

the INNOVATOR

The Newsletter from the GRAHAM CENTRE for Agricultural Innovation



Photo: Emily Malone

From the Director

Welcome to the Winter edition of *the Innovator*. As always, there is much to report, but I will pick a few highlights.

I am very pleased to announce the appointment of our new Industry Advisory Panel. More than 20 expressions of interest were received for the eight positions, which shows the high level of interest in the work of the Centre. It was a very strong field, and a tough decision to select the Panel. We welcome Ms Cindy Cassidy, Ms Diana Gibbs, Ms Angela Avery, Mr Murray Scholz, Mr Andrew Bouffler, Mr Chris Mirams, Dr Angus Crossan and Mr David McKeon on board. The Panel brings a wealth of experience and expertise across various segments of the industry, and I very much look forward to working with them. You will have the opportunity to meet the Panel at the launch of the Centre's Strategic Plan on Tuesday, 18 July.

Our Pathway Leaders have been very active since their recent appointments and our fortnightly meetings have been very helpful in resolving issues and determining the best way to implement our strategy. Each of the Pathway Leaders are planning pathway meetings, with one of the first tasks being to determine the strategic direction of each pathway. The Centre's Strategic Plan was deliberately concise and lacked discipline details, as the pathway strategies are intended to provide more detail on our strengths.

Programs for our Sheep and Beef Forums have been finalised and we are again looking forward to thought provoking presentations and discussion at these events, Friday, 7 July for the Sheep Forum and Friday, 4 August for the Beef Forum. In exciting early news, I'm pleased to announce that in 2018 the Australian Society of Animal Production will hold its Biennial Conference in Wagga Wagga, with the third

day (Wednesday 4 July 2018) being a 'Producer Day' that will incorporate our Beef and Sheep Forums.

Partnering with industry continues to be a focus, and our involvement in the new Food Agility and High Performance Soils Cooperative Research Centre (CRC) provides strong opportunities to build new partnerships and strengthen existing ones. Project proposals are currently being developed in consultation with industry, and I encourage you to get in contact if interested.

From July to September this year I will be taking on the role of Pro-Vice Chancellor (International Education and Partnerships) and Dr Marta Hernandez-Jover has kindly agreed to take on the role of Director during this time. Please join with me in welcoming Marta to the role.

Professor Michael Friend

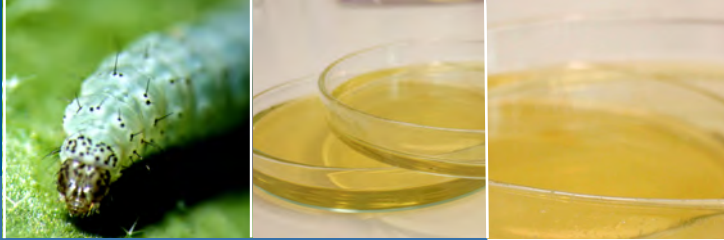
THIS ISSUE

News	2
Research Activities	10
In the Limelight	16
Events Calendar	18

quick links

Graham Centre website
CSU website
DPI website





Inspiring students to consider agricultural science career

From mapping cuts of meat on a cow and pasture assessment in the paddock to checking out rice in the laboratory, high school students experienced hands-on activities at the Agricultural Science Enrichment Day. More than 100 high school students from Wagga Wagga attended the event on Friday 2 June and we look forward to welcoming students from across the Riverina on Friday 23 June. Our aim is to showcase the work done by professional agricultural and animal scientists.



International prize for Graham Centre research student

Research into canola processing and the effect on bioactive components in the oil has earned a Charles Sturt University (CSU) PhD student international recognition.

Ms Clare Flakelar, who is a member of the Graham Centre, was presented with a student excellence award at the American Oil Chemists' Society (AOCS) conference in Florida in the United States.

Her research is examining how canola oil processing affects the concentration of bioactive compounds.

"Many bioactive components in canola oil are linked to beneficial health effects," Ms Flakelar said. "For example commercial canola seed contains lutein, a bioactive compound with the potential to prevent macular degeneration.

"But these components, particularly carotenoids, tocopherols and sterols, are reduced or eliminated entirely during current commercial oil production.

"My research involves assessing the behaviour and influence of certain factors on these bioactive components, primarily the effects of genotype, the storage of seed and oil, and the processing from seed to oil.

"My goal is to provide industry with some of the information they need to pursue the retention or enhancement of bioactive compounds in end-product oil for consumer health benefit."



PhD student Ms Clare Flakelar received her award at the American Oil Chemists' Society conference in Florida USA.

Ms Flakelar said it was a thrill to be presented with the award and to present her research at the conference.

"The ACOS Processing Division has a long history, and to stand in front of its distinguished members, many of whom have written patents and developed their own techniques that are used within the oils and fats industry, was an honour.

"The AOCS annual conference is a perfect platform to extend our research to a combination of international industries and researchers, and I count myself extremely fortunate to be given the chance to attend and present.

"This year's conference included presentations from a broad range of topics, and involved some of the most esteemed lipid chemists."

Ms Flakelar's PhD research is funded by a Graham Centre University Research Scholarship and a Grains Research and Development Corporation (GRDC) Grains Industry Research Scholarship.

Contact: Ms Clare Flakelar, E: cflakelar@csu.edu.au

Supporting animal welfare research

The Graham Centre will be at the forefront of research into animal welfare in livestock production through its role with two national bodies.

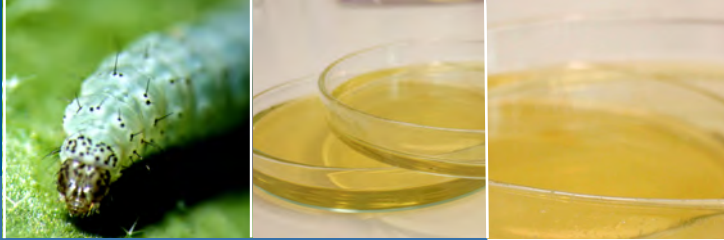
Associate Professor Jane Quinn represents Charles Sturt University (CSU) on the steering committee for MLA's Strategic Partnership for Animal Welfare Research, Development and Adoption (RD&A).

This partnership between the MLA Donor Company (MDC) and research bodies, including CSU, will be responsible for the investment of \$35 million over five years, on a 50:50 basis.

Ten projects have already been funded, including one involving CSU and Elanco Animal Health to investigate feed additives to help cattle adjust to a feedlot.



Graham Centre member Associate Professor Jane Quinn is on two national steering committees for animal welfare research.



NEWS

Professor Quinn said, “Charles Sturt University and the Graham Centre are focused on delivering meaningful research outcomes for primary industries in our regional footprint.

