From the Vice-Chancellor

As a strategic partner at the National Agricultural Fieldays, we welcome the opportunity to showcase how our teaching and research benefit the community, the region and the nation.

I believe our location in the heart of rural New Zealand makes us especially attuned to the issues facing farming today. We have expertise in land ownership, environmental impacts, soil remediation, water as a valuable resource – the list goes on.

Earlier this year, we welcomed respected agricultural commentator and researcher Jacqueline Rowarth who has joined us as Professor of Agribusiness. Professor Rowarth has already begun to strengthen our links with the wider agriculture sector in the Waikato region and beyond.

I hope you enjoy reading about how our researchers and students are adding value to land-based industries, and we look forward to welcoming you at our Fieldays stand in the Premier Feature area.

From the Vice-Chancellor

THE UNIVERSITY OF WAIKATO.
DELIVERING SUSTAINABLE
RESEARCH SINCE 1964.

From the earliest Fieldays, the University of Waikato has been producing graduates, developing research, and partnering with local Crown Research Institutes and land-based industries to meet the needs of our local community and the national agriculture sector.

Located at the centre of New Zealand’s agriculture, research, technology, and science heartland, our academic research identifies and responds to local and national requirements for study options and research that support land-based industries.

Sustainability is a central driver of our research programmes and we take a strong leadership role in areas of environmental, economic and industrial sustainability, and in research supporting social and cultural sustainability.

Visit us in the Premier Feature Site and the Innovation Centre on M Road to see some of our research highlights and talk with our talented staff and students working directly in these areas.

You can also follow our live Fieldays updates on Facebook and Twitter by visiting (facebook.com/WaikatoUniversity) and (@waikato, hash-tag #fieldays).

Agribusiness “Silicon Valley”?

The herringbone milking parlour, the electric fence, in-line milk sampling, and added value milk ingredients – they’re all game-changing innovations, and they all came out of the Waikato.

“The Waikato really is the Silicon Valley of agribusiness,” says Professor Jacqueline Rowarth (pictured), a leading agriculture researcher and commentator who has taken up the inaugural Chair of Agribusiness at the University of Waikato Management School.

The region is home or close to the Headquarters for Zespri, Fonterra, Ballance AgriNutrients, TruTest, LIC, DairyNZ, Shoof and Gallaghers among others, plus a clutch of crown research institutes, industry bodies, Waikato Innovation Park and the University of Waikato.

It’s this fertile mix, says Professor Rowarth, that makes the Waikato such an important part of New Zealand Inc.

She cites Harvard Business School research which shows people are most creative and innovative when they have knowledge and can collaborate with others to make progress towards goals they value.

“Our job at the University of Waikato is to give future agribusiness leaders a knowledge base so they can go on to be innovative,” she says. “And part of the education is to ensure that they are wayward thinkers – that they question the status quo from their base of knowledge. That’s the first step towards innovation – asking if there is a better way.”

The University offers a business degree with a specialisation in agribusiness, and is currently developing a professional masters-level qualification aimed at graduates wanting to gain a better understanding of New Zealand’s biggest industry.

“The proposed qualification has the backing of leading agricultural organisations, and will help fast-track a much-needed new generation of agribusiness leaders,” says Professor Rowarth.

Agribusiness “Silicon Valley”?
A summer studying cows has given a University of Waikato student an unparalleled insight into bovine behaviour.

Dushyant Parmar’s farming experience was pretty limited before he started working with farmer co-operative Livestock Improvement Corporation (LIC), in the Protrack department over summer.

Now he’s something of an expert.

“New-borns will follow anything,” he says. “The teenagers are a lot more rebellious and like to do things their own way in their own time. And then there’s the older cows – they’re too lazy to be bothered trying to figure things out for themselves so they’re very compliant.”

Parmar, a mechanical engineering student, was involved with the development and testing of LIC’s new Protrack Drafter product that uses an automated drafting gate. His project was part of work placement that is a feature of many degrees at Waikato University.

The gate works like an extra pair of hands for farmers. Cows are fitted with an electronic identification tag and a farmer pre-programmes which animals need drafting. During milking the automatic gate takes care of the rest.

Trials of the new Drafter took place at four Waikato farms and on one in the South Island. Parmar says the on-farm testing was invaluable. “In the field things happen you can’t anticipate. It’s where you see what’s really going on.”

Upgrades have been made to the milking screen in the Herringbone shed pit which instantly shows which cows have been drafted, which are due to be drafted and total draft numbers. Pop-ups also tell a farmer when a cow has reached the gate. “The user interface is a lot friendlier for farmers now,” Parmar says.

The gates can also separate animals into three different groups, allowing for greater efficiency.

As for the cows, Parmar reckons it takes them about six months to get used to the system. “But eventually they all get it.”

Scientists from Waikato and Massey universities working with iwi have found a way to use fungi and plants to clean up contaminated sites in the Western Bay of Plenty.

Sawmilling operations in the area have left a legacy of dioxin contamination from timber preservative solutions used in the 1970s. Dioxins are known to be harmful to human health, and the Kopeopeo Canal, east of Whakatane, is so heavily polluted with these toxins that the locals have been warned against eating eels caught there.

