



Australian Government
**Department of Agriculture
and Water Resources**

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

2017 AWARD RECIPIENTS



We thank our partners for their support and commitment to the 2017 Science Awards.



Australian Government

Cotton Research and
Development Corporation



AMPC



AWI Australian Wool
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MEAT & LIVESTOCK AUSTRALIA



RURAL
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Wine
Australia
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Australian
Wine

The 2017 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 2017 Science and Innovation Awards.

For more information about the Science and Innovation Awards, please visit agriculture.gov.au/scienceawards.

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

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

2017





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From the Chief Scientist

Science in all its forms is a critical foundation of the work and mission of our department to help drive a stronger Australian economy by building a more profitable, more resilient and more sustainable agriculture sector. The department uses its scientific capability to develop practical outcomes that underpin its business. This capability is drawn from a broad range of expert staff in zoology, botany, molecular biology, microbiology, geospatial analysis, food and nutrition science, quantitative science, biosecurity, environmental science and veterinary science.

There is a diverse range of scientific work happening across our department as well as in the agricultural sectors. This work is led by committed and innovative staff who bring science and scientific evidence to the fore to support our nation's agricultural, fisheries and forestry industries.

And it's this shared commitment and passion for science and its role in agriculture that is reflected by the winners of the 2017 Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry.

I'm delighted to present to you this next generation of young scientists, researchers and innovators who share this commitment to the continued success and sustainability of our agricultural industries. I encourage you to read about each of the recipients and their projects, which span innovative approaches to water management, smarter approaches for on-farm energy sources, improving health outcomes for cattle, sheep and honeybees; and improving crop productivity.

Their fascination with how science can support and improve our agricultural industries to be more productive, competitive and innovative is welcomed.

I thank our Award partners for their continued generous support of the Science and Innovation Awards, and the dedication and expertise of the numerous judging panel members who selected the research projects presented by the 2017 recipients. As our Science Award partners will confirm, applications in this 2017 round were highly competitive and demonstrated original thought and sound understanding of industry issues.



Dr Kim Ritman
Chief Scientist

Department of Agriculture and Water Resources



Since 2001, the Science Awards have helped more than 220 young Australians make their ideas a reality and showcase their talent to the world.

About the Science Awards

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

The Awards attract applications from young Australians 18 to 35 years – scientists, researchers, innovators – whose projects demonstrate a fresh way of thinking about, and resolving issues for, agriculture.

The 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 and innovators aged 18–35 years 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.

In 2017 there were 11 Award categories open to applicants, including cotton; dairy; established, new and emerging rural industries; fisheries and aquaculture; grains; health and biosecurity; meat and livestock; pork; red meat processing; viticulture and oenology and wool. Each Award category is generously supported by the leading research and development corporations and industry organisations.

Recipients of the Awards receive grant funding to pursue their research project and share their results with industry, their Award partner and the Department of Agriculture and Water Resources. Recipients can build strong networks across their industry while gaining national and international exposure for their work by presenting at conferences and seminars, and through publishing papers.

The successful category Award recipients are then invited to apply for additional funding for an extended research project – the Minister for Agriculture and Water Resources Award.



Dr Clare Anstead

Recipient of the Australian Wool Innovation Award

Clare Anstead is tackling one of sheep farmers' most hated diseases—flystrike.



“It’s horrible for the animals, it’s horrible for the farmers because they’re seeing their animals suffering, and then obviously the amount of money that’s lost every single year is also really awful for the farmers.”

Flystrike is caused by the Australian sheep blowfly *Lucilia cuprina*, and costs farmers hundreds of millions each year in Australia alone.

It occurs when the blowflies lay their eggs in the folds of the sheep’s skin, often around the buttocks.

When the larvae hatch, they essentially eat the sheep alive.

Everything has been thrown at the disease in recent years, from mulesing to insecticides, vaccine research, biological control and genetic manipulation of the fly.

