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Recipes for agricultural education

The future of Maori in primary industry

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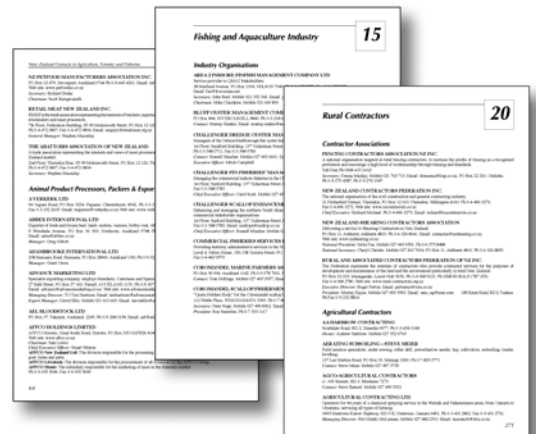
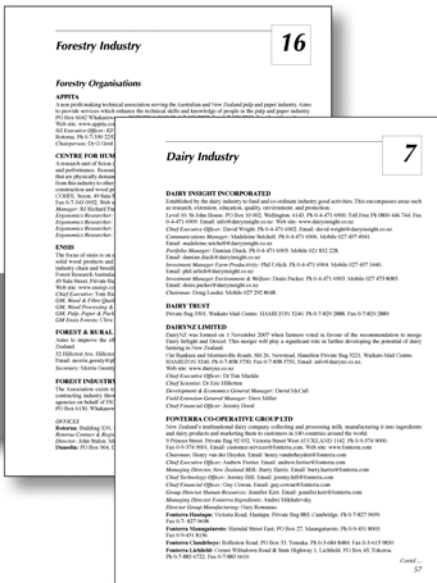


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Primary Industry Management is dedicated to the publication of articles on all aspects of agricultural science and the management of primary industry resources. The opinions of the contributors are their own and not necessarily those of the publishers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

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Editorial

WHAT DO MAORI LANDOWNERS EXPECT FROM THEIR PRIMARY SECTOR PROFESSIONAL?

Hilton Collier

With the deadline for settling Treaty of Waitangi claims now just five years away, the pace of settlement is accelerating. Assets worth millions of dollars are being transferred to iwi ownership. Some of these assets include rural and urban land as well as substantial amounts of cash.

Given our philosophical view of land ownership it is probable many of these funds will be used to buy back land assets. So what does this mean for rural professionals?

Modern business approach

Recently my own iwi, Ngati Porou, was involved in due diligence for some substantial farming assets that may form part of our Treaty Settlement. They needed someone to value the land, and someone to look at the farming operation as a business proposition. In short, what is the real estate worth and how much value can be extracted from it, on a sustainable basis?

This business was to be acquired for long term iwi ownership. Extracting an acceptable yield was a significant consideration. While capital gain is a factor, this was not expected to be realised, therefore is of minimal value.

A registered valuer was commissioned to do the valuation work and I was appointed to look at the current and future cash flow prospects these farms offered. Being someone with the required farm management expertise and possessing the skills and experience were their primary criteria for appointing me. Being of Ngati Porou descent was a bonus.

To be able to win this work, my iwi first identified their need and the skill set they considered necessary in the people who would carry out this assignment. They looked at a list of possible candidates and then selected the people they wanted to negotiate with.

The final selection was made on the basis of personal relationships – people they thought they could work with, who understood them and their needs. In this respect this is no different from the approach used by my non-Maori clients looking for someone to work with them. There is no reason for any difference. The needs are identical. The technical skills and expertise needed are the same. This highlights the modern day approach being adopted by Maori to managing their assets.

Some assets are ‘taonga tuku iho’ – treasures to be passed down through generations. In such circumstances a formal analysis of the value proposition may be more subjective rather than determined by objective analysis. Such treasures include the likes of mountains, bush and rivers. Other assets are those acquired primarily for the provision of material benefits to iwi members. These are opportunities for rural professionals.

Traditional approach

It would be fair to suggest that not all my Maori clients operate at this business level. Others have a vague understanding of their needs and what they might want from their professionals. These can be challenging situations. We as professionals need to work our way through the maze of issues, some completely unrelated, and others trivial. This is necessary if we are to try and clarify their objectives and how we might serve them. If we cannot do this then the professional’s experience may not be positive.

They often expect their professionals to have a far wider range of expertise, well outside what can reasonably be provided. Often they view a broad understanding of complex issues, such as livestock tax options, as having the detailed knowledge they need to provide more definitive advice on the matter. We professionals would need to be clear on what services we can provide.

Maori clients can struggle to reach a conclusion on some matters. Technical or unpopular decisions will result in the fall back position of procrastinating rather than making a tough call. They struggle to balance iwi/hapu/whanau politics. Often these battles compromise the quality of their decision making through an inability to see the big picture. They will forget they are the client who is responsible and ultimately must make decisions. They invariably get involved in management and do not understand that their role is governance. The professional often needs to guide them to subtly upskill themselves by taking advantage of the various courses available.

Despite this they are good clients to work with. They form very tight relationships with their professionals. They tend to take a long term view of their assets, as a sale is usually the last option. They are extremely loyal to those who understand them and how they work. Then again, that is what good client relationships are all about.

Hilton Collier is a Registered Farm Consultant with AgFirst. He is of Ngati Porou descent. His practice specialises in farm supervision and secretarial services to several large trusts and incorporations throughout Hawkes Bay and the East Coast.

Lead Article

THE FARM MANAGEMENT PROFESSION ITS EVOLUTION OVER THE LAST 75 YEARS

Vince Ashworth

The genesis of the farm management profession was in the mid-1930s with the establishment of the Lincoln Farm Advisory Service led by Associate Professor AH Flay. At a time when the farming industry was struggling from the effects of the Depression, it was Flay who first practised a holistic system approach to advising farmers. He was assisted by RH Bevin and later HE Garret introducing teaching that understood farming to be an integrated system involving all of the constituent technical and socio-economic disciplines. The advisor's task was to analyse problems or weaknesses in this system and recommend or look for solutions.

With the expansion of state services under the first Labour government, the land-based departments – Lands and Survey, Valuation, State Advances and Agriculture – saw the need for better qualified staff. The understanding of economics, especially production economics, and the financial aspects of farming of most existing staff was limited. The departments demanded staff with a knowledge of valuation and farm financial issues in particular.

VALUATION AND FARM MANAGEMENT DIPLOMA

Led by H E Caselberg a senior staff member of the State Advances corporation, and RH Bevin, the government sponsored Rural Cadet Scheme was conceived. Those selected completed a five-year training course, half of which was spent working on various farm systems in different parts of the country and half at study, partly at Massey followed by two years at Lincoln to complete the Valuation and Farm Management diploma (VFM). The diploma had been introduced in 1939.

The VFM diplomates were to have a marked effect on the development of the farm management profession. J D Stewart (later Sir James) became the leader of farm management teaching at Lincoln. In 1965 he became the first Professor of Farm Management. This was some 30 years after Flay advocated farm management teaching. That it took this time to be fully accepted by the academic fraternity reflects the continuing difficulty the universities seem to have with a multi-disciplinary subject. Under his guidance and helped by Professor Philpot, head of the Agricultural Economics Department, the VFM was upgraded to the Bachelor of Agricultural Commerce with a farm management option.

FARM IMPROVEMENT CLUBS

Until the 1950s the Department of Agriculture focussed largely on giving technical advice to farmers with comparatively little consideration of the economic and financial aspects. By the late 1940s farmers were beginning to demand something more than what the department offered. Ralph DuFaur working in the department in South Auckland, along with some of his colleagues, conceived the Intensive Farm Management group among dairy farmers agitating for improved service and advice. The group would test whether or not an intensive analytical type of farm management service would result in increased productivity and increased incomes.

Arising from his farm management training, DuFaur had a keen interest in farm finance and production economics. His work showed that the farm management approach paid off. So the first farm improvement club was conceived under which a group of farmers employed their own professional farm advisor. The Franklin club with Ralph DuFaur as the advisor was the precursor to a movement that had a marked effect on all farm advisory services including those of the Department of Agriculture and the Dairy Board Consulting Service. The club movement proved to be the catalyst for a change in the Department of Agriculture from giving purely technical advice to a more holistic farm management approach.

At its peak in the early 1980s the movement included around 70 clubs, many employing two advisors. Its greatest appeal was with dairy farmers, possibly because new technology and improved management systems for dairy production were being developed at that time. In addition, improved results were achieved more quickly than with sheep and cattle farming. It only took a simple change in management to see increased milk in the vat the next day, whereas new technology and management systems on sheep and cattle farms have longer gestation periods.

The great majority of the club advisors were those with VFM diplomas who moved from one of the land-based government departments into private employment – I was one of them. Not only did the club work allow them to make full use of their training, in almost all cases it would double their state service incomes.

PROFESSIONAL FARM MANAGEMENT

The clubs had limitations. There was a limit to what farmers would pay and clubs were reluctant to allow advisors to undertake more lucrative work outside their own members. This would have allowed them to increase their incomes without the need to increase club subscriptions. Nor would they allow one member to receive more intensive support. In the end these limitations saw the movement disappear as progressively more advisors went into private practice or obtained positions in companies or institutions that provided a career path and increased incomes.

In 1960 I resigned my position as a club advisor and went into private practice in Morrinsville. To the best of my knowledge this was the first professional practice in farm management consulting. There may have been one or two other individuals undertaking part-time advisory work that preceded Ashworth and Associates but who did not establish a professional practice as such.

By demonstrating success Ashworth and Associates paved the way for increasing numbers to go into private practice. The firm diversified its sources of income from a wide variety of assignments including farm advisory, farm supervision, valuation, feasibility studies, economic evaluation, farm financing, staff recruitment and ultimately international agricultural development consulting.

The Society of Farm Management

During the 1960s with expanding of the numbers of club advisors and private farm management consultants, there emerged a need for a professional organisation which would, among other things, guide the development of the profession. The Institute of Agricultural Science was reluctant to admit diploma holders who constituted the majority of club advisers. It was hoped that such an organisation would set professional standards of conduct as well as providing a forum for exchanges of knowledge and experience and continuing education.

When my colleagues Norman Clarke, John Graham, Mark O'Connor and I set about establishing the Society of Farm Management, recognition of farm management as a separate identifiable profession was the ultimate goal. Farm management consulting as a profession was something new. The well established professions such as valuation, law and accounting all operated with the support of their own professional organisations. So in 1969, after nationwide canvassing and promotion of the concept among interest parties, and drawing on the experience of our Australian counterparts, the Society of Farm Management was established at an inaugural meeting held in Hamilton.

One of the early steps of the society was to establish a Registration Board under which practising consultants who, in the opinion of the board showed that their work was of sufficient professional standard, would be entitled to become Registered Farm Management Consultants. The aim was to provide clients with an assurance that the consultant they employed was fully qualified to undertake the task at hand. The board was also empowered to consider complaints about professional misconduct and if necessary, take appropriate disciplinary action against the individual concerned.