Now a unique partnership is tackling the problem in a way that combines mātauranga Māori with Western science.

The partnership includes the University of Waikato, Massey University, EarthFax Development Corporation in the USA and the Bay of Plenty Regional Council, as well as representatives from the local iwi, Ngāti Awa, and S.I.G (formerly Carter Holt Harvey).

With funding from the Health Research Council, the partnership is exploring options for bioremediating more than 36 contaminated sites in the Whakatane area using fungi and plants to naturally break down the toxins.

The partnership’s initial programme, Te Ohu Mo Papatuanuku, focused on contaminated sediments from the Kopeopeo Canal. Working closely with iwi, Waikato’s Professor Roberta Farrell and honorary research associate Dr Joanne Thwaites Kelly (pictured) collaborated with Massey’s Dr Chris Anderson and Paul Futter of the Bay of Plenty Regional Council on the two-year trial.

The researchers found the best combination for reducing dioxins was to incubate the sediments with fungi for six months and then plant poplar trees, which grew for nine months. This reduced the toxicity equivalent quotient – which measures both concentration and toxicity of the dioxins – by 85% within the total allotted time of 15 months.

“There is very limited research on large scale bioremediation of dioxins, and this is the first time fungi and plants have been used at this scale and in combination,” says Dr Thwaites Kelly.

The next stage of the project begins later this year when the Bay of Plenty Regional Council dredges the canal as part of flood protection measures. Some 30,000 tonnes of sediment from a 5km stretch of the canal will be removed to a safe site for bioremediation.

Waikato’s Professor Farrell says the project’s participatory collaborative approach to working with iwi has been a real success. “Science and mātauranga Māori have meshed beautifully, and that’s what’s made the project the most important for me as a scientist,” she says.

“Ngāti Awa want the land to be useable again for kai, and that is our target as well, to get dioxin levels to zero so that food can be grown in the bioremediated soil.”
**Floating some ideas for farming solutions**

Rebecca Eivers has a soft spot for Waikato’s ailing peat lakes.

The University of Waikato doctoral student wants to nurse them back to health one floating wetland at a time.

Waikato peat lakes are shallow and often surrounded by intensive farming. That makes them more susceptible to sediment build-up and exacerbates problems like algal blooms caused by excessive nutrients.

“They have unique environments and we need to understand what is happening, it is a lot more complex than we first thought,” Eivers says.

While nutrient leaching from farms is largely responsible for the deteriorating state of the peat lakes, over time the number of wetlands in the region has also been drastically reduced.

That’s significant because the wetlands act as the “kidneys of the waterways”, filtering nutrients and improving water quality before the water makes its way into the lakes.

However wetlands often need to cover a large area to do that job properly.

So part of Eivers’ research, which is partly funded by Waikato Regional Council and the Department of Conservation, involves trialling floating wetlands that sit on top of an existing water source. Alternatively a farmer could create a sediment pond, sit the wetland on top and potentially double the efficiency of nutrient filtering while also reducing the land mass required to do the job.

Over the next year Eivers will be monitoring the effectiveness of two floating wetlands by measuring the amount of nutrient uptake by them.

But there’s more to it than that.

Eivers knows that wetlands are extremely sensitive to their surroundings and that one model does not fit all.

“There is no generic formula. As the research develops I will be observing which plants work better in which environment, working out how big a floating wetland needs to be to be effective and building on that.”

There is also another component to her research – at the same time she is studying the effectiveness of a biological fertiliser that is applied according to a tailor-made programme for each area of the farm.

“The approach with this fertiliser is little and often but very site specific. I’m looking at what happens when it reaches the water.”

Eivers says ultimately the ideal scenario would be to reduce the amount of nutrients leaching from farms by improving management practices such as reducing the amount of time stock spend in one area, altering fertiliser regimes or by reducing stocking rates.

On a Waharoa dairy farm two special machines aren’t missing a trick.

Twenty times a second they record the amount of carbon dioxide going in and out of the soil and they will keep measuring it at the same rate for the next year.

There’s something going on in the dairy farming pastures of New Zealand and a team of University of Waikato scientists is determined to discover exactly what.

They know the amount of carbon in dairy soils has reduced in recent years but they don’t know if it is still declining or has hit a plateau. And they also want to find out what management practices will best restore those carbon levels. It’s important because carbon supports life in the soil and declining amounts mean declining returns for farmers.

Lead researcher Professor Louis Schipper, co-researcher Dr David Campbell, research fellow Dr Susanna Rutledge and technician Aaron Wall are behind the testing which is being carried out under the New Zealand Agricultural Greenhouse Gas Research Centre and funded through the Primary Growth Partnership.

In addition to measuring the amount of carbon going in and out of the soil, the team must also factor in how much carbon is going out in other ways, such as milk or feed imports.

“There is a lot of carbon there and we are trying to measure a small change. You can’t just measure the total amount of carbon in the soil and come back a year later and measure it again,” Professor Schipper says.

The frequency of the testing, averaged out every half hour, will give them precise measurements and comprehensive data to enable them to determine how best to tackle the issue.

