defining nz

FIELD DAYS 2010

Matching water to soil

Technology innovation helps farmers irrigate according to soil needs

Making agricultural waste more productive
Research to revolutionise solar energy
Pest research to protect Māori crops

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Te Kunenga ki Pūrehuroa | MASSEY UNIVERSITY

"The relationship between Massey and the agri-food industry is as long as the University's history" – Steve Maharey

VICE-CHANCELLOR

The relationship between Massey and the agri-food industry is as long as the University's history.

For more than 80 years we have worked closely with practitioners to come up with new and better ways to produce and grow primary products, ready them for consumption, and get them to market.

The University's relationship with the primary sector goes deep. We are providing solutions to the problems faced by everyone who works the land. Here at Field Days, we hope to talk with you more to gain a better understanding of the hurdles that we will face in the future, as well as enlighten you about some of our successes.

Last year Massey launched its agri-food strategy, which takes a holistic approach to the sector, applying our expertise to every aspect of the value chain. Researchers from every part of the University are involved; business, humanities, creative arts and science.

We have more than 400 staff and postgraduates working in the area, from best practice in pastoral livestock to cutting-edge food product development and policy advice on topics from international trade to small business.

Our modern infrastructure includes a $25m food development complex, $17m animal health and food safety research building and 2000ha of farms.

We are providing innovative responses and solutions to social, environmental and economic issues. We can add value to your business and to New Zealand.

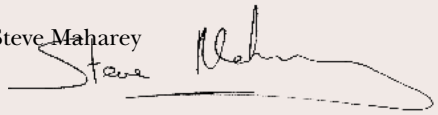
In this special issue of *DefiningNZ*, you can sample some of the work being carried out by researchers across the University that is of benefit to the agri-food community. The Precision Agriculture team is working with some young entrepreneurs – Massey graduates themselves – to solve the problems farmers face getting the right amount of water to the right areas on their farms.

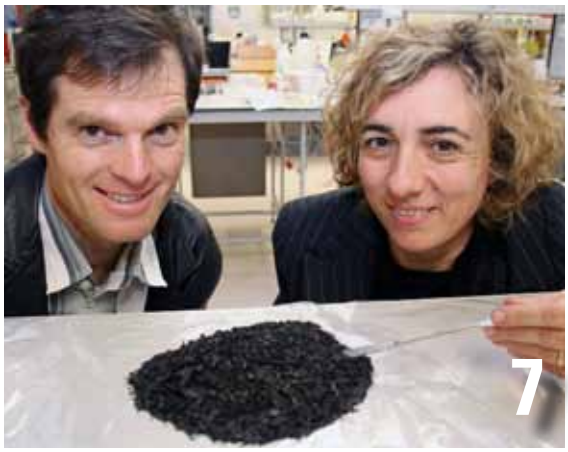
Another feature looks at the environmental success that can be achieved through organic farming, which has been quantified at one of Massey's farms over the past ten years.

Two major centres of research are also now based at Massey: the New Zealand Centre for Biochar Research and the New Zealand Centre for Life Cycle Management. Both of these centres will contribute greatly to the industry in the future.

These are just a few of Massey's ongoing projects, for more information on these and other stories visit us online: news.massey.ac.nz. ■

Steve Maharey





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Variable rate irrigation

Traditionally, centre pivot irrigators have been a somewhat blunt instrument – delivering a uniform amount of water to the land whether it needs it or not. This has led to losses both in terms of production – crops can't grow in a bog – and unnecessary water loss. Now, a group of current and former Massey students are changing that. >>

Photographs: David Wiltshire

Stuart Bradbury and Dr Carolyn Hedley

Research by a Massey PhD student has helped a Manawatu company, Precision Irrigation, launch its variable rate irrigation system, which will provide farmers with the ability to precisely target their water use.

Part of the system was devised by Dr Carolyn Hedley at the Centre for Precision Agriculture in the Institute of Natural Resources.

Her research coincided with development work being carried out by two former Massey graduates Stuart Bradbury and George Ricketts. Their company, Precision Irrigation, has developed the system that can deliver variable applications of water under a centre pivot irrigator.

The system incorporates more sophisticated control of the irrigator through a simple-to-use interface that can utilise the scientific knowledge created through the PhD research.

Water application is matched to the exact requirements of the soil. The system creates a detailed map of the soil that indicates the soil's ability to absorb and hold water for plant use.

These maps often show that the soil is variable so uniform application may be wasteful in many areas, while being insufficient in others.

Hedley says that the soil's available water holding capacity is derived from an electro-magnetic surveying method.

"An electromagnetic sensor with accurate GPS is used to map soil electrical conductivity, which quantifies soil variability on a basis of texture and moisture differences," Hedley says. "These differences are then investigated by field sampling, and the available water-holding capacity of each zone is measured.