“*Lucilia* is really fascinating as a parasite because they develop resistance to insecticides so quickly, which makes them very, very difficult to control,” Clare says.



“We’re coming at it from a genomics approach” explains the University of Melbourne lecturer.

“We can start identifying the genes that are specific to *Lucilia*, and those are the ones that we’re hoping to target down the track as a completely novel means of control.”

Despite being early in her career, Clare, who grew up on the prairie province of Saskatchewan in Canada, already has a paper in *Nature Communications* under her belt.

She says she loves that the flystrike project is brand new.

“I’m just so excited,” Clare says.

“Omics technologies are becoming the norm now, which is incredible because when I started studying I hadn’t even heard of them.

“The fact that we’re able to identify these genes and then down the track knock them out... it’s so cool.”



awi Australian Wool Innovation Limited

Australian Wool Innovation Limited

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 45,000 levy payers and matching eligible research and development (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.

 www.wool.com



Dr Caitlin Byrt

Recipient of the Grains Research and Development Corporation Award

Food loving plant biologist Caitlin Byrt is stealing the traits of weeds to make cereal crops more successful in salty or drought-affected soils.



Caitlin will study the roots of the wild relatives of barley crops to see what makes them so tolerant to stress.

These traits could then be crossed into modern cultivars, resulting in higher grain yields.

The University of Adelaide graduate, says the real challenge is to figure out which traits are actually useful for modern agriculture.

“Mangroves grow in seawater, so obviously they’re really tolerant to salinity,” she says.

“But it’s not like mangroves necessarily have traits that are useful to growing a cereal crop.

“We can’t have cereal crops that have ginormous mangrove-like roots.”

Luckily Caitlin has already had success in this area with a similar project looking at a wild relative of wheat.



Caitlin was able to identify two key genes making a wild wheat variety more salt tolerant, which were crossed into modern cereal varieties.

The project achieved a 25 per cent increase in durum wheat grain yield in saline soils, and the traits and genes were distributed to more than 18 countries.

Caitlin says the barley project offers access to an amazing collection of plants with huge genetic diversity.

Amidst this collection she’s very likely to find a trait that’s beneficial, boosting not just Australian farmers but food supplies around the world.

“Food security is something that really concerns me and always has done,” Caitlin says.

“I enjoy good, fresh, high-quality food—that’s a priority for me—and so I would like to see a situation where we can continue to enjoy that into the future.”



Grains Research and Development Corporation

The grains industry plays a vital role in Australia’s economy, comprising 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 \$192 million in around 900 RD&E projects to directly benefit 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 the aim is to continually break new ground for growers.

GRDC is working to ensure Australian grain growers have:

- better practices developed faster
- access to superior varieties that enable them to effectively compete in global markets
- new products and services (both on and off farm) to assist growers to effectively compete in global grain markets
- the awareness and capacity to optimise adoption of grains research outputs.

 www.grdc.com.au



Dr Alison Carey

Recipient of the Dairy Australia Award

Brisbane based biomedical scientist Alison Carey is applying her expertise in human vaccines to prevent dairy cows from getting mastitis.

Alison will be looking at immune responses to the highly contagious bacteria *Streptococcus agalactiae* and *Streptococcus uberis*—which cause bovine mastitis—in the first step towards developing a vaccine.



Alison, a Research Fellow at the Queensland University of Technology, says when immune cells respond to infectious agents they deposit little bits of protein on the surface so other immune cells can start mounting a response.

“We’re going to infect immune cells with the streptococcal strains, and then isolate these little bits of protein on the surface of the cells and identify them,” she says.

“Hopefully if we can work out what they are we can amplify those sorts of immune responses.”

Bovine mastitis occurs when bacteria enters a cow’s teats and causes the mammary gland to become inflamed.

It severely impacts the quantity and quality of milk produced, and costs farmers upwards of \$200 per cow for every clinical case of mastitis.

Infections are currently controlled by cleaning teats after each milking, long-acting antibiotics or culling of the cow.



