



Dr Bryce Buddle (middle), Dr Dairu Shu (left) and Tania Wilson (right) from AgResearch's Infectious Diseases Immunology Team at the Hopkirk Research Institute are making good progress in developing an improved vaccine for TB in cattle.

Closing in on a superior bovine TB vaccine

AgResearch scientists are making encouraging progress towards developing an improved vaccine to protect cattle from tuberculosis (TB).

Bovine TB represents a threat to the marketing of dairy and meat products in New Zealand and globally.

While TB is currently well controlled in New Zealand livestock, it costs more than \$80 million per year to keep this disease under control.

With funding from the Foundation for Research, Science and Technology, AgResearch's TB Immunology and Animal Health Team, led by Dr Bryce Buddle, have been working on developing a vaccine for TB in cattle that is effective, economical, and compatible with current TB testing methods. A suitable vaccine must also

be acceptable to our export markets and not affect meat quality.

The current BCG vaccine is problematic in that it often leads to false positive results in diagnostic skin tests for TB. While more specific blood tests can be used to prevent these false positives, these add expense.

Dr Buddle and his team are looking at whether delivering the BCG vaccine orally would offer protection without interfering with diagnosis. They are also working on refining the current vaccine to deliver a dosage that achieves these twin aims.

Furthermore, in a collaboration with Massey University and Industrial Research Limited, Dr Buddle and his team are investigating the potential of a new protein-based vaccine, delivered with a novel vaccination delivery system.

"The prospects for a vaccine to better control and eradicate bovine TB are encouraging. We are optimistic about taking another step forward in November with results from research into the lower dose BCG vaccine," Dr Buddle says.

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New General Manager for Food & Textiles Group

Professor McNabb explains more

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Providing leadership for AgResearch's substantial capability in food and textiles research and development will be the focus for the new General Manager of the Food & Textiles Science and Technology Group, Professor Warren McNabb.

An eminent scientist, Professor McNabb has been with AgResearch for 16 years, most recently as Section Manager of Food, Metabolism & Microbiology.

He also holds an appointment at Massey University as Adjunct Professor of the Riddet Institute and is an active collaborator in The Centre for Pastoral Foods for Human Health, the partnership between AgResearch and The Liggins Institute.

Educated at Massey University, his PhD was in animal science where he majored in nutrition and metabolic physiology.

Professor McNabb is also a Fellow of the New Zealand Institute of Agricultural and Horticultural Science and a Professional Member of the New Zealand Institute of Food Science and Technology.

He was a key member of the science team that established New Zealand's first nutrigenomics research capability, and sits on the Science Management Team of Nutrigenomics New Zealand.

Professor McNabb says that he expects his new General Manager role to be one of leadership in a challenging and ever-changing climate.

"With the pressure on the textiles industry, we need to be vigilant in maintaining the real economic value that our research and development adds to that industry, and concentrate on developing an industry-wide strategy to get the sector moving forward."

He says while New Zealand's food industry is more buoyant, it too is underpinned by research and development that helps create valuable

new products, while reducing processing costs.

"AgResearch has great capacity in agri-foods research and development, and we need to raise our profile in this fast developing area of science and technology, that represents huge potential to increase economic returns for New Zealand.

"To best facilitate outcomes for New Zealand producers, and economic return for New Zealand, we need to keep working with our existing partnerships in agri-foods – with Food Innovation Network New Zealand (FINNZ), Food Innovation New Zealand (FINZ), the Riddet Institute, Fonterra, The Liggins Institute and the Centre for Pastoral Foods for Human Health.

These represent a core capability for New Zealand that gives the country a competitive advantage in food. Together with these partnerships, AgResearch has an important role to play for New Zealand's agri-food industries."

Professor McNabb says finite land and resources mean we can't just keep raising production levels – there is an adjacent need to reduce our carbon footprint and improve our social and environmental sustainability.

"Research and development delivers productivity growth to the food and textiles industries because it enables New Zealand companies to create more sophisticated, higher-value products that generate a valuable and sustained financial return to this country."

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Professor Warren McNabb

World-first epigenome scan augments livestock research

A host of scientific advances to boost the livestock sector will now be possible thanks to a significant epigenomic research success led by an AgResearch scientist.

As part of an international collaboration, AgResearch Scientist Dr Christine Couldrey has headed a team in achieving what is believed to be a world-first, a successful bovine genome-wide DNA methylation scan.

The scan determines which regions of bovine DNA receive an additional layer of information during the development of the cow. Although not part of the DNA sequence itself, the DNA methylation that is added to the genome (single set of DNA chromosomes) results in different cell types having unique epigenetic signatures. These signatures are inherited as cells divide, but remain dynamic in nature as animals develop and grow to adulthood.