“As Australia’s first regional veterinary science program and a leading provider of agricultural science education and research, we have the expertise and capacity to contribute ground-breaking research to improve animal health and welfare.

“The Graham Centre partners with industry to identify research opportunities to support profitable and sustainable sheep and beef enterprises through improved management.”

Professor Quinn is also representing the University on the Australian National Strategic Partnership for Animal Welfare, a government committee that drives change in animal welfare practices in production industries.

Read more about MLA’s Strategic Partnership for Animal Welfare Research, Development and Adoption (RD&A) [here](#).

Contact: Associate Professor Jane Quinn,
T: 6933 4208; E: jquinn@csu.edu.au

Participants sought for study into coloured rice health benefits

The potential health benefits of coloured rice is the subject of new research at the Functional Grains Centre in Wagga Wagga.

Participants in the study are being sought by Charles Sturt University (CSU) PhD students Ms Kiara Thompson and Ms Esther Callcott as they investigate if the bioactive compounds in whole grain coloured rice varieties have therapeutic effects for obesity and related diseases such as cardiovascular disease.

“The seed coats of coloured rice are rich in antioxidants and our aim is to test the role of these chemical compounds in reducing blood clotting, inflammation and chemical



PhD students at the Functional Grains Centre, Ms Kiara Thompson and Ms Esther Callcott, are examining the health benefits of coloured rice and they’re looking to roll up their sleeves and give blood for research.

damage to cells in overweight or obese people and in those who have type 2 diabetes,” Ms Callcott said.

The researchers are seeking people who are overweight or have type 2 diabetes to take part in the study. They will be asked to complete a health and food questionnaire, body measurement and give a small sample of blood.

“We’d like to hear from people who are overweight or obese, that is those with a Body Mass Index of greater than 24.9, and or, those who have type 2 diabetes,” Ms Thompson said.

“To take part in the study people need to be non-smokers, aged between 18 and 65, who are not pregnant and who don’t suffer any chronic diseases.

“We also need to ensure they’re not taking anti-inflammatory or anti-clotting medication.”

The research is supervised by Dr Abishek Santhakumar and Professor Chris Blanchard from CSU’s School of Biomedical Sciences.

The Functional Grains Centre is an Australian Research Council (ARC) Industrial Transformation Training Centre and is an initiative of the Graham Centre.

Contact: Ms Esther Callcott, E: ecallcott@csu.edu.au
Ms Kiara Thompson, E: kthompson@csu.edu.au

International conference on animal health surveillance

The drivers for improving animal disease surveillance in small livestock enterprises in Australia has been outlined by Dr Marta Hernandez-Jover at the International Conference on Animal Health Surveillance (ICAHS) conference in New Zealand.



Dr Marta Hernandez-Jover at International Conference on Animal Health Surveillance (ICAHS).

Dr Hernandez-Jover said the conference aimed to share advances in surveillance from an applied and practical perspective with stakeholders from government, industry, private sectors and universities.

“It emphasised the importance of the integration of surveillance in the animal, human and environmental health, using multidisciplinary approaches,” Dr Hernandez-Jover said.

“It was a great opportunity for learning from others on the different approaches of using community engagement in surveillance systems.

“The science presented in the conference was of high quality and very inspiring. There were excellent networking and social activities, such as a cultural visit to the Pohutu Geysers with a traditional Maori welcome”.

Contact: Dr Marta Hernandez-Jover,
T: (02) 6933 2086; E: mhernandez-jover@csu.edu.au

Harvest weed seed control to meet the ‘global herbicide resistance challenge’

Nearly 400 delegates attended the second Global Herbicide Resistance Challenge conference held recently in Denver Colorado, among them, Graham Centre member, Dr John Broster.

Speakers at the conference presented papers on a wide range of topics from the herbicide resistance status for each continent, through to more in-depth presentations on resistance mechanisms and genomics.

Dr Broster from Charles Sturt University’s (CSU) School of Agricultural and Wine Sciences presented a paper on the potential to target and destroy weed seeds when harvesting irrigated crops like rice, during the Harvest Weed Seed Control (HWSC) workshop.

“HWSC is a suite of management practices such as narrow windrow burning, chaff carts or the Harrington seed destructor, all developed by Australian farmers,” Dr Broster said.

“The aim is to target a weakness of many weed species which is that they retain their seed at the time of crop harvest.

“All of these practices use the harvesting process to collect the weed seeds and then destroy them in various ways to prevent the seed from entering the seed bank.

“Recent studies have shown that 46 per cent of Australian grain growers are currently using some form of HWSC on part of their farm.”

Dr Broster said the uptake of HWSC has been slower in other regions, such as the United States, where many researchers and farmers were looking only at new herbicides or herbicide resistant crop varieties to manage resistance.



Dr John Broster (far right at the back) amongst delegates at the Global Herbicide Resistance Challenge.

But he said that’s changing.

“Since the first GHRC in 2013 there has been significant interest in HWSC from US researchers and farmers with a number of farmers adopting some of the practices,” Dr Broster said.

Dr Broster was the sole representative of CSU at the conference, although he said there was a large contingent from the other CSU, Colorado State University.

Contact: Dr John Broster,
T: 02 6933 4001; E: jbroster@csu.edu.au

Looking for tapeworm in Alaska

A white knuckle ride on a dog sled in snow covered Alaska is not the average day in the office for Graham Centre researcher Dr David Jenkins.

But that’s where he found himself earlier this year during a visit to the veterinary school at the University of Alaska in Fairbanks where he was sharing his expertise on parasites in native wildlife.

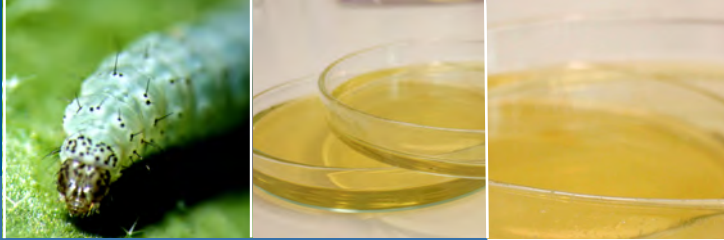
The visit was part of a push to raise awareness of hydatid disease and control in native Alaskan communities.

“Hydatid disease is serious and potentially fatal condition in humans which occurs when accidentally ingested tapeworm eggs lead to fluid-filled cysts developing in vital organs such as the liver and lungs,” Dr Jenkins said.

“People get infected with tapeworm eggs from contact with the faeces of an infected dog. In Alaska, just as in Australia, wildlife also plays a key role in the transmission of this parasite.

