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Standardised planning

VOL 18 NO 1 MARCH 2014 ISSN 1174-524X



Primary Industry Management



THE OFFICIAL JOURNAL OF THE NEW ZEALAND INSTITUTE
OF PRIMARY INDUSTRY MANAGEMENT INCORPORATED



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Primary Industry
Management**





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Primary Industry Management is the quarterly journal of the New Zealand Institute of Primary Industry Management Incorporated. It is supplied free of charge to more than 700 NZIPIM members involved in rural consultancy, education, science, technology and agri-business. It is also available on subscription to the wider rural community with an interest in technical, management and rural business information.

Primary Industry Management is dedicated to the publication of articles on all aspects of agricultural science and the management of primary industry resources. The opinions of the contributors are their own and not necessarily those of the publishers or editor. The whole of the literary matter of *Primary Industry Management* is the copyright of the NZ Institute of Primary Industry Management.

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Subscription

\$75+GST (New Zealand), \$100 (Australia), \$120 (other countries). Subscription enquiries should be directed to the NZ Institute of Primary Industry Management.

Primary Industry Management

Volume 18, Number 1 March 2014

ISSN 1174-524X

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Julian Bateson

An eye on the future

We have recently been told by the government that the short term future looks very bright for New Zealand primary industry in general, even for forestry. However, we always need to keep a close eye on the future and be ready to adopt, adapt and improve. Watching what is happening outside the country is important, but also making sure that we have good education and training in place so that the next generation is ready and waiting to take up the challenge.

The first article in this issue by Keith Woodford and Marvin Pangborn is an account of the big changes in the way milk is being produced in the United States. The term mega-farms is used for farms which have many thousands of cows being milked, some with over 10,000 cows. The authors expect this industrialisation of milk production to continue, although water availability will be a limiting factor in many areas. How these mega-farms will affect the international market in the future, and therefore New Zealand milk exports, is not clear. However, if milk prices remain high and feed prices in the United States remain low, who knows what may happen?

There is a very interesting contrast with mega-farms in the article by Victoria Westbrooke about some small dairy farms in the Waikato. In this case big is not always better. Farmers with less than 250 cows responded to a survey on their future plans, many of which are to just stay very much as they are. One of the comments by a farmer summarises it very well – If we can make good money on a small farm, why have the problems of going bigger? This attitude is often thought of as being negative, but it can save a lot of difficulties encountered trying to run that little bit faster and not quite getting there.

Education in agriculture is a very important subject which does not seem to go away and we continue in this issue of *Primary Industry Management* with very relevant contributions from Jacqueline Rowarth, Al McCone and

Melonie Sheppard. The first article by Jacqueline Rowarth, Professor of Agribusiness, considers the change in students over the last few decades, what other countries are doing about it and how New Zealand can take action.

Al McCone has a different perspective as a manager of staff for Landcorp which employs over 600 agricultural employees. His organisation needs people who can nurture stock and protect the land while producing high energy pasture. They also need people who can coach, manage and lead. Melonie Sheppard is also an agricultural employer. She is one who thinks that in New Zealand we are spoiled for choice, but that the results of agricultural training and education are very variable. The debate will continue.

The remaining articles cover a variety of topics. One of them by James Turner, David Stevens and Kelly Rijswick considers the role of rural professionals in innovation. Rural professionals are an important source of knowledge for farmers, with farm consultants having a high level of credibility in expertise and trustworthiness. However, the authors conclude that although the link between researchers and farmers is vital, it is undervalued by the researchers themselves.

Hilary Walker and Paul Le Mière look at the problems for farmers who have to manage the overlapping, and sometimes conflicting functions of regional and territorial authorities. They say there needs to be a balance with consenting authorities working more closely with farmers and the agricultural industry.

Finally, back to dairying, and to the article by Jill Greenhalgh, Philippa Rawlinson and Rupert Tipples. They consider the effects of the changes in Southland to farming in last 20 years, in particular the social, population and employment effects. Modern dairying still remains a relatively new industry in Southland and further change can be expected, particularly environmental ones.



Keith Woodford and Marvin Pangborn

The industrialisation of milk production in the United States



The American milk production industry is transforming from family-owned farms of 50 to 500 cows to mega-sized production units milking at least 2,000 cows. In many cases the herds are 5,000 to 12,000 cows. Approximately 40 per cent of American milk production now comes from 800 of these mega-farms and this proportion increases each year.

The United States dairy industry is also transforming from a domestically focused industry to one where increasing volumes are exported. As of June 2013, exports comprised 18 per cent of national production and the United States has become the second largest exporter of dairy products after New Zealand.

Given the importance of the United States dairy industry as a competitor to New Zealand, we have initiated a research project to understand the economic and technological reasons for mega-farm growth in the United States. In this article we report on findings obtained during visits to 12 large-scale dairy farms in this country during June 2013. Additional information came from extension specialists at land grant universities and United States Department of Agriculture statistics.

Production trends and farms

The United States milk production industry has three segments. The first is the family farm sector in which the number of farms is declining by about five per cent a year. In 2012 there were about 55,000 mainly family dairy farms with less than 500 cows, which now only produce about 30 per cent of the nation's total production. Back in 1999 there were 110,000 of these farms.

The mid-sized farm sector, with herds of 500 to 2,000 cows, is almost unchanged in size since 1999 at about 2,500 farms. This sector produces about 30 per cent of the nation's milk. Then there are the mega-farms, which have grown steadily from about 250 in 1999 to 800 in 2012. Of course this size is all relative. A farm with 500 milking cows would produce five to six million litres of milk a year, which is more than three times the milk produced on an average New Zealand farm.

Over the last decade, there has been only a two per cent overall increase in the number of cows, but total production has increased 18 per cent from higher production per cow. It is notable that per cow production is higher on the mega-farms than the medium farms, which in turn is higher than on the smaller farms. On the mega-farms, per cow production is usually between 10,000 and 11,000 litres per lactation.

The farms we visited were in the three north-western states of Idaho, Washington and Oregon, and the south-western states of New Mexico and Texas. In size they ranged from a small three-generation family dairy of 1,685 cows to herds of over 10,000 cows in milk. Some owners had multiple herds, with total cow ownership of over 40,000 for one of the businesses. The mega-dairies tend to have a policy of no visitors, and we would not have had access without a prior network of industry contacts.

Terminology

The Americans use the old imperial terminology of pounds (lb), hundredweight, feet, inches and acres. Without understanding this terminology it is not possible to interpret the dairy information that comes out of America. There are 2.2 lb in a kilogram, 100 lb in an American hundredweight, 3.28 feet in a metre, 2.54 centimetres in an inch, and 2.48 acres in a hectare.

Temperatures are measured in degrees Fahrenheit. To convert Fahrenheit to Celsius, subtract 32, then multiply by five and divide by nine. Quoted cow numbers are usually cows-in-milk. Therefore a 6,000 cow farm will be milking 6,000 cows in all months and dry cows will be additional to this.

Payment systems

Milk is sold in dollars per 100 lbs, or simply per hundred. The quoted prices are for milk with 3.5 per cent fat and 3.0 per cent protein. However, the payment that farmers actually receive is also based on milk components of protein and fat above the base levels. One quoted price in June 2013 was \$18.45 nett of cartage, called the mailbox price, as a base price plus 32 cents per additional tenth of a pound for protein and 18 cents per additional tenth of a pound for fat. Using an exchange rate of one New Zealand dollar to 83 US cents, this equates to a price in the New Zealand system of about \$7.25 a kilogram of milk solids.

However, the actual payment that farmers receive also depends on the class of the milk. Milk destined for fluid consumption is called Class 1 and the price is federally determined. Other classes of milk are determined by a mix of federal regulation and market prices. Class 2 is ice-cream, dairy desserts and cottage cheese. Class 3 is all other cheese types and this has become the most important category in the western states. Class 4 is for butter and milk powders.

There are some additional subsidies which exist for all farms. Their effect can be significant on the small farms but is generally insignificant on the larger ones. The above description on the milk marketing system is a simple summary of a very complex system. We met no-one on our trip who claimed to actually understand the system in its entirety.

The economics

The main measure of dairy farm economics is in the ratio of milk price to feed price. Feed prices are quoted per pound of dry matter and 16 per cent protein content. Milk is also quoted per pound. Traditionally, the ratio was about three to one but in recent years has been much lower, slipping to less than 1.5 during 2009 and again in 2012. This was mainly due to greatly increased feed prices. The ethanol industry is widely blamed for these price increases but there are also other forces at work, including drought, together with the shipping to China of lucerne hay, corn and soybeans.

A complementary measure is the percentage of income spent on feed. For much of 2013 this figure has been 60 to 65 per cent of income. Depending on farm size and efficiency,



A feed mixing wagon on a mega-farm

farmers need a margin of six to eight dollars per hundred of income over feed costs to be profitable. These feed costs assume all feed, including forage, is bought in. For many farmers who produce their own forage the cash costs will be lower and for these farmers, the high feed prices of recent years are simply a transfer from one part of the enterprise to another.

The western model

The traditional small-scale American dairy model from the eastern states is of small dairies with cows held in either individual tie-stalls or in free-stalls within covered barns. The cows may go out to pasture during the daylight hours of summer. In contrast, the western model is of mega-dairies where the cows never see pasture. Initially developed in California during the 1960s, these dairies feed a total mixed ration of forage and concentrates, minerals and in some cases vegetable by-products. The western model subsequently spread to all of the other western states of Washington, Oregon, Idaho, Arizona, New Mexico and Texas, and is now migrating to the mid-west grain producing states such as Kansas, South Dakota, Iowa and further east.

All the dairying regions in the western states are characterised by low rainfall of 150 to 500 millimetres a year and large inter-seasonal temperatures. Oregon and Washington also have traditional dairy regions which are much wetter, but this is not where the recent development in these states has occurred. Both winter cold and summer heat are stress factors in all regions, with cold being the main problem in the north and heat in the south. However, even in New Mexico and Texas there can be winter snows.

Housing and milking systems

The original system was the open lot. With this, cows remain outside all the time except when they are being milked and shade areas are provided. More recently, there has been a move to the free-stall system where cows are in semi-enclosed sheds in pens of several hundred. The raised bedding area is separated by rails into separate pens, designed

so each cow can lie in the bedding material, but when they stand up the urine and manure fall outside the bedding area into a central laneway.

Feed is supplied ad-lib on the other side of the covered central laneway. Side walls are open in most weathers, but often there are curtains which can be lowered in cold weather. The two economic advantages of the free-stall system are lower bedding costs, because the cows do not spoil the bedding by urination and defecation, and a modest increase in production efficiency during winter.

The third system is fully enclosed sheds with cross-ventilation using evaporative coolers. With an ambient temperature of about 40°C we observed an internal shed temperature of about 25°C. Infra-red testing of the cows inside this shed showed skin temperatures were about eight degrees lower than outside animals. The main benefits of the cross-ventilation systems are a modest production increase and a major increase in pregnancy rates.

The milking systems are parallel sheds, like a herringbone but with the cows at right angles to the pit, and rotaries, which are also known as carousels. The engineering technologies associated with both systems are sophisticated and we would judge as superior to most New Zealand sheds. All cows are washed and dried before milking. We observed one 72 bale rotary operating smoothly, milking at 480 cows an hour, milking 4,500 cows twice a day.

We also observed parallel sheds ranging from 30 to 60 on each side where cows were being cupped at 4.8 seconds per cow using a claw design and associated cupping procedure of placing all four cups simultaneously. We have not seen this in New Zealand. The milking pits in the better parallel sheds were usually three metres wide, creating a pleasant milking environment. Guard rails prevent urine and faeces from falling into the milking pit.

Labour

The milking sheds are usually operated for about 22 hours a day with cows milked either two or three times a day, and with the remaining two hours for cleaning. Milking shifts are normally eight hours or 12 hours. Each shift consists of four or five workers. In making comparisons to New Zealand, it is relevant that these cows produce about 2.5 times the milk of a New Zealand cow and about twice the components of fat and protein. With the usual caveats about inter-farm variation, the cost of the milking labour is between about US3.5 cents and US7 cents a litre of milk.

More than 95 per cent of labour on dairy farms is Hispanic. Most of these workers are of Mexican background and Spanish is the main language spoken in the milking sheds. All have the required papers to allow employment but the consensus seems to be that about 70 per cent are false. There is an e-verification system but this is not mandatory for employers to use at the moment. Everyone knows that there are illegalities in the current system, and everyone knows that something will eventually need to be done about it, but no-one wants to talk too much about it.

For the Hispanic workers it is much better to be working

on American dairy farms than living back in Mexico or other Central American countries. For the farmers, the presence of Hispanic workers is a necessity. For the government it is also not a bad situation as these workers are paying their taxes, but because their social security numbers are false they will never be able to claim benefits. The Hispanic workers generally get paid between US\$9.50 and \$11.00 an hour. Some are on salaries of \$28,000 to \$32,000. Hispanic herd managers, known as herdsmen, can be earning \$60,000 or more. The workers do not live on the farms.

Production and feed

The typical American cow is a large Holstein weighing about 1,400 lb. However, we were surprised during our current research to find a marked swing to Jerseys weighing about 800 to 900 lb. This is due to the large focus on cheese in the western states and therefore milk components. This focus on cheese is a reflection of the distance from the major fluid markets.

Holsteins usually produce about 80 lbs or 36 litres of milk a day on about 55 lb of feed. A typical cow was in June 2013 grossing about US\$15 a day with feed costs of about US\$8. Of course the precise figures vary from farm to farm, with number of milkings per day and use or non-use of the hormone bovine somatotropin being the main factors. Estimates of the proportion of farms using this hormone ranged from 50 per cent down to less than 20 per cent. The consensus was that it increases production in Holsteins by about eight per cent but that the cows wear out more quickly.

Jerseys usually produce about 55 lbs or 25 litres of milk but with higher components. We spoke to farmers who have separate sheds for Holsteins and Jerseys and they are increasing the number of the latter based on measured economic conversion efficiencies of the Jersey sheds. Some farmers are using sex-selected semen to increase their Jersey numbers more quickly.

Replacement rates are high. One farmer quoted 25 per cent for his Jerseys and 36 per cent for Holsteins. Other farmers were replacing their Holsteins at over 40 per cent. Not all of this was by necessity, but with current high beef prices they assessed that for Holsteins it is economic to bring in heifers and sell the older cows.

If a farm is to produce all of its forage, then it will need about one acre for each 1,400 lb Holstein cow. This forage is about 55 per cent of the feed with the rest being grain-based concentrates. These concentrates are usually bought in, often from the mid-western states. Farms that do not have their own farmland have been particularly hard hit by the increasing feed prices since about 2007. For those farmers who do have land, they have been able to generate a counterbalancing income from the farmland, although the dairy enterprise may have lost money.

The importance of water

States such as New Mexico and Texas rely on the Ogallala and some smaller aquifers for underground water. These aquifers are depleting and farmers are having to drill to increasing depths. A typical water allowance is an acre-foot



Large scale grain transport



Idaho open lot dairy farm with irrigated crop land behind



A newly born calf every 20 minutes of every day on a mega-farm



Parallel parlour milking system



Open lot dairy in Washington State arid zone

or 300 millimetres of water. It is water shortages which are now causing the south-western farmers to look east to the grain and feed producing states of the mid-west such as Kansas, Iowa, Wisconsin, South Dakota and Minnesota which depend much less on irrigation.

There are important problems relating to leaching nutrients into underground water. With the open-lot system this is challenging to manage. However, we saw some free-stall and cross-vent systems where there was close to 100 per cent capture and return of nutrients to the paddocks.

Capital and scale

In very broad terms it costs about US\$1,500 to US\$1,800 per cow 'place' for an open lot system, US\$3,000 to US\$3,300 per cow place for a free stall system and US\$4,500 to US\$5,000 per cow place for an enclosed cross-vent system. Irrigated land would usually cost US\$15,000 to US\$20,000 a hectare.

We saw one 6,000 cow open-lot system with its own forage land and very pleasant owner housing which recently sold for US\$25 million including livestock and feeding equipment. This equates to about NZ\$7.00 per kilogram of milk solids.

There was debate among our informants as to the most economic size of farm, but it is almost certainly not less than 5,000 cows producing at least 50 million litres a year. Some saw benefits of 10,000 cows in two adjacent herds. The largest herd we saw in one location was 25,000 cows. With these large farms all operations become standardised. For example, with 25,000 cows there will be one cow birth about every 20 minutes for every day of the year, and labour can become very efficient at each specific task.

Export markets

The American dairy producers are still very focused on production for the internal United States system. It is almost as if the exports mainly of cheese, skim milk powder and whey have come about by accident. The largest traditional export market has been Mexico, but there is increasing recognition that the future may also include exporting to Asia.

Feed prices have been declining rapidly throughout

2013 and there is little doubt that, at late 2013 prices for feed and dairy products, mega-farms within the United States industry can be internationally competitive. One of the challenges for this industry is that currently its processing plants are misaligned with international demand. They are particularly poorly placed to provide whole milk powder, which in 2013 is the most profitable product.

Conclusion

We expect the industrialisation of milk production in the United States to continue, driven by the fundamental economies of scale in the mega-model. However, water availability, along with environmental and political problems, will influence the particular states in which this occurs. We expect to see a continuing migration of the western system away from the desert states of the south to the feed-producing states of the mid-west, driven by the physical constraints of lack of water in the south, lower feed costs in the mid-west and proximity to the higher-paying fluid milk markets. We also expect most of these mega-farms to have at least 3,500 cows per herd, and in many cases to have multiple herds. The decline of small farms with less than 500 cows will continue.

The future of the export industry is harder to predict. The first question is whether the growth in the mega-farms will be sufficient to outpace the contraction in the traditional small farmer segment. However, if prices are strong then there is no reason why the mega-sector could not double in size with the majority of this being exported. The main problem will be the relativity between milk and feed prices.

The big dairies need an income-over-feed margin of about eight dollars per hundred before they will expand. With whole milk powder at over US\$5,000 a tonne, the current price as we write this article in October 2013, then these margins are easily achievable, with corn in particular now being cheaper than at any time in the last three years. However, at US\$3,000 a tonne, the western model will still struggle to be economic at current feed prices.

Professor Keith Woodford and Marvin Pangborn are part of the Agricultural Management Group based at Lincoln University.

Jacqueline Rowarth

Graduates in agriculture

Headlines such as ‘A dearth of agriculture graduates is threatening food sustainability’ in the United Kingdom, ‘Concerns over shortage of agriculture graduates’ and ‘Australia running out of food freshers’ from across the Tasman, along with ‘Agriculture begging for graduates’ from New Zealand have featured in the media in the last 12 months. They indicate a failure globally to explain to society the realities of what it takes to produce food sustainably. They also show that we have failed as an industry, despite all best endeavours, to encourage and enable the younger generations to move into the rewarding and challenging careers which are available in the primary sector. This article considers the change in students over the last few decades, why the world is in its current predicament, what other countries are doing about it, and how New Zealand can take action.



