Message from the Director

Since the last newsletter, we have had a very busy couple of months with the Outlook Conference, Board and Advisory Committees meetings, and applications to various funding agencies. Also, many of our staff visited overseas to attend international conferences and develop collaborative links.

We are very pleased to welcome Dr Tony Fischer to our Industry Advisory Committee (IAC). Tony has a distinguished career as a world-leading agronomist and crop physiologist. He has been adviser to the Australian Centre for International Agricultural Research, and Director of the Wheat Program at the Centre for International Maize and Wheat Improvement in Mexico. Prior to this he was a Senior Principal Research Scientist with the CSIRO Division of Plant Industry, Canberra, conducting research on wheat physiology and its application to wheat breeding; on reduced tillage for wheat systems; and on nitrogen fertiliser management in wheat. As he is a local Boree Creek boy, we look forward to his contribution to our IAC and research directions.

The 2008 Riverina Outlook Conference - “The Climate for Fodder” was held in Wagga Wagga on 14 August. The aim was to highlight for growers up-to-date information on hay and silage production and feeding, and showcase the opportunities for managing risks and the challenges of maintaining livestock production levels in a variable climate. Highlights were presentations by two producers who have met the challenges of recent seasons, Wagga dairy farmer Glen Jolliffe and Holbrook beef producer Warwick Cookson. Proceedings are available on our website. We welcome suggestions for a theme for the 2009 conference that would be of interest to farmers. We thank our sponsors (see back page) for supporting this annual event.

Rain over the region last week has saved many crops but with no subsoil moisture the outlook is still pretty grim. Many farmers I met at the Henty Machinery Field Days are keen to explore forage conservation options to provide more flexibility. We are starting research on the opportunities and risks of Roundup Ready canola in our cropping rotations and a seminar is planned for early November on the subject.

We are keen for feedback on the content of this newsletter and look forward to your suggestions.

Professor Deirdre Lemerle

The EH Graham Centre for Agricultural Innovation is a strategic alliance between the NSW Department of Primary Industries and Charles Sturt University. It aims to be the Australian Centre of Excellence in Mixed Farming Systems and undertakes world-class collaborative research and education with key partners to deliver productivity gains and environmental protection that address the challenges of climate change, water scarcity, food security, bio-security, and the skills shortages in agriculture.
Research Centre Fellows 2008

CSU provided the Graham Centre with $600,000 in 2008 to “buy in” research time of academic staff to focus on our research priorities. The following staff were awarded fellowships:

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<thead>
<tr>
<th>Name</th>
<th>Research Focus</th>
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<tbody>
<tr>
<td>Professor Nick Sangster</td>
<td>ruminant parasites</td>
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<tr>
<td>Dr Michael Friend</td>
<td>animal nutrition</td>
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<tr>
<td>Professor Peter Wynn</td>
<td>animal nutrition</td>
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<tr>
<td>Professor Peter Chenoweth</td>
<td>animal reproduction</td>
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<tr>
<td>Dr Tiggy Grillo</td>
<td>animal parasites</td>
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<tr>
<td>Mr Jan Lievaart</td>
<td>animal parasites</td>
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<tr>
<td>Associate Professor Gavin Ash</td>
<td>biological control</td>
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<tr>
<td>Professor Geoff Gurr</td>
<td>biological control</td>
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<tr>
<td>Dr Samson Agboola</td>
<td>healthy food products</td>
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<td>Dr Jim Virgona</td>
<td>pasture systems</td>
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<tr>
<td>Associate Professor Phil Eberbach</td>
<td>stubble and water use</td>
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<tr>
<td>Dr Jason Condon</td>
<td>stubble and nutrient use</td>
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<tr>
<td>Professor David Kemp</td>
<td>pasture systems</td>
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<tr>
<td>Dr Jian Zhao</td>
<td>healthy food products</td>
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<tr>
<td>Dr Gaye Krebs</td>
<td>animal nutrition</td>
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Travel Grant Reports

XXIII International Congress of Entomology in Durban, South Africa, 23 - 27 June 2008

Dr Mark Stevens, Principal Research Scientist, Yanco Agricultural Institute, NSW DPI