The scan was achieved by an international collaboration, made up of Dr Couldrey, together with Dr John Grealley and Dr Masako Suzuki at the Albert Einstein College of Medicine in New York. The scientific feat builds on the first sequencing of the cow genome which took place in April this year.

While the data is still being analysed, it is now clear the successful scan in late July will pave the way for a range of other scientific advances.

The failure rate in cloned embryos is presumed to be due to unknown errors in epigenetic reprogramming, but this scan opens the way for identifying these errors, thereby resulting in a much higher success rate and better understanding of bovine DNA methylation for a range of breeding and health outcomes.

Dr Couldrey believes this work could have huge benefit to the livestock industries.

"This success can lead to future benefits and savings for farming. The work



Dr Christine Couldrey has led a team to a significant epigenomic research achievement that will facilitate further scientific advances.

has just begun and the analysis will help understand how we can turn this knowledge into practical solutions for the agricultural sector, but dispersing superior genetics and some applications for pharmaceutical products are clear results."

Dr Couldrey has also been working with Dr Mitchell Potter, an internationally-recognised computer scientist from the US Naval Research Laboratory. The team is working on analysing DNA using biologically-inspired algorithms to better understand epigenomes.

The bovine scan accomplishment follows more than three years of intensive work and collaboration, made possible through

grants from the Paykel Foundation and funding from the Foundation for Research Science and Technology.

AgResearch Chief Executive, Dr Andrew West, has welcomed Dr Couldrey's achievement.

"AgResearch and our talented scientists are at the cutting edge of so many issues, usually working with a much lower level of funding, and this world-first is a major achievement that stands to benefit farmers in the longer term."

For more information contact christine.couldrey@agresearch.co.nz

Seminars build bridge between science and on-farm application

The success of a recent Palmerston North sheep and beef farming seminar has led to demand for a South Island event.

The two-day Institute of Motivated Farmers Technology Programme saw a group of farmers join AgResearch scientists to discuss where agricultural science is headed, and what it will deliver to farmers in the next few years.

AgResearch Chairman Sam Robinson, who helped facilitate the seminars, said their success lay in having farmers lead the topics up for discussion.

"The programme was driven by industry and the eventual users of this research and technology. People came along motivated to learn and participate, and with the knowledge they were going to be discussing cutting-edge science that will help build and grow the future New Zealand agricultural sector."

The programme was jam-packed, like a "speed dating" format, Mr Robinson says, with senior AgResearch scientists given a short slot to talk about their area of research and where it was headed, then open it up to industry folk for discussion and questions.

Among the 12 scientists who spoke was AgResearch's Dr Greg Lambert, talking about systems thinking and technology, along with organisation of the value chain and the power of supermarkets; and Professor Warren McNabb, who discussed new feeds and feeding systems, and targeted supplements. Eminent genomic researcher John McEwan also spoke about the power of genomic selection.

Mr Robinson said the event was successful beyond his expectations, with excellent feedback from those who participated.

"It provided a platform for a very strong surge of information across the division between practical farmers and the depth of science from researchers."

"It enabled a rekindling of relationships and mutual understanding between farmers and scientists, and showed farmers the world-leading science AgResearch is undertaking, and how that will benefit them in their business."



The event has resulted in high demand for a South Island-based seminar, and discussions for a similar format for dairy farmers.

For more information contact gavin.sheath@agresearch.co.nz

AgResearch students shine at molecular biology meet

Contributions from AgResearch scientists and students made for a successful and interesting event at the annual Queenstown Molecular Biology Conference (QMBC) held earlier this month.

Attracting participants from around New Zealand and overseas, the conference aims to promote the discipline of molecular biology and facilitate high level scientific meetings on subjects related to molecular biology.

This year's QMBC had a focus on stem cell research, at which AgResearch's

Reproductive Technologies Section had a strong presence, presenting posters, and as invited speakers.

AgResearch PhD student Jessica van Leeuwen won the conference's 'Young Investigator Award' for the best student poster presentation, and was also selected to give an oral presentation as part of

the student presentations section of the conference's Developmental Biology satellite meeting. Jessica is working on a Marsden-funded project with Dr Peter Pfeffer. Emma Redgate, also an MSc student with Dr Peter Pfeffer, received an award for the best student poster presentation at the satellite meeting.

Overseer enters exciting new development phase

Find out more

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The OVERSEER® Nutrient Budgets Model (Overseer) has entered a new stage of development, with the appointment of a lead science provider and the launch of a significant enhancement programme.

Overseer is nutrient management software that enables farmers to develop a nutrient budget for their farm, to estimate their on-farm emissions of greenhouse gases and assist their business in balancing profit and environmental impact.