The past

A report in this journal in 1998 suggested that ‘until the late 1980s, agricultural graduates were 8 to 11 per cent of the total, and increased from 600 to 1,000 between 1975 and 1988.’ This data came from the New Zealand Vice-Chancellors’ Committee *University Graduate Destination* reports. From 1988 to the early 1990s there was a rapid slide in numbers and proportion, some of which might reflect a change in accounting by the committee. It reported in 1993 that the ‘number of New Zealand agriculture and horticulture graduates surveyed was 226’. This was 1.4 per cent of the graduate numbers of 16,002 and consisted of agricultural commerce, agricultural science, horticultural commerce, horticultural science, horticultural production and technology, with farm management and valuation. No distinction was made between university levels of qualification.

By 2000 agriculture had been moved to the biological sciences in terms of classification and 100 students graduated, with 171 in resource and environmental studies. In commerce and business there were 67 students who graduated in management or land-based production, and 123 in property and valuation. This suggests production-based degrees were still 1.3 per cent of the 22,735 graduates with no distinction on level of qualification.

The current state in New Zealand

Current Ministry of Education tables reveal that graduate numbers have fluctuated over the last few years, as shown in the table on the next page, and were at their lowest in 2008 when only 50 agricultural science and 40 agribusiness students graduated. This was fewer than the agriculture and horticulture graduates from Massey University alone in 1981 – 125, with a similar number from Lincoln University.

Comparisons with earlier years are fraught with challenges in terms of which qualifications were lumped together. However, of the 25,380 domestic graduates in bachelors degrees in 2012, which is the latest data from Ministry of Education, 100 had completed their studies in agriculture, 30 in horticulture, 80 in farm management and agribusiness, and 170 in environment.

Ministry of Education completion data, also in the table, shows that in undergraduate and postgraduate qualifications over the last few years the production science degrees have not competed well with the environmental qualification. Doctoral qualification data is not presented as many agricultural PhDs complete under the grouping of natural and applied sciences.

The Ministry of Education reports that all agriculture and horticulture

Ministry of Education data for domestic completions

Bachelor degrees	2006	2007	2008	2009	2010	2011	2012
Agriculture	110	80	50	70	100	80	100
Horticulture	30	30	20	40	30	20	30
Farm management and agribusiness	100	100	40	90	70	90	80
Environmental science	90	60	80	120	70	170	170
Graduate cohort	21300	19010	20840	21130	20560	23150	25380

Honours, postgraduate certificate and postgraduate diplomas	2006	2007	2008	2009	2010	2011	2012
Agriculture	20	20	10	20	20	20	20
Horticulture	n	n	0	n	10	n	10
Farm management and agribusiness	30	20	30	10	10	10	10
Environmental science	90	90	90	110	120	190	140
Graduate cohort	7620	7040	7660	8160	8500	8910	8960

Masters degrees	2006	2007	2008	2009	2010	2011	2012
Agriculture	10	10	n	10	10	10	10
Horticulture	0	n	n	0	0	n	0
Farm management and agribusiness	10	10	10	n	n	10	n
Environmental science	50	50	50	50	40	50	40
Graduate cohort	3530	2670	3250	3100	3220	3470	3370

bachelor degree graduates in 2012 were aged between 20 and 24, indicating that most students went to university straight from school or after a year. Most have had some employment experience and many try to work part-time when at university. The latter can have an unfortunate effect on attendance.

While part-time work is regarded as a necessity to offset fees and living expenses, in agriculture a considerable number of students have significant scholarships and because of online teaching and study guides, books are rarely bought. No comment about cars, mobile communication devices, take-away food and holidays. The young are living the lifestyle their parents can afford, supported in too many cases by a student loan.

The school foundation

Top students are as good as they have ever been. There are excellent graduates of both genders who are making a contribution to the agricultural sector, helping it to drive the economy. However, as the proportion of the school completion students coming into tertiary training is now much higher than it was during the 1970s and 1980s, there has been a change in the breadth of ability appearing. Of further note is that New Zealand has a very high rate of involvement in tertiary education. A total of 52 per cent of school leavers complete an undergraduate degree in New Zealand – the OECD average is 40 per cent. A further 29 per cent of school leavers complete a sub-degree programme – the OECD average is 11 per cent.

It is a result of a deliberate government policy of educational inclusion that more people are encouraged to go to university.

The younger generations also tend to have greater self-belief than previously. They have been given high grades – in the United States 43 per cent of grades given are As – and rewarded for participation rather than effort or achievement. They have also been encouraged to evaluate and challenge other people’s ideas and decisions. Peter Sheahan, author of *Generation Y: Thriving and Surviving with Generation Y at Work* and a Y-generation member himself, says that Y-generation members ‘are inclined to argue if they don’t like what is being said or done, whether or not they have taken the time to inform their opinion.’

The result has been the development of an education system with more focus on ‘teaching to the exam’, mastery tests where students can have repeated attempts at passing, as well as multi-choice and internal assessment so that teachers can justify the assessment. In New Zealand, research by Professor Luanna Meyer of Victoria University has shown that this style of education has suppressed motivation. There is also research which suggests that creativity has been suppressed in this generation because of constant supervision, toys that switch on, and the use of templates in assessments.

Below expected levels

The National Education Monitoring Reports state that students are interested in science and see it as having value for the future when in years four and eight. However the results

of the National Monitoring Study of Student Achievement released at the end of November 2013 indicated that 80 per cent of final year primary and intermediate school students are performing at below the expected level in science.

The Programme for International Student Assessment education achievement results released in early December by the OECD reported that New Zealand's 15-year-old students had slipped from seventh to thirteenth in reading, seventh to eighteenth in science, and from thirteenth to twenty-third in maths. Education academics have warned that the data should be treated with caution, as it is hard to compare different education systems accurately with different languages in different parts of the world. They suggest that it would be more useful to look at how current New Zealand students compared to previous New Zealand students. 'Not well, but otherwise' might be the answer from those of us who have been in tertiary education in the numeracy, literacy and science disciplines for some time.

Dramatic changes

Part of the problem with the perceived quality of graduates is the amount of bridging teaching, whether it is or is not acknowledged as such, which is required because learning at school has changed so dramatically. Subject liberalisation was an attempt to make education more relevant for a greater proportion of the population, and choice increased. New subjects such as recreational studies, media studies, photography and drama, all for academic credits rather than after-school activities, were part of reforms designed to enable every child to complete a qualification with a sense of achievement.

At the same time, the need for a scientifically literate society able to understand the benefits and risks of new developments was recognised and the approach to teaching traditional subjects was changed. This meant a move away from a system where knowledge and abstract facts were considered to be important and exams were final, to what is termed a child-centred approach with greater emphasis on course work, open-ended tasks, context-dependent knowledge, analytical skills and verbal reasoning. The unintended consequence is that children have tended to opt for subjects which they perceive to be enjoyable and where acceptable achievement can be obtained for minimum effort.

Research from the Centre for Evaluation and Monitoring at Durham University has shown it is more difficult to obtain a high grade for subjects where memory and accuracy are required such as physics, chemistry, biology, maths, French and German than in what are termed the creative subjects such as drama, design, photography and media studies. The Australian headline in mid-December 'Maths and science lecturers struggle with ill-prepared university students' provides further evidence for a global problem. The Chair of the National Committee for Mathematical Science has said that students have great difficulty completing first-year university subjects because they had been given 'very dangerous advice' at school to choose subjects they thought would boost their Australian tertiary admissions rank.

Keep a broad mix of subjects

The result for agriculture at universities is that students do not have the expected science background. The fact that numbers are lower than might be expected is because the lack of required science background means they have enrolled in a different degree. Germane to the current predicament in agriculture is the advice to just follow your passion. Research in the United States by Cal Newport, author of *So Good They Can't Ignore You: Why Skills Trump Passion in the Quest for Work you Love*, has shown that famous people who have given this advice publicly actually did not have passion until they had worked at it for some time. At 15 years old it is unlikely that a lifetime's passion will be identified, and keeping a broad mix of subjects actually limits future options, whereas doing what are termed the hard subjects allows diversity later in life.

Science, technology, engineering and maths subjects have declined in popularity in formal education globally. This is despite the fact that knowledge from these subjects is vital in meeting the challenges in –

- Food and the environment
- Economic development, which is linked to tertiary education in science and technology
- The ability to create wealth from innovation, linked to scientists and engineers in the workforce.

Analysis for the United Kingdom Parliament published by Westgate in 2007 has suggested that factors behind the decrease in science, technology, engineering and maths students include –

- Shortage of specialised teachers in these subjects
- Poor image of science and scientists
- Perception of science as a hard subject
- Lack of knowledge about careers in science, technology, engineering and maths.

All of these factors are true, but research for the Ministry of Research, Science and Technology published in 2006 showed that schoolchildren still take the sciences if they want to be doctors or veterinarians. Research from the United Kingdom reports that young people take subjects which are useful, enjoyable, that they can comprehend and that complement each other and do not take those that are difficult or boring. In New Zealand, studies of the effect of the NCEA led by Professor Luanna Meyer report that students mainly choose subjects because they are of interest to them and because they are related to a future job or career goal.

Workforce planning

Workforce planning is necessary for ensuring that the right career aims are in place in the young so that they have the right knowledge, skills and attributes available when needed. It is notoriously hard to achieve. Isaac Asimov's novella *Profession* focused on identifying by brain analysis exactly what profession would be best for a person – no choice was allowed. Children were taught to read at the age of eight and then educated at the age of 18 by an almost instant process known as 'taping'. The top educated people competed in

professional Olympics in the hope of being bought by an advanced outworld. Market forces were at work.

These forces also operate in New Zealand, but are not being picked up by schools. The Ministry of Business Innovation and Employment has produced *Occupation Outlook* in an attempt to help career advisors. It gives many different types of occupations, the demands, the fees associated and remuneration. For farm management, the *Outlook* states that income is average, fees are low because it is not necessary to have a degree, although increasingly qualifications are important, and job prospects are good for new entrants who like an outdoor lifestyle and rural location.

A Federated Farmers survey reveals that total value packages on the farm are better on average than in the city, as shown in the table.

Remuneration on the farm 2013

Position	Mean in dollars	Change from 2012 per cent
Dairy assistant	38,803	+3.5
Dairy assistant herd manager	46,256	+2.0
Dairy herd manager	56,061	+7.0
Dairy farm manager	70,336	+6.5
Dairy operations manager	69,323	-2.7
Sheep and beef general hand	41,981	+2.1
Sheep and beef shepherd	46,902	+4.3
Sheep and beef head shepherd	55,256	+11.7
Sheep and beef stock manager	55,770	0.0
Sheep and beef farm manager	66,740	6.6
Grains arable tractor/machinery driver	47,652	0.0
Grains arable senior tractor/machinery driver	55,818	+6.9
Grains arable farm manager	66,359	+11.0

Remuneration in agribusiness – industry response

Position	Salary dollars	Benefits
Field representative seeds	44,000	Car, computer, telephone, clothing
Field officer fertiliser	48,000	Car, computer, telephone, clothing
Bank intern	50,000	
Rural portfolio manager	50,000	Car, computer, telephone, clothing
Farm technician	48,000	Accommodation
Farm business technician	55,000	

For rural professionals in agribusiness the starting salaries are rather higher than those for the average graduate. The problem for agriculture in the Ministry of Education data is that it is in the same category as environmental science.

Median and quartile annual earnings of young domestic bachelor graduates

Field of study	One year after study	Two years after study	Five years after study
Agriculture, environment and related studies	\$48,063	\$53,197	\$61,559
	\$38,613	\$44,728	\$49,157
	\$28,146	\$33,036	\$37,224
Education	\$46,749	\$48,205	\$56,280
	\$44,590	\$45,815	\$49,804
	\$38,885	\$41,011	\$36,155
Engineering and related technologies	\$49,830	\$53,878	\$69,975
	\$43,124	\$46,287	\$58,287
	\$33,273	\$37,422	\$46,716
Management and commerce	\$45,690	\$51,320	\$68,014
	\$39,838	\$44,741	\$53,791
	\$31,061	\$36,891	\$41,373
Natural and physical sciences	\$44,662	\$51,320	\$59,961
	\$36,874	\$43,074	\$48,974
	\$26,153	\$32,349	\$36,212
Total students	\$46,642	\$51,244	\$63,366
	\$39,701	\$44,474	\$50,938
	\$28,543	\$34,311	\$37,576

Salaries are exceedingly important for the younger generations, ranking number one in surveys by Robert Half International as shown in the next table. More promotion of the higher salaries, as well as the benefits and opportunities for career development which are available in agriculture, will help in improving the calibre of recruits in the future. Other important aspects in recruitment are the brand as the younger generations want to be regarded highly.

Consideration before joining the workplace Robert Half International 2008 and 2012

Consideration	Score in 2008 out of 10	Score in 2012 out of 10
Salary	9.1	9.0
Benefits	8.9	8.9
Company stability	N/A	8.9
Career growth	8.7	8.6
Location	8.4	8.4
Leadership	8.0	8.0
Brand	7.6	7.8
In-house training	N/A	7.2
Job title	7.2	6.7

Graduate destinations

In 1993 the New Zealand Vice-Chancellors' Committee reported that job titles for agriculture and horticulture graduates, for both undergraduate and postgraduate, were – agricultural and horticultural scientist, agronomist, agricultural or horticultural manager/worker, life scientist or technician, management trainee, insurance/real estate representative, farm/horticultural consultant. Employers were – government departments, research institutes, universities, private or self-employment, trading banks, producer boards, mercantile firms/seed companies, and farmers, orchardists and market gardeners. Animal nutritionist and landscape architect appeared in the next two years.

In 1997 the agricultural graduate data was incorporated into the biological science data. This meant that it was no longer possible to see where graduates from specific degrees were being employed. In 2008 DairyNZ analysed where its scholarship holders were working, as shown in the next table, and reported that the bulk were in agriculture but not all were in dairying.

Employment destinations for DairyNZ scholarship graduates 2008

Employment	Percentage
Accounting	1
Dairy farming	22
DairyNZ	5
Environmental science	3
Farming including overseas	5
Fonterra	8
Job seeking	6
Other industries	3
Overseas	9
Postgraduate studies	6
Rural banking	9
Rural professional consulting	23

The employability of graduates in agriculture is high. Professor Quintin McKellar, Vice Chancellor of the University of Hertfordshire, estimates that British agriculture needs 60,000 more workers for optimal productivity, and that to be internationally competitive the sector will require graduates with advanced problem-solving skills. There are currently 7,000 agriculture students graduating from universities and colleges in the United Kingdom each year, which is insufficient to replace the approximately 10,000 leaving the industry by retirement. Increasing the workforce is out of the question without recruitment from overseas. Similarly, Australia is graduating approximately 700 young agriculturalists a year and analysis of job advertisements indicates a demand for 4,500 agricultural graduates annually.

Actions taken

The United Kingdom has taken action. In something of a volte face the British Government stated in September 2012 that, 'We do not currently have the basic science base to deliver more sustainable food production practices.' Only 19 months earlier it had accepted a report from the Food Research Partnership Skills sub-group which said that 'the supply of high level skills to provide the research to support effective, joined-up policies; to develop and disseminate new knowledge and technologies; and to exploit the opportunities for innovation' was sufficient.

The problem is that the people reviewing the problems failed to predict demands for sustainable food production, and did not foresee the challenges of food production in climate unpredictability or anticipate the effect of pests and diseases. The British Government then announced an expansion of its agri-apprentice scheme to £1.4 billion, and another £12 million was provided for postgraduate education in sustainable efficient food production, advancement of the United Kingdom agri-food industry, food quality and health, and livestock health in production.

In addition, in September 2012, the UK Education Secretary stated that school league tables would be scrapped and a focus on traditional subjects would be instigated to stop schools promoting soft subjects. Internal assessment would go and subjects would be wholly end-of-course exams. New courses in English, maths and science split into biology, physics and chemistry, foreign languages, history and geography would be introduced. A new suite of qualifications would also be created for other subjects such as art, religious studies, design and technology. The changes were welcomed by business leaders condoning rigorous assessment in the school system as part of raising achievement.

In contrast, New Zealand has recently brought in school ranking. The Australian Council of Deans of Agriculture was formed in 2007 because of concerns about market failure in agriculture – declining roles and increasing jobs. However, the Council has yet to gain significant traction with government support that has any effect, for example decreasing fees and increasing government-funded scholarships.

In New Zealand, significant programmes to raise awareness have been in place for some time. Outstanding in the Field, Windows on Dairying, Go-Dairying, Agri-kids, Agri-teens, media support through Young Country, special editions in newspapers, and now the Pathway in Agriculture, are all good initiatives but are taking some time to have effect. Part of the problem is the over-arching dirty dairying and redneck perception of farming, which is untrue but permeates societal reaction as well as agribusiness as a whole.

The future

The agricultural value chain from plant-to-palate, farm-to-fork or block-to-bowl needs greater understanding by society so that the productive end of the food chain is regarded favourably. It also needs a revolution to feed a growing population sustainably. Professor McKellar has

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Al McCone

An end-user view of the state of agricultural education and training

In November 2013 Landcorp had a portfolio of 137 farms on owned or leased land and this number will grow as further dairy farms on a central plateau development are added. There are almost 600 permanent employees on the farm, and each payday we disburse the equivalent of another 200 permanent wages to some of a large group of casual workers.



Our skill requirements are the same as those required for every farm. We need people who can nurture stock and protect our land while producing high energy pasture, build and repair fences, operate complex machinery, and cope with the timely decision-making required for successful farming. We need those who can coach, manage and lead. As with all employers, we want thinking, practical, innovative staff, fully equipped for the jobs they are asked to do.

The 2012 census data shows New Zealand as having just over 38,000 pastoral livestock farms of varying size, producing over \$17 billion in export earnings each year. The pastoral livestock industry employs around 38,500 permanent employees and has an average turnover rate of 25 per cent. Landcorp figures show we need to replace around 160 people a year, and approximately 70 would need to be at the shepherd general or dairy assistant entry level.

The article by Dalziel et al in the September 2013 issue of this journal sets a good scene for this opinion piece. They point out that the age, experience and levels of training of farm assistants, and the breadth of that training, are a factor in differentiating between high and low profit farms. More important are the questions the article raises. It seems to follow that we should question –

- Why after more than 20 years of vocational training using an ITO model, almost 50 per cent of dairy farm managers surveyed had no or low levels of production qualifications and over 55 per cent had no or low levels of business qualifications
- Why the top quartile of performers tend to use informal learning, such as discussion groups, rather than formal learning
- Why those top performers are no more or less likely to have qualifications than low performers
- Why the top quartile is likely to find the statement ‘we encourage staff to develop their skills and participate in training’ less agreeable.