COMMERCIALISATION AND PRIVATISATION

The Labour government which came to power in 1984 set about changing the economic structure of the country. An unprecedented and radical reform of State Services took place. Wherever possible services, which were provided free, were commercialised – the era of State Owned Enterprises and user-pays was introduced.

The Farm Advisory Division of the Ministry of Agriculture was reorganised to aid its operation as a commercial entity. The farming industry no longer had access to free advisory services.

The government owned Agriculture New Zealand was later privatised. This move substantially increased the number of consultants operating in the private sector. The only nominally

free advisory services were those provided by the Dairy Board, commercial farm service companies especially those in the fertiliser industry and in a growing number of cases, commercial banks.

The profession today

The establishment of the society, now the New Zealand Institute of Primary Industry Management, was a major step towards achieving recognition as a true profession. Consultants are much more professional in every sense of the word than in the 1960s when I first started in practice. However, while considerable progress has been made the process is, I believe, not yet complete.

The renaming of the society and the introduction of agricultural commerce degrees at both Lincoln and Massey has widened the fields in which consultants practise. Banks and fertiliser companies, for example, now employ professional consultants. These, in addition to the respective technical fields, have a sound knowledge of the business aspects of farming embodied in farm management teaching.

MEMBERSHIP

The overall membership is widely diversified. Some 211 are practising consultants. Of the total membership of 903, including 20 overseas members, 87 are employed by banks, 30 are practising accountants, 10 with the fertiliser industry and 30 with DairyNZ. Farmers make up some four per cent of the membership signalling the trend for today's farmers to be much better educated and informed and consequently much more challenging than those of 40 or 50 years ago.

An interesting proportion of the total NZIPIM membership is the number of students, 232 representing nearly 27 per cent of the total. This points to the Institute successfully promoting itself among future generations of potential consultants.

Registration has not achieved all that for which it was established. The numbers of practising consultants actually registered to date amounts to only 24 percent of the consultant membership. Registration was originally conceived as a key tool in maintaining professional standards among consultants and in gaining wider recognition of farm management consulting as a true profession. A challenge now for the Institute is to analyse why practising consultants appear to be reluctant to apply for registration and if necessary make changes that will make registration attractive to greater numbers.

In an age of increasing specialisation, the multi-disciplinary profession of farm management still struggles for recognition. Even the universities appear to have difficulty with where to fit farm management. Lincoln, for example, has shuffled the Farm Management Department to and from a number of faculties and divisions. This experience does not bode well for professional recognition.

The future

Full recognition and respect of the profession should be a continuing objective of the Institute. It will be achieved by all of its membership, and especially the practising consultants, maintaining a high standard of professional practice and ethical behaviour. It is the latter upon which other professions and the public make their judgement of how professional we are.

Today's consultants are better informed as indeed are their clients, and have access to a range of tools that were not available to the pioneers of the 1930s, 1960s and 1970s. The use of slide rules was an innovation in the 1950s and 1960s. The purchase of the first hand held calculator by Ashworth's necessitated a full partners meeting and was considered a major investment in the late 1960s. What is now bought for a few dollars cost nearly \$500 in 1960s. Laptop computers, analytical tools and programmes, email, the internet and cell-phones constitute a whole range of bewildering information technology. Each of these brings their own challenges of understanding how to maximise the benefits they offer.

Changing challenges

The role of and challenges for consultants is ever changing. Technology development and the changing socio-economic scenario ensures that new challenges will continue to emerge. Larger farms, diversified production systems within many farms and changing land-use require new approaches. Keeping abreast of these changes pose major challenges for consultants and for university teaching.

Environmental issues such as carbon footprints, climate change, food quality and safety, animal rights, nutrient management, rapidly changing market conditions, changing food consumption habits throughout the world, water use, comparative energy use and cost, biotechnology and genetic manipulation are among some of the issues that confront us today. As farmers compete with non-farm incomes, the trend towards larger farms is likely to continue as are the continuing changes in land use diversification. While larger farms increase individual owner's incomes it is problematic whether or not this trend actually results in real economies of scale.

Consultants need to take note of the changing world economic structure and power, the rise of China, India, Brazil and Russia for example, and the effect these changes will inevitably have on our markets and consequent food production mix. A huge danger for practising individuals is not keeping abreast and understanding these issues. It is too easy to neglect opportunities for continuing education and research.

MILESTONES

Milestones marking the development of farm management as a profession.

- Mid-1930s – The Lincoln Farm Advisory Service holistic system approach to advising farmers and the beginning of farm management teaching at Lincoln College.
- 1939 – Introduction of the Lincoln College Diploma of Farm Management.

Role of the NZIPIM

The challenges facing individual consultants are the challenges that face the Institute – a rapidly changing landscape. The Institute needs to do whatever it can to support the membership to meet these challenges. Ensuring there are continuing education opportunities wherever they may be including internationally is crucial. One area that the Institute should consider addressing is the linkages between research and extension. One downside of the privatisation process appears to be weakening of these linkage.

The Institute needs to do whatever is necessary to ensure the membership maintains a high standard of professional and ethical behaviour. Support of the Institute is important to consultants. They need to be prepared to pay for the services provided whether they be direct or indirect. One example is the current journal. It is a publication of high standard and is widely read. It is crucial that the Institute continually strives to maintain this standard and where possible, improve it.

Conclusion

Since the 1950s when the majority of farm consultants were state servants, there has been one fundamental change. Today, the great majority of those providing farm management advice to farmers and others are personally accountable for the standard and quality of that advice. It represents a basic incentive to give high quality services and advice. This, in my view, has been the main factor that has driven a quantum leap in professional standards.

Since the 1960s the profession of farm management has made substantial progress towards wider recognition as a profession. The task is not complete. Responsibility for furthering its future lies with the behaviour of the individual membership and the professional standards they set themselves in their practice. A strong and active Institute is also crucial. Public image, and in particular those of other professions, is what matters in the end.

I would like to acknowledge helpful comments from Prof Keith Woodford, John Scott, Mark O'Connor, Andrew Honeyfield, Neil Taylor, and Dr Bruce Thorrold.

Vince Ashworth is a Life Member of the NZIPIM

- Early 1950s – Formation of the first Farm Improvement Club, South Auckland.
- 1960 – Establishment of the first professional private farm management consulting practice in Morrinsville,
- 1969 – Formation of the Society of Farm Management,
- Late 1980s – Commercialisation and subsequent privatisation of the government Farm Advisory Service.



POLYTECHNIC TRAINING FOR THE PRIMARY SECTOR IS THE SECTOR GETTING A FAIR DEAL?

Jonathan Walmisley

One constant in tertiary education in New Zealand is the constant state of change. Change in the last nine years has come about due to changes in government priorities, the formation of the Tertiary Education Commission (TEC), the government agency to lead relationships with the tertiary sector, changes in labour markets and in student expectations. Institutes of technology and polytechnics, universities, private training establishments (PTE) and industry training organisations (ITOs) are different and change affects them differently. This article considers the polytechnic perspective of the changes and their effect on training for these in the primary sector, predominantly in the farming sector.

TWENTY POLYTECHNICS

There are 20 polytechnics in New Zealand ranging in size from the largest UNITEC to the smallest, Telford Rural Polytechnic. In general they are located in cities and towns with most of their students being able to access their courses on foot or by public transport. The exception is Telford which is located on a farm in South Otago. Telford is the only polytechnic dedicated to providing training for the primary sector, being a farm training institute at heart. The only similar training provider is Taratahi Agriculture Training Institute, outside Masterton, which is treated by the TEC as a PTE.

During the 1990s there were few polytechnics giving training for the primary sector. Instead they concentrated on courses for their local urban community. There were exceptions such as the Waiariki Institute of Technology for forestry, Bay of Plenty Polytechnic's Edgewater Campus for horticulture, Christchurch Polytechnic Institute of Technology's Seven Oaks Campus for horticulture and Nelson Marlborough Institute of Technology Richmond Campus for horticulture and agriculture. The Christchurch and Nelson polytechnics are now closed.

However there were only two providers for training across the sector – Telford and to a lesser extent Taratahi. This situation remained relatively unchanged until early this decade. The focus of tertiary education over this period was increased participation.

Over the same period New Zealand saw a proliferation of PTEs, many of which were specialist or foundation-second chance education. However, a number took the opportunity presented by the lack of polytechnic commitment to the rural community to fill the gap, three examples being Agribusiness Training, National Trade Academy and Agriculture NZ. Some of these were funded through WINZ, others received their funding through the ITOs, notably Dexcel, Agribusiness Training and Agriculture NZ, and a few received direct funding from the Ministry of Education.

THE YEARS 2002 TO 2007

In 2002 we saw the introduction of the Tertiary Education Strategy 2002–2007. The government of the day was concerned that the sector was competitive, institutional rather than system focused, with some institutions failing and not aligned with national goals. The strategy developed six objectives aimed at increasing relevance, connectedness and the quality of the tertiary education system. At the same time they moved away from the goal of raising participation at least cost, to one that recognised the tertiary education system as a national development asset.

The Tertiary Education Strategy 2002–2007 required tertiary education providers to, amongst other things –

- Raise foundation skills such as numeracy, technological literacy, communication skills, team work, learning to learn and self-confidence skills
- Develop the skills needed for our knowledge economy
- Support industries in meeting their self-identified skill needs
- Opportunity for all students.

While the strategy changed, the funding regime which encouraged increased participation did not. In response to a concern that some large volume, sub-degree courses lacked relevance and quality in 2005 the TEC issued the statement of tertiary education priorities. The emphasis was to be on technical and trade skills and improving literacy and numeracy.

TWO MAJOR PLAYERS

In the years 1992 to 2007 the proportion of employed New Zealanders with higher level educational qualifications increased. In this period those with degrees or higher increased from 10 per cent to 22 per cent and the total proportion with post-school qualifications increased from 49 per cent to 59 per cent. This growth in training provision was very evident in the primary sector.

Primary sector organisations and employers had identified that a shortage of skilled workers was holding the sector back. In addition, it was identified that at this level providing skills training face to face, close to a person's work or home and in short bites, produced the best results. This expectation was already met in towns and cities but not for the rural communities.

Regrettably the polytechnic sector did not rise to the challenge to provide the training needed. Whilst Taratahi increased its output, two major players evolved in the period 2002 to 2006. The first of these was Aoraki Polytechnic, in partnership with Agribusiness Training, for short awards and qualifications in agriculture and horticulture nationally

The second was Telford which entered a number of collaborative arrangements. In the first of these, with Agriculture NZ and Agriculture ITO, Telford formed the well known and highly respected FarmSafe brand under which skills training is

offered. Then Telford entered arrangements with Agriculture NZ, Tectra and the National Trade Academy for agriculture, horticulture and equine studies. Telford also entered arrangements with regional fire authorities to provide limited training to rural fire fighters.

These arrangements provided training that met many of the skills training needs of the primary sector. The result was a huge uptake of training. FarmSafe alone has involved over 41,000 different learners over a period of six years. For most this was the first formal training since leaving school.

There were a few providers who were putting their efforts into providing the training needed. These specialist providers were beginning to meet the primary sector industries' needs. This approach should not come as a surprise as international research has shown that the best results for learners in the primary sector come from specialist training providers. Skills' training was becoming available to all, life-long learning was a reality and the primary sector was beginning to get a fair deal.