"The research suggests that if irrigation is scheduled specifically to the trigger point of individual zones there are likely to be up to about 20 per cent water savings, depending on how variable the soils are."

Centre director Associate Professor Ian Yule says centre pivots have become the main method of irrigation because they are much easier to manage than other systems, but they are terribly inflexible.

"You are very limited if you want to grow different crops under the same irrigator, simply avoid irrigation on non-productive areas under it, or respond to variations in water demand," he says. "What Precision Irrigation has done is produce a system that overcomes all of these difficulties; add Carolyn's work to this and we now have a system that can match water application to variable soils."

"Variable rate irrigation can reduce a farm's water, nutrient and carbon footprints, creating better financial outcomes while improving our environmental performance." – Associate Professor Ian Yule

Bradbury and Ricketts studied mechatronics at the School of Engineering and Advanced Technology before starting the company. Bradbury says the system is proving popular in New Zealand and there is interest from overseas.

"Interest is growing, we've had feedback from farmers who've installed the system, one farmer saying it has saved him $50,000 in potential lost crop in just one season," he says. "Another dairy farmer, who installed a system worth $30,000 says he's saving about $10,000 a year."

Case studies indicate that not only does the system lower water use, it reduces drainage and has the potential to reduce leaching from agricultural land.

"Variable rate irrigation can reduce a farm's water, nutrient and carbon footprints," Yule says. "It is a win - win, creating better financial outcomes while improving our environmental performance." ■

Professors Jim Jones and Marta Camps

WASTE NOT WANT NOT

The New Zealand Biochar Research Centre is taking the agricultural sector's waste and turning it into productive fertiliser that is not only good for the soil, but also the environment.

The Centre is hosted at the Manawatu campus and is led by Associate Professor Marta Camps, a soil scientist, and chemical engineer Professor Jim Jones.

Together they are investigating the production of biochar from New Zealand biomass, or organic matter, and its sequestration by adding it to soil.

> Globally, we can use less land to get the same amount of productivity, which is also obviously good for the environment." – Dr Marta Camps

Turning biomass to biochar captures and locks away carbon that was extracted from the atmosphere during growth. Biomass growth is the least expensive method for extracting atmospheric carbon. However, when biomass dies and decays, the stored carbon decomposes to atmospheric carbon as carbon dioxide and methane.

Camps says biochar can help in many ways. "In New Zealand, there are high methane emissions as a result of the agriculture industry," she says. "Biochar can mitigate those emissions, because the compound breaks the carbon cycle. Globally, we can use less land to get the same amount of productivity, which is also obviously good for the environment."

Jones will develop the biochar production technology and the associated bioenergy generation. Camps will investigate the functional form of biochar and whether the soil health benefits can be realised in New Zealand soils and environments.

Jones says the centre will focus on advancing the understanding of biochar for mitigating climate change. "Over the next three to four years we hope to make significant progress towards determining the process economics of biochar production and to have assessed the efficacy of biochar in a range of New Zealand soils."

College of Sciences Pro Vice-Chancellor Professor Robert Anderson says the appointment of Jones completes the Biochar Research Centre.

"We have now formed a strong partnership that will lead research in this vital area," he says. "Professor Jones has an admirable record both here at Massey and within industry, and is uniquely placed to help lead the centre."

Last month, the centre hosted the inaugural Biochar Workshop, which saw research leaders and stakeholders meet on the Manawatu campus to discuss the opportunities the substance could provide.

The Ministry of Agriculture and Forestry funds the centre's two professorships and provides $1million annually for research and development. ■

HARNESSING THE SUN

Harnessing the sun's energy to create electricity is not a new idea, but research being led by chemist Ashton Partridge could revolutionise the concept. He talks to Bryan Gibson.

Photographs: David Wiltshire

A research team led by Associate Professor Ashton Partridge, from the Institute of Fundamental Sciences, has won $5.76 million to further its research into high efficiency photovoltaic solar panels.

"These are plastic panels," Partridge says. "At the moment you have silicon panels; now they're fine but they're also very expensive. The installation cost is expensive. They're very brittle, if hail hits them they will break."

The new panels would be far more sustainable. "They're recyclable too, after a 25-year lifetime we can chip them down and just reuse them as a base material."

Partridge's team is made up of scientists from across the globe, each playing a vital part in the project. It includes members of Auckland University's engineering school, while scientists at Canterbury and Otago universities are also involved with various aspects of the research.

As an organic chemist, Partridge is focused on the dyes that convert the sun's energy into electricity.

"Photons from the sun are absorbed by the dye," he says. "Because the dye itself is coloured it will absorb in the visible spectrum. Most of the sun's energy is within that spectrum, and so you can see the light. The electron is excited and is removed from the dye molecule.