Labour shortages and unhelpful recruitment attitudes

There is a shortage of good applicants for most farming jobs in many regions, and this is especially so in the initial employee group. One effect of this is an increasing reliance on imported labour, particularly in the southern dairy sector. The shortage of new blood into the industry is not helped by the attitudes in some secondary schools. I often encounter stories of young people who have been advised against a farming career by the school career guidance counsellor.

This advice is more generally given to students who have academic potential. There is a message, presumably well meant, that farm work is menial and below

the student. Some of our staff have also told us they were discouraged from university study in agriculture. Both Taratahi and Telford have put considerable effort into re-educating school attitudes. Taratahi has increased their applicant group by over 300 per cent using dedicated and innovative efforts. I have also been very impressed with the effort made by Young Farmers groups by their Agri-kids programme as well as the DairyNZ Go Dairy innovation.

It is also relevant to consider that some of those who are steered toward farming have not done well in the school system. The sector has many workers who have literacy and numeracy shortfalls. This does not help them to develop further by on-the-job training which relies heavily on self-directed study or short intense periods in classrooms.

Gaining the right skills

Whether local or foreign, initial recruits to the industry require a basic grounding before they can be useful on the farm. Generally, those who come from farming families have a modicum of skills but increasing numbers come from non-farming backgrounds. There are more entrants who are either passionate but unskilled from towns and cities or an unskilled job-seeker who is trying yet another avenue for employment.

Traditionally a young person who came new into farming would serve the equivalent of an apprentice period with a farmer, gradually learning the stock and pasture skills required. Pastoral livestock farming has developed succeeding generations of workers by using on-farm coaching and learning by experience. Workers learned what the farmer knew and what they learned in conversation with other farmers. This gave rise to the ubiquitous field day, an opportunity to look at and discuss new techniques with visitors and other local farmers, a practice which still exists and is a potent teaching and learning forum.

Institutions such as Taratahi and Telford grew from a realisation that this traditional method was not developing enough workers with the depth of knowledge required for agriculture to move ahead. Both institutions have their own Acts of Parliament, which show how readily the government of the day appreciated the efforts made to set them up. Both institutions have grown considerably over recent years to meet the industry needs.

There has been some effort to bring lower level agricultural training to secondary schools but our experience of this is split. On one hand, it acknowledges the existence of agriculture as a realm of knowledge and in some cases sparks a real interest that students take forward to post-secondary training. The work-experience option seems to operate well, especially where the student is assigned to a motivational farmer. On the other hand, the number taking part in secondary school agriculture subjects does not reflect the number joining the industry. Some staff I have talked to tell of classmates who were there for the easy option and that very few from the class carried on to agriculture.

Post-secondary pre-employment training

There are a number of opportunities for post-secondary pre-employment training. These include –

- Private institutions which produce two year immersion programmes and ready-to-work graduates such as Waipaoa Station and Smedley
- Specialised public institutions such as Taratahi and Telford
- Polytechnics and wananga which offer a smattering of courses among a wide group
- Small farm based starter or taster courses such as the Aratiatia-based Landcorp-AgricultureNZ Future Farmer course.

The Waipaoa Station, Smedley and deep immersion courses use their graduate results to attract a high calibre applicant and select a small number from this group. Almost all graduates from these courses are capable of holding down general shepherd positions immediately on graduation and have the right attitude towards work to accompany their skills.

Despite a high turnover of positions, the graduates from farm based pre-employment programmes seem to remain in the sector. For example, our research on the Future Farmer programme shows that of 114 graduates over 10 years, 89 per cent are still in the agricultural workforce.

There is no doubt that Taratahi and Telford produce numerically as many, if not more, competent and successful graduates as do the smaller and more highly immersive programmes. The reputation of these larger institutions is anchored in a mixture of the not-so-successful graduate, especially those with inadequate development of a work ethos, and word of mouth history. I believe these institutions have made good strides over the last few years as they have sophisticated feedback mechanisms to provide what is required by the sector and are subject to stringent teaching and qualification moderation. Both run sound farm-based programmes.

University-level tertiary study in agricultural subjects is well catered for, with two world class institutions at Massey and Lincoln. The degree of cooperation between the universities and the post-secondary training institutions is heartening. Lincoln, in absorbing Telford, has provided an educational continuum which is a must for the sector. Taratahi and Massey appear to be developing a similar connection by cooperative association rather than ownership.

Training on the job and education

Once employed, there are various choices for further training and education. A number of Primary ITO qualifications are available at Levels 3 to 6. The higher level diploma has relevance to those wishing to progress on to farm management. There appears to be considerable drop-out beyond initial training courses across this spectrum.

The sector should have profited more than it has from the introduction of industry-based training in the late 1980s

and early 1990s. This provided an opportunity to develop a coherent set of learning objectives which would supply best practices and provide avenues for enhanced learning and development. In turn, this should have led to much improved capability for pastoral livestock farming. The work-based training approach seemed to be ideal for an industry known for training based in the workplace.

Having four or five existing tertiary institutions, including two universities, specialising in agriculture provided the basis for a pathway to match training and education to career development. While the pathway exists, vocational training does not appear to have had an effect to the extent that it might have and there are several reasons for this.

Poor input into the system

As mentioned, a large number of those who enter the sector have not done well in secondary schools. Vocational training needs to be more accessible and inviting for these individuals.

A number of entrants are not keen on formal learning and bookwork, and a significant proportion of these have literacy and numeracy shortfalls. Unfortunately, the current workplace-based training does not provide the specialist trainers required to deal with this level of student.

Recent attempts by the Primary ITO to implement numeracy and literacy programmes appear inadequate given the fact that there is a tendency to avoid being involved with qualifications-related training. Landcorp has done some work in this area and it can have a significant effect on individuals and the farm. But it is an expensive proposition which is beyond an individual employer and requires better access to centralised funding.

Inadequate access to public funding

The public funding schemes which operate do not allow for exceptional circumstances. An industry which produces over eight per cent of gross domestic product and 40 per cent of export revenue has no special funding that allows tutors to –

- Travel or put in place the technology that would enable them to be closer to remote students
- Build trust relationships with school-shy students
- Build on low level literacy and numeracy levels in a familiar environment.

The apprentice carpenter who may travel 20 minutes after an eight-hour day to attend classroom work attracts the same funding as a dairy worker who works up to an 11-hour day spread in two shifts from 4:00 am to 6:00 pm and then may have to travel up to an hour over rural roads to the nearest provider. There is no ability to provide localised tuition, perhaps in rural primary schools, because lack of travel funding makes this difficult to support a provider and an employer.

In many ways the sector is fortunate to have organisations such as Beef+Lamb NZ and DairyNZ which take interest in attracting and developing people in the industry. Many innovative developmental mechanisms are being tried by these organisations, including support for discussion groups where learning takes place. Both provide scholarships to

individuals and also provide impetus and funding to the Primary ITO as in the legislative requirement. I believe the current funding arrangements do not take into account the nature of rural employment and this has had a detrimental effect on the adoption of vocational training.

Perceptions of tick-and-flick training

There is little confidence in the results of what has become known as tick-and-flick training. Over recent years, it appears that the graduates of competency-based qualifications have failed to provide the result required by farmers. As many farmers will tell you, they know that having a Level 3 or Level 4 certificate does not make a person competent. There is need for significant tuition and feedback on the farm, something many feel is onerous or that they are ill-equipped to provide. Unfortunately for a recent graduate, this means the farmer will take someone with a proven work history without a qualification instead of an inexperienced graduate with little background on the farm.

Some farmers have forgotten or do not know how much a role they traditionally played in developing practical skills, and they have become intolerant of taking on trainees they need to put extra effort into. The Primary ITO has a programme Farmers as Trainers which is a very good start in building farmer confidence in developing new entrants. Knowledge of this initiative and accessibility to it needs to be expanded.

The reality is that a tick of competence does not necessarily ensure the individual has the right attitude or application. It is in these areas where we see the high Level 2 year immersion courses succeeding and Taratahi and Telford making strides. Donovan Wearing of Taratahi was recently reported as being critical of training programmes that had some ‘perverse incentives’ in place, teaching learners to shear 10 sheep to pass a qualification rather than developing work-orientated attitudes to finish the job and shear all 500 sheep in a pen. Wearing’s view, with which the majority of farmers would agree, is that helping students to get the right attitude and feel positive about the sector is central to a thriving industry. This is certainly the focus I have observed at Waipaoa Station and Aratiatia, as well as Taratahi and Telford.

Lack of training providers

I have been told there were not enough training providers available across the country for vocational training at the beginning of the current vocational training programme in the early 1990s. It appears that the rapid growth of private providers in other industries was not matched in the agricultural sector. This was partly because the funding model worked well in towns and cities but not in rural areas. Some polytechnics which had been producing agricultural courses stepped into other areas where better funding was provided. The private trainers who did enter the field were stretched when the funding started to contract and more stringent completion requirements were put in place. Many are now defunct or struggling.

The initial dearth of providers meant the Primary ITO was required to step in and take a provider role by part ownership of FarmSafe and a wholly owned subsidiary, Agricultural Services Ltd. Whether this has detracted the ITO from its primary role and dissuaded other providers from entering the field is unclear, but the efforts of Agricultural Services Ltd in developing foreign markets are a source of bewilderment for some in the industry. It may well be that these alternate markets are subsidising other parts of New Zealand training that the Tertiary Education Commission funding does not, and if so some transparency would go a long way to settling any disquiet.

What we are now seeing are the major institutions looking to fill the provider gap, especially at Level 5 and above, which is a reversion to days before the ITO. It is heartening that both Lincoln and Massey are or will be offering the DipAg as an off-site option as well as using Taratahi and Telford. The inception of AgriOne as a joint Massey-Lincoln mechanism to encourage higher level professional development is very important.

It is worth noting that the Primary ITO is looking to the Open Polytechnic as a provider with extension study expertise, which could result in significant improvement in accessibility. The future of continuation training in our sector lies in using a blended approach that can overcome the difficulty of work hours, rural demography and geography. Investment in training students to use broadband technology via satellite, cable or cellular networks is essential for such learning to be really effective.

Turf battles

The government's intent is that learning and development after secondary education should consist of a seamless experience for learners. The reality is that there are turf battles over qualifications and funding. Donovan Wearing has been reported as saying that he believes the sector needs to start working together to benefit learners rather than themselves.

I have heard of some organisations not recognising other nationally recognised qualifications. A recent example of this has made an identified talent and future farm manager within our organisation disillusioned with, and possibly antagonistic towards the Primary ITO. I have also heard of providers being told their contracts with the ITO would be cancelled if they also undertake programmes on contract directly with an organisation such as Landcorp rather than through the ITO.

There are a number of initiatives to bring things together, in particular the Primary Industry Capability Alliance. This collaboration between DairyNZ, Beef+LambNZ, Massey and Lincoln universities, Federated Farmers, New Zealand Young Farmers and the Primary ITO is geared to provide and promote an integrated career and development pathway across the primary industries.

This alliance brings together all the elements of education, training, networking and leadership development from school-based education, vocational training, university and leading industry associations. For everyone to contribute

meaningfully to the sector, especially the Primary ITO, there needs to be certainty about roles, a focus on reducing unnecessary overlap and a willingness to cooperate.

Promoting health and safety

Agriculture has one of the highest accident rates within the New Zealand employment sectors. The cost of new accidents to ACC in 2012 was around \$32 million and that of all active claims in the sector was closer to \$50 million. The cost of associated lost production and employment of relief workers would add considerably to this figure.

Landcorp has a well defined induction which includes a requirement for staff to be familiar with local risks and company practices, as well as attending compulsory agricultural safety training. We have discovered the quality of providers in both knowledge and presentation is variable. The ITO administered AgExcel programme of ensuring quality is a start, but only if the systems, processes and execution are appropriate. It is interesting that while the government has decided on a number of initiatives designed to boost safety in the workplace, the rules for industry training funding appear to make it difficult for the Primary ITO to fund stand-alone health and safety related training.

It can be suggested that the compliance level of training is an employer responsibility. In practice the provision of safety training for several different types of vehicles, other machinery, chemicals, stock and for safety systems and reporting requirements is wider than that which applies to many other sectors and beyond the scope of many farmers to adequately teach. There needs also to be provision for certification for specialist areas such as chemical handling. Conservatively, we estimate three to four full days are needed to properly instruct individuals on the basics of health and safety on farms and test that the lessons have sunk in.

Safety on any farm is the responsibility of all those on the farm, and in particular the farm owner and the farmer or manager. The current preoccupation with compliance training has resulted in a real gap in developing people at the manager level who understand that safety is part and parcel of production, and is more about standards, expectations and attitudes than about the skills training. If this is endemic across all sectors it would at least partially explain the current woeful figures of workplace accidents in New Zealand. Landcorp is working to develop a comprehensive workplace programme which will concentrate on that level of development.

The Landcorp way

As a corporate farmer, having a number of farms produces savings on purchasing and financing which allows us to invest heavily in people. Apart from institutional or Primary ITO agricultural programmes, Landcorp also has an internal suite of programmes from self-leadership through to advanced business management. We often contract directly to ensure the providers are of sufficient quality to give the required results at our place at times which suit us. We try to ensure achievements are recorded as nationally recognisable

qualifications, although this is not always encouraged by the qualification granting bodies.

Landcorp reimburses individuals who have achieved farming-relevant Primary ITO or university qualifications, and we pay directly for health and safety and essential pastoral courses such as mastitis management. More importantly, we are able to improve development from a mix of individualised programmes and movements across jobs and farms. We have a number of entry-level programmes designed to supply university and polytechnic graduates with accelerated practical and management skills.

We need to work towards much more accessible development mechanisms than the current tutor-in-a-classroom-based model. Telford have suggested that the successful Ministry of Agriculture and Forestry discussion groups of the past may have an electronic equivalent and this may lead to other online group learning capabilities. We know that local field days are very good for the transfer of ideas and we need to investigate how to benefit from this. The next step is to encourage more advanced mechanisms for formally assessing and recognising learning which is achieved outside the classroom.

Landcorp is also very keen on providing pathways for people with poor literacy and numeracy. Our next challenge is to convince funding agencies that the model we successfully tested is eligible for that funding without it being diluted by the overheads of other agencies.

What does the future hold?

Institutions such as Taratahi and Telford remain central to producing good entry-level people into the sector. It is their efforts in attracting people to the industry that are paying

real dividends. It is essential that they continue to provide alternate means of provision and improving the quality and diversity of their graduates.

The gap the sector needs to fill is the provision of viable training of sufficient accessibility and quality to take the bulk of these graduates to the level required as technology and science becomes a greater part of day-to-day farming. AgriOne fills an advanced educational role for the sector, and there is need for the Primary ITO or a similar organisation to fill the gap between entry-level training and the university level.

At this point, it is difficult to see any provider filling this gap except for the four institutions mentioned – Lincoln, Massey, Taratahi and Telford – or organisations such as the Open Polytechnic, Wintec or Te Wananga o Aotearoa. This is because their size allows them to work within the current funding arrangements and to explore working with different models.

Most of all, we need to be sure that the learning is effective. The advancements and quality control mechanisms of the institutional providers appear stronger and better resourced than those of the current Primary ITO. The Dalziel et al article showed that cooperation between universities and industry-good bodies can result in useful information for taking forward the capability of staff. It is time for everyone to work together in a more coordinated fashion to ensure maximum effect and consistency across the sector.

Al McCone is National Manager Staff Relations and Training at Landcorp Farming Ltd. This opinion piece is based on his perceptions of the New Zealand agricultural training scene after two years in this position. The views in this article are those of the author.

>> Graduates in agriculture continued from page 12

stated that universities, research institutes and industry will need to harness their combined intellect to make the substantive advances necessary to keep feeding people. He also suggests that new generations of graduates should leave university with the intellectual capacity to use technology in imaginative, productive and profitable ways, as well as having the flexibility to embrace the unknown.

Many of the New Zealand agri-graduates already do this, which is why they are in demand. Improving the system for the future will take government initiative, not just in the recently announced funding for increasing the skills of teachers in maths and science, but also in sending improved signals to students, parents and careers guidance counsellors

on the value of learning about sustainable food production. The simplest way to do this is by dropping the fees in areas where demand outstrips supply – the skilled migrant list published by the Department of Labour is the clue – and creating significant scholarship packages which support living.

The argument that students might take agriculture but not enter employment in the sector has been raised. But as that person would know about sustainable food production, whether or not he or she was working in it, why would it be a problem?

Jacqueline Rowarth is Professor of Agribusiness at the Waikato Management School, University of Waikato in Hamilton.

Melonie Sheppard

Agriculture training and education Spoilt for choice but is it hitting the mark?

As an employer of farm staff in New Zealand we are spoilt for choice for training and education options for new and current employees, with more offerings on the boil. However are they hitting the mark and resulting in the productivity our agriculture sectors aim for?



For many years we have had access to basic training in skills such as riding an all-terrain vehicle or using a chainsaw. These are critical skills for all farm staff to master. Recently, government-led changes have placed greater expectations on industry training organisations and training providers to more clearly align their products and services to industry strategies.

At the same time industry bodies such as Beef + Lamb, the Deer Industry and Young Farmers have recognised the role they need to play in educating farmers if we are to have a productive and sustainable industry. From the days of the Federated Farmers cadet scheme we have seen more technical, farm, business and people management training evolve. Today there are few roles, experience levels or required skills on-farm where an employer is not able to obtain formal training as a stepping stone to meeting the need. The table on the next page highlights the range of education and training options available to prospective and current farm staff.

Lost focus

Most industries would envy us being able to cater for such a large proportion of our workforce. However, while this suggests we are all singing from the same hymn sheet and happily sharing the bus, let us not confuse the offering of numerous education and training options with farmers being able to access a work ready, capable and knowledgeable workforce.

As the options increase, do we move further from the implementation and execution of current knowledge and new skills and more towards ticking another box that we have trained and educated our staff this year? As employers, we have lost a critical focus on ensuring we have full uptake and execution of the basics and core programmes already in place. There is still much work to be done.

The starting point is a shared vision and strategy. The dairy industry is leading the way with their Strategy for Sustainable Dairy Farming 2013–2020. For other sectors, establishing an industry strategy is in progress and we are still a long way from a confident clear direction and alignment of education and training options.

Refinement needed

Results of agricultural education and training efforts in New Zealand are still very variable and our measures of hitting the mark need refining. Qualification achievements are an important measure, but by no means the only one, and for most employers they are well down the list of how they measure the value of training. This is the case even though qualifications are important for the recognition of a course completed, of new learning acquired, and to secure funding from the Tertiary Education Commission.