The future from 2007 to 2012

The Tertiary Education Strategy 2007-2012, for implementation from 2008, also came with a capped funding environment. The days of training for all who wanted it were over. The focus was now to be –

- Increased success for young New Zealanders more achieving qualifications at Level 4 and above by the age of 25. For much of the primary sector the majority of skills are at Level 3 – the area of growth over the period up to 2006
- Increased literacy and numeracy for the work force
- Increased achievement at advanced trade, technical and professional qualifications to meet regional and national industry needs.

The strategy set out clear expectations for the polytechnic sector, some of which actually brought the polytechnics into conflict with other parts of the tertiary education sector. The expectations were to provide skills for employment and productivity, to support progression to higher levels of learning or work through foundation learning and to act as a regional facilitator.

The last role gave regional ITPs rights to prioritise the training needs of their region and to stop other polytechnics offering training in their region. This cut across the ITO's mandate to provide leadership on matters relating to skills and training needs and was taken by some ITPs as the right to offer training to those in work in a similar way to the ITOs. In addition there was no identified role for specialist polytechnics – the Open Polytechnic and Telford.

REGIONAL RESPONSIBILITY

The years 2008 and 2009 have seen six regional polytechnics take on the responsibility for general agricultural provision for their region. Funding for training in support of primary sector industries has been transferred from Telford and Aoraki Polytechnics to these regional ITPs. There have been a variety of results, none of which have enhanced training for the primary sector in those regions –

- One polytechnic cut its only in-house agriculture programme. It sub-contracted the training back to the original providers, but retained up to 30 per cent of the funding for administration.

The amount of training to the primary sector in this region is now considerably lower than in 2007

- One polytechnic has increased its own capability in the form of providing training in direct competition to the ITO and has sub-contracted the rest back to the original provider
- Two polytechnics have just sub-contracted the work back to the original provider
- One polytechnic will not be teaching agriculture as other industries have a higher regional priority
- One polytechnic is increasing its in house capability but with low level training.

In a very short period of time the level of training available to the primary sector has decreased over that offered in 2006 and 2007. Many polytechnics are taking the funding that was previously used by Telford and others in the primary sector and are using it to support on-campus urban training. The reason for this is that it is easier and provides a better financial return.

Should this policy continue unaltered then the future of training by polytechnics for the primary sector could be bleak. There could be a return to what happened in the 1990s when most polytechnics had retrenched to on-campus courses where demand by students could be easily met whilst reducing overheads and streamlining teaching. I would argue that within a capped funding model, this is inevitable.

The future

All is not lost and there is a glimmer of hope. First, there is a new government which has already expressed some concerns over the regional policy. Second, the TEC has carried out a review of land based training.

The findings of the land based training review were to support investment strategies and to ensure that the investment in training was compatible with the requirements of stakeholders. In March 2008, industry bodies and others were invited to make submissions for a report due in July. In October a discussion document was issued which appeared to have ignored many of the submissions and was a reiteration of the Tertiary Education Strategy in another form. Stakeholder reaction was immediate and industry was in total agreement that the TEC must be prepared to look beyond current policies if there is material evidence which shows these policies obstruct the best interests of the land based industry.

CHANGE IN POLICY?

The submissions in response to the consultation document covered a number of important issues which do not align with TEC policy –

- There was agreement that publicly funded short courses should be available and unrestricted by rigid credit and qualification regulation
- Sub-contracting is valuable and legitimate where it integrates with a provider's existing capacity and capability, but not where it substitutes for that capacity and capability allowing the contracting provider to extract a toll without a substantive contribution
- There was qualified agreement that the number of qualifications needed to be reduced and rationalised

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RECIPE FOR AGRICULTURAL TRAINING SUCCESS

Terry Walters

Smedley Station, nestled under the Wākarara Ranges in Central Hawke's Bay, was originally bequeathed to the Crown by Josiah Howard of Tikokino. When he died in January 1919, his will made nearly a decade earlier bequeathed all his property without restriction to the King. However he was confident that the government of New Zealand would use the property as a foundation for agricultural education.

In October 1919, the Howard Estate Act was passed, providing that the lands be held by the Public Trustee in trust for the Crown, as a permanent endowment for agricultural education. The Act also made provision for leasing the property or carrying it on as a farming undertaking, the net revenues from the administration of the estate to form what was known as The Howard Estate account. The money in the account was to be used for the purpose of establishing and maintaining a school of agricultural education. This was to be under the control of the Minister of Agriculture and for the improvement and development of the estate.

NO GOVERNMENT FUNDING

Since those days the Smedley Station has grown into a 5,000 hectare property and is commercially run with no government funding. The performance and management of the livestock on the station is critical to the financial outcome and the long term viability of Smedley as a business and as a training farm.

The livestock on the station is made up of 28,500 stock units –

- 12,000 high performance breeding Kelso ewes consistently achieving 145 per cent lambing
- 3,000 ewe hoggets mated with 82 per cent lambing
- 500 Angus cows with replacements
- 119 R1 Angus heifers mated
- 1105 finishing bulls
- 211 breeding hinds with replacements
- 495 velvet stags.

HOWARD ESTATE ADVISORY BOARD

The Howard Estate Advisory Board was established in 1927. Currently it is made up of representatives of the following organisations –

- Federated Farmers – Mike Halliday
- Agricultural and Pastoral Societies – Phil King



- State Primary and Secondary Education Sector – Fenton Wilson
- Rural District Councils and Chambers of Commerce – Peter McKenzie
- Urban District Councils and Chambers of Commerce – Hugh Pearse
- Smedley Ex Cadets Association Incorporated – Pat Portas
- Public Trustee – John Derry.

The board and the farm manager meet every six weeks. These meetings consist of full updates on the training progress, both practical and theoretical, as well as financial updates and more general business.

INTAKE SELECTION

One of the board's most important roles is the selection of the new intake every year. After the initial processing of all the applicants by the cadet secretary Judy Walters, the board and manager set about becoming familiar with all of these young people via their CVs.

There can be up to 65 applications for the 11 vacancies. Two days for the interviews are set aside in September, and the board interview up to 50 applicants over this period. Each applicant has 15 minutes to sell themselves and put their hand up for selection.

By the end of the two days the Board has voted and the 11 successful people will be notified and asked if they accept a two-year Smedley cadetship. All unsuccessful applicants are also notified and thanked for their interest. These unsuccessful applicants have an opportunity for their names to be sent on to other training organisations.

Orientation is the time where the prospective cadets and their families come to the station to see if Smedley is the pathway into agriculture that they want. This is held over a weekend in June, when we outline what our expectations are of our cadets and the training they will receive. This is the time to ask plenty of questions.

CRITERIA USED IN SELECTING A SMEDLEY CADET

These are some of the key things we have identified for a career in farming and farm training –

- A passion to be on the land
- Someone who has already gone out of their way to work on farms, for example at weekends or on school holidays
- Team players of any sport
- Physically fit as hands-on training is physically very demanding
- A can-do and a will-do attitude
- The ability to read and write
- Good references as evidence of commitment to learning and agriculture
- To be still at school and be doing their best
- To be between the age of 16 and 20 years old.

These are just some of the things that we look for in a prospective cadet, and not necessarily in that order of priority. It is also important to keep in mind that we accept quite a number of young people from town also, not just from farming backgrounds.

THE SUCCESS OF SMEDLEY

There are a number of factors underpinning Smedley Station's success. The relevant theory component is one of them, and starts

right from the beginning of the first-year cadet training. Working with our theory training provider Agriculture NZ which does an excellent job, we have put together a programme that follows the farming calendar throughout the year. The trainee gets the relevant information in the lecture room that applies to what they are currently doing on the farm.

SECOND-YEAR CADETS

Year one cadets work at attaining Level 2 and 3, and in the second year they attain the Level 4 Certificate in Agriculture (Sheep Farming). Agriculture NZ has the expertise in this area with excellent tutors for the theory component. Up to half of our graduates go on to university and do further tertiary education – usually either a Diploma in Agriculture or an agricultural degree.

There are bursaries available for these graduates at the end of each semester but these are contingent on a successful result.

TRAINING

The practical training of Smedley cadets is done by Smedley staff. This is group of people that has a considerable amount of knowledge, the skill base and many years of practical experience. It takes a certain type of person to teach young people day in and day out on all the basics in agriculture, let alone the other important aspects such as safety. In addition these very young trainees have little or no experience, so the process is very time-consuming and sometimes a game of patience.

The first-year cadets are involved in things like fencing, handpiece work, tractors, chainsaws, preparing mutton for the cookhouse and dog tucker for the station dogs. The second-year cadets are required to bring in a broken-in huntaway at the beginning of the year. Once they have reached the stage where they are working with their first dog like a team, they then purchase a young heading dog. We then teach them to train that dog, and their role on the station becomes stockman.

Smedley is run by myself as manager, with a stock manager on the main station, two stock managers on the satellite farms, a maintenance manager, a workshop manager and tractor operator, a shepherd, two station cooks and 22 cadets.

All staff must not only have expertise in their fields and the ability to pass down these attributes to trainees on a daily basis. They must also have good people skills as they play a pivotal role in the shaping of our cadets.

GRADUATION

At the end of the year comes the highlight. Graduation is a big day for the eleven graduating cadets and the station. The woolshed is scrubbed spotless, you can almost eat off the floor, and the scene is set for the guests. A lot of service industry representatives are invited, as well as the parents, families and whanau. A motivational guest speaker rounds the afternoon off and gives that last bit of inspirational advice.

The graduating cadets get a Smedley certificate in recognition of the two years' training they have successfully undertaken. There are a number of prizes awarded and the staff spend quite some time deliberating. Most of the prizes have been sponsored by our local service industry and the businesses that we deal with.

AGRICULTURAL TRAINING RESULTS

How do you know if what you are doing is worth the time, effort, money and, sometimes, the headaches? The real test comes in the work place that our young people are employed in. How do agricultural employers view our trainees is the ultimate measure of the success of our training outcomes?

The answer is clear and simple. From August on I receive numerous phone calls, faxes and emails from farmers wanting to employ a Smedley cadet graduating in December, or a former cadet. This is proof positive that Smedley Station's training environment is very successful at turning out people who are well skilled and qualified for a career in agriculture. We produce a well rounded young person who has a broad knowledge of all things practical, an excellent work ethic and an academic qualification.

An ex-board member and ex-cadet Barry Scott and I carried out a survey on cadets that had graduated from 2000 to 2005. We found that there was only one out of the 50 who was not involved in agriculture. This was a fantastic outcome that we were very proud of, but more importantly it also confirmed that Smedley's cadet selection process and its delivery of agricultural training has successfully stood the test of time.

It takes Smedley two years of training to achieve these results because of the nature and diversity of farming and farm safety. There can be no shortcuts taken, as the trainee will ultimately be the one who suffers.

RESIDENTIAL FARM TRAINING

Residential farm training plays a huge part in the making of a Smedley graduate. It is more than the fact that they are physically living their dream. They are living in an environment of decision making and, the key here is seeing and living with the outcome of that decision.

