



From left to right, Stewart Collie (Team Leader, Textiles), Brent Gregory (a Director of BGI Developments) and Surinder Tandon (Senior Scientist, Textiles) showcase a wool garment coloured using a revolutionary new dyeing process.

## AgResearch and BGI Developments agree to commercialise revolutionary dyeing process

A revolutionary new dyeing process developed by AgResearch that allows wool fabrics to be dyed vibrant colours is about to be commercialised by New Zealand-based company, BGI Developments.

The agreement between AgResearch and BGI Developments has the potential to earn New Zealand millions of dollars by leading to the large-scale manufacturing of multi-coloured, fine wool fabrics, which will be distributed to fashion houses around the world.

"These products are a world first in textile and fashion development, and an excellent example of how technology can enhance New Zealand's exports," says Robyn George-Neich, Director of BGI Developments.

"The new colouring process developed by AgResearch means that patterns and graphics are dyed in the fabric, not just printed on top. The fabric looks and feels better, because it doesn't have plastic graphics on it. The consumer benefits because the pattern doesn't deteriorate over

time. The garment feels more comfortable and retains its appearance for longer."

A team of textile scientists at AgResearch under the leadership of Dr Stewart Collie have developed the new process through intensive research over the last eighteen months.

"The applications are very flexible and allow two colours to be used in all garments, avoiding the need to commit to one style well before a product enters the market," says Dr Collie.

The process can also be used on a wide range of fabric weights, and it is lightweight and machine washable.

Dr Collie says, "Quite frankly, it makes

wool look and feel sexy. It's a world away from Fred Dagg's prickly black singlets and brings brightly coloured wool fashion into the twenty-first century."

"Judging by the response of New Zealand fashion designers, there's a great deal of interest in manufacturing vibrant coloured wool garments from this fabric. The reaction has been incredibly positive; I'm very optimistic about its uptake by the industry," he says.

For further information:  
[robyn@bgidevelopments.co.nz](mailto:robyn@bgidevelopments.co.nz)  
[stewart.collie@agresearch.co.nz](mailto:stewart.collie@agresearch.co.nz)





From left to right, Dr Tanira Kingi (Science Advisor Māori), Hoani Ponga (Māori Business and Relationships Manager) and Irene Kereama-Royal (Innovation Manager) work together to further AgResearch's Māori strategy.

# Collaboration is key to successful Māori Strategy

Dr Tanira Kingi, AgResearch's Science Advisor Māori, believes that successful partnerships and collaboration are key to ensuring that AgResearch can successfully implement its Māori Strategy.

Dr Kingi joined AgResearch in April 2010 and is responsible for developing and implementing the Strategy that he wrote in July 2009. The Strategy aims to ensure that "AgResearch is connected and engaged with Māori organisations in the pastoral sector."

The Strategy has three key platforms: engagement with Māori; building capability within AgResearch to engage with Māori; and delivering research and development that will address the needs and interests of Māori.

AgResearch is working closely with Māori incorporations, trusts and iwi authorities that have arisen through the Treaty settlement process, as well as with other Crown Research Institutes such as Landcare Research, NIWA, GNS, Plant & Food Research and Scion.

Dr Kingi's background is in agricultural economics and development, and he has several projects underway that support the Māori Strategy.

These include the development of tools for land use assessment and industry scenario development.

Dr Kingi's strengths lie in his ability to manage interdisciplinary teams and to "get people from different backgrounds to work together." For example, Dr Kingi was the science leader of the multi-disciplinary 'Iwi Futures' project and is currently an objective leader for AgResearch's collaborative 'Clean Water, Productive Land' research project, which is funded by the Ministry of Science and Innovation.

The Iwi Futures project, which was led by Massey University and funded by the Foundation for Research, Science and Technology (FRST), was completed in October 2010. It developed a decision-making framework for Māori landowners.

Dr Kingi's objective in the Clean Water, Productive Land project aims to develop a set of tools that integrate mātāuranga Māori (traditional knowledge) into tools to improve

the management of critical source areas and reduce contaminants into fresh water.

Two colleagues have recently joined Dr Kingi's team to further AgResearch's Māori strategy. Hoani Ponga is Māori Business and Relationships Manager, whose role has "a strong emphasis on developing business and ensuring the relationships that AgResearch has with iwi connected to our campuses and farms are good." This includes maintaining correct protocols and good communication with AgResearch's iwi partners.

