Ashlea says.



AgriFutures Australia AgriFutures AgriFutures Australia

AgriFutures Australia is dedicated to growing the future of Australian agriculture and the long-term prosperity of rural industries and communities through research, leadership, investment and support. In practical terms, this means:

- initiatives that attract capable people into careers in agriculture, build the capability of future rural leaders, and support change makers and thought leaders.
- research and analysis to understand and address important issues on the horizon for Australian agriculture.

- research and development for established industries that do not have their own research and development corporation, including the rice, chicken meat, honey bee and pollination, thoroughbred horse, pasture seeds, export fodder, ginger and tea tree oil industries.
- research and development to accelerate the establishment and expansion of new rural industries, such as deer, buffalo, kangaroo and camel milk.

Our objective is to deliver results that lead to practice change on-farm, greater productivity, profitability, sustainability, capacity and wellbeing.

Visit www.agrifutures.com.au