

the INNOVATOR

The Newsletter from the GRAHAM CENTRE for Agricultural Innovation



Photo: Sharon Kiss

From the Director

Welcome to the spring edition of *the Innovator*. The wet conditions have continued since my last column, and we look set for a great spring. It was very pleasing to see strong numbers at both our sheep and beef forums this year, and the optimism in both industries.

Thank you to all those who contributed to our strategic planning activities. The strategic plan, along with supporting documentation, was submitted to the Deputy Vice-Chancellor (Research, Development and Industry) several weeks ago. This will be considered by the review panel, and we expect to advise the outcome of this process shortly. Assuming we are reaccredited, we will move quickly to have the strategic plan endorsed by the Centre Board, implement a new membership policy, and implement a new research pathway structure. The first meeting of the newly established Centre Board (comprising of three senior representatives from both CSU and DPI) will be in early October.

Our researchers continue to be successful in securing grants. Leslie Weston's group have secured a new GRDC funded project on weed management as part of a consortia addressing weed issues in the Northern Region, Geoff Gurr has an ACIAR funded project on sweet potato in PNG, Jane Quinn is leading CSU's involvement in a new MLA animal welfare consortia, and the Graham Centre is the lead on a new MLA project scoping the research, development and adoption needs for mixed

farming systems. Congratulations to all those involved in developing these proposals.

Finally, the excellence of our researchers was recognised in the recent Vice-Chancellor's awards for Excellence. *Marta Hernandez-Jover* and *Geoff Gurr* both received the award for research excellence - congratulations to both on an outstanding achievement.

Professor Michael Friend

Professor Michael Friend

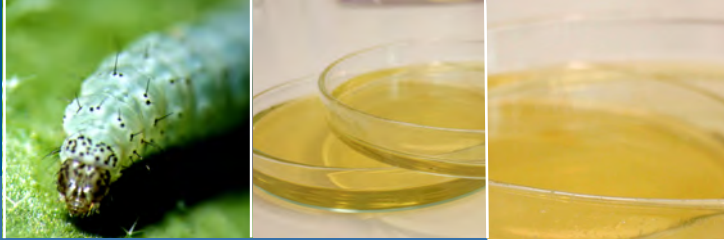
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NEWS

New approach for animal disease surveillance

Charles Sturt University (CSU) researchers are set to play a key role in developing a new approach for surveillance for emergency animal diseases.

The research, through the Graham Centre for Agricultural Innovation, aims to develop a producer-led approach to improve early detection and control of outbreaks.

It's part of a wider \$11 million project funded by Meat and Livestock Australia (MLA) and the federal Rural R&D for Profit Programme.

Dr Marta Hernandez-Jover and Dr Rob Woodgate from CSU's School of Animal and Veterinary Sciences will work closely with animal industry stakeholders.

A senior lecturer in epidemiology and veterinary public health, Dr Hernandez-Jover's research has focused on biosecurity among Australian livestock industries.

"Emergency animal diseases have the potential to cause significant economic and social disruptions and losses across all Australian animal industries," Dr Hernandez-Jover said.

"For example the Australian Bureau of Agricultural Resource Economics and Sciences (ABARES) estimates an outbreak of Foot and Mouth Disease could lead to \$50 billion in losses over ten years.

"Surveillance is critical in ensuring an efficient and effective response to protect primary producer's livelihoods in the event of an incursion.



Dr Marta Hernandez-Jover (pictured) and Dr Rob Woodgate will work as part of a larger Rural R&D for Profit Programme and MLA funded project, working with stakeholders redesigning a new surveillance approach that is 'owned' by producers. The project involves nation-wide data collection to gain a better understanding of current practices and producer attitudes and behaviours in relation to the management of emergency animal diseases. Photo: Emily Malone

"As part of this project we'll be working with all stakeholders to redesign a new surveillance approach that is not driven by government perspectives, but from the 'bottom up' by grower values so that it is 'owned' by producers themselves.

"The project will involve a nation-wide data collection exercise to gain a better understanding of current practices and producers' attitudes and behaviours in relation to the management of emergency animal diseases.

"This will inform the development of a farmer-led surveillance system involving all animal industry stakeholders.

"The aim is to provide governments with guidelines on how to circumvent problems that impact negatively on areas essential for early disease detection, control and eradication."

CSU will work with a group of scientists at CSIRO led by Dr Wilna Vosloo.

This research is part of a larger research project, 'Improved surveillance, preparedness and return to trade for emergency animal disease incursions using FMD as a model.'

The project is led by the CSIRO and involves Meat and Livestock Australia, Animal Health Australia; CSU, Bureau of Meteorology; Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES); Australian Government Department of Agriculture and Water Resources - Animal Health Policy Branch.

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Australian universities crops competition 2016

The Australian Universities Crops Competition (AUCC) provides the unique opportunity for university students to develop their agronomic and business management skills through practical experience and interaction with industry representatives.

It exposes competitors to all aspects of the supply chain to ensure these future agribusiness professionals have whole industry awareness, from input costs and variety selection to yield potential and end users.

As in previous years, students will most likely be tested on a crop seed identification and grain production, business management, pulse identification, analysis and classification, grain grading, canola, live crop identification,



The 2016 CSU Crop Competition team - a great, self-motivated team keen to take on other Universities, in particular their American counterparts. (L to R): Jessica Simpson, Hayden Petty, Grace Rogers, Harriett Brickhill (mentor/tutor), Tyler Austin, Javier Atayde, Tim Callen, Matthew Dunn (mentor/tutor), front: Caitlin Langley, absent: Jack Hogan. Photo: Sergio Moroni

foliar disease analysis and weed identification and live crop yield potential and production practices.

In 2015 Charles Sturt University won the first placed Individual Undergraduate Award and Team Award, and are looking to defend their title this year.

This year's CSU team have been training in the paddock and are being tutored by last year's overall winner CSU graduate

Matt Dunn and Honours student and 2015 participant Harriett Brickhill. The team's mentor is Dr Sergio Moroni.

This year's competition will be held in Temora, NSW on 28-30 September.

