Australian Government

Department of Agriculture and Water Resources

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

2018 AWARD RECIPIENTS

We thank our partners for their support and commitment to the 2018 Science Awards.

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The 2018 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 2018 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.

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

2018

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From the Chief Scientist

Good science is the foundation of productive, competitive and sustainable agriculture, fisheries and forestry industries. It also plays an essential role in public policy development and evidence-based decision-making across our department.

One of the key public activities in the science field run by our department is the annual Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry. It provides grant funding to support innovative research projects that have the ultimate objective of supporting a successful and vibrant agriculture sector, with research that can be transferred for on-farm benefit.

I am pleased to introduce to you the recipients of the 2018 Science and Innovation Awards. Each of them have been able to demonstrate innovation in scientific or technological approach whilst relating their project to a significant, long standing or emerging issues for our primary industries.

This year's recipients have showcased their commitment to, and knowledge of their chosen industry, by developing individual projects that over the next 12 months, will provide informed research outcomes and benefits to improve industry sustainability and success.

I encourage you to read about each recipient and their project. This year's projects ranged from improving health and welfare outcomes for pigs, sheep, calves and cows; developing an educational aquaponics system; creating high efficiency fertilisers from waste; plant heath diagnostics for grain legumes and grapevines; exploring a natural resistance to avian influenza; producing high value compounds using microalgae, and improving the eating quality of lamb meat. I am delighted these research projects will be undertaken as part of this year's Science and Innovation Awards cohort.

I especially want to thank our Award partners for their ongoing commitment and generous support. Partners provide their Award recipients with industry expertise and advice to assist recipients work on their project, 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 2018 recipients of the Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry.

Dr Kim Ritman
Chief Scientist
Department of Agriculture and Water Resources

Since 2001, the Science Awards have helped more than 230 young Australians make their ideas a reality and showcase their talent to the world.

About the Science and Innovation Awards

Each year 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 supported more than 230 individuals by providing grant funding for 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 through publishing papers. Ultimately each has the chance to progress in their chosen career.

In 2018 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 category is generously supported by the leading research and development corporations and industry organisations.

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.

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.

Dr Jamie Barwick

Recipient of the Australian Wool Innovation Award

When Jamie Barwick started his own sheep stud as a young farmer he—like thousands of others—found he had a big problem with parasites.

"I didn't have much of an idea we had a big parasite problem at home," Jamie says.

"And I didn't really know what was causing it, so I thought 'there's got to be a better way that we can actually detect and respond to this'."

Jamie, now a precision agriculture lecturer at the University of New England, is developing a way to automatically pick up parasites by monitoring changes in sheep behaviour.

His Science and Innovation Award project will use motion sensors and GPS trackers attached to the animals to detect changes in activity and movement.

Ultimately Jamie wants to develop a behaviour prediction algorithm that can act as an early warning system for animals showing signs of declining health, leading to earlier detection and intervention before clinical disease becomes apparent.

"I'm working to try and pick that up a little bit earlier than you would in a traditional way of using a faecal egg count," he says.

"I'm looking at whether there's some behaviour changes—possibly that's an increasing behaviour or a decreasing behaviour—or a different grazing location.

"We're hoping to try to pick that up and see if that's related to some increasing worm infection in the sheep."

Jamie is not alone in facing problems with parasites.

Roundworms represent the most expensive animal health burden for the sheep and wool industry, costing more than $430 million a year.

If it works, Jamie's idea could be of real benefit to farmers.

"I'm always trying to align the research with an actual industry need," he says.

"If we can actually do it and a farmer can get an early indication of animals that are becoming unwell, I know that's going to be really valuable."

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 50,000 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

Maddison Corlett

Recipient of the Australian Meat Processor Corporation Award

Murdoch University PhD student Maddison Corlett is hoping to make one of her favourite foods taste even better with research into the best way to package lamb meat.

Traditional packaging with cling film results in the discolouration of meat, which changes from red to brown in roughly 48 hours and impacts negatively on consumer appeal.

So lamb is often packaged in a high oxygen environment, which preserves the cherry red meat colour.

You can see it on supermarket shelves in the form of trays covered with a sealed film of plastic.