"The problem we've had to overcome with photovoltaics is how easily that electron is bumped out and how easily it is transmitted from one layer to the other. Eventually it has to end up in the copper wire, but there are a whole lot of interfaces there. The problem is minimising the impedance, or resistance. That's the art."

The work on dyes is continuing at the Massey-based MacDiarmid Institute for Advanced Materials and Nanotechnology, which Partridge heads. "But we have commercial partners we're working with, we have a proof of concept device and we have a route to market."

The final product is a plastic tile that could be used to cover an entire roof, which has obvious benefits.

"Let's say on average you get 650 watts per metre squared of roof space," Partridge says. "If we could harvest 10 per cent of that, based on average roof areas and average power consumption, we could generate enough energy for the total needs of a house plus two electric vehicles.."

The beauty of the project is the large number of institutions involved, which Partridge says must be done more if New Zealand is to flourish as a scientific nation.

"This project spans a whole lot of research institutes and endeavours to get us all working together, so that we can actually produce something for New Zealand. New Zealanders and Australians are some of the best scientists in the world, we just have to be focused and we have to work together."

The aim is to keep the intellectual property in New Zealand as much as possible and for there to eventually be a photovoltaics industry here in New Zealand, he says.

The work is not new to Partridge, who has been working on conducting polymers for the best part of 20 years.

He collaborated with Alan MacDiarmid for eight years making an electronic nose: a computer that could smell.

Now there are a number of PhD students from around the world working with him on either this project or others related to conducting polymers.

"There are two working on dyes, and I have six working on different types of sensors for different applications."

It is this type of sustainable, environmentally focused research that Partridge sees as appealing to new scientists.

"We've got a whole stack of kids coming up through the university system and we need places for them to work. They need to be excited, they need to see a future in science, and hopefully this will help give them that." ■

Associate Professor Ashton Partridge

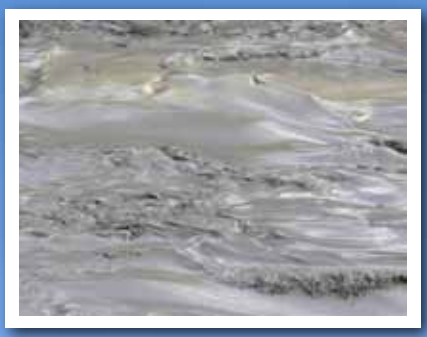
Massey has struck a collaborative partnership with the Centre for Nanotechnology and Molecular Materials at Wake Forest University in North Carolina to work on the development of next generation solar cells, new portable sensing technologies for medical and bio-defence applications, lighting systems and nanomaterials.

The partnership will establish a long-term exchange of scientists and engineering capabilities between the universities. It will also provide exchange student experiences for undergraduate and graduate students.

The effort, led by Associate Professor Ashton Partridge from the MacDiarmid Institute at Massey and Professor David Carroll from Wake Forest will focus on the development of market ready technologies.

"The agreement will provide Massey University with strong scientific partners at the Nanotech Centre and can provide a convenient gateway to commercialize into the U.S. market, Carroll says.

"For Wake Forest University, Massey provides complementary engineering capabilities for continued development of our device programmes."



Ash to ashes

Few New Zealanders have any idea how much destruction a moderate-scale volcanic eruption could wreak. Volcanologist Shane Cronin says even a relatively small ash eruption would severely disrupt energy distribution, agriculture and air travel.

When the Mt Ruapehu's Crater Lake dam broke in 2007, a massive lahar up to eight metres high swept down the precipitous eastern flanks of the volcano and into the Whangaehu River. Volcanologist Professor Shane Cronin and his team of 20 researchers was on-site to collect raw data, and their research has since revealed a multi-faceted picture of how lahars behave.

If there is a flip-side to the damage volcanic eruptions cause, it may be in the contributions they make to the fertility of volcanic soils. As Ruapehu finished discharging lahars from its Crater Lake in 1995 and 1996, it began erupting ash, which was swept by the prevailing winds over vast areas of the central and northern North Island. Cronin (a PhD student at the time) followed it, mapping the distribution of where it fell.

The maps turned out to be a critical piece in the puzzle of understanding the environmental impacts of the eruption for farmers, fertiliser companies and health authorities. Massey scientists analysed the ash chemistry and found it carried fertility-promoting elements, especially selenium and sulphur, which are naturally low in North Island pastoral soils.

But, as some farmers discovered, not everything the ash brought was beneficial. Out on the Rangitaiki plains east of Taupo, a number of sheep and cattle died soon after asfalls, and when Taupo veterinarian Don Shanks performed autopsies, he found their guts contained masses of ash, and their kidneys were pale and swollen – a classic signature of fluoride poisoning.

Associate Professor Shane Cronin

Ruapehu's eruptions in 1995 and 1996 were a cause of serious inconvenience, but in the scale of what might have been, did not amount to much.