During July 2008 Dr Stevens attended the XXIII International Congress of Entomology (ICE) in Durban, South Africa. Dr Stevens found this congress to be very stimulating and came back with lots of new ideas for research projects. Just as importantly, he made a lot of new contacts with leading pest management researchers from around the world. There are too many to list here, however mention should be made of the stored grain entomologists based in Manhattan, Kansas, who work for either the USDA-ARS or Kansas State University: James Campbell, Jim Throne and Tom Phillips are all leaders in the field of stored grain pest ecology, and their advice and guidance will be extremely valuable in relation to new research projects supported by the CRC for National Plant Biosecurity. Contacts made or renewed with researchers based at Washington State University and the University of Florida will also be of value in ongoing research programs on plant volatiles and aquatic toxicology.

Several ideas for postgraduate projects were developed with colleagues who attended the congress, some of them with the potential to lead to international collaboration. Michael Stout (Louisiana State University) and Dr Stevens discussed the possibility of looking at chironomid midge colonisation in US rice fields, and discussions with Major Steve Frances (Australian Army Malaria Institute) indicate that DNA-based studies on mosquito predation are now an option in southern Australia, as appropriate molecular markers have been identified. Studies of this sort are valuable tools for examining trophic relationships, and are becoming increasingly popular with ecologists as DNA technology becomes more accessible to applied researchers.
Dr Stevens chaired a rice pest management symposium during the congress, and presented papers on stink bug ecology and management of chironomid midge larvae with the pathogen *Bacillus thuringiensis var israelensis*. Unfortunately several of the invited speakers did not turn up, and this was pretty much characteristic of the congress as a whole – financial constraints, visa restrictions, and a concern about security issues in South Africa led many registered delegates to cancel their trips at the last minute. This was the only downside to what was otherwise an enjoyable and stimulating congress. The next ICE will be held in 2012 in Daegu, South Korea. Travel was supported by a grant from the EH Graham Centre.

**Australian and New Zealand Societies of Animal Production, Brisbane, 24 - 27 June 2008**

**Dr Susan Robertson, Post Doctoral Fellow, School of Animal & Veterinary Sciences, CSU, Wagga**

The Australian and New Zealand Societies of Animal Production held their first joint conference in Brisbane 24 – 27 June 2008. Dr Robertson attended this conference to present a paper for the EverGraze project on the incidence of congenital goitre in lambs observed during 2006. Highlights of the conference included presentations on smart foods and the potential for the Australian industry, reproductive performance and in utero effects on livestock performance, and the implications of changing animal welfare standards on livestock production.

Two of the themes of the conference, ‘Transformational changes in livestock systems – which includes developing new feed base and livestock systems’, and ‘Reproductive performance and in utero effects on livestock performance’ are highly relevant to the Graham Centre, aligning with the research priority of pastures and animals and constraints to production. Several presentations dealt with aspects of lamb survival, including Western Australian work dealing with shelter. Dr Robertson said “Since lamb survival is the focus of one of the EverGraze projects, these papers will be useful for comparison when writing our results. They indicated that shelter is ineffective in mild winters, similar to our findings, supporting our current research to determine the environments in which shelter will be effective”. There was a range of papers dealing with transgenerational effects of nutrition on reproduction. The presenters expressed some doubt as to how relevant to on-farm production this effect is – it needs to be of practical significance.

Also of high relevance was a presentation of the implications of changing animal welfare standards on livestock production. Standards will be introduced in Australia, probably integrated with existing quality assurance schemes (eg NLIS in the sheep and cattle industries), such that customers, via demand, will be able to have a larger impact on what is perceived as appropriate production procedures. At this stage the measures of ‘adequate’ performance have not been determined. During discussion, concern was expressed about who would determine what is ‘adequate’, and whether producers would have higher costs as a result of the scheme. While there was some indication that producers currently following ‘best practice’ would have no problems, the not unwarranted impact of public pressure on market forces in the current lamb mulesing issue, is evident. Livestock marking and castration could well be a focus in the future. Animal welfare is, in a large part, perception – different cultures and societies have different expectations. Papers on these issues are published in the Australian Journal of Experimental Agriculture and are worth reading.

