

Wise Use of N-Fertiliser on Hill Country Pastures

WiseN Up!

Water Quality in NZ Streams—What Do We Know?

Special points of interest:

- The Pastoral Greenhouse Gas Research Consortium and MWNZ are now key funders of the project
- The next Annual Project Conference will be held on the 6th March 2006
- FAQs 4 & 5 are now available



Inside this issue:

- Additional Funding Granted From the Pastoral Greenhouse Gas Research Consortium and MWNZ **2**
- 2006 Annual Conference Set to be a Scorcher **2**
- Focus Farm Feature—Dovedale **3**
- Sound Bite—Andrew Burton, TDC **4**
- Did You Know? **4**
- AgResearch Scientist Profile—Tom Fraser **4**

A national study completed by Scott Larned and his NIWA colleagues in 2004, showed that river water quality in NZ is at great risk of impairment in low elevation catchments.

Data from 15 surface-water monitoring programmes NZ-wide was collected over a 4-year period from 1998-2002 and the study considered parameters such as biological health (E. coli levels), nutrient status (nitrogen and phosphorus levels) and physical indicators of water quality such as flow, temperature, clarity and conductivity.

Results showed that median concentrations of dissolved inorganic nitrogen, dissolved reactive phosphorus and E. coli, all exceeded the guidelines recommended for the protection of aquatic ecosystems and human health. In addition, flow rates were decreasing, and temperature and conductivity were trending upwards – indicating a steadily decreasing level of water quality. The only improvement was a weak trend in increasing clarity, but the reasons for this are unknown and probably related to climate patterns.

The assessments were taken on four land-cover classes - native forest, plantation

forest, pastoral and urban. Biological and nutrient concentrations which included nitrogen status were 2-7 times higher in the pastoral and urban classes than the forest classes and water clarity was 40-70% lower.

Pastoral and urban land use clearly contributes to the degradation of NZ freshwater streams in lowland regions, but what can we expect to happen in hill country zones? It is known that water quality in intensively farmed pastoral areas is generally poorer than in extensively farmed catchments. This would suggest that less intensively farmed, less populated hill country areas are probably on the safe side of the ledger in terms of water quality, however this may not last.

From 1985-2002, beef and sheep farming intensified considerably. Per animal performance increased (through improved genetics, health and nutrition), lambing percentages increased from 100%

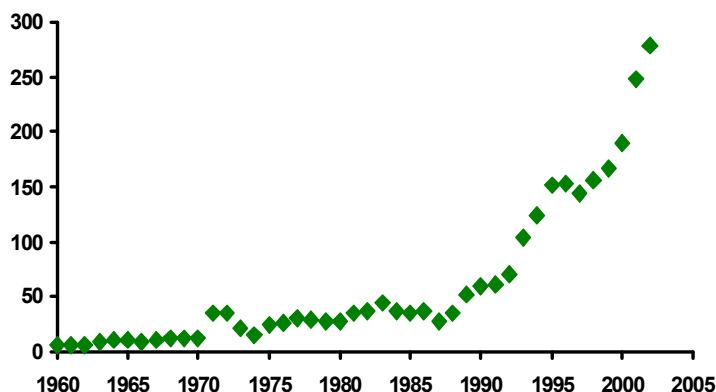
- 116%, average lamb carcass weights increased from 12.5kg – 16.7kg and farmed land area dropped by 7%. All of these factors put natural resources under pressure. In addition, the trend to intensify continues as producers carry on looking for ways to increase production and enhance economic performance.

The application of N-fertiliser has been one of the methods used to improve performance. The rate of N-fertiliser use in New Zealand has increased almost exponentially over the past 20 years as demonstrated by the following graph. Although a majority of this increase has occurred in the dairy sector, hill country farmers are becoming more and more interested in the strategic use of nitrogen.

The Wise Use of N-

Fertiliser on Hill Country Pastures project will look more closely at the actual environmental consequences of N use on hill country and will seek to help farmers understand better the effects of intensifying their operations in this manner. The environmental aspects of the project are one of the key areas of research and project participants are actively helping to find the answers to some hard questions. The first set of results from the Ballantrae and Invermay trial sites will be available at the March 2006 conference as will objective information from several of the focus farms. You are encouraged to contact us with any questions (Project Co-ordinator Clare Johnston on 06 324 7033), or alternatively contact your local farm facilitator about demonstrations in your area.

N-Fertiliser Use 1960 – 2002 (000t)





MEAT & WOOL
NEW ZEALAND



“The contribution of hill country farming practices to New Zealand’s N₂O emissions is not well understood. This trial will provide useful additions to existing data”

*Mark Aspin
Manager of the PGGRC*

Additional Funding Granted From the Pastoral Greenhouse Gas Research Consortium and MWNZ

Additional funding for the next two years has been secured from Meat and Wool NZ (\$100,000 p.a.) and the Pastoral Greenhouse Gas Research Consortium (PGGRC) (\$125,000 p.a.).