Fluoride is a Jekyll-and-Hyde ion. Small doses in drinking water and in toothpaste can protect against tooth decay. In greater concentrations it can progressively cause dental fluorosis which stains teeth, and skeletal fluorosis, a painful bone disease.

Being highly reactive, fluoride is quickly bound by the soil, and most plants do not take up fluoride readily. The risks lie in ash that is eaten when it covers pasture or when it contaminates drinking water.

Around Ruapehu, the risk of fluorosis passed soon after the ashfalls did. In other locations, such as Ambrym in Vanuatu, ashfall on a daily basis causes major human and animal health impacts due to fluoride; here the long-term answer, says Cronin, lies in a shift to reticulated groundwater-based systems and ongoing environmental monitoring.

In 2003, Cronin's six-year programme *Living with Volcanic Risk* received $4,248,000 for 2004-2009 from the Public Good Science and Technology Fund from the Foundation for Research, Science and Technology. This program has now been incorporated as a component within the $14.6 million New Zealand Natural Hazards Research Platform, due to run over the next 10 years.

Enlisting economists, statisticians, Māori studies experts, geologists and soil scientists, the project continues to provide "probabilistic hazard forecasts and new risk management tools in order to reduce socioeconomic losses from volcanic events to New Zealand". Cronin and his team focus on the scenarios likely to arise from eruptions of Ruapehu, Nga-uruhoe and Taranaki and what any renewed activity might mean for us.

Volcanic Risk Solutions, the Massey-based multidisciplinary centre for applied volcanic hazard and risk management research, now numbers more than 20 staff, 13 at Massey, with the remainder at other New Zealand, Australian, German, British and United States universities. Postgraduate placements with the centre are highly sought after and students come from all over the world to work within the unit.

Cronin and his colleagues, particularly Garry McDonald, of the New Zealand Centre for Ecological Economics and Market Economics Ltd, and Professor Anton Meister (Applied Economics), have conducted a number of sectoral and regional analyses projecting the economic loss for various eruptive scenarios.

Ruapehu's eruptions in 1995 and 1996 were a cause of serious inconvenience, but in the scale of what might have been, did not amount to much.

Even a relatively small ash eruption at the present time would severely disrupt energy distribution, agriculture and air travel.

If Mt. Taranaki awakes again soon, Massey research shows that it will undoubtedly erupt over durations of many years and perhaps decades, creating a host of new and ongoing environmental challenges for landusers around it.

Cronin knows what happens when volcanoes behave badly. In reviewing one of two e-mail bulletins that go out weekly to volcanologists worldwide, he notes that 16 different conspicuously active volcanoes are listed in various localities.

Today New Zealand is absent. It won't be always. ■

Professor Hamish Gow

Pilot project for African agriculture

New Professor of AgriBusiness Hamish Gow is working with colleagues from Michigan State University with a $1million grant from the Bill and Melinda Gates Foundation to help African educators develop free and open access to agriculture education material, which they hope could improve agricultural practices and build a sustainable economy.

AgShare Open Education Resources is an 18-month pilot project with African educational institutions to create a virtual hub of resources and curriculum for Master of Science degrees in agriculture, with areas of emphasis in livestock, crops and agribusiness.

"Higher education plays a critical role in developing the practices and resources necessary to dramatically boost agricultural yields in the developing world," says Khalid Bomba, a senior program officer in the Agricultural Development initiative at the Bill and Melinda Gates Foundation. "AgShare Open Education Resources has the potential to provide Africa's future scientists and leaders with access to current educational materials, enabling them to create innovative solutions for small farmers."

The AgShare team will work with various international experts to develop best practices for sharing information through open education resources – an educational learning trend in which materials reside in a public domain for users to freely share and repurpose.

The AgShare learning networks will share content such as modules, textbook material and videos via the Web. In remote areas where the internet is less accessible, information will be distributed through DVDs and printed material.

Thebeneficiaries include African university faculty, students and researchers, industry, government and nongovernmental employees and farmers from around the continent. ■

New centre to meet growing needs of the green consumer

A new Life Cycle Management Centre based at Massey University will assist primary producers to meet the growing needs of the green consumer.

Sarah McLaren has been appointed Associate Professor in Life Cycle Management and inaugural director of the New Cycle based at the Manawatu campus.

McLaren comes from Landcare Research, where she was lead researcher, and was previously a senior lecturer at the Centre for Environmental Strategy at the University of Surrey.

Massey recently won a long-term contract with the Ministry of Agriculture and Forestry to host the Centre. The Centre is partnering with Landcare Research, Scion, AgResearch and Plant and Food Research.

The Centre will provide coordination and focus for the activities of life cycle management practitioners across organisations and industry, particularly through capability development.

