



AgResearch Senior Scientist Dr Warren King says black beetle can be managed with the use of ryegrass cultivars containing the novel endophyte AR37.

Black beetle causes pasture woes

It looks harmless but the African black beetle, which arrived from South Africa via Australia early last century, is causing increasing damage to northern North Island pastures.

AgResearch Senior Scientist Dr Warren King is heading research at the Tokanui Dairy Research farm on pasture persistence and pasture renovation.

Warren says there is increasing frustration among farmers who renew their pastures only to see them fail. "Considering the costs and time involved, pastures have to persist to pay back the investment."

All the hard work can be undone by the presence of pests such as the black beetle, which is heartbreaking news for farmers.

Warren says a string of very dry summers and autumns over the last

three years has contributed to higher black beetle numbers especially on lighter soil types such as ash and peat.

"We're seeing as many as 95 black beetles per square metre and 30 or more is typical. Any more than 20 is a concern."

Warren says the best way for farmers to manage black beetle infestations by using a combination of pasture management, coated seed and ryegrass cultivars containing the novel endophyte AR37.

"Insecticide-coated seed provides protection at a critical time; the grass is germinating at a time when

the black beetle adults have just emerged from the soil. They're hungry and can be very destructive. Novel endophytes have been shown to give protection against other pests as well, such as Argentine stem weevil. "

"There are no silver bullets though – it's a case of getting all the little things right."

Funded by MAF's Sustainable Farming Fund and co-funded by DairyNZ and Ballance Agri-Nutrients the project involves 20 farms, 10 in the Bay of Plenty and 10 in the Waikato, and has another 12 months to run.

warren.king@agresearch.co.nz

Turning bright ideas into working solutions

AgResearch's Lincoln-based Engineering Department has recently designed a purpose built ATV mounted hydraulic soil sampler that is already making life easier for researchers at Ruakura.

Research Associate Brendon Welten is part of a team in the Climate, Land & Environment Section involved in research on nutrient cycling in farming systems. This involves a large amount of fieldwork collecting soil samples to a depth of 90cm for nutrient analysis and installing ceramic cup soil solution samplers on an angle to a depth of 75cm.

"We currently have 1500 soil solution samplers installed in a number of trials and have collected thousands of deep soil cores in the past year," says Brendon. "These tasks place a large physical burden on our team as to date they have been done manually."

Senior Scientist Dr Mark Shepherd had

seen a mobile hydraulic unit in the UK and suggested the team design a similar one for New Zealand conditions. Brendon approached Steve Gebbie, head of the engineering development team at the Lincoln campus with a design brief to create an automated hydraulic soil sampling machine that could be mounted onto a quad bike.

This presented a unique set of challenges. "When you are talking hydraulics, you are talking about tonnes of force on the back of a bike," says Steve.

To overcome the insufficient rear end mass of the bike a hydraulic powered hammer was incorporated into the design for the driving mast.

"By keeping all loads within the corer chassis, and isolating the bike from any impacts using hydraulic cylinders to jack the rear end of the bike off the ground while coring, it was possible to protect the bike from the extraction force," says Steve.

A jockey wheel provided the final solution to maintain the rear end loads on the quad bike.

Brendon says the machine is taking the arduous work out of soil sampling and installing soil solution samplers.

"This allows our team to soil sample to a depth of 1.2m with ease and provides us with higher quality soil samples. It also improves the consistency in the angle of insertion for ceramic cups. It's increasing productivity, while freeing up technical staff to undertake other research activities."

Steve says the team rarely turns down a request to build anything.

"It's exciting getting a new challenge. There is a lot that can be done automating systems such as field measurements and we can help make the scientists' lives easier."

As well as Steve, the engineering team consists of an electrician, toolmakers, design engineer, and electronics engineer. "It's a small team but as a one-stop shop, we can do everything, including software development and control systems, from small \$100 jobs to \$250,000 projects."

steve.gebbie@agresearch.co.nz



The purpose built ATV mounted hydraulic soil sampler built by the Lincoln-based Engineering team.

Redback spider DNA discovered in katipo spider

The katipo may now be safe from humans following recent changes to the Wildlife Act, but a larger threat is looming for this endangered New Zealand spider.

AgResearch scientist and spider expert Dr Cor Vink says his research shows there is redback spider DNA in katipo spiders in areas around Gisborne.

"Previous lab research has shown that interbreeding can occur when redback males mate with katipo females. However, this is the first time we have found evidence of this in the wild," says Cor.

Redback spider populations are already established in New Plymouth and Central Otago around Bannockburn, Alexandra and Wanaka. Redbacks, and the related black widow and brown widow, are frequently intercepted by MAF at the New Zealand border.