Training statistics –

- In 2012 almost 1,000 more people working in the dairy sector enrolled in ITO training than in 2011, with 54 per cent of trainees gaining their qualification
- Similar results were achieved in the sheep and beef sector, with 952 trainees enrolled in ITO training in 2012 and 57 per cent gaining their qualification compared with 797 in 2011
- The number of trainees in the wool harvesting industry has been steadily declining over the past few years with 1,455 in 2012 compared with 1,561 in 2011 and only 33 and 39 trainees respectively achieving their qualification.

This is mainly caused by the reduction in sheep numbers, with the consequent significant decline in the number of shearers. Tectra, New Zealand’s largest provider of wool harvesting training, say they are not seeing new entrants to the industry. With fewer new entrants coming into it, the number of trainees progressing through the different levels is reducing.

Our education and training sector in the future needs to produce training which is relevant to the needs of the farmer and is consistent across the country. How can various providers all produce graduates with the same graduate profile on exit? One can be a hands-on programme with trainees living full-time on the farm and out working in the real world, while in another, trainees are lucky to have 10 weeks of practical experience for the whole year.

Training providers and employers both need to recognise what can be achieved within the given timeframe. What does work ready really mean? Talking with providers and farmers there is a clear disagreement within what the graduate is capable of, at all levels of training. Over-promising and under-achieving is not helpful if we are to bridge the gap and have employers and their staff value the qualifications on offer.

Applicants for on-farm roles

Most employers today would agree that it is challenging to find good quality staff for positions in agriculture. This is shown by relatively high agricultural wage inflation since 2008, particularly in the dairy sector. In terms of farm roles, applicants for entry level positions in New Zealand come from two main sources – graduates from the various programmes shown in the table and who are mostly young people or career changers.

All of the programmes after secondary education are operating at full capacity each year and all report an over-subscription for places by more than 50 per cent. This poses the question – have we a problem attracting people into farming, then training and educating them, or is it more a case that we are not catering for the masses wanting to get involved?

In addition, perhaps some farmer employers are their own worst enemy. A number of graduates from these programmes say they struggle to get their first job as they

Farm-based training and education options

Potential and current employers	Training and education available	Future opportunities
School students	<ul style="list-style-type: none"> • NCEA – Agriculture for Years 11-13 • Primary ITO Trade Academy now working with 27 schools • Correspondence courses through Open Polytech and other providers • Young Farmers of NZ, with support from industry bodies, running TeenAg and Agrikids competitions • ‘Food and You’ Career Experience days for 8 to 13-year-olds 	<ul style="list-style-type: none"> • More schools offering agriculture via the Trade Academy • Greater numbers participating in existing programmes • Mentoring students expressing an interest in a career in agriculture to help make it a reality
School leavers	<p>Range of options from –</p> <ul style="list-style-type: none"> • Full-time including Landcorp’s Future Farmer, Smedley, Waipaoa, Land Based Training, Telford and Taratahi programmes • Massey and Lincoln Universities – diploma and degree programmes. • Primary ITO Modern Apprenticeship 	<ul style="list-style-type: none"> • ITO and providers to spend more time understanding what employers need their entry level applicants to have to be work ready – skills, experience, knowledge of dogs and so on • Recognition of when a trainee is ready to take on new learning – the return on investment for an employer will be nil unless they can apply the training
Career changers	<p>Many of the above cater for career changers</p>	<ul style="list-style-type: none"> • Developing guidelines for career changers to assist them into the industry • Working with employers to help them recognise the highly valuable transferrable skills this group bring to our industries rather than just focusing on the skills they appear not to have
Farm staff	<ul style="list-style-type: none"> • National Certificates in Agriculture (Levels 2-5) • Short courses in areas such as rural staff management and effluent management • DairyNZ Career Pathway Tool • Primary ITO farm training plans which identify skill gaps and how to fill them 	<ul style="list-style-type: none"> • A workforce capability matrix has been developed with Learning Continuum for the Dairy Industry. Work is being done to develop the same for sheep and beef and other primary industry sectors
Farm owners	<ul style="list-style-type: none"> • DairyNZ, Beef and Lamb NZ, Deer Industry NZ and others run field days and workshops to support information transfer from research to farmers 	<ul style="list-style-type: none"> • In the sheep and beef sector, a major success has been a pilot project to improve access to subsidised training for farm owners

do not have experience. This is a particular problem for the sheep, beef and deer sectors. As asked earlier, what is it fair for an employer to expect from both the applicant and of any prior training of an entry level graduate?

Applicant characteristics and trends at present show that more women are entering various roles in agriculture and there is an increase in people from other industries looking for the good life on a farm. It goes without saying that bringing an ex-plumber or mechanic into a farm team has benefits. The dairy industry in particular has a third of entry level employees via migrant workers, with Phillipino, Dutch and South African staff adding significant value to their workforce.

Literacy and numeracy

Like most hands-on industries, New Zealand agriculture is not alone in finding that a concerning proportion of applicants and employees have not acquired skills in basic literacy and numeracy. Our education and training sector has invested significantly in establishing programmes to reduce the barriers that literacy and numeracy problems have on learning and the contribution staff make on the farm.

In 2012 the Primary ITO took 6,600 trainees using adult literacy and numeracy assessment. Almost 200 trained mentors are now available throughout the country to provide support to those experiencing difficulties completing their qualifications for literacy and numeracy reasons. For employers this is a great help, as well as a growth in confidence and competence it gives our future farmers.

Applicants for off-farm roles in agriculture

Taking a glance at off-farm roles which support our primary producers such as fertiliser representatives, consultants, bankers, researchers and agribusiness managers, applicants for these roles have been short in numbers as well. However, trends from Lincoln University for students undertaking Bachelor of Agricultural Science and Bachelor of Commerce (Agriculture) programmes would suggest we are making up ground here. For example –

- Over the past five years an average of 180 to 200 students enrolled in the Year 1 management paper and has hit a high in 2013 with 260 students enrolled
- By Year 3 a total of 95 to 100 students complete capstone management papers 316 and 317, most of whom enter the workforce looking for roles in agribusiness
- Enrolments for diploma courses are fairly consistent, with an average of 81 students studying the Diploma in Agriculture over the last five to seven years and 45 the Diploma in Farm Management.

The Primary ITO also recognise the opportunity to encourage development of management skills in the industry. In 2012 they initiated the professional land managers project which incorporates four separate sub-projects based on the idea of a conveyor belt of learning. This opens the opportunity for graduates from this programme to move into off-farm agribusiness management roles when their days of

hands-on farming are over. With the average age of farmers still around 58 years, having career options for experienced farm owners and managers must be the start of a wider pathway for industry succession and is a critical way ahead.

From an employee perspective, the information in the table represents a big incentive to enter and stay within New Zealand's agricultural sector. The dairy industry is well ahead in offering a clear pathway from entry level to management and farm ownership in its various forms. At the same time it has high staff turnover compared to the other sectors. This suggests that there are fundamental reasons why staff leave and this is not due to a lack of training and education being available. They work too many hours and accommodation quality is still a problem on many farms.

Summary

New Zealand's primary industry has taken full responsibility for educating and training our own to secure a productive and sustainable future. There is a wide range of programmes with more being developed to cater for various needs. Having recognised the seriousness of labour and skill shortages, and realising no-one else can fix our problems, we are seeing much more collaboration and pooling of resources between sectors. As levy payers, any collaboration now is good news. However we need to heed the words of John W Garner, author and educator, who said –

Much education today is monumentally ineffective. All too often we are giving young people cut flowers when we should be teaching them to grow their own plants.

We should not lose sight of those crucial basics and identify for the future the areas of critical competence before we announce a person is work ready or able to contribute in their respective roles. Progression can come too fast, and many employers see that training has actually reduced our practical skills for a gain in theoretical knowledge.

We need to ensure employers are integral in the design of programmes which promise to help them achieve their production aims. Skills and knowledge have to be applied to be valued. There is no point putting staff on courses when they cannot apply their training in their job. This is called a day off, not a good return on investment.

Be aware of how fear influences the openness of employees to new ideas. While not easily admitting it, many farm managers and employers are concerned that staff may be smarter than they are. Farmers forget they already have qualified by experience and no whipper-snapper can take that experience from them. However, the combination of experience, new ideas and knowledge will be very powerful if people are able to learn how to have the conversations which will harness this power.

A lack of education and training options for our primary sector will not be a barrier to our industry progress. However implementation of the new lessons of this training may well be.

Melonie Sheppard is Human Resources Manager at Lone Star Farms Ltd based in Nelson.

James Turner, David Stevens and Kelly Rijswijk

Revitalising the role of rural professionals in primary sector innovation

From the 1960s to the present day, management decisions on the farm and in forests and orchards are being made in an increasingly complex off-farm environment. New Zealand exports primary products to many more markets today than in the 1980s. The number of export markets for this country's red meat has risen from 76 countries in 1986 to 99 countries in 2010, with an increase in value from US\$547 million to US\$2.2 billion in the same period.

The perception of dairy farmers to the risks in their farm business has changed. Surveys of their risk perceptions by Massey University in 1992, 2004 and 2009 identified a general trend of increased risk from most sources. Perceived sources of risk have also changed. Price remains important in the global economic and political situation, but input prices and regulatory change are perceived as more important now than in 1992.

The pathway to farm ownership has also changed in the last 20 years. It is no longer a straightforward progression from sharemilking to farm ownership. As well as the higher debt levels on farms there are more paths to ownership to choose from – corporate farm, leasing, professional manager or an off-farm professional career. These changes on and off the farm have also meant that the skills needed to manage farms have changed, especially in the area of business management.

DairyNZ highlight the need for good management practices and governance which are appropriate to the farm system to ensure a profitable and sustainable dairy farm. To achieve this, farms need skilled and motivated staff. Other DairyNZ research shows that, along with skills and experience in dealing with livestock and forage management, people skills such as teamwork, communication and problem-solving form an essential part of farm jobs.

Big changes

During the same period there have been big changes in the rural professions. The deregulation of the farming sector began in 1983 with the removal of subsidies, and progressed with changes in the public sector which saw research and extension separated by privatisation of the extension and consultancy services. The farming industry adapted, but eventually ended up in crisis between 1987 and 1989.

The deregulation of the farming industry and the fragmentation of the extension service saw many new

opportunities taken up by consultants who were trained under the previous public sector consultancy services. At that time producer boards moved into a supporting role for extension and initiatives such as the sheep industry Monitor Farm Programme which were formalised in 1991.

In 2012 the Ministry for Primary Industries undertook a survey of providers of services to help technology uptake in this sector. The survey identified insufficient numbers of people devoted to supporting technology uptake was a challenge to increasing adoption rates across the primary sector. Consultants who worked in the public sector consultancy services before the mid-1980s are coming to the end of their careers and training new consultants has been relatively low. In addition, consultants must now focus on providing services which make money rather than those that may advance the industry as a whole.

Role of rural professionals in innovation

Rural professionals play an important role in the process of innovation. First, they are a critical source of knowledge used by farmers. Research undertaken by AgResearch for DairyNZ found that farm consultants are often used by farmers as a source of information when making pasture renewal decisions. This is due to farm consultants being seen as having a high level of credibility in expertise and trustworthiness in the eyes of farmers. Rural professionals develop their knowledge, practices and technology using their own local networks.

The same study found that the main sources of information for farm consultants for providing advice on pasture renewal are their own experiences with farm consulting, farmer experiences and farm magazines. However, earlier work by AgResearch in the late 2000s found evidence of a growing gap between the rural professions and the agricultural research sector.

Secondly, rural professionals are seen as having an important role in working directly with farmers to take up technology and practices to increase agricultural production. An AgResearch survey of informed farmers, rural professionals and researchers in 2006 found that farmers and rural professionals considered farm consultants as very important and effective in the process of uptake of research by farmers. In this role, rural professionals were seen as being important for farmers to be able to keep up with technological and market changes affecting farm enterprises.

Knowledge exchange

A potential barrier to the effectiveness of rural professionals in their roles in the innovation process is the limited exchange of knowledge between rural professionals and researchers. Rural professionals appear to be under-valued by the research sector. Researchers surveyed in the study of the role of rural professionals considered farm consultants as relatively less important in the process of technology uptake by farmers and only slightly above average in their effectiveness in this role. There is also a difference between researchers and rural professionals in the entire innovation process.

Rural professionals identified themselves as having a potential role in influencing research priorities, participating in research, giving direction in making user-friendly information available to users, and providing feedback from farmers to researchers. Researchers agreed that rural professionals needed to be better integrated in the innovation process. However, this appeared to be in roles primarily related to knowledge transfer such as annual forums, workshops, newsletters and extension positions, as well as on research project advisory boards.

Increasingly complex problems

The roles that rural professionals have in primary industry innovation, as well as barriers to their effectiveness in these roles, are increasingly important. This is because the industry needs to deal with increasingly complex problems that can only be solved by changes on and off the farm.

As pressures on natural resources intensify, New Zealand primary industries are facing increasingly complex problems such as water allocation, water quality and sustainable land management involving competing interests. It seems that the primary sector is at the top of its performance. All the easy problems have been dealt with and we have stretched our natural resources.

For example, improved lambing percentage and carcass weight have increased productivity per ewe in the sheep industry by 85 per cent in 20 years. At the same time the breeding flock nearly halved from 45 to 24 million, the area farmed declined by 28 per cent, and sheep and beef farming was increasingly concentrated on less productive hill country. Increased productivity, number of cows, stocking rate and expansion on to traditional sheep areas has led to strong growth in dairy production. Productivity, expressed as milk solids per cow, rose by 31 per cent. The number of cows increased from 3.5 million to 6.5 million, the stocking rate

rose from 2.6 to 2.9 cows per hectare, and land area in dairy from 1.35 to 2.24 million hectares.

Science works

The productivity increases in the dairy and sheep industries have been underpinned by extensive research into the inheritance of traits, along with the development and application of genetic selection. This technology involves a significant amount of complicated science, but is relatively simple to apply. The use of science in assisted reproductive technologies in the dairy industry has meant that adoption of complicated technology is now universal.

As we get to the limits of our current resources we begin to see more complex problems. These arise from uncertain interactions among farm, environmental, economic, market and regulatory systems. For example, dairy farmers have got to the point where off-farm inputs are used to support outputs from increased stocking rate and per cow performance.

It has been estimated that approximately seven to eight per cent of the milk produced in New Zealand relies on the importation of palm kernel expeller and over a million cows are wintered using a dairy platform. These change the focus from traditional dairy farm pasture-based problems to the whole supply chain as nutrient use increases and losses are transferred from dairying to dairy support. The transfer means that finding solutions becomes more complex as different farm systems and farming cultures interact.

Understanding lucerne

Solutions to complex problems are the product of interactions rather than a sum of the parts. Solving the problems requires the ability to innovate by combining changes in farm practices, technologies, infrastructure, markets and regulations in the right way. An example of a complex technology is lucerne as a grazing pasture rather than a conservation crop. Traditionally lucerne has been used in central Otago as a forage crop for haymaking, mainly to fill a winter feed deficit, with occasional grazing. This has restricted its use, preventing the potential of sheep grazing systems to be seen in this environment.

Recent developments of our understanding of the growth pattern of lucerne and responses to defoliation and interactions with root reserves have created new rules and grazing opportunities. An increase in the understanding of the water use efficiency and interactions with nitrogen has allowed more accurate prediction of the responses of various forages to available soil water. Major redevelopment of the farm system is part of implementing this technology. Several projects have demonstrated the need for significant farm systems redesign to integrate lucerne as grazing pasture into everyday farming. This should answer farmers' questions of how much lucerne they need and the effect on winter and early spring management.

The increasing complexity of the challenges the primary sector faces means that knowledge specific to a particular problem is needed. Usually no one individual

has all of the relevant knowledge and it may not be readily accessible because participants are not necessarily aware of what they know from their own experience. Creating new knowledge and applying it to solve complex challenges needs a process which accepts and harnesses science along with the applied knowledge of rural professionals and farmers.

Technology transfer alone will not solve problems

The historical approach to innovation in primary industries has involved science developing technologies separate from users and then transferring them via extension agents and rural professionals. This has proved to be partly successful in the uptake of relatively simple technology, but has been less successful in solving complex problems.

For example, a review of a three-year intensive research and extension programme to encourage the uptake of micro-irrigation and soil moisture monitoring in Victoria's Goulburn Valley found a negligible effect on orchard water use efficiency. The programme did not focus on the changes in external social and economic systems which were also required. A retired family member often managed the furrow or bay irrigation. As such, the son or daughter managing the orchard did not consider the time required to manage irrigation important for orchard management. Secondly, to make the best use of the soil moisture monitoring, growers had to have access to on-demand irrigation. However this was not available for the growers and instead they had to order water in advance.

A research project aimed at improving water use efficiency on irrigated Canterbury dairy farms provides another example. The project involved three years designing and testing a water-scheduling software package and a quick-test protocol in the field for evaluating irrigation systems that would help make better water use decisions.

A project review found that farmers made significant progress in improving water use efficiency. The major causes of change were not technological. Instead they were economic, with farmers changing to more efficient application systems with higher pasture yield potential. They were also social, as farmers responded to public criticism about wasting water resources. The required change was happening even though the tools were never used.

To develop solutions jointly to solve complex problems requires a new method beyond technology transfer. An alternative is the development of innovation networks where you all learn and innovate together. From this process of co-innovation, problems are solved using a complementary mix of technologies and practices, along with social, market and policy changes.

Using co-innovation

Co-innovation is a systemic way to help adopt innovation and means considering the wider system as a whole rather than its individual parts. The interaction among the parts of the system then become as important as the individual parts,

as well as the rules, regulations and infrastructure in which these take place. The practical application of co-innovation involves an interest in shared problems bringing participants together to form an innovation network. They need to come from along the value chain on the farm such as farm owners, farm managers and farm staff, as well as off the farm such as processing companies, researchers, policy and regulatory agencies, farm input suppliers, consultants, veterinarians, other rural professionals and non-government agencies.

Innovation networks provide a physical or virtual forum for exploring and identifying common problems, as well as investigating and implementing joint solutions. Everyone has a shared objective in coming together to cooperate.

Participants jointly identify the main questions associated with important problems and create knowledge to deal with these by learning interactively. Co-creating knowledge requires expert and local knowledge to be valued as relevant for developing potential solutions. Managing these relationships so that everyone involved is an active participant is important, but participants have to partly give up their independent positions to cooperate and coordinate development of the solutions.

Monitor Farm programme and research

Co-innovation is not new, and there are examples of this being applied in New Zealand in the past. The sheep industry Monitor Farm programme was a catalyst for significant increases in the productivity of sheep and beef industry. These increases were also supported by significant change in the meat processing and market industry. Processing became more efficient as deregulation saw new entrants to the industry, further markets were found, and carcass size steadily increased. New processing technology was developed and implemented. Genetic gain was accelerated with the introduction of new analysis techniques and new genetics were introduced from Europe.