Associate Professor Sarah Mclaren

As well as ensuring that New Zealand retains its environment, the venture supports the economy by enabling producers to meet the needs of the green consumer, a market growing rapidly worldwide.

McLaren says new Centre "provides a unique opportunity to develop New Zealand's capabilities in life cycle management and support New Zealand organisations in proactively responding to the increasing demand for products with demonstrated environmental credentials".

The ministry's deputy director-general, policy, Paul Stocks, welcomed McLaren's appointment and her role in driving life cycle management capability across the primary sector.

"Life cycle management is critically important to the success of primary producers as it enables them to quantify the environmental impact of products, something international consumers are increasingly seeking," he says. "It also supports producers to understand and identify opportunities for productivity and efficiency gains across supply chains. McLaren's appointment will support New Zealand in its efforts to lead international activity in these areas."

The University is supporting the Centre by funding three PhD scholarships to create a life cycle management team to carry out ongoing research.

The Centre will be hosted by the University's Institute of Food, Nutrition and Human Health alongside the Agribusiness, Logistics and Supply Chain Management Group. Institute head Professor Richard Archer says the Centre will have a major educational focus and initially papers will be developed within existing under-graduate and post-graduate qualifications.

"Under Associate Professor McLaren's directorship, the centre will work with land-based industries to meet their demand for training,research and technology implementation and provide trained life cycle management practitioners."

The Centre will be supported by the Agricultural and Horticultural Systems Management Group at the Institute of Natural Resources and the Sustainable Processing Cluster at the School of Engineering and Advanced Technology.

McLaren will also work with the New Zealand Centre for Ecological Economics, at the Manawatu Campus. ■

Pest research aims to protect Māori crops

Massey Master of Science student Aleise Puketapu will start new research this month that may save traditional crops, including kumara, taewa and poroporo, from extinction.

It will be the first study of its kind on the effects of the insect pest tomato potato psyllid on traditional Māori crops.

Tomato/potato psyllid has been an established pest in New Zealand since 2006, when it was first identified in a tomato crop in an Auckland greenhouse.

Both adults and nymphs cause damage to tomato, capsicum and potato crops and the insect is also a threat to several species harvested by Māori.

Puketapu, 23, (Te Atiawa, Tainui) will examine the lifecycle and epidemiology of the tomato/potato psyllid. She says this will enable growers to make informed management and control decisions. "I will be assessing pest host preference and population dynamics."

The research will provide an insight into the relationship between pest and host plant, and what can be expected in terms of pest population and infestations within a single growing season. "During the 2008-09 cropping season, I was working on a growers guide regarding pests and diseases affecting taewa and witnessed the devastation that the tomato potato psyllid posed to Māori potatoes."

Research being undertaken by Puketapu is supported by a $18,500 Te Tipu Pūtaio Fellowship from the Foundation of Research Science and Technology. She says the fellowship also adds structure to her research.

"I have set milestones to achieve and specific outputs that are required of me which will inevitably keep me on track through the year and ensure I complete my research on time."

The tomato/potato psyllid proved to be a serious horticultural pest to many crops in the 2008-9 summer cropping season. The most significant effects were apparent in Solanaceous crops of which tomatoes, potatoes, tamarillos and capsicums are major consumable products. The tomato/potato psyllid is a carrier of a bacterial disease commonly known as zebra chip which causes yield losses that can be as high as 80 per cent.

Infected plants appear stunted, yellow to brown in colour and the leaves may roll and turn pink at leaf margins. There is also the possibility that the insect vectors a second disease, Candidatus Phytoplasma australiense, which caused the decline of the cabbage tree.

Puketapu grew up in Whanganui, attending Sacred Heart College and Cullinane College, winning a junior scholarship and then a tertiary scholarship as a senior. She enrolled at Massey in year 13 and won a Rangatahi Māia Scholarship.

While completing her Bachelor of Science and Postgraduate Diploma in Resource and Environmental Management Puketapu worked closely with Dr Nick Roskruge, a senior lecturer in Horticulture and Māori Resource Management at Massey, who also coordinates the National Taewa Māori project and chairs Tahuri Whenua, the National Māori Growers Collective. "Through working with Dr Roskruge, I gained hands-on experience with traditional Māori crops, learning their whakapapa and significance to Māori society."

This summer she worked on a scholarship with the National Bioprotection Research Centre. ■

Photograph: David Wiltshire

NO BONES ABOUT IT

A strong scientific base is the key to a milk product that has become the market leader in Asia. Professor Marlena Kruger from the Institute of Food, Nutrition and Human Health and Dr Linda Schollum, health research manager at Fonterra Brands, talk to Bryan Gibson about the product they've spent almost a decade developing.

Anlene is a fortified milk targeted at bone health. It is produced by Fonterra and the science behind it was developed in partnership with researchers at the Institute of Food, Nutrition and Human Health.