Irene Kereama-Royal is a lawyer with a background in environmental law and has prior experience with FRST and Plant & Food Research. Her role as the Innovation Manager is to develop strategies that link AgResearch scientists, other Crown Research Institutes and iwi groups to ensure that research products and services are relevant to Māori.

For further information:  
[tanira.kingi@agresearch.co.nz](mailto:tanira.kingi@agresearch.co.nz)





Project Rerewhakaaitu aims to develop whole farm nutrient management plans in order to decrease nitrogen and phosphorus losses into the lake.

# Farmers lead the way to better lake water quality

In 2001, Project Rerewhakaaitu was initiated to improve water quality in the only Rotorua lake where dairy farming is the main activity on surrounding land.

A decade later, the project is now in its third phase, aiming to develop whole farm nutrient management plans in order to decrease nitrogen and phosphorus losses into the lake.

The first two phases of the project built up an understanding of how to minimise nutrient losses on these farms, and the third phase is now implementing this knowledge on farms.

Rather than taking a top-down approach, this project is unique in being farmer-led, with support from AgResearch and the Bay of Plenty Regional Council.

Ian Power and Bob Longhurst, Scientists at AgResearch's Environmental Footprinting Centre (EFC), say that the farmers "are a really enthusiastic bunch of people

and they are keen to do the right thing so that water quality improves."

The EFC helps dairy, sheep, beef, deer, goat, arable and horticultural farmers, businesses and regional councils understand nutrient flows and losses. The EFC also provides expert guidance on making the best use of nutrients to give high production with low emissions.

Project Rerewhakaaitu has so far seen 27 dairy farms use OVERSEER® Nutrient Budgets to develop farm-level nutrient budgets and determine what mitigations could be undertaken to improve nutrient use efficiency and reduce nutrient losses. The farmers have also completed "Enviro Walks," which identified "hot spots" where nutrient or sediment loss can impact water quality on farms.

Farmers will implement their own nutrient management plans where possible. From these results, an overall catchment management plan will then be developed, which will ensure the long-term health of the lake.

The Project has been funded by the MAF Sustainable Farming Fund, the Bay of Plenty Regional Council, DairyNZ, FertResearch and AgResearch.