The other session with relevance to the Graham Centre was a presentation on “mart foods”. Smart foods have functions that provide health benefits. Many livestock products have the potential to be manipulated by farm management practices and marketed on the basis of providing a health benefit, and so could significantly increase returns to producers. Travel was supported by a grant from the EH Graham Centre.

**Reference**

New Appointment

Professor Leslie Weston has been appointed to the position as Professor of Weed Science at the School of Agricultural and Wine Sciences, CSU, having been funded by a NSW Government Life Sciences Award. She comes to CSU from Cornell University in the US and will join the weeds research group within the EH Graham Centre. Her interests are in chemical ecology of weeds, weed invasion, allelopathy and soil-plant interactions.

Professor Weston’s most significant career achievements are focused on her research and extension efforts while at Cornell University as a faculty member in the Department of Horticulture. During the past years, she has published or co-authored over 100 articles. Her research has been recognized nationally and internationally for its significant impact in the fields of weed science, allelopathy, natural products chemistry and horticulture.

Her work has also been highly praised for its scientific merit and utility through patent awards. Professor Weston currently holds two international patents for natural products with biological activity that were discovered in her laboratory and have commercial potential as bioherbicides. More importantly, her work and that of her students has had a marked impact on the field of allelopathy, and the development of alternative weed management strategies for horticultural and agronomic cropping systems, ranging from use of cover crops to selection and utilization of weed suppressive groundcovers in landscapes, roadsides and reclamation areas. In addition, groundbreaking research has led to the development of new techniques, bioassays and discovery of novel allelochemicals which are the focus of continued widespread study across the globe. Her work has been cited in Science, Plant Physiology and many other articles presented in high impact journals and widely circulated books.

Professor Weston also has a strong involvement in the horse industry, involving a breeding enterprise with appaloosas. She hopes to continue her association with horses in Australia.

Award

Professor Jim Pratley received the 2008 Molisch Award for “continued excellence in the field of allelopathy research” at the recent 5th World Congress on Allelopathy held in Saratoga Springs, USA in September 2008. A number of people from the Graham Centre Allelopathy Team attended the Congress.

Recent Adjunct Appointments

Approximately 50 Graham Centre members hold adjunct (or honorary) appointments at Charles Sturt University. The following staff have been offered appointments or re-appointments since 1 July 2008:

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<thead>
<tr>
<th>Dr Mark Conyers, Adjunct Professor</th>
<th>Dr Ric Cother, Adjunct Professor</th>
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<tr>
<td>Dr Brian Dear, Adjunct Professor</td>
<td>Dr Joanne Holloway, Adjunct Lecturer</td>
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<tr>
<td>Dr Iain Hume, Adjunct Senior Lecturer</td>
<td>Mr John Lacy, Adjunct Senior Lecturer</td>
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<td>Dr Guangdi Li, Adjunct Senior Lecturer</td>
<td>Dr David Luckett, Adjunct Associate Professor</td>
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<tr>
<td>Dr Rod Mailer, Adjunct Professor</td>
<td>Dr Sergio Moroni, Adjunct Research Fellow</td>
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<tr>
<td>Dr Gordon Murray, Adjunct Professor</td>
<td>Dr Tom Nordblom, Adjunct Associate Professor</td>
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<td>Mr John Oliver, Adjunct Professor</td>
<td>Dr Harsh Raman, Adjunct Associate Professor</td>
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<tr>
<td>Mr Mark Richards, Adjunct Research Associate</td>
<td>Dr Brendan Scott, Adjunct Associate Professor</td>
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<tr>
<td>Dr Shoba Ventanagappa, Adjunct Senior Lecturer</td>
<td>Mr Myo Win, Adjunct Lecturer</td>
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<td>Dr John Wilkins, Adjunct Associate Professor</td>
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www.grahamcentre.net
Updates

Cover cropping for weed control, the additional benefits

As farmers search for new techniques to deal with the changing climate, several grower groups together with Graham Centre scientists are evaluating the benefits of cover cropping for improved moisture infiltration, soil health and weed control.