New Zealand Milk (a forerunner of Fonterra Brands) and Massey University set up a collaboration about 15 years ago to form the Milk and Health Research Centre with bone research as one of its specific research aims. Even though there have been several reorganisations and renamings for both partners, the relationship has continued, and Massey's Bone Research Group is still active in helping to develop and innovate Anlene.

For almost a decade, Professor Marlena Kruger from the Institute and Dr Linda Schollum, health research manager at Fonterra Brands, have worked together to support the product's development.

Schollum says there was a clear need for such a product in the Asian market. "The Asian diet is very low in calcium, and so it was a good opportunity to use milk to deliver a nutrient that almost all of the Asian continent needs."

The group started by testing milk itself to find out which properties, apart from the obvious calcium, were helpful to bones health, Kruger says.

"Then we started testing what we could add to milk to further improve bone quality. The research on Vitamin K was part of that, and we're looking at other components as well, which may enhance calcium absorption, or benefit bone in other ways."

Anlene has been on the market in Asia for more than 15 years and was released in New Zealand three years ago, but work continues to improve it.

Schollum says the relationship Fonterra has with the University has been a key to the product's success.

"Anlene is a success because the science behind it is sound. We have clinical evidence that it helps bone health; the science isn't just based on reading a paper somewhere and then adding something to milk – we've actually done the research, which is very important."

The group is active in publishing all its findings, both positive and those that haven't shown strong benefits.

Massey's Professor Marlena Kruger and Fonterra's Dr Linda Schollum check results from the DEXA scanner, a machine that uses x-rays to measure bone mineral density.

"Anlene is a success because the science behind it is sound. We have clinical evidence that it helps bone health." – Dr Linda Schollum

"Publication builds our credibility," Schollum says. "We publish even when we aren't going to commercialise a specific ingredient."

Fonterra is also looking at doing more research in the Asian market, with Massey again as a partner.

"As new things come to commercialisation because the science base is important, we want to involve people like Marlena as an investigator to work with local researchers in Asia to conduct testing," Schollum says.

"Many regulators now require research that is done in their own country before allowing product claims to be made."

She says having an independent research centre helps give credibility to the claims the product makes. "There is a sense that if research is industry-funded then it's tainted, so it's important to have Marlena on board to make sure it is robust, and is openly so. We do not want to be accused of publishing biased work."

The pair says the emergence of Anlene in Asia has been heart warming, both from a professional and personal point of view.

"Part of our education is that you can take all the calcium you want, but if you don't keep active you're not going to be able to do the best for your bones," Schollum says.

"So we've got a lot of activities around mobility and exercise. Last World Osteoporosis Day, in Indonesia alone, we had 78,000 people walking down the streets. It's goose bump stuff, really. It's a very powerful message." ■

Vet bonding scheme expansion welcomed

The expansion of the Government's voluntary bonding scheme for veterinarians will have a positive effect on the industry according to the head of the Institute of Veterinary, Animal and Biomedical Sciences, Professor Frazer Allan.

The scheme, launched last year, encouraged new graduates to stay in an eligible practice by providing a taxable payment of $11,000 for every year, up to five years, that they worked in the practice.

Agriculture Minister David Carter announced in January the scheme would be expanded to any practice that worked with production animals such as dairy and beef cattle, sheep, pigs and poultry.

Allan says the expansion is good news. "Providing an incentive for vets to work in the production animal sector will help greatly in rectifying the shortage it's seen in recent times," he says. "The old scheme targeted identified regions where there were known shortages but was too targeted as practices in other areas also had difficulty with recruitment."

The expansion of the scheme would also help Massey graduates. "Those entering the workforce will now have more choice about where they go," Allan says. "Being able to source the $11,000 per year will allow graduates to make inroads into their student debt."

Since the scheme's inception last year, Allan has worked with the New Zealand Veterinary Association and the Ministry of Agriculture and Forestry to assess the scheme and suggest amendments.

"This expansion is a good step forward as it not only addresses a need within the industry, but supports graduates. Practices now need to show they have the systems in place to support the career development of young vets, which will create a win-win situation for the entire sector."

Professor Frazer Allan is Head of the Institute of Veterinary, Animal and Biomedical Sciences and has previously been director of the institute's veterinary teaching hospital. He graduated BVSc from Massey in 1988 and also completed his PhD at Massey.

Photograph: Bryan Gibson

SHEAR HARD WORK

Images courtesy Auckland University Press.

A new book on the history of New Zealand shearing was launched at the 50th Golden Shears at Masterton in March.

Written by Massey almuna, historian and former staff member Hazel Riseborough, *Shear Hard Work: A History of New Zealand Shearing* brings to life the noise and bustle, the long days and hard work, and the extraordinary men and women of the New Zealand shearing industry.