Alison’s work will ultimately be combined with other research on *Staphylococcus aureus*, in a bid to develop a vaccine that targets all three major causes of bovine mastitis.

“I’ve done a lot of work with *Streptococcus* in humans, and we’re always looking at ways to apply our knowledge to other areas that we can progress a bit further as well,” she says.

“I had identified that *Streptococcus* also causes these other infections in the bovine area.

“I saw the Science and Innovation Awards come up and thought, ‘I can instantly apply my human models to this model as well’”

Alison grew up on the Central Coast of New South Wales, and completed a Bachelor of Science (Hons) at the University of Newcastle in 2004 and commenced her PhD in vaccine development there. In 2007 the research lab, including Alison, relocated to QUT, where she finished her studies in 2010.



Dairy Australia

Dairy is one of Australia’s leading rural industries, with a \$3.7 billion annual farmgate value and an estimated wholesale value of \$13 billion.

The Australian dairy industry is recognised for its excellence in innovation, and has significantly increased the productivity and profits of its farms through improved pasture, feed, herd management and efficiency gains in manufacturing, distribution and exports. The industry encourages and nurtures young innovators and offers them exciting careers prospects.

The Science and Innovation Award and Dairy Australia’s Scholarship programs are two examples of Dairy Australia’s commitment to building industry capability by helping propel promising and innovative individuals into rewarding dairy careers.

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

 www.dairyaustralia.com.au



Dr Benjamin Holman

Recipient of the Australian Meat Processor Corporation Award

Ben Holman wants to swap subjective colour chips used to grade meat in abattoirs with a smart phone.

The University of Tasmania PhD graduate has gained significant experience through hands on experience at several farms and is currently working towards his Masters of Biostatistics at the University of Queensland.



Ben's Science and Innovation Awards project will test a new colorimetric instrument called the Nix™ Pro Colour Sensor to see if it can be used to measure dark cutting.

As Ben explains, this project is the first to explore the capacity of smart device integration with Nix™ Pro Colour Sensors to provide an accessible, easy to use and replaceable technological alternative for dark cutting and colour evaluation.

Dark cutting is the term used for meat that does not bloom or brighten when it is cut and exposed to air.

Customers prefer beef cuts to be a bright red colour in shops and avoid dark coloured meat, making it less valuable.

Dark cutting is thought to occur in 10 per cent of all beef carcasses at a cost of more than \$36 million a year.

Currently most meat is classified in abattoirs using subjective manual measures.



Until recently the only alternative has been expensive scientific instruments that were impractical in messy abattoirs where everything needs to be hosed down at the end of the day.

But the Nix™ Pro Colour Sensor could deliver colour measurements comparable to existing technology worth thousands.

If successful, the technology could make it easier to do repeat, accurate measurements of meat quality with minimal training and could be used to estimate other useful measures of carcass quality.

Cowra based Ben says he is looking forward to working more closely with industry.

"It's good getting out there and having a yarn with industry because you tend to learn more about the issues and the gaps that need to be filled," he says.

"It gets me out of the office to where the action is."



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.

Red meat processor levies are strategically invested in research, development and extension programs that are aligned to targeted marketing initiatives. These programs deliver outcomes and benefits for both the Australian red meat processing industry and broader Australian community.

AMPC supports projects in processing technologies, environment and sustainability, food safety, product integrity and meat science, and market access.

Project topics for future students would relate to the following areas, focusing on the red meat processing industry:

- Investigating factors towards enhancing meat quality and product integrity (including eating quality and food safety).
- Investigating options for enhancing sustainability, including environment, waste, energy and water management and efficiency.
- Innovative new technologies that improve meat processing processes and efficiency.
- Supply chain management and market access, including integrated supply chain approaches and value adding to products.
- Social license to operate and community engagement exercises and
- Understanding of the changing regulatory environment and the subsequent impact to the industry.



