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Fertiliser Matters

New Zealand Fertiliser Manufacturers' Research Association Newsletter

Food export led recovery dependent on fertiliser use

If food exports are to lead our economy out of recession, then farmers will have to resist what is the traditional response when times get lean on the farm, which is to reduce fertiliser application.

Many economists see food exports as this country's way out of the recession, and that view is supported by food commodity prices holding up relatively well on the international market.

However, during the fertiliser sales season covering 2007/08 sales of two of the three key nutrients – phosphate and potassium – declined, while nitrogen use was static.

Anecdotal reports from the companies on trading during 2008/09, suggest that sales during the lead up to autumn, particularly of super phosphate, have continued to decline.

There are suggestions that as many as 70 percent of farmers are putting on less than, what for them would be, 'maintenance levels' of fertiliser and are eating into their 'nutrient bank'.

If this practice continues in spring, or even worse, farmers forgo putting on any fertiliser at all, then production declines are inevitable.

The threat to food production is that New Zealand research* shows that when farmers reduce fertiliser applications below maintenance levels, farm production falls away rapidly. When fertiliser applications are resumed, it can take a number of seasons for production to return to previous levels.

Last season's decline in fertiliser use was attributable to the significant increase in the international prices for fertiliser raw materials, with prices doubling and in some cases tripling in the space of 12 months.

In recent months prices have retreated, but with the economy in such an uncertain state, many farmers are conserving cash and holding back on investing in farm production.

A second season of low fertiliser use has the potential to trim food output at the very time when as a country we need farmers to boost production.

Factors which affect the decline in production from withholding fertiliser use include lower levels of inorganic and plant available nutrients in the soil, and for the pastoral industry, lower redistribution of nutrients through dung to the more productive parts of paddocks.

By years two and three pasture production decreases rapidly, and can fall by as much as 20 percent.

High producing plant species, are more susceptible to withholding fertiliser than less nutritious species such as brown top. These lower value species became well established, resulting in high value pasture taking longer to re-establish itself.

The research also found that ewes on fertilised pasture lactated largely on feed intake, while those feeding on pasture from which fertiliser was withheld achieved the same production through mobilisation of body reserves.

** A series of research projects presented to the 1990 New Zealand Grasslands Association Conference*

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Enabling farmers to get

For the past two decades the fertiliser industry has been working with Government agencies, regional councils and the agricultural sector to develop a range of tools and services that assist farmers to balance the competing needs of farm production and protecting the environment.

These tools and services ensure that when the major farmer co-operatives develop recommendations for farmers for nutrient use, farmers will be as conversant with the impact their decisions will have on the environment, as they will on production.

The ultimate aim is to get farmers to only apply the specific nutrients to their farms needed to meet their production targets, while at the same time preventing soil and water degradation.

The more important of these tools and services are:

Overseer

The tool behind many of the initiatives is a New Zealand developed computer software programme named *Overseer*.

Overseer had its origins in two separate streams of work, one being carried out by the Ministry of Agriculture & Forestry, whose interest lay in sustainability, and the other by Fert Research, whose interest was in the relationship between nutrient use and plant growth.

Both organisations were using AgResearch to undertake and interpret this early research and as the two streams of work progressively overlapped, the three parties, MAF, Fert Research and Ag Research agreed on a joint approach.

Today's computer software programme combines more than 25 years of field trials, intellectual property and knowledge around

editorial

by Dr Hilton Furness – TECHNICAL DIRECTOR

While much has been achieved, still much to do

New Zealand's wellbeing and economic wealth are heavily dependent on the state of our natural environment.

As a people, we are outdoor loving and our way of life is shaped by our urban, rural and wilderness environment, and our interaction with it.

Our environment is known for the richness of its biodiversity, with more than 80,000 species of native animals, plants and fungi. We frequently use images of our stunning landscapes, forests and valuable agricultural and horticultural land to present New Zealand to the rest of the world.

Our land and sea based primary production and tourism sectors place great emphasis on our 'clean, green image', and these sectors between them generate some 8 percent of the country's gross domestic product. Tourism is this country's largest foreign exchange earner, while our agricultural sector is responsible for earning in excess of half the country's export earnings.

Our lifestyles and use of the land all impact on the environment, and this influence is growing as our population and economic activity increases.

The Government, local authorities, organisations involved in primary production, tourism and environmental groups, and individuals all have a vested interest in ensuring that we treat our environment in a sustainable way. Through protecting the environment, we protect our wellbeing and economic wealth.

For the past two decades Fert Research, working independently and also in partnership with the Government, regional councils, primary industry groupings and environmental bodies, has developed a range of tools that contribute to achieving farming sustainability (see section *Focus on Nutrient Management*).

Much has been achieved, but there is much more to do as our knowledge and understanding on the relationship between nutrients, soil, water and plant growth expands.

Fert Research is delivering answers, and remains committed to continuing to work with all interested parties to achieve the right balance between farm production and environmental protection.

on with the job

soil, nutrients, plant growth and farm operations.

Overseer is owned jointly by MAF, Fert Research (representing its member co-operative companies Ballance and Ravensdown) and AgResearch, and it is available for use by all, free of charge.

Based on long-term averages, *Overseer* calculates and estimates the nutrient flows in a productive farming system including outputs which may present an environmental risk.

Understanding nutrient flows enables field staff to develop on-farm nutrient budgets, nutrient management plans and helps identify the risk of environmental impacts from nutrient loss through leaching or runoff and greenhouse gas emissions.

Fertiliser Recommendations

The fertiliser co-operatives have developed a proprietary econometric component which they use in conjunction with *Overseer* to prepare *fertiliser recommendations* for farmers.

Nutrient Budgets

A *nutrient budget* identifies overall nutrient inputs to a farm system such as fertiliser, rainfall, irrigation, nitrogen fixation and supplements, and compares them with outputs in the form of production, transfer off the farm, atmospheric loss, leaching/ runoff and residual soil levels.

They help identify production or environmental risks arising from nutrient excesses or deficits.

Fert Research's co-operative member companies develop nutrient budgets for dairy farmers at the time they prepare their fertiliser recommendations, and explain to farmers the implications of the decisions they make.

The co-operatives are currently working with the country's meat, wool and horticulture farmers to progressively introduce nutrient budgets to these sectors.

Nutrient Management Plans

A *nutrient management plan* is a written document that describes how the major plant nutrients (nitrogen, phosphorus, potassium, sulphur, calcium, magnesium and sodium) will be managed.

The nutrient management plan aims to optimise production and maximise profit value from nutrient inputs while avoiding or minimising adverse effects on the environment.

Information for different nutrient management scenarios can be evaluated before finalising recommendations.

They enable farmers on an individual basis to bring a business approach to:

- Managing their nutrient use to most efficiently meet production targets and desired soil fertility.
- Manage greenhouse gas emissions and the impact nutrients have on water and the soil.
- Meet their Resource Management and Regional Council obligations.

Accredited Advisers

To ensure its nutrient advisers are fully conversant with issues such as the science and research behind *Overseer*, production and environmental considerations in terms of land management, and the practical use of the *Overseer* model, the industry has developed a comprehensive training programme including postgraduate courses in sustainable nutrient management, taught in co-operation with Massey University.

To complete the full training programme takes between 18 months and two years of in-service training.

Elements of the courses cover the Code of Practice for Nutrient Management; fertiliser manufacturing, quality control and storage; soil science; environmental perspectives; understanding and use of *Overseer*; nutrient budgets and audits; pasture and cropping management; farming practices and economics; and nutrient management planning.

Additional elements are being developed to cover greenhouse gas emissions and carbon trading schemes.

All field staff of Fert Research member companies are required to successfully complete the courses.

Nutrient Auditing

Representatives of member companies of Fert Research undertake internal audits of the nutrient budgets, nutrient management plans and fertiliser recommendations made by their staff to ensure correct compliance with company protocols, the application of scientific principles, consistency and accuracy.