Cover cropping has been used in Southern America for decades to protect bare soil from erosion and to improve water infiltration and suppress weeds. As part of a GRDC-funded project on Integrated Weed Management (IWM), researchers are investigating the benefits of cover cropping for weed control in no-till and organic systems. The use of a green or brown manure crop has previously been included in IWM strategies for problem weedy paddocks but this still involves some cost in incorporation or using a non-selective herbicide to kill the crop. Farmers in the Central West of NSW are evaluating crimp rolling of the standing cover crop. Crimp rollers are generally 0.6 – 1 m in diameter with water or oil for additional ballast and are towed behind a tractor to flatten the standing crop. The roller has a series of 10 – 12 blades or blunt knives running around the drum approximately 15 – 16 cm apart and 6 – 8 cm tall. The action of rolling the knives across the crop, combined with the weight of the roller, flattens the crop and crimps it every 5 – 6 cm, breaking the stem and killing the cover crop. Crimp rolling produces a mulched layer of several centimetres thick on the soil surface, suppressing weed germination, improving water infiltration into the soil and reducing evaporation.

A number of different crops are being evaluated in experiments at Wagga Wagga and Wellington, including cereal rye, wheat, oats, barley, vetch, forage canola and mustard. Three management strategies were applied to the cover crops, Cut-Removed (as a control), Cut-Retained and Crimp-Rolled. At Wellington in 2007, cereal rye and oats were the most successful in reducing weed biomass, whereas vetch and forage canola were the weediest treatments. Much of this is due to the competition from the biomass produced by the crop.

Potential allelopathic compounds leached from the stubble may also contribute to this suppression of summer weeds. Cover cropping dramatically increased soil moisture. Compared to the control (Cut-Removed), the treatments of Cut-Retained and Crimp-Rolled resulted in 70% and 120% increase in soil gravimetric moisture content in 0 – 10 cm layer when assessed in May 2008 prior to sowing. These significant differences were maintained at the 10 – 50 cm layer but all management strategies had very similar moisture contents at 30 – 50 cm.

The use of cover crops has enormous potential to control weeds and ameliorate the soil. Retaining a thick mulch for weed control reduces the need to cultivate for weed control, reducing diesel use and tractor running costs. This research is funded by GRDC.

Further information: Dr Hanwen Wu, hanwen.wu@dpi.nsw.gov.au, ph 02 6938 1602, Eric Koetz, eric.koetz@dpi.nsw.gov.au, ph 02 6938 1954, and Prof Deirdre Lemerle, deirdre.lemerle@dpi.nsw.gov.au, ph 02 6938 1667.
Managing zero water allocation in dairy production

Glen and Andrea Jolliffe operate a dairy farm 20 km west of Wagga with their four sons. Mr Jolliffe presented his solutions to managing his operation with zero water allocation at the recent Riverina Outlook Conference.

Silage production and detailed feed budgeting allows the Jolliffe family at Euberta in the eastern Riverina to manage the uncertainty of irrigation allocations and to support a 8,200 litre milking average from their 145 cow Holstein Friesian herd. The dairy operation has become increasingly reliant on silage production in the last five years as water scarcity and unpredictable rainfall have emerged as major problems. Culling 15% of the milking herd and concentrating on feeding a high-quality, balanced ration has enabled milk quality and production to be sustained.

“The drought has made me much more conscious of the quality of what we're feeding, the cost and the quality and quantity of the milk it's producing” said Glen Jolliffe. Ideally we operate on a base ration of pastures and forage crops and grazing will always be our cheapest option. In years of full irrigation allocation we used hay and grain as the main feed supplements to fill the March to June feed gap and silage was really only a strategy to manage the flush of high-quality spring pasture growth,” said Glen.

Receiving only 35% irrigation allocation in 2003/04 prompted a change in strategies and high-quality silage was the logical choice. Glen opted to double silage production to 400 tonnes of silage dry matter in the spring of 2003 to fill the 2004 autumn/winter feed gap, resulting from the irrigation cuts. A zero irrigation allocation in 2007/08 put huge pressure on the Jolliffe's feed supply.