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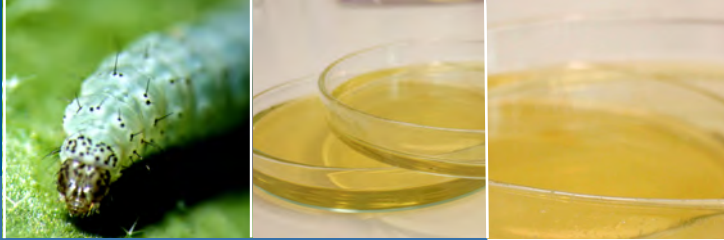


Investigating plant defence chemistry

In May, Dr Olivia Reynolds, NSW DPI visited Geoff Gurr at his 'satellite lab' at Fujian Agriculture and Forestry University in Fuzhou, eastern China. Here she worked with Dr Jian Liu and his team investigating the chemistry of plant defence, including the role that plant-available silicon appears to play in promoting the strength of induced defences against herbivores. Those interested in this topic should aim to catch their symposium at the International Congress of Entomology in Florida during September.

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At left, Olivia Reynolds visiting Geoff Gurr at Fujian Agriculture and Forestry University, China. Photo: Dr Jian Liu, Fujian Agriculture and Forestry University.



NEWS

Enhancing food security and livelihoods

Professor Geoff Gurr travelled to Tanzania in late May-early June as part of an ecosystem services delivery project focusing on Phaseolus beans funded by DEFRA (UK) and the McKnight Foundation (USA). This is a collaborative project involving two PhD students at the Nelson Mandela African Institution of Science and Technology and the Royal Botanic Gardens, Kew, Victoria. Field sites are typically small and set in vegetationally diverse landscapes, so as to suggest scope for high levels of beneficial insect activity, but with only a few sources of nectar and pollen on many sites. The sites aim to promote activity of pollinators and natural enemies of pests by understanding which plant species promote beneficials and suppress pests. Appropriate recommendations can then be made to growers to enhance food security and livelihoods.

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Geoff Gurr on the foothills of Mount Kilimanjaro with PhD students Philemon Elisante (L) and Prisila Mkenda (R). Photo: Prof Phil Stevenson, Kew

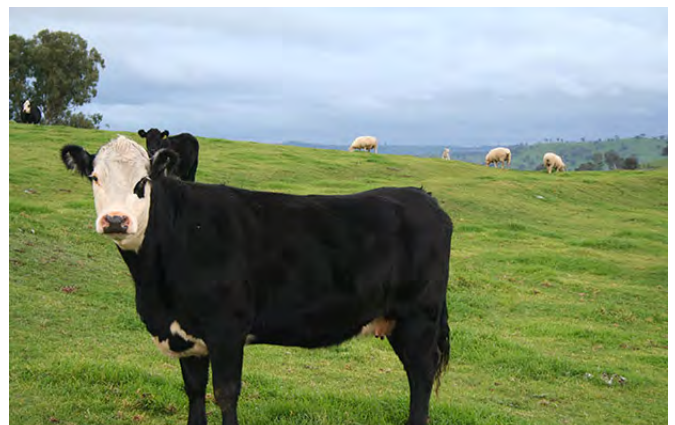
Beef research under the microscope

Strong beef prices, continued demand and an excellent start to the season have resulted in widespread optimism across the beef industry. However, it is important the industry remains innovative to ensure it continues to thrive and remain competitive in global markets.

This year's Graham Centre Beef Forum held on Friday 5 August saw 100 producers and industry representatives come together to listen to industry experts discussing their latest research findings around issues of key relevance to producers and the Australian beef industry.

Nick Sangster, Meat and Livestock Australia set the scene discussing current and planned beef research, development and adoption priorities. Alistair Smith, CSU, looked at the implications from recent research in southern NSW on Pestivirus, a disease that is estimated to cost the Australian beef industry \$114.4 million annually. Crookwell beef producer Andrew Nixon discussed his beef business, while Shawn McGrath and Scott Norman, CSU, and John Wilkins, NSW DPI, discussed emerging technologies that may revolutionise the way we manage cattle into the future.

With the current high cattle prices, the topic of trading cattle is hot for many producers. John Francis, Holmes Sackett drilled down into the principles, and Molong beef cattle producer James Morse discussed his experiences with trading cattle in his business. Grassfed beef is in high demand, and producers need to show evidence of best management practices along the supply chain. The Cattle Council of Australia's CEO Jed Matz, spoke about the importance of integrity in quality assurance programs such as the Pasturefed Cattle Assurance System (PACS).



This year's Graham Centre Beef Forum saw 100 producers and industry representatives come together to listen to industry experts discussing their latest research findings around issues of key relevance to producers and the Australian beef industry. Photo: Toni Nugent

A big thank you to this year's supporters Meat and Livestock Australia, Local Land Services Riverina, National Australia Bank and Teys Australia.

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Optimism high across the sheep industry

It's a great time to be in the sheep business with strong meat and wool prices and continued high demand, improvements in understanding of how management can improve profitability, combined with genetic gains and favorable seasons, sees optimism high across the industry. Riding on these high levels of optimism, around 130 producers from across the region converged on the CSU Convention Centre on 8 July for the Graham Centre's Sheep Forum.

But the industry should not become complacent as significant challenges exist, which if not addressed, will threaten the future viability of the industry. The industry needs a strategy to address these threats and exploit opportunities and Mark Harvey-Sutton, Sheepmeat Council of Australia set the scene for the day discussing research priorities and the sheep industry strategic plan (2015-2020), and what this means for future research and development and marketing initiatives for the industry.

Rob Woodgate, CSU, discussed worm control, and sheep management to reduce the onset of resistance across the region and the impact of worms on sheep. CSU researcher Susan Robertson provided producers with practical advice on management strategies to improve lamb survival and presented her teams latest research findings around this topic, while Lockhart producer Tim Westblade spoke about his own experiences and management to improve lamb survival on-farm.