From the first day they live, work and learn in an environment that is structured to meet their needs and the needs of a commercially run agri-business. Smedley's buddy system has stood the test of time. From day one the new cadet is assigned to a second-year cadet. These two will room together for the year, and the senior cadet acts as a mentor for the first-year cadet. This is a fantastic way to help settle in a newcomer, making the transition from school into working and training for their future.

The 22 cadets that stay in our hostel complex awaken to the smell of a cooked breakfast. The cookhouse is just a short stroll from the hostel and is one of the focal points on the station.

Smedley cadets wake up in the morning on the farm they will work on. They have an understanding of the importance of trust, a good work ethic and safety, and they quickly get a feel for everything related to the day-to-day work in general and livestock farming.

As you know there has to be more to life than just work so we encourage activities outside work. Hunting seems to be a favorite pastime and provides a welcome addition to the table. We take the cadets to small bore shooting at a local hall and the staff compete against the cadets.

Then there is winter sport which is rugby for most of them. We have an internal horse sports day around lambing time, where games are played on horseback, and we put down a hangi. This is one of the very few times where the station shouts the cadets a few beers, as it is also a docking shout.

Last but not least we take the cadets to a paintball afternoon towards the end of the year, and I can tell you that once on the field, being a staff member counts for very little.

SUMMARY

Smedley Station as seen through my eyes is the most incredible training arena. It has successfully trained 598 cadets from 1931 to 2009, but its effect on New Zealand's agricultural sector over the years is harder to measure.

The Smedley cadetship sets the platform for graduates to be successful in the world of agriculture. Graduates are spread from one end of the country to the other, in areas such as rural finance, consultants, farm managers, farm owners, shearers, stock managers, shepherds and farm workers. Just how do you put a value on that?

From a personal perspective, this station has the ability to consume a man's thoughts 365 days a year. My wife Judy and I spent six years as the stock manager and seven years as managers. It has not only been a pleasure but a privilege to be part of Smedley.

Terry Walters is the Manager of Smedley Station

Polytechnic training – continued from page 7

- There were concerns over the desirability and credibility of regional provision. The primary sector is represented by national bodies and there was already evidence of under-performance under the regional model
- There was no support to proliferate the number of providers
- There were concerns over transferring funding from lower to middle and higher levels of education. Economic transformation on the land and the demonstrated improvements in productivity comes from training in lower level skills.

Regrettably the land based training review recommendations which went to the TEC board in December are not yet public. Cynics may claim that the report will be buried. However I am

confident that industry bodies will not allow that to happen and that the results will advise investment priorities in the future and be incorporated into the new government's strategy for tertiary education.

Continuing down existing policy is not an option if the primary sector is to be served by the polytechnic sector in the way it needs. Only a change in policy direction will enable the provision of the correct quantity and quality of training and until then the primary sector will not get a fair deal.

Jonathan Walmisley is Chief Executive Officer of Telford Rural Polytechnic. This article reflects the view of the author and in no way expresses an official view.

RURAL EDUCATION AND TRAINING

AN INSTITUTE OF TECHNOLOGY PERSPECTIVE

Rosemary Wyborn

The Waikato Institute of Technology as its name implies, is situated in the Waikato region. There are three campuses in Hamilton and regional campuses at Te Kuiti, Otorohonga, Waihi and Thames. They offer a range of programmes to approximately 6,000 full-time student equivalents. Wintec, as the Waikato Institute of Technology is known, has given primary industry education – agriculture, horticulture, forestry and the associated food production industries – for more than 40 years. Apart from forestry, it continues to offer programmes in all of these areas.

A LITTLE BIT OF HISTORY

Wintec entered the agriculture education arena in 1972. A prospectus from that date describes ‘a Trade Certification Authority Course for Federated Farmers Cadets, Young Farmers’ Club members and sons of farmers’, with agriculture tutor Jack Till. By 1979, Jack led a department of nine agriculture tutors and two technicians and for a full time certificate in agriculture, block courses and short courses in farm management in Hamilton, and trade certification authority courses throughout the region.

Later Wintec bought a farm at Avalon Drive on the northern outskirts of Hamilton. They built an agriculture education centre with classrooms, resource rooms, a seven-a-side dairy shed built extra wide for students, animal handling facilities, and with 25 hectares of dairy pasture.

WINTEC TODAY

Today Wintec has one tutor based at the Te Kuiti campus giving a full-time agriculture programme to small groups of students. Requests for full-time courses within the Hamilton area are minimal. Wintec still has the dairy unit and farm, but much of the building now caters for veterinary nursing, animal care and large animal technician students.

One-day agricultural secondary school courses are available on request. AgITO courses which replaced the trade certification courses, are now presented in the Waikato by DairyNZ or Agriculture New Zealand. Wintec has sub-contracted other providers for short course primary industry programmes across the region.

Wintec established a horticulture education centre at the Hamilton Gardens in 1985 for amenity and production horticulture, arboriculture, landscape and floristry. Numbers of horticulture students reached a peak of about 240 in 2001 and are around 85 today. Sub-contractors add a further 25 full-time student equivalents. We have had a long association with the dairy manufacturing industry and we have presented block course packages in food science and dairy manufacturing for industry staff for more than 30 years.

Challenges for the sector

Currently a number of institutes of technology are struggling to support primary industry education. Some have closed their

agriculture and horticulture units including Palmerston North, Christchurch, Taranaki and Unitec. The number of primary industry tutors in the Primary Industries Polytechnic Tutors Association continues to shrink. Ten of the 20 ITPs are still offering some form of agriculture programmes, and around 14 institutes of technology continue to offer horticulture programmes. Many Institutes of Technology struggle to attract economic numbers of students into their agriculture and horticulture programmes.

The shortage of skilled farm workers and the ready availability of on-farm training through the AgITO means that students with an interest in agriculture can find work readily. As a result, the full-time pre-employment training programmes at institutes of technology struggle for enrolments. Institutes of Technology that have contracts that are funded through ITOs for their training often find this funding stream inadequate.

The final decisions and recommendations of the tertiary education review may also affect the sector. The October 2008 consultation paper recommended possible funding changes for compliance-based short-course programmes, and such changes could influence levels of provision for the sector.

SUCCESS

The institutes of technology which are most successful in terms of agriculture training are those that moved away from the traditional full-time programmes and into the short course, close to farm model. Aoraki and Telford were the clear leaders in this. They either produced short course programmes nationally themselves, or they contracted private training establishments or other providers for their programmes.

In 2007 the tertiary sector was required to develop investment plans for approval by the Tertiary Education Commission (TEC). From 2008, each of the institute of technology student numbers were capped. At the same time the TEC introduced a regionalisation policy whereby institutes of technology were to stay within their local regional boundaries and not go national.

This led to some significant changes. For Wintec this meant closing down our Auckland campus. With respect to agriculture, Aoraki and Telford were limited, or stopped producing their short course programmes in some regions including the Waikato. The equivalent numbers of students were repatriated to the regional institute of technology where the learners were based. Wintec chose to take up the primary industry short-course programmes and maintain the overall levels of provision to the sector.

CENTRAL POLICY

Central to the regionalisation policy is the responsibility of each institute of technology to assess the relative education need within its region, and then allocate its full-time student equivalents accordingly. This means identifying a range of general provisions, as well as the sectors that are strategically important for the region.

Clearly, for Wintec based in the heart of the Waikato, one of these has to be the primary industries sector. Crucially in a

capped environment, trade-offs will have to occur, and if an institute of technology is to create room for growth in one sector, it may well have to reduce in other sectors. In reality, changes to provision will be influenced by a mixture of strategy and regional need, student demand, financial considerations and whether or not the particular institute of technology is at, below or above its agreed funding cap. Wintec, in selecting primary industries as a key sector, is signalling that it recognises its importance to the regional and national economy. It will continue to support and provide appropriate educational provision.

The remaining question, is how should Wintec best satisfy primary industry education requirements within the region? We must be responsive to the needs of the industry and the learners, and work with the ITO to produce what is needed.

Moving forward

The training requirements for new entrants to the farming industry, particularly dairying, are being well catered for by the AgITO and by their contracted provider, DairyNZ. We will identify niche areas of training and education that are not currently being catered for.

One area where Wintec has led the institute of technology sector in upskilling the rural community is computer training. Wintec, through the FarmSmart programme, has produced on-line courses in computer software programmes via the Wintec mobile classroom and via satellite technology to remote parts of the region.

Institutes of technology are expected to provide opportunities for students from certificates to diplomas and degrees, and to increase the numbers of graduates leaving our institutions with higher level qualifications. We need to develop higher level educational programmes for the primary industry sector.

ENDORSEMENTS

Wintec has recently gained accreditation for a three-year Bachelor of Technology degree with endorsements in agritechnology, environmental technology, food technology and biotechnology. These endorsements are regionally focused. We expect students to carry out a work-based project in the third year supported by regional organisations and others such as Innovation Waikato, AgResearch and NIWA. We see the agritechnology endorsement as being critical to the future of our primary industry community. Our industry stakeholders believe that graduates of the programme will be highly sought after as they will bring much needed knowledge and work-ready skills to the industry.

The ITOs are there to identify the needs of industry, developing appropriate national qualifications and coordinating training delivery for industry employees. The institute of technology sector can support the ITO sector by using niche specialist products and packages of training. We need to assist those industries who are working in the rural sector and help them to develop useful training packages.

Internationalisation is another strategy for Wintec and a number of the institutes of technology, and we are currently exploring several international educational opportunities, in partnership with others. Agriculture continues to lack sufficient skilled staff, and recruitment of international students is a reality.

Increasingly the sector is moving to digital and on-line delivery and this is an area where we can provide expertise and support for the ITO sector, for industry and for the learner. Wintec has its own 'curriculum factory' to develop educational resources for its staff and external clients. We see that we can support education training both here and internationally using on-line and distance education packages.

Collaboration

Collaboration between the different institutes of technology and ITOs has to be the way forward. Institutes of technology have the infrastructure to support the training needs of the primary industry sector. We have to be flexible and adaptable for quality rural training close to the workplace.

We should collaborate with the ITOs and work with them to see that all of the training requirements of industry are being met. The ITO sector has to identify the learning needs of their industry, particularly between Levels 1 and 4. The Institute of technology sector is expected to produce more graduates from higher level qualifications, so there are opportunities for all. By collaborating with one another we should be able to develop new course materials cost effectively and to make these available to different regional and national learners.

Below are some examples of the collaborative initiatives that Wintec has led, or been involved in recently.

AGRITECHNOLOGY EDUCATION CENTRE

Wintec in collaboration with AgResearch, AgITO, Innovation Waikato and a coalition of secondary schools has received funding from the TEC to develop an agritechnology education centre at the AgResearch Tokanui farm. Here a dry stock and dairy support farm is being converted to a 200 hectare dairying platform which will milk up to 800 cows.

The education unit will have an on-farm educator who will adapt farm outputs into educational packages for presentation to a range of learners including secondary school students, tertiary learners, farmers and commercial companies, national and international visitors.