“In Australia we see foxes, dingoes and kangaroos affected by the parasite, while in Alaska it’s foxes, wolves, moose and caribou.

“The disease was identified as a problem in native Alaskan communities in the 1950s as people were infected mainly through domestic sled dogs that had been fed offal infected with hydatid cysts.



NEWS

“Control efforts focussing on the importance of de-worming domestic dogs were successful but now there’s a push from the Alaska Tribal Health Consortium to understand more about the current status of infection with hydatid cysts and hydatid tapeworms in wildlife.

During a 17 day visit, Dr Jenkins gave seminars and workshops.

“I was asked to share my experience and run a series of workshops with staff, students and the public dissecting a number of species of wildlife to identify tapeworm infection,” Dr Jenkins said.

“Although Alaska and Australia are a world apart there’s much to be gained from sharing knowledge across international borders and I’m hopeful this will lead to further collaboration to better understand an issue that has significant public health impacts.”

Dr Jenkins is a senior research fellow at Charles Sturt University’s (CSU) School of Animal and Veterinary Sciences and his current research is examining the financial impact of hydatid disease in the Australian beef industry and determining the role of wild dogs in the transmission of sheep measles in Australia.

Contact: Dr David Jenkins,
T: (02) 6933 4179; E: djjenkins@csu.edu.au

Developing opportunity for research collaboration

The opportunity for AgriTech collaboration was the focus of workshops in Brazil and Argentina attended by Graham Centre Director Professor Michael Friend, Professor Leslie Weston and Professor Chang-Tsun Li, along with researchers from UNE, during May.

The workshops were organised by Austrade and the opportunities for collaboration with researchers from University of Sao Paulo, EMBRAPA (the CSIRO equivalent in Brazil), the University of Buenos Aires, and INTA (the CSIRO equivalent in Argentina), the University of El Salvador along with other research providers and industry were discussed.

Contact: Professor Michael Friend,
T: (02) 6933 2285 E: mfriender@csu.edu.au

Graham Centre member and CSU lecturer in farming systems, Mr Michael Campbell, travelled to Texas Tech University in the United States in May to develop opportunities for staff and student exchange and research collaboration. Representatives from Texas Tech then visited the Graham Centre in June.

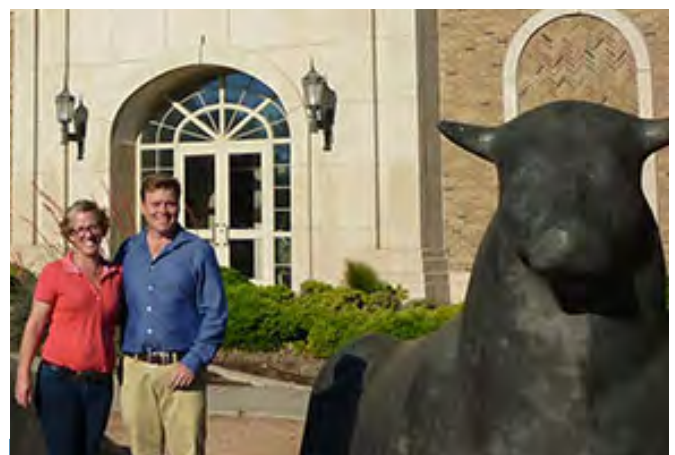
Contact Mr Michael Campbell,
T: (02) 6933 2427; E: mcampbell@csu.edu.au



A ride on a dog sled was a highlight for Dr Jenkins during his recent visit to Alaska. Photo: Christine Thomson.



State Secretary, Sao Paulo State Secretariat for Agriculture, Mr Arnaldo Jardim and Assistant to the State Secretary, International Relations, Alberto Amorim with Professor Michael Friend.



CSU lecturer in farming systems Mr Michael Campbell, travelled to Texas Tech in the United States to explore research collaborations and student exchanges.

Centre scientist brings world parasite experts together

Parasite taxonomist, Associate Professor Shokoofeh Shamsi recently ran a workshop at the Flanders Marine Institute - home of the World Register of Marine Species (WoRMS) in Belgium.

It brought together experts to look at how marine parasites are documented in the register and to work to develop a portal for scientists to access information about marine parasites.

“Many sea species are under threat of extinction and establishing a parasite portal under World Register for Marine Species is crucial for better understanding of the marine biodiversity,” Dr Shamsi said. “It will also play an important role in any future study aiming at conservation of aquatic species.”

Dr Shamsi’s workshop in April 2017 was funded by a grant from LifeWatch Belgium, part of the E-Science European LifeWatch Infrastructure for Biodiversity and Ecosystem Research.

Contact: Associate Professor Shokoofeh Shamsi,
T: (02) 6933 4887; E: sshamsi@csu.edu.au



Associate Professor Shamsi (far left) at the workshop in Belgium. Delegates discussed how to document marine parasites in the World Register of Marine Species (WoRMS).

Keep up to date with the Graham Centre on social media ...

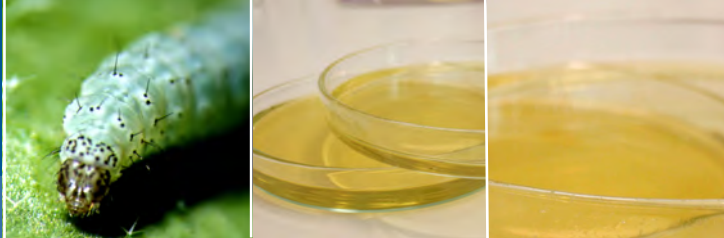
Don't forget to follow the Graham Centre on **Twitter** @GrahamCentre



and like us on **Facebook** <https://www.facebook.com/GrahamCentreForAgriculturalInnovation?ref=hl>

and on **Instagram** grahamcentre05





NEWS



Graham Centre Sheep Forum

Friday, 7 July 2017 | 9.00am – 1.00pm (8.30am for 9.00am start)
Charles Sturt University Convention Centre, Wagga Wagga

Production management on-farm and its effects on meat quality
Bruce Hancock (Rural Solutions SA:PIRSA/Sheep CRC)

The use of technologies for lamb carcase assessment
Steph Fowler (NSW Department of Primary Industries)

Minerals in pastures: calcium and magnesium levels and implications for supplementation
Shawn McGrath (Fred Morley Centre, Charles Sturt University)

Fully sick grazing cereals - common sheep diseases to watch out for
Gordon Refshauge (NSW Department of Primary Industries)

Manipulating fatty acids in sheep: implications for animal and human health
Edward Clayton (NSW Department of Primary Industries)

Drones as tools in agriculture
Ben Watts (Bralca consultancy)