"From the 1850s, when shearers were disparaged as the 'very dregs of the colonial democracy', to the present day when New Zealand shearers set world records and shear sheep around the globe, shearers have played a defining role in New Zealand life," Riseborough says.

She was one of the first women to qualify as a wool classer through Massey and has since pursued advanced degrees in Māori studies and history, taught at the University, and conducted research for the Waitangi Tribunal.

In *Shear Hard Work*, Riseborough chronicles key changes in the industry – from the mechanisation of shearing to the expansion of the shearing season and the shrinking of the New Zealand flock. She explores the changing culture of shearing, the role of Māori and women, and how the efforts of Ivan and Godfrey Bowen helped professionalise the industry. And she looks at those things that persisted – the challenge and competition of life in the shearing shed and the glory of being the 'ringer', the fastest shearer on the board.

"Shearers have played a defining role in New Zealand life."
– Hazel Riseborough

Riseborough is the author of *Days of Darkness: Taranaki, 1878-1884*, and the best-selling *Ngamatea*.

Shear Hard Work: A History of New Zealand Shearing is published by Auckland University Press. ■

Sample pages and further information about the book are available online at: http://ow.ly/1blWt

The rural sector is a vital drive for the economy

Last year, gross agricultural (including horticulture but not forestry) revenue was $23.1 billion. Contribution to Gross Domestic Product was $10.5 billion. The rural population is, however, less than 15 per cent of the almost 4.4 million people that now live in New Zealand. Clearly the rural sector is vital for New Zealand, and rural people are driving the economy.

Market forces are at work in terms of rewards. Information from the 2010 Federated Farmers/Rabobank Farm Employee Remuneration Report shows that farm workers are better off than their urban counterparts. The Total Value Package last year was $48,388 per annum - $5227 more than the average. For senior positions, dairy averaged $80,265, arable $72,099 and sheep/beef $63,613. Casual skilled employees earned $19.80 per hour and unskilled earned $16.96 per hour.

For graduates in the rural professions, the news is even better: in the fertiliser industry, for instance, good field staff are expected to be earning over $80,000 within five years of graduation. As a farm manager, a position which good graduates can achieve within a couple of years, the rewards are similar.

Education in areas of importance to the country pays off to the individual. It is also vital for future food production.

Food production is becoming more and more complicated. Advanced technologies, computer-driven equipment and programmes that integrate all the information and give the answers appear to make things simple – but when something goes wrong, people need to be able to fix it. This means that they need knowledge of soils, pastures and animal health – as well as machinery, meteorology, human resource issues etc. Agriculturalists are involved in multi-million dollar businesses... and they are managing these businesses within an increasingly regulated environment.

The New Zealand challenge is in farming sustainably without subsidies within the increasing environmental restrictions.

Hamish Gow, new Professor of Agribusiness at Massey University, believes that New Zealand's marketing challenge lies in overt 'responsible production'.

He says that low footprint production is insufficient to create a marketing advantage and we need a bundle of validated and verified concepts to create high-value opportunities. We also need a brand story that can be presented by manufacturers and retailers. ID preservation and full trace-back to farms is necessary in this.

An educated workforce in agriculture is paramount to achieving a high-value future, and Massey University is supporting ongoing education for people at all stages in their careers.

Professor Jacqueline Rowarth

Professor Jacqueline Rowarth is director of Massey Agriculture

Healthy herd on happy land at organic farm

An organic dairy trial has proven mastitis, one of the major issues facing organic dairy farmers, can be managed without antibiotics.

Massey has run a 20ha organic block in conjunction with a conventional block of the same size and compared the two for the past 10 years.

Recent data shows that the somatic cell count – the signifier of mastitis in a herd – in the organic milk is consistently lower than in the conventionally farmed milk.

Co-director of AgriCommerce Associate Professor Nicola Shadbolt says that in February, for example, somatic cell counts ranged from 55,000 to 77,000 on the organic farm.

"This compares favourably with the conventional farm, where the range at the same time was between 60,000 and 108,000," she says. "It shows that with good farm management, one of the biggest problems in the organics industry can be overcome."

Organic dairy farms are strictly audited and cannot use antibiotics, which is the conventional treatment for mastitis.