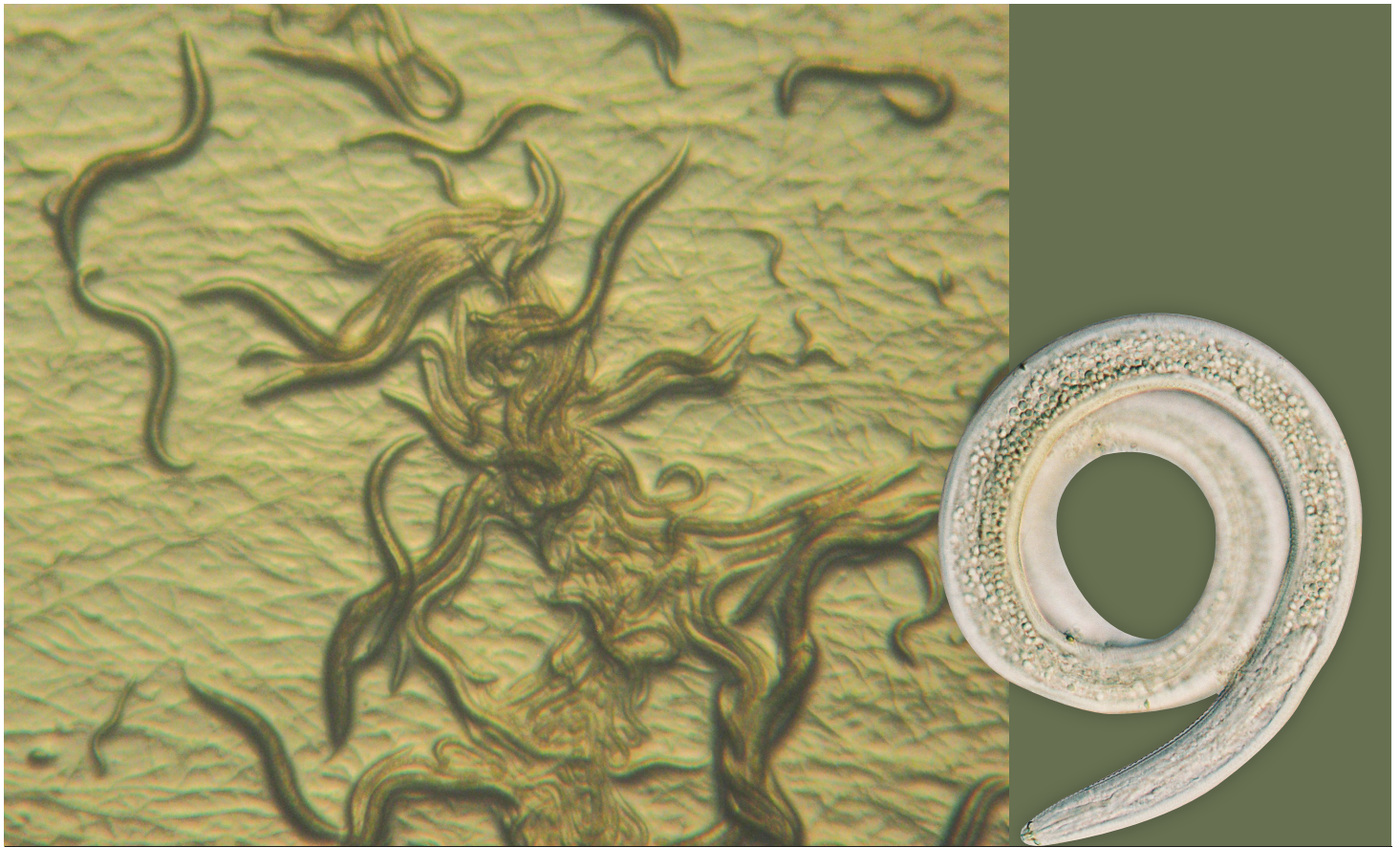
For further information:  
[ian.power@agresearch.co.nz](mailto:ian.power@agresearch.co.nz)  
[bob.longhurst@agresearch.co.nz](mailto:bob.longhurst@agresearch.co.nz)

**DairyNZ**

**Sustainable Farming Fund**  
Ministry of Agriculture and Forestry  
Te Manatū Ahuwhenua, Ngāherehere







Dr Nigel Bell's web-based lucid key uses images such as these to help non-specialists better identify nematodes.

# Lucid key makes nematode identification easier

Species identification is a critical part of scientific research and its applications in areas such as biosecurity. New web-based systems for identifying species, called lucid keys, are now making it easier for non-specialists to use keys for identification.

Dr Nigel Bell, Scientist in AgResearch's Biocontrol and Biosecurity Section, has developed a web-based key for identifying nematodes, tiny worm-like animals, as part of the multi-organisational Science Solutions for Better Border Biosecurity (B3) programme.

Dr Bell's key was one of the first advanced identification systems when first developed, and since then a number of similar keys have been developed for other species. For example, Dr Scott Hardwick has developed a key for ticks, which is currently being used by MAF for biosecurity purposes.

Unlike traditional dichotomous taxonomic keys, which lead the user through a series of yes or no questions, lucid keys are "multi-access," which means the user can start with whichever character traits are most striking or obvious. This

avoids users getting stuck when one question cannot be answered, which is a common problem with traditional keys.

In other words, "the user decides how to tackle the identification," says Bell.

Dr Bell's nematode key uses the Lucid software developed at the University of Queensland, which makes building a basic online key relatively simple, even for non-taxonomists.

Most morphological terms are illustrated so the non-specialist should be able to make use of the key.

Dr Bell originally developed the nematode key for his lab colleagues. The team was researching how the nematode community structure could act as a "bio-indicator" of soil condition quality, but in

order to do this, the team needed to be able to consistently identify nematodes at the genera and family levels. The lucid key enabled all team members to help with the identification process.

Dr Bell tried the key with other colleagues and it worked so well that scientists as far afield as Italy, the West Indies and Australia are now using the key.

For further information:  
[nigel.bell@agresearch.co.nz](mailto:nigel.bell@agresearch.co.nz)

View the lucid key

[CLICK HERE](#)



**B3**

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BETTER BORDER BIOSECURITY  
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Pru Renshaw punches a sheep blood FTA sampler. The resulting 2mm punch will be used for DNA extraction, genotyping and parentage analysis.