Optimism remains high across the sheep industry with around 130 producers attending the Graham Centre's Sheep Forum to hear from key industry experts and researchers regarding practical management strategies and the latest research findings that continue to underpin the viability of the industry. Photo: Toni Nugent

Shawn McGrath, Fred Morley Centre, discussed his whole farm modelling work looking at the long-term impacts on productivity and gross margins of sheep enterprises, and managing flocks based on scanning results and feeding to meet body condition score targets. PhD student Lucy Watt presented her research on lamb growth rates from grazing hard-seeded pasture legumes as an alternative to sub clover, and Janelle Jenkins, Riverina LLS, discussed the findings from her recent project looking at issues relating to maintaining sub clover in pastures.

The field day was supported by Meat & Livestock Australia Riverina, Local Land Services, New Horizon Farming, NBI Enterprises and the National Australia Bank.

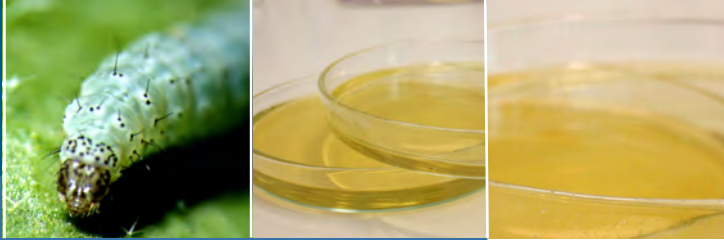
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Farewell to Professor Len Wade

Professor Wade has been at CSU and a Graham Centre member for the past 9 years and was farewelled by friends and colleagues at morning tea on Friday 19 August, wishing him the best for his retirement. He hails from Queensland where he graduated from the University of Queensland with a BAgSc (Hons) in Crop Agronomy before completing a PhD in Crop Science at the University of Western Australia. Professor Wade has a long and distinguished research background in agronomy and crop physiology, working both within Australia and internationally. Prior to joining CSU, he was GRDC Chair in Crop Agronomy at the University of Western Australia for five years. A key highlight during his time at CSU and the Graham Centre was being part of the team that developed and implemented the building of the National Life Sciences Hub. We wish Len all the best in his retirement.



Graham Centre Office Manager Maree Crowley congratulating Professor Wade on his retirement. Photo: Toni Nugent



NEWS

Boosting veterinary medicine services in China

Yuchi Chen, a first year PhD student at the School of Animal and Veterinary Sciences and the Graham Centre, completed an intensive lecture trip under the CSU banner in seven cities in China in May this year. He was invited by Zoetis China, one of the biggest international veterinary pharmaceutical companies, to deliver seven full-day educational lectures and wet labs on Clinical Pathology (Haematology and Cytology) to veterinarians, in seven cities (Shenzhen, Xiamen, Qingdao, Changchun, Tianjin, Xi'an and Chengdu) within eight days.

A total of 445 participants attended his lectures. In China, the need for proper veterinary medicine services has increased tremendously in the last 10 years, along with the demand for good continuing education to veterinary clinicians themselves. Yuchi has worked in China as a veterinarian consultant and lecturer for the last six years before joining CSU, and has built a reputation as an expert in clinical pathology among his Chinese colleagues. The professional material and topics presented were not only based on his previous work, but also involved knowledge and experiences he has gained at CSU.

After his intensive lecture trip in China, Yuchi attended the 8th World Congress of Veterinary Dermatology (WCVD8) (<http://www.vetdermbordeaux.com>), held 31 May - 4



PhD student Yuchi Chen recently shared his knowledge and experience on Clinical Pathology (Haematology and Cytology) with colleagues in China and Bordeaux.

June in Bordeaux, France. WCVD is held every four years in different cities around the world and is the biggest International Veterinary Dermatology conference. This year 2,250 veterinarians from over 70 countries attended. Yuchi was granted two scholarships to attend this congress; the first was the World Association for Veterinary Dermatology (WAVD)-WCVD8 scholarship (30 successful applicants in total), that gave him a free congress registration and financial aid to cover flight and accommodation costs, while the second scholarship, International Society of Veterinary Dermatopathology (ISVD) scholarship, (only two successful applicants among 30 WAVD-WCVD8 scholarship recipients), gave him a free registration to a special ISVD lecture day (1 June) during the congress.

Yuchi's PhD project is on photosensitisation related to plant toxicity in livestock, which is highly related to dermatology and dermatopathology. Attending this conference has been of tremendous benefit to his research as well as extending and maintaining social research networking opportunities that may benefit his research work in the future.

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Parasites are forever

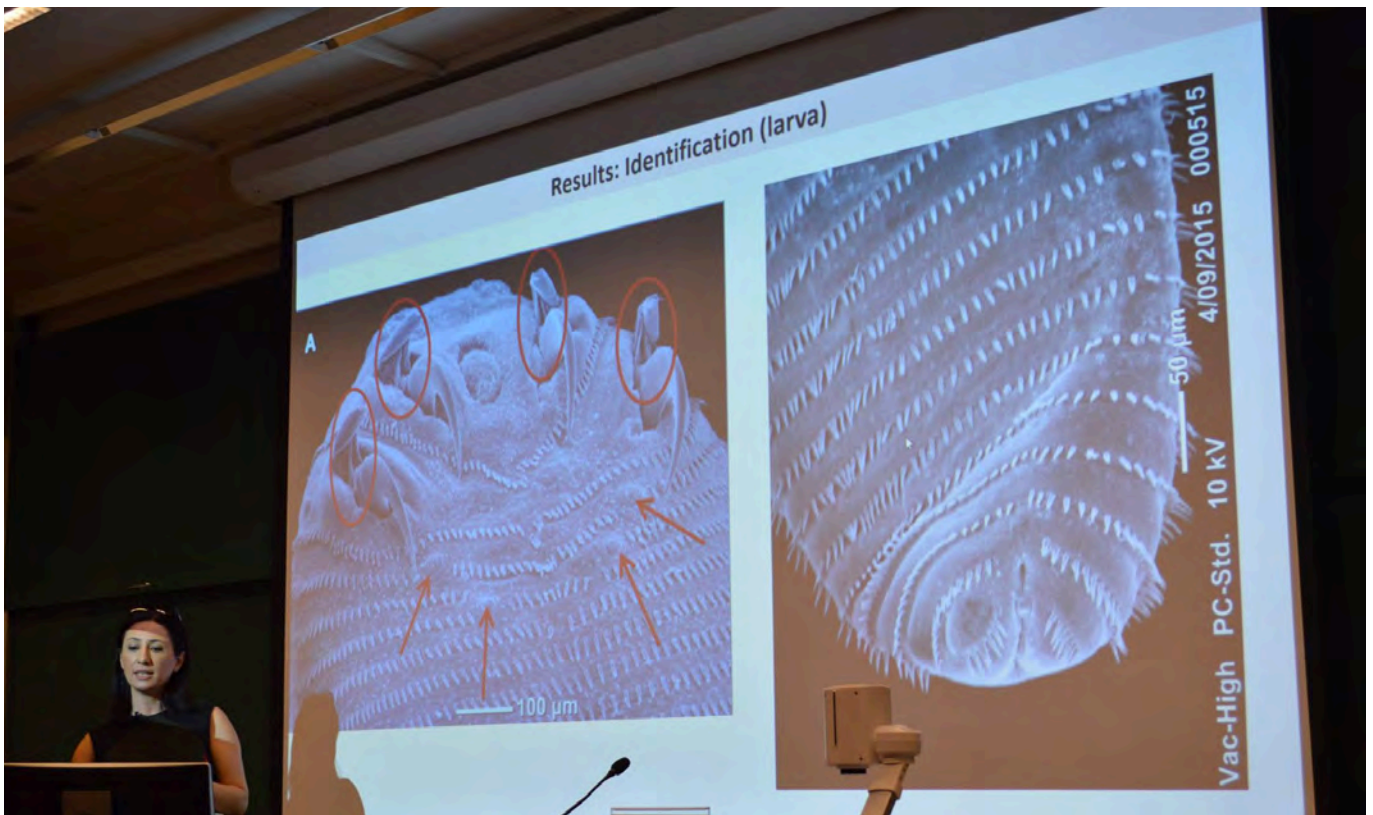
Dr Shokoofeh Shamsi, Senior lecturer in Veterinary Parasitology, School of Animal and Veterinary Sciences, CSU was invited to Chair a scientific session on Taxonomy and Phylogenetics at the 12th European Multicolloquium of Parasitology (EMOP) held in Turku, Finland in July. EMOP is the most prestigious European parasitology conference held every four years.

Shokoofeh and PhD student Thomas Williams happily escaped some of the coldest days in Wagga and arrived in Turku on a beautiful sunny summer day to attend the conference.

With the motto of 'parasites are forever' there were some excellent and novel topics at the conference such as Alien Species in Parasitology or Paleoparasitology. Shokoofeh gave two oral presentations on emerging foodborne parasites, 'Infection with tongue worms in Australian livestock and wildlife' and 'Revision of emerging foodborne parasites in Australia'.

She also presented four posters that were collaborative works with Honours and Master students and international collaborations. Her posters were titled, 'Parasites of edible fish in New Caledonian waters', 'Australian cormorants and their role in transmission of seafood borne parasites', 'A revised method for detection of parasites in seafood' and 'New species of zoonotic parasites in edible fish from the Persian Gulf.'

In addition to the scientific sessions, EMOP hosted the First International Parasite Film Festival where Shokoofeh on behalf of the Australian Society for Parasitology presented 'Gula Guri mayin' (which means 'Heal the body'), an outcome



Dr Shokoofeh Shamsi presented her research findings on infection with tongue worms in Australian livestock and wildlife at the 12th European Multicolloquium of Parasitology, Finland in July.

of the partnership of the society with a group of artists in Far North Queensland. To watch the video go to <http://parasite.org.au/outreach/gula-guri-mayin/>

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He acknowledged and thanked his funding bodies MLA and ACIAR for providing him with the opportunity to attend the course.

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International collaboration helps build students skills set

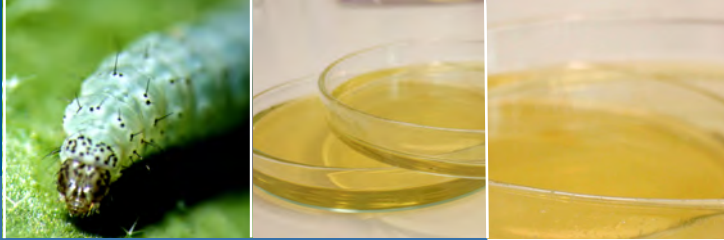
Graham Centre PhD student Sajid Latif attended a two week training course 'Hands-on Liquid chromatography-mass spectrometry course in the analysis of small molecules (phytochemicals, contaminants, primary metabolites' during June at Aarhus University, Denmark.

The analytical chemistry and metabolomics aspects of Sajid's research requires him to develop a specialised skill set in mass spectrometry as well as the in-depth knowledge of analytical chemistry. The intensive course consisted of theoretical lectures from well renowned academics and industry experts coupled with comprehensive practical exercises using samples from his research project.

Sajid said the course contents were well aligned with procedures and protocols he wants to adopt for his research project.



Graham Centre PhD student Sajid Latif, at left, recently participated in a two week training course in liquid chromatography-mass spectrometry at Aarhus University, Denmark, learning from some of the best researchers and academics in the field.



NEWS

Industry competitiveness and the dairy policy environment in Pakistan

Milk is the most important agricultural commodity in Pakistan. A case study presented at the International Food and Agribusiness Management 26th Annual World Conference in Denmark in June, by PhD student Sosheel Godfrey, provided an in-depth analysis of a rural-urban farm in Pakistan marketing fresh milk along the milk value chain. The research took a qualitative approach to study the core roles of the chain actors, product physical flows and the spoilage risks involved, price determination based on market power dynamics and product seasonality, and facilitating the function of financing and the nature of relationships along the chain.

Sosheel presented his paper twice at the conference. In addition to his oral presentations, he submitted a lengthy conference paper (13,000 words). The next step is to curtail this paper and publish it.