MWNZ, along with existing sponsors Fert Research and now PGGRC (co-funded by MAF), will fund the Ballantrae and Invermay trials over the next two years. A majority of the demonstrations already operate on MWNZ funded monitor farms and the additional funding reiterates the importance of such research to the wider industry.

MWNZ Farm Health Portfolio Manager Mark Aspin, says, “This activity will add important information to the debate around the increased use of nitrogen in hill country farming systems. Through the Wise Use of Nitrogen project we believe there is a unique opportunity to assemble all of the relevant information

that farmers need to be taking into account when discussing the merits or otherwise of using N-fertiliser”.

The PGGRC was launched in 2002, to identify, establish and develop on-farm technologies to improve production efficiency for ruminants and, to identify, establish and develop on-farm technologies for sheep, dairy and beef cattle and deer, which lower methane emissions and nitrous oxide from grazing animal systems.

The consortium is made up of members from, Dairy Insight, DEEResearch, the Fertiliser Manufacturers' Research Association, Fonterra, M&W NZ and Wrightson Ltd and AgResearch Ltd. The industry funding contribution is matched dollar for dollar by FRST (the Foundation of Research, Science and Technology).

Current research at the Ballantrae

and Invermay trial sites has involved measurement of nitrate leachate from drainage water, however the PGGRC will now fund the assessment of nitrous oxide gas emissions. The data collected will also contribute to the calculation of the national inventory for greenhouse gas required for New Zealand's commitments to the Kyoto protocol.

Under the Kyoto Protocol New Zealand has committed itself to reducing greenhouse gas emissions to the 1990 level over the period 2008 - 2012. Nitrous oxide is a powerful greenhouse gas that contributes to global warming. In New Zealand, nitrous oxide accounts for about 17% of the total greenhouse gas inventory, and over 75% of this comes from the direct and indirect emissions of nitrous oxide.

The 'Wise Use of N-Fertiliser on Hill Country Pastures' project started in 2004 and will run until 2007.

2006 Annual Conference Set to be a Scorcher

The 2006 “Wise Use of N-Fertiliser on Hill Country Pastures” conference is scheduled to take place in March 2006.

Invited guests from all sectors of the industry have been asked to attend the conference which will be held in Palmerston North. The conference promises to provide a wealth of information from focus farm demonstration results, the Ballantrae and Invermay nitrogen trial results and provocative addresses by Horizons and Environment Waikato.

The project has attracted a significant amount of ‘political’ attention since its inception in early 2004, and Regional Council groups and other environmental agencies have provided some

contentious and challenging feedback. The conference will be an opportunity for the ‘hard questions’ to be asked and for open discussion between the project team and the wider industry.

The 2004 inaugural conference attracted an opening address by the previous Minister of Agriculture, the Hon Jim Sutton. The Minister challenged the industry to get in behind the project and praised the collaborative nature of the project which draws funding from a diverse range of sponsors. He said,

“It is important that we make sure farmers know the benefits and consequences of increasing nitrogen fertiliser use on hill country, both short and long term, and that farmers seek to adopt

practices that minimise the downside.”

Next years opening addresses are expected to be given by Gary Murfitt, farmer and Chairman of Horizons Regional Council. The possibility also exists that a prominent parliamentarian will attend but this is not yet confirmed. Around 80-100 participants are expected to attend the conference, including a mix of farmers, scientists, Regional Council and Federated Farmers representatives and wider industry participants.



The Hon Jim Sutton Addresses the Inaugural Conference in 2004

Focus Farm Feature

Dovedale Community Group, Nelson

Farm Profile

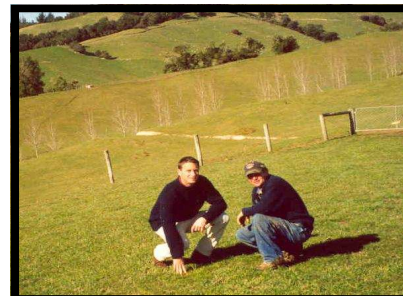
Ashley and Cathy Peters own the Dovedale property on which the “Wise Use of N-Fertiliser on Hill Country” project currently runs. The Peters’ are the current Monitor Farmers for the Nelson area, which is facilitated by Andrew Trolove. This is their final year as the Monitor farm and they will hand over the reins to another group in February 2006.

The Peter’s property is 371 effective ha’s and receives 1100mm annual rainfall. The topography is 18% flat, 71% rolling hill and 12% hard hill country. Average pH, phosphate, potash and sulphur levels in 2005 were 6, 25, 4.8 and 6.3 respectively.

Between 2004 and 2005, one and two year ewes were bought in and mated to a terminal sire ram, with in-lamb or lamb-at-foot ewes traded. In 2006, the Peters’ will start to breed their own replacements, subject to community group feasibility results.