Glen had always used feed budgets but with soaring grain prices and drought conditions setting in by mid September 2007, it was critical to get the budget right and sure up feed reserves while he still had options. He harvested 150 tonnes of surplus ryegrass pasture dry matter as round bale silage and topped this up by purchasing 770 tonnes of failed standing cereal crops from neighbours within a 15 km radius to make fine chop silage.

“We can't get milk out of poor feed, so it was important to aim for high-quality silage, have it tested and balance the ration accordingly” Glen said.

All silage made in 2007 was tested within six weeks of cutting to check quality and, in consultation with the dairy nutritionist, adequate grain supplies were secured to ensure a nutritionally balanced ration. Glen calculated that the 920 tonnes of silage dry matter he stored in 2007 would meet the requirements of the milking herd and heifers until mid-August 2008. That may seem a pessimistic outlook for the season, but Glen considered that if 2008 was similar to recent years there was no guarantee of adequate paddock feed supply until the end of winter. Unfortunately this worse-case scenario eventuated.

“The milking herd was fed a combination of grain at milking, followed by fine chop cereal silage in feeders since mid-summer until paddock feed jumped away in late August and we might have to get used to that pattern. Although the cows initially dropped production by 10% when they came off green feed, the bonus was that the milk components were higher and we were paid for that extra quality, so returns were on par,” he said.

Glen considers that a positive to come out of the challenges of 2007 has been that he is confident he can make high-quality silage from a range of crops and pastures. It will always be cheaper to graze pasture, but high-quality silage has proven to be the most cost-effective form of forage to fill the feed gap left by the irrigation cuts. It has proven to be an economic option to buy the standing crops, and then cut, cart and store the silage for a total cost of $200/t of dry matter.

Using feed tests allowed accurate calculation of the level grain supplementation required to meet milk production targets. This also provided a good estimate of the likely income. The silage program was very successful in dealing with the vagaries of
drought, particularly with the challenges of zero water allocation. The dairy operation remains viable. The next challenge is to further reduce risk levels in order to cope with the long-term consequence of climate change.

Further information: Glen Jolliffe, gdai@bigpond.com

**EH Graham Centre Soil Carbon Workshop, 30 June - 1 July 2008**

The aims of the Carbon Workshop were to improve coordination between soil carbon projects in southern NSW, and to identify information gaps and opportunities for collaboration. Twenty five participants discussed research opportunities of the soil carbon amendment with Biochar. Adriana Downie (Best Energies) explained the process of manufacturing Biochar, while Lukas Van Zweiten (NSW DPI, Wollongbar) detailed the status of Biochar research at the north coast station. Yin Chan (NSW DPI, Richmond) described the methodology behind and objectives of the Carbon Sequestration under Pastures project (funded by Climate Action Grant Program).

David Waters gave a preliminary description of his GRDC funded PhD thesis, *The Impact of Biochar under Dryland Broadacre Cropping*. This was followed by a description of a RIRDC funded broadacre compost project, given by Eric Love (CORE chair). An informal discussion encouraged all participants to contribute to the future directions of NSW DPI in soil carbon research and extension.

The major outcomes from a successful and informative workshop were the identification of further research opportunities including carbon under pasture systems, a scoping study for a Biochar processing plant in the South West Slopes and Riverina, and the need for a carbon awareness seminar targeted at farmers and regional communities.

Further information: David Waters, david.waters@dpi.nsw.gov.au; ph 02 6938 1991.

**Promoting science in primary schools**

The Graham Centre was successful in receiving a small grant from the NSW Natural Resource Advisory Council (NRAC) to increase the awareness of agriculture in schools, with a focus on Natural Resource Management (NRM).

The initiative developed as a result of discussion at the Graham Centre’s Women’s Advisory Group (WAG) in 2006, regarding the declining interest in agriculture as a career path and the limited awareness among the general public of the food supply chain – from paddock to plate.

Mandy Strong, a primary school teacher and farmer from Lockhart, highlighted the lack of well-resourced, accessible and technically sound information as a major factor limiting the ability and confidence of teachers to promote an interest in science and agriculture among students.

