

Australian Government

Department of Agriculture and Water Resources

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



2016 AWARD RECIPIENTS

Award partners for the 2016 Science and Innovation Awards



Australian Government

Cotton Research and Development Corporation

Australian Grape and Wine Authority





Dairy Australia









Australian Wool Innovation Limited





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The 2016 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 wish to thank the panel of judges for their significant contribution to the 2016 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 2016 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







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From the Chief Scientist

On the 7th December 2015 the Prime Minister, the Hon Malcolm Turnbull MP, announced the Government's National Innovation and Science Agenda. Through this Agenda, the Government will invest \$1.1 billion to incentivise innovation and entrepreneurship, reward risk taking, and promote science, maths and computing in schools by focusing on four priority areas:

- Culture and capital, to help businesses embrace risk and incentivise early stage investment in startups;
- Collaboration, to increase the level of engagement between businesses, universities and the research sector to commercialise ideas and solve problems;
- Talent and skills, to train Australian students for the jobs of the future and attract the world's most innovative talent to Australia; and
- Government as an exemplar, to lead by example in the way Government invests in and uses technology and data to deliver better quality services.

The Agenda is part of the Government's commitment to establishing Australia as a leading innovation system.

Innovation in agriculture, fisheries and forestry is essential to maintain productivity growth, to address issues around sustaining our natural resources and to adapt to a changing climate. I reflected on what innovation means with these Awards, which has been celebrating the best that young agricultural innovators and scientists offer every year since 2001. To me, innovation represents a partnership – between the science community and our agriculture community, our researchers and farmers working together to develop new solutions to industry issues and building a more sustainable and productive agriculture sector.

And I am delighted that the research projects undertaken as part of the Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry, are part of that innovation partnership.

I am pleased to present to you the recipients of the 2016 Science and Innovation Awards. I encourage you to read about each of the recipients and their projects, which span new approaches for pathogen detection and testing, new processing techniques and new technologies, which will benefit a range of agricultural industries.

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 2016 recipients. As our Science Award partners will confirm, applications in this 2016 round were highly competitive and demonstrated original thought and sound understanding of industry issues. Congratulations to our 2016 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



From a competitive field of applications drawn from across Australia, here are the recipients of the 2016 Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry.

About the 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 2016 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.



Giana Bastos Gomes

Recipient of the Fisheries Research and Development Corporation Award

More than a decade of watching devastated aquaculture farmers losing their fish to disease has inspired Giana Bastos Gomes to find a way to detect pathogens before a catastrophic outbreak occurs.



Townsville based Giana is creating a digital device she hopes will be able to identify the type and quantity of a pathogen on the farm, and avoid a time-consuming wait for samples to be analysed off-site.

"The traditional way to detect disease in aquaculture is to collect samples and send them away to a laboratory," she explains.

"One of the problems is that usually farms are in isolated or rural areas far away from centres where the diagnostic laboratories are, so usually the results take too long."

Giana, who is originally from Brazil, is a qualified veterinarian and is undertaking a PhD at James Cook University.

Her DNA-based detection tool will aim to detect pathogens in the water so farmers can treat their fish before they show signs of infection. Aquaculture is the fastest growing agribusiness in the world and is worth more than US \$100 billion a year but each year 40 per cent of global production is lost to disease.

"Disease in aquaculture is certainly different from terrestrial animals," Giana says.

"As the animals are under the water, we don't see much until they really show signs of real problems."

"Once the fish are infected the spread of pathogens is very fast... the animals can't breathe and they stop eating and then start dying very quickly."

Giana will initially develop a detection tool for two common fish pathogens - marine fish white spot parasite and freshwater white spot parasite and will likely try out the device in farmed barramundi.

She hopes to have a prototype to test on farms within three years.



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 an FRDC sponsored award will have a great idea, will be a great role model for young people to further their interest in science, and be keen to use this opportunity to build their networks with other researchers, the FRDC and with industry.

frdc.com.au



Yvonne Chang

Recipient of the Cotton Research and Development Corporation Award

As research assistant Yvonne Chang explains, soil organic carbon (SOC) enhances many soil functions including productivity and soil structure. Current methods to improve long-term SOC in depleted soils have inconsistent outcomes, primarily resulting from variation in the rates of microbial activity on soil organic carbon.



