Waikato Regional Council

Nutrient management

The need for managed nutrient use

GENERAL INFORMATION

Fertiliser is necessary to maintain a healthy, clover-based, pasture-based farming system. With the information from regular soil testing and computer modelling based on over 30 years of soil research in New Zealand, nutrient supplementation of pasture can now be more accurately targeted. This helps make the most use of the money spent on fertiliser for the farm.

Over the last two decades fertiliser and urea use has increased significantly, to support higher stocking rates and higher production. However, these added nutrients (from fertiliser, feed supplements and effluent) used on farm are placing increased pressure on rivers and lakes as the nutrients eventually find their way to waterways. Nitrogen (N) and phosphorus (P) are having the biggest effect. Like pasture on farm, algae and waterweed in waterways use these two nutrients to grow and multiply. The current trends indicate that nutrient use on farm needs to be better managed to maintain our productive base and at the same time preserve water quality, which is essential for all aspects of our lives from the farm to the factory, from home to holiday use.

Applying fertiliser is a permitted activity under regional council rule 3.9.4.11, subject to certain conditions. If applying more than 60kg N/ha, or applying N to any area that has had effluent applied to it in the previous year, farmers must have a nutrient management plan to comply with regional plan rules.

NUTRIENT BUDGETS

A nutrient management plan starts with a nutrient budget. This explains the sources of nutrients and where they are destined. For example, in the first column of the following nutrient budget, N enters the farming system by clover fixation (122kg N/ha) and nitrogenous fertilisers (4kg N/ha). N is recycled in dung and urine, redistributed around the paddock and on the dairy shed effluent area.

It then leaves the farm in the form of meat and milk (51kg N/ha). It can leach to groundwater (20kg N/ha) or escape as a gas to the atmosphere (39kg N/ha). Some N will be immobilised or absorbed as organic matter for use at a later date (16kg N/ha). Following is an Overseer® nutrient budget estimating these inputs and outputs.

(kg/ha/yr)	N	P	K	S	Ca	Mg	Na
Nutrients added							
Fertiliser, lime & other	4	2	26	26	130	23	0
Rain/clover N fixation	122	0	2	3	2	4	14
Irrigation	0	0	0	0	0	0	0
Nutrients removed							
As products	51	9	11	3	13	1	3
Exported effluent	0	0	0	0	0	0	0
As supplements and crop residues	0	0	0	0	0	0	0
To atmosphere	39	0	0	0	0	0	0
To water	20	2.3	25	26	36	3	47
Change in farm pools							
Plant Material	0	0	0	0	0	0	0
Organic pool	16	15	0	-1	0	0	0
Inorganic mineral	0	16	-11	0	-1	0	-4
Inorganic soil pool	0	-41	2	0	84	23	-32

An example of a typical nutrient budget.

P on the other hand arrives mainly in the form of fertiliser. Some P is fixed in the soil, some leaves in milk and meat and some escapes from the farm on the back of sediment, overland to waterways.

Fertiliser representatives or farm consultants can help farmers formulate a nutrient budget using the Overseer® computer modelling programme.

Once a nutrient budget has been constructed, informed decisions can be made about the steps to optimise production and avoid, reduce, remedy or mitigate the effect of these nutrients on the environment. This is the second step and is essential in developing a nutrient management plan.

NUTRIENT MANAGEMENT PLAN PROCESS

A farm map is a good starting point in formulating a nutrient management plan. Identify the different land management units (e.g. the dairy shed effluent area, silage paddocks, hogget block, steep country) and the environmentally sensitive areas (e.g. rivers and streams and their margins, steep slopes, seeps and wetlands).

PROFESSIONAL ASSISTANCE

Farmers may decide to obtain professional assistance with nutrient budgets and nutrient management plans. Fertiliser representatives and farm consultants trained in nutrient management by Massey University's staff at the Fertiliser and Lime Research Centre are qualified to give assistance. They will be certified nutrient management advisors.

SOME EXAMPLES OF WHAT TO COVER IN YOUR PLAN

Assess the risk for each land management unit

- Streams and wetlands are environmentally sensitive areas.
- Stream banks may be eroded by cattle.
- Wetlands can suffer pugging, especially in winter.
- The dairy effluent area may have increasing soil potassium levels which could lead to metabolic problems in cows.
- Staff may allow effluent irrigator to over apply effluent so effluent ponding occurs.
- Steep, low pasture producing slopes may be prone to erosion in storm events.
- Some grazing areas may have higher than optimal Olsen P levels.
- Winter applied N risks being washed off paddock and into waterways.
- The farm may have a high N leaching level.

Plan to actively manage the risk

- Streams are fenced and planted to maintain stream banks, exclude stock from waterways and shade the water to keep it cool.
- Wetlands will be fenced and planted to prevent pugging and stock losses.
- The dairy effluent area may be expanded to dilute the potassium effect on soils and so reduce the risk of metabolic problems.
- Alternatively, maize may be grown on the effluent area to utilise the high soil levels of potassium and N.
- Steep slopes may be retired and planted in production forestry.
- Staff will be trained in good effluent management practices.
- The higher than optimal Olsen P areas will be “mined” until optimal soil test levels are achieved.
- N will be used when grass is growing well and rainfall will not wash it from the paddock.
- Dairy cows will be stood off in the winter and urine collected for land application when soil temperatures are higher and grass can make better use of this nutrient.
- Wetlands will be fenced and planted in the winter.
- The following year the dairy effluent area will be expanded by 20ha with the addition of more effluent pipes.
- Staff training in effluent management will occur in the winter when the cows are not being milked.
- In the third year, the steep slopes will be retired and planted in pines.
- Optimal Olsen P soil test levels will be reached in Year 3.
- In the fourth year, a trial will commence to evaluate maize grown on the effluent area.
- A winter loafing pad for dairy cows will be constructed in Year 4 and connected to the effluent pond.

Remember to set timeframes around each action.

It is important to communicate this new information to staff and contractors and those who will help action the plan.

Re-evaluate plans regularly to ensure adjustments are made to achieve a successful outcome.

MORE INFORMATION

Contact

- Waikato Regional Council
  Freephone 0800 800 401

Publications

Download or order the following publications at **www.waikatoregion.govt.nz/publications** or freephone 0800 800 401:

- Making Dollars and Sense of Nutrient Management. Dairy NZ.
- Farm Enviro Walk. Your on-farm environmental health check list. Dairy NZ.
- Land and Environment Plans (Levels 1, 2 and 3). Beef and Lamb NZ.

Other factsheets in this series:

- Efficient use of phosphorus
- Effluent management
- Environmental hotspots
- Managing soil fertility
- Nitrogen
- Nitrogen leaching
- Soil management
- Waterway management

Web

- www.waikatoregion.govt.nz/ForFarmers
- www.dairynz.co.nz
- www.beeflambnz.co.nz

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