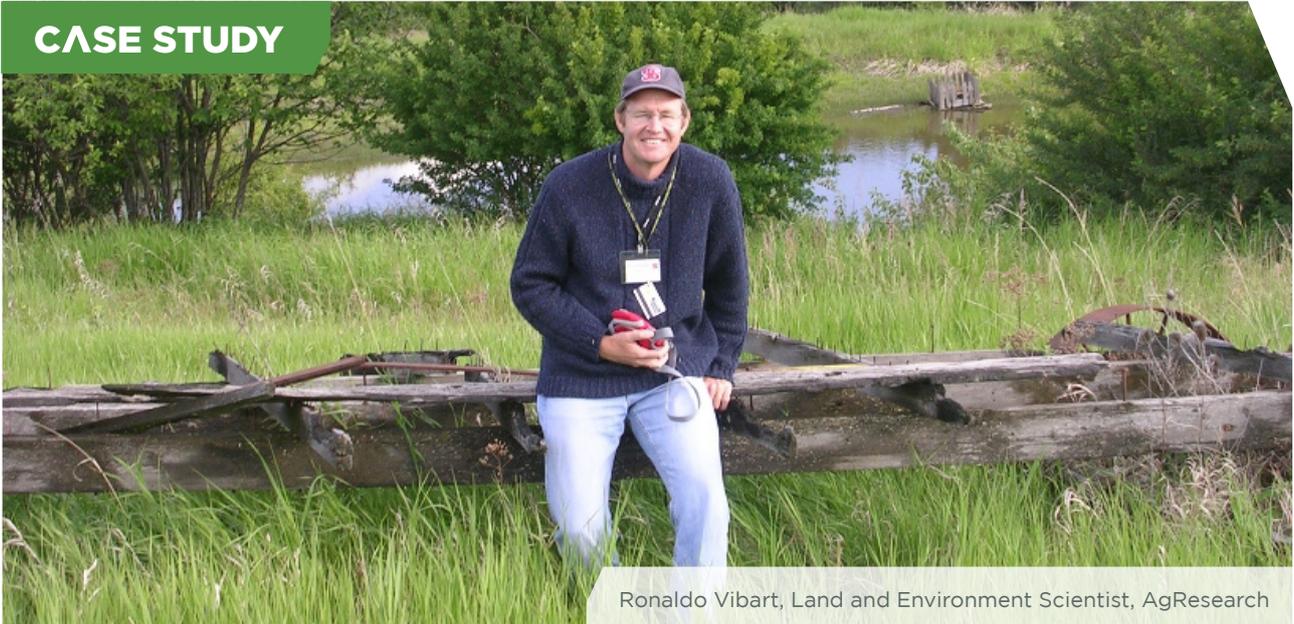


CASE STUDY



Ronaldo Vibart, Land and Environment Scientist, AgResearch

PUTTING A FARM ON PAPER

AgResearch is one of New Zealand's leading crown research institutes focused on supporting the country's pastoral sector through scientific research and development. With the sector generating export revenues in excess of \$18.6 billion annually, AgResearch plays an important role in helping drive innovation through research and transfer of technology and knowledge, in partnership with key stakeholders.

AgResearch scientist Ronaldo Vibart is part of the organisation's 'Land and Environment' group and works in a team called 'Sustainable land use and global change.'

The scientists in his group work across a number of disciplines including soil and land use, nutrient management, water quality, greenhouse gas emissions and mitigation, climate changes and adaptation, and environmental footprinting.

Ronaldo describes how he uses FARMAX on a day-to-day basis as a research scientist.

"We analyse pastoral land use and land management in relation to environmental impacts and climate change," says Ronaldo, who describes himself as a farm systems analyst.

"We aim to improve dairy, beef, sheep and deer production systems by carrying out innovative research on soil and water management, pasture fertilisation and farm nutrient management. Our team is working on solutions to reduce negative impacts on the quality of soil, water, atmosphere and ecosystems. My role is to interpret these production systems, as best as possible, using models that simulate farm-scale operations throughout New Zealand."