Cor's research, which is currently in review in the international journal *Biological Invasions*, is focused on modelling the preferred climate of redbacks. From this he can predict what climates in New Zealand will suit the unwanted Australian visitor.

The redback venom is highly toxic to humans, causing severe pain, hypertension and vomiting. "You're not likely to die, but you'll feel like you're going to," says Cor.

Katipo bites are also "extremely" painful, and while some people are at risk of developing complications, it is unlikely to be fatal. The only recorded deaths due to katipo bites were of two children, both before 1840.

Katipo spiders, which only live in a narrow 200 m strip along the coast, face extinction from declining habitats



Spider expert Dr Cor Vink hopes to stop the redback spider setting up home in New Zealand.

as people remove driftwood from beaches and invasive weeds provide inappropriate vegetation on sand dunes.

The recent changes to the Wildlife Act mean that katipo spiders now have absolute protection with the maximum penalty for killing a katipo a \$100,000 fine or a year in prison. This puts the venomous spider alongside kereru and kiwi on the protected species list.

"It's impossible to determine how many katipo there are in New Zealand, but

their numbers are declining," says Cor. He says, however, that extinction by interbreeding could be a greater threat to katipo than humans and habitat loss.

Cor believes biological control could be an alternative, but without more research on these two spiders he says, "the katipo as a species might one day no longer exist."

cor.vink@agresearch.co.nz

Toxic grass to stop bird strike at airports

Some lateral thinking has seen AgResearch Scientist Chris Pennell broaden his application of animal unfriendly grass from airports to golf courses, kiwifruit orchards and vineyards.



AgResearch's Chris Pennell trials different fescue and ryegrass cultivars to establish the most favourable grass seed that can be used for bird avoidance at airports and at other recreational facilities such as golf courses.

After a close encounter with a bird strike while on a flight to London several years ago, Chris investigated using toxic endophytes in ryegrass and fescue for wildlife management. His idea was to create a grass that could be used at airports to keep birds away from the area and reduce the risk of bird strike, a \$1.5 billion challenge to the aviation industry annually.

Initial trials of forage grasses, inoculated with endophyte strains with high levels of ergovaline and loline alkaloids, proved successful in reducing insects and birds at a New Zealand airport. With the positive results of this early work, two turf species of grass have been inoculated with endophyte technology for wildlife management. Jackal, a tall fescue, with AR601 and Colosseum, a ryegrass, with AR95 are now on the market through PGG

Wrightson Seeds. The tall fescue was chosen for airfields and is being trialled at major airports in New Zealand.

The ryegrass with AR95 should have applications in wildlife management for the golf and recreational industries, where faecal contamination from birds can be a problem.

"Once it was proved that the endophyte technology worked to reduce a number of insects," says Chris, "I wondered if there wasn't a way it could be extended and delivered in a range of applications across the recreation and horticulture sectors.

"After all, if you've developed an endophyte-containing grass which insects avoid, leading to fewer insects in the grass, then why can't you use the grass in orchards or vineyards

where insects are a problem?"

Chris developed a technique to extract the water-soluble loline alkaloids, which have natural insecticidal properties, from the endophytic grass seed. Chris has already tested his hypothesis on lettuces, potatoes and cabbages against insects like aphids and grass grubs.

"Turf clippings from the swards of the grass should contain the compounds to make a natural insecticide," he says.

While there have been some early successes, even if it proves possible to transfer insect-deterrent bioactives to non-endophyte plants, it will be important to ensure that nothing unwanted enters the human food cycle.

chris.pennell@agresearch.co.nz

AgResearch scientists make their mark around the world

There are plenty of 'tall' tales to tell about AgResearch Forage Improvement Scientist Dr Phil Rolston and this picture is definitely worth a thousand words.

Phil has become a familiar figure around the Guizhou Province, a region in China he has visited regularly for the last 27 years. This photo was taken of Phil with three local women during a roadside break while he was on a recent trip with Tim Harvey of Massey University. Phil and Tim spent three days with New Zealand Embassy staff from Beijing (Ambassador Karl Worker and 2nd Secretary Alexandra Peirard) visiting 'young animal raising' project demonstration villages. He also visited Guizhou University and discussed New Zealand's future relationship with the Guizhou region. Phil and Tim ran two workshops on pasture, feeding and raising cattle and goats which were attended by 90 technicians from 43 counties plus trained local farmers.

phil.rolston@agresearch.co.nz



Awards recognise AgResearch scientists

Dr Dave Leathwick

AgResearch parasitologist Dr Dave Leathwick is the newest recipient of the prestigious 2010 McMeekan Memorial Award. Dave's work in parasite management and drenching practices, including the use of adopting combination drenches and the use of refugia to manage parasites, sees New Zealand lead the way globally in the fight against drench resistance in worm populations.