Dr Priscilla Johnston

Recipient of the Cotton Research and Development Corporation Award

As a precious resource in agriculture, water management is a critical issue for industries, with chemist Priscilla Johnston's Science and Innovation Award project focusing on the cotton industry. Growers have already made huge steps toward reducing their water usage, and by adopting emerging technologies.



Priscilla is hoping to make the most of available water resources with a new 'smart' polymer she created for use in agriculture as part of her postdoctoral research.

"This polymer can be sprayed out onto soil to form a barrier that slows down water evaporation and keeps more water in the soil for the plant to use," she says.

"It's been specially designed so that water is also able to pass through it and into the soil."

"Because of that very special feature, there's opportunity that we can use it on rain-fed crop systems and surface irrigated crop systems."

Priscilla's polymer has already been shown to reduce the rate of water evaporation by up to 77 per cent compared to bare earth.

It's non-toxic and degrades in the soil.



But the Science and Innovation Award will take the project to the next step with trials of the polymer on cotton crops.

Priscilla is interested in using polymer chemistry to solve real world problems.

She has already made polymers to help increase the lifespan of solar cells and produced new 'green' plastics that can be chemically broken down and fully recycled with UV light.

But this will be a new challenge for Priscilla, who will swap her usual round bottom flasks and chemistry lab for the glasshouse.

"I'm looking forward to growing cotton," she says. "Just being in the glasshouse and seeing the polymer in action will be a wonderful experience."



Australian Government

**Cotton Research and
Development Corporation**

Cotton Research and Development Corporation

The 2017 Science and Innovation Awards are supported by the Cotton Research and Development Corporation (CRDC) as part of its commitment to investing in research, development and extension (RD&E) for the world leading Australian cotton industry.

CRDC's invests along the entire cotton supply chain, from the farm to the customer. One of its core focus areas is its investment in people: ensuring capable and connected people drive the cotton industry. As such, CRDC supports and rewards young scientists for their exploration of concepts and creation of new knowledge in the pursuit of scientific breakthroughs.

CRDC strongly believes in investing in cotton's most important resource – its people – to help achieve the industry's vision for a globally competitive and responsible cotton industry, delivered through RD&E.

 www.crdc.com.au



Dr Natoiya Lloyd

Recipient of the Wine Australia Award

How many components can you taste in a glass of wine? Blackberries? Plums? Maybe some oak? But what about less desirable components like smoke taint? Chemist Natoiya Lloyd is able to examine hundreds of compounds in wine with a single chemical screening.



Natoiya's Science and Innovation Award project uses cutting edge analytical chemistry techniques to detect smoke taint in wine, and give winemakers better information to ensure the quality of their product.

"Around the world controlled burns and wildfires can lead to unavoidable smoke drift into vineyards," the Urrbrae, South Australia based Natoiya says.

"This can cause the formation of taint compounds in grapes and significant economic losses if the quality of the finished wine is affected."

Natoiya is set to analyse wine using metabolomics, an innovative screening technique using high-end analytical instrumentation and bioinformatics tools.

It aims to measure as much of the chemical composition of a sample as possible in the one analysis.



"At the moment winemakers can get their samples screened for specific compounds that we know are associated with smoke taint in wine," she says.

"But it's not a full, complete picture of all the components that are contributing to smoke taint because of the diverse range of fuel sources for fires.

"For industry to access such a screen gives them a much broader understanding of the effects, if any, of a particular smoke event."

Not one to shy away from thorough research, Natoiya can often be found in vineyards helping with grape picking or pruning.

She's even part of a small group that has their own batch of wine on the go.

"It's good to get out in industry and understand the whole process so you can contribute and add more value," Natoiya says.

Wine Australia for Australian Wine

Wine Australia

The Australian Grape and Wine Authority, which trades as 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 wineaustralia.com for information about our current RD&E projects and research priorities.

 www.wineaustralia.com



Dr Kate Loudon

Recipient of the Meat & Livestock Australia Award

Veterinarian Kate Loudon's simple remedy of magnesium supplements could boost cattle growth rates while reducing the incidence of dark meat.