But recent research suggests this modified atmosphere packaging (referred to as MAP) can make beef and lamb tougher to eat.

Maddison's Science and Innovation Award project sets out to find the ideal oxygen concentration to maintain the red colour consumers prefer while keeping the meat tender.

The lamb meat she sources will be taste-tested by a panel of everyday consumers who will score the meat on eating quality using the indicators of tenderness, juiciness, liking of flavour and overall liking.

"The red meat industry has invested a lot of money into MAP meat infrastructure because it's delivering the cherry red-coloured lamb meat consumers prefer," Maddison says.

"My project will build on earlier research and aim to show the lowest oxygen concentration that can be used in MAP packaging whilst maintaining the eating quality and the lamb meat colour, allowing processors to continue to use the current MAP machinery in place.

"I hope the research findings will greatly benefit the industry and can be widely adopted.

"I really like that we can deliver real findings to meet consumer demands—people want cherry red, tender meat and I like to think I'm helping to make this happen."

Maddison is looking forward to working with producers and those throughout the supply chain to deliver the best possible product to consumers.

AMPC

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.

www.ampc.com.au

Dr Sofie De Meyer

Recipient of the Grains Research and Development Corporation Award

Sofie De Meyer is using innovative technology to help farmers discover more about the bacteria in their soil quickly and easily for real time nodule bacteria identification.

Legumes are an important component of the grains industry both as crop and as nitrogen fixer for subsequent grain crops including wheat and barley.

Sofie explains legumes form an association with a special type of bacteria known as rhizobia, which can take nitrogen from the air and make it available to the plant.

These bacteria colonise the root nodules of legumes, acting as fertiliser factories within the plants. But the legumes grown in Australia are not native and the right rhizobia are not naturally present in the soil.

"Farmers need to go and buy a product - an inoculant - and then apply that on their legumes," Sofie notes.

"Because this is an investment, farmers need to know how much is required and when it needs to be applied.

"That's where we come in with MALDIID. We have developed a technology that can identify these particular bacteria in legume root nodules very quickly and efficiently."

MALDIID has already proven successful for legume pastures and the award will allow Sofie to create a rhizobia identification module for important grain legumes, including chickpeas, common beans, lupin, peanuts, peas, faba beans, lentils and soybeans.

"You can compare it a little bit with a soil test. Farmers do soil tests to know what their pH is like or what the nutrients in the soil are like, and based on that information they do fertilisation or liming" Sofie says.

"What we offer farmers is a test for legume health."

Growing up in rural Belgium and spending her childhood on a neighbour's farm helping out with harvesting, milking cows and feeding animals, prompted Sofie's fascination for bacteria. She followed this up by studying at Ghent University in Belgium for her masters and later PhD. But moving to Australia Sofie found she had to start from scratch as farming is done in very different ways and the climate is so dramatically different.

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

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

Cassandra Douglas-Hill

Recipient of the AgriFutures Australia Award

Cassandra Douglas-Hill plans to put fresh herbs, micro-greens and redclaw crayfish on the menu in Broome with an ambitious project to bring aquaponics to the remote town.

As her Science and Innovation Award project, the social entrepreneur is set to team up with the local TAFE and other organisations to build an economically and environmentally sustainable aquaponics system. Aquaponics is the combination of hydroponics and aquaculture in a closed system that adds another element of environmental sustainability.

The hydroponics section (or grow beds) of the system aims to intensively grow high value crops such as micro-greens and herbs for the local market. The aquaculture section will experiment producing redclaw crayfish and value added local fish species.

As well as being the only commercial aquaponics set up in Broome, the project aims to educate the community about the benefits of a closed system, as well as local food and sustainable production.

Broome's population triples in the dry season but fresh, locally-grown produce can be hard to come by.

Most food is trucked thousands of kilometres to the town, and Cassandra hopes the produce from her aquaponics system will be a hit with local restaurants.

"We've lived in some remote places before and there's always a need for local food systems," she says.

"What we're trying to do is create a little bit of an addition to the Broome local food movement and grow something, but grow it commercially and do it sustainably."

Cassandra has a long history of success with community food projects.

She started Food for Alice, a food distribution service that advocates for sustainable and ethical local food, while living in Alice Springs, and managed a farmers' market in the Adelaide Hills.