Fert Research has commissioned an external, independent audit process to verify the validity of the nutrient budget and internal audit systems. The audits ensure the data input to the *Overseer* computer model is done in a reliable and consistent way nationally, and that confidence can be placed in interpretations and recommendations.

External auditors close the integrity loop around nutrient budgets for farmers, ensuring that the money they are spending on nutrients will deliver their production and sustainability goals, and for third parties, that environmental considerations are being fed into decision making.

Other key management tools that contribute to environmental sustainability include:

The **Code of Practice for Nutrient Management**, which is freely available and contains a wide range of tools for use by farmers, local government planners and associated agricultural organisations. The code enables nutrient use to be managed on an individual, site-specific basis, while adhering to relevant legal and planning requirements and taking account of social, financial (including production) and environmental best practices.

The code is part of a number of quality assurance schemes and regional plans.

Nitrification inhibitors reduce nitrous oxide (greenhouse gas) emissions and leaching losses from animal waste and fertilisers. Gains in dry matter production are also possible from their use.

Member co-operative companies of Fert Research have developed and market proprietary nitrification inhibitors.

World fertiliser production stays marginally ahead of demand

The world's capability to provide the key nutrients to grow sufficient food to meet global demand remains keenly balanced.

While the global demand for nutrients has slowed since mid 2008 as a consequence of the global recession, this has also impacted on the short and medium term development of additional capacity.

A paper* prepared by the International Fertilizer Industry Association (IFA) late last year forecast that for four key product groups – nitrogen (other than urea), urea, phosphoric acid and potash – production supply capability in 2009 would exceed demand by between 4 percent and 6 percent.

It warned, however, that should demand for fertiliser recover world-wide and grow on a sustained basis, serious impacts would arise. Initially, these would be seen in pressure on deliveries and then on supply itself, "since limited new capacity is expected to come on stream in the short term and several medium term projects have been postponed".

Only 12 months ago the United Nations Food and Agriculture Organization** reported that the combination of population growth, the changing dietary preferences of developing nations as they grow more affluent and growing crops for biofuels had led to food prices increasing significantly.

In turn, this had driven up the demand for fertiliser and fertiliser prices, as farmers increased production to take advantage of higher food prices.

At that time fertiliser manufacturers were gearing up production capacity to meet anticipated future demand. Many of these projects have subsequently been shelved through lack of funding or concerns about whether future demand will be there.

In New Zealand during 2008 prices of many nutrients doubled in the space of 12 months, with super phosphate costing around $470 a tonne and urea creeping close to $1000 a tonne in mid 2008.

Today, New Zealand prices have eased, with super phosphate costing around $390 a tonne and urea $650 a tonne.

IFA concluded its report by saying "a significant rebound in fertiliser demand would again stretch the limits of global supply adequacy, especially for potash and phosphate".

* *World Agriculture and Fertilizer Demand, Global Fertilizer Supply and Trade, P Heffer and M Prud'homme, IFA, 2008*

** *FAO (2008) Current World Fertilizer Trends and Outlook 2011-12, FAO, Rome*

Viewpoints…

Production capability

Plots at Rothhamsted Experimental Station in England have been receiving commercial fertilisers since 1843 and are more productive today than at any time in the past. Similar results are being obtained from the plots established in 1876 by the University of Illinois.

www.agroservicesinternational.com

Feeding the world

48 percent of the world's population are fed thanks to the use of mineral fertilisers.

www.efma.org

Cereal output's double impact on environment

By 2030, the world's need for cereals will double. This will have to be achieved by either increasing yields from existing farmland or extending farmland into non cultivated areas.

Of the gas emissions that affect climate, 12 percent are attributable to changes to land use. Any extension of agricultural land will increase this percentage.

www.efma.org

Supporting world's population

Without the use of nitrogen fertilisers the world would support 40 percent, or 2.5 billion people, less than it does now.

www.efma.org

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