Although the initial grant application was for $60,000 and included primary and secondary students, the NRAC funding was only $6,000. The project objectives were pruned and the funds were used by a team, working in their own time, to develop resources for primary school students (K-6 syllabus).

An important element is that the team is a close collaboration of teachers and members of the EH Graham Centre to provide meaningful...
resources. The resulting resource kit, which is a work in progress, is called The Travelling Lunch Box. The Lunch Box theme is “Where does my food come from” – with a particular emphasis on What is soil?, Why is soil important? and How do plants grow? (including basic botany and an understanding of the climatic requirements of plants).

This novel resource kit provides primary teachers, many of whom do have a limited background in sciences, and their students with a single resource that very simply links everyday life to NRM management. It includes: background information, relevant resources and activities for students to analyse, apply and evaluate ideas and activities to promote a greater understanding of Australia’s food production capabilities and why NRM is critical for sustainable production. These resources are currently being trialled.

The major feature of this project is that, wherever possible, existing material has been used as a basis and added to, to create up-to-date activities that teachers and students from all backgrounds (rural, urban and metropolitan) can relate to, while meshing with the necessary curriculum targets.

The project team combined many talents - Mandy Strong from the Greater Kengal Cluster Group of Schools (Milbrulong, Pleasant Hills, Yerong Creek, Mangoplah and Boree Creek) and Sandra Blanchard (2008 graduate from CSU’s Bachelor of Education) ensured that the resources developed have been designed to meet the Quality Teaching and Learning aims of the syllabus; John Harper, Geoff Burrows and Helen Burns provided scientific content; Marion Addinsall, from CSU’s Centre for Enhancing Learning and Teaching provided graphic design expertise; and Jenni Horsnell, technical officer in the School of Agricultural and Wine Sciences and award-winning nature photographer, provided images of Fruit and Vegetables.

The project team is committed to obtaining further funding and the continued promotion and improvement of The Travelling Lunch Box. There is great potential to build on the subject areas already covered in TTLB.

The display was also well attended at the Henty Machinery Field Days this year.

Further information: Helen Burns, hburns@csu.edu.au; ph 02 6938 1947.

Using satellite maps to uncover the truth about stubble burning

Agriculture has long been accused of contributing to air pollution through the practice of stubble burning, but a new research project underway by Graham Centre researchers is aiming to quantify the real extent of the practice. CSU spatial scientist Dr Remy Dehaan is working with Prof Jim Pratley and Dr Iain Hume on the Riverina-based project.

For years anecdotal evidence has been used to accuse farmers of environmental mismanagement but spatial science technology can map 30 years of land management and show whether the practice has increased or decreased. The project is a collaboration with GeoScience Australia who has contributed $80,000 in satellite maps for analysis. Initially the project will map an area covering the Wagga Wagga, Albury and Lake Cargelligo regions. Using satellite maps and historical knowledge means the researchers can quantify the changes in management practices and provide an accurate picture of the extent of the burning.

The project has the potential to become Australia-wide, and provide some hard evidence to show that farmers are adapting and are reducing stubble burning. The project comes under the Conservation Farming and Stubble Management initiative, where a key objective is how to better manage large stubble loads when they occur.

Further information: Dr Remy Dehaan, rdehaan@csu.edu.au; ph 02 6933 2499.
Using cell biology to find an Achilles heel in oomycete pathogens

Oomycetes have long been classed with the fungi because of their fungus-like growth habit. Like fungi, they form meshworks of microscopic tubes called hyphae. Molecular analysis has revealed, however, that these organisms are more closely related to brown algae than fungi. Oomycete pathogens account for about AU$6 billion in losses and cost of control worldwide. Infamous oomycetes include *Phytophthora infestans* the cause of late blight in potato and the 1845-1847 famine in Ireland, which resulted in a million deaths and immigration of half a million to other countries such as America. It is still a problem today, in this International Year of the Potato. Another is *Plasmopara viticola*, cause of Downy Mildew in Grapevines, and *Pythium*, cause of damping off in seedlings, including canola. Other oomycetes, such as Saprolegnia, are second only to bacteria in fatalities of fish in aquaculture.