Cassandra moved to Broome a year and a half ago, and is determined to unleash her passion for locally-grown produce on the town.

"People want control over their food systems… and they want something that's fresh and local," she says.

"The community and business desire is there and Broome is an exciting place to be right now to develop this system."

AgriFutures Australia

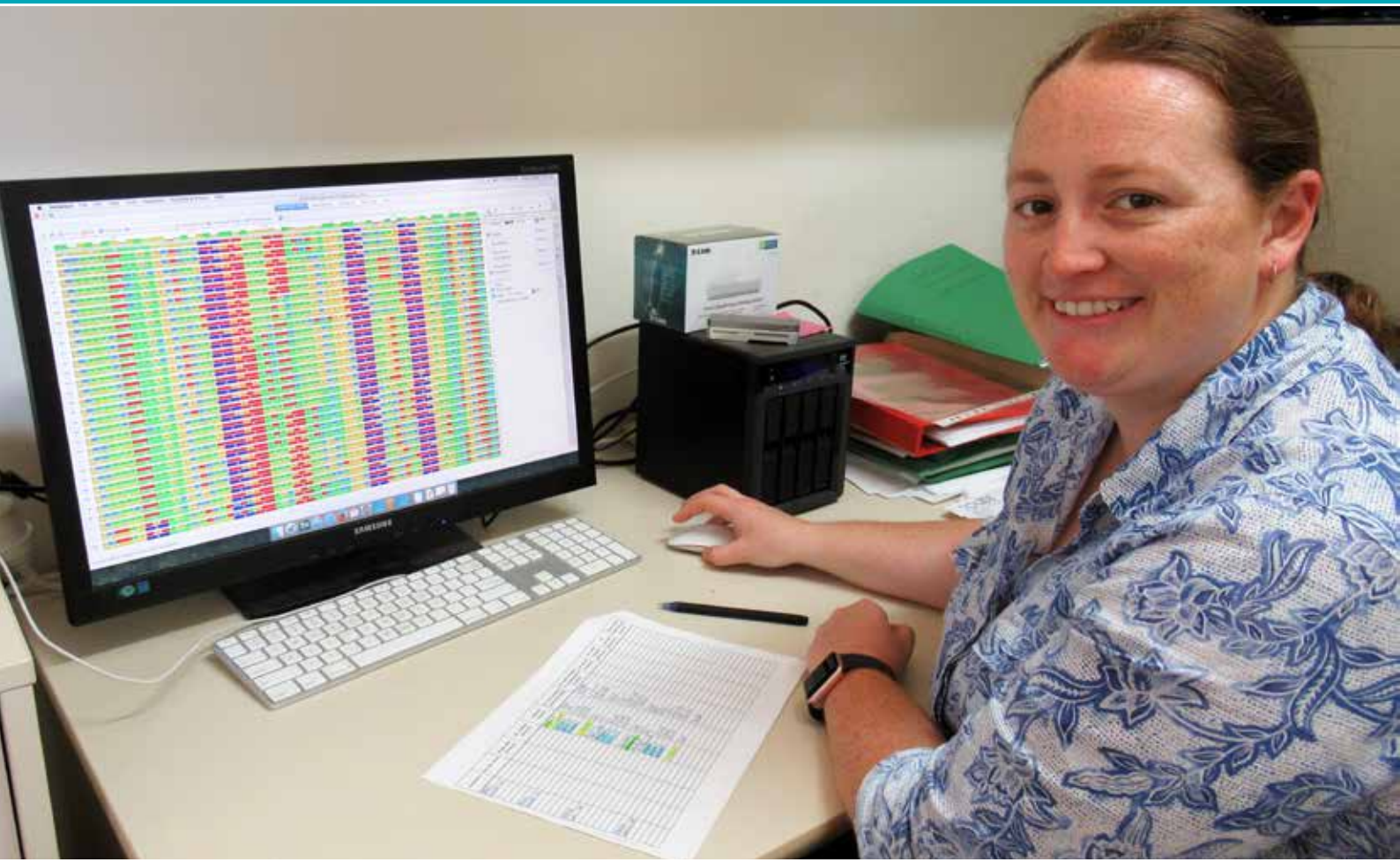
AgriFutures Australia

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.

www.agrifutures.com.au



Dr Monica Kehoe

Recipient of the Wine Australia Award

Molecular plant pathologist and wine lover Monica Kehoe is hoping that a simple test for grapevine leafroll viruses could deliver results in the field in as little as 30 minutes.

