

Identifying current limitations to
achieving optimum nutrient
management practices on dairy
farms

February 2010

NICON RURAL SERVICES

Executive summary

Nicon Rural Services was contracted by Dairy Australia to conduct rapid market research to identify current limitations to achieving optimum nutrient management on dairy farms and to suggest areas of possible future investment.

The market research was commissioned in response to information suggesting nutrients were unevenly distributed across farms, only 30% to 40% of the nutrients supplied were being removed in products (milk, hay, meat) and that most dairy farmers were not aware their soil nutrient levels (Cathy Phelps, Dairy Australia, *per comm.*). This is despite programs like Dairy SAT, the availability of decision support tools to calculate the rate and type of fertiliser to apply to achieve optimum nutrient levels and surveys reporting 95 per cent of dairy farmers conduct soil tests.

A focussed conversation method was used to capture the critical issues that were likely to limit achieving optimum nutrient levels on dairy farms. Twenty eight people were interviewed as part of the market research. The participants represented a broad cross section of the dairy industry and the different dairying regions in Australia. Interviews were conducted by Nicon Rural Services and JTC Rural Facilitation in January and February 2010. Most interviews were by phone, with only four face to face discussions.

A number of reoccurring themes were identified in the interview process.

Farmers want to put fertiliser out, often regardless of soil test information or advice, because they see fertiliser as intrinsically linked to farm productivity and high soil fertility levels as 'an asset'. The exceptions were in Northern Victoria, where farmers were prepared to reduce fertiliser applications as a result of financial pressure and a lack of irrigation water and in Western Australia where reduced fertiliser application rates appear to be the result of a well resourced research and extension program.

The interviews indicated *most farmers did not soil test regularly or strategically* and were more likely to soil test if it was offered as a free service. Farmers also preferred others to calculate their fertiliser requirements.

Fertiliser resellers and consultants were highly influential in the fertiliser decisions farmers made and they used a wide range of methods and tools in calculating fertiliser recommendations. There was no demand for more sophisticated decision support tools. *Ongoing one to one advice* provided by resellers and consultants was pivotal in influencing a farmer's decision to use fertiliser.

Advisors lacked confidence in the target soil levels presented in the Better Fertiliser Decisions project and questioned the ability of national recommendations to apply to their regional conditions.

Nutrient maps had been used in a number of states but *their effectiveness depended on ongoing advisor support*. Treating paddocks with individual nutrient applications was impractical, but having two or three management zones was more realistic.

Dairy factories viewed sound on farm nutrient decisions as important to their business and security of supply. A number of factories had invested in programs to support their suppliers. However most *nutrient management programs were driven by environmental concerns and were not associated with farm business performance*. This created a perception that nutrient management was an add on and not fundamental to the farming business.

Effluent was acknowledged as a nutrient source, but its *utilisation was limited by the availability of water and the cost of infrastructure for storage and distribution*.

Farmers were also *receptive to 'alternative' fertilisers* which were viewed as being more environmentally friendly than conventional 'chemical' fertilisers.

The consensus view was that that *the dairy industry will face increasing regulation* regarding nutrient

management. The fertiliser industry has the Fertcare® program which addresses potential nutrient issues in the dairy industry but it is not currently demanded by farmers or suppliers.

While all people interviewed agreed that there should be optimal nutrient use on dairy farms, achieving this will involve a significant shift in current farming practices and philosophies. The key recommendations to achieve this shift are:

- **Recommendation 1: *Establish localised on farm validation trials in each district, led by key district advisors***
- **Recommendation 2: *Discuss with fertiliser resellers, dairy factories and consultants their requirements to become more actively engaged in promoting nutrient re-alignment, including creating demand for Fertcare®.***
- **Recommendation 3: Explore the refinement of existing activities, in particular**
 - Offer to consultants and fertiliser resellers the opportunity to incorporate the most recent insights from the Accounting for Nutrients program into their local models.
 - Refine and offer a subsidised regular soil testing service based on management zones, through enrolled one to one advisors (fertiliser resellers, dairy factory programs and consultants).
 - Increase engagement through the dairy factories to re-align the nutrient management message with business profit and supply security rather than environmental protection.
 - Explore the potential to link tissue testing of paddocks with excessive soil fertility and animal health issues.
 - Develop and extend lower cost methods of distributing effluent across dairy paddocks.

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1. Background

Nicon Rural Services was contracted by Dairy Australia to conduct rapid market research to identify current limitations to achieving optimum nutrient management on dairy farms and to suggest areas of possible future investment.

The market research was commissioned in response to information suggesting nutrients were unevenly distributed across farms, only 30% to 40% of the nutrients supplied were being removed in products (milk, hay, meat) and that most dairy farmers were not aware of their soil nutrient levels (Cathy Phelps, Dairy Australia, *pers comm.*). This is despite programs like Dairy SAT, the availability of decision support tools to calculate the rate and type of fertiliser to apply to achieve optimum nutrient levels and surveys reporting 95 per cent of dairy farmers conduct soil tests.

Methodology

A focussed conversation method (Stanfield, 1997) was used to capture the critical issues that were likely to limit achieving optimum nutrient levels on dairy farms. Focussed conversation is a semi structured questioning process that not only captures *what* is happening, but enables participants to reflect on *why* certain behaviours, decisions or outcomes may have occurred.

The key areas to explore in conversation were informed by program logic. Program logic maps the cause and effect relationships that are believed to exist from conducting an activity or creating a product to achieving practice change and ultimately a desired outcome. It includes technological and behavioural aspects and helps to focus the investigation on the areas that will be the catalyst to drive change.

Twenty eight people were interviewed as part of the market research. The participants represented a broad cross section of the dairy industry (table 1) and the different dairying regions in Australia (table 2).