Magnesium deficiency has been known about for a long time.

But the focus in cattle has always been when cows have obvious clinical signs of grass tetany, when the animals convulse and can die.

“What we’re starting to see with other recent research is that it’s actually having some impacts on the animal even when there’s not an obvious clinical sign,” Kate explains.

Previous magnesium supplementation trials saw a 20-25 per cent boost in growth rates for lambs grazing cereal forage crops and lucerne.

If similar effects are seen in cattle grazing grass pastures it would result in substantial economic benefit to the beef industry.

“It’ll be interesting to see what [the growth rates improvements are] in cattle,” Kate says.

“Even if it’s not up to that magnitude, even 10 per cent is a huge difference.”



Low magnesium has also been linked to an increase in dark cutting, which costs the beef industry tens of millions every year.

Kate says the project will be the first time research has been done into magnesium and the growth rates of cattle grazing on grass pasture.

“If magnesium supplements can be shown to work, it has the potential to be a very practical, cost-effective solution for farmers,” she says.

“If we can prove the benefits... it will bridge that gap really nicely from science to the farm without it being overly complicated or cost prohibitive.

“It’s a really on the ground, practical solution.”

Kate currently lectures and teaches clinical production of animal medicine to veterinary undergraduate students at Murdoch University.



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 world-class research and marketing initiatives that contribute to producer profitability, sustainability and global competitiveness.

 www.mla.com.au



Dr Kym Patison

Recipient of the CSIRO Health and Biosecurity Award

Rockhampton based Research Fellow Kym Patison is harnessing the social interactions between cows to alert producers when something is wrong.

Her project aims to develop an on-farm welfare monitoring system that uses proximity loggers attached to animals' necks.



When two cows come together, the loggers record when and how long they interact for, and can be used to alert farmers to any unusual behaviour.

“Cattle have quite set social structures,” Kym says.

“They have regular contact patterns that they make with members in the group and they’ll contact some more than others depending on the relationship that they have with them.”

Eventually farmers will be able to use the information to detect animal health issues, such as a sick animal, or problems in their environment, such as the presence of a wild dog or an empty trough.

“The producers will be able to see this from their computer, or an alert would be sent to their phone, and they can check on them straight away,” Kym says.

Kym grew up on a dairy farm in south west Victoria and worked with cows right up until she started her PhD at the University of Melbourne.



“Once they get used to you they love seeing you and getting a good scratch,” she says.

“They’ve got beautiful eyes and can be very graceful creatures. I love working with them.”

She says it was a big change going from the dairy industry to extensive beef operations.

Moving to Rockhampton made Kym realise how difficult it was for extensive beef producers to get to know their cattle like a dairy farmer knows their cows.

“[On the dairy farm] you get to know individual cows and they’re kind of like your pets, it makes it easier to know when something’s wrong,” she says.

“Whereas on extensive operating systems it’s almost impossible to have individual relationships with each of the animals.

“There’s different challenges in both... but technology is a way of bridging the gap and improving the way animal welfare is monitored.”



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 under the banner of one-Health – the integration of multiple disciplines 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.