dave.leathwick@agresearch.co.nz

Dr Liz Wedderburn

The Scottish Agricultural College (SAC) has awarded AgResearch Principal Scientist Dr Liz Wedderburn, a five year visiting fellowship. Liz says she will use the opportunity to continue the collaboration with SAC towards strengthening the resilience in rural land use and associated communities which contributes towards AgResearch's 2020 Science goal of supporting agriculture and its communities.

liz.wedderburn@agresearch.co.nz

Dr Derek White

Dr Derek White, Principal Scientist for AgResearch's Forage Biotechnology Section has been appointed Adjunct Professor at Massey University's Institute of Molecular BioSciences. The appointment will strengthen links between the two institutes and Derek hopes to involve both AgResearch and Massey University researchers in the study of characteristics useful to a wide range of plant-based industries.

derek.white@agresearch.co.nz

Work at Tokanui Dairy Research Farm progressing well

The role environmental and genetic influences play in milk production are under the microscope at AgResearch's Tokanui Dairy Research Farm near Te Awamutu in the Waikato.



influences. Epigenetics looks at how environment and genetic information encoded in an animal's DNA together influence different traits.

"It's well known that factors such as nutrition and hormones influence the number and activity of the cells within the mammary gland that secrete milk proteins, which in turn influences levels of milk production," says Kuljeet.

"In this case we're testing how nutrition affects the foetus during pregnancy. The testing looks at permanent effects on lactation performance of the daughter during her lifespan, and whether effects may be passed onto the daughter's offspring. The results could have a significant effect on livestock management."

Peter Benfell, Science & Technology General Manager - Agriculture & Environment, says while the results of the two milk production trials will only be known next year, the progress made so far indicates there is capacity for more related research projects that can benefit farmers and the dairy industry. "Over the coming years Tokanui will prove to be a major asset for pastoral research in New Zealand. Not only is there a large pool of cows to select from, but this research and development facility has been designed to carry out focused studies."

The projects have both entered the data and sample analysis phase with results expected in 2011.

adrian.molenaar@agresearch.co.nz
kuljeet.singh@agresearch.co.nz
john.siemelink@agresearch.co.nz

Two milk production trials are underway as part of a programme funded by the Foundation for Research, Science and Technology. Both trials are studying the influences on molecular functioning of the mammary gland and how it regulates milk production in cows.

Dr Adrian Molenaar heads a project looking at 'lactation persistency', the volume of milk produced by cows over the whole season.

"By-and-large cows in New Zealand show poor lactation persistency, which cannot solely be explained through nutrition. However, some cows are more persistent than others and we have

selected two herds of cows, one group more and one group less persistent, for more intensive study to try and find out why they are like that.

"Performance can also be influenced by different management practices such as milking frequency. Our goal is to understand the local mechanisms within the udder that regulate persistency and use these to develop novel strategies and/or technologies to enhance productivity," says Adrian.

The second milk production trial, led by Dr Kuljeet Singh, is an epigenetics study to understand how the mammary gland responds to different environmental

The Singing Scientist returns

Dr Matthew Barnett – Senior Scientist in AgResearch's Agri-Foods & Health Section who found TV and radio fame in 2009 with the Epigenome Song, has written a second song based on his scientific work, this time about Fibre.

'I Love Fibre' has debuted on Radio New Zealand's Our Changing World and in live performances to the Nutrition Department at the University of Auckland. The University will use the song in Nutrition courses led by Dr Clare Wall and Prof Lynnette Ferguson.

Matt's nutritional research sits under the umbrella of Nutrigenomics New Zealand, a collaboration between AgResearch, Plant & Food Research, and the University of Auckland. Funded by the Foundation for Research, Science and Technology, the group aims to determine how foods and food components affect health at the molecular genetic level.

Matt says that while his first love is rock he decided to stick with a country theme this time because it worked pretty well for the Epigenome Song. "Plus it gave me the chance to dress up in checked shirts and a flax hat".

To enhance its use as a learning tool, Dr Clare Wall had asked that the song include some specific references, such as soluble vs. insoluble fibre, and beneficial effects for heart health. "Obviously you can't have a piece referring to fibre without mentioning bowel movements (done in the best possible taste, of course)."

The Epigenome song from 2009 has had over 7,000 views on YouTube, including a request for a Paris concert, and sincere thanks from a range of students.