Yvonne's Science and Innovation Award project will investigate whether fungi associated with cotton plants roots can be used to store organic carbon in the soil for long periods of time.

Yvonne says the amount of carbon in agricultural soils has been depleted by decades of intensive cultivation.

"Soil carbon's been linked to a lot of really important functions, including increased plant productivity, improving soil structure and similar things," she says.

"Current practices we've been using to try and manage carbon loss, like adding different forms of plant matter or compost, have given mixed results... there's nothing really consistent across the board."

But the benefits to the environment and the agricultural industry could be far greater by reducing greenhouse gases and aiding cotton farmers' participation in the Federal Government's Carbon Farming Initiative. If it works, the study has the potential to be applicable to other crops as well.

"The fungus that we're using form specific interactions with different plant species so we might not necessarily be able to use the same fungal isolate for all plant species but we'll try and see what happens," Yvonne says.

Yvonne has always been interested in how the world works and is passionate about understanding soil processes.

"It's really fascinating that the plants form interactions with various soil microbes." she says.

"It's exciting to think that when we understand how things work better we might be able to improve the way we do things in agriculture and increase how sustainable it is in the long term."



Australian Government

Cotton Research and Development Corporation

Cotton Research and Development Corporation

The 2016 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. For more, visit www.crdc.com.au.





Dr Jake Dunlevy

Recipient of the Australian Grape and Wine Authority Award

Be nice to Jake Dunlevy—he has a hand in making sure your wine will taste good in the years to come.



Jake's Science and Innovation Award project aims to keep the salt out of wine by finding genes that limit the uptake of sodium and chloride ions by grapevine roots.

The research could help to combat increasing soil salinity in wine regions around the country, and is part of a broader aim to breed new grapevine rootstocks that are designed for Australian conditions and resilient to climate change.

Growing up in McLaren Vale with his vineyard owner parents and winemaker brother, Jake has seen firsthand the devastating impact salinity can have on grape growers.

In 2013, a sixth of his family's 17-acre crop was rejected because of excess ion levels in the grapes while the rest was downgraded from a B grade to a D grade.

"The salt primarily affects the vine's health, which results in reduced yields so it's bad for growers," he says. "Then there's a secondary problem that the berries can accumulate high levels of the sodium and chloride ions, which is detrimental to the quality of the grapes and the resulting wine."

Jake says some of the countries we export to have specific limits on how much sodium and chloride can be in wine.

The uptake of the two different ions seem to be controlled by different genes.

"The sodium story has been pretty well unravelled in different plants over the last 10 or 15 years," Jake notes.

"But there haven't been any real breakthroughs in identifying genes limiting chloride uptake so if we could identify that one it would be an exciting finding and potentially valuable to other crops outside of grapes."



Australian Government

Australian Grape and Wine Authority

Australian Grape and Wine Authority

The Australian Grape and Wine Authority (AGWA), which trades as Wine Australia, supports a prosperous Australian grape and wine community by investing in research and development (R&D), building international and domestic markets, disseminating knowledge, encouraging adoption and protecting the reputation of Australian wine.

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

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.

Visit www.research.wineaustralia.com for information about our current RD&E projects and research priorities.





Jock Graham

Recipient of the Meat & Livestock Australia Award

"Your Holy Grail is to be tracking every animal, where they are and the health of them on the farm," fourth-generation farmer Jock Graham says about farms of the future.



"To go with that you're getting water systems that are monitored with real-time monitoring, soil moisture sensors around the farm and soil health monitors looking at pH and a few other different things."

"There's plenty of ways you can monitor a farm and it's just about having those monitors accessible to a designed communication system... and make the system something that's low cost and very efficient, so it can be taken up by farmers."

Jock's Science and Innovation Awards project is setting the blueprint for connected farms for decades to come by testing real-time livestock tracking and remote sensors to maximise the benefit of high speed broadband in rural areas.

Jock explains that live monitoring can only improve farming knowledge of livestock and allows farmers to take early preventative action for pest and diseases. Benefits could also extend to less labour and time to muster animals, improved data on cattle grazing patterns and responding to paddock maintenance issues. Working from Eulonga Pastoral Co in south-west New South Wales, Jock will investigate a range of new technologies with the property's 1000 head of Angus cattle, 5000 Merino ewes, 2000 hectares of mixed crops and one sand quarry.

"There's definitely a lot of opportunity to implement a sensing system so you've got the ability to know what's going on all the time from any location," he says.