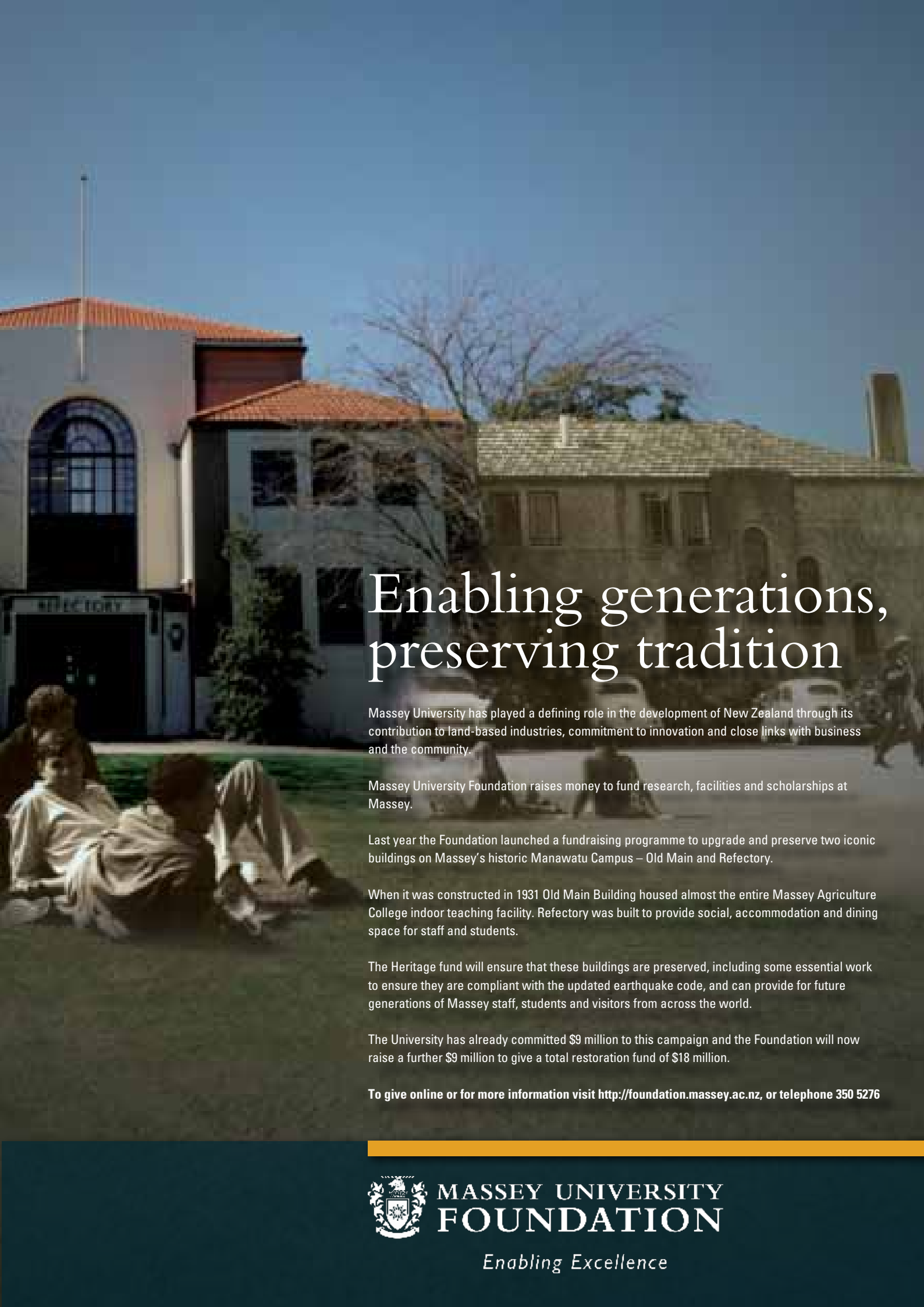
Associate Professor Nicola Shadbolt

A large team of researchers from across the University isinvolved in monitoring and evaluating the trial. This includes farm management, veterinary health and soil science specialists.

Shadbolt says another benefit shown in the trial is the reduced nitrogen run-off from the organic block.

"Recent data shows that the organic farm leaches just 8kg/ha of nitrogen compared with 19kg/ha from the conventional farm," she says. "This shows that an organic operation may be enticing to those who farm in an at-risk area, such as beside a waterway."

Financially, the organic block was holding its own, due to the 20 per cent premium paid for organic milk by Fonterra. ■



Enabling generations, preserving tradition

Massey University has played a defining role in the development of New Zealand through its contribution to land-based industries, commitment to innovation and close links with business and the community.

Massey University Foundation raises money to fund research, facilities and scholarships at Massey.

Last year the Foundation launched a fundraising programme to upgrade and preserve two iconic buildings on Massey's historic Manawatu Campus – Old Main and Refectory.

When it was constructed in 1931 Old Main Building housed almost the entire Massey Agriculture College indoor teaching facility. Refectory was built to provide social, accommodation and dining space for staff and students.

The Heritage fund will ensure that these buildings are preserved, including some essential work to ensure they are compliant with the updated earthquake code, and can provide for future generations of Massey staff, students and visitors from across the world.

The University has already committed $9 million to this campaign and the Foundation will now raise a further $9 million to give a total restoration fund of $18 million.

To give online or for more information visit http://foundation.massey.ac.nz, or telephone 350 5276

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