The major infective agents in oomycetes are microscopic swimming zoospores (Figure 1). These swim toward hosts such as plant roots, attracted by chemicals released from wounds. When there, they quickly shed their propulsion devices (flagella) and encyst on the host, quickly growing a germtube which invades the host.

One of the things Dr Harper finds remarkable about the oomycetes is that the structure of the infective zoospores has been highly conserved and study of their components may provide us with a means of “counter attack”.

Whilst on sabbatical from July – December 2007, Dr Harper went to work in Professor Adrienne Hardham’s Phytophthora laboratory at the Australian National University (http://www.rsbs.anu.edu.au/Profiles/Adrienne_Hardham/). He focussed on a fibre inside the zoospore of a model oomycete, *Phytophthora nicotianae*, that appears to anchor the propulsive front (anterior) flagella in the cell. The back (posterior) flagellum appears to act like a rudder. This fibre has characteristic stripes (striations) seen by electron microscopy (Figure 2) and are much like those found in Chlamydomonas, a green algae. The major component of the Chlamydomonas fibres is a crystalline protein called Striated Flagella Assemblin (SFA) by its discoverer Karl Ferdinand Lechtrech. John obtained antibodies against SFA from Dr Lechtrech, and used these to probe zoospores prepared for immunofluorescence microscopy. His results indicate that SFA may well bind to the anterior rootlet, but he also discovered that the basal bodies, from which the flagella grow, label for the SFA protein (Figure 3)

Further evidence that oomycete zoospores contain SFA comes from a bioinformatics search of *Phytophthora* gene databases which indicate that there are sequences with homology to SFA in the data base.

The work has added to our knowledge about zoospore components and a paper is in preparation.

Imagine if we can target SFA or another key zoospore structure specifically with a drug that disassembles the protein(s), perhaps we can mess up the propulsion of zoospores and prevent infection!

This research is supported by a CSU Research Fellowship.

Further information: Dr John Harper, jharper@csu.edu.  ph 02 6933 2837.
In the Limelight

Dr Jim Virgona

Position: Senior Lecturer (Agronomy)

Organisation: Charles Sturt University, Wagga Wagga

Career Brief
Attended Sydney University from 1980-83. Oh look, I’ve lied already – I didn’t attend that much but I did get a very ordinary degree in Agricultural Science. After that I landed a position in Snow Barlow’s lab at Macquarie University and did my Masters there – on the effect of water deficit on stem-stored carbohydrates in wheat. At the Research School of Biological Sciences at ANU I did my PhD with Graham Farquhar on the relationship between water use efficiency and growth in crop and pasture species. I commenced as a research agronomist position (to investigate pasture seed production) with NSW DPI (Agriculture, as was) in 1991. The chronic lack of funding in pasture seed research combined with mentoring from Brian Dear meant that I was able turn my attention to important facets of pasture production: perennials in the cropping zone, grazing management of phalaris based pastures and landscape impacts on pasture growth. In 1999, I left NSW DPI for a job in the School of Wine and Food Sciences at CSU to pursue interests in teaching and research in plant physiology. A mid-life crisis mistake. Luckily, I was able to transfer to the School of Agriculture to teach and research in agronomy in 2002, where I have been ever since.

Research and Teaching Activities and Interests

Research activities
My research focus now is to develop management strategies that can be applied on-farm in the two main production systems found in southern NSW, namely, permanent pastures (improved and native) and mixed farming.

Teaching activities
Mostly, the physiology and ecology of plant production systems and pasture production. I have a special interest in making sure students are computer literate and have the ability to recognise plants.

Professional Links
- Australian Society for Agronomy
- Grassland Society for Southern Australia

A typical day for me includes … there is no such thing – some days teaching, some days in the field managing research, frequently addressing farmer groups – who knows? But typically disorganised.

My main project at the moment is … as part of EverGraze, I manage a major grazing systems experiment at Holbrook which is aimed at developing profitable strategies for the utilisation of native pastures.

My favourite part of my job is … interacting with students, farmers and researchers – in that order, and analysing data. I love data.

When I am not in the office I like … to keep fit, read and play music.