From 2003 to 2005, yearlings and 2yr old bulls were purchased and dairy cattle were grazed. In 2006 100kg weaner bulls and 18 month bulls will be purchased and dairy heifers grazed.

When the “Wise Use of N-Fertiliser on Hill Country” programme was first mentioned, Ashley and Cathy wanted to be involved. Facilitator Andrew Trolove said,



Dovedale Community Group owner Ashley Peters with facilitator Andrew Trolove

“I thought it would be a good opportunity to lift performance on their hill country property plus demonstrate to the wider community that there are positives to applying nitrogen fertiliser”.

2004 Nitrogen Demonstration

The aim was to look at the financial benefit of applying nitrogen fertiliser to boost pasture covers and to carry higher early winter stock numbers, which would then flow through to improved financial returns at weaning. The environmental goal was to ensure that no more than 200kgN/ha was used as part of the trial.

In the first year the area had to be accessible by ground spreader, both in order to get the timing right and to keep costs down. At the end of the winter/spring trial period the area was managed as part of the whole farm.

The 2004 trial was made up of a 5ha trial area which was compared to a 6.3ha control. A total of 129kgN/ha was applied to the trial

area in Aug and Sept. Results are shown in the table below.

The group found that keeping pasture covers in the optimum range (no greater than 2200kgDM/ha) was challenging. Dairy heifers were introduced to achieve this, as it was felt that there was risk adding ewes to the system if it became dry.

2004 Results	Area (ha)	N Applied (kgN/ha)	Ewes/ha	Lambing %	% Lambs drafted at 15.5kgcw on 18 Nov	Net return/ha
Trial	5	129	11.8	139%	26%	\$805
Control	6.3	0	9.2	147%	12%	\$656

The 2004 trial was a learning experience and led to several changes in the 2005 trial.

2005 Nitrogen Demonstration

The 2005 demonstration incorpo-

rates several modifications. This

2005 Trial	Area (ha)	N Applied (kgN/ha)	Ewes/ha
Trial	16.5	144	10
Control	7	0	7.6

includes using more cattle in the system for flexibility and eating ability, increasing the frequency

of N applications, using aerial applications, trialing a bigger area in order to realise management implications, applying sulphur and monitoring feed quality from weaning to December.

One of the key points of interest for Ashley and Cathy is the sustainability of nitrogen use: “How much nitrogen can we put on to be sustainable without stuffing the biology of the soil?.”

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“Soil health and water quality are vital for the wellbeing and the long term profitability of any farming operation.”

Andrew Burton, TDC

Sound Bites

Andrew Burton, Resource Scientist (Land), Tasman District Council

“The Tasman District Council is pleased to be involved with Ashley and Cathy Peters group at Dovedale in helping to assess the effects that nitrogen use on their hill country may have.

Intensification of farming systems is ongoing and science has to keep up if it is to be of assistance. To do this the Tasman District Council have set up a soil health monitoring programme to assess the effect of the additional nutrients and increased stocking rates on the trial block. Also stream health and water quality are being monitored in the stream that drains the trial catchment.

We are looking forward to obtaining robust data to assist the nitrogen group in gauging and assisting in nitrogen use management on hill country.”

Did You Know?

- That responses to fertiliser-N range from 8 to 20 kg DM/kg N applied, and are greater on hill country than highly developed flat land?
- That farmer and trial experience show low-moderate rates of nitrogen (< 80kgN/ha/yr) are profitable in many hill country situations?
- That national N-fixation is estimated at about 1.0 million tonnes p.a?
- That current N-fertiliser application is about 0.35 m tonnes p.a. and trending upward?
- Thus nearly 25% of N inputs to our pastures are now as fertiliser nitrogen?

AGRESEARCH SCIENTIST PROFILE: Tom Fraser

AgResearch Scientist Tom Fraser is currently working with N-project facilitators at the Peters property (Nelson), and the Lissaman property (Marlborough).

Tom has had a ‘long’ history, since joining DSIR Grasslands in 1969 as a technician and moving on to AgResearch as a Scientist in the AgSystems team, in the field of forage evaluation. Much of Tom’s work in this area is looking at the animal performance on improved forages. The main driver in this work is ‘farmers get paid for animal product, not for growing grass.’ So how do you best convert

forage production into animal production?

Tom has recently been involved in the delivery of the ForageMaster workshops to over 50 sheep and beef farmer groups throughout New Zealand. Tom says,

“Nitrogen on hill country pastures should be considered as another management option to best match feed supply and demand. As with many options available to farmers, applying nitrogen to these pastures will only be successful in an economic and sustainable way if all the basics are already in place. These include, pasture species to make best use of the

fertiliser, animals to utilize the extra feed and fences to control the animals. Nitrogen fertiliser in itself will not remedy poor farm management practices”.

Tom is based at AgResearch Lincoln.



AgResearch Scientist, Tom Fraser

The Project Team again wishes to acknowledge the sponsors:

