

Research and tech push on

In the second of a two part series **Richard Rennie** reviews progress with some of the science and technology covered in *Farmers Weekly's* New Thinking pages over the past two years.

Laser target on gases

SINCE installing \$250,000 worth of laser equipment in a Waikato paddock over two years ago Waikato University researchers have become adept at getting their money's worth out of the expensive kit.

The Quantum Cascade Laser (QCL) sitting in the Matamata paddock continues to help the scientists get a better picture of how greenhouse gases, particularly nitrous oxide, behave in a real-time, real-farm setting.

The machine's ability to measure gas levels has been proved over the past two years and now scientists are using it to analyse how gas levels can be manipulated and reduced, in keeping with the very real demands the Zero Carbon Act requires of pastoral agriculture.

Echoing Ernest Rutherford's mantra "We don't have much money so we need to think" Professor Louis Schipper says the scientists have found they will be able to get the one expensive machine to do two jobs.

"By placing the machine on the mid-point of a north-south line we now have a ryegrass/clover mix on one side and on the other side a sward with about 30% plantain.

"Depending on wind direction we can then analyse the gas levels with the QCL, and determine if the plantain sward generates less nitrous oxide than the conventional pasture."

Plantain has been intensively studied over the past two years for its potential nitrate and nitrous oxide-reducing properties and forage scientists have found a 30%-plus concentration of the grass might significantly reduce losses.

"If we can prove this is the case at paddock scale by measuring the nitrous oxide emissions we hope to also tell how great those reductions are. We can then look at farming responses such as grazing methods and management of that pasture."

The researchers have also been able to adapt the QCL to be an in-field diagnostic tool, capable of measuring micro-samples of gas emissions from small areas in the field, eliminating the need to send the samples to external labs for analysis.

Schipper said the ongoing support of the Troughton family whose property students and scientists regularly traipse over continues to be a big part of the project's success and promising future work.

"We expect that in about a year's time we should have some results to give us some really valuable



AT WORK: AgResearch's laser machine testing a paddock for greenhouse gases.

“ Chinese palates tend to detect the sourness of fermented products more sharply. ”

Dr Li Day
AgResearch

insights about where we can go with plantain from here.”

Riparian value nailed

In the two and a half years since Niwa set out to survey riparian plantings farmers have put in many more thousands of kilometres of fencelines and millions of trees.

This first line of defence for pastoral farming in controlling nutrient and sediment losses is now firmly included in the national freshwater proposals.

Meantime, Niwa ecologists have found before riparian strips can be surveyed for their effectiveness the tools needed to measure that effectiveness had to be upgraded.

"So, in this time we have been working on our stream health monitoring and assessment kit (Shmak), adding in new variables and tools for measurement of stream health and different levels of test types depending on what you can commit to and how advanced you wish to be," freshwater ecologist Elizabeth Graham says.

The upgrade has been timely, given the broader measurement tools likely to be required by the Government in the latest freshwater package.

Recognising having hundreds of riparian sites around the country

to measure could prove a big ask Niwa staff are instead selecting about 50 around the country, building sampling hubs from which a subset will be sampled regularly.

"These will be based in areas where there have been a lot of plantings and are accessible."

They are likely to include Waikato, possibly Taranaki-Manawatu and sites in the South Island.

"But we are still open to hearing from farmers who may be interested in participating. We are planning to start this summer to visit all 50 sites and assess them."

The researchers hope to determine how riparian plants' age, height, density and type work together to make the planting effective.

"We are hoping to have some definitive figures to be able to recommend to farmers on future plantings."

Fermentation research bubbles on

While kefir, a fermented milk drink might not be for everyone, a growing consumer interest in fermented foods is continuing and AgResearch scientists are at the forefront of identifying new versions of this age-old practice.

Dr Li Day and her colleagues' work on the step change in food fermentation project includes research partners the Riddet Institute, Callaghan Innovation, Teagasc of Ireland, the University of Bologna in Italy and Japan's Kyoto University.

In the past couple of years they have started to build a collection of new bacteria cultures suitable for

fermenting foods, including those discovered by AgResearch and some from industry partners.

"AgResearch already has a seed and plant bank at the Margot Forde Germplasm Centre. This would be an extension of that," she said.

In keeping with their original aims to identify more indigenous cultures the scientists have also been working with iwi groups and associated food and beverage companies.

Traditional fermented products like kanga pirau (Maori porridge) have featured in NZ's culinary past, and might offer some new opportunities to markets interested in food provenance and history.

Partnering with dairy companies, the research has already found its application in improving the quality and sensory

attributes of NZ-produced dairy products for target export markets.

"Research around developing new meat products is also gathering pace to transform low-value meat cuts to high-value charcuterie products for export." The researchers have also learnt more about differences in tastes between New Zealanders and export countries.

"Chinese palates tend to detect the sourness of fermented products more sharply and don't like it as much. They prefer a more savoury and sweet taste so the challenge is to find a culture or method that can help develop that."

Day says the researchers hope to maintain their momentum in the study of a food process that continues to experience strong growth in almost every global market.

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