Current CD in my car would be … Vaughan Williams’ London (2nd) Symphony – if I had a CD player!
Dr Iain Hume

**Position:** Soil Scientist

**Organisation:** NSW Department of Primary Industries, Wagga Wagga

**Career Brief**

I completed a Bachelor of Science (Hons) from the Cranfield Institute of Technology in the UK. I then worked for the UK Ministry of Agriculture Farm Waste Unit conducting research and advising farmers on the appropriate management and use of organic farm waste.

Following emigration to Australia, I worked for the NSW Department of Agriculture (now NSW DPI) at Deniliquin concentrating on salinity issues, measuring and modelling the waterbalance of farming systems to optimise resource use with minimal environmental impact.

Following my PhD study of the remote sensing of forage growth at the ANU, I moved to the Wagga Wagga Agricultural Institute to continue agricultural hydrology research.

**Research Activities and Interests**

- I am continuing my interest in hydrology field research in the Future Farm Industries CRC project “EverGraze” project.
- A new direction and challenge has been to link hydrology, farm economics and social science to find the real cost of managing land to meet environmental goals. This has been through a recently completed GRDC project to manage salinity and is continuing in a new project looking at the cost of increasing of soil carbon, groundcover and managing water.

**A typical day for me includes …**

It depends on the weather. Sometimes field work – digging holes is a favourite. Teaching me pasture recognition and quantification is an ongoing battle for Craig Lihou, my Technical Officer. Too many hours in front of the computer – this applies to us all. I have been doing quite a few farmer meetings and these are always great value as they are a litmus test of your ideas and results.

**My main project at the moment is …** EverGraze

**My favourite part of my job is …** Those moments when it all clicks into place and the hard work pays off.

**When I am not in the office I like to …** Bike ride – I still race and coach cycling. Potter in the garden, I am the ‘doer’, Janet comes up with the ideas for an evolving native bird friendly garden.

**Current CD in my car is …** Depends on the mood – from Johnny Cash to Pink Floyd via Van Morrison.

**Summer Edition of The Innovator**

The Summer Edition of The Innovator will be released in mid January 2009. Submission of articles for this edition closes on **Friday, 19 December 2008.** Please email articles to Sharon Kiss.
Secretariat

Who’s who and how to contact us …

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The Graham Centre Board of Management and Industry Advisory Committee held a combined meeting in August. Pictured, front row from left: Dr Richard Sheldrake, Ms Lucinda Corrigan, Professor Ian Goulter, Professor Deirdre Lemerle, David Wolfenden and David Sackett. Back row from left: Lee O’Brien, Greg Fraser, Derek Ingold and Dr Nick Austin. Absent: Professor Paul Burnett and Dr Tony Fischer.
ABSTRACT For some time the Australian agricultural sector has been subject to considerable public criticism about the impact of some industry practices on the environment. Issues of concern have included loss of biodiversity, diminishing water quality, reduced water availability, and increased soil erosion and salinisation.

However, over recent decades there have been significant changes implemented to many farm management systems, which have resulted in improved environmental and productivity outcomes. These changes have included introducing deep-rooted perennial pastures, extensive tree planting, fencing off riparian zones, the adoption of best-management practice systems, and the retention of areas of natural vegetation. Changes have been stimulated by a range of different factors including government regulations, incentive programs, government grants and market-based instruments.

The improved environmental outcomes arising from these changes are of great importance to both the sector and the wider community, although generally go unnoticed. In part this is due to the propensity for bad news to gain more attention than good news, but it is also partly due to the fact that improved environmental outcomes are a public good that is usually not marketed or valued economically.

Developing robust methodologies to establish the value of enhanced environmental outcomes from agriculture is an important step that will assist increased community recognition of positive change, and is also a necessary step in developing future natural resource policy priorities.

The research reported here provides a detailed examination of this issue, and uses case studies to highlight the value that changes in farmers natural resource management practices have delivered to the Australian community. The research also highlights the opportunity that exists for governments to increase the value of farm environmental services provided for the community, if appropriate policies and incentives are implemented.
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Claiming the Date!

The EH Graham Centre 2009 Riverina Outlook Conference will take place on Thursday, 13 August 2009 at the Charles Sturt University Convention Centre - mark your diaries!