

THE JOURNEY TO ACHIEVE
“NUTRIENT MANAGEMENT CERTIFICATION”
AND THE ROLE OF THE FERTILISER INDUSTRY

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Abstract

From its inception in 1947, but particularly since the 1990s, the Fertiliser Industry Association has been active in developing processes to meet the growing demand from its farmer shareholders to improve nutrient use efficiency and lower their environmental footprint. This has led to very significant investments by the Fertiliser Industry in research, capacity and capability initiatives. With support from the dairy industry, the Nutrient Manager Adviser Certification programme was successfully introduced in New Zealand in November 2013. This paper provides an overview of the Certification programme, the purpose of which is: *‘To build and uphold a transparent set of industry standards for nutrient management advisers to meet so they provide nationally consistent advice of the highest standard to farmers.’*

Introduction

Dairy NZ, under their Primary Growth Partnership (PGP) contract with the Ministry for Primary Industries (MPI), engaged the Fertiliser Association of New Zealand (FANZ) to produce a certification scheme for nutrient management advisers. Importantly, guidance and input were sought from a range of sector groups including the New Zealand Institute of Primary Industry Management (NZIPIM), Universities, Federated Farmers, Regional Councils, and environmental NGOs. This paper publically announces the initiation of this programme, and also provides an opportunity to trace and reflect on the many steps the Fertiliser Industry has taken to enable this innovative certification programme to be achieved.

Historic Reflection

I started in the fertiliser industry in 1981 when the nutrient and fertiliser advice I, and my peers, gave farmers was based on farm observations and learned experience. It is fair to say that it was more of an art than a science! Farmer visitation frequency was also low compared to current practices. For example, I was one of three technical staff on the East Coast of the North Island compared to the 16 staff servicing that area now. Consequently we would usually only see our farmer shareholders once every two years.

Fortunately, in 1982, Dr Ian Cornforth and Dr Alan Sinclair produced a book on *Fertiliser Recommendations for Pasture and Crops in New Zealand* that was strongly supported by the fertiliser industry. Essentially, this publication included a set of look-up tables incorporating animal, pasture, and soil loss factors and stocking rates that allowed readers to determine the phosphorus (P), potassium (K) and sulphur (S) maintenance requirements of grazed pastures. This provided a very useful framework for me, as a young graduate, advising farmers on their nutrient needs.

In 1984 the “Computer Fertiliser Advisory Scheme” (CFAS) was initiated. However, it did not work particularly well because of the poor quality of input data by MAF farm advisors and other consultants, and the inability of the centralised computer system to take individual farm financial situations into account. While CFAS represented a more scientific approach it was nevertheless discontinued.

The following year, 1985, MAF invested in summarising all the lime trial findings (SALT) in New Zealand and produced a publication *Lime in New Zealand Agriculture*. This valuable piece of work was later used to inform the Econometric and OVERSEER® models. The same approach was also used to summarise all the P, K and S field trials in 1994; an initiative that was supported by the Fertiliser Industry. Then in 2007 the Fertiliser Industry adopted the same methodology and funded the review of all the nitrogen trials in New Zealand. It has been estimated by MPI that these combined trials represent some \$70 to \$100 million of investment.

The Birth of OVERSEER®

MAF contracted AgResearch in 1994 to produce a nitrogen budget model to report on N losses to the OECD. To do this well, a modelling approach was required and this led to the development of OVERSEER®. The model has had many upgrades through to 2013, culminating in the current OVERSEER® version 6.1. The \$15 million invested over this period by its owners - FANZ, MPI and AgResearch – has enabled OVERSEER® to become acclaimed as a world class model. It incorporates the latest peer reviewed scientific findings and even further improvement will come with future investment.

The OVERSEER® model is unique to New Zealand and enables a farm system for the nutrients cycling in that farm system to be modelled. This includes those lost from the root zone, thus allowing different farm systems to be evaluated as to their nutrient losses relative to any nutrient loss cap. This is consistent with the Resource Management Act (RMA), being an effects-based piece of legislation. The unpalatable alternative that many countries face is an inflexible cap on nutrient inputs.

Like all models, there is variation in the output estimates. At the Horizons ‘One Plan’ Hearing, Stewart Ledgard estimated that “variability in selecting inputs can give differences in N leaching losses in the order of $\pm 20\%$.” This ‘user’ error, generated by the inappropriate selection of input parameters by the OVERSEER® operator, has been largely addressed through the recent development of the nationally agreed OVERSEER® Best Practice Data Input Standards.¹ Another source of error might be referred to as ‘temporal’ error as this relates to confusion and misunderstanding around the long-term average estimates of, for example, N leaching losses produced by OVERSEER® and the actual N leaching losses that might occur from a farm in any given year. These two estimates will, of course, differ for any given year, mainly as a result of annual variations in rainfall from the long-term average. This is, for all intents and purposes, an ‘error’ in the interpretation of OVERSEER® estimates and not an inherent error of the model. Another source of uncertainty in the OVERSEER® outputs can be referred to as ‘model’ error as it is caused by inaccuracies in the equations that drive the model. The source of this error can be addressed through ongoing validation of the model and the timely incorporation of new science into the model.

¹ Published in November 2013 by OVERSEER® Management Services Limited on behalf of the owners of OVERSEER®, ISBN 978-0-473-27104-6

In this regard, you might be interested to note that the FANZ has long invested in the science underpinning these sorts of models. For example:

- In 1992, and also in 2007, studies were conducted into N loss and P loss - the extent and causes in pastoral agriculture - reviewed by Stewart Ledgard and Bruce Thorrold, then of AgResearch;
- Throughout the 1990s the Fertiliser Industry invested heavily in specific research on lime, potash, nitrogen, sulphur and trace elements;
- Industry-funded postgraduate scholarships in the area of nutrients and contaminants have resulted in:
 - 7 projects on cadmium;
 - 14 projects on environmental aspects; and
 - 17 projects relating to animal production.

In 1992, FANZ solely invested in the “Outlook” model; the AgResearch PKS lime model that was the forerunner of the Econometric model. At one point the Outlook and OVERSEER® models (in an early OVERSEER® version) were incorporated together, but were subsequently separated again. The Econometric model, compares fertiliser nutrient and lime investment costs with potential pasture production gains and enterprise product returns to determine the financial impact of fertiliser investment decisions. For example, capital P and lime strategies can be compared financially with maintenance or even complete withholding strategies. The model has enjoyed further investment by the Fertiliser Industry to enable it to become a valuable functional model for our advisory staff to recommend the economically optimal amount of PKS and lime.

Fertiliser Chemical Quality

After the NZ Government repealed the Fertiliser Act 1980, the fertiliser industry became involved, along with Federated Farmers, in self-managing its own fertiliser quality through the Fertiliser Quality Council. This led to the introduction of the FertMark scheme in 1992 which was administered by Federated Farmers. In 2001 the ground spreaders brought the Spreadmark programme into the organisation and it was renamed as the Fertiliser Quality Council (FQC). This administered both the Fertmark and Spreadmark programmes. Aerial application joined in 2006 with an Aerial Spreadmark code being established.

Codes of Practice

In 1998 the Fertiliser Industry led and promoted the *Code of Practice for Fertiliser Use*. This was revised in 2002 to enable fertiliser applications to remain a permitted activity within regional plans. In 2007 the Code was upgraded and renamed as the *Code of Practice for Nutrient Management*.

Delivery Capability

In 2007 the Fertiliser Industry took the lead role in completing nutrient budgets for around 95% of dairy farmers to honour dairy industry obligations under the Clean Streams Accord.

Extension

In the late 1990s the Fertiliser Industry, with initial financial assistance from the then Dairying Research Corporation, crystallised all the information used for producing fertiliser

recommendations for dairy, sheep and beef and arable farmers into easy-to-read booklets. Some 50,000 copies, over several editions, have since been printed and distributed for free.

Audits

The Fertiliser Industry has highly experienced and capable technical staff whose role includes the production of nutrient budgets, nutrient and fertiliser recommendations and nutrient management plans. This work has been undertaken on a planned basis since the delivery of nutrient budgets commenced. Additionally, in 2008, the Fertiliser Industry introduced an external audit programme of nutrient management plans with the auditor, QCONZ, undertaking the audit.

Technical Capability

In terms of technical capability and training, the Fertiliser Industry has been a leader in this area since the launch of the first *Intermediate Sustainable Nutrient Management Course* in 2002. This course is now delivered annually by Massey University. Since 2002, 1118 people have undertaken the course, with a 90% pass rate.

In 2005 the Fertiliser Industry again showed its initiative with the introduction of the *Advanced Sustainable Nutrient Management Course*. This is also delivered by Massey University. To date, 317 people have completed the course, with a near 100% pass rate.

In 2013 DairyNZ and the Fertiliser Industry, with significant input from a range of key Industry people and other stakeholders, developed the *Nutrient Management Adviser Certification Scheme* in New Zealand. The prerequisites for certification include: completion of the two Massey courses in *Sustainable Nutrient Management*; evidence of having completed adequate training in nutrient management; peer and farmer endorsement that the applicant can deliver the required nutrient budget to the expected standard that delivers value to the farmer; and achieving a pass mark in a rigorous scenario-based assessment of technical competence delivered through an online learning management system. Ongoing professional development is also required to maintain certification.

Importantly, at the same time, the Fertiliser Industry led development of the OVERSEER® *Best Practice Data Input Standards* on behalf of the OVERSEER® Owners. These standards were developed with input from a wide range of stakeholders. They represent a consensus of the views of the seven technical expert users. A wider stakeholder advisory group consisting of agricultural industry representatives, regional councils, the Ministry for Primary Industries, the Ministry for the Environment and Irrigation New Zealand have also critiqued and endorsed the Standards.

Where to From Here?

The Fertiliser Industry will continue to build on the initiatives introduced to date. This will include the continuous improvement of OVERSEER® with industry support; updating of the Econometric model; ongoing updating of the *Best Practice Data Input Standards*; expansion of the *Nutrient Management Adviser Certification Programme* to provide certification for advisers specialising in provision of nutrient management plans for sheep and beef and arable cropping properties; and ongoing support for research and PhD students.

Conclusion

The combination of the above innovations, together with the farm records that fertiliser co-operatives hold on behalf of their farmer shareholders, enables robust, repeatable and high quality nutrient budgets to be compiled. These inform the fertiliser recommendations that are often nested within a Nutrient Management Plan.

It is evident that the Fertiliser Industry has taken the lead and significantly invested, over many years, in nutrient management initiatives and practices underpinned by sound New Zealand-specific science for the benefit of the farmers of this country. Many overseas farmers regard New Zealand with envy when they encounter the quality and robustness of the nutrient management advice given to our farmers.