AG-BIO INNOVATORS ACADEMY

Wintec led the Ag-bio innovators academy, a TEC-funded initiative. This brought together key staff from, amongst others, AgResearch, Wintec, Waikato University, Lincoln University, Milfos, Fonterra, Gallaghers and Innovation Waikato to share expertise and experience, with the intent of collectively developing new technologies and intellectual property.

Conclusion

Wintec is serious about being a credible provider of primary industries education. We are building a strong network of agritechnology industry partners. Our intent is to give quality education to the Waikato community. We want to be the providers of choice for primary industry training and learning within the Waikato region, and we will work in collaboration with others to meet regional and national primary industry educational needs.

Rosemary Wybourn is the Head of School, Science and Primary Industries, Waikato Institute of technology (Wintec)

TEACHING AGRICULTURAL AND HORTICULTURAL SCIENCE IN NEW ZEALAND SECONDARY SCHOOLS

Kerry Allen

The New Zealand secondary school subject of agricultural and horticultural science focuses on the study of primary production systems, environments and their sustainability. Studying agricultural and horticultural science helps students to recognise how primary production contributes to shape New Zealand's economic, social and environmental development. As a discipline, agricultural and horticultural science provides opportunities for students to contribute to the community, the economy and the environment of the future.

Many schools offer agricultural and horticultural science at Year 9 and 10 in a variety of courses, such as rural studies. The majority of schools that offer agricultural and horticultural science offer it at senior levels. Agricultural science and horticultural science are generally treated as separate subjects at Level 1 National Certificate of Educational Achievement (NCEA). However, they are very closely linked, and boundaries become more blurred at Level 2 and 3, where there are achievement standards common to both subjects.

SUBJECT HISTORY

Agriculture became a School Certificate subject after World War II, and went on to later be offered at sixth form certificate level. Agriculture became very popular in schools with farms such as Timaru Boys High School, Feilding Agricultural College and St Andrews College.

Over the following decades, horticulture also started to be offered in secondary schools. In 1990, both agriculture and horticulture became bursary exam subjects. Numbers grew to over 900 bursary candidates by mid 1990s. However, there was no supporting curriculum or resources provided by the Ministry of Education. In 1993 the Horticulture/Agriculture Teachers Association was established, where teachers attempted to produce resources by the voluntary efforts of members. However, resource production was difficult with a small and dwindling supply of experts.

NEW ZEALAND CURRICULUM

Agricultural and horticultural science is mentioned only in passing in the new New Zealand curriculum, in the science learning area –

... a wider range of programmes is possible, for example, schools may offer programmes in ... agriculture ...

There are no achievement objectives at any level specific to agriculture or horticulture. The subject is often referred to as an orphan subject as no one is really sure where it fits. As it was, the new curriculum would not have been of any great benefit to the subject or the industry unless the mechanisms, resources,

or people were put in place to make it happen. The Ministry of Education has realised that this is an issue, and over the last six months has implemented the writing of teaching and learning guidelines for agricultural and horticultural science. These will be made available to teachers in mid 2009.

Issues for agricultural and horticultural science

Agricultural and horticultural science as a secondary school subject has a number of issues that it faces.

SUBJECT SPECIALIST TEACHING

Senior subjects like agricultural and horticultural science often attract small student numbers, so provision of the subject is at the cost of larger classes in bigger subjects such as maths or English. This can result in the subject not being offered.

Agricultural science, which is more popular in the South Island than the North Island, is probably at more risk, as there are fewer qualified teachers. Attracting specialist teachers can be problematic, especially for schools in rural areas. The Post Primary Teachers Association (PPTA) tried to discuss staffing for the new curriculum between 2004 and 2007, however no progress was made.

Both disciplines require access to friendly local farmers and producers. This can be problematic for some schools, particularly urban ones, as teachers find it difficult to take students out of the classroom to visit agricultural or horticultural enterprises.

TEACHER EDUCATION

In the 1990s the Ministry of Education removed subject-targeted funding for secondary teacher education. This affected agricultural and horticultural science, as it reduced the ability of schools of education to offer smaller subjects, such as agricultural and horticultural science. At present, no teacher training institution offers agricultural and horticultural science. Therefore, students with agriculture or horticulture as their speciality are not entering the profession and few agriculture or horticulture teachers are specifically trained for the task. Most are enthusiastic volunteers.

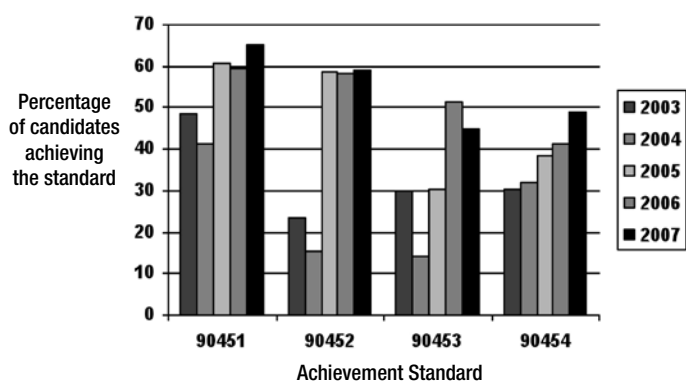
Agricultural and horticultural science teachers also lack professional development support. Two agricultural and horticultural science senior subject advisers in 2007 were invaluable, but then the whole scheme disappeared in 2008. In short, teachers are under resourced, under trained and have little chance of improving with the current levels of professional development and support available. Not a good future for a fragile subject.

RESOURCE SUPPORT

The Ministry of Education does not see agricultural and horticultural science as a priority area and therefore has not provided benefits like teacher scholarships, which encourage teachers to train in agricultural and horticultural science. However they have been aware over the years that the subject has had problems.

In 2004, three subjects were identified as having unacceptable results in NCEA. Agricultural and horticultural science was one of these. As a result, the Ministry of Education funded the Beacon Schools initiative, initially at Level 2 and subsequently at Level 3. This initiative allowed practising teachers to produce teaching resources in the form of schemes and associated resources, which was then distributed to all New Zealand agricultural and horticultural science teachers. The Beacon Schools initiative helped raise some achievement rates in NCEA, in cases from 15 per cent to 50 per cent.

Level 2 AgHort Science – Student achievement



Unfortunately, the lack of resources, such as textbooks, can also hamper a teacher's ability to teach a subject well. This has been the case for agricultural and horticultural science. Due to the uneconomic nature of writing resources for agricultural and horticultural science, very few have been completed. Teachers therefore spend many hours writing their own resources.

DECLINING STUDENT NUMBERS

The accurate number of students taking agricultural and horticultural science is difficult to state and generally is taken from those students who have enrolled in NCEA Achievement Standards in Levels 1 to 3. However, the number of students has been declining at all levels since 2002. For example –

- AS90154 livestock management from 835 students in 2002 to 597 in 2007
- AS90155 Pasture and crop production from 837 in 2002 to 606 in 2007
- AS90453 Livestock reproduction from 655 in 2003 to 494 in 2007

- AS90454 Livestock production and growth from 619 in 2003 to 438 in 2007.

Although student numbers have declined, there is some optimism. Significant improvements in results have occurred in recent years and these results do not indicate the increase in numbers of secondary school students who are involved in agricultural and horticultural science education via unit standards or ITO provided courses. No data is available on these numbers.

RECOGNISING EXCELLENCE

In 2004, agricultural and horticultural science was omitted from the scholarship list, but students could still gain a top scholar award if they earned excellence in all three Level 3 agricultural and horticultural science externally assessed standards. However, in 2006 funding for the top scholar award stopped, removing the incentive for academically top scholars to choose agricultural and horticultural science.

With the loss of both of these awards of excellence, this affected the status and academic credibility of the subject, affecting the numbers and calibre of students encouraged to study agricultural and horticultural science. However, after much political lobbying and hard work by the Horticulture/Agriculture Teachers Association and the PPTA to forums such as the Select Committee, the scholarship for agriculture and horticulture has been reinstated for 2009. This will improve the status and academic credibility of the subject.

LOW ACHIEVEMENT AT YEAR 13

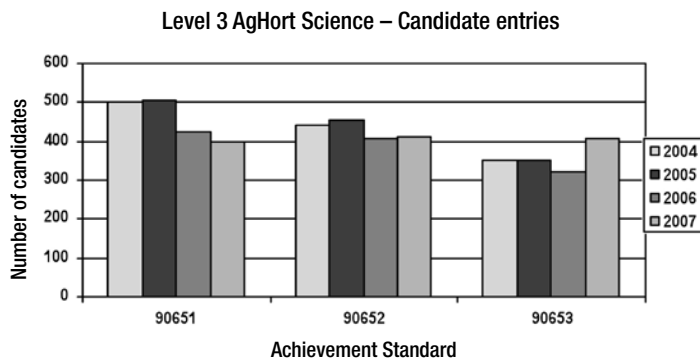
Under the Bursary system, scaling was used to ensure that marks were scaled to a pre-determined mean of 49 per cent and the top two to three per cent gained scholarship. However, in the NCEA system, low numbers of students who sat agricultural and horticultural science Level 3 Achievement Standards actually got the qualifications. For example 166 candidates gained a minimum of 14 credits from Achievement Standards in 2006. This trend continued, with a drop in numbers who were successful in two of three external standards at Level 3 between 2004 and 2007.

A gloomy outlook started to creep in and some schools started to lose interest in offering agricultural and horticultural science particularly agricultural science in city schools. Te Puke High School, once one of the biggest agricultural and horticultural science schools in New Zealand, had three full-time teachers and their students had gained many scholarships. They now are struggling to get enough students to run a Year 13 class.

USE OF UNIT STANDARDS

Low success rates in Achievement Standards in agricultural and horticultural science throughout the levels have encouraged schools to offer Unit Standards instead, both general education and industry-based. The internal assessment, the pass or fail nature, and the availability and provision of teaching material from Unit Standard course providers have appealed to both schools and teachers alike. However, Unit Standards can have a negative effect on the ability of students to gain entrance to university. With more support for Achievement Standards, like the Beacon Schools initiative, this trend could be reversed.

Unit Standards in agricultural and horticultural science provide an option for increased levels of success and a pathway



for the increased proportion of less able students that the subject often attracts or is dumped with. While there are opportunities for these students, it is often at the cost of the subject being attractive to the academic cohort of the school's students. Therefore Unit Standards are only addressing part of the industry's human capital needs.

SUPPORT FROM PRIMARY INDUSTRIES

A formal link between the secondary education side of agricultural and horticultural science and the wider industry groups does not really exist at present. When industry groups meet to discuss this, secondary schooling is often overlooked and industry-specific education is often seen as starting with the respective ITO. While this has started to change with experienced teachers, the strategic significance of agricultural and horticultural science in schools is generally overlooked.

The conflict that exists between the academic pathways and the skills pathways needs to be emphasised. Many industry groups see secondary schools as providing skills education and programmes but few acknowledge the academic side and the place the subject in secondary schools can play in growing interest and capability in this area. However, the agriculture and horticulture industry has recognised that there is a current and looming crisis and the competitive nature of the 21st century labour market and has looked to change the image.