www.csiro.au/en/Research/BF

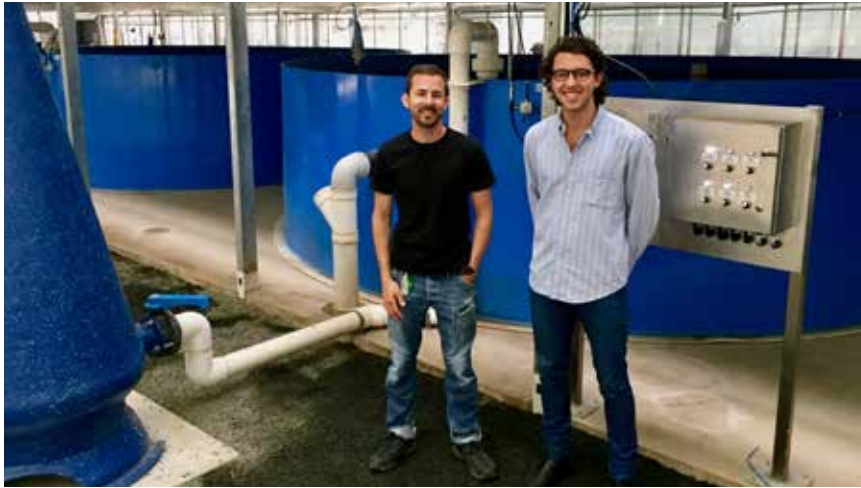


Kevin Rassool

Recipient of the Fisheries Research and Development Corporation Award

What do doctors fighting pneumonia in developing countries and aquaculture farmers have in common?

They both stand to benefit from a world-first invention that generates oxygen without the need for electricity.



Bundoora based engineer Kevin Rassool is part of the brains behind FREO2 Siphon, a device that uses the potential energy of flowing water to concentrate oxygen.

The invention was developed after one of FREO2's founders attended a talk by a world-leading pneumonia expert about the struggle to provide electricity to rural villages to treat sick children.

He asked 'did they really need electricity?' Or just oxygen?

The group of physicists, engineers and medical professionals put their heads together and the device was born.

But there's another industry crying out for oxygen without power—aquaculture.

Kevin is working with Green Camel, a barramundi farm in south-west Sydney, to see if the FREO2 Siphon can supply oxygen the company would usually have to buy in.

"We are going to test the feasibility of using our system, which doesn't use any electricity, to meet the oxygen demands of the fish in aquaculture," he says.

"We see it as a double win. Any technical gains, any innovation, anything that occurs in the aquaculture stream is directly applicable to the medical stream and vice versa."

If the invention can be shown to work at Green Camel, it could be implemented across the industry.

"If this were to be able to be rolled out in many aquaculture facilities globally, it could improve food security worldwide," he says.

"I found a passion for development through my travelling and volunteering in communities nationally and abroad. The goal for my engineering studies at the University of Melbourne is to equip me with the skills and knowledge to drive positive change in those communities and many more like them. Working at FREO2 for the last two years has provided an intersection of my passion for development and my skills in engineering."

Kevin is due to complete his Masters of Mechanical Engineering in 2017 and intends to continue on to a PhD at the University of Melbourne in 2018.