Ronaldo uses two farm-scale simulation models to

carry out this work - FARMAX and Overseer. Both software systems are the original brainchild of AgResearch scientists and now widely used by farmers and rural consultants across the country.

With a background in dairy pasture-based nutrition as well as agronomy, Ronaldo uses his expert knowledge to scale up the component research to on-farm systems.

"My dual background gives me scope to work across both the nutrition and agronomy aspects of a farm, which can be quite handy when it comes to interpreting what it looks like on paper.

"...One of the most useful features of the FARMAX system in the environmental science field is its ability to capture a farm setting and 'put it on paper'..."

"We need to be able to decipher what's happening and run a few scenarios to look at production and environmental outcomes. FARMAX provides the farm setting - the financial and biophysical parameters - and I then feed that into Overseer, which gives me the environmental outcomes."

He describes FARMAX as a "natural and instinctive tool" to use if you're trying to capture some of the dynamics of farming and says he uses the system in three different ways.

FUTURE PLANNING FOR EFFICIENT FARMING

Ronaldo and the team recently carried out a climate change project, looking at Southland, Hawke's Bay and Waikato sheep and beef farms, specifically.

"By coupling the information NIWA provided us with forecasted weather trends, we were able to develop pasture growth curves for individual years between 1980-1999 and 2030-2049, based on rainfall, radiation and other factors," tells Ronaldo.

"By having weighted average growth rates, we were able to see what the *past* pasture curve looked like for

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particular regions, and what the *future* pasture growth rate might look like with environmental factors included, such as an atmosphere high in CO₂ - and then compare the two.

“I then used FARMAX to adapt a farm system hypothetically with the pasture growth curves in mind, so we were able to make a number of adjustments to adapt our farm to future growth rates and analyse the resulting financial impacts.”

PUTTING A FARM ON PAPER

Ronaldo says one of the most useful features of the FARMAX system in the environmental science field is its ability to capture a farm setting and “put it on paper.”

“We were asked to develop farms that were highly profitable but low greenhouse gas emitters. Once we identified these farms, we interviewed the farmers, toured the farms and used FARMAX to capture their land resources, livestock and management policies.

“We then put that information into Overseer to see whether the farms were producing emissions as we thought they were, or not. It was a fascinating process; we ended up choosing four dairy and four sheep and beef farms from throughout the country as case studies.”

CAPTURING THE DYNAMICS OF LAND WITH ACTUAL SURFACE INFORMATION

“What I’m after with FARMAX is gauging whether farms are biologically feasible - the feasibility comes from matching what is demanded by livestock and what are we supplying in terms of feed energy - if it measures up or if we are going to have a shortage, or excessive growth by under-utilising our pasture,” says Ronaldo.

He tells of another study that tried to determine what the average farm looked like for particular regions.

“We integrated FARMAX information with geo-spatial information where we were able to take the actual farm and put it into a grid of farms for the region and then apply some of the

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RONALDO’S TOP FOUR FARMAX BENEFITS:

- 1. Biophysical:** The model captures the biophysical essence of a pastoral farm or farm system.
- 2. Farm viability:** It assesses farm viability by matching feed supply with feed demand; the available graphs are good at pointing this out.
- 3. Blocks:** You can create blocks that are different from other land blocks. Although these blocks of land cannot be managed independently, this is still a good feature of the software.
- 4. Financials:** The financial data is updated regularly and provides a good comparison tool (across scenarios or farm practices tested).

social interactions of these farmers.

“By doing that, we had a mass model which came in very handy to assess some of the regional nutrient losses and potential policies that could be applied to slow them down.”

Similarly, about four years ago, when the emissions trading scheme was a hot topic, Ronaldo carried out a simulation to investigate carbon balancing and the extent different forest blocks would counter-balance emissions from livestock.