The owners (the Ministry of Agriculture and Forestry (MAF), AgResearch and Fert Research) have completed the Government tender process and appointed a lead science provider for the four-year, \$4 million programme to develop Overseer.

A proposal submitted by AgResearch and

supported by partners Massey University and IT company Rezare Limited was the successful bid.

The Overseer owners will now begin to implement their 10-year strategic plan, which includes improving the performance of the model, improving its accessibility and usability, and adding new features. MAF and Fert Research will each contribute \$500,000 per year for four years, for the ongoing development and maintenance of the model.

Available free-of-charge, Overseer is widely used by farm advisors, fertiliser consultants and farmers to examine

the efficiency of nutrient use and flows within a farm, potential environmental impacts, and mitigation options.

Continually upgraded to meet the ever-changing demands of the industry, it is applicable to dairy, sheep, beef and deer farms, as well as a range of crops.

Overseer can be downloaded free of charge at www.agresearch.co.nz/overseerweb, or posted out on CD by contacting MAFPolicy, Private Bag 3123, Hamilton, or email overseer@maf.govt.nz

For more information contact mark.shepherd@agresearch.co.nz

Come see the Dairy Farm of the Future

AgResearch's Waikato
Tokanui Dairy Research Farm

OPEN DAY

November 20 9am-3pm

See our state of the art milking and animal data collection system

Talk with our scientists about how they are helping farmers:

- Improve dairy cow performance
- Add value to dairy beef
- Improve ryegrass persistence
- Reduce Green House Gases
- Make better use of resources
- Grow tomorrow's farmers

And tour the farm.

Go 40 minutes South of Hamilton on SHW3, turn into Te Mauhai Road, then into Farm Road.

For more information:
Wayne.green@agresearch.co.nz
07 8346620

Farmers will have the opportunity to see world-leading research meet world-leading dairy farm practices at an open day for AgResearch's new dairy and development farm.

Fonterra Chairman Sir Henry van der Heyden will open the event at Tokanui Farm, just south of Te Awamutu in the Waikato, on Friday November 20.

AgResearch has spent \$6.5 million over the last year converting its 340 ha Tokanui beef finishing operation into a dairy farm, installing extensive experimental facilities and benchmarking many aspects of farm performance.

The new dairy research and development farm provides a vital facility to trial leading-edge technology and novel farming practices to help the dairy industry meet today's challenges, and grow the sector.

The farm comprises a milking platform of approximately 200 ha which will initially run 800 cows, with 140 ha used as a support block.

Premium-value milk, greater productivity and superior environmental stewardship are just three of a raft of areas where the conversion will facilitate innovative research and development to support and grow the dairy industry and export sector.

Balancing the environmental and productivity expectations of the industry and public will be a significant challenge. New technologies and practices that reduce emissions from the farming system will be integrated into the milking platform, along with other management practices aimed at minimising the environmental impact of modern farming.

Find out more

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Cow Collars Collect Animal Information

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Food research collaboration aims to double export value

The establishment of Food Innovation New Zealand (FINZ) is expected to boost New Zealand's economy by billions of dollars through transforming commodities into premium, high-value foods.



At the FINZ launch (from left): Professor Paul Moughan (Massey University); Dean Tilyard (Biocommerce Centre); Steve Maharey (Massey University Vice Chancellor); Dr Andrew West (AgResearch Chief Executive); Prime Minister John Key; Jeremy Hill (Fonterra); Jono Naylor (Palmerston North Mayor); Ian McKelvie (Manawatu Mayor); Peter Landon-Lane (Plant & Food Research); and Professor Harjinder Singh (Massey University).

The country's leaders in agri-foods have joined forces in the FINZ initiative - a collaboration between Massey University, AgResearch, Plant & Food Research and Fonterra.

Launched by Prime Minister John Key at Massey University last month, FINZ brings together the Southern Hemisphere's largest collective of food innovation experts.

The collaborating teams of scientists will facilitate powerful underpinning food science to support the agri-food sector, says Dr Andrew West, Chief Executive of AgResearch.

"It is pleasing to work more closely, especially with Fonterra, whose continued success is very important to New Zealand," says Dr West.

AgResearch has a well-established capability in dairy and red-meat food science. This new collaboration will supplement those AgResearch already has with the University of Auckland's Liggins Institute in Pastoral Foods for Human Health and its Nutrigenomics Centre, along with the Universities of Otago and Waikato in areas of food science and food agrotechnology. It expands AgResearch's link with Massey University that, to date, has principally

focused on livestock health and welfare.

"The new collaboration will also have a strong focus on providing scientific assistance to multinational food companies, many of which use New Zealand-produced food ingredients," he says.

For more information please contact AgResearch General Manager of the Food & Textiles Section, warren.mcnabb@agresearch.co.nz

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