These changes happened simultaneously as the innovation which each player made was based on their circumstances and the changes started by others. During that time many technologies were introduced on the farm using the Monitor Farm framework, processing technology was developed, and new markets were added. These have all the hallmarks of co-innovation as complementary technology is added throughout the value chain, marketing targets are altered and new products brought in. Rural agribusiness consultants had an important role to play in developing and running the Monitor Farm programme, providing evidence that revitalising the links between science and practice are vital for future co-innovation.

Another example is the Farmer First programme which aimed to develop a method which complemented traditional research. It did this by working closely with farmers to research their targets and constraints to change. The programme then involved them in the design and evaluation of practices and technology to improve farmer aims. As part of the programme, three beef breeding cow technologies with potential to increase cattle gross margins

by 48 per cent were evaluated – heifer mating, dairy cross cows and exotic terminal sire bulls.

By understanding aims and constraints the programme was able to identify the reasons for farmers for not taking up certain technology. All farmers were aware, but reasons for not adopting any of them included the increased risks and costs associated with changing farm systems and a lack of resources on less developed farms to allow more intensive management.

The Farmer First research programme is similar to co-innovation in several respects –

- The programme formed a network of farmers, farm advisors, farm systems and breeding researchers
- Participants came together with the shared objective of improving farmer well-being in Taihape/Hunterville and summer dry coastal Hawkes Bay
- The first phase of the programme was focused on farmers, farm advisors and researchers jointly identifying the main questions related to farmer aims and constraints to improving farmer well-being
- The second phase involved farmers directly in the research to develop potential solutions, which allowed identification of the main constraints of existing beef breeding technology being adopted
- Farmers' expert and local knowledge was combined with researcher science knowledge and farm advisor farm system knowledge.

There are past examples of co-innovation in the primary sector. The Primary Innovation research programme funded plans to test and refine the application of co-innovation.

Testing co-innovation

Primary Innovation is evaluating the reasons for success in four examples of innovation –

- The DairyNZ InCalf programme for increasing dairy herd reproductive performance
- The Apple Futures programme for integrated apple orchard management
- Beef + Lamb NZ Land and Environment Plan for sustainable land management
- Cost-effective forest resource evaluation.

Primary Innovation is also currently implementing and evaluating co-innovation over the programme's 'five years in five' innovation networks to solve problems of differing complexity. All the problems involve on-farm and off-farm, the influence of multiple stakeholders and consideration of a range of other factors. The cases are on dairy herd reproduction, control of tomato-potato psyllid in potato crops, improving water use efficiency in an irrigation scheme, implementation of nutrient management plans on dairy farms, and improving the link of products from planted forests to markets.

Co-innovation for rural professionals

What might co-innovation mean for rural professionals? Early evidence confirms the important role that rural

professionals play in innovation networks connecting knowledge and people. This includes rural professionals helping the exchange of knowledge among farmers and growers and between researchers and farmers, as well as being a source of innovation themselves. The main role which consultants play in working with farmers to achieve their aims and objectives places the rural professional in a unique position as a participant in innovation networks.

Rural professionals develop and implement new technology and practices to deal with problems identified by their clients. Two examples of this have recently been documented. The first is the four-day shifting winter feeding strategy project developed and implemented in Southland and Otago. This project was led by a rural agribusiness consultant, and in a follow-up between 35 and 50 per cent of farmers had tried the practice and 93 per cent of them said they would continue with it.

The Lucerne for Lambs Sustainable Farming Fund project in Central Otago was also led by a rural agribusiness consultant. As part of the process it specifically included other agribusiness representatives to help with the development and implementation of grazing plans for lucerne.

Rural professionals are an important link for knowledge among farmers and this is aided by rural professionals using their own local networks to develop practices and technology. In a survey on sources of technical information a third of respondents rated farm consultants as an excellent source of knowledge, and 15 per cent rated the wider rural agribusiness sector as such.

Link between research and farmers

Rural professionals are a crucial link between researchers and farmers as they help the exchange of knowledge between the two groups. Research on the role of agricultural consultants identified that they help the exchange of knowledge from researchers to farmers in several ways as they seek out new information, assess its integrity and adapt it to client needs. The same research identified the ways that rural professionals helped the exchange of knowledge from farmers to researchers.

The earlier research on the role of rural professionals identified a barrier to rural professionals playing this role of a link between researchers and farmers – that they are under-valued by the research community. This was preventing the input of rural professionals into the innovation process, particularly in helping to identify research gaps, translate research into user-friendly formats, access relevant information, and incorporate their own knowledge into the development of innovations. This continues to be a barrier five years on from the earlier research. No mention was made of rural professionals by the participants from researcher organisations interviewed as part of the Primary Innovation programme.

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Deane Carson

Water and nutrients in Southland

Nutrients entering waterways have been a problem which has been widely debated in Southland for generations. Historically the focus was on industry and nutrients entering water by direct discharge, widely known as point source nutrients. As industry has understood and improved behaviour, the focus has moved towards more complex processes including nutrients coming from pastoral land.



These nutrients are known as diffuse nutrients. Of significant concern to the public has been nitrogen and phosphate. This article describes the lessons of a farm consultant when trying to understand the context of the problem. To simplify findings the focus is mainly on rivers rather than groundwater.

National state

Globally New Zealand has been promoted as '100 per cent pure' and 'clean and green'. In recent media environmental lobbyists have targeted and questioned the accuracy of these brands using various international studies to place doubt on their credibility. In an international study the OECD reported New Zealand as having relatively good water quality compared to other developed countries. The Waikato, Clutha and Waitaki rivers were reported in the top four of 88 rivers for nitrate in the study between 2002 and 2004. Similarly, Lake Taupo was reported as the best lake out of 44 lakes for nitrate.

New Zealand rivers do not score as well for phosphate content, but are still relatively good. The Waikato river ranked 28th, Clutha river fifth, and the Waitaki river fourth out of 89 considered. Lake Taupo ranked seventh for phosphate out of 48. The 2007 Environment New Zealand report also stated –

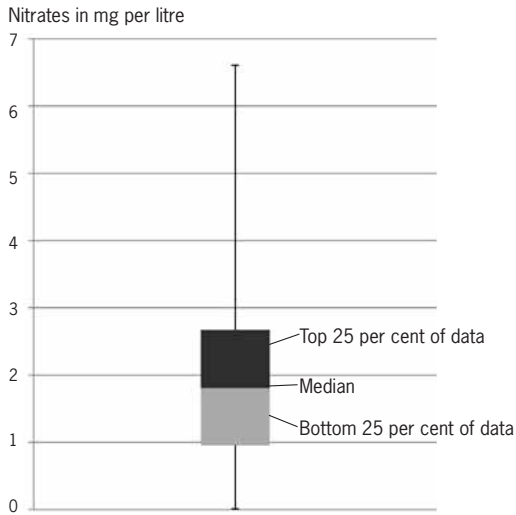
... it is reasonable to compare only our most nutrient-enriched rivers with rivers reported by the Organisation for Economic Co-operation and Development (OECD). This is because, in general, OECD measurements are taken at the mouths of rivers flowing from large catchments. As a result, the OECD data represents relatively highly nutrient-enriched river systems that do not compare readily with New Zealand's less nutrient-enriched, and in many cases, smaller river systems.

Despite this doubt the Ministry for the Environment still refers to the OECD data when reporting the state of our water quality. In addition, despite its weakness, this data still appears to be one of the best studies for water quality comparison.

National trends

In July 2013 the Ministry for the Environment river condition indicator reported 10-year stable or improving trends across four of the monitoring parameters in 90 per cent of the sites. Nitrate was suggested as the problem nutrient with approximately 26 per cent of rivers deteriorating, 21 per cent improving and the remainder stable. This is in stark contrast to the 2009 report which stated that 'levels of four nutrients total phosphorus, dissolved reactive phosphorus, oxidised nitrogen and total nitrogen have shown strong increases. This was generally in rivers surrounded by pasture.'

There has been an apparent change from declining to stable but nitrate continues to show some increasing trends. The Ministry for the Environment makes



OECD river nitrate data average 2002 to 2004 for Clutha, Waitaki and Waikato rivers

no statistical claim with regard to the difference of 26 per cent deterioration and 21 per cent improving.

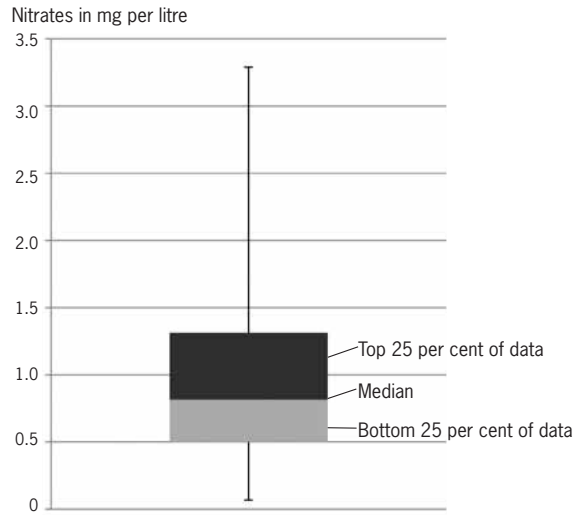
In November 2013 Dr Jan Wright, Parliamentary Commissioner for the Environment, released a report *Land Use and Water Quality in New Zealand*. The report discussed the findings of two models used to predict land use change and subsequent nutrient loadings between 1996 and 2030. The general conclusion was that dairying is expanding, is likely to go on expanding, and that nutrient loss of nitrate and phosphate will continue with it.

As a consultant with a science background, including modelling, I think it is important to point out that biological models have errors. One of the models, called Clues, is recognised as having a standard error of 30 per cent. The other, the Land Use in Rural NZ model, is used to predict land use change and a measure of accuracy could not be found. The potential error of adding these two models together was not reported. A significant amount of literature exists to support the report’s conclusion that nitrate will continue to increase. Casting doubt on the findings is the fact that recent phosphate levels appear to have improved during dairy expansion years.

Southland

There is limited information that compares and contrasts water and nutrients in Southland with other regions. A majority of research and reports present findings against standards and water monitoring sites, categorised as pastoral, indigenous forest, scrub, exotic forest, tussock, bare and urban.

The most recent Ministry for the Environment *State of the Environment* report for regions was provided in 2007, but it gave very little information to show how Southland compared to other regions. Similarly, Environment Southland’s *State of the Environment* report gave little in terms of regional comparisons. As a farm consultant I want to know how our region compares to others. It is critical that we understand which regions are moving forward and backwards so that corrective actions can be assessed.



OECD river nitrate data average 2002 to 2004 for Lake Taupo

During a 2013 seminar at Winton, Justin Kitto from DairyNZ presented results of a recent review of Environment Southland data. Relative to standards, DairyNZ reported 11 per cent of sites failed for nitrate and 57 per cent failed for phosphate levels. These figures are startling but context requires us to consider the standards.

River water quality review results

Parameter	Percentage of sites showing significant deteriorating trends	Percentage of sites showing significant improving trends	Percentage of sites exceeding standards
Nitrate	49	7	11
Dissolved phosphorus	1	39	57
Ammonia	4	40	18
<i>E.coli</i>	7	11	56
Turbidity	1	34	n/a

There is a debate around standards about what is fair and how we measure nutrients. A health standard might be the most important measurement for some, but others might argue ‘natural state’ gives us a better comparison when considering our influence on the environment.

For nitrate, DairyNZ have reported data compared to a new water plan standard of 2.4 mg per litre. This is significantly higher than the standard of 1.7 mg per litre for lowland waterways and 1.0 mg per litre for lake fed waterways considered in the *State of the Environment Report 2010*. Applying the new standard to the data we can see seven per cent of sites currently fail to meet the standard. The problem with nitrate does not appear to be the current state of the water quality, rather the trend for increasing levels.

Findings from the National River Quality Network 1996 to 2002 indicated that during this period approximately 50 per cent of native forest rivers failed to meet the phosphate standard of 0.01 milligrams per litre. Although DairyNZ report that 57 per cent of Southland rivers failed to meet the

standard, historically around 50 percent of New Zealand's native forest rivers have also failed. The context of *State of the Environment* reporting is very important. Making comparisons against national standards does not put into context how our environment has changed from its natural state.

The *State of the Environment* report indicates that 26 per cent of rivers were improving for phosphate, seven per cent were deteriorating, and the remaining 66 per cent were stable. Conversely, for nitrate 47 per cent of rivers were deteriorating, with only six percent improving and the remaining 47 per cent stable. A 2013 review of data by DairyNZ corroborates these findings, indicating a stronger trend for phosphate improving and a similar result for nitrate. This trend surrounding water nutrients seems to be in line with national monitoring that phosphate is improving and nitrate is deteriorating.

Local government

Local government actions have focused on compliance using fines and infringement notices. The changing behaviour of Environment Southland compliance staff has made it very hard to understand compliance statistics. Declines in the percentage of farms which are fully compliant have been attributed to tougher stances taken by the council rather than failings by farmers. A series of events, including the appointment of a new CEO, some bad press and a new compliance manager seems to have resulted in a behaviour change again. This is result which appears to have won favour with farmers.

In the past local government legislation focussed on effluent management, with stricter rules established for the storage and application of effluent. Grazing rules have also changed, with a three metre set-back rule restricting stock proximity to water courses and water bodies during the winter months.

In April 2012, Environment Southland put in place an interim rule called Rule Change 13 and it set a process for consenting dairy conversions. New assessment criteria recognise soil type and a farm management plan. The aim of the council is to have a system which will stop dairy conversion on some of the most sensitive soils in Southland, recognising nitrates as an increasing problem and the soluble diffuse nature of nitrogen as being hard to control. At the time of writing no conversions have been stopped by the council, despite the fact that two of the consents granted have been for dairy conversions on relatively light soils. It is fair to say that the consent process has been cumbersome for some, although strict environmental requirements will probably favour the environment.

As a farm consultant it is hard for me to view these farm management plans favourably. They are expensive, detailed beyond the capability of most farmers, and focus on a few farmers rather than the majority. They are a broad attempt at controlling diffuse nutrient loss from converting farms but the question has to be asked – if the same money was spent on education, would it have a greater effect?

Agribusiness consultant actions

Agribusiness consultants have feared an apparent rift between the council and farmers. Without on-farm contact,

educational messages arrive to farmers in the headlines of the media. Our response has been to try and build a bridge. We view consultancy in part as a conduit for technology and information transfer. To improve council contact with farmers, we have involved council scientists in farm discussion groups. It is early days, but the signals are good.

Already one group has established a trial to determine the best way to fertilise peat soils. This replicated trial will be carried out on farmland with virtually zero costs. The council have offered scientific expertise and, where appropriate, water quality testing. Involving a farm consultant in the mix ensures feed quantities are measured, and at the end of the day economics are weighed against the environmental effects.

We hope that the this relationship will also provide Environment Southland with a better understanding of farm systems and perhaps a testing grounds for ideas before they become policy. It is our view that the solution to reducing nitrates in waterways lies with educating farmers. We hope that the Water and Land 2020 programme will provide the collaboration needed.

Overall summary

On an international platform, New Zealand rivers appear to be of good quality, although comparisons made are of questionable value. This country needs to do a better job to ensure it represents itself in a fair light when international studies are conducted. Nationally, evidence exists to support a decline of phosphates in rivers and that this trend is also happening in Southland rivers. Evidence also exists which suggests an increase in nitrates in New Zealand rivers including those in Southland.

Recent water modelling exercises have suggested that phosphate and nitrate levels in Southland and New Zealand will increase in the future. The accuracy of this modelling is unknown and not well presented. This is not to say we should ignore the results, but simply use the findings in the context they are presented.

Whether it is international, national or local data which is presented the context often seems to be missing from media reports. Comparisons of nutrients in water are often made to health standards that bear little importance when considering farming influence. Recent legislative rules in Southland have seen attempts to control nitrates in water, with farm management plans being used to assess dairy conversion consents. Some positive gains will be made by placing strict environmental criteria on consents but the process is cumbersome, confusing and costly for farmers. For the effort required, only a small percentage of farms are receiving the environment messages.

Agribusiness consultants have taken action to use the skill and information contained within the council by building relationships between the council and farm discussion groups. It is hoped that these relationships will present as a win-win for all parties involved and early signals are good.

Deane Carson is a Farm Management Consultant at Agribusiness Consultants and Personnel Ltd based in Invercargill.

Russ Tillman and Philip Mladenov

The nutrient management adviser certification programme



The Nutrient Management Adviser Certification Programme is a national standard for training, certification and continuing professional development farm nutrient management advisers. It was launched in November 2013. The aim of the programme is to build and uphold a set of industry standards for nutrient management advisers so they provide nationally consistent advice of the highest standard to farmers.

The need for high quality advice on nutrient management on farms is increasing as farmers try to grow profitability, and at the same time meet increasingly stringent environmental regulations imposed by central government, local government and industry organisations. The programme defines the standards for people to meet to provide certified nutrient management advice.

The process has brought greater uniformity to qualifications and continued professional development requirements, as well as the levels of expertise required by those producing nutrient management plans. The establishment of a formal certification process for nutrient management advisers is also providing regulatory agencies, such as regional councils, with a mechanism for the preparation of on-farm nutrient management plans by people with the skills to ensure that they comply with council requirements.

A nutrient management plan is a written plan which describes how the major plant nutrients, nitrogen, phosphorous, sulphur and potassium and any others of importance to specialised crops, will be managed annually on a particular area or property. This plan will be implemented to optimise productivity, reduce nutrient losses and avoid, remedy or mitigate adverse effects on the environment.

Certification is open for all nutrient management advisers who want to be recognised as meeting the standards set for New Zealand. This includes farm advisers whose scope of work goes beyond nutrient management advice, because it is recognised that sound nutrient management advice underpins any plan for farm-related operations. DairyNZ commissioned the Fertiliser Association to develop the programme as part of a Primary Growth Partnership jointly funded from DairyNZ levy money and investment from the Ministry for Primary Industries.

Establishment of the programme

An early step in the establishment process was convening an advisory group. The first task for this group was to discuss and then endorse the concept of the adviser certification programme. The group then produced a number of recommendations about the establishment of the programme and its operation. Membership of the advisory group included –

- The Fertiliser Association of New Zealand and the fertiliser companies Ravensdown and Ballance Agri-nutrients
- Industry organisations including DairyNZ, Horticulture NZ, the Foundation for Arable Research, Deer Industry NZ and Beef + Lamb NZ
- NZIPIM

- Regional councils
- Lincoln and Massey universities and Agri One
- AgResearch and the Ministry for Primary Industries
- Fish and Game and Federated Farmers.

It was considered essential to have such wide-ranging representation on the advisory group for two reasons. The first was to allow the agricultural industry to speak with one voice about the qualifications and proficiency of those who advise on nutrient use and management in the farming community. The second reason was to secure agreement from regional councils, and non-governmental organisations such as Fish and Game, that such a certification programme would be of value in defining 'suitably qualified people' who could complete nutrient management plans for farmers to the standard required for regulatory purposes. For this reason, it was agreed that the recommendations of the advisory group would, as far as possible, be arrived at by consensus.

After endorsing the concept of the certification programme the advisory group considered the most desirable ownership and governance structure. Several possible ones were considered, including an incorporated society and a company. Although many organisations represented on the advisory group such as regional councils and universities had a vested interest in the establishment of such a programme, they felt it would not be appropriate for them to be involved formally in its ownership or membership.

It was therefore decided that for practical reasons the certification programme would be owned and administered by a company wholly owned by the Fertiliser Association and created solely for the purpose of operating it. The company would operate as a not-for-profit organisation and registration fees would be set at a level that would cover operating costs and help the establishment of an appropriate reserve.

This company, the Nutrient Management Adviser Certification Programme Ltd, has now been established. However, it was also recognised from the outset that if the programme was to have credibility with stakeholders outside the fertiliser industry, then the views and recommendations of the advisory group would need to be followed carefully by the company. To date this has been the case.

Setting the standards

Once the concept of the programme had been endorsed and the ownership structure decided on, the advisory group nominated a standards setting group to recommend the criteria on which certification would be awarded. The group is composed of a small number of subject matter experts with particular expertise and experience in the use of the nutrient management decision support programme Overseer and the preparation of farm nutrient management plans. After several meetings the group recommended the competencies which would need to be demonstrated to achieve certification and the means by which these could be assessed. These recommendations were considered by the advisory group and adopted.

To become certified, nutrient management advisers have to demonstrate they have appropriate qualifications

in agriculture or equivalent field experience, and a suitable training record for a range of subject matter. They also need endorsement from two farmers verifying that the nutrient management plans which they produced were easily understood, useful and able to be applied.

Advisers would normally be required to have successfully completed the intermediate and advanced courses in sustainable nutrient management in New Zealand agriculture. In addition, they should be able to demonstrate that their skills and knowledge meet required standards from a competency assessment.

The courses

The sustainable nutrient management courses were developed by Massey University in conjunction with the Fertiliser Association to train advisers responsible for safe and effective nutrient management. The intermediate course is focused on soils, nutrient cycles, fertiliser recommendations, nutrient budgeting and environmental protection in either pastoral agriculture or orchard and arable production. The advanced course covers an advanced knowledge of nutrient cycling pathways in New Zealand's farming systems, using case study examples of farms that have unacceptable nutrient loss to the wider environment.

Intermediate courses are held at regular intervals throughout the year depending on demand. Attendance at a three-day contact course is required, along with some pre-course study and successful completion of a two-hour examination. The intake for the advanced course is normally in February each year, with a requirement to complete four assignments, attend a three-day contact course, and successfully complete a two-hour examination.

It is recognised that there will be a limited number of highly qualified and experienced nutrient management advisers who gained their qualifications and were working in the area before these courses were established. There is a limited amnesty period to the end of March 2014 during which these experienced nutrient management advisers will be able to apply for certification, even though they may or may not have completed the intermediate and advanced courses. The criteria for this exemption are outlined on the programme website.

Administration and assessment

The application for certification, the competency assessment, and the recording of professional development activities are handled online. An online assessment feature developed specifically for this programme will test the competency of applicants in evaluating a range of Overseer scenarios.

The development of this feature has required considerable investment and it is hoped that administration costs will be minimised by this method. A website has been set up which contains a description of the certification programme, and provides information for those applying for certification – www.nmacertification.org.nz.

Before applicants formally apply for certification it is recommended that they complete an online self-assessment



to ensure they are adequately prepared for the certification requirements. Once this has been done the adviser can proceed to apply, and when the applicant has started the application process their name will appear on the website in the list of advisers who are working towards certification.

The certification process initially involves the completion and submission electronically of an application form detailing the applicant's qualifications and experience. Once this has been processed the applicant is contacted and advised about how to access the online assessment feature. The certification assessment can be completed in the adviser's workplace under the supervision of a manager or senior colleague. Once certified, an adviser is listed on the website as certified. Farmers and the public are able to view the list of certified advisers.

As part of the certification programme, a formal complaints resolution process has been established should any concerns arise that indicate best industry practice has not been followed. Details of the complaints procedure, including the appropriate complaint form, are available on the website.

It is anticipated that approximately 50 per cent of New Zealand's nutrient management advisers will have completed their certification competency assessment by mid-way through 2014. The cost to complete the assessment and achieve certification is \$500 plus GST, but any costs associated with attendance at the intermediate and advanced courses are in addition to this charge. The cost of the three-yearly recertification process is still to be determined.

Continuing professional development

To maintain certification, a nutrient management adviser must complete a minimum of 15 hours of continuing professional development each year and complete a re-certification process every three years. Normally this will consist of five hours of formal learning which has been assessed and 10 hours of informal learning. A wide variety of relevant activities will qualify as credits for continuing professional development although each year some activities may be designated as mandatory. These may result from

the release of substantially modified versions of Overseer or a significant change in legislation that affects nutrient management.

The onus will be on the certified nutrient management adviser to update their online record to include the professional development activities completed. It is intended that the website will also provide access for advisers to learning modules which cover topical issues in sustainable nutrient management. These modules will be able to be completed by advisers as part of their continuing professional development requirements.

Summary

The nutrient management adviser certification programme has been established to certify nutrient management advisers in New Zealand. The programme was established and endorsed by a wide-ranging advisory group. A standards setting group was nominated by the advisory group to set the criteria on which certification would be awarded.

To become certified nutrient management advisers need to have –

- Demonstrated appropriate qualifications in agriculture
- Field experience and training in a range of relevant subject matters
- Completed the intermediate and advanced courses in sustainable nutrient management in New Zealand agriculture
- Endorsement from two farmers verifying the quality of their nutrient management plans
- Passed a rigorous online competency assessment.

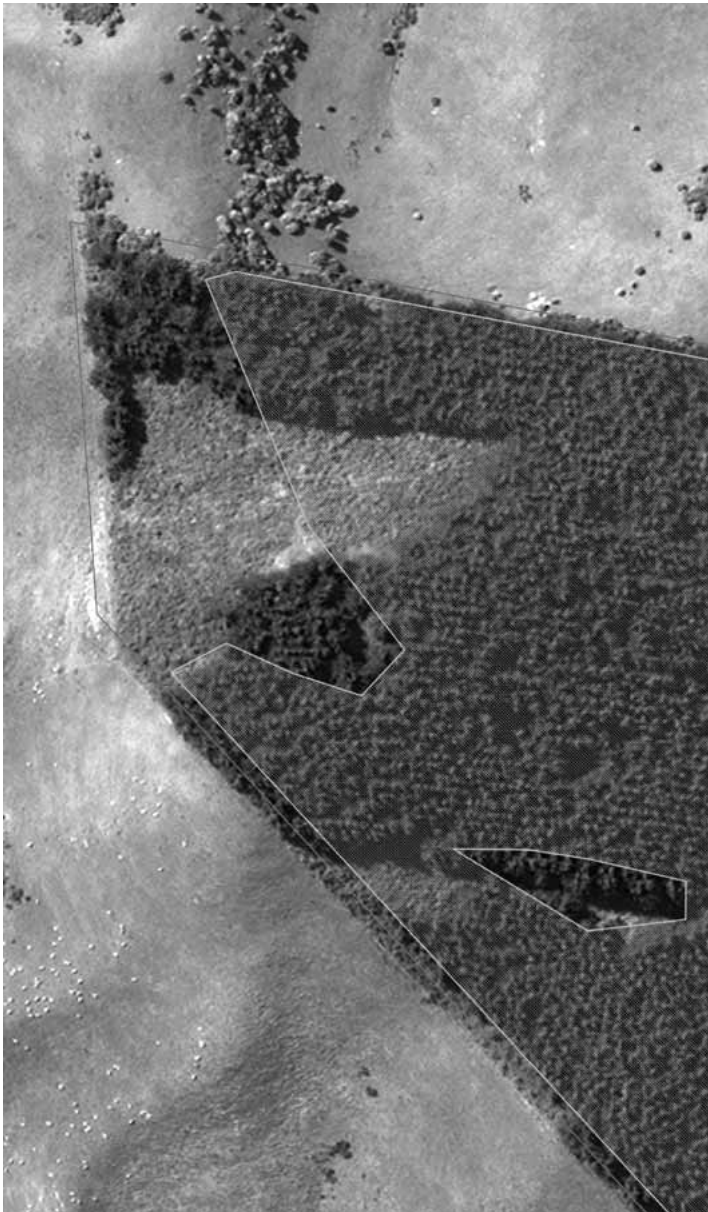
To maintain certification advisers must comply with continuing professional development requirements and a re-certification process. It is hoped to have half of nutrient management advisers fully assessed by the middle of the year.

Russ Tillman is Chair of the Nutrient Management Adviser Certification Advisory Group and is based at the Institute of Agriculture and Environment, Massey University, Palmerston North. Philip Mladenov is Chief Executive of the Fertiliser Association of NZ in Wellington.

Hilary Walker and Paul Le Mière

Standardised planning A double-edged sword for farmers?

With the largest policy team outside government, working mainly in regional offices, Federated Farmers is well placed to understand the effect which the implementation the Resource Management Act has on farmers across the country. The land-based nature of farming businesses, which make use of natural resources such as soil and water, means both regional and territorial authorities will have intersecting jurisdiction over a property. In some cases, a farm owner's property will cross a boundary or they could have several properties in different districts. This will add to the number of councils they need to have a working relationship with.



This is primarily a problem for those farmers with multiple farm ownership, whereas it is the direct and indirect overlapping of functions between regional and territorial authorities which cause the most frustration. The RMA prescribes the functions of regional and territorial authorities along with the decision-making process, but how these duties and functions are discharged is largely autonomous. A further variable is that there is no requirement to use best practice models for plan structure or terminology. Together, these factors combine to create a bureaucratic minefield at a time when the job just needs to get done.

Would the standardisation of plan content, format and definitions be the answer or a case of being careful what you wish for? This article will identify the resource management frustrations farmers have in dealing with multiple councils and plans and outline the reforms central government are proposing in this area.

It is the view of Federated Farmers that, while the problems around different councils having different rules and requirements can be frustrating, any changes must be carefully considered. The right balance between competing aims of consistency and certainty compared with flexibility and responsiveness must be found. Striking this balance will require both legislative change to planning processes and increased commitment from local authorities to endorse the enabling intent of the RMA.

One activity, multiple controls

Members looking for advice about whether or not they need resource consent to conduct some kind of land use activity is a common request to policy staff. Many have looked up their regional or district plans and become lost in the phone book size of it, or talked to the respective councils only to be frustrated by an inability to get a straight answer.

The importance of getting the right advice and making an informed decision before undertaking an activity is

crucial. The RMA has harsh penalties for offences and these are rigorously enforced by the courts. Some farmers have found out the hard way that ignorance is no defence, with criminal convictions, hefty fines and comprehensive mitigation packages handed down at sentencing.

The key to negotiating planning documents and making informed land management decisions is knowing who looks after what and why, and where controls may apply on a particular property. This is where the complexity begins. In a deliberate attempt to encourage integrated resource management and reduce central government involvement, legislators have adopted a two-pronged approach. One created a division of functions between regional and territorial authorities and the other an overlap.

Recognising differences

The intention of devolved resource management responsibility was to allow for differences in local environments and different community values to be recognised and catered for. This has been supported by farmers, who are used to accommodating their farming practices to the vagaries of their own individual environments. However, the implementation of the RMA has evolved in a way that has created some drawbacks.

There is a hierarchy of local authority planning which is used to manage their functions under the RMA. All of the documents influence different aspects of farming-related activities. Regional councils develop regional plans that are often fragmented into separate water, air, coastal, soil and hazards plans. These plans contain the controls designed to manage land use to achieve stated objectives. Territorial authorities also prepare plans with controls relating to amenity, biodiversity, heritage, culture, landscapes, access, subdivision, infrastructure and hazards. Plans can be combined to create simpler processes internally and with external neighbouring councils, but there has been limited uptake of these options.

Permitted and prohibited

Regulatory land use controls are governed by a sliding scale of five activity types. These range from 'permitted', for which no consent is required if the activity complies with any defined standards, terms or conditions, through to 'prohibited' where no application for consent can be made. The activity types are legally defined, but what activities or land use effects are assigned to which type is determined by the respective plan. What may be permitted in one plan could be considered controlled or discretionary and needing consent in another.

The effect of separate and overlapping functions means control over one land use activity is often found in several different plans for different purposes by two different regulators. Creating a farm track, for example, could have applicable rules in a regional coastal plan for the purpose of managing effects on the sensitive coastal marine area or a soil conservation plan with rules managing the effects of earthworks on water quality. In addition to that regional regulation, the district plan could also have interests in controlling a farm track for general amenity or landscape

purposes or for biodiversity purposes if vegetation is being removed.

The reality is that multiple resource consents from the two authorities would be required if the track did not meet permitted standards from either regulator. A similar situation can occur for increasingly common dairy farm activities such as the installation and use of a feed-pad or herd home. Consents from both the regional and district councils are needed for different aspects of the necessary earthworks, buildings and discharge of effluent activities. Whether each consent is granted or declined is evaluated independently, and this is where increased delays, costs and uncertainties are created.

Riparian margins

Riparian margins are another example of where the functions of the two local authorities collide to cause multiple layers of control for a farmer to negotiate. A regional council will define and apply land use controls over riparian margins for the purpose of maintaining and enhancing water quality, maintaining and enhancing ecosystems in water bodies, biodiversity values, soil conservation and avoiding or mitigating effects of natural hazards. District councils will define and apply land use controls over riparian margins to avoid or mitigate the effects of natural hazards, maintaining indigenous biodiversity, and maintaining and enhancing access or amenity values.

The way an activity is defined also makes a difference for resource users because definitions often contain the thresholds which establish whether consent is required. Currently there is no requirement to create consistency by defining generic terms such as earthworks, riparian margin, intensive farming, farming, buildings, indigenous vegetation or hazardous facilities at a national level. The matter has been succinctly summarised by the Ministry for the Environment as the reason for the latest resource management reforms –

Often there are multiple resource management plans operating within one district. These plans may have different approaches to the same issue, have inconsistent terms and definitions, and be difficult to use. Plans can be difficult to understand without expert advice, which means applying for resource consent is more costly and time consuming than it should be.

Resource management reforms

Central government has identified streamlining and simplifying planning and consent processes as vital to reducing the costs, uncertainties and delays which stymie current resource management planning. The multiplicity of plans was branded by the independent Technical Advisory Group established to inform the resource management reform process as a cause of inefficiency, complexity and fragmentation. It noted that there are 171 operative RMA documents and 78 local authorities with poor integration and consistency between them.

Existing provisions allow for cooperation between councils when developing plans, but there is little incentive



to do so. The Minister for the Environment considers that simplifying the planning framework will be an important step towards improving both the environment and the economy.

The reforms aim to create fewer and better resource management plans with more efficient and effective consenting. This will be partly achieved by using a national planning template designed to standardise planning documents. The intention is to provide a common structure, format and definitions to maximise consistency across the country, as well as combine all planning instruments within a defined area into one document.

A single plan

To help collaboration, a council planning agreement will set high-level frameworks about how the single resource management plan per district will be produced. This will combine regional and territorial functions and outline the roles and responsibilities of each council. Given the problems identified above, this plan has organisational merit. However it is unclear at this stage whether the single plan is merely a housekeeping 'cut and paste' exercise, with resource users still needing to appease both consenting authorities, or if the changes will make a difference and reduce duplication, increase simplicity and provide clarity in functions.

Federated Farmers supports the principle of having common definitions and standard terms as these aspects can be set at a national level. Definitions and terms are regularly debated and appealed during the development and notified plan stages and as such, it would reduce time and money. However this support is currently mitigated by a lack of detail on the drafting and development process at this stage.

It will be important that those who have been directly

involved in planning development, regional and district planners, policy staff and other stakeholders have input into the construction of the template. This should ensure standardised terms, definitions or standards are appropriate, and helps, rather than creates, an extra layer of inflexibility and control.

Central government has indicated that this template could help standardise specific zones and rules for particular activities. The benefits of increased consistency and certainty are desirable. However, this degree of national standardisation would require a very robust development and assessment process to ensure controls are not reduced to a blunt one-size-fits-all.

Promising intentions

Not all adverse effects are created equal and spatial context is very relevant. The knowledge required to develop the best resource management policy under the RMA involves a dynamic and often complex blend of science, technology, good practice and experience. Not all resources and effects have the same depth of data and expert opinion for a national approach.

Implementation costs are also necessary to consider, and there is a wide range of financial means across councils and farming businesses. This is important with regard to methods of compliance or the equipment required for implementing standards. On balance the intentions of the reforms look promising. However, in the absence of the draft bill yet to be released, it is difficult to know whether changes to introduce varying degrees of standardisation will result in positive or negative consequences for resource users.



Striking the right balance

Outside the resource management reforms and the potential positive consent changes that will be made, consenting authorities need to work more constructively with farming industry and sector groups. The value of each farming business is generally dependent on its sustainable management. This, coupled with the ethic of stewardship, which is inherent in most farmers, aligns their business with the purpose of the RMA more than local authorities seem to understand.

It is vital that common aims and values are identified and opportunities are realised to complement these and not cut across them. Sector and industry groups understand this, and over recent years have been developing variations of land and environment plans, or whole farm management plans to help farmers make better decisions.

Effective farm management requires an holistic approach incorporating financial, animal welfare and environmental aims into whole farm planning with strategies being complemented by thinking innovatively and acting responsibly. Farm plans are designed to meet these objectives. It has been suggested that these could set the industry standard for environmental practice which meets the requirements of RMA plans and as such, removes the need for any farm consents.

This proposition has appeal, but there are problems which will need to be resolved. These include the non-regulatory intent, the broad range of purposes, who is responsible for monitoring and enforcing the plans, and most critically, who owns the information within the plan given that once it is in the local government arena it is public information.

Federated Farmers supports the use of these proactive industry-led methods and as the uptake increases and science and technology evolves to enhance decision-making, they

could become increasing relevant to meet council planning requirements. However this is likely to be informative and complementary until the problems mentioned above can be appropriately resolved.

In terms of adopting a better planning approach, councils need to stop drafting rules with the lowest common denominator in mind. There should be no tolerance for deliberate and reckless environmental damage, but rules in a plan are unlikely to influence the attitude behind these actions. Overly strict or unnecessary rules will, however, stifle innovation and development, which could benefit the environment overall.