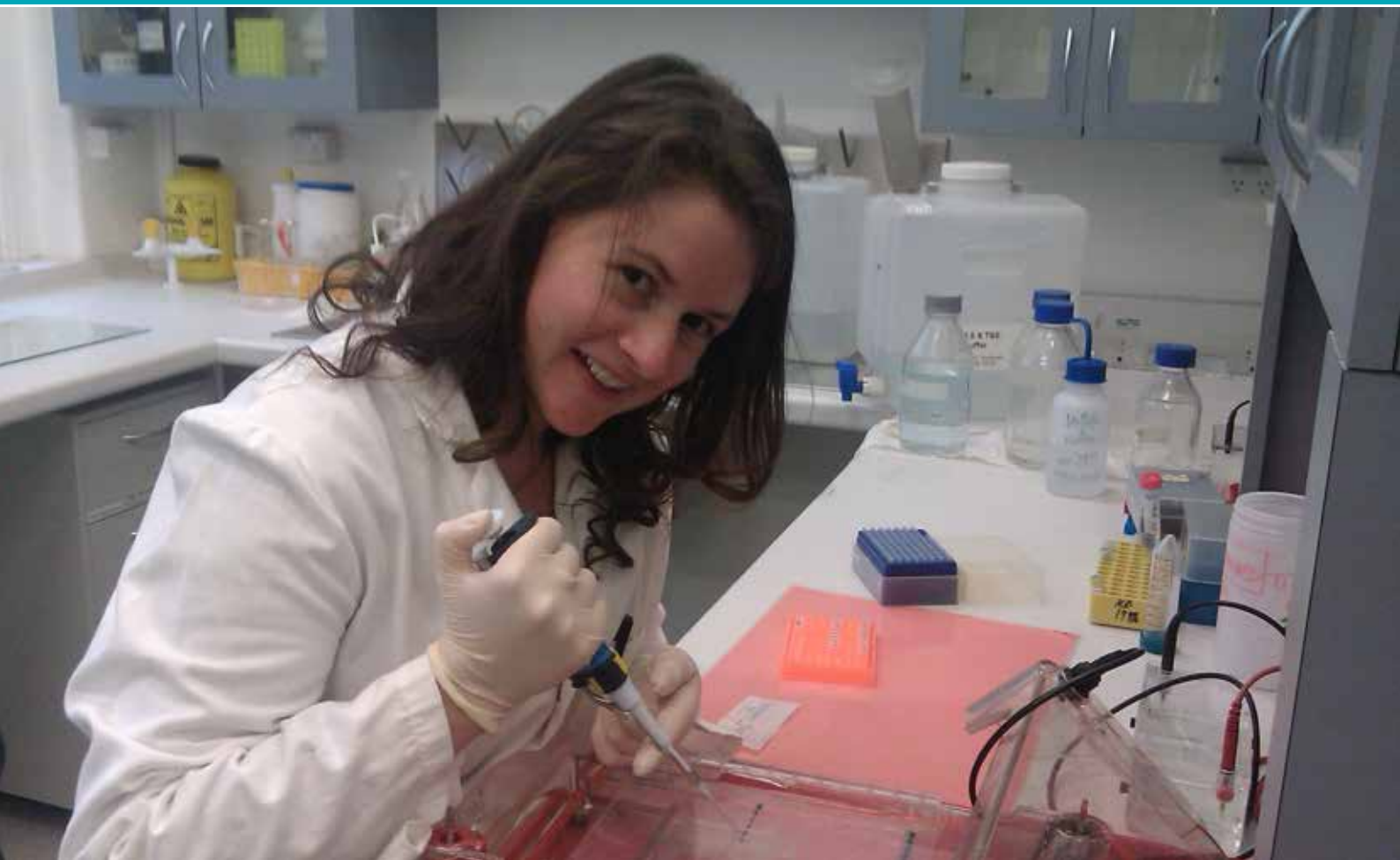


Fisheries Research and Development Corporation

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.

The fishing industry faces significant challenges, but it also provides enormous opportunities to build a rewarding career. 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.

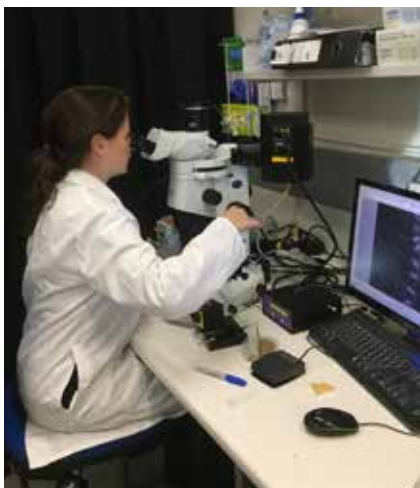
 www.frdc.com.au



Dr Emily Remnant

Recipient of the Rural Industries Research and Development Corporation Award

Emily Remnant hopes to protect honeybees from viruses—by infecting them with bacteria. With honeybee populations around the world being decimated by disease, Emily is investigating if the symbiotic bacteria *Wolbachia pipientis* can be used as a form of immunisation.



“This bacteria helps other insects fighting viruses but it hasn’t been examined in honeybees yet,” she says.

“So I’ll test the bacteria in bees and see if it helps them survive damaging viruses.”

Wolbachia has already been shown to give virus resistance to flies and prevent mosquitoes transmitting dengue fever.

Emily grew up in Wangaratta, a regional centre in the north east of Victoria, and moved to Melbourne to study science at the University of Melbourne. She fell in love with genetics and started her PhD investigating the genetic basis of how insects become resistant to pesticides.