For more information contact matthew.barnett@agresearch.co.nz



[To see Matt's *I love fibre* song and music video](#)

[CLICK HERE](#)



[The Epigenome Song is still attracting viewers](#)

[CLICK HERE](#)



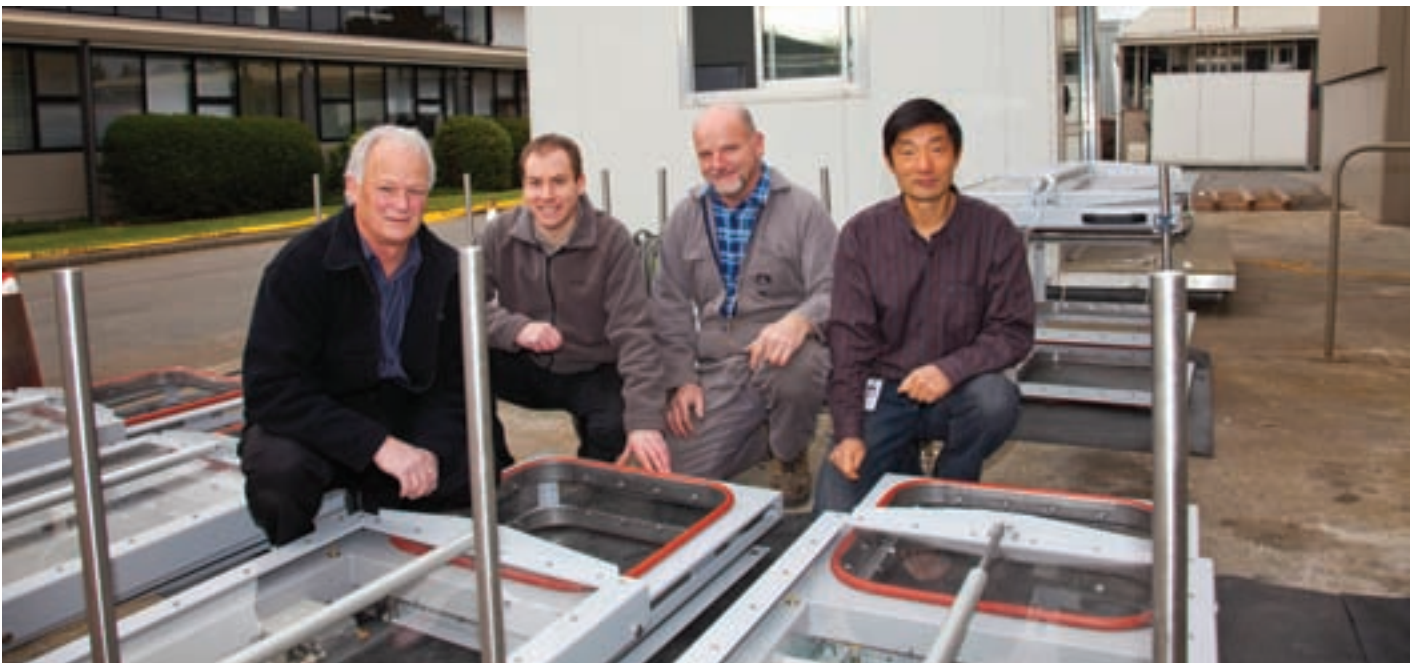
New Farm Manager

Tokanui Dairy Research Farm has recently appointed John Siemelink as Farm Operations Manager. John ran farms for seven years with DairyNZ but more recently has returned from running a 1,100 cow farm in the United States.



Mobile technology advances greenhouse gas monitoring

AgResearch's development engineers have followed up their successful Gypsy Moth mobile greenhouse gas technology (see intouch December 2009) with a second-generation unit.



(from left) Steve Gebbie and engineering team members Scott Sevier, Robert Wood, and Hong Zhang with the second-generation greenhouse gas emissions unit the AgResearch team built for CRI Plant & Food Research. (Absent Bruce Jessep.)

The Lincoln engineering team has built a set of chambers linked to a Portahut that can be moved to different paddocks as required by the scientists. The unit has been bought by Crown Research Institute, Plant & Food Research.

Chambers with automated lids are placed in cropping paddocks. The lids on the chambers open when it rains and close to

collect nitrous oxide. Sealable extensions enable the chambers to be lifted higher as crops grow. Samples of the gas are pumped back to the analyser in the hut, where repeat measurements allow a calculation of the nitrous oxide emitted from the soil.

Engineer Steve Gebbie says the development projects have been

successful because of the willingness of scientists to share experiences and technology. "Most projects development engineers undertake are one-offs. It's nice to get a repeat project where we can include improvements resulting from feedback from the research team using the equipment."

steve.gebbie@agresearch.co.nz

■ to contact intouch:

Intouch Editor: Allanah James
AgResearch Corporate Affairs Manager

Phone: (03) 321 8823

Email: allanah.james@agresearch.co.nz

Website: www.agresearch.co.nz

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