Too many transactions that take place between councils and farmers are for relatively small-scale activities such as small farm buildings, structures, small-scale earthworks, culverts and crossings and tree planting. Normal and anticipated farming activities should be explicitly acknowledged as being an acceptable part of the rural environment and given a permitted activity status. An added requirement to meet certain performance standards may be acceptable if the potential adverse effects deem it necessary.

This thinking is in line with the often disregarded enabling intent of the RMA, which aims only to intervene where activities are likely to cause unacceptable environmental effects. A permitted status still allows councils to recover costs and establish recording or monitoring requirements as needed. Adopting a planning approach which helps as many permitted activities as possible has the benefits of increased certainty, control of effects via standards, and reduced overall transaction cost for both council and landowner.

Hilary Walker is Regional Policy Advisor and Paul Le Mière is Regional Policy Manager at Federated Farmers of New Zealand based in Hamilton.

Jill Greenhalgh, Philippa Rawlinson and Rupert Tipples

Southland dairying 20 years down the tanker track

Southland has moved from being a backwater to a booming province over the past 20 years. Dairy cows have replaced the once ubiquitous sheep. But what do the people who live in this formerly conservative province think of the changes dairying has brought? A research project in early 2013, funded by DairyNZ, aimed to find out how Southlanders have been affected by the transformation of the region. This article presents an overview of the project, and a future article will focus on the social changes resulting from dairying.



Southland's visual landscape has changed dramatically over the past 20 to 25 years. It was once home to nine million sheep but now over half of these have been replaced by 385,000 dairy cows and shearing sheds have been replaced by cowsheds. Permanent sheep fences have become electric two-wire fences and each neat paddock contains a circular water trough. The sheep farmer's homestead, with its attendant garden and shelterbelts nestled into the landscape, is much less obvious than the several new houses for each farm required to accommodate farmers and employers. Some farms have large herd homes for the cows.

Southland's dairying story

That Southland has been home to dairy cows in its earlier days is obvious from the remaining old dairy factory buildings, identifiable from their unique shape, dotted across the province. The fact that there were once 88 of these is testament to the importance of dairying in bygone days. Dairying was part of the mixed farming common to the province. However, after World War II, prosperity for sheep farming saw the slow steady demise and centralisation of dairying until by 1981 only the Edendale factory remained, run by the Southland Dairy Cooperative. Sheep farming was the predominant land use, with the few dairy farmers left considered to be their poorer cousins.

The Edendale factory was aging but the Southland Dairy Cooperative gradually installed new technology. In 1981 and 1982 enquiries were received from prospective new suppliers and the factory grew steadily. By 1989 the company had 165 suppliers with an average herd size of 121 cows. The company budgeted for a 15 per cent increase in production in 1990, but growth was double this and continued in a spectacular manner through the 1990s.

A group of dairy farmers, dairy company employees, real estate agents and bankers formed the Dairy Promotion Board of Southland in the early 1990s. They attended the

Mystery Creek field days to promote dairying in Southland ‘as a province to farm in with a lifestyle to enjoy.’ Southland’s climate ensured reliable summer grass growth and fewer health problems than in the North Island. The lower land prices appealed to progressive farmers from Taranaki and the Waikato. They were able to buy at least twice as much good quality land for the same money in Southland compared to their home provinces.

Investigating the effects

With over 20 years of change and considerable knowledge about the resulting economic effects, DairyNZ decided it was timely to investigate the social effects of Southland’s transformation from sheep to dairying. Taylor Baines and Associates were the first to look at land use change to dairying following the introduction of irrigation in the Waitaki and the Amuri Basin, but these were relatively small areas compared to Southland.

This journal, *Primary Industry Management*, published a feature on Southland in 2011 presenting opinion pieces from a range of contributors. The research project was carried out with the intention of discovering what the wider Southland inhabitants and communities have experienced from the changes. To achieve this, over 60 semi-structured and informal interviews were undertaken with a wide cross-section of organisations and individuals in the small town of Winton in central Southland and the larger town of Gore in eastern Southland.

Winton had served as the centre for the surrounding sheep and mixed cropping farms until the arrival of dairying in the 1980s. It is now almost completely surrounded by dairy farms. The local participants noted that it had always been a relatively affluent township, but all the new buildings offering support services there illustrate the effect of dairying. Few other townships the size of Winton would be home to three banks.

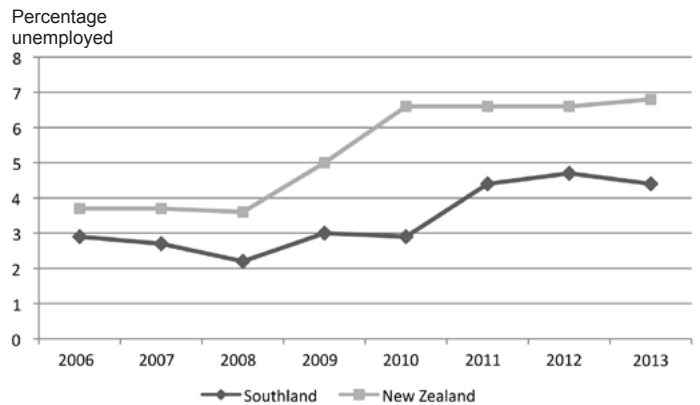
Gore, however, still has a hinterland with a mixture of sheep and cows. Riversdale in the Waimea Valley was the first Southland region to install irrigation. Gore residents were much less likely to recognise the effects of dairying on their businesses than those in Winton. A Gore signwriter claimed it did not affect him but he was in the process of signwriting the vehicles of a local vet practice. Their veterinarian numbers have increased four-fold as a direct result of dairying.

Population, employment and economic data

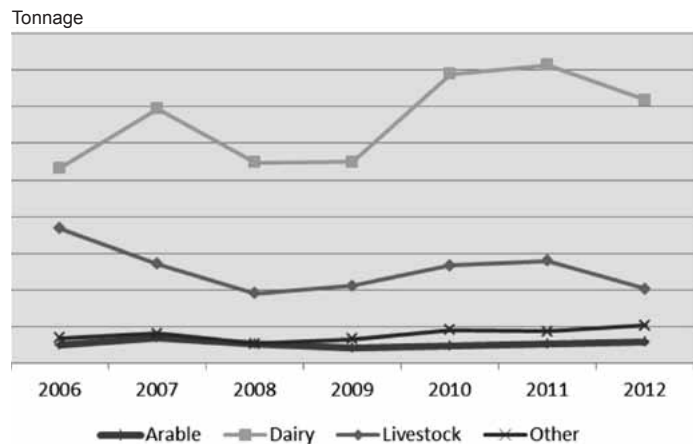
We initially looked at the population, employment and economic data on Southland. In 2012 17.5 per cent of employed Southlanders were engaged in agriculture, fishing and forestry compared to 6.6 per cent New Zealand-wide. Southland has one of the highest workforce participation rates, with 71 per cent in paid full-time or part-time employment compared to 64 per cent of the total population.

Since 2000 the growth of dairying has increased employment for people in dairying and dairy manufacturing, construction and wholesale and retail trade, but decreased employment in sheep farming and meat processing. The unemployment rate there has been lower than the New Zealand rate since 2005. In 2012 Southland was the top region for real value-added growth and second for employment growth. Fertiliser sales provide a graphic indicator of the growth in dairying.

Unemployment rate in Southland and New Zealand between 2006 and 2013



Ravensdown tonnage sales by farm type in Southland 2006 to 2012

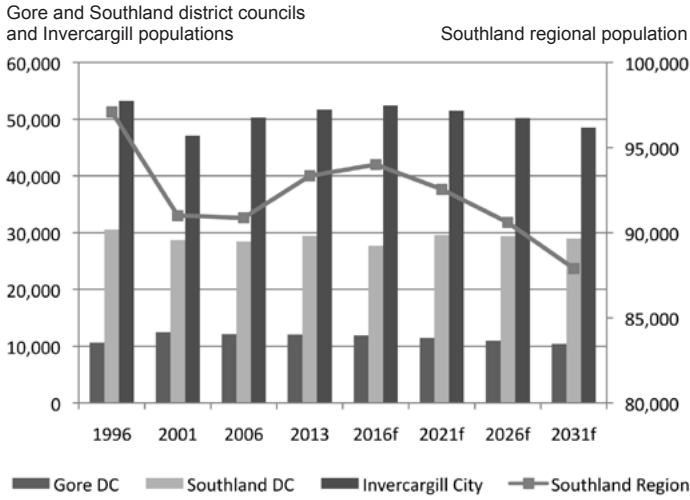


Population changes

The looming problem for Southland is a predicted stagnant population growth along with an ageing population. Census 2013 figures indicate the Southland regional population has increased, but so too have the number of people aged over 65. Reflecting this, the median age in Southland is predicted to increase from 33.6 years in 1996 to 41.9 years by 2031. In Winton, the number of people aged over 55 increased by 15 per cent from 2001 to 2006, and there was a seven per cent growth of residents aged 25 to 34. This could reflect the arrival of younger dairy farmers around Winton and older landowners retiring to Winton.

Gore has a population bulge of people aged 35 to 60 and a reduction in numbers of people aged 20 to 30. Further analysis of the 2013 census figures will reveal whether dairying has slowed the effect of the ageing population.

Real and forecast population change in Southland and Gore District Councils, Invercargill city and Southland region 1996 to 2031



Increasing agricultural diversity and employment

The growth of dairying challenges the commitment and ability of sheep farming families to keep land in their family as the value of rural land increases, but it does offer them a wider array of options than in the past. There are still three times as many sheep, beef and cropping farms as there are dairy farms in Southland. The increase in land values and the resulting increased equity in land have enabled sheep farmers who want to sell their farms to have the opportunity to sell up and retire comfortably, purchase larger sheep farms further inland, or lease their land to dairy farmers.

Dairying has also provided sheep farmers with an opportunity to diversify without converting to dairying. They can grow dairy fodder, offer dairy support or enter a dairy equity partnership. This diversification of rural land uses means rural Southland is no longer solely dependent

on sheep farming, but on sheep, dairy and dairy support. Southland sheep farmers have also learned from dairying how to grow more and better quality feed for their stock.

Employment opportunities

Dairying has had a significant effect on employment opportunities on the farm and off the farm. Between 2009 and 2010 it created 220 jobs for highly skilled farm owners and managers as well as farm employees. Young farmers value the career progression options available. In 2012 the Edendale factory provided work for 520 full-time staff and 55 seasonal workers.

Agricultural related sectors by employment in Southland and New Zealand

Occupation	Jobs	Per cent Southland	Per cent NZ
Meat processing	3,646	7.0	0.9
Dairy	3,002	5.8	1.6
Sheep	2,547	4.9	0.7
Services to agriculture	827	16	12
Road freight transport	1,140	2.2	1.3
Dairy product manufacturing	419	0.8	0.4
Sheep, beef cattle	419	0.8	0.2
Shearing services	413	0.8	0.2
Deer farming	381	0.7	0.1
Road, bridge and construction	342	0.7	0.6
Farm produce and supplier wholesaling	292	0.6	0.3





Compared to sheep farms, dairy farms have much higher livestock needs and farm maintenance requirements from the service sector, providing a wide range of business and employment opportunities. Young professionals such as rural bankers, accountants, lawyers, consulting officers and veterinarians have provided a boost for the rural townships with their demand for housing and their contribution to sports and community activities.

The difficulty in finding sufficient farm staff has driven an influx of migrants into Southland. The majority of migrants are Filipinos, but they also come from most continents. Now schools have multicultural rolls offering cross-cultural interaction for their students, and the wives of migrant farm employees help to staff rest homes, supermarkets and councils.

Community interactions

Previously, Southland's ageing sheep farmer population meant that the rural areas were in decline, most noticeable in the falling school rolls. Rural school rolls have tended to stabilise overall, but the Gypsy Day movement provides challenges for school resourcing and disrupts children's learning, for those who move as well as those who remain. One medium-sized school had experienced student movement into and out of the school of between 20 and 30 per cent of its roll every year over a five-year period. However, the young families involved in dairying are revitalising rural Southland with their need for educational facilities, health and welfare services, transport and infrastructure.

The migration of dairy farmers from the North Island to Southland has seen significant cultural changes in this conservative region where a sheep farm might be owned by a fifth generation farmer. The more traditional dairying areas welcomed the new migrants but in other areas the incumbents were suspicious, resentful and even hostile toward the farmers who were coming to change rural Southland. Some local areas hosted welcoming community events, but when the visitors

failed to turn up local enthusiasm quickly waned.

The locals soon recognised that early starts, a twice-a-day milking regime and the tendency for employees to move farms regularly prevented dairy farming people from becoming involved in local community activities. Golf club membership declined, it was difficult to get a committee together to run the local community hall, and sheep farmers are still disproportionately represented on school boards of trustees. The locals also see migrants as not integrating into the community and not even spending their money locally as they often send some home. However, there was evidence that the sense of community was declining in some areas before the advent of dairying, and also of some communities making a real effort to maintain neighbourliness.

Sport and recreation

The volunteer organisations, such as St John's and the fire service, find it difficult to attract sufficient volunteers. However they have attributed that to a nationwide trend of people leading busier lives and employers being unwilling to release staff for call-outs. Rugby participation is declining, but young people have a wider choice of sporting activities than in the past as well as the ability and inclination to travel beyond the local rugby club for their sport and recreational needs.

Sport is still important for many Southlanders, with Gore and Winton offering excellent sporting facilities. Dairy workers are unable to play regular Saturday rugby, but soccer and basketball are played by New Zealand and migrant dairy workers.

Duck shooting is a cultural institution which remains strong, with over six per cent of Southlanders taking part in the annual event. The tendency of the early dairy farmers to fill in the farm duck ponds created alarm in the duck-shooting fraternity, but now the ponds are reappearing on dairy farms. Fishing is also important, both recreationally and economically. However, while the trout are still abundant, the lower levels of the waterways are now less fished in favour of the upstream areas above dairy farmland.

Environmental effects

The intensification and expansion of dairying has put additional pressures on Southland's freshwater ecosystems from –

- Dairying's spread into marginal land
- Water abstraction for irrigation
- Loss of vegetation, reducing biodiversity and increasing run-off
- Drainage of wet areas and wetlands
- The requirement for dairy support.

The participants in this project generally showed concern about water quality but the perceptions of different aspects varied. Some believed that water flow in lowland rivers has decreased, while others maintained it had not changed. Some declared most rivers were safe to swim in and suitable for fishing, but others reported they preferred to fish and swim in the higher reaches of rivers.

The *Southland Times* has written editorials about the environmental problems in the belief that, although the region needs dairying, it also needs leadership to ensure that the environment is protected for generations to come. Dairying was given the 'dirty dairying' tag, which the urban community agreed with. Urban opinion was not helped by the media focus on poor employment practices, particularly relating to migrant dairy farm employees.

This research found that the perceptions of Southlanders were that dairy farmers are making an effort to improve compliance levels. There is evidence of some degradation of waterways, reducing the ability of iwi to gather their traditional foods, but insufficient monitoring has taken place to determine the degree of pollution and the trends of water quality. This was reflected in the responses of participants – there was no consensus on the overall environmental effect of dairying.

Conclusion

Rural Southland is characteristic of a multi-functional rural space for food and fibre production, landscape and biodiversity maintenance, socio-economic viability and vitality, and a generator of employment. Our survey participants recognised these features of rural Southland. Most acknowledged the socio-economic benefits which dairying has brought, particularly its role in generating employment. The farmers interviewed saw the land, first and foremost, as a source of production for milk, meat and wool.

Other participants valued the region's amenities for water-based activities such as fishing, food collecting, swimming and boating, and for duck-shooting, hunting and tramping. Therefore the visual changes in the landscape, the effect on freshwater and the loss of biodiversity concerned participants.

Dairying remains a new industry in Southland. As farm conversions continue, it is still settling into its place in the region's landscape and its farmers into their niche in the local society. Further change is to be expected, but it is apparent that Southlanders recognise the economic benefits which it brings and are slowly beginning to accept the social changes accompanying the land use change. Leadership from the rural sector, including dairy, sheep, and beef farmers, appears to be an important determinant of the rate of this acceptance.

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Victoria Westbrooke

Waikato farmers plan for the future

The average size of New Zealand's dairy herds has been rapidly increasing and is now approaching 400 cows per herd. Yet well over a third of herds are considered small, with less than 250 cows as reported by DairyNZ in the 2011/12 New Zealand dairy statistics. These farms are important as they support over 4,000 farming families.

In the 1990s, a small farm was considered to be 40 hectares. With high performance and moderate debt levels these farms were thought to have a good chance of survival. This was the basis of an article by James Allen in this journal in September 1998. Future options were suggested for these farming businesses, such as increasing productivity, moving to a larger farm, diversifying or eroding equity in the business. High performance small farms today, again with moderate levels of debt, could also have a good chance of future survival. Which future business option suits a particular farmer will depend on their own situation, and some may result in better financial and non-financial result.

The first step in understanding which strategies may best suit individual small farmers is to appreciate the objectives of each farmer, the long term plans and preferred farming systems. This article reports the main findings from interviews with 13 Waikato farmers, each farm with less than 250 cows and at different stages in their ownership career.

The farmers interviewed had two main objectives. The first was to have sufficient time and flexibility for non-farm activities. The second was to achieve sufficient cash for family and business needs.

Non-farming activities were of particular importance to those interviewed, and included involvement in the local community, church, school, family and the wider industry. One farmer explained his view – 'There are other things to do apart from milking. It is lifestyle first. Cows give security of income, although I am not passionate about the cows.'

Many farmers were uncomfortable with the term lifestyle as it implied being very relaxed or even lazy. One farmer preferred to use the term values system, explaining that she placed a very high value on other, non-farming aspects of her life. With regard to the second objective, a farmer commented – 'If we can make good money on a small farm, why have the problems of going bigger?'

Long-term aims

For the long term, the majority of the farmers interviewed wanted to remain on their property when they retired from active milking, with staff to manage the farm on a day-to-day basis and to milk the cows. To be able to achieve this, farmers aimed to have very low or zero debt. Their plan was

to use funds previously available for repaying debt to pay a full-time staff member. As one farmer explained – 'If we add a labour unit I feel we need to be mortgage free.'

The main risk to this long term plan was the farmers' own health. Most of those who now employed a staff member to milk their cows had done so due to health reasons. Farmers' health becomes the time frame for the long term plan. Those in the middle stage of their career had a time at which they felt that they would need to stop milking due to health or fatigue. The majority of farmers considered that the farm was to fund their own retirement and was not necessarily to be handed on to the next generation.