A key focus of the conference was the use of case studies for teaching. Sosheel said he was able to understand how academics use this teaching method to challenge students, motivating them to think and solve real life problems. With only a small number of case studies available for developing countries, Sosheel was encouraged by his peers at the conference to publish his research as a teaching case study.

He said another eye opener was the importance that Europe and smaller countries such as Denmark give to innovation and sustainability. These themes and marketing Denmark as a high quality, high value food producing country and tourist destination were seamlessly integrated into the talks of everyone that addressed the conference, including the Foreign Minister, Mayor of Aarhus, business CEOs and academics.

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Food allergens and their impact on human health

Food allergens can have a significant impact on the overall health (both physical and mental) of a susceptible individual. Based on the evidence, it appears both antibody mediated humoral and T-cell mediated cell mediated arms of the immune system are involved in these responses to food allergens.

The prevalence of hypersensitivity responses to food allergens has increased in the last decade, with nut and gluten allergies being the most widely reported. The reasons for this are not clear, however it is also known that self-reported food allergies in particular, have been increasing in recent years and it is unclear if some of these cases of food allergies are clinically significant or if these are reported as a result of a perception of food allergy by the individual.



Left: Presenting his case study of rural-urban farms in Pakistan marketing fresh milk along the milk value chain, at the International Food and Agribusiness Management 26th Annual World Conference, has encouraged Sosheel Godfrey to publish his research as a teaching case study. Photo: Thomas Jakobsen

Right: A large contingent of researchers attended the International Food and Agribusiness Management 26th Annual World Conference at Denmark in June.

The outcome of a hypersensitivity response to an allergen can range from symptoms such as hives to coeliac disease and potentially life threatening anaphylactic reactions. While allergies to various foods have been reported in the literature, nut and gluten allergy remain two of the most widely recognised food related allergies in many countries.

Dr Thiru Vanniasinkam presented a paper at the Australian Institute of Food Science and Technology conference in Brisbane recently, focusing on the mechanisms of nut and gluten allergies, and the potential implications of these allergies in the context of developing food products from nuts and cereals such as wheat, so they are low in allergens and do not contain toxic epitopes that promote hypersensitivity reactions.

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What role does oxidative stress play in lameness and negative energy balance in cattle?

Dr Angel Abuelo, School of Animal and Veterinary Sciences, CSU attended the 19th World Buiatrics Congress in Dublin (Ireland), the world-leading and reference conference in cattle health production during July. With more than 3000 delegates (practitioners, academics and animal scientists) from 78 countries, the environment was unique to discuss different aspects related to bovine health management. The most up-to-date research was presented in different formats including survey-based studies through to those that involved highly-specialised laboratory equipment, all with the same goal of increasing the health status of cattle, either beef or dairy. Angel presented two posters on his research looking at the role of oxidative stress in two major bovine disease complexes: lameness and negative energy balance.

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

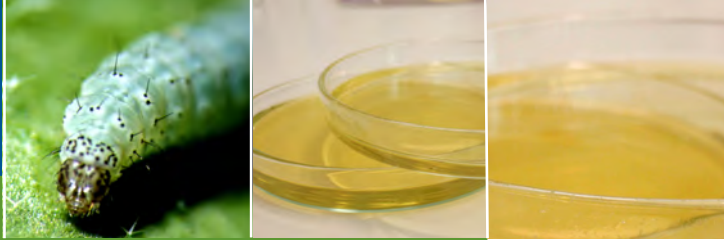
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and on **Instagram** [grahamcentre05](https://www.instagram.com/grahamcentre05)





RESEARCH ACTIVITIES

The effect of reduced source from anthesis to seed fill on canola yield components

Canola (*Brassica napus* L.) is the third largest broadacre crop after wheat and barley in Australia, and is grown extensively across south east Australia. Achieving high yields is the main objective for breeders and growers alike. Yet, while research to date has found that high biomass at anthesis, podding and maturity is key for high yield, little information is known on the contribution of reserves to yield and the physiological response of canola to yield limited conditions.

Harriet Brickhill, a fourth year Agricultural Science Honours student, is investigating how the yield components of canola are affected from anthesis to pod fill with reduced assimilate availability. Her project is also examining any compensatory and physiological responses.

Three different shading periods were imposed to reduce light intensity, from anthesis onwards and will be compared to evaluate how the timing and intensity affects assimilate

availability and yield components. A number of measurements are being taken to determine the crop response, including the partitioning of biomass and contribution of water soluble carbohydrates to yield. This trial is currently being conducted in a CSU glasshouse in Wagga Wagga, with the findings to be confirmed in a field trial.

The research conducted so far indicates that assimilate supply does not meet demand throughout anthesis and podding, creating a hierarchical response in the plant. Compensation occurs due to yield limitations, yet this changes according to the timing, intensity and duration of source limitation.

Harriet received a Graham Centre scholarship to fund her project, and is supervised by Dr's Sergio Moroni (CSU) and Felicity Harris (NSW DPI). Harriet has found her honours year challenging and rewarding and is looking forward to the future experiences her research will bring. Harriet thanked the Graham Centre and her supervisors for their assistance and support.

Harriet grew up in Griffith, NSW, and became interested in a career in agriculture after attending Hurlstone Agricultural High School. Harriet enjoys going for long runs, bonfires and cooking a mean roast for her friends on a Sunday evening. Harriet is currently looking for a job as an agronomist (get in touch!) although she plans to travel to Morocco for a few months after she graduates to recover from a whirlwind year.