Monica's Science and Innovation Award project looks at grapevine leafroll virus 1 and 3, which can cause poor fruit quality and a reduction in yield of between 10 and 70 per cent.

The diseases are a huge problem for the wine industry, with one Australian study finding 13 per cent of vine samples were infected with grapevine leafroll virus 1 and 14 per cent with grapevine leafroll virus 3.

If the test works, vineyard owners will be able to remove infected plants before the virus spreads.

Monica says the first part of the project is to collect samples and then sequence the genomes of both viruses.

"We'll take that and build an improved diagnostic test, and then take that out in the field and test it," she says.

"Those virus genomes will be added to a public database so that everyone can access them.

"And then we'll have the diagnostic that hopefully will be useful for our growers here in Western Australia and the rest of Australia."

Currently with the Western Australia Department of Primary Industries and Regional Development, Monica has been working with plant viruses for 12 years and says she really enjoys designing new diagnostics.

She is excited to be working with wineries in the picturesque Margaret River and Swan Valley regions.

"I do enjoy a glass of wine, and we do have some pretty nice wines here in Western Australia," Monica laughs. "So it's not a hardship to work with these guys."

"And I know that what you can do with it at the end is going to be really useful for the industry."

Wine Australia for Australian Wine

Wine Australia

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 Wine Australia for information about our current RD&E projects and research priorities.

www.wineaustralia.com

Dr Christina Marth

Recipient of the Dairy Australia Award

Veterinarian Christina Marth is helping producers identify cows that may have difficulty falling pregnant.

Christina's Science and Innovation Award project will search for molecular markers associated with subfertility in cows, one of the biggest economic losses for Australian dairy farmers.

She ultimately aims to develop an easy test to identify cows less likely to conceive in the first round of natural or artificial breeding—a move that could completely transform the dairy industry's approach to fertility management.

"This would allow for the targeted treatment of subfertile cows and decreasing calving intervals and thus increasing herd milk production" Christina explains.

Now based at the University of Melbourne, Christina is originally from Germany, where she trained as a vet with a special interest in large animal reproduction.

She has already had success with a similar project in horses, looking particularly at the animals' immune systems.

"When we spoke to people, they always said, 'that's really interesting, but have you thought of doing anything in cattle because for cattle it's so important,'" Christina says.

"For horses… there's a lot of companion horses where it doesn't matter that much whether they get pregnant every year.

"Whereas for cows, it's such a big economic factor for farmers."

"Farmers and the dairy industry could benefit from a simple and innovative cow-side diagnostic test that would provide a reliable diagnosis in a timely manner."

Christina expects to find that genes associated with the immune system are expressed at significantly different levels between cows with normal and reduced fertility.

"It's actually really fascinating to see how well orchestrated the immune system is," she says.

"I think that it has a much bigger impact on fertility in any species than we've given it credit for so far."

Dairy Australia

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.

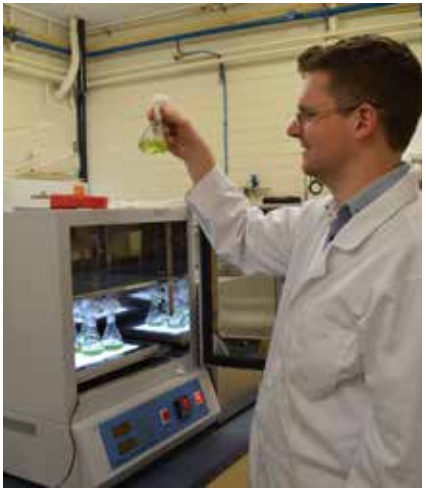
Dairy Australia is the industry-owned national service body, investing in essential research, development, extension and industry services across the dairy supply chain to attain the best outcomes and profits for farmers, the dairy industry and the broader community. This investment helps support and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

www.dairyaustralia.com.au

Dr Dale McClure

Recipient of the Fisheries Research and Development Corporation Award

Wastewater could go from trash to treasure for aquaculture farmers under Dale McClure's plan to use it to produce high-value vitamins and pigments.



Dale sees an opportunity to grow microalgae in the nutrient-rich water left over from intensive fish farming, which producers would usually need to clean up.

A key issue for land-based fish farms is that they produce wastewater rich in nutrients which must be treated before being returned to the environment. One of the significant challenges for the sector is how to treat the wastewater in a cost-effective manner. Dale's project aims to evaluate whether the wastewater can be used to produce high-value compounds using microalgae.

Grow the right type of algae and it could produce high-value compounds—such as Vitamin K and weight loss pigment fucoxanthin—which are highly sought after by the pharmaceutical and food industries. Some compounds are worth more than $10,000 a kilo, and could provide a valuable second income stream for farmers.

"The idea is to take what's a problem for them at the moment and then try and work out how they can make some money out of it or do something more valuable with it," Dale explains.

"I can see it as a win for the farmer. If they just have the tanks there they can run them at a low cost and then generate another product so they've diversified their revenue."

Dale is a chemical engineer at the University of Sydney and—like all great engineers—is excited to be building something new and testing it in the real world.

He has already had success growing microalgae in the lab and is looking forward to taking the technology onto a farm.

"It just seemed like a cool thing to do," he says.

"You can solve the problem of trying to make ingredients that make healthier foods and also solve the environmental issue with the wastewater.

"And for farmers… it's a pretty tough business so if they can have another source of revenue or diversify their income that's another interesting thing that I would like to look at."

FRDC
FISHERIES RESEARCH & DEVELOPMENT CORPORATION

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

Jarud Muller

Recipient of the Meat & Livestock Australia Award

Brisbane based animal production scientist Jarud Muller will investigate why some cows are delayed in delivering milk to their calves after birth, which increases the risk of calf mortality from dehydration.

While recent research indicates 75 per cent of north Australian beef breeding businesses have calf mortality rates of above 5-10 per cent, there is little understanding on how to prevent these mortalities.

Based at the Queensland Department of Agriculture and Fisheries, Jarud says calf mortality can really hurt the producers' hip pocket.

"You're potentially wasting a lot of pasture to carry pregnancies that do not result in a saleable product," he says.

A recent large-scale study showed calf mortality in northern Australia is most commonly associated with poor cow nutrition, heat stress, and handling cows and calves in the months around calving.

"However, we suspect that the specific reason is primarily low milk delivery and the dehydration of newborn calves," Jarud says.

Jarud recently completed a study with 12 Brahman cows and calves at the Department of Agriculture and Fisheries' Spyglass Research Facility in Charters Towers, Queensland.

"Half of the calves received plenty of milk from birth and gained about a kilo a day," he says.

"The other half barely received enough milk to maintain themselves for the first three days of life, positioning them at risk of dehydration if any problems with milk delivery occur.

"This demonstrates the need to investigate problems occurring in the first three days of life, and that's what I am planning to do on a commercial herd scale.

"Until we learn more about the specific reasons for calf mortality in northern Australia, we cannot develop the cost-effective management strategies to reduce it."

The outcomes from Jarud's Science and Innovation Award will potentially inform mitigation strategies and lead to improvements in animal welfare.

MEAT & LIVESTOCK AUSTRALIA

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.

www.mla.com.au

Tanya Nowland

Recipient of the Australian Pork Limited Award

With managing antibiotic use in the Australian pork industry a key focus for the sector, Tanya's innovative approach to correcting enteric dysbiosis, or diarrhoea, in pigs could result the provision of another tool for producers which could potentially further reduce the use of antibiotics in the treatment of such illnesses.

Tanya is investigating whether faecal microbiome transplantations (FMT) can be used to treat piglets with diarrhoea, further reducing the need for antibiotics.

"Post weaning diarrhoea is a common problem seen in pigs and has significant health concerns for the animal. The current methods for controlling this include vaccination, environmental controls, targeted animal husbandry and when other interventions have failed, antibiotics. My Science and Innovation Award project will examine whether FMT can provide a non-antibiotic solution to this problem."

Faecal transplants have been used to improve human health for hundreds of years, with evidence of the technique dating as far back as 4th century China.

Tanya's unique research could be the first time faecal transplants have been tested in farm animals. She plans to take faeces from heathy pigs, extract the bugs and then transfer the bacteria-filled solution to the sick animals.

"I've been really intrigued by the whole microbiome and the gut and all the human research behind it," Tanya a research officer with the South Australian Research and Development Institute, says.

"As soon as I heard about humans, I thought about how to look at this in pigs.

"Some studies in humans are linking it to mental health and things like that... it's just a really interesting concept and it's reallynew."

Tanya grew up on a mango farm in Darwin and fell in love with pig farming during a university work placement.

"With the pork industry and the farmers, they're all really keen for you to come on and improve production."

"They love their pigs and so there's a lot of support in the industry, it's a really positive one to be a part of."

AUSTRALIAN Pork

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.

www.australianpork.com.au

Rhys Pirie

Recipient of the Cotton Research and Development Corporation Award

Growing up on a beef cattle farm near Harden, working on farms during university breaks, and a stint working in Europe for a global biotechnology company prompted Rhys to explore re-purposing organic wastes, such as livestock manure, biosolids, cotton gin trash and sugarcane mill mud, as alternatives to commercial fertilisers.

Rhys, a PhD student at the University of Queensland, explains that while organic wastes are attractive alternatives to commercial fertilisers, there are challenges.

"High transport costs, lower nutrient density, higher moisture content and determining the appropriate nutrient application rates make the adoption and use of organic wastes not as appealing to producers" he explains.

"My Science Awards project will look to develop a low-energy methodology to transform these organic wastes into high-efficiency fertilisers and soil ameliorants derived from domestic waste streams."

As Rhys notes, nutrient use efficiency has large economic and social implications as the loss of nutrients from fertilisers and manures to the environment increases costs for farmers and has large impacts on human and environmental health.

"That was what made me want to look into nutrient use efficiency more," he says.

"This is about trying to close nutrient loops and how to more efficiently fertilise crops."

Rhys will work with a market leading company with expertise in organic waste agglomeration and then test the resulting pelletised fertilisers in greenhouse trials using cotton plants. The next step will evaluate whether the trials can progress to a commercial stage and be economically viable.

"While my project is working with the cotton industry now, there's potential that my research results could be taken up by other agricultural industries, and lead to lower social and environmental impacts from farming systems."

Australian Government

Cotton Research and Development Corporation

Cotton Research and Development Corporation

The 2018 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 capacity building: 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 Kirsty Short

Recipient of the CSIRO Health and Biosecurity Award

University of Queensland virologist Kirsty Short is poised to help improve health outcomes for both poultry and human lives with her research into bird flu.

Asking why chickens are susceptible to the highly pathogenic avian influenza while Pekin ducks are largely resistant, Kirsty will investigate why infected chickens typically die within hours through researching the molecular basis of this species-dependent difference.

"It's actually really horrific if you ever see a chicken infected with it, because they can die within 24 hours of contracting the virus," she says.

"Sometimes it can be so severe they die too quickly to even develop symptoms.

"But if they do develop symptoms... it's nasty. Typically it's things like haemorrhaging, so they get a lot of blood loss, they get a lot of swelling in their feet and their comb."

If you dissect a chicken after it has succumbed to the infection, you will see the virus predominately targets the cells that line the blood vessels—known as endothelial cells.

Kirsty's project will look at the immune response of these endothelial cells in chickens and compare it to ducks.

"If we can identify a particular immune gene that is lacking in chicken endothelial cells or it's just poorly expressed in the chicken, we can try and engineer that into poultry populations," she says, leading to improved biosecurity and poultry health.

One of the biggest concerns with bird flu is that it can jump from poultry to humans, with farmers at high risk.

"Probably the most deadly is the strain called H5N1," Kirsty says. "That strain has infected more than 800 humans to date, and the mortality rate is approximately 60 per cent.

"What we see in these avian flus is that when they cross into the human population they're not easy to spread between humans.

"The people who are contracting them are those that are working with the poultry."

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.

www.csiro.au/en/Research/BF