Farmer business strategies

The business strategies were similar and focused on generating a cash surplus, even in difficult years, cost control, debt reduction and then expansion, intensification or diversification depending on the situation and personal preferences. In the early stages of their careers debt levels had been high, with cost control and debt repayment being vital survival business strategies. At the same time most farmers had needed to bring basic farm infrastructure, such as fencing, up to a level where the farm could run efficiently. This balancing of debt repayment with on-farm spending was explained by one farmer – 'We prioritised everything and if we could not afford, it we did not do it.'

The focus on generating a cash surplus and cost control remained. For most farmers the capital gain of their properties was secondary to the cash returns. The focus on debt varied. One group aimed to get debt levels to zero or very low before they would seriously consider alternative business options. A second group concentrated on getting the mortgage down to an acceptable level and then actively looked at alternatives. Very few farmers interviewed were not planning to significantly reduce debt levels.

Intensification has been suggested as a way small farmers could lift production and profitability (Parker et al 2000). There were two main reasons why most farmers interviewed were not interested in significant capital investment to lift production. First, repaying debt was considered lower risk than investing in increasing production. Reducing debt also met the majority of the long term aim of very low debt levels

and be in a position to employ staff. Secondly, some farmers believed they could get a higher return investing off the farm.

The farmers interested in spending to increase productivity tended to be the newer entrants to farm ownership. These farmers had planned or paid for the infrastructure from cash-flow rather than borrowing. Workload was an important consideration when farmers were thinking of investing in capital to lift productivity. Investment in new infrastructure, such as in-shed meal feeders, could depend on whether it was thought to reduce workload. Farmers said they would consider intensifying if it would allow the business to support a returning family member, or was considered essential for their business to survive.

Despite being small, many farms had increased in size with the purchase of adjoining blocks of land. This had to be financially viable under the conservative criteria of the owners. In addition, several of the farmers interviewed were involved in equity partnerships, and many mid-career farm owners had investigated moving to the South Island during the 1990s. Farmers were not against expansion, but it had to meet their objectives, of having sufficient time and flexibility and generating sufficient cash. One farmer commented – ‘It is already a gold mine, why go larger?’

The comment explains the challenge facing farmers considering expansion to allow the next generation to be included in the business. The majority of these Waikato small farms were on highly productive, high-value land. Purchasing a sizeable adjoining block of land would require significant capital, and probably a high level of debt, which could be risky.

The alternative was to sell the home farm and use the equity to buy a larger farm on cheaper land. This would mean moving from the local community and amenities. Farmers were also concerned that the larger property could be less profitable than their current farm. Many farmers considered equity partnerships as this would allow business expansion without moving from the home farm or milking more cows.

None of the farmers interviewed were either running or contemplating running businesses which diversified their dairy operation, such as operating holiday cottages or a contracting business. However, farmers were interested in diversifying their non-farm income. Two farmers were working full time off the farm and employing a farm manager to run the home farm. This was financially advantageous, and allowed the farmers to follow their interest, but the challenge was to maintain the focus and profitability on the home farm. This was also a reason many of the farmers interviewed did not want to run a non-dairy farming business.

The most popular means of diversification were investing in commercial property or shares and equities. Approximately a third of farmers interviewed had significant funds in one of these investments, and other farmers said they would consider these options when in a financial position to do so. The choice of off-farm investment depended on their own preference, skills, and the potential to work with a group, which was often family based.

Future farming systems

The preferred future farming systems had to fit with the objectives of providing time and flexibility as well as generating sufficient funds for the family and business. While farmers did not want, in general, to manage staff, those contemplating expansion would consider a farm with one employee. Future options mentioned by those interviewed were once-a-day milking, adjusting the stocking rate and the level and method of feeding supplementary feed.

Once-a-day milking was a popular option among smaller dairy farmers with those interviewed mainly using it in the second half of the season. The most obvious benefit was freeing up time for other activities. Those not using once-a-day milking commented that the milk production losses would be significant, or they feared losing milk quality bonuses due to the rise in somatic cell count. However, even farmers not in favour of once-a-day milking would seriously consider the option if staff were not available and it allowed them to remain on their farm.

In terms of cow numbers, half of the interviewed farmers had reduced the stocking rate on their farm to improve cow feeding. This result could also have been achieved by importing more feed, although few farmers were interested in this option. As one farmer commented – ‘I think the whole system was being pushed too hard and was not working’.

The method of feeding supplements was important. The system chosen depended mainly on the workload and capital requirement. Other considerations were flexibility. Few farmers were interested in investing in bunkers and feed pads, due to the capital cost and workload. One farmer explained – ‘I would have to spend capital, and we are firmly focused on debt reduction.’

Implications for future business

The farm businesses involved in this study, with plans to reduce debt, have a good chance of supporting the current generation of farmers. This was the timeframe that interviewees were concentrating on.

Future business strategies need to focus on achieving a work life balance and cash returns for the current farming generation. Capital development and the cost of increasing productivity need to be very carefully compared to the low risk return from repaying debt. Research and extension programmes could focus on equity partnerships and investments off the farm for farmers in a financial position and the inclination to increase the overall business or wealth. Finally, the health and fatigue levels of farmers are critical and need to be allowed for in any future business strategies.

References

Parker WJ, Rauniyar GP and Dooley AE. 2000. The future for the small dairy farm: plans, priorities and constraints, *Proceedings of the New Zealand Society of Animal Production*, 60: 241–246.

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Profile

Bob Engelbrecht

Farm business consultant, valuer and Ashburton district advocate



Bob Engelbrecht grew up on a small farm between the north and south branches of the Eyre River near Oxford in North Canterbury. When he left school he started out as a land survey cadet but soon tired of working on city sections. The family farm ran sheep and a few dairy cows, and after his father became ill he returned but the farm was small and uneconomic.

His next decision was to go to Lincoln College, as it was known in 1964, and complete a Diploma in Agriculture as well as a Diploma in Valuation and Farm Management. Nearly 50 years later, in December 2013, he was awarded a medal from Lincoln University for long and meritorious voluntary service to the institution. His first position after college in 1966 was as a farm adviser with the Lauriston Farm Improvement Club in Ashburton district.

Five decades of consulting

Bob has been in the job for five decades and believes that a farm business consultant or rural valuer should be able to stand alone in their profession as a lifetime career rather than as a means to some other objective. However, this is not to criticise any consultant or valuer who chooses to move in another direction. He feels that sometimes the contribution of the farm business management and rural valuation professions is not well recognised or valued for the skills required to provide the high standard of services expected by the community. Instead it is seen simply as a means of an entry into farming rather than a long-term professional career.

He also notes that after many years of working as a farm business consultant the relationship with farming families can often become very close. In the event of a major problem or crisis, the farm consultant is usually their first point of contact, almost in the role of a family counsellor. Over the years he has seen many farm consultants using their businesses as a means of preparing to purchase their own farm property for either full-time or part-time purposes.

Another area that Bob has been involved in is that of high country pastoral leases. With his experience in farming and valuation, he was one of a panel of three given the responsibility of producing the 2005 Armstrong Report, which made recommendations to the government on how to set rentals for these leases, the principles of which have now generally been accepted.

Focus on irrigation

On-farm development in the Ashburton district is the result mainly, but not exclusively, of irrigation which is an activity Bob he has been heavily involved with for over 40 years. He was a founding member of the NZ Irrigation Association, and has become a regional identity for his dedication to the development of agriculture and helping farmers grow their businesses as well as for his passionate pursuit of water and irrigation. He says that people under the age of 40, whether involved in farming or not, would struggle to understand the contrast between Ashburton plains land farming before the 1970s and the present day.

Before the 1970s the Ashburton district was a fragile rural economy based mainly on sheep and some cropping farming, with variable results depending on seasonal rainfall and soil types. Groundwater irrigation developed quietly until 1984 when Rogernomics brought it to a halt and the Irrigation Association went into recess. With the recovery of farming in the early 1990s, and new progress in irrigated agriculture, interest was renewed in an organisation based on representing all facets of irrigation. By 2001 there had been a name change to Irrigation NZ, with Bob being honorary chairman, secretary, treasurer and newsletter producer for the first few years.

Bob feels that under carefully managed irrigation, and particularly by dairy farming, almost all soils on the Canterbury plains have developed dramatically since they became effectively irrigated. He says one of the major stress factors for farmers in his region used to be drought – it is now a thing of the past thanks to irrigation. The build-up of soil organic matter, along with improved soil pH and nutrient levels, now allows the soil to retain soil moisture and nutrients to a much greater degree than under earlier dryland farming. This is of great benefit for future farming and land use alternatives, as well as improving the farmer's ability to manage nutrient losses. He feels privileged to have had a front seat in such a major change in farming systems.

He knows that careful irrigation works as it improves the soil capability and creates a more confident farming community. Irrigation was also a magnet to the region for businesses such as South Pacific Seeds, Five Star Beef, CMP and Talleys.

Ashburton district a go-ahead area

A desirable place to farm

Bob believes that the Ashburton district has gone from being one of the least desirable farming districts to one of the most desirable in the country for three reasons – irrigation availability, the versatility of its soils and because Ashburton is a very good farm servicing town. As a result Ashburton is now generally recognised as one of the most dynamic rural towns in New Zealand.

In earlier days, 25 to 30 years ago, it was difficult to get many young professionals to come to Ashburton to work. However, when they came to the district they usually did not want to leave once they realised the opportunities it provided from a business, social, recreational and sporting point of view. There are now a number of well-established younger professionals operating in the town.

Best place to dairy

Dairying or dairy support is now the most common land use for about 70 per cent of the 250,000 hectares of plains land in the Ashburton district. Bob says that diversification of land use has always been one of the strengths of the district. While he would not wish to see wall-to-wall dairying on the Ashburton plains, he can understand to a large degree why this is happening.

The following statistics from Dairy NZ for the 2012/13 farming season provide a lead –

- Ashburton district has the largest dairy herds in New Zealand with an average of 875 cows and this herd size has been increasing recently each year. This compares to the New Zealand average of 402, South Island average of 614 and the North Island average of 332.
- Ashburton district has the highest production of milk solids of 1,425 kilograms per effective hectare, compared to the New Zealand average of 988, South Island average 1,137 and North Island average of 904.
- Ashburton district dairy cows have amongst the highest production of milk solids per cow in New Zealand of 397 kilograms compared to the New Zealand average 346, South Island average 378 and North Island average 327.

Dairy farmers are less affected by the weather and can still milk in the rain, calve in the mud, and keep going. Once they have milk in the vat they do not have to worry about it. The tanker collects it and then it is marketed by an organisation working on their behalf. This is not so for the arable farmers. The following factors have had a major effect on the increasing trend to dairy farming in many parts of irrigated plains land in Canterbury –

- Relatively poor financial results in arable farming, especially relative to the very high skill levels required
- The climate and other risk effects
- The often long delay between investment in a particular crop to the final receipt of income.

The environment

Environment Canterbury's Regional Land and Water Plan

will continue to require changes in farming practices to a greater or lesser degree. Bob feels that environmental problems will become increasingly more demanding on all farmers in the Ashburton district and the whole of New Zealand. However this is no different from what has been a relatively constant change in farming over the past 40 or 50 years, although he sees change happening at an ever-increasing rate.

Environmental opposition to irrigation development is often sparked by misinformation, which Bob finds frustrating. He worries about bureaucracy taking over and political correctness becoming a substitute for common sense. He feels it is more complicated now to get and retain resource consents for water for irrigation or for effluent management than in the past, and that there has to be a balance between some wanting to move ahead on projects and others trying to 'save the world'.

Recommendations to farmers

From his long years of experience as a farm business consultant and valuer, Bob has the following 12 recommendations for farmers on the Canterbury plains. They could be applied elsewhere.

- You need to be better than average, and better still in a year's time
- Attention to detail is important
- Good timing is everything
- Be well informed – read, ask questions, learn, keep your ears and eyes open
- Measure and monitor, if you do not measure then you cannot monitor and you cannot know what changes to make
- Focus on the important factors and do not get hung up on trivial problems
- There is no such thing as a low-cost farming system
- Use a conventional farm programme unless you have a high level of management experience and specialist skills
- Farm programme and management need continual monitoring and review throughout the season
- Self-deception is usually the biggest stumbling block, so be totally honest with your analysis of crop and seed yields and animal performance results
- Scale and size of a farm operation can help, but can also have a negative effect if not well managed
- Top farmer performers eat, drink, sleep and breathe their farming businesses but they also approach their family, recreational and sporting time with the same enthusiasm.

Transition to retirement

Bob is in the process of retiring from professional work, but still has a number of projects and tasks to complete for clients. He continues to have regular contact with many farmers, and other professionals in the Ashburton district and beyond. At 73 years of age he feels it is now time to focus on personal objectives while he is fit and well, particularly those which are family and community oriented. He will still take a vital interest in farming and other activities within the Ashburton district and further afield.

Guidelines for authors

Articles for the journal *Primary Industry Management* all need to be written to suit the audience – text to be comprehensive and authoritative without being difficult to read. The articles should contain high quality professional information worthy of a good journal, but must also be readable and understood by someone who is not necessarily totally familiar with the subject. The editor will make every effort ensure the articles end up like this, but it is easier if authors start with the same aim and it will save a lot of time.

Articles should be approximately between 2,000 and 4,000 words. They can be longer, but we do not want shorter versions. Text should be supplied in Word and sent as an email attachment.

Photographs and illustrations

Text should be sent along with photographs and other illustrations, such as figures and tables, carefully labelled. Authors should not attempt to lay out an article to make it look like the printed version.

Photographs should be sent as separate jpps correctly labelled and each at least 500 Kb in size, preferably larger. The use of photographs taken with mobile phones is becoming more prevalent and this is a concern as the quality can be very poor. Please use a camera.

Figures and tables should be placed in the document as a guide so that the editor can see where they are meant to be. However, they should also sent as separate Excel files or similar. Do not convert tables and charts to a jpg as quality is severely reduced. Charts or tables copied from a website are usually unusable, as are photographs copied from websites. This is apart from the copyright problems.

If in doubt about any of these guidelines, please ask first.

References

Most of the *Primary Industry Management* journal articles are not refereed or academic treatise, although they are expected to be authoritative, accurate and professional. The articles need to be understood by literate professionals who, in general, are not practising academics and do not usually read or want to read referenced articles.

In a referenced journal, an author might want to explain that Smith discovered something. The correct way to reference in an academic journal would be ‘... it seems the world is flat (Smith 1999) ...’, with the full reference details at the end.

It will read a lot better if you can say ‘... In 1999 John Smith discovered that the world is flat ...’ Remember, the aim is that you want people to read all the way through. The article can be professional and accurate and also quite readable, even if the subject is complex. Stephen Hawkins can manage it with very complex physics.

An academic trend for students is for every sentence or paragraph to have a reference applied. This is to ensure that students are not copying other people’s work without making sure that this is properly recorded, or referenced. This habit is gradually being transferred to the non-academic world. However, it makes reading articles in journals virtually impossible and the habit should be avoided – because you want people to read your article.

If there is an overwhelming urge to mention a website, this urge should be curbed. If the desire continues, do not use a long convoluted link that no one will copy correctly. For example do not use something like – ‘... see http://www.worldisflat/what-not%tolookat/but_willmake-a/ ***spelling/mistake/and=fail/’ with the underlining left in. For some reason there are those people who still think that you can click on a link when it is in a printed publication.

If it is very important to mention a website it should be simple. For example just write ‘...You may find it interesting to look at the website www.worldisflat.com.’

Style

Throughout any article do not use emphasis in the form of italics, underlining, bold or block capitals. These will not be carried through to the final product in the journal, so they are best left out in the first place.

Jargon words should also be avoided, and there are lots to avoid. Examples include engage, deliver, staircasing, wraparound, key performance indicators, front-ended, stakeholders, datasets etc. There are hundreds more which are similarly unnecessary and irritating to the reader. Use plain English, it makes more sense.

Do not assume that everyone reading your article knows as much as you do. If they did, why are you writing it? They are learning or reinforcing some of what they already know. If you use a word which you are not sure will be understood by the reader, use an alternative. The other option is to explain what it means. For example you might be very familiar with the word 'tomo', but it will help to explain that it is a sink-hole, but using the word sink-hole is better in the first place.

Avoid acronyms as much as possible, especially when they are totally unnecessary. For acronyms, the convention is that if for example you write Ministry for Primary Industries, then (MPI) is put in brackets immediately afterwards. From then on it is always MPI, obviously without brackets. However, if MPI is never used again in the text, there is no point in putting MPI in brackets in the first place.

Do not create pointless acronyms, such as 'steering group management for pointless acronyms with lots of others' (SGMPAWLO). This sort of problem occurs a lot and is to be seriously avoided.

A lot of acronyms start to litter the text even when correctly used. Authors should find a better way wherever possible. It often just requires a little more thought.

Avoid other capital letters for words which do not need it. For example 'farm management consultant' should not have capitals. If the phrase is used two or three times in a paper, all the words are perfectly acceptable and 'FMC' is not the solution. Remember what the aim is. You want people to read the article all the way through and understand what they read. That is why you spent time writing it.

Use brief headings where appropriate and keep sentences and paragraphs to a sensible length. Avoid too much and too little. As a rule, try to keep sentence length below 45 words. In addition, do not have every sentence as a new paragraph, which is becoming a habit in many places. The better it is written the more likely the article will be used and read.

Biographic notes about the author

It is very useful to have a brief understanding about the author of an article. For that reason we ask for a short biographical note which will appear at the very end of the article. We do not want a life history, however eminent this life may be.

Please supply a one sentence, approximately 25 word maximum, biographic note. A good example would be – 'James McCartney is Managing Director of Manawai Agricultural Consultants Ltd in Whangarei. Before this he spent 15 years as Agriculture Officer on the *USS Enterprise*'.

Deadlines

Getting the articles in on time is really important. We ask for them to be in by a certain date which will be significantly before publication. We need them by the dates required as there is a lot of work to do between receipt and publication. The sooner they arrive before a deadline, the better. If, for any reason, an author is likely to be a day or two late please let us know in advance and we will help where we can.

It is understood that problems will occasionally crop up and authors will suddenly find they cannot supply what they promised. We hope this is rare, but it happens. Please let us know well beforehand rather than just not producing anything. We are aware of time problems and understand that things can go wrong. All we ask is that you let us know in good time and we can adopt a new plan.

Finally

If you have any doubt about part or parts of the above guidelines, please ask for clarification. The editor is always happy to offer help and ideas to authors who would like their text to be better.

The main advice is to write simply and clearly for the target audience you have in mind. There are many different levels to aim for, but it is best to assume some intelligence and knowledge, but not to assume too much.

When you think your paper or article is complete, read the text again from a printed copy, not on a computer screen, and make any corrections. As a final stage, go and do something else for a day or two, return and read again what you have written, correcting and improving as you go.

Good luck, and enjoy your writing.