Jock has a degree in agricultural economics and worked in Sydney banks for several years before returning to the family farm.

There, his passion for combining technology and agriculture meant he was never going to do things the way they'd always been done.

Jock has already developed an app with a mate to record everything a farmer would usually write in their stock notebook and set up communication towers that relay WiFi signals from animal tags and sensors.

"There is huge potential with this technology to make farming more connected, informed and efficient" Jock adds.



Meat & Livestock Australia Limited

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.





Dr Cindy Hauser Recipient of the CSIRO Health and Biosecurity Award

You're probably used to seeing detection dogs at Australian airports sniffing out illicit drugs, explosives, biosecurity hazards or even large amounts of cash.



But what if you could train the same dogs to hunt for invasive weeds in bushland or pests and diseases on crops?

University of Melbourne research fellow Cindy Hauser is looking at whether detection dogs can be harnessed to find pests in the field.

"I want to develop guidelines to help work out how we can make the best of them in agricultural environments," she says.

"I'm really excited in the potential of detection dogs but I think we need to be smart about how we use them."

Cindy's project builds on previous research into noxious hawkweed that found human searchers were only able to detect non-flowering hawkweed plants 20 per cent of the time, even when dedicating 25 hours of search time per hectare of land. This preliminary study found that Missy the dog could be trained to distinguish three species of hawkweed from other plants in backyard conditions, and had the potential to be better than human search teams at detecting non-flowering plants.

Cindy says using dogs to detect pest animals, plants and pathogens in the field is a far cry from the controlled environment of an airport and poses unique challenges.

"When you get into the outdoors there are all sorts of other distractions that the dog is faced with... the smells of other plants and animals, changing terrain and shifting winds that carry the weed scent," she says.

"When we're trying to cover huge areas of agricultural land or national park, we also need protocols to make sure a dog covers that area thoroughly.

"We need to understand what they can do well and what they too might be missing."



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 Health and Biosecurity 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.





Dr Lauren Hemsworth Recipient of the Australian Pork Limited Award

Lauren Hemsworth is harnessing one of the most well-known psychology experiments—Pavlov's dog—to improve the welfare of lactating sows.



The University of Melbourne research fellow is examining whether classical conditioning can be used to encourage lactating sows to eat more at a time when they often lose weight, making for healthier animals and avoiding costly reproductive problems down the track.

"We commonly see that once the sows have farrowed and they're in lactation, that regardless of how much feed is provided we just can't get feed intakes up," Lauren says.

"Often we find that the feed intakes of sows are lower than what they physically require to be able to sustain lactation and growth.

"There's been a range of different practices that have been put in place to try and increase these feed intakes and it just isn't happening so we need to try and look at something a little bit out of the box."

In Pavlov's famous experiments, the Russian scientist rang a bell every time he fed his dog. After he repeated the procedure number of times, the dog began to salivate when the bell rang even in the absence of food, in what is called a learned or conditioned response.

Lauren says previous research had shown that a learned cue such as a buzzer can be used to initiate feeding bouts and increase feed intake in sated rats.

"We thought that this is something that we could apply in lactating sows," she says.

The proof-of-concept study will initially use a mature gilt as a model for lactating animals.

"It's a little bit different but if it can work, the potential for use within the production system is great," Lauren says.

Increasing feed intake in sows during lactation is likely to improve piglet performance and consequently, a producer's production costs may be reduced and profitability increased, Lauren concludes.



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.





Joanne Hughes

Recipient of the Australian Meat Processor Corporation Award

When you're picking up a steak to throw on the barbeque, what do you look for in your meat? A thick cut steak with a nice red colour?



Joanne Hughes's project could help bring brighter, redder meat to supermarket shelves while saving the beef industry up to \$100 million.

The CSIRO projects officer and PhD student is targeting dark meat with a new high pressure processing technique she hopes will be able to lighten beef cuts without altering the meat in any other way.

"Consumers tend to prefer paler red meat colour so dark meat is often associated with consumer rejection," Joanne says.

"Dark meat can have a poorer shelf life or more variable eating quality, so there can be issues with consumer acceptability and return purchase.