There are examples of schools working effectively with industry groups such as Waihi College with Zespri. An industry consortium recently began providing resources targeted at assisting effective teaching at secondary level. A website of resources RuralSource, a set of 10 DVDs and an educational board game were well received by agricultural and horticultural science teachers. There has also been an increase in the number of industry-funded scholarships.

THE CORRESPONDENCE SCHOOL

Up until 2004, the Correspondence School offered good opportunities for students in schools with limited student numbers or no specialist teacher. However recent changes have restricted access to the Correspondence School for students in these schools. Therefore not as many students now have the same opportunity to study agricultural and horticultural science.

At one point, around 25 per cent of Bursary agricultural and horticultural science candidates were being taught by

The Correspondence School. This was not ideal as there was no face-to-face teaching but it is better than nothing. The Correspondence School has built up considerable collections of high quality resources and workbooks at all levels. These have never been made available to schools generally and is a sore point as there are few textbooks for agricultural and horticultural science.

Do we need agricultural and horticultural science in schools? The answer is a resounding yes. Very few young New Zealanders have any contact with or awareness of rural New Zealand and what agriculture or horticulture is. The changing demographics with increased urbanisation are further accentuating the gap in awareness of the wider agricultural sector. Very few urban students enter the agriculture, horticulture or applied sciences disciplines at tertiary level. A positive contact at secondary school is the best opportunity to interest and involve the next generation.

Industry or the ITOs will look after on-farm or orchard skills but who is going to look after the applied or academic needs of the industry? The belief that people will simply come out of the pure sciences at secondary school level into the applied sciences is not working. New Zealand's economic base is still and is likely to continue to be from land based industries. We need to attract at least our share of the best and brightest or our future capabilities will be restricted.

The way forward

There are numerous positive steps that could be implemented to ensure the continuing contribution of agricultural and horticultural science to secondary schools and the economic, social and environmental development. Some of these are –

- The re-introduction of the specialist advisers in agricultural and horticultural science, this time in every school support services region, to help teachers professionally
- Significantly increase the resourcing and support provided for agricultural and horticultural science
- Provide teacher education scholarships for career-changers willing to train as agricultural and horticultural science teachers
- Fund one or two universities to specialise in offering teacher education in agricultural and horticultural science
- Ensure better and more formal links with wider industry groups.

Studying agricultural and horticultural science equips students with knowledge and skills, which can enhance their lives and will benefit the community and the environment. This is important whether or not the students move on to work professionally in either the agriculture or horticulture industries. It is therefore important that agricultural and horticultural science gets the support that it needs now before it is too late.

Kerry Allen has been teaching agricultural and horticultural science for the past 12 years and is the secretary and treasurer of the Horticulture/Agriculture Teachers Association.



FARM MANAGEMENT AT LINCOLN UNIVERSITY

Keith Woodford

This article presents a personal perspective. It is written in the spirit of academic freedom whereby academics may write on matters of professional relevance without seeking the approval of their institution. The responsibility that goes with that freedom is to ensure that readers understand that the author does not represent his or her institution. In relation to this article it is reasonable to assume that not all senior managers at Lincoln would share some of the perspectives written here by their Professor of Farm Management and Agribusiness. The article is also written for a specific audience. That audience is farm management and agribusiness professionals, many of whom will themselves be graduates in farm management, but perhaps from an earlier era.

The Lincoln approach

Farm management is something that makes Lincoln different. It has been that way for the best part of 80 years. For a long time farm management could be regarded as the dominant field of study at Lincoln. Looking back 40 years to the late 1960s when I was myself a student at Lincoln, the majority of Bachelor of Agricultural Science students specialised in farm management. And it was farm management and rural valuation that provided the glue for the Diploma of Valuation and Farm Management. I am told that it was also that way long before I was a student.

I know of nowhere in the world that teaches farm management with the same emphases that we have at Lincoln. In many universities of the world where farm management is taught, it is seen as a subset of agricultural economics. In some universities there is a somewhat broader perspective whereby farm management focuses on decision making using business principles from economics, accounting and finance. In an even smaller group of universities there is a focus on integrating business principles, social sciences and technology into bio-economic systems.

Farm management at Lincoln fits into this latter category, but even within this category it stands out for the way in which the integration is managed. In particular, there is a strong emphasis on case studies of real farms. Students visit those farms, collect the data, construct budgets and analyse alternatives. Students are required to develop skills at eliciting information from farmers, and identifying the key issues for themselves.

GOING WHERE THE PROBLEM IS

Our approach is trans-disciplinary. Trans-disciplinary is a term that is often left unspoken but it contains an important principle. Unlike most tertiary educators, we have no prime allegiance to any particular discipline. Instead we go where the problem takes us. Technique always comes second to the issue.

To many practitioners this may seem self-evident and the obvious way to operate. But in academia, and particularly in agricultural economics, it is more common to start with a technique and then take it for a walk in search of a problem. The problem then gets massaged and typically simplified to fit the mathematics of the technique. Technique based research is the tried and tested approach to getting published in international

journals. It is not necessarily the way to facilitate change in the real world – but our interest is in the real world.

Sometimes we describe ourselves as generalists but that is not a useful term within a university environment. Everyone has to be a specialist in something if they are to find a place in the sun within a university. So we are specialists in integration. We are interested in decisions and the decision making processes. Good decisions require information to be acquired from many sources and then integrated in a way that brings coherence to an issue.

FIELD TOURS

Field tours are a fundamental part of the Lincoln farm management experience. Lincoln students majoring in farm management at degree level undertake two North Island tours and one Southland tour. Diploma in Farm Management students undertake a one week tour of the northern South Island. It is only by studying issues in a range of contexts that most students can acquire competence in the fundamental principles of farm management.

We also argue strongly for the importance of farm practical work. It is not only to learn the practical skills themselves, but to learn how farmers think. We have never taught much rural sociology at Lincoln, but we get away without it because our students understand farmers from having lived amongst them.

Adapting to the modern world

Although adherence to the principles of problem identification and analysis remains fundamental to our farm management philosophy, there are many things that have changed over the years. The boundary between farm and horticultural management has been smudged, and both are taught from within the same group. In addition, we no longer limit our interest to what happens inside the farm gate.

A Massey colleague said to me recently that 90 per cent of the strategic decisions on a farm arise from events outside the farm. Our students therefore need to understand these events. I think we do a much better job than in previous eras in at least sensitising our students to the external environment, and providing the frameworks for further learning. We would like our students to see farm management as one crucial component in

the value chain linking the paddock to the plate. The farm gate is there to keep the animals in. We are not those animals.

The advent of computers has changed many aspects of how we teach farm management. It has taken some time, but finally we have all of our students constructing their budgets in Excel. Assignments are always word processed and the standards we require are higher than in the past.

Students from as little as five years ago might get a shock to see what we now expect. It is easy for previous generations looking at our current graduates to forget how little they themselves knew when they first graduated, and how much they have learned since. Now 40 years later, I am still somewhat embarrassed to think how little I really knew when as a fresh-faced graduate I joined the Ministry of Agriculture as a farm adviser.

The career focus of our students has also changed. About a third of degree students expect to be farming within five years and more than half within 10 years. Many of the remainder are open to the notion of a farm-based career but are leaving their options open. Careers in agribusiness and agricultural servicing are often seen as short term options. About 80 per cent of our degree students come from a farm.

Our courses

THREE MAJOR COURSES

The Bachelor of Commerce (Agriculture) is a three year degree that grew out of the Diploma in Valuation and Farm management in the 1970s. There have been some minor name changes along the way from Bachelor of Agricultural Commerce to Bachelor of Commerce (Agricultural) to Bachelor of Commerce (Agriculture) but the essential philosophy has been maintained. On occasions it has been a challenge to maintain this philosophy as well meaning people have tried to turn it into a more conventional commerce degree and restrict the technology and science options.

But our students tell us very clearly that what they want is the combination of commerce and farming systems. Many of these students choose soil, plant and animal subjects as their 300 level final year electives to combine with the compulsory farm management and agribusiness subjects. Across the three years of the programme we have well over 200 students in total.

SIBLING DEGREES

The Bachelor of Agriculture and the Bachelor of Agricultural Science are sibling degrees. The former is a three-year programme and the latter is a four-year programme. Many students do not decide until their third-year as to what their end point will be. In previous times it was accepted that only the four-year degree was a professional degree. Very few students graduated with only the three-year version. However, times have changed and many students now graduate with the three-year degree. Agriculture and agricultural science students are only required to take one farm management subject but the majority take additional subjects.

DIPLOMAS

At diploma level we have the one-year Diploma of Agriculture followed by a further year of study for the Diploma of Farm Management. A typical first year class would be about 65 in number, with 30 to 35 continuing for the second year diploma.

Not everyone at Lincoln has much interest in these applied diplomas, and there is a body of opinion that these programmes should not be offered. They do not fit neatly within the national education system.

But within our own group we are strongly committed to these programmes. We think they make a unique contribution and are proud of that. Fortunately, there are also strong financial reasons for keeping these programs, and so their future is likely to be safe for at least a few more years.

POSTGRADUATE COURSES

We also offer postgraduate courses. Until this year we have offered a Master of Applied Science (Farm Management Consultancy). We have purposefully kept numbers small because of staffing constraints, but it has been an important programme, with some excellent applied research undertaken by the students. Unfortunately, our staffing constraints meant that this year we did not take enrolments and we are also unlikely to offer the programme next year.

We also have a PhD programme. Most of our PhD students come from overseas. Currently we have students from countries as diverse as Papua New Guinea, Vietnam, Brazil and Jamaica. We also have two of our own staff studying for PhDs with the likelihood of further staff enrolments.

Over the last 10 years we have had a steady stream of Masters students from South America, including Uruguay, Brazil, Paraguay, Argentina and Peru. Currently we have only one South American Masters student and he is from Uruguay. The decline is partly because NZAID is no longer offering scholarships to most of these countries. It is also partly due to declining some good students on account of our staffing constraints.

The challenges

The days when the farm management way of thinking was dominant at Lincoln are long since gone. Most of our senior managers at Lincoln have not been exposed to farm management in their own education and do not have a natural empathy for what we are trying to achieve. Lincoln has become a research intensive university, at least in terms of the philosophy if not all aspects of reality, and farm management does not fit here easily. Predominantly, we in farm management are educating people for professional careers in which their actions will be research informed, but in general we are not educating future researchers. So we tend to think differently from some of the more academic people around us.

We always feel that our case study based teaching is under threat. Timetable constraints limit us to being allowed to take students off campus on only three days each semester for any one subject. However, by working together on joint field trips with other subjects we can get this up to five days, with the specific days labelled as such in the centrally determined timetable. Our well meaning colleagues sometimes make suggestions along the lines of 'why don't you take a video of the farm and then show that in the class, saving the need for a visit?' Our field tours are also under continual threat because of their cost.

STAFFING

Staffing is an ongoing issue. In the old days farm management classes were never more than about 60 students and often much

less. In my earlier stint of lecturing at Lincoln in the late 1970s we would have two lecturers dedicated to servicing the second year Ag Com students, and another two lecturers for the third year students, with the class itself often split in two. The Ag Sci students were always taught separately from the Ag Com students, not only to keep the class numbers small but on account of their differing educational backgrounds.