Table 1: Participant groups involved in interviews

Participant type	Number
Agriservices (soil testing)	1
Consultants	9
Factory field staff	5
Farmers	3
Fertiliser / Merchandise resellers	4
Government Extension (DPI)	4
Landcare	1
Regional Development Programs	1
TOTAL	28

Table 2: Location of participants interviewed

REGION	Farmer
National	3
NSW	3
SA	2
Subtropical	2
Tas	3
Vic	12
WA	3
TOTAL	28

Interviews were conducted by Nicon Rural Services (Cam Nicholson and Fiona Conroy) and JTC Rural Facilitation (Jennifer Clarke). Most interviews were by phone, with only four face to face discussions. Interviews were conducted in January and February 2010.

Once all interviews were completed, the key issues from the conversations conducted by each interviewer were identified independently of each other. This added a level of rigour and reduced the chance of 'group think', given the limited sample size involved. The issues were then collated, which enabled common points to be explored and areas of difference to be identified.

This report describes the critical issues that were likely to limit achieving optimum nutrient levels on dairy farms. Quotes from participants are presented in italics. The suggested areas of investment are preliminary and additional work is required to explore these options with the appropriate groups. However the suggestions are supported by the insights gained through this market research.

2. Key findings

A number of reoccurring themes were identified in the interview process. They are presented to describe the environment in which the nutrient management program is positioned.

1. Farmers want to put fertiliser out

An overwhelming number of interviewees reported that farmers wanted to put fertiliser out, irrespective of soil tests and advice. Farmers have an entrenched view, established over years of experience and following industry 'best practice' advice, that fertiliser is critical to the performance of their dairy business. The message that fertiliser grows grass, grass is the cheapest feed available and grass makes milk has been the core message in numerous extension programs and marketing initiatives.

Farmers believe that fertiliser, predominantly phosphorus and nitrogen, is critical to pasture growth and remains a limitation to production. *"Their most fertile paddocks grow more, hang on longer, get going earlier in the season and perform better in winter. This tells them that high fertility levels work."*

Many considerations contribute to this view:

- Until recently fertiliser has been a reasonably cheap input.
- Farmers view soil fertility as an asset. Spending money on fertiliser is not seen as money wasted but as both a short term and long term investment. There is feed security by having soil fertility, the equivalent of 'having money in the bank'.
- Farmers are conservative and operate a risky business. In their minds reducing fertiliser inputs adds to the risk rather than lessens it.
- Farmers in recently developed dairy areas (in the 1970s) have strong memories of increasing fertiliser use lifting soil fertility and increasing pasture growth.
- A number of interviewees referred to experiences in New Zealand which reinforced the need for higher soil fertility.
- In some cases advisers were using a maintenance rule of thumb which was based on a New Zealand model.
- Others said the high phosphorous targets Australian dairy farmers aspired to in the past were strongly influenced by the New Zealand dairy industry and followed the *"New Zealand maxim – the more you put on, the more grass you grow."* These references also include the use of New Zealand pasture varieties *"which need high fertility"* and the number of New Zealand dairy farmers who have relocated to Victoria and have a culture of high fertiliser use.

In the vast majority of cases, farm advisors and agronomists reported that farmers would apply fertilisers even if the advice they received suggested that fertiliser was not required. *"Even if you tell a farmer they don't need fertiliser in a particular paddock, you'll find they still put some out - just to make sure."*

2. Regional differences

Interviews highlighted two dairy regions where farmers were developing divergent attitudes towards fertiliser application.

In the Northern Victorian irrigation area, there is considerable financial pressure on farm businesses as a result of low milk prices and a lack of irrigation water. The ongoing drought has meant that

water, not fertiliser, is the factor limiting on-farm production and the feed base on farms has changed dramatically as a result. The change from predominantly permanent pastures to annual pastures in this region has given farmers the opportunity to 'mine' old established permanent pasture paddocks. In some cases these old permanent pasture paddocks had Olsen phosphorus levels of 70 to 80 mg/kg.

This change in mindset has involved Northern Victorian farmers taking 'a leap of faith' and is driven by financial pressure. While the use of phosphorus by these farmers has dropped, the use of nitrogen has increased to boost pasture production throughout the growing season (this increased use of strategic nitrogen throughout the growing season was also reported in other regions).

In Western Australia, a series of ongoing research and extension programs (Vasse Milk Farmlets, greener pastures, Partner Farms and other projects funded through Western Dairy) examined soil fertility and pasture production but involved fertiliser representatives. The establishment of demonstration Partner Farms, where large scale commercial dairy farmers reduced their phosphorus fertiliser applications and monitored the production impact was very informative. These activities coincided with rising fertiliser prices.

"Everyone feared their pasture would crash if they didn't apply P, but the Vasse Milk Farmlets proved that this didn't happen if you had high soil fertility already. The Partner Farmer put these findings on farms. They picked leading farmers and looked at what they were doing - it created a few challenges because other smaller farmers who weren't as technically advanced couldn't keep up because the Partner Farm didn't necessarily represent what they did. You could have a really go ahead farmer in his mid 40s as the Partner Farm, but what they were doing wasn't what a neighbouring farm run by three brothers in a partnership, or a father and son farm could do. There are a lot of other factors at play, but it's important not to forget that for farmers seeing is believing."

The small size of the Western Australian dairy industry meant a well resourced research, extension and demonstration program had an effective reach and significant impact. *"It's been really good because farmers have been able to see the project farms and talk to the owners about what it all means."*

However the result in Western Australia has not been experienced in other dairy regions. In these regions farmers and their advisors fear a 'crash' in pasture production if they don't apply fertiliser. We interviewed farmers and advisors who have had experiences, or heard of other people's experiences, where pasture production has collapsed when fertiliser wasn't applied. Whether this crash was due to declining soil fertility or other factors is unclear, however the farmers and advisors believe not applying fertiliser was the cause. There were also farmers who have experienced poor pastures which they have improved over time with fertiliser and new improved pasture species. These farmers associate the fertiliser with the improvements they have witnessed on their farms and fear their feed base will revert to historical levels if they back off or don't apply fertiliser. *"They don't want to go back to fog grass"*.

Anecdotes of pasture production falling as a result of not applying fertiliser and personal experience have strongly influenced the recommendations some advisors make to their farmer clients. *"We drum it into all our farmers not to listen to anyone who says you don't need fertilisers because your Colwell P is a certain level, because if you don't put fertiliser out then your productivity will fall."*

Advertising associated with new, highly productive pasture varieties which advocate the need for high soil fertility for optimum production also fuels this fear of pasture not performing if fertiliser applications cease or are cut back.

3. Questioning of target soil levels

The general perception is that the information coming out of the Better Fertiliser Decisions project, Ellinbank, is scientifically accurate, but people still have difficulty coming to grips with the revised targets which are significantly lower than previous recommendations. *“Can’t fault the science, the research is technically sound and makes sense, but I still can’t get my head around it.”*

Experience has a large part to play in shaping this attitude. Many farmers and advisors have seen improvements associated with increasing soil fertility and the new message just doesn’t add up with their past experience. High fertility equates to highly productive pastures (as discussed previously).

Many are also sceptical about how it will apply in their region. They don’t believe the national standards are specific enough or relevant to their region or unique farm environment. They want advice that fits *“my soil, in my paddock, the way I farm.”* *“How will the revised targets apply in the irrigation areas?”*, *“it’s too coarse and needs to be far more site specific to be credible.”* *“The levels are based on clover based pastures and we’re predominantly ryegrass.”*

Part of this problem may be because the message from the Better Fertiliser Decisions project differs from the message farmers and advisors believe they have been told in the past. The perception is that the government advisers have moved the goal posts!

The historic message in the dairy industry, which has been consistent for decades, has been the more you put on the more grass you grow. Dairy advisors have encouraged increasing soil fertility for a long time. Such a dramatic change in advice, emanating from the Better Fertiliser Decisions project, would be tantamount to a back-flip and may be seen to undermine their credibility.

Some farmers treat optimum soil fertility levels as the minimum acceptable level. The more is better philosophy was repeatedly encountered during interviews. Soil fertility levels above the optimum were seen as positive: *“more is better”*, *“soil fertility is money in the bank”*, *“an asset”*, *“a little extra is insurance.”*

It is also important to acknowledge when discussing ‘optimal soil fertility levels’ that most farmers have a limited understanding of the existing soil fertility levels on their farms (see later).

4. Appreciating the segments in the dairy advisory community

There are many people working within the dairy industry that provide advice to farmers. Collectively we are calling these individuals *advisors*, but within that sector we have identified four distinct segments.

Fertiliser resellers/agronomists work with individual clients on a one to one basis. Their advice is focused on soils and pasture/crop production. The advice they provide, free of charge, is considered by them as an investment in future product sales. Repeat business is essential.

Whole farm consultants work with individual clients and sometimes with groups of farmers. They have agronomic skills and knowledge, but they take a whole farm systems approach to their work. They are being paid directly for their advice, so meeting expectations means return business.

Dairy company field staff work with all farmers who supply milk to the company. They work primarily one to one with suppliers and sometimes with groups of suppliers. Their advice is broad ranging, but the areas of expertise vary between individuals. Some have specialist agronomic knowledge depending on their background. The advice they provide is an investment by the dairy company in securing and maintaining quality milk supply.

Government advisors, eg Departments of Primary Industries (and universities), tend to be

program and project based, predominantly working with groups of farmers. Their work is focused on raising awareness, providing information and developing skills. They have a limited capacity to influence nutrient management decisions on an individual farm because it is difficult to address individual issues in a group situation. *“The power of one to one interaction cannot be overstated.”* The availability of program and project funding limits the level and longevity of service they can provide. The source of the funding for these programs (environmental versus productivity dollars) may also influence the slant on the advice provided.

5. Fertiliser resellers and consultants are very influential in the decisions farmers make

Fertiliser sales representatives/agronomists (resellers) and consultants are key people in a dairy farmer's decision making process when it comes to fertiliser use. The strength of this influence, especially with the fertiliser resellers, was a common response in almost every interview.

Resellers and consultants provide a one to one service which builds a relationship and trust with the farmer. The trust builds up over time and through experience.

Repeat business is essential for resellers and consultants, so they are focused on working with clients and meeting their needs. If a reseller or consultant is not meeting a farmer's need, then the farmer will go elsewhere for product and/or advice.

The local knowledge held by fertiliser resellers and consultants is valued highly by farmers. These people are also readily accessible and importantly, tailor their recommendations to suit the individual farm/farmer's needs. They make the time to explain what is going on and help to step them through the process. *“It gives them (farmers) confidence to make changes on farm if they are working with someone whose advice they trust.”* *“Fertiliser decisions are very people based. It boils down to who they (farmers) know and trust.”* Fertiliser resellers often offer soil and tissue testing as part of their service.

6. Different approaches amongst fertiliser resellers and consultants

There is considerable variation among fertiliser resellers and consultants in how they approach fertiliser and nutrient advice to farmers. Some consultants work purely on a 'maintenance' approach. They look at what the farm operation is producing and calculate what nutrients are exported. If their client is happy with existing levels of production, then their fertiliser recommendation are based on maintenance application rates. If their client wants to increase production, they lift the recommendations.

There is also a safety position associated with adopting the maintenance approach. *“We know what production we are getting, let's at least maintain it.”*

Some consultant/advisors have a philosophical problem with not recommending fertiliser applications. This is often based on personal experience and has become an overriding factor in their recommendations. *“Personally I would never tell a dairy farmer not to put out fertiliser, even if the soil test said the levels were adequate. I had an experience in New Zealand with a farmer who was told not to put fertiliser out because of a high soil test and it took his pasture three years to recover. Advising people not to apply fertiliser is a very dangerous practice. If they can't grow grass, then they can't grow milk.”*

Personal experience and 'gut feel' are important influences in older advisors, even though they may be aware of the latest research results. As mentioned previously, they don't question the rigour in the science, but they don't feel comfortable with the recommendations, how it can be applied to individual farms and how it will affect or be perceived by their clients.

An age (experience) difference was also evident in the responses. Younger advisors, with less experience were more likely to embrace recent research findings, use these as gospel and happily talk about target levels for nutrients. Older advisors appeared to tailor the message to better meet farm and regional conditions as well as farmer expectations.

7. Resellers and advisors all have their own programs or ways of calculating fertiliser requirements

There was little consistency in the types of tools and programs that resellers and/or advisors are using to calculate fertiliser requirements. Most used their own programs which they had developed to suit their needs and the regional conditions, or tools they had been using for a long time (often bought with them from previous jobs). They are very comfortable using their own programs because they are familiar and they understand what calculations are involved. *“I still like using what I’ve been involved in because I know exactly what calculations are involved and it fits our conditions.”*

There was an overriding preference for simple tools which they can understand and explain to clients. Advisors liked simple tools which were able to consider local factors and farm conditions, reinforcing the value in providing information that relates to *“ my soil, my paddock, the way I farm”*.

Some advisors were critical of what they termed black box calculators. *“We don’t want more black boxes, we want less and simpler ones that allow us to see the formulas and explain these to the clients.”*

Some tools were seen as being far too complex. *“It takes it to the nth degree and farmers don’t work to the nth degree”*.

Some advisors also cautioned about relying solely on the output from decision support tools, stressing the need to use the information as a guide, while also taking into account trends in soil test results, individual farm needs, budget constraints and production targets. *“A lot of the tools don’t allow for regional variations and then don’t give the farmer the sort of answer they want or can use. The DA program Farm Nutrient Loss Index is an example - there’s a lot of figures but it doesn’t tell farmers or advisors what they want to know.”*

8. Farmers want others to do the fertiliser calculations

The majority of farmers do not undertake the calculations associated with nutrient management decisions. Some farmers do not have the skills to do the calculations to determine fertiliser requirements and farmers who can make these calculations still preferred others to do the calculations for them. *“It’s time consuming and tedious – an intensive process.” “Farmers are busy people which is why they get a consultant to work it out for them.” “There are plenty of spreadsheets, programs and guidelines which are accessible on the net, but farmers are more attuned to dealing with a person, such as a consultant.” “Farmers say to me – ‘Don’t tell me what’s involved – just tell me what to do.’”*

One farmer commented that she was capable of making the fertiliser calculations herself, but now lets her fertiliser rep do it. She is happy for them to do the calculations but checks by asking astute questions. *“DA has developed some fantastic tools, but farmers don’t have time to use them and most aren’t comfortable with computers.”*

One dairy company conducted a major nutrient management program which involved giving 90 farmers detailed soil test information, a nutrient map and a copy of the FarmKeeper software to track their fertiliser use and stock movement in each paddock. *“The majority of farmers found it too hard and didn’t up date anything. The end result has been a lot of unused software and reports. Farmers are too busy and don’t like sitting at computers.”*

Some organisations are working hard to introduce decision support tools to groups of farmers, with the key factor in initial uptake seeming to be one to one support to engage farmers in the process and stepping them through it. There are examples where, despite initial enthusiasm and good up front assistance, two years down the track most farmers in the target group are no longer using the tool. Other programs are in their infancy, so long term outcomes are unknown.

9. There is no demand for more complex decision support tools

As explained in point 7, advisors have their own methods of calculating farm inputs such as fertilisers. The programs and models that they use have often been modified for their situation and regional conditions.

A constant criticism of decision support tools is they often don't allow enough customisation and tend to add more layers of complexity. *"Computer models that make soil nutrient recommendations are generally 'too clunky'. Anyone can generate a recommendation with a computer model, but it won't take into account the one-on-one knowledge you get from talking to a farmer about their business."*

Advisors were critical of the volume and complexity of reports produced by some decision support tools. If farmers don't understand how the end results are achieved, can't interpret what the reports are saying or are daunted by the volume of information delivered, they are unlikely to make use of the tool or the information produced.

The general perception is that there are already enough tools available.

10. Dairy factories see supporting their suppliers (farmers) with nutrient and fertiliser management decisions as important

Having farmers make sound nutrient and fertiliser decisions is extremely important to dairy factories. Dairy factories need a secure, reliable milk supply. They need farmers to manage their pastures to ensure their milk production. Factory staff are also very aware that environmental problems posed by nutrient run off from dairy farms is a threat to their business. *"The last thing we want is for a producer to be shut down because they have nutrients entering a waterway."*

Bega Cheese conducted an environmental risk assessment across all their suppliers and identified nutrients as a major risk. As a result they invested heavily in a nutrient management plan to help their suppliers address the issue. National Foods, Taree in NSW, has been actively involved in providing soil test interpretations and fertiliser advice to suppliers. Murray Goulburn has a Farm Environment Program, which is promoted to their suppliers and incorporates nutrient management as part of the package. There are other factory initiatives as well. Most dairy factory field staff are also directly in contact with the factory suppliers and provide one to one advice at no charge.

11. Nutrient management programs often driven by 'environmental' perceptions rather than related to business and profit

A lot of programs aimed at controlling nutrients losses from farms are driven by environmental pressures. Farmers are very aware of the pressure the EPA has placed on farm effluent management to prevent nutrients entering waterways. More recent nutrient management programs have established links to landcare and environmental funding, involving organisations such as Catchment Management Authorities and local councils. These organisations do not necessarily have an understanding of how farms operate. *"There has been funding from the various government*

departments through numerous environmental initiatives regarding effluent, but they tend to be designed to meet government objectives rather than provide ongoing practical solutions on farms.”

The message conveyed by these programs are very dependent on the program staff. The emphasis in some nutrient management programs is on limiting environmental damage, rather than making better use of the nutrient assets on the farm to improve farm returns. Even the colour used in the nutrient mapping in some States gives a negative message to farmers. Some nutrient maps show the high fertility paddocks coloured red for danger and low fertility paddocks are coloured green. Given the majority of farmers associate high fertility as being an ‘asset’ and as something they have strived for, turning high fertility to red for danger is a very different message to the one they have been told in the past.

A few people interviewed commented that it appears some State Agriculture Departments have done a back flip on their traditional extension message in response to growing environmental pressures or changes in funding.

There is a risk that an environmental emphasis on nutrient management programs can overshadow the potential extension message that improving farm nutrient distribution through management has benefits for farm productivity and farm profitability.

Farm nutrient decisions by farmers are primarily dollar driven. It is important that extension messages reflect the way farmers think. *“Being green is not easy when you are in the red.”*

12. The perception about dairy farmers taking regular soil tests is not true

While lots of dairy farmers (or their advisors) take soil tests, it is clear from the interviews that the majority of farmers do not soil test regularly or extensively enough. Most farmers only take a few soil tests a year. *“Two to three soil tests are not enough across a 50 paddock farm. Most farmers don’t appreciate the variation across their farms and will retest the same paddock. There’s a distinct lack of soil test data which makes it hard. You’re flying blind.”*

Farmers who do soil test tend to choose a couple of paddocks (2 or 3) with the main priorities being hay paddocks or paddock that are perceived to have a problem. While this does not give an overall picture of the nutrient status across their farm, their practical experience and observations will give them ‘a gut feel’ of the high fertility and low fertility areas.

Very few farmers have a strategic soil testing program which covers their entire farm on a regular basis. In some regions soil test information is extremely limited.

This has been exacerbated by dry conditions and poor milk prices. Under these conditions, farmers view soil testing as a cost which they can cut. It is expensive and the money would be better spent on fertiliser or feed.

The exception is for farmers working with some of the consultants who had developed strategic, routine testing programs for all paddocks across the farm.

Most farmers do not carry out their own soil tests and as mentioned previously do not interpret the results. Programs that offer free or subsidised soil testing result in greater soil testing across farms.

However the move towards more regular soil testing may be slowly changing. One soil testing laboratory has noticed a significant increase in soil testing in both South West Victoria and Gippsland and attributed this to rising fertiliser prices. The rising costs encouraged them to make sure that what they bought was effective.

In some cases free or subsidised soil testing is available through fertiliser companies. Farmers often feel the advice from the tests will be biased towards applying fertiliser, but still accept the company

rep's recommendations. This may be because the recommendation to apply fertiliser fits with their underlying belief that fertiliser is essential for pasture production.

A number of programs which are not related to fertiliser companies eg EWEN , Catchment Nutrient Project (Tasmania) and the Nutrient Management Plan program offer farmers free soil tests to develop nutrient maps and management plans. These soil tests and the associated programs are of greatest benefits to farmers when they also come as part of a package which includes recommendations and one to one advice on what they should do on their farm. *"You don't necessarily need to keep doing soil tests year after year, but it's important to follow up on how it went last year and help farmers plan what they will do next year."*

Farmers who have been able to use soil tests results as part of a package of advice and support are more likely to increase their use and frequency of soil tests.

Queries raised over soil test results in the media have not undermined the overall credibility of soil tests in the dairy community, except for one Gippsland consultant who believed media coverage had resulted in less soil testing.

13. Nutrient maps help farmers visualise nutrient spread but their effectiveness is dependent on ongoing one to one support and advice, otherwise they sit on the shelf

There were two distinct experiences with nutrient maps. There are cases where the maps have been developed at considerable expense and are now sitting in filing cabinets and not being used. Then there are areas where the maps have been a valuable extension tool and helped farmers visualise their farm's fertility and change nutrient management.

The differences between the two scenarios is that farmers who use the maps have had help with the interpretation and then support to implement the appropriate management changes. *"It's been the best extension tool and has really turned on 'light bulbs' more than anything else I've seen." "Instead of getting pages of pages with soil test figures farmers can see a picture of their whole farm. It's visual and easy to remember"*.

Farmer who don't use the maps tend to be left without support and find them too complex to interpret, let alone use in their decisions relating to farm management. *"At first everyone involved thought it was great – it was interesting and there were a lot of very pretty maps, but after a year the whole thing proved too difficult for farmers to interpret". "Farmers who weren't using agronomists and consultant didn't use the results."*

Farmers also didn't feel comfortable with the overriding message that high fertility was red for danger, as mentioned earlier. *"Older farmers tended to disagree with the optimal ranges presented in the project (maps). These people were quite happy that their paddocks came up as red, because that was the level they were trying to achieve, so will continue with current practices"*.

One farmer, whose nutrient map, *"has lots of red on it"* doesn't use it or refer to it for farm nutrient decision making but *"I'll pull it out when I want to sell the place"*. In this case the farmer clearly viewed the red areas as a positive attribute of the farm.

In Western Australia the colour scheme on the maps is different and more aligned to a farmer's focus on farm production, rather than environmental risk. *"Each farm got a colour coded map (opposite colouring – red low, green high) which let them group paddocks on colour. There was high (green for going well, can save money here) through to adequate marginal and low (red for danger, risk of low production)."*

14. Individual paddock treatment is impractical, better to have a few management zones

The implication from nutrient maps that highlight every paddock is that each paddock requires individual treatment. This concept is overwhelming. As one advisor describes it *“paralysis by analysis, just too much information, they (the farmers) don’t know what to do with it.”*

It is also impractical to consider individual paddock treatments. Fertiliser contractors find it very difficult to achieve multiple blends and rates to suit individual paddocks. While newer machinery does allow for variable rates, the supply of small amounts of different products is logistically difficult. Fertilisers are often delivered in loads and requests for small lots of more than two or three products per farm becomes unmanageable. At busy times of year there is high demand for contract spreading, so farmers often need to fit in with contractor availability and keep the job relatively simple.

Farmers in Western Australia were encouraged to group paddocks with similar colours together as management zones, especially when it came to fertiliser applications. A consultant’s experience from the Western Australian greenerpastures program sums up the general sentiment. *“We can’t go round putting different fertiliser blends on different paddocks, but realistically we can put out two different ones and there is a saving.”*

There is a general view amongst advisors that a more achievable approach is to identify and work with management zones or classes. For example, one advisor explained the three zone model that he uses with his clients:

1. Effluent treated and sacrifice areas,
2. Day paddocks and fodder conservation paddocks,
3. High stock retention paddocks, including night paddocks.

This gives a maximum of three products and rates, which is manageable.

15. Effluent management is limited by cost to implement (infrastructure) and perceived returns

There are two key issues associated with effluent management; storage and distribution. In most interviews people spoke about distribution challenges (particularly liquids) rather than storage.

Effluent is viewed as both a nutrient source and a disposal issue. Generally it is considered to be a valued resource, the significance of which seems to have been reinforced by rising fertiliser prices. However effluent distribution often occurs across a much smaller area than best practice would recommend, resulting in nutrient build up. A few people also identified associated palatability and stock health issues, eg. grass tetany associated with repeated applications of effluent on small areas.

Distribution was easier for farmers with irrigation systems which could distribute the liquid effluent mixed with fresh water. This lack of irrigation water was an issue in Northern Victoria. For those without irrigation, the biggest barriers to best practice in the distribution of liquid effluent is the cost of infrastructure (pumps, sprays, pipes) and labour. Investment in extending distribution systems is viewed as marginal, i.e. the costs outweigh the fertiliser savings. Hilly areas also had challenges in distributing liquid effluent via pumps.

The issue of manure build up on feedpads and loafing areas was raised for the Northern Victorian region. Due to on-going drought, the amount of time stock are spending on feedpads and loafing areas has increased, resulting in high loadings of manure in these areas. In most cases the manure is scooped up and stored in piles, sometimes for several years before being spread. Much of the concern with feedpads relates to the unpleasant environment created by the build-up of manure and associated animal health issues, eg. mastitis.

16. National programs (Dairy SAT, EMPB, Nutrient Management Plans, etc) have ‘the book’ and ‘the workshop’ but it sits on the shelf unused

There were many instances where interviewees spoke about programs that had been run, often with initial enthusiasm on the part of farmers, but in the long run implementation was poor. People spoke about ‘dusty folders’ and maps sitting in bookshelves, not being used.

Two reasons were given; the complexity of the information and inadequate follow up. If the information delivered is too detailed people become overwhelmed and decide it is easier to continue with existing practices. It is generally accepted that decision making in relation to nutrient management is complex because the decision involves knowing current soil fertility, the quantity of nutrients coming onto and going off the farm, effluent disposal, fodder conservation, production targets, business goals, practicalities of application, risk of nutrient loss, costs and returns and financial constraints. It can be very difficult to process and analyse all the information without assistance.

It is one thing to learn the theory in a course or workshop, but it is a big step to apply and implement that on farm. This is where follow up support is so valuable. People need one to one support to make complex changes that affect whole farm systems.

In NSW, Bega Cheese’s experience with 90 farmers highlighted that a lack of follow up meant things didn’t happen. The company conducted an environmental risk assessment across all suppliers which identified nutrients as a major risk. They decided to be proactive on managing nutrients and help suppliers. Bega Cheese became involved in a major soil testing and mapping exercise with DPI Ellinbank.

Bega had 90 farm suppliers’ farms soil tested and the results went to DPI Victoria at Ellinbank who produced coloured nutrient maps and a report for each farm. Bega Cheese ran a workshop for the farmers involved and gave each farmer a copy of the Farm Keeper software program to track their fertiliser use and stock movement in each paddock. *“The first problem was that farmers who weren’t using agronomists and consultants didn’t use the results. The second problem the factory encountered was that the data became dated. Farmers didn’t carry out Stage 2 of the project which involved recording where the fertiliser went and where the cows grazed each day. It was too hard to maintain. The majority of farmers found it too hard and didn’t update anything. Although many thought the project was great at the time, only a few have continued actively using the software and the data. The end result has been a lot of unused software and reports”.*

In other cases farmers talked about some programs offering ‘a carrot’. Farmers who complete the course are often eligible for assistance. *“The big plus is the grants. We wouldn’t do a lot of this stuff if there wasn’t some sort of farm assistance.” “Some of the grants are up to 50 % off the cost of things – it’s a real carrot for people to do the programs. People wouldn’t take it seriously if the carrot wasn’t there because often there are things people would like to change, but can’t otherwise afford.”*

Successful programs such as those run in Western Australia put the theory into a real farm situation, provided local farm demonstrations via ‘focus farms’ and had follow up activities, such as farm walks. These project involved DPI, consultants, dairy farmers and the fertiliser industry so everyone understood the program and had consistent messages.

It was also noted that as a result, more farmers were working with agronomists and consultants, obviously seeking out further one to one assistance.

17. The fertiliser Industry has the Fertcare® program in place but it is not widely adopted

Fertcare®¹ was developed by the Fertiliser Industry Federation of Australia (FIFA) in response to the growing interest in enhancing nutrient management across Australia. It uses the members Code Of Practice originally developed by the Australian Fertiliser Services Association (AFSA) as the foundation of the program. Theoretically if all fertiliser products were supplied and spread according to Fertcare standards, problems with nutrient management should be minimised.

Our limited investigations would suggest there is currently little or no preference from farmers to choose a Fertcare accredited supplier over a competing supplier. Fertcare® accreditation is voluntary and given there is a cost to obtain and maintain Fertcare® accreditation, which can be onerous on smaller operators, those with accreditation could be seen to be at a financial disadvantage.

It appears the Fertcare® program contains many of the elements the dairy Industry is trying to achieve but runs the risk of not being fully utilised unless farmer demand is increased and/or regulations are imposed where a Fertcare type 'duty of care' is required.

18. More regulation is coming

The dairy industry is familiar with EPA regulations regarding nutrient run off associated with effluent. There is concern in the industry, especially from dairy factories, that nutrient run off is a risk to the industry and that regulations could be introduced that would limit farm management practices, especially fertiliser applications. *"We did an environmental risk assessment across all suppliers which identified nutrients as a major risk. This will either be a carrot – the potential to make or save lots of money; or a stick which will be greater regulation regarding nutrient run off". "If we don't do something then there will definitely be more regulation." "The success of any program depends on having a strong driver so people are motivated to do what's involved and change."*

Ongoing dry conditions, especially in Northern Victoria, have limited the potential for nutrient run off from dairy farms, but there is a concern that if normal conditions return, nutrients in surface run off will become an issue.

State Government regulation is starting to shape fertiliser use in parts of Western Australia and there are concerns these regulations could potentially remove soluble phosphorus fertilisers from the industry because of the risk of phosphorus leaching into estuaries.

The Western Australian Government's Fertiliser Action Plan initiative along the coastal areas of the South West required farmers in particular areas where soils are subject to leaching (mainly beef producers) to demonstrate that an application of phosphorus is justified by supplying a nutrient budget and advice from a Fertcare accredited advisor. *"Regulation is just around the corner and we are making sure the work we have done is part of the big picture so our dairy farmers are on the front foot."*

¹ Fertcare is a training, certification, and quality assurance program targeting sound stewardship in fertiliser use. One part of Fertcare is the Fertcare Accredited Advisor program which is targeted specifically at those who provide professional level advice on fertiliser use based on the results of soil and/or plant analyses. It involves an assessment of competence in providing recommendations based on soil and plant tests. Regular audits of advisor recommendations are made (Source: Fertcare Accredited Advisor Program Manual, Dec 2008).

19. Farmer perception that alternative fertilisers are not chemical fertilisers and are more environmentally friendly

There is a general community perception that chemicals are bad and that the alternatives are natural. Many farmers are dabbling in so called 'natural' fertiliser or soil supplement products. These products appeal to farmers who feel 'something is missing' in their pastures or soil and the pastures are not responding the way they use to or should. In some cases the people selling these alternative products will visit a farmer and provide one to one advice, which is something farmers value.

"DA definitely needs to fund more non conventional fertiliser work. There's a lot of 'snake oil' out there but a few alternative products which could work and improve nutrient use, such as Fulmic and Humic Acid. Farmers are keen on things that claim to improve production and are vulnerable to 'snake oil' products, but Ag Department trials never include them so there's nothing to substantiate or discredit the 'snake oil' claim. It's important that we have replicated trials - ideally on farms - run by independently funded research organisations whose only agenda is to determine if these products improve production."

3. Discussion

The practice change desired by Dairy Australia requires a significant shift in current farming practices. This shift will be very difficult to achieve, primarily because the practice changes challenge long established principles and experiences not only of the farmers but their advisors and close confidants as well.

Every one interviewed agreed that action should be undertaken to optimise nutrient management on dairy farms. The possibility of increased guidelines on fertiliser use, improved storage and disposal of dairy effluent and even formal regulation of fertiliser application was recognised by all sectors as a looming and possible inevitable outcome for the dairy industry. Just how 'formal' this becomes was a matter of some divergence.

Challenging long held beliefs

The greatest challenge relates to the importance farmers and their advisors place on high soil fertility to grow pasture, especially high soil phosphorus. This belief has arisen as a result of the consistent and long standing messages that grass is the cheapest source of feed and increasing soil fertility (phosphorus) is the way to achieve this. Low soil fertility, especially phosphorus, has been 'sold' as a limiting factor to production. The extension message has been convincing and widely accepted.

More importantly farmers have seen the positive impact increasing soil fertility has had on production and pasture composition. They have measured increases in growth, they have seen increased milk production and they have seen improvements to their pasture. They have lived it and it is grounded in their experience. Put simply, fertiliser works for their business so they are keen to keep putting it on.

There is also a strong element of risk management in applying fertiliser. Farmers and their advisors believe increased soil fertility is an asset, like money in the bank. In tight seasons, they all believe higher soil fertility is beneficial to maximise production when rainfall is limiting. Reducing fertiliser inputs is a last resort, once other expenditure cuts have been made. Only in years of low milk prices and high fertiliser prices do some farmers reconsider their fertiliser use and even then the changes in application rates appear minimal. The notable exception to this is in Northern Victoria, where a lack of irrigation water has become the most limiting factor to production, requiring a major restructure in the feed base of the dairy business (mainly from perennial pastures to annual pastures). As a result, fertiliser has become an input adjusted to suit the new feed base and consequently applications have reduced.

The most influential people in shaping the fertiliser decisions farmers make are the fertiliser resellers and to a lesser extent farm consultants. They too have heard the messages from the dairy industry and they too have seen positive increases in pasture growth with their clients by using fertiliser. They recommend high levels of soil fertility. Most importantly they (on the whole) have satisfied customers who come back for repeat business. The positive farmer response simply reinforces the advice to keep recommending fertiliser.

Against this backdrop, the core of the current nutrient management message is trying to unpick decades of communication and positive past experience. While the notion of optimum nutrient levels and the concept of diminishing pasture returns with additional fertiliser use is generally accepted, the level at which this occurs is hotly contested. The current published optimum is either considered the minimum, or less than the minimum, by advisors, resellers and many farmers. Being above this level not a problem, rather it is insurance. To farmers and advisors, reducing your asset base by not applying fertiliser seems counter intuitive. How can your business be better off with lower fertiliser use? It was not uncommon to be told "*I would never recommend not putting*

fertiliser on” or “if we are well above target levels, we will just apply maintenance.”

Some may wish to argue the core message of the nutrient management program is consistent with past messages, however we believe the perception of farmers and advisors is different. Apart from not having confidence in the optimum soil fertility levels being promoted (too low), they see the current message as a change. Some even described it as a back flip.

Irrespective of whether the message has changed or not, the bottom line is most farmers and advisors see the current information as different and challenging their long held beliefs. Unless this perception is changed, other investments will have little impact.

There is a potential risk to key players with the desired practice changes. To the farmer there is a risk their production may decline; to the fertiliser seller there is a risk that their farmer clients may question their change in advice as well as a possible negative impact on product sales. To the consultant the risk is with credibility and future engagement.

It is difficult to avoid risk in business. Most people are willing to take calculated risks, when they know what the consequences might be of various actions. Knowledge, personality, stage of life, succession and debt all influence the level of risk someone is prepared to accept. Above all, risk is a personal thing and requires personalised discussion to work through changes.

Building confidence in the message

Gaining experience and confidence reduces the perceived risk. What is patently obvious from this market research is that the majority farmers and advisors do not have confidence in the optimum nutrient levels being promoted and/or the actions to achieve optimal fertility levels on dairy farms. They are aware of the science and rationale behind the optimum levels, yet they still have trouble accepting the values. Additional promotion of the data is not going to change their beliefs. Being involved and experiencing the theoretical response in their local area is required to change this perception. ***We believe building confidence in farmers and advisors that lower soil fertility levels are appropriate for the farm business is the most important action required at this stage.***

Achieving a change in belief will underpin the effectiveness of other investments made in the nutrient management program.

A critical aspect in developing confidence in farmers and advisors is to conduct the work in a manner that answers their questions. This means the work needs to be done *with them* and not *for them*. Involving advisors and farmers in the design of the work, in particular discussing appropriate targets, asking them ‘what needs to be measured and how does it need to be measured to prove to you that these targets are appropriate for your business’ is essential. The advisors need to be in control (even though they may pay for someone else to do the hack work). The key question is ‘what happens if I change the fertility status a farm to get to the ‘optimum’ fertility levels (or soil conditions) recommended?’

This may appear to return to previous times of on farm trialling. This is partly true, however it was identified by many advisors and resellers as a way to build confidence but it has to be done ‘in my patch, on my soil type, the way we farm’. What may be different is, who is involved in the design (and maybe execution) of the trialling, who the target audience is and the strong focus on what needs to be measured to answer advisor (and farmer) questions.

Recommendation 1: *Establish localised on farm validation trials in district, led by key district advisors*

Selling the message

The dairy industry has a potential advantage over other broad acre industries in relation to the number of people who interact one to one with farmers. The key groups of people are fertiliser resellers, dairy factor field officers and consultants. They already have credibility and trust with their clients, built up over time that is worth its weight in gold. They must be enrolled to the cause if lasting change is to occur.

Fertiliser resellers and spreaders have an incredible amount of influence. It is critical these people are brought on board to sell the message in a positive way. Care must be taken not to 'demonise' the fertiliser industry, portraying them as over-servicing dairy farmers. Our conclusion would be they are simply responding to past experience and client demand. If handled incorrectly, the fertiliser industry *will* feel threatened with the message because on the surface it will have a negative effect on sales. If they take a conflicting position on optimum fertiliser use, it will more than counter alternative messages from elsewhere in the industry. However if the engagement is well considered and high fertility is seen as a positive rather than a negative, it will enable other soil conditions to be addressed. Fertiliser resellers can then consider substituting products by taking a more complete view of soil management to include lime, gypsum, other elements eg K, S and trace elements. This re-alignment would complement the growing interest in soil health.

Fertcare[®] is an industry based program which if adopted by fertiliser resellers would achieve the fundamental aspects of the nutrient management program. Currently there is no farmer demand for Fertcare[®] and without user demand there is no incentive for resellers to adopt it. If anything Fertcare[®] is a cost and disincentive to adopt. Encouraging the use of Fertcare[®] accredited suppliers should be encouraged.

Dairy factory field officers are the second critical group who must be engaged. They see every farmer and should have the production and sustainability of these farmers at heart. In general farmers believe the factories support their production focus, even if they are sometimes clash on milk prices. We believe the opportunity exists to expand on the aspects of security of supply and risk management, fostering mutual benefit between factories and farmers. Optimum nutrient management is part of the supply and risk considerations.

Dairy factories have a growing interest in nutrient management and there are some good examples of on farm programs, albeit driven from an environmental and not production focus. Advantages could be gained if the need for enhanced nutrient management is more closely align with profitability. To achieve this, factory field officers would need additional skills in farm production issues (including fertilisers).

Dairy consultants are the third group who engage at the one to one level. They tend to work with the more progressive farmers in the industry and currently advise on fertiliser use based on their own optimum soil fertility levels. They currently don't trust the 'new figures' and have their credibility and repeat business to worry about. They need to feel the recommendations are best thing for their client. They need to lead or at least be involved in the validation of the localised trialling recommended previously.

While fertiliser resellers, dairy factor field officers and consultants all indicated an interest to have greater involvement in the nutrient issue, preliminary questioning would indicate they do not currently have the capacity to engage further at this stage. In the case of some dairy factory field officers, they also do not have the technical skill to engage at the one to one level.

Recommendation 2: *Discuss with fertiliser resellers, dairy factories and consultants their requirements to become more actively engaged in promoting nutrient re-alignment, including creating demand for Fertcare[®].*

Refining existing activities

There was no support for the development of more complex or sophisticated decision support tools. Most consultants had their own version that was localised and could be explained to clients. They did not want a generic model that reduced their capacity to customise calculations and explain what was occurring to their clients. ***However we suspect if an invitation was extended to consultants and fertiliser resellers to incorporate the most recent algorithms into their local models, this would be accepted.***

The concept behind the nutrient mapping was well supported, however the implementation of the mapping requires further refinement. Individual paddock testing is too costly, the red colours for high fertility is counter-productive and the conclusions from the results impractical to apply eg a 40 paddock farm may have 40 different blends and rates. It was suggested a better approach would be to start with farm management zones and get regular testing of these zones so it can be used for strategic decision making rather than problem solving. ***We believe there is great scope to refine and offer this service, possibly as a subsidised program through enrolled one to one advisors (fertiliser resellers, dairy factory programs and consultants).***

There was an underlying sentiment that nutrient management was an environmental issue, considered 'nice to do when I can afford it', rather than a mainstream or core production issue. ***We believe there would be a benefit to re-align the nutrient management message with business profit rather than environmental protection.*** This means greater engagement with production and supply surety through the dairy factories.

Farmers worry about what their cows eat and managing pasture nutrient levels to optimise animal health may be an avenue to explore in the future. ***It may be possible to link tissue testing of paddocks with excessive soil fertility and animal health issues.***

Effluent disposal has received considerable attention in the past. However most of the emphasis has been on the collection and storage of effluent. This market research would indicate a major impediment is the distribution of nutrients across the farm. ***More work could be done to develop and extend lower cost methods of distributing effluent across dairy paddocks.***

4. References

Stanfield R B (1997)

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