"One of the key factors for the beef processing industry is the economic impact—we've found that within Australia there's a 12 per cent incidence of dark meat and it's costing the industry up to \$500 million a year." Joanne grew up on a sheep farm in Scotland, bottle-feeding lambs as a child, but it was her love of proteins and biochemistry that sparked her interest in how the natural processes in muscle can be used to improve the food we eat.

Her project aims to develop a set of conditions for high pressure processing (HPP) to reduce dark meat, which could potentially bring about a saving of up to \$100 million per annum for the industry over the next five years.

"It's like a cold pasteurisation process where processors could pressure treat the raw dark muscle in order to lighten its appearance to a brighter red colour that is more acceptable to the consumers," Joanne says.

"If we use HPP at a lower pressure we don't believe it would have any detrimental affect on flavour and we could potentially get some improvement in eating quality."



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 (RD&E) 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 the 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
- Livestock management, including animal health, welfare and biosecurity at the processing establishment.





Dr Jatin Kala

Recipient of the Grains Research and Development Corporation

Wheat farmers could have a custom map of their property identifying areas most likely to be hit by frost if Jatin Kala's Science and Innovation Award project proves a success.



The Murdoch University atmospheric scientist is studying the link between frost and topography at the farm-scale, starting with a single research farm.

If it works, his data could be overlaid onto the entire West Australian Wheatbelt, providing farmers with an indication of the parts of their land most likely to be affected by icy nights.

Jatin says although Australia's southwest is becoming warmer and drier because of climate change, many farms in the Wheatbelt are actually experiencing an increase in frost.

"It's something we don't fully understand," he says.

"The idea is that under a warming and drying climate with fewer clouds and calmer conditions, one actually gets very cold conditions at night.

"We tend to think global warming and frost isn't going to be an issue but it's not true." Frost, along with rainfall and heat stress, is one of the biggest challenges faced by the wheat industry and is estimated to cost Australian growers \$95.8 million a year.

If farmers know which parts of their property are most susceptible, they might be able to mitigate the risk by adopting management practices to minimise frost damage in these areas.

Jatin says he is excited by the opportunity to work on a project in the field that will have a real impact in the community.

"I'm mostly a modeller, I work with atmospheric and land surface models so I sit a behind a computer a lot," he says.

"This is more practical—this could have real implications for farmers."



Grains Research and Development Corporation

The Grains Research and Development Corporation (GRDC) is one of the world's leading investors in grains research, development and extension (RD&E). The GRDC invests over \$150 million per annum 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 Grains Research and Development Corporation is responsible for planning and investing in RD&E to support effective competition by Australian grain growers in global markets, through enhanced profitability and sustainability.

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.





Dr Yujuan Li

Recipient of the Rural Industries Research and Development Corporation Award

After finishing a PhD in how roundworms can be used to monitor soil health and underground food webs, Yujuan Li has turned her expertise to controlling them.



As part of her Science and Innovation Award project, the Central Queensland University research officer will investigate if fungi can be used to combat a destructive worm that attacks ginger plants, known as the root-knot nematode.

The project will study how effective different nematode-trapping fungi (isolated from Queensland soils) are in controlling the worm, both in the lab and in glasshouse trials.

Ginger is worth more than \$95 million in south-east Queensland through a combination of farm gate sales and value-added products such as brewed drinks and confectionary.

But in recent years the industry has seen declining yields and significant crop losses because of pathogens in the soil, with the root-knot nematode taking the title of the most serious pest for Queensland growers. Yujuan says existing chemical control methods for the worm are toxic and not environmentally friendly.

She says many chemical products have been taken off the market, putting the ginger industry at risk, and she hopes fungi could prove a viable alternative.

It will be the first time a fungi biological control has been tried against a roundworm in ginger in Australia and, if successful, could lead to the development of similar products for other crops.

"Root-knot nematodes have a very wide host range... like sweet potato, tomatoes and capsicum—heaps of plants are good hosts for them," Yujuan says.

"This has the potential to have a big benefit not only for ginger but for the whole horticultural industry."



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.





Amy Lockwood

Recipient of the Australian Wool Innovation Award

Drones flying over sheep farms could be regular sight in lambing season if Amy Lockwood's Science and Innovation Award project proves a success.



Amy is set to investigate if unmanned aerial vehicles can be used to improve lamb survival by increasing the frequency of monitoring while minimising disturbance to lambing ewes.

"The project is looking at ways to improve lamb survival through understanding ewe and lamb behaviour," she says.