Are acid soils under control? Legumes tell us we could do better
Helen Burns (NSW Department of Primary Industries)



FP283

Register now

\$25 per person

Includes morning tea and lunch

NO PAYMENTS WILL BE TAKEN ON THE DAY

Pre-pay at:

www.trybooking.com/PYKU

www.grahamcentre.net

Toni Nugent:

sfd@csu.edu.au | 0418 974 775

Supported by



Rabobank





Graham Centre Beef Forum

Friday, 4 August 2017 | 9am–1pm (8.30am for 9am start)
Charles Sturt University Convention Centre, Wagga Wagga

The Australian beef industry looking forward
Angus Gidley-Baird (Rabobank)

Application of 3D cameras on live animals and carcasses
Edwina Toohey (NSW Department of Primary Industries)

Advancements in Meat Standards Australia (MSA) and how these apply to your beef business
Sarah Strachan (Meat and Livestock Australia)

Improving communication and building knowledge across the beef supply chain
Jasmine Nixon (Teys Australia)

Producer case study: Benefits of Meat Standards Australia (MSA) and Quality Assurance (QA) systems on-farm
Geoff Roberts

Supplementary feeding to improve meat quality:

- Optimising performance and welfare of weaning strategies
- The potential of canola meal as a supplement for grass-fed cattle
- Does beef from Holstein steers taste good?

Molly Vardenega, Emma Lynch and Veronika Vicic
(Honours students, Charles Sturt University)



F5282

Register now!

\$25 per person

Includes morning tea and lunch

PREPAYMENT IS ESSENTIAL

Prepay at:

www.trybooking.com/PYKX

www.grahamcentre.net

Toni Nugent:

bfd@csu.edu.au | 0418 974 775

Supported by



Rabobank



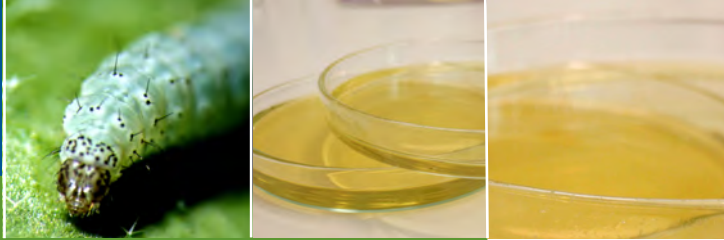
Department of Primary Industries



Local Land Services
Riverina



Charles Sturt University



RESEARCH ACTIVITIES

Trial to test canola meal as finishing ration for beef

Feeding 40 steers has become a twice-daily routine for Charles Sturt University (CSU) Bachelor of Animal Science (Honours) student Ms Emma Lynch.

Her research, supported with a [Graham Centre Honours Scholarship](#) is evaluating the use of canola meal for supplementary feeding or finishing beef steers.

“Pasture growth and quality can be variable throughout the year and supplementary feeding in a grass-fed production system is one way that producers can meet carcass specifications,” Ms Lynch said.

“The canola meal we are using is a by-product of oil production and in recent years it’s been a cheaper option than pellets producers often use to supplementary feed their cattle.

“There is an increasing demand for grass-fed beef that complies with the Pasture Fed Cattle Assurance System (PCAS).

“The advantage of using canola meal, rather than supplementary feeding with a traditional finishing grain diet, is that producers can still meet the PCAS guidelines.”

Ms Lynch’s research is supervised by lecturer in farming systems Mr Michael Campbell from CSU’s [School of Animal and Veterinary Sciences](#) and NSW Department of Primary Industries (DPI) livestock research officer Dr Edward Clayton.

The trial is being run over 60 days with half the cattle fed a supplementary ration of canola meal and the other half pellets.

“The steers are being weighed every 14 days so we can compare growth rates and we are also collecting samples to study the fatty acids in the blood, in particular Omega-3,” Ms Lynch said.



Ms Emma Lynch is studying the use of canola meal for supplementary feeding for finishing beef steers.

“At the end of the trial the steers will be slaughtered and we will assess the meat quality along with the fatty acid composition of the carcass.

“The fatty acid data, in particular the amount of omega-3, will provide valuable information that will link with other projects examining human health attributes of meat.

“I hope to be able to give producers more information about the effect of canola meal on live animal performance and carcass quality so they can make better decisions about how to fill the feed gap in their production systems.

“The study will also provide useful information for processors about how canola meal influences the carcass traits of grass-fed beef cattle.”

You can hear more about Ms Lynch’s research, ‘Investigation into supplementing grassfed cattle with canola meal and the effects on carcass traits’ at the [Graham Centre Beef Forum](#) on Friday 4 August.

Contact: Ms Emma Lynch, E: emmadott95@gmail.com

Don’t panic, it’s not hairy!

Drive through the Riverina in summer and you’re bound to notice wind swept panic grasses on roads and fence lines. Graham Centre research by PhD student Mr Yuchi Chen is shining new light on this noxious weed.

More about the weed

Panic grasses (*Panicum* spp.) are annuals or perennials that are globally distributed from the tropics to the warm temperate regions. Currently, there are 38 species of panic grasses found in Australia, including nine exotic species. They are found in South Australia (SA), Victoria and New South Wales (NSW) in late spring and summer and have become more prevalent in recent years in the Wagga Wagga region. Panic grasses produce a panicle inflorescence that detaches at maturity and is disseminated by wind, accumulating on roadsides, along fence lines and in yards.

Many panic grasses are categorised as noxious weeds and cause crop and pasture losses due to competition, as well as photosensitisation in grazing livestock.

Various panic species have been reported to cause hepatogenous photosensitisation in Australian livestock. The toxic components are thought to be saponins and other metabolites, although their exact roles in liver damage and secondary photosensitisation are not yet known.

Panic in the Riverina

In order to obtain panic grasses samples for further toxicity and metabolomics analysis, and to gain knowledge of their distribution patterns, specimens were collected from 82 locations in a 200 kilometre radius range from Wagga Wagga in February-March 2017.

RESEARCH ACTIVITIES



From left: Accumulated dried seed heads of *Panicum* spp. in front of the School of Animal and Veterinary Sciences building on the Wagga Wagga campus of CSU; Sheep showing photosensitisation symptoms on the face; Mature *Panicum hillmanii* plants at roadside near Wagga Wagga. Lower right photo shows details of the hairy leaf blade and the sheath, with branching panicle inflorescence

The identities of these samples were confirmed by the Australian National Herbarium. Surprisingly, the vast majority, about 80 per cent of these samples, were identified as Hillman's panicgrass (*P. hillmanii*). By contrast, hairy panic (*P. effusum*) and witchgrass (*P. capillare*), which were previously considered as the most abundant species in the sampled region, only accounted for 5 % and 1 % of samples respectively.