“I began working with honeybees in my first postdoc position at the University of Sydney, and became interested in honeybee viruses, and with my background in genetics and resistance, it naturally led to the idea for my current project,” Emily explains.

But infecting a honeybee with a symbiotic bacteria isn’t easy. Emily will have to inject honeybee eggs with bacteria taken from donor insects using a specialised piece of equipment called a microinjector.

She has been in New Zealand learning from the best in the world at the University of Otago, and is one of the only people in Australia with the specialist skill.

Emily says honeybee viruses are often spread by the *Varroa* destructor mite, which is currently not in Australia.

But most beekeepers consider it only a matter of time before the devastating mite reaches Australian shores.

If the bacteria can be shown to work, it could help protect the Australian industry from colony collapses seen in other parts of the world.

Australian beekeepers could export virus-resistant queens.

The horticulture industry would also benefit, with conservative estimates putting the value of pollination to Australian fruit, vegetable and seed production at \$4-6 billion.

“It’s just a new approach,” Emily says.

“Most people try to prevent the viral problem by killing off the *Varroa* mite but the viruses are an issue even without the *Varroa*.

“My approach is innovative because it’s using a natural mechanism to prevent the viruses themselves.”



RURAL INDUSTRIES
Research & Development Corporation

Rural Industries Research and Development Corporation

The Rural Industries Research and Development Corporation’s (RIRDC) core business is to maintain and enhance the productivity of the rural industries it supports and to address national rural issues through government-industry partnership.

RIRDC is specifically charged with managing investment in RD&E for those primary industries which are too small to set up their own RD&E entity and to address multi-industry and national interest RD&E needs. In doing so, RIRDC investments contribute to the delivery of outcomes against the National and Rural R&D Priorities set by the Australian Government.

RIRDC is the primary funding source for RD&E that investigates the potential of new plant and animal industries for Australia, and for providing support to new industries as they mature and grow.

The breadth of issues and industries RIRDC deals with is as varied as it is unique. RIRDC plays a vital role in the development of rural Australia and is the rural R&D corporation with the remit to manage multi-industry and national interest R&D.

 www.rirdc.gov.au



Dr Stephan Tait

Recipient of the Australian Pork Limited Award

If University of Queensland researcher Stephan Tait's Science and Innovation Award project works out, pig manure could be used to power vehicles on Australian farms.

"Farmers are using biogas, which is a gas that's released from their manure treatment systems," he says.



“About 13 per cent of the industry at the moment is using this biogas from the manure treatment, and there’s an ability of about 36 per cent in total of the industry to use biogas.”

But pork farmers are only able to effectively use about 50 per cent of the biogas that they produce, with the rest being used to generate excess electricity that is sold to the grid at low value.

“The key issue is that there’s quite a bit of excess biogas available at pig farms, so farmers are expressing their annoyance that they don’t really have a good use for all the biogas on their farm,” Stephan says.

“We’re trying to explore options for farmers to be able to use that excess biogas for the other fuel needs, like driving tractors or transporting pigs from the farm to the abattoir.



“To do that they need to prepare the gas to a suitable quality and the technology just isn’t available in Australia at the moment at a reasonable cost.”

Where biogas is being used to its full potential is in Europe, where it’s used to fuel vehicles.

Building on the work of the Pork CRC and Australian Pork Limited, Stephan will inspect farms in Finland, Sweden, Austria and China, and hopes to bring otherwise undocumented technology back to Australia to benefit the local industry.

“It’s really looking for a good use for that leftover biogas, and helping farmers to use biogas instead of purchased fuel so they can make their businesses more profitable,” he says.



Australian Pork Limited

Australian Pork Limited (APL) is the national representative body for Australian pork producers.

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, and 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 of APL and those who aren’t required to pay levies can apply for associate membership.

APL’s headquarters are in Barton, Canberra with state-based marketing managers and other regionally based staff located in Sydney, Melbourne and Bendigo.

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