"We're also better utilising technologies that are available on the farm to potentially improve efficiency and productivity."

In Australia one in four lambs die before weaning, with survival rates particularly poor in Merino sheep and when ewes give birth to twins.

This mortality rate comes at a huge economic cost, with estimates that improving the survival of single lambs by 15 per cent and twins by 30 per cent would deliver returns to the industry of \$285 million and \$515 million respectively. Amy, who is a PhD student at Murdoch University, says current methods of assessing lambing sheep are limited and often involve close human observers.

"This can result in disturbances to natural ewe and lamb behaviour and can potentially cause impacts on lamb mortality," she says.

On the other hand smart technology such as drones could cover 30 hectares or more, checking food, water and fences as well as the behaviour between ewes and lambs after birth.

This is particularly important in the first three days following delivery, when more than 80 per cent of lamb mortalities occur.

Amy was born in the regional town of Albany and spent a lot of time on farms growing up.

"I've really enjoyed the livestock side of things from a young age, which is where my passion has come from," she says.

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 27,000 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.





Dr Edward Narayan Recipient of the Meat & Livestock Australia Award

Agricultural research might seem like a sideways choice for a man who has spent much of his career in wildlife conservation studying amphibians, koalas, bilbies, woylies, bears and tigers.



But for comparative physiologist Edward Narayan, the non-invasive techniques he perfected to measure stress in wildlife are also ideal for use on farm.

As part of his Science and Innovation Award project, Edward is set to develop non-invasive tests to detect stress in Australian lambs which he hopes can improve the animals' on-farm health and welfare while increasing the value of the meat.

Edward's research project will look at the warm summer period, nutritional stress and physical activity, and their management with mineral supplementation, by examining physiological and molecular measures of stress and meat quality.

"The traditional markers of stress have a lot of variation because if you are collecting blood you're stressing the animal," Edward explains.

"We're doing this non-invasively from faecal samples and saliva samples, which provide a robust snapshot of an animal's stress endocrine status." Edward, who is a member of the Graham Centre for Agricultural Innovation at Charles Sturt University and teaches animal physiology in the School of Animal and Veterinary Sciences, says environmental stress in lambs can be detrimental to the quality of the meat, particularly if that stress occurs during the finishing period.

"If the animal is stressed there can be a negative impact on the juiciness of the meat itself because stress hormones can diminish glycogen reserve," he says.

He wants to one day see his non-invasive techniques applied to other livestock.

"It's the beginning of a very long-term and fruitful journey," Edward says.

"Animal health and welfare are very critical issues for Australia so we can use this in pigs, beef cattle, poultry, aquaculture... there's a variety of applications with the main goal of improving animal production."



Meat & Livestock Australia Limited

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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.





Dr Nadeeka Wawegama Recipient of the Dairy Australia Award

As a veterinary student in Sri Lanka, Nadeeka Wawegama came across many cases of mastitis in the livestock she was caring for.



Often, the disease was unresponsive to antimicrobials, and all the cases had a devastating impact on farms.

"I understood at that time that just becoming a veterinarian would not help," Nadeeka says.

"We need better diagnostic tools, antimicrobials and vaccines, which require research."

Nadeeka's passion for research brought her to the University of Melbourne, where she is studying a poorly understood microorganism known as Mycoplasma bovis that causes mastitis, pneumonia, arthritis and middle ear infections in cattle.

Mastitis is one of the most complex and costly diseases worldwide in dairy cattle, with studies suggesting at least 50 per cent of Australian dairy herds are affected by subclinical mastitis at a cost to industry of more than \$60 million a year.

Mycoplasma bovis was first identified as a significant problem for Australian dairy herds in 2006. Nadeeka says the disease is notoriously difficult to detect because current diagnostic tools such as PCR only work some of the time.

"Once an animal is subclinically infected they become carriers throughout their lives but shed it intermittently, so it evades detection" she says.

Nadeeka hopes to use an enzyme-linked immunosorbent assay (ELISA) test she developed as part of her PhD to estimate the prevalence of Mycoplasma bovis in dairy cattle around Australia.

Unlike existing methods, the ELISA test detects antibodies against the disease, and can identify infected dairy herds by testing milk samples.

"The results will improve our knowledge about Mycoplasma bovis infection in Australian dairy herds, and the industry will be able to make decisions to control and prevent transmission," Nadeeka says.



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.

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