The key perpetrator in the Riverina, Hillman's panicgrass, is an annual grass from the United States that has evidently adapted to Australian conditions. It was introduced to SA and Victoria in the 1900s, and was up to now rarely encountered in NSW. By comparing the wind direction patterns with the flowering and panicle maturation period, we hypothesised that Hillman's panicgrass has spread from Victoria to NSW mainly by wind dispersal, and is now the dominant panic grass species in southern NSW. This hypothesis will be further tested by additional distribution studies and genetic analyses.

Better identification of the weed

Current identification of panic grasses typically relies on morphological features, requiring detailed observation of inflorescence and spikelets using microscopy. Misidentification in archived panic grass samples suggests that morphological identification is unreliable. Therefore, the use of molecular markers and DNA sequencing approaches for identification may ultimately prove useful for identification. The development of molecular marker based methods for accurate identification of panic grasses at an early stage of growth will also be important for further strategic control of noxious panic grasses in southern Australia.

Potential impact on sheep health

Hillman's panicgrass (*P. hillmanii*) has been reported to cause photosensitisation in sheep in Victoria and given the presence of this weed in southern NSW there could be similar outbreak events here in the future.

Graham Centre research aims to profile the potential toxicity of Hillman's panicgrass through metabolomic analysis, to further assess the risk for photosensitisation and cytotoxicity. This information should help manage livestock in future outbreaks.

This research team includes Associate Professor Jane Quinn, Dr Panayiotis (Panos) Loukopoulos, Professor Leslie Weston, Mr Chen and collaborator Dr Xiaocheng Zhu.

Contact: Mr Yuchi Chen,
T: 040592099; E: yucchen@csu.edu.au

Awareness and management of zoonotic diseases in Pakistan

Research by Graham Centre PhD student Ms Shumaila Arif aims to raise awareness of diseases that can be transmitted from animals to humans, to improve the health of farmers in Pakistan.

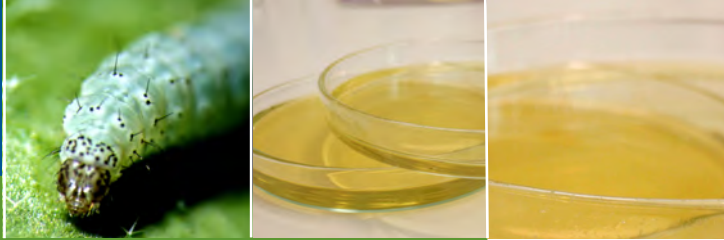
As part of her research through the School of Animal and Veterinary Sciences at Charles Sturt University (CSU), Ms Arif has conducted focus discussion groups with smallholder farmers in four districts in Pakistan.

"A zoonotic disease is one that transmits from animals to humans accidentally through direct or indirect contact with an infected animal, for example the bacterial zoonotic disease brucellosis or tuberculosis," Ms Arif said.

"My research aims to investigate farmers' perceptions towards the farm and household practices that might pose a risk for humans contracting zoonotic diseases, in particular brucellosis.

"The focus groups were held in March and April 2017 to investigate the attitudes towards disease and the gender perceptions regarding their family health decisions.

"Farmers often have a poor understanding of zoonotic diseases and a high level of risky practices are being



RESEARCH ACTIVITIES



From left: PhD student Shumaila Arif, assisted by ASLP Area Advisor Anam Afzal conducting a farmer focus group activity with women farmers in the village Mirza Abbad, Jhelum Pakistan; Male farmers participating in a communication network for human and animal health in the village, Pakpttan Pakistan. Photos: Shumaila Arif.

undertaken on farm and in households across a number of regions of Pakistan.

“Poor knowledge about diseases, incorrect perceptions, and attitudes towards the treatment support the need for health education, particularly on zoonotic diseases that can be controlled by practice change.

“I found that female farmers were more willing than males to change their practices and participate in awareness programs.”

Ms Arif is supervised by Associate Professor Jane Heller, Dr Marta Hernandez-Jover, Associate Professor Peter Thomson and Dr David McGill.

Her research is supported by an Australian Centre for International Agricultural Research (ACIAR) John Allwright Fellowship.

Contact: Ms Shumaila Arif, E: sarif@csu.edu.au

Dual-purpose crops: a flexible option for Southern Tablelands sheep producers

Dual-purpose crops can offer sheep producers on the Southern Tablelands of NSW a flexible and profitable option to fill the winter feed gap, according to new research.

A four-year study funded by Meat and Livestock Australia (MLA) has examined the benefits and risks of incorporating dual-purpose wheat and canola crops in grazing enterprises in the region.

Graham Centre researcher, Dr Shawn McGrath, from the Fred Morley Centre at Charles Sturt University (CSU) was part of the CSIRO-led project.

The research

The farming systems experiment was conducted near Canberra and consisted of three treatments: pasture only (control) and pasture with dual-purpose crops prioritised for grazing by either Merino ewes (ECG) or weaners (WCG).

Replicated farmlets were split into six paddocks of 0.23 hectare each. Dual-purpose wheat and canola were rotated with ley pastures in four paddocks in the ECG and WCG treatments. Crops were sown during February or early March and grazed during late-autumn and winter.

The findings

Over the four years, priority grazing of weaners on dual-purpose crops increased wool production by nine per cent or 0.4 kilograms greasy fleece weight (GFW) per ewe and increased average lamb production by 16 % or 7.6 kg liveweight sold per yearling lamb, compared to a pasture-only system.

A key advantage of prioritising grazing for weaners was that it allowed other livestock classes to also graze the crops. In 2013, 2014 and 2016, ewes in the WCG treatment lambed down on crops, and in 2014 agistment wethers were brought into the system to graze the wheat crops. The liveweight increase by wethers was 259 kg per hectare over a 21 day grazing period.

RESEARCH ACTIVITIES

Giving ewes priority access to crops reduced supplementary feeding when seasonal conditions were poor, increased wool production by 16 % or 0.7 kg GFW per head compared with the control (phalaris x sub-clover based pasture). However, sale weight of yearling lambs did not increase compared to the control.

Good management of crops can result in minimal impact of grazing on grain yield. In this experiment, yields for wheat were not significantly affected by grazing, however yields for canola were slightly reduced, an average of 17 %, by grazing.

Impact on feed supply

The project highlighted the change to feed supply when dual-purpose crops are incorporated into Tablelands farming systems.

Dual-purpose crops can supply a large amount of high quality feed during late autumn and winter. For systems that use autumn-sown crops however, the main deficit in feed shifts to be during late summer and autumn, the period when crops are being established, so additional supplementary feeding may be required during this period. The effect of not grazing pastures over winter allows them to 'catch-up' by spring in comparison to systems that do not have dual-purpose crops.

The advantage of having two dual-purpose crops in the mix

Another key insight was the potential to increase the grazing window by sowing dual-purpose canola as well as a dual-purpose cereal. Canola has higher autumn growth rates and will generally be available to graze first. However if germination or growth rates of canola are poor in a particular season, having an alternative such as dual-purpose wheat can fill the gap, so that the wheat is grazed in the sequence before canola.

In this project canola was grazed first in the sequence in three out of four years. Producers should be mindful that winter growth rates of canola are slower than cereals, and canola may take longer to recover from grazing. In this project the number of sheep grazing days on crops over autumn and winter ranged from 1300-3200 days per hectare.

Contact: Dr Shawn McGrath, E: shmcgrath@csu.edu.au
Dr Andrew Moore, E: Andrew.Moore@csiro.au

Research to improve biosecurity awareness in emerging industries

From crocodiles and camels to dairy goats, buffalo and rabbits, researchers from the Graham Centre are working with Animal Health Australia (AHA) in a project aimed at developing biosecurity resources for new and emerging livestock industries.

Senior lecturer for veterinary epidemiology and public health, Dr Marta Hernandez-Jover, is leading Charles Sturt University's (CSU) part in the project, working with research assistant Ms Lynne Hayes.

Dr Hernandez-Jover said the first step of the project was gathering information about current practices and attitudes towards biosecurity and emergency animal disease (EAD) preparedness among 17 new and emerging industries.

"Our research revealed that most new and emerging industries want biosecurity information, but we need to provide a tailored approach to engaging with and developing materials for them," Dr Hernandez-Jover said.

"Results from the industry consultation clearly demonstrate the varied nature of new, emerging and maturing industries. Particularly with regards to the industry size, the level of commercial operation, and the producer linkages to industry representatives.

"One of the key issues is how to reach these producers. We found that private veterinarians are seen as trusted sources of information and the first point of contact in the event of unusual signs of disease, in conjunction with other producers.

"So working with industry bodies and private veterinarians will support increasing awareness of biosecurity and EAD management."

As part of the project, AHA is developing resources for each of the new and emerging industries with factsheets, posters and videos available on the [Farm Biosecurity website](#).

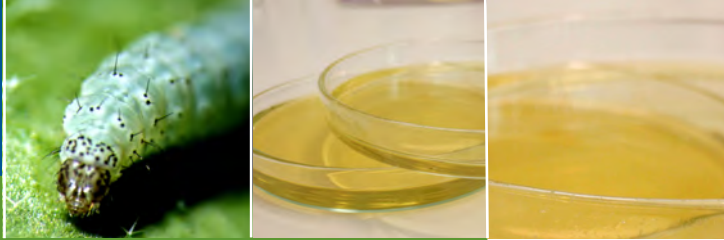
The next phase of the research will see Dr Hernandez-Jover and Ms Hayes study how producers' use and engage with this information.

The project is funded by the Rural Industries Research and Development Corporation (RIRDC).

Contact: Dr Marta Hernandez-Jover,
T: (02) 69332086, E: mhernandez-jover@csu.edu.au



Dr Marta Hernandez-Jover and Ms Lynne Hayes are part of a project to improve the awareness of biosecurity in new and emerging industries.



RESEARCH ACTIVITIES

Barley grass seed contamination

The cost to the sheep industry of the damage to skin and carcasses caused by barley grass and other weed seeds is the focus of new research by Graham Centre PhD student Mrs Jane Kelly.

The problem

Weed seed contamination results in significant losses across the Australian lamb and mutton value chains. Seven weed species have been implicated in causing carcass damage and barley grass (*Hordeum* spp.) has been identified as a key offender. Changing climatic and cropping conditions has seen the continued spread of barley grass across south-eastern Australia and some populations are showing herbicide resistance. Variable patterns of seed dormancy are also contributing to invasion success. This increased prevalence of barley grass is likely to be linked to the increased incidence of seed contamination in sheep.

Ms Kelly's PhD research, through Charles Sturt University's (CSU) School of Animal and Veterinary Sciences, is analysing weed, climate and abattoir data to map the regional severity of seed contamination in Australian sheep and how prevalence associated with weed distribution and climate patterns.

Results

Results showed that distribution of seed contamination in sheep carcasses is influenced by state and region, with widespread contamination occurring throughout the mixed farming zone and regions in the high rainfall and pastoral zone.

There was also an association between the distribution patterns in seed contamination, brome grass and barley grass populations (Figure 1), highlighting both species as key contaminants in south-eastern Australia.

Further findings showed seed contamination in sheep increases with average monthly rainfall, whilst high prevalence also occurred between mean monthly temperatures of 8°C to 35°C. This temperature range typically represents spring and early summer in south-eastern Australia and coincides with the time of seed fall of annual grasses, a period typically associated with seed injury in sheep.

Seed contamination was also greatest in regions of lower elevation, altitudes characteristic of the mixed farming zone. This is likely due to contact between causal weed species and the high density of sheep flocks in these areas.

The age and sex of animals also influenced incidence of seed contamination in flocks (Figures 2 and 3). Older males, for example cast for age rams, experienced the highest rate of carcass contamination. Castrated males, mixed age animals and animals less than two years of age experienced the least

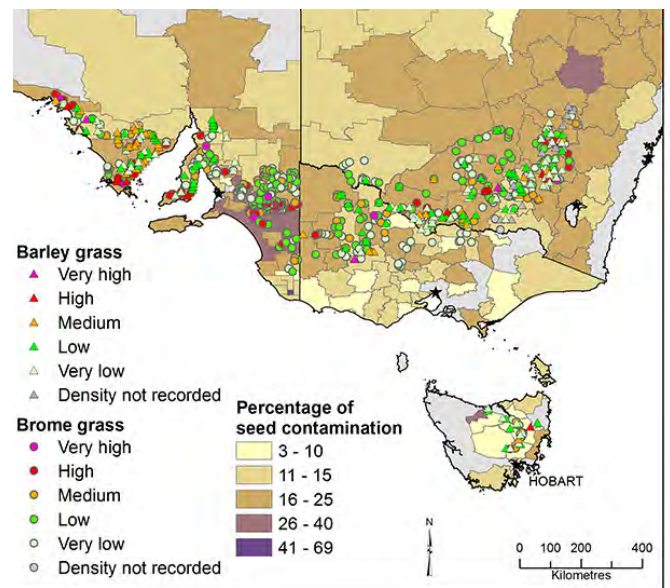


Figure 1. Regional distribution within NSW, VIC, TAS and SA of total density of carcass contamination and distribution of barley grass and brome grass populations across south eastern Australia between 2007 and 2015.

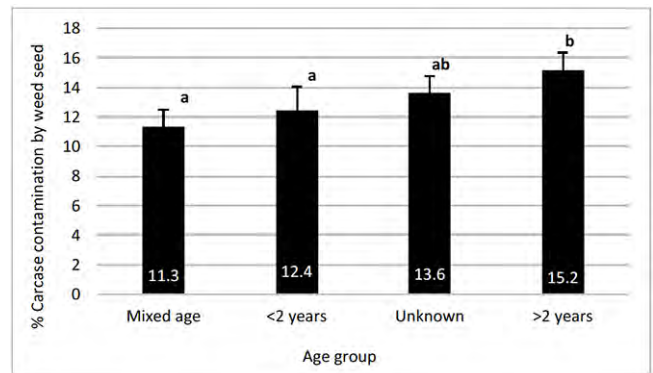


Figure 2. Mean percentage of sheep contaminated with weed seed in each age group.

Values with the same letter are not significantly different ($P < 0.05$). Values within each column represent mean values.

contamination. These results are largely associated with the length and frequency of animal exposure to seed over time.

What next?

The results highlight the importance of barley and brome grass management across the mixed farming zone. Future control efforts should focus on the use of integrated management strategies, as changing climatic conditions over the next decade may result in more favourable environmental conditions for annual grass establishment. Managing seed contamination in older animals will also prove important as these animals disperse weed seeds across and between farms.

RESEARCH ACTIVITIES

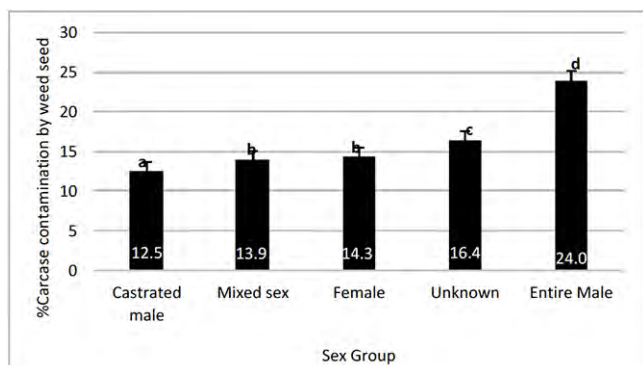


Figure 3. Mean percentage of sheep contaminated with weed seed in each sex group.

Values with the same letter are not significantly different ($P < 0.05$). Values within each column represent mean value.

The next component of Ms Kelly’s research will examine the efficacy of integrated management strategies for control of barley grass under typical cropping conditions characteristic of both the mixed farming and high rainfall zones.

Results from this study will then be incorporated into the third component of the research, which aims to develop a model simulating barley grass population dynamics under various management strategies. This model will be integrated within a bio-economic model for seed contamination in sheep, studying the cost of control and identifying profitable options for management on farm.

Ms Kelly’s research, ‘Seed contamination in sheep carcasses by barley grass (*Hordeum* spp.): an analysis of prevalence, economic impact and management’ is supervised by Associate Professor Jane Quinn, Professor Leslie Weston, Dr. Karl Behrendt, Dr John Broster and Dr Panayiotis Loukopoulos.

Contact: Ms Jane Kelly,
T: (02) 6365 7576; E: Janekelly@csu.edu.au

Fellowship to examine new ways to process data from metabolomics studies

Graham Centre researcher Dr Paul Weston’s area of expertise is in plant chemical ecology, in particular he’s interested in identifying toxic chemical components of plants that affect other organisms.

The research approach taken by Dr Weston, known as metabolomics, involves measuring the abundance of the range of chemical compounds contained in samples using equipment like a mass spectrometer, which helps to identify the compounds.

With funding through a [Graham Centre Research Centre Fellowship](#), Dr Weston hopes to develop new ways to efficiently analyse the massive amounts of data generated when scientists are looking for an unknown compound using chromatography coupled with mass spectrometry.

“The most limiting and time consuming aspect of most metabolomic studies is analysing the data produced by the instruments,” Dr Weston said. “The aim of my fellowship project is to develop systems to comprehensively and efficiently analyse the data and to share these findings with students and other researchers.”

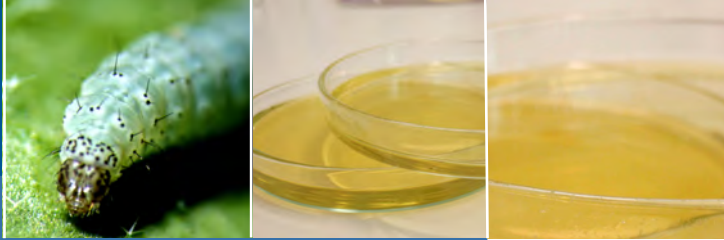
While Dr Weston’s current research is focused on plant, animal and insect interactions, finding better ways to analyse the data in metabolomic studies has implications for other fields of research, including human health and biomedical research.

The Research Centre Fellowships are available to Graham Centre full and associate members and aim to simulate increased research capacity and enhance research outputs.

Contact: Dr Paul Weston,
T: (02) 6933 4815; E: pweston@csu.edu.au



Dr Paul Weston’s metabolomics research is being supported by a Graham Centre Fellowship.



IN THE LIMELIGHT

Jenifer Ticehurst

Position: Adjunct Senior Lecturer, and Research Fellow

Organisation: Charles Sturt University

Career Brief

I completed an undergraduate degree in natural resource management at the Australian National University (ANU), which included an honours project comparing the biophysical and social performance of different grazing systems in the Southern Tablelands. After working as a research technical assistant for a few years with CSIRO and NSW Department of Primary Industries, I completed a PhD titled, 'Hydrological analysis for the integration of tree belt plantations into Australia's agricultural systems'.

Since then I have spent time researching with a team at the ANU, developing models for decision support that integrate social, economic and environmental factors to assist in natural resource management. This included developing Bayesian networks for the management of NSW coastal lakes, and the management of native vegetation in Victoria. This work had a strong focus on the engagement and participation of clients and stakeholders, and won three 'Environ's Awards from the NSW government in 2007, as well as the 'Chair's award' for outstanding contribution to the Commonwealth Environment Research Fund project called Landscape Logic in 2010.

More recently I have focused on social research in rural areas, with Professor Allan Curtis at Charles Sturt University (CSU), studying the adoption of best land management practices such as fencing off waterways from livestock for water quality control and the adoption of water use efficient practices by irrigators in the Murray-Darling Basin.



Dr Jenifer Ticehurst's research interest is in increasing the sustainability of Australia's farming systems.

Research Activities

My research interest is in increasing the sustainability of Australia's farming systems. I believe the key to this is to provide an adequate compromise between economic viability and environmental sustainability. This requires the knowledge and understanding of the requirements of a sustainable system (from an economic, social and biophysical view), the ability and means to convey this information in a meaningful way to land and water managers, and the appropriate economic and political structure to support any required changes.

My recent research has used irrigator surveys to determine their current and future intention to adopt more water use efficient irrigation practices. This is used to calculate how much water could be saved and therefore the capacity that farmers have to adapt to changes in available water from climate and policy changes.

Teaching Activities

Recently supervised student thesis topics:

- What are the social norms that shape the way groundwater irrigators conceptualise and manage their groundwater sources?
- Modelling of farmers' adaptation options under future uncertainty: a case study on the lower Campaspe.

Professional Links

- Member of the Australasian Bayesian Network Modelling Society
- Modelling and Simulation Society of Australia and New Zealand
- American Geophysical Union

A typical day for me includes: Negotiating the kids out the door, dropping them at school, work, home, negotiating the kids into bed, then going to bed myself.

My main project at the moment is: Investigating whether there are opportunities to increase irrigated agricultural production in the Murray-Darling Basin by managing and using surface and groundwater resources together (i.e. conjunctive use), while still meeting our environmental targets.

My favourite part of my job is: The feeling that I'm making a difference for farmers while taking care of our natural resources.

When I am not in the office I like: To be out and about with family and friends camping, water skiing, running, playing rugby and soccer with the kids.

When I am driving I like to listen to: The radio. I don't really mind what's on but I'm just glad we've moved past the Wiggles (not that they're not talented).

Ashleigh Kilgannon

Supervisors: Dr David Hopkins (NSW DPI), Professor John Mawson (CSU), Dr Benjamin Holman (NSW DPI), Mr Michael Campbell (CSU)

Thesis title: A practical means to accelerate beef ageing and sustain acceptable eating quality and safety: chilled storage temperature manipulation

Funding body: Australian Meat Processor Corporation

Relevant Current Employment: NSW Department of Primary Industries, Cowra

Career and studies till now: I graduated from Charles Sturt University with a Bachelor of Animal Science in 2016 and began studying a Master of Philosophy in Meat Science in January 2017.

Currently studying: Master of Philosophy

Research Interests: Reducing ageing times for beef products so that products can hit the shelves sooner without compromising food safety, eating quality or nutritive value. Consumer perceptions of the meat industry also interest me.

A typical day for me includes: I wake up at sunrise to walk my dogs, have breakfast and generally start work about 8.30 am. My days at work either consist of writing or undertaking lab work, with the occasional trip to somewhere to pick up or drop off samples. If I get a chance in the evening I'll walk the dogs again, have dinner and read before bed.

My main project at the moment is: The accelerated ageing project is currently my main focus. It involves ageing beef loins at varying temperatures and varying times, with many of the samples undergoing a temperature change partway through their allocated ageing time. After the allocated ageing time has finished (either at 6, 8, 10 or 12 days) the samples are sectioned so they are able to be tested for a variety of indicators of eating quality. They will be compared against loins aged at the industry standard to determine whether there may be a more practical ageing time/temperature combination for beef.

My favourite part of my studies is: In day-to-day life the lab work is the most interesting. However, I do love when I

get the opportunity to travel somewhere for work, most frequently Wagga Wagga or Sydney.

When I am not studying I like to: In my down time I love to read classic novels, play guitar, garden, and especially cook - my colleagues love that because I like to cook more than I like to eat so they often get surprised with cakes and other goodies. I also like to catch up with friends and explore new places, so I tend to spend a bit of time travelling around the area since most of my friends live a fair way from Cowra.

When I am driving I like to listen to: When I'm driving I generally listen to Triple J, otherwise I have a few CDs in my car made up of a mix of country music, acoustic indie/folk, rock and metal music.

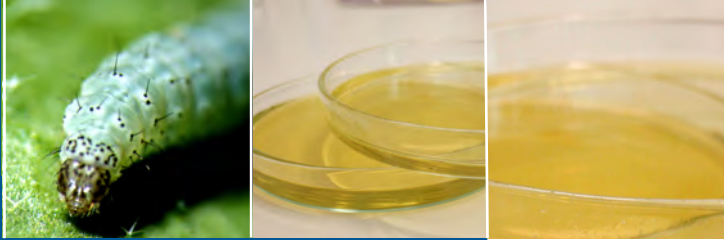


Ms Ashleigh Kilgannon especially enjoys laboratory work as part of her studies for her Master of Philosophy.

Spring Edition of *the Innovator*

The Spring Edition of *the Innovator* will be available in September. Submission of articles for this edition close on **11 August 2017**

Please email articles to Emily Malone emalone@csu.edu.au



2017 EVENTS CALENDAR

Date	What	Where	More information
2 & 23 June	Science and Agriculture Enrichment Day	Graham Centre, Wagga Wagga	Toni Nugent E: tnugent@csu.edu.au
7 July	Graham Centre Sheep Forum	Convention Centre, CSU Wagga Wagga	Toni Nugent E: tnugent@csu.edu.au
18 July	Launch of the Graham Centre Strategic Plan 2017 - 2021		Toni Nugent E: tnugent@csu.edu.au
4 August	Graham Centre Beef Forum	Convention Centre, CSU Wagga Wagga	Toni Nugent E: tnugent@csu.edu.au
10 & 11 August	Agribusiness Today Forum	Location and Venue TBC	Dr Karl Behrendt E: kbehrendt@csu.edu.au



Welcome to the Graham Centre's new interns Dione Howard, James Reilly, Caitlin Ryan and Gabe Brown.

Over the next nine months they'll be working with researchers from CSU and NSW DPI to gain an insight into the Centre's research activity.

CONTACTS

Professor Michael Friend
Director
T +61 2 6933 2285
M 0429 407 725
E mfriender@csu.edu.au

Ms Toni Nugent
Industry Partnerships and
Communications Manager and Editor
T +61 2 6933 4402
M 0418 974 775
E tnugent@csu.edu.au

Ms Maree Crowley
Centre Manager
T +61 2 6933 4399
E mcrowley@csu.edu.au



Photo: Pamela Lawson

Our Location:
Albert Pugsley Place (off Pine Gully Road)
Wagga Wagga NSW 2650 Australia

Mailing Address:
Graham Centre for Agricultural Innovation
Charles Sturt University
Locked Bag 588
Wagga Wagga NSW 2678 Australia