# Genomnz™: New Zealand's top animal DNA lab

New Zealand's leading animal DNA testing laboratory, *Genomnz™*, is the commercial arm of the Animal Improvement Section of AgResearch. It delivers genetic analysis for a wide range of farmed species, as well as plant and aquaculture species.

The business builds on AgResearch's world-leading expertise in molecular genetics, especially gene mapping and gene discovery. *Genomnz™* services include genetic profiling, parentage testing, searching for reproductive traits, and contract research and development.

*Genomnz™* works with a range of farmers, breed associations, industry groups, companies and universities worldwide. The lab also works closely with other Crown Research Institutes such as Scion and Plant & Food Research.

The laboratory began its work in 1996 with sheep, dairy cattle and deer, which remain their specialty today. However, they have now diversified to a wide variety of species,

including alpaca, dairy goats, miniature horses, aquaculture, and plant species such as potatoes, pears, apples and pine trees.

Dr Rosemary Rickman, Manager of *Genomnz™* since 2007, says the increased interest from the aquaculture industry to develop fish breeding has been a particularly exciting development. *Genomnz™* has developed several DNA tests that help to determine the best breeding stock for fish species. Other research on salmon has helped define DNA markers for desirable traits such as colour.

The laboratory employs a team of highly experienced staff and utilises state-of-the-art equipment to ensure the thousands of samples submitted annually

are processed accurately, cost effectively and with timely results. AgResearch has also developed sophisticated proprietary software and customised databases which allow for precise parentage analysis and data recording.

*Genomnz™* is accredited by International Accreditation New Zealand (IANZ) to the ISO 17025:2005 standards, which ensures their testing is the highest quality. The lab is also a CS Pro Illumina provider, which gives the laboratory powerful SNP detection capabilities.

For further information:  
[rosemary.rickman@agresearch.co.nz](mailto:rosemary.rickman@agresearch.co.nz)





Attendees of the Third Annual Centre for Reproduction and Genomics (CRG) Research Colloquium in Dunedin.

# Third Annual CRG Research Colloquium

In late February, the Centre for Reproduction and Genomics (CRG) attracted more than 120 scientists and interested parties from around the world to its Third Annual Research Colloquium.

One major theme of the colloquium was how scientists could contribute towards the development of New Zealand's economy. Director of the CRG, Professor Neil Gemmell, believes that aquaculture is one key area that should be a focus for the Centre.

Although aquaculture is not the Centre's core purpose, Gemmell says the CRG can "leverage our strengths and knowledge in animal science into aquaculture to help New Zealand achieve its economic development goals." This will be done in partnership with established participants in the aquaculture industry.

A second food-related theme of the conference was how scientists can address the security of global food supplies, another area in which Gemmell thinks the CRG should take a leadership role.

Professor Gemmell says the challenge here is not just strengthening New Zealand's economy but also a broader humanitarian

mission that includes "smart thinking using technology already at hand to address broader issues such as ensuring quality food sources (especially protein) are available globally at relatively low costs."

Professor Bruce Whitelaw, from Edinburgh's Roslin Institute, delivered a keynote address that explored this issue by discussing ways that disease-resistant animals could be developed to enable higher density farming with relatively low disease rates and the chance for higher food production per area.

A third theme that emerged from the colloquium was what Gemmell calls the "interesting potential" emerging between the two collaborating partners in the CRG, the University of Otago and AgResearch.

As an example, Peter Smith of AgResearch presented his recent work on the development of an animal model for polycystic ovarian syndrome (PCOS), which affects about 10% of women worldwide.

Smith is using a sheep model to investigate how polycystic ovaries form and ultimately, in collaboration with Otago researchers, will explore how drugs can be used to improve fertility outcomes for PCOS sufferers.

In another session, Dr Elinor Karlsson of Harvard University discussed her work on dog genetics, which has the potential to help researchers understand the genetic basis for some human diseases.

Professor Gemmell says that Smith and Karlsson's work are examples of "exactly the kind of science that you can only do by linking medical and animal science researchers." Gemmell is keen to leverage this potential to develop broader global partnerships in Europe and North America.

