Discovery

Searching deep for microbes

The role of microbes in producing methane is being studied by an Irish scientist, writes **Jarrod Booker.**

Sinead Leahy is part of an international project led out of AgResearch, called Hungate1000.

While science is helping us discover vast new worlds beyond our own, the worlds explored by Sinead Leahy are far too small to be seen by the naked eye.

This world of microbes – tiny bugs such as bacteria that could fit by the millions in the eye of a needle – are all around us and keep the planet functioning. For Leahy, a senior scientist at AgResearch, her focus over the last decade has been on the complex world of microbes in the stomachs of ruminants like cows and sheep – and the huge implications these tiny single-cell organisms have for both New Zealand's economy and environment.

"We know so little about this microbial world, because people don't see it and they don't realise how important it is to us in New Zealand. It's only recently that we have started to get DNA sequencing technologies that allow us to study these worlds with new insight," Leahy says.

"The microbes in the sheep or cow's rumen (a chamber of the stomach) powers the animal by allowing it to break down the grass it eats, and gives us the products like milk, meat and wool that New Zealand sells to the world."

Paris climate talks: NZ agricultural greenhouse gas emissions a tough nut to crack

It is not only the size of the microbes in the rumen that makes them difficult to identify and study, it's also the environment they exist in – without oxygen – and the highly complex roles they play, and how they interact with each other.

Irish-born and raised Leahy, alongside her colleagues in rumen microbiology at AgResearch, has spent the last decade in New Zealand learning more about these microbes, to help farmers produce healthier, more productive animals and lift New Zealand's economy.

But the potential is also huge when it comes to methane gas produced by the animals, given that methane is the largest contributor to New Zealand's greenhouse gas emissions.

As scientists at AgResearch and elsewhere press to find ways to reduce the amount of methane produced – including potential for a methane vaccine – Leahy says the role of microbes here is crucial. By learning more about the microbes that are part of the process of producing the methane in the animals, there is the opportunity to find new ways to address it.

Leahy was part of an international project led out of AgResearch, called Hungate1000, in which the genomes of hundreds of different microbes from ruminants from around the world were mapped to provide an important resource for researchers globally.

AgResearch scientists Sinead Leahy and Christina Moon in the laboratory.

While New Zealand should be proud of its rugby players and rowers, they should also recognise that in areas like rumen microbiology, New Zealand is a world leader, she says.

Though she and her Irish-born husband are now also New Zealand citizens, along with their two New Zealand-born children, there is no question where her loyalties lie when it comes to the rugby arena. She looks back on the famous Irish victory over the All Blacks in Chicago last year as "one of the greatest days of my life".

"It was a long time coming. After all the pain of the last 10 years, I finally got to come to work in my Ireland jersey and lord it over everyone for a change."

Leahy, 38, was one of nine children growing up in the Irish township of Bilboa – she had more siblings than there were pupils in her primary school class. Her grandfather's small farm nearby had her exposed early to rural life – "we grew up with milk straight from the cow".

Her family was very strong in mathematics, and she remembers telling them at a young age she was going to be a researcher.

"I remember in primary school a teacher turning water with different colours with dye. It basically set me on the path from there."

After completing her PhD in Cork, Leahy arrived in New Zealand in 2006, for what she told family and friends was part of a two year adventure around the world. After landing the job at AgResearch, and becoming attached to the work, her team, and the lifestyle, she decided to stay.

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> SINEAD LEAHY

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While retaining her position at AgResearch, Leahy has recently taken up a new role of International Capability and Training Co-ordinator for the Government-funded New Zealand Agricultural Greenhouse Gas Research Centre (NZAGRC).

The role will support the goals of the Global Research Alliance on Agricultural Greenhouse Gases, an initiative supported by the New Zealand Government to increase collaboration between countries to reduce the emissions intensity of food production. One of the objectives of Leahy's role is to engage scientists and policy audiences in the developing world on why lowering agricultural greenhouse gas emissions intensity (the emissions per kilogram of meat, milk, vegetables or grains) is important for their agricultural production.

"It's something I haven't done before, working on that interface between governments and the science, and the area of developing policy," Leahy says.

"It's vital to have that policy in place if you want to make real change, and for that policy to be built on quality science."