Then comes the clever bit – one of the towers at the farm will have one of its farm management practices adjusted and the results compared. The first adjustment will include greater plant diversity in the pasture to determine whether that makes a difference.

“There is good reason to believe that this will work, but equally we might have to say that didn’t work and try something else,” Professor Schipper says.
# Rural communities: a complex demographic picture

Like most Western nations, New Zealand has an ageing population as population growth slows. But what does this mean for our rural communities?

Professor Jacques Poot of the National Institute of Demographic and Economic Analysis (NIDEA), based at the University of Waikato, will deliver a Fieldays seminar on this topic.

"We know the drift of rural population to the cities has been going on for decades, as urban agglomerations are becoming more and more important everywhere; and we’re interested in how this links in with our ageing population. But it’s not quite so simple as to say that all rural populations are declining due to net outward migration or ageing."

Professor Poot (pictured) is currently examining data on population trends in rural New Zealand. He says some rural areas on the fringes of urban areas are experiencing population growth as lifestylers move in, others are benefiting from growth in the primary sector or tourism, while yet other more peripheral rural populations are hollowing out as young people leave to find work.

"Nationally, about 14% of the population lives in a rural area. According to Statistics New Zealand’s population projections, around one-third of New Zealand’s territorial authority areas can expect population decline between now and 2031. However, about half of territorial authorities which represent largely rural populations face this prospect."

Professor Poot says a better understanding of these demographic changes is important to inform future planning for services in rural areas such as education, health care and transport.

Professor Poot’s Fieldays seminar, “The challenges of future rural population change”, will be held at noon Thursday 14 June in the Premier Feature area.

---

## The 2012 Fieldays Seminar Series – powered by the University of Waikato

The University of Waikato produces graduates, develops research, and partners with local industries to meet the needs of our local community and the national agriculture sector. Come and listen to some of the people who are leading the way. All seminars and panel discussions are 20-30 minutes with question-time after. All seminars take place in the Premier Feature area.

### Time | Speaker | Topic – all seminars run 20-30 minutes, with questions after.
--- | --- | ---

**WEDNESDAY 13 JUNE**

11.00am | Professor Jacqueline Rowarth, Professor of Agribusiness – University of Waikato | Food and the environment

Land is a finite resource. Sustainable management of land is vital for the future and is challenging – when it goes wrong, the environment suffers, and food prices escalate. The balance between efficient food production and food prices is a global concern and New Zealand has a role to play in getting it right.

3.00pm | Panel discussion facilitated by Professor Jacqueline Rowarth
Panel: Peter Buckley – Waikato Regional Council
Logan Moe – University of Waikato
Or Dan March – University of Waikato | Collision of land use

Are we on a collision course between the drivers for New Zealand’s economic growth and our changing lifestyles? Each year 50,000ha is lost to lifestyle blocks. Is the demand for land, increasing urban encroachment and need for recreational areas hollowing out our rural communities? Are these issues even on the government’s agenda?

**THURSDAY 14 JUNE**

10.00am | Professor Jacqueline Rowarth, Professor of Agribusiness – University of Waikato | Efficiency versus productivity

Farm ownership models affect different aspects of the business. Corporate farming is great because owners are involved in creating and developing their business. Achieving a balance, particularly around employment for younger generations, is important for our future and requires debate in the face of interest from overseas.

12noon | Professor Jacques Poot, National Institute of Demographic and Economic Analysis – University of Waikato | The challenges of future rural population change

In coming decades New Zealand is expected to experience slower population growth and population ageing. Meanwhile, the increasing international mobility of people creates more uncertainty. While the big cities will continue to grow, population decline is almost certain for many regions. What are the likely trends and what are the implications for rural communities?

3.00pm | Panel discussion facilitated by Professor Jacqueline Rowarth
Panel: Brad Morse – University of Waikato
Chris Kelly – Land Corp | This land is my land

The face of farming in New Zealand is changing. We have increasing foreign ownership, corporate ownership, super farms and the rise of new ownership following Treaty of Waitangi settlements. So, what’s the best approach for New Zealand’s future?

**FRIDAY 15 JUNE**

10.00am | Panel discussion facilitated by Professor Jacqueline Rowarth
Panel: Jenzi Verno – University of Waikato
Frank Scrimgeour – University of Waikato
Willy Leferink – Federated Farmers Board | The right to farm

With seemingly endless moves to license the environment, pressure on water rights and water allocation, the Resource Management Act, and the looming Emissions Trading Scheme, has the regulatory environment in New Zealand become too restrictive? Or is it the only way to save New Zealand’s physical environment?

12noon | Speaker to be advised | Watch out for advice on another engaging University of Waikato seminar.

3.00pm | Professor Jacqueline Rowarth, Professor of Agribusiness – University of Waikato | Opportunity or a death knell

High standards for welfare and environment are costly in agriculture, yet food prices aren’t rising as fast as inputs. As standards are increasingly regulated, and tools that farmers use to maintain efficiencies are removed, income is eroded. Unless we can create new, high-value markets for food, New Zealand farming will move out of our hands.