For further information:  
neil.gemmell@otago.ac.nz







Farmers usually dock lambs' tails within the first week to six weeks after birth to reduce the risk of myiasis, or fly strike.

# Scientists investigate animal welfare implications of tail docking

Farmers in New Zealand usually dock their lambs' tails to reduce the risk of myiasis, or fly strike, a debilitating disease that can cause animals extreme discomfort, loss of condition and even death.

The main methods for docking are the application of a constrictive rubber ring around the base of the tail, causing the tissue to die and eventually fall off or removal with a heated docking iron. Farmers usually dock within the first week to six weeks of a lamb's life and typically will not give the animals any pain relief.

A great deal of research has been conducted to determine if sheep experience pain during tail docking. Overall, both physiological and behavioural evidence suggests that they do. There is also evidence that if tail docking is carried out, sufficient length should be left to cover the vulva of female lambs or a comparable length in males to reduce the welfare impact of the procedure.

Using local anaesthetics, crushing nerves,

or administering anti-inflammatory drugs all can be used to reduce the animal's pain to some degree, but such methods are costly and time consuming. As a result, few farmers actually use such methods, particularly as there are no legal requirements that they do so.

Nonetheless, it is important to have alternative systems in place for farmers if views on the acceptability of conducting painful procedures on livestock shift, or to meet standards that higher value markets might require.

Scientists in the Animal Behaviour and Welfare Team at AgResearch, in collaboration with scientists at Massey University, have been researching the development of practical methods for

pain control that are cost-effective and convenient for farmers to use.

In addition, the Animal Behaviour and Welfare Team are also taking a step back to ask the more fundamental question of whether tail docking is in fact necessary for market lambs.

Dr Mhairi Sutherland says, "There is not a lot of evidence on how else fly strike could be controlled, and we need a better understanding of the causes of fly strike before we can find solutions." It is clear that any alternative would not be acceptable if stock are exposed to increased risk of fly strike as a result.

For further information:  
[jim.webster@agresearch.co.nz](mailto:jim.webster@agresearch.co.nz)



# Awards and Achievements

**Dr Margaret di Menna**, Scientist Emeritus, has had the reading room at the University of Otago's Abbey College named in her honour because she was the first woman PhD graduate from the institution in 1954.

Dr di Menna's PhD in microbiology focused on the nature and relationships of yeast on the human body.

Although doctoral degrees were first offered at the University of New Zealand (later to be the University of Otago) in the 1920s, it was not until 1944 that the first PhD was awarded from the University of Otago, and doctoral degrees remained uncommon until the 1960s.

Dr di Menna says humbly, "I am most gratified to have this honour but it was just a matter of me being there at the time."

**Dr Stewart Ledgard** has been appointed as an adjunct Professor to the New Zealand Life Cycle Management Centre at Massey University.

AgResearch is a joint partner with Massey University and three other Crown Research Institutes in the Centre, which aims to develop skills in Life Cycle Management in New Zealand across organisations and industry.



Dr Margaret di Menna (left) with the Deputy Vice Chancellor (Vice Chancellor Elect) Professor Harlene Hayne, University of Otago (right).

Dr Ledgard is involved in aspects of course development and supervision of PhD students via the Life Cycle Management Centre. His current research in this area focuses on resource use, efficiency, and carbon footprinting across the life cycle of

dairy, lamb, beef, venison and wool products and on managing agricultural systems to reduce environmental emissions.

## AgResearch grieves passing of former Chief Executive Bill Kain

AgResearch's first Chief Executive, Dr Bill Kain, passed away on 25 March while chairing the final session at the International Farm Management Association congress in Methven, Canterbury.

He dedicated his professional life to the pastoral sector and was "an irreplaceable giant in New Zealand science," according to current Chief Executive Dr Tom Richardson.

Dr Kain began his career as an entomologist and made a great contribution to

understanding a wide range of pests, particularly grass grub. During his career he held senior positions in MAF Technology, and while his interests broadened, his personal style, mentorship, generosity and infectious enthusiasm never changed.

### to contact intouch:

Intouch Editor: Wayne Green  
AgResearch Corporate Affairs Manager (Acting)

Phone: (07) 834 6620  
Email: [wayne.green@agresearch.co.nz](mailto:wayne.green@agresearch.co.nz)  
Website: [www.agresearch.co.nz](http://www.agresearch.co.nz)

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