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Effect of low temperature on early vigour of canola

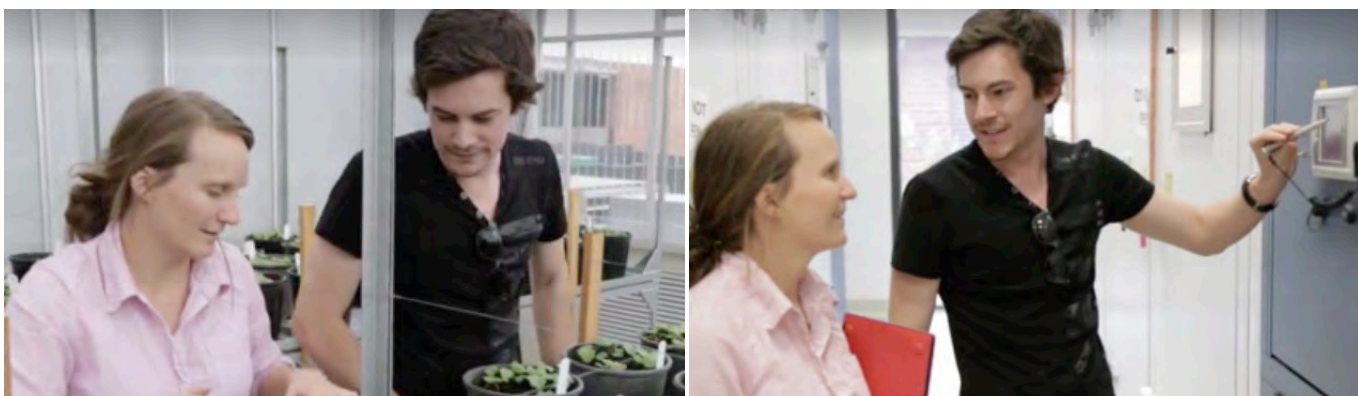
Canola is exposed to periodic low temperatures throughout growth and development. Low temperatures promote flowering through the process of vernalisation, but can reduce biomass accumulation during early vegetative growth. It has been identified that the response to vernalisation varies among canola varieties, which is an important component to flowering. However, there is also a varietal variation in biomass accumulation when exposed to low temperatures, indicating possible cold tolerance. There is a positive correlation between early vigour and final yield, making cold tolerance an important characteristic in optimising early vegetative growth.

Alistair Dart is from Narromine, NSW and is conducting an Honours project as part of his degree in Agricultural Science at CSU, Wagga Wagga. His research aims to evaluate the effect of low temperature on early vigour of canola. Thirty eight genotypes, including open-pollinated, hybrid, TT varieties and breeding lines are being subjected to various exposures at 8°C. The project is conducted under controlled environments and Alistair has had the opportunity to use the growth chamber cabinets in the phytotron and the glasshouse facilities located at Wagga Wagga.



Fourth year Agricultural Science Honours student Harriet Brickhill is investigating how the yield components of canola are affected from anthesis to pod fill with reduced assimilate availability. Photo: Charles Sturt University

RESEARCH ACTIVITIES



Honours students Alistair Dart and Harriet Brickhill using NaLSH controlled environment facilities to conduct canola projects.
Photo: Charles Sturt University

The research aims to highlight possible differences in early vigour and any differences in cold tolerance. Identifying canola genotypes that are more vigorous will highlight genetic variation and improve decision making for varietal selection and sowing time, ultimately to optimise potential yield.

Preliminary results indicate that some genotypes appear to be more or less sensitive not only to low temperatures, but the length of time they are subjected to them. Biomass accumulation is relatively similar across two, four and six weeks of low temperatures for some genotypes, suggesting that some genotypes are cold tolerant. However, more sensitive genotypes see a reduction in biomass with increasing exposure.

Alistair is a recipient of the Honours Scholarship program through the Graham Centre. The project is primarily supervised by Dr Sergio Moroni, CSU and co-supervised by Dr Felicity Harris, NSW DPI. Alistair would like to thank his supervisors for their consistent support throughout the year. He is finding honours to be very rewarding, as overcoming challenges has helped him to reflect on and improve organisational skills and time management. He believes his honours project has provided not only a great skillset, but a great focus on canola growth and development that can be applied in future goals and challenges.

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What Tastes Better?

What tastes better, chilled or frozen lamb? This is the question that Masters student Cassius Coombs and his supervisors at NSW DPI (Cowra) and the Graham Centre have been asking for the last year. It is common knowledge that chilled meat spoils faster than frozen meat, but if the same storage duration is used for each type of storage (eight weeks), does one come out on top?

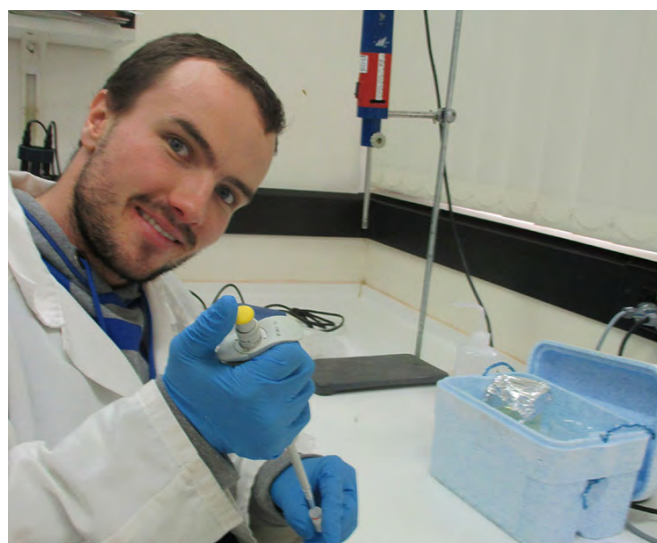
Using a small consumer panel at Cowra, Mr Coombs and the team evaluated the responses regarding tenderness, juiciness, flavour and overall liking of meat. Their findings

showed a clear consumer preference for lamb chilled for eight weeks compared to lamb frozen for eight weeks.

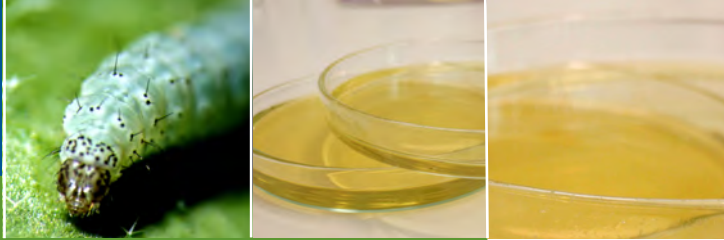
Mr Coombs and the team also completed a second study, relating measurements of microbial loading of experimentally aged beef to colorimetric measurements over three days of display. This study showed that at least some variability in colour could be explained by the microbial loading, with the Enterobacteriaceae family related to colour deterioration and lactic acid bacteria related to improved lightness and redness.

So if your meat in the fridge looks a bit off-colour, does that mean it is spoiled? Not necessarily as the relationships were not overly strong, though these show promise and a larger-scale study on food safety and meat colour changes relating to prolonged storage durations is currently underway.

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Masters student Cassius Coombs is trying to answer the question of whether chilled or frozen lamb tastes best. Consumer panels show a clear consumer preference for lamb chilled for eight weeks compared to lamb frozen for eight weeks.



RESEARCH ACTIVITIES

Remote monitoring boosts beef research

Charles Sturt University (CSU) researchers are part of a team exploring how remote monitoring technology can be put to use in the beef industry.

The team is currently developing a tool that will alert researchers when a calf is born and provide location details.

Associate Professor Scott Norman from CSU's School of Animal and Veterinary Sciences, says this tool will be used in research to understand more about calf losses in the northern beef industry.

"Calf loss has been identified as a significant contributor to poor reproductive performance within the northern beef herd, affecting productivity and profitability," Professor Norman said.

"But the large scale and remote nature of the industry in the north means there's little information about when and why these losses are occurring."

"We hope this tool will help researchers fill in some of those gaps. If we can identify where the losses are occurring and the reasons for these losses, and implement management strategies to address those problems, it will be a significant benefit to the industry."

The tool has been developed as part of a project funded by Meat and Livestock Australia (MLA) involving the NSW Department of Primary Industry and Central Queensland University.

Professor Norman, who's also a member of the Graham Centre for Agricultural Innovation, says this could be the tip of the innovation iceberg.

"The telemetric technology used in this device has the potential to provide researchers and producers with valuable information about cattle behaviour, said Professor Norman.

"We're now investigating other ways we can use the telemetric technology, for example an ear tag that could help producers identify when a cow is oestrus and to which bull she is bred.

"We may also be able to monitor behaviour patterns to get an understanding of mothering behaviour, all from a remote location."

The Remote Calving Alert for Beef Cattle project involved Professor Norman, Dr Cyril Stephen, Ms Tonya Collop, Ms Jaymie Loy, Ms Katie Asplin - all from CSU and Professor David Swain, Dr Kym Patison and Mr Don Menzies from Central Queensland University.

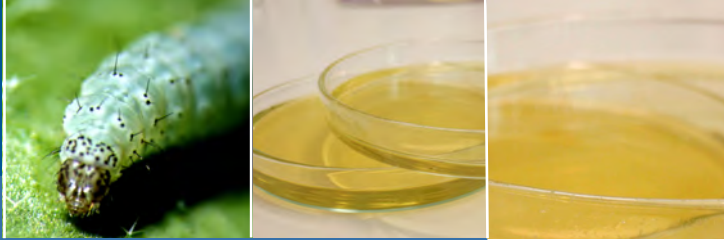
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Contact: Associate Professor Scott Norman,
T: 02 6933 2088, E: snorman@csu.edu.au



Calf loss is a major cause of poor reproductive performance in Australia's northern beef herd, but a new tool that alerts researchers when a calf has been born and also provides location details will assist in understanding more about calf losses. The calf alert tool has been developed by Associate Professor Scott Norman (pictured) and his colleagues from NSW DPI and Central Queensland University as part of a MLA funded project. Photo: Emily Malone





IN THE LIMELIGHT

IN THE LIMELIGHT

Cassius Coombs

Supervisors: Professor Michael Friend (CSU) and Dr David Hopkins (NSW DPI)

Thesis title: Identifying storage thresholds in frozen and chilled red meat

Funding body: Australian Meat Processor Corporation

Relevant Current Employment: NSW DPI, Cowra.

Career and studies till now: Graduated in 2013 from The University of Sydney with a Bachelor Animal and Veterinary Bioscience. I worked for one year in Brazil as an English teacher, then as a courier in Sydney for six months before starting my Masters at CSU.

Currently studying: Masters of Philosophy

Research Interests: Meat quality, meat export, preservation of meat using chilled and frozen storage, meat tenderness and mechanisms behind it, and new technologies for meat quality determination.

Professional Links:

https://www.researchgate.net/profile/Cassius_Coombs

A typical day for me includes: I'm a very late riser and late sleeper, so unless there's important lab work, days rarely start before 9 am. I often eat a hearty breakfast before coming into work, drink coffee and either get writing on my conference posters, papers for my thesis or cutting and homogenising samples in the lab. In such a project as mine the homogeniser is grinding meat so often I can hear it in my sleep. I will often continue doing these until 6 pm or later, at which time I try to catch some sun rays (if not before), practice kung fu, try new recipes at home and then head off to bed.

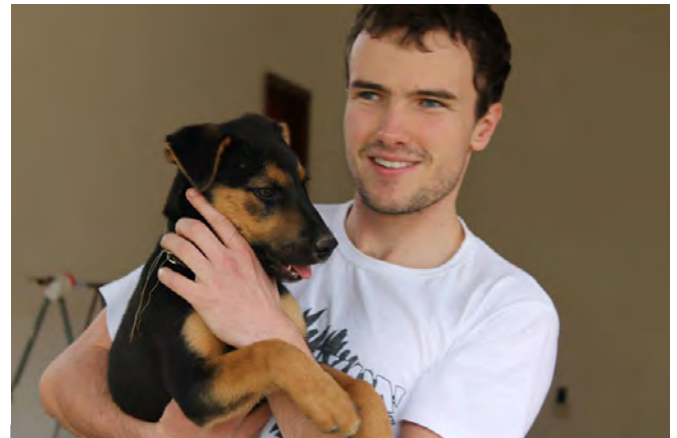
My main project at the moment is: I've been working on Frozen Meat Thresholds (FMT) for about 18 months and currently I'm in emptying the freezers and finishing all the lab work, since sampling (up to one year frozen storage) is just about complete. We have chilled, then frozen lamb and beef loins under standard Australian abattoir conditions to mimic the export process, and displayed a sub-section of each loin following the prescribed chilled-then-frozen storage duration. From this we aim to develop different quality and safety thresholds for international markets of Australian red meat.

My favourite part of my studies is: I honestly enjoy the lab work the most, followed closely by the networking and presentation of my findings at conferences. The writing up is quite good too; there is also a strange feeling of satisfaction

when filling in a massive data sheet and getting closer and closer to completion.

When I am not studying I like to: I'm concurrently working on achieving a black sash at my kung fu school in Sydney, so this takes me away most weekends. I also like spending time with my girlfriend and travelling to new places, catching up with friends and being social, and meeting new people. I enjoy keeping fit and healthy through exercise and eating, as well as discovering new music via YouTube (a good companion for thesis writing) and seeing live bands.

When I am driving I like to listen to: I spend a lot of time in the car, and I much prefer to be deliberate rather than listening to the radio, so I put on lots of electronic dance music and old school music to take me back to the past (last week it was almost all Rolling Stones), or biographies by or about great men of history, or something a bit more rah-rah like Tony Robbins. Music for me often sets the mood and my tastes range from bubblegum pop, to different varieties of heavy metal, punk rock, hip hop, reggae and psychedelic music.



Cassius Coombs is identifying storage thresholds in frozen and chilled red meat in his Masters research.

Spring Edition of the Innovator

The Summer Edition of *the Innovator* will be available December 2016. Submission of articles for this edition close on

Monday, 14 November 2016.

Please email articles to Toni Nugent.

Allan Gunn

Position: Senior Lecturer, School of Animal and Veterinary Sciences

Organisation: Charles Sturt University

Career Brief: I completed high school at my local (160 km from our family farm at the time) state boarding school in Mutare, Zimbabwe, before having an enforced year as a peace time soldier doing National Service. I then went on to study agriculture at the University of Natal, Pietermaritzburg (now UKZN) for four years. After completing my studies I travelled around the UK where I did tasks including despatch riding in London- my first job north of the Zambezi river, tree planting on the Isle of Mull, and silage making in the UK midlands and Kentucky, US.

After working for an agricultural aviation (crop spraying) company and farming our family farm, I did a quick tour of Australia (where I was a janitor in WA and packed mangoes in Qld), PNG and New Zealand. After another short stint of agricultural consultancy, (in reality playing rugby), I eventually succeeded in entering veterinary school at the University of Edinburgh, the Royal (Dick) School of Veterinary Studies.

After completing my studies, I worked in the UK for a few years before returning to Zimbabwe to practice, having passed the veterinary registration examinations. I set up my own practice in rural Zimbabwe for a few years, until the advent of the farm invasions scuppered my desires to be a rural veterinarian in Zimbabwe, and a farmer.

So, after a few *locum tenens* in Australia, the UK and China, my British girlfriend and I came to the Hunter valley in Australia for a couple of years, for me to become a permanent resident. Between us we now have four ANZCVS memberships, a DACT, and Viki has a PhD. Sixteen years later as Australian citizens my wife Viki, and our three kids, Nadia, Laurence and Harriet are enjoying the challenges that academia and CSU Wagga have to offer after 12 years in the Hunter.

Research Activities: Trying to understand the hypothalamic pituitary control of reproduction, especially the role of kisspeptin, and trying to non-surgically prevent reproduction in farm animals and dogs. On the way we have proven that gastric regurgitation occurs in horses, and we are working on the determining the pH of the uterus in mares.

Teaching Activities and Interests: Learning how to impart what knowledge and skills I have to the next generation of professionals, and more importantly, trying to stop them from making the silly mistakes that I made.

Professional Links: I am a member of the Australian and New Zealand College of Veterinary Scientists, Royal College of Veterinary Surgeons, the British College of Veterinary Specialists and the American College of Theriogenologists.

My main project at the moment is: Mapping kisspeptin neurones in the hypothalamus of cattle, and attempting to develop non-surgical castration in cattle, sheep and dogs with some eminent colleagues at CSU and Melbourne.

A typical day for me includes: Waking at 4.30 am, going for a 20 km cycle and a 5 km run, before feeding the dogs and the kids breakfast at 7.30 am (the beginning is a lie!) Arriving at work sprightly at about 8.30 am, going on a farm visit with a bunch of students to entertain, and entertain me. Having a bite of lunch and organising the next PBL session after struggling through the ever increasing email traffic. Ending with a game of squash and home to see the family.

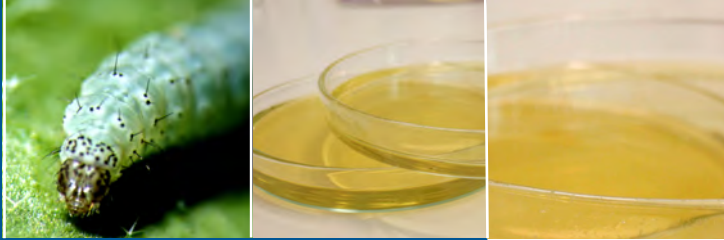
My favourite part of my job is: Interacting with great students and fantastic work colleagues.

When I am not in the office I like: Trying to keep active and having fun with my lovely wife and kids.

When I am driving I like to listen to: Wow, it has to be ABC news radio! That is when it is not summer and there's cricket on the radio.



In his spare time, Allan Gunn loves to keep fit and is an avid rugby player and referee.



2017 EVENTS CALENDAR

| Date | What | Where | More information |
|-------------|-----------------------------------------|------------------------------------|------------------------------------------------------------------------------|
| 2 & 23 June | Science and Agriculture Emrichmanet 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 |
| 4 August | Graham Centre Beef Forum | Convention Centre, CSU Wagga Wagga | Toni Nugent E: tnugent@csu.edu.au |
| 5 December | Graham Centre End of Year Function | Convention Centre, CSU Wagga Wagga | Toni Nugent E: tnugent@csu.edu.au |



Photo: Sharon Kiss

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Photo: Toni Nugent

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Primary Industries