In the current world we teach our introductory farm management to all of our second-year degree students together, regardless of their course or academic background. It is a comparable situation for the third-year students. This means that there is no common disciplinary knowledge that we can assume apart from what we teach within our own subjects.

For example, the B Com (Ag) students should all have taken an economics subject in their first year, but a considerable number of the Ag and Ag Science students will not have done so as economics is no longer compulsory for them. Most of the Ag Coms will have taken an accounting subject, but almost none of the Ag or Ag Sci students will have done so. The Ag and Ag Sci students will have studied chemistry but almost none of the Ag Coms will have.

Teaching the impossible

This year our introductory farm management subject has 135 students and this is typical of the last five years. One lecturer supported by a tutor will take all of these students to one farm. The subsequent class discussions also take place with the total group of 135 students.

Farm management lecturers from elsewhere in the world tell me that it is impossible for such events to be learning experiences, but somehow we do it. Even field trip administration has become a major task, with detailed risk management procedures required. This year's introductory class has about 40 females, and so the days of going behind the shed in times of need, or using the farmer's toilet, are history. Instead, the tutor drives to the farm with a trailer loaded with Portaloos.

Marking of student projects has always been an issue and with large classes it has become even more of a chore. Despite this, in general we get a faster turnaround of projects than when I was lecturing at Lincoln 30 years ago. We could not do this without assistance from outside markers. Our lecturing colleagues from other subjects often ask us why we do not lessen the task by using multiple choice questions. It can be hard to explain that farm management does not lend itself to multiple choice.

The university struggles to know how they should deal with farm management. When I came back to Lincoln in 2000 we were part of the Division of Applied Management and Computing. We seemed to fit there quite well, although many said that it was an odd assemblage of groups who did not fit anywhere else.

Then in 2004 that division was disbanded and we became part of the Division of Agriculture and Life Sciences. It should have worked but it did not. Then at the end of 2008 we were shifted to the Commerce Division, now relabelled as the Faculty

of Commerce. Some of us were cautious about the latest shift, but the reality so far is that there have been more pluses than minuses. We are starting to feel valued and at least a little understood. But trans-disciplinarity remains a puzzling concept to many of our colleagues.

We now call ourselves the Agricultural Management Group. We see ourselves as encompassing interests in farm management, horticultural management, agribusiness, farming systems and innovation systems.

The future

The future of farm management at Lincoln is potentially very exciting but also a matter for concern. The future is exciting because there is a new wave of belief from outside the university that farm management cannot be strong as a profession if it is not also strong in the universities. We are also seeing research organisations start to question the dominant paradigms of reductionist bio-physical research, and to perceive a need for a more holistic systems approach that recognises the importance of both economics and people. That seems to offer opportunities for us.

However, there are also some storm clouds around us. For the last decade, and arguably longer, farm management at Lincoln has been in considerable decline in terms of staff numbers. We are now hanging on by a thread. This year we have had two resignations and it is pleasing that these people have not only been replaced but with strong appointees. But we are so thin on the ground that we have had to throw these new people into the deep end with minimal support. The average age of farm management staff would now be about 55 years, or perhaps a little more.

CRITICAL MASS

At the moment we are not taking on additional postgraduates, and this will continue until at least some of our existing postgraduate students reach completion. Quite simply, we lack the critical mass of qualified staff to have a vibrant postgraduate programme. We have been unable to get institutional recognition of the problems we face.

We also have to recognise that university level farm management cannot be strong unless it is underpinned by applied but rigorous research. Some but not all of this can be undertaken by postgraduate students. We have to strengthen our culture of applied research. That may be a challenge given the research models we need to be following for systems-based research are somewhat different than those of our academic colleagues from the more traditional disciplines. It is not an easy road to travel.

Keith Woodford is Professor of Farm Management and Agribusiness at Lincoln University. He is a graduate of Lincoln University and University of Queensland (PhD). He spent four years lecturing in farm management at Lincoln from 1978–81, followed by 19 years based overseas. He returned to New Zealand and Lincoln in 2000.



IS EDUCATION ENOUGH?

Richard Fitzgerald

A recap of the changes in the agricultural sector over the past decade or so provides an indication of the educational needs of the sector into the future. Significant challenges exist both inside and outside the farm gate for which tomorrow's farmers must be equipped to deal with.

The past decade has seen the rise in the awareness of food safety and increasing volatility in international markets. Brand strategies encourage product value and compliance requirements have grown significantly. In addition to this, farms have become larger and the workplace dynamics have changed. The need to assess and mitigate business risks both on-farm and beyond the gate has become more critical and primary products must be supplied within increasingly tighter quality requirements. After all this, tomorrow's farmer must run a financially, socially and environmentally sustainable business. The challenge for the educational sector is to position itself to equip people for this business environment.

A WIDE RANGE OF SKILLS

Tomorrows' farmers will be continually assessing the business horizon to identify opportunity and risk as part of their day-to-day management. It will require a good grounding in the theoretical aspects of primary production and a global view of the business. They will need to be aware of the environmental, social and financial environment in which they operate so as to manage the risk surrounding their business.

Farmers in the future will require the ability to process large amounts of information and learn to discern what is relevant, and apply that information to their business environment. They will need greater capability in the soft skill areas which will underpin the application of the educational knowledge and information. Soft skills can be described as the cluster of personality traits, social graces, communication, language, personal habits, friendliness and optimism that define character.

A person's ability to communicate effectively within the farm will be critical as operations become larger and people management becomes a more important skill. Leadership on the farm will be critical to ensure integrity of quality assurance production systems and self-motivated ongoing learning. The soft skills of a farmer will become significantly more important in the future.

LOOKING AHEAD

The future needs of the agriculture sector should encourage the development of young farmers today and changes for the future. Four key areas that need attention address current gaps in the participant development process –

- A focus on the development of the soft skills of industry participants
- A focus on the life skills or elementary personal leadership of young people
- Workplace strategies to engage young people's hearts and minds
- The development of a progression pathway for a career in the agriculture sector.

To date education in the rural sector has been supplied by a range of providers. Massey and Lincoln universities, Taratahi, Telford, Agriculture ITO and a number of other institutions have provided education at age and stage appropriate levels. This education has been focused on the transfer of knowledge surrounding technical and practical proficiency.

For mature personal development there are a number of industry-wide sector development programmes. These mostly function at an advanced stage of participant maturity and assume an established level of personal development. The initiatives generally occur in isolation with little correlation between programmes, and limited streamlining of competencies are covered within the course content in relation to other programmes.

A significant gap exists at the elementary stages of personal leadership or self management. This stage of development is critical because the advanced development programmes are built on these personal leadership skills. Personal leadership is the foundation on which all leadership is built and it provides a platform for development. This can be the further development of soft skills, technical and practical proficiency, or an individual's level of self management in their willingness to participate in the development process.

The current educational environment does not cater well for the development of foundational personal skills. As mentioned previously, traditional educational providers cover the formal component of education but little support is given to the process of basic personal development. These skills will have a huge influence on the effectiveness of formal educational development and should not be overlooked.

EDUCATION AND TRAINING

Personal leadership requires a foundation of knowledge which is then consolidated with the application of that knowledge through experience. There are few industry initiatives which build competency in this area. One example of an entry level personal development programme is the a course offered by Taratahi in conjunction with AgITO and NZ Young Farmers. It provides an entry level personal leadership educational experience with a workshop and exploration experience. This is then built upon with application and further knowledge.

Organisations such as NZ Young Farmers provide an environment for personal development through their Leadership Growth Programme. This focuses on the theory and application of personal leadership. This is achieved by the application of knowledge in the organisation's network using leadership roles and activities. This training process grows the individual both socially and emotionally leading to a broad based development process.

EMPLOYEES ARE CHANGING

Young staff entering and progressing through the industry are different from what employers have been accustomed to. There has been a social change, and Generation Y – those born from the 1980s to the early 2000s – are entering the workforce in ever greater numbers. They bring a whole new attitude and a different set of expectations to their work life, and unless the

agricultural industry comes to grips with this, it will not become the career of choice amongst the gifted and talented.

Generation Y people have been brought up in a period of rapid technological change. The internet and cell phones have always been part of their life with instant messaging forming a critical part of their communication and relationships. They also bring different attitudes to the employment table with greater awareness of environmental, career and lifestyle priorities.

The emergence of Generation Y has caused some culture clash in the workplace. The recent rise in unemployment has provided employers with broader staff options but it is inevitable that employers will need to face the challenge of integrating Generation Y into their staff team.

YOUNG PEOPLE

Experience within the NZ Young Farmers has shown that young people entering the agricultural industry are often highly motivated and enthusiastic. Just like generations of young people before them, they enjoy participating in things of consequence and want to have meaning in what they do.

NZ Young Farmers works almost exclusively with young people, and involving their minds and hearts is the core business. A key breakthrough in working with young people came through an analysis of the successful National Bank Young Farmer contest. It was clear that young people worked effectively and tirelessly if they had a sense of ownership of the process.

The breakthrough came when the planning system was identified and the results defined. By restructuring the processes to enable an individual to achieve an identified result, young people will work effectively if the work is done in a broad but well defined framework.

The critical ingredients of success are –

- Defining the results for the individual to meet the business objective
- Clarifying the boundaries within which the individual can operate.

For example something as simple as supplementary feeding of stock can be used to achieve a sense of ownership and responsibility by a young employee. It could be done by first explaining the importance of stock nutrition and feed intake so as to understand the consequences of poorly fed stock, followed by training on safe equipment use and supplementary feeding out knowledge. The result is defined and the boundaries are set for the feeding out.

The young employee can be given the freedom to discover the best way of loading the supplementary feed, which sequence to feed the stock and how to manage their time in the process. This is a small example, but the principles can be applied to other aspects of the farm operation to build ownership of an employee to the business in which they are employed.

A PROGRESSION PATHWAY

Another key learning tool for working with young people is the need to demonstrate the pathway for progress through the agricultural industry. Once again, the NZ Young Farmers' experience has shown that young people will more readily work in their role if they can see it in the wider industry context. This is easily demonstrated with the dairy industry model where a progression pathway can be readily plotted. Many young people work very hard to achieve their goals because they know where they are heading.

Herd managers and sharemilkers have achieved success in their business careers relatively quickly by being focused on specific goals. However, it has become apparent to the wider industry that many young people have achieved significant business positions while lacking broader life skills which are essential for effective leadership within those roles. This has led to high staff turnover.

CORE COMPETENCE

The agricultural industry should streamline the various development programmes currently available by identifying the core competencies necessary for progression through the industry. These then should be aligned to on-farm or industry roles. As an individual works up the ladder, they should participate in development initiatives which build their competency at the same rate. The progression pathway should not stop at the on-farm roles but provide a process through to executive leadership levels in industry and corporate boards.

Providing a young person with the ability to plot their way through their career identifying the opportunities and the development along the way, will be like providing a map for their life. They are more likely to stay in the industry and be active participants. They will be more involved and committed to a career.

A CAREER ON THE FARM

The principles of preparing young people for a career in the agricultural sector apply to the on-farm environment. This can be achieved by –

- Personal development of staff and farmers should be a core business expense
- Judicious use of time off-farm for personal development will help employee work-life balance and add business value
- Farmers should look at the employment package more broadly than remuneration and time-off, and look at developing the whole person as part of the employment package.
- The farmer should recognize that staff may have different requirements than the farmer did at the same age
- Farmers should recognise that young people need to see the big picture within the farm business
- Building ownership to the role is important and can be achieved by clearly defining the parameters of work while giving flexibility to the employee.

SUMMARY

The future focus should be in developing and equipping well rounded, informed people with the ability to gather information and discern the relevant from the unnecessary. People need to be equipped practically, technically, socially and emotionally.

Young people should be developing elementary personal leadership focusing on life skills. This should be packaged to provide a context for development in relation to the career objectives of the individual. It will demonstrate a progression pathway for young people to create for themselves. Education will play a key role in this process by enabling individuals to make informed decisions about the opportunities.

This process should create leaders at all stages of the agricultural industry. Their critical thinking will position the industry effectively in a constantly changing world, and should ensure New Zealand is at the cutting edge.

Richard Fitzgerald is the Chief Executive Officer of NZ Young Farmers and has been heavily involved in restructuring NZYF.

JOINT ACTION VITAL FOR LIFELONG LEARNING

Kevin Bryant

The Agriculture Training Organisation (ITO) has been working closely with the two leading industry groups, Meat and Wool New Zealand and Dairy NZ to develop strategies for human capability development in their industries. Both industry groups recognise the strategic importance of attracting the right people to their industries and training them effectively. Training strategies must also involve providing opportunities for those already employed to build their own capability and knowledge by education, on-farm training and extension.

The expectation of both industry groups is that the Agriculture ITO will take a leadership role on these strategies for learning and development. The solutions will target employers and managers, as well as employees – and therefore will have an effect across the spectrum of formal and informal learning.

Our leadership role

Agriculture ITO is well-placed to fulfil this leadership role and –

- Is focused on raising productivity and capability at all levels of the business, from new employees to managers and owners
- Has undertaken significant research and development into training effectiveness and its effect on results
- Has developed best practice learning resources that will standardise knowledge transfer in the agriculture industry
- Is working closely with leaders in the fields of education and extension
- Is leading a project for the Ministry of Agriculture and Forestry to ensure common messages on climate change for land based industries in training and extension activity.

Last year more than 12,000 people participated in learning programmes with Agriculture ITO. Over 95 per cent of national qualifications in agriculture achieved are through Agriculture ITO. In dairy, currently over a third of those are at NZQA level 4 and above. In the sheep and cattle industry, the number is just over half.

While some educators may choose to see vocational education as low value training, this is not a view shared by industry leaders. Quality standards associated with industry training have been steadily strengthened over a number of years, enhancing a training culture for skilled and motivated workers to the workplace.

Industry's six areas of focus

DairyNZ, Meat and Wool NZ and Agriculture ITO have identified the following areas as key to achieving sustained improvement in productivity through developing people for our industries.

Create a learning culture which includes all types of learning and encourages the uptake of learning. Lift programme completion rates which leads to –

- A larger pool of people with proven capability at a skills and management level to achieve both business and industry results

- Improved attractiveness of industry vocational training
- Improved perception of industry among potential employees and new entrants.

Develop quality learning solutions where trainees experience opportunities regardless of employer and training provider and there is seamless transferability of training. Ensure that there are best practice resources to meet demand. Contribute to retention and progression of farm staff so they can develop long-term careers in the industry. ITO leadership which results in –

- Aligning vocational training needs and provision
- Providing education and training which the industry values and actively engages in
- Industry alignment with education requirements to achieve productivity gains
- Ongoing strategies for meeting the industry's education needs.

In short, Agriculture ITO is required to stimulate increased demand for lifelong learning at all levels, across the spectrum of vocational training, education and extension. In addition we must ensure people in the industry know how to access these opportunities. Thanks to our close relationships with industry leaders, and the research and development we have carried out to guide our own evolution of learning services, we are confident of being able to deliver on those expectations.

Success will almost certainly require increased involvement with the many education providers, advisers and extension services that complement our own. It will also mean improving the ways we measure the effect of learning, so we know what works.

MEASURING WHAT MATTERS

In a previous article in this journal Agriculture ITO set out the methods and some preliminary findings of a study we undertook to capture and demonstrate the value of our learning programmes. The study found that while many values cannot be easily measured, it did identify direct economic benefits resulting from training.

Summary of training benefits to dairy, sheep and cattle industries

	Improvement in performance after training	Potential value per trainee
Dairy		
Feed use	30%	\$4,437 per year
Mastitis detection	29%	\$683 per year
Lameness detection	30%	\$925 per year
Heat detection	29%	\$2,284 per year
Sheep and cattle		
Animal management and health	\$25 per hectare	\$7,250
Pasture management	\$25 per hectare	\$7,250
Stock management and stockmanship	\$10 per hectare	\$2,900

These figures were based on employer estimates of the effect on each area of farming activity by an employee, and the difference made by low, average and high performance. While the dollar figures are averages, and individual results will vary, this clearly demonstrates that employers themselves see the value of training being applied in the workplace.

Recorded completion of learning programmes is one measure of the success of learning, but it is not the only one. The effect of informal learning and extension activity which is not assessed is even more challenging to measure in large scale. Yet few people would challenge the value of these channels of knowledge transfer.

Providing the numbers are great enough, averaging estimates of improvement in skill and understanding demonstrated by participants after their learning is statistically valid. In our customer satisfaction survey last year, we asked employers and employees to rate performance before and after training in a range of attitudinal and performance criteria.

The figures show significant jumps after training in good and very good performance from around 25 per cent to around 70 per cent. Converting performance improvement into dollars is more subjective, but what is being captured here is improved productivity. This kind of measurement is a valuable start in recording the application of learning in the workplace. Agriculture ITO is actively pursuing further ways to measure productivity increases through learning.

Learning

Significantly, learning best practice indicates it is not the learning provider, or necessarily the learner who has more to do, but employers themselves. The article mentioned earlier referred to a model of learning developed by Professor Robert Brinkerhoff that showed the way to increase the effect that training makes. Professor Brinkerhoff argues that the key influencer in the effectiveness of vocational learning is the employer.

To be most effective, learning needs to have a purpose – it needs to be focused on results. This means that learning for the workplace has to establish what goals the business want to achieve, what skills are needed to achieve them, and then who needs to have those skills.

In this way, the learner understands why he or she is learning, and how it will affect their performance in the workplace. Even more importantly, their employer will then give the opportunity to use that learning – because that is where the process began.

FOCUS ON RESULTS AT WORK

This learning approach has had a profound effect on our business, both internally, and for our learning programmes. Our staff are being encouraged to have conversations with customers that focus less on particular training programmes and more on business goals. Some of these goals will be supported by our programmes, others may involve learning or extension available through different providers. Our aim is to act as a broker in these cases and it is vital that we are closely connected with the industry and are well aware of relevant opportunities.

Our learning programmes have also changed. We have re-focused our programmes on particular skills that can be taught and assessed more quickly. We have boosted the farmer's involvement

in the process and we have developed new programmes that require assessment in the workplace. The Milk Quality workshops are one example. These are one-day courses, supported by guidebooks and assessment of application in the workplace several weeks later, with the clear aim of improving milk quality. Using extension advisers and consultants as assessors for these and other industry-endorsed programmes will increase as we repeat this model with other programmes.

The employer is the key

The importance of the employer in improving productivity through learning was emphasised by findings from a second report we were involved in with DairyNZ – *Good Employment Practices in the New Zealand Dairy Industry*. The study involved interviews with employers and employees to identify the key reasons for productive employment relationships on New Zealand dairy farms. It showed that a genuine and productive relationship between employer and employee is indispensable for productive employment practices.

Co-author Jeremy Neild said the main message of the report could be summed up in three phrases. Employers need to have the right attitudes, to recruit the right person and have the right strategies, training and workplace environment to achieve productivity.

Attitudes, people and environment are the key ingredients of the learning culture focus identified as a priority by DairyNZ and Meat and Wool New Zealand. They follow very closely the seven reasons behind workplace productivity identified by the Department of Labour –

- Building better leadership and management
- Organising work
- Networking and collaborating
- Investing in your people and their skills
- Encouraging innovation and using technology to get ahead
- Creating a productive workplace culture
- Measuring what matters.

Summary

Effective recruitment, training, and a culture of lifelong learning are all vital contributors to improved productivity and profitability in our land-based industries. For New Zealand's college of rural and management learning providers, research tells us a key area of focus must be the employer. As New Zealand's farming businesses adapt and grow to meet market demands and take advantage of new opportunities, new and greater skills will be needed.

The move to a more corporate business structure also brings with it more opportunities to develop integrated and satisfying career pathways. Supporting the owners, managers and the staff of these enterprises will require close cooperation across the spectrum of learning provision and extension.

Agriculture ITO is particularly keen to be more closely involved with rural professional groups and individuals with whom we share a common client base. Only by working together can we address training needs on the scale required and foster the learning culture which our industry needs to prosper.

Kevin Bryant is the Chief Executive, Agriculture ITO.

THE FUTURE OF THE MAORI AGRICULTURAL SECTOR

Tanira Kingi

Maori participation in New Zealand's pastoral and forestry sectors is primarily through the farming activities of trusts and the incorporations. With around 130 incorporations and over 5,000 trusts, Maori are collectively the largest group of corporate farmers in New Zealand.

However, the distribution is skewed, with a small number of large organisations controlling the bulk of Maori land. This equates to around 30 per cent of incorporations administering over 80 per cent of incorporation-farmed land, with as few as 100 trusts controlling over 60 per cent of land under trusts.

Many of these farming entities have done, and are doing, relatively well with adequate governance and management systems in place. The challenge is the 280,000 hectares that do not have management structures and the thousands of trusts that own very small, uneconomic parcels of land. The latter collectively amounts to a similar area – around 300,000 hectares. While the lack of a structure and small land area does not necessarily equal poor use or under-development, the odds are stacked against these landowners.

This article examines the underlying causes and consequences of being too small with too many owners, at a time when the average farming units in the industry are getting larger. In addition, Maori farming entities are facing mounting pressures from owners to produce tangible benefits. For a large number of owners, the average financial return is too low to be of any real benefit to the individual.

Rising unemployment is expected to hit urban Maori communities hard in the coming years. There is the added prospect of Maori moving back to their rural homelands looking for a low-cost living alternative and these organisations will be facing increasing pressures on all fronts.

Too many owners on small blocks of land

Farming-by-committee throws up a number of challenges, including the need for good organisational governance and management systems. There are many successful Maori trusts and incorporations scattered around the country that are fine examples of well governed and managed farming organisations. Some have gained wider public recognition through their participation in the Ahuwhenua Trophy.

While Maori land is only 1.5 million hectares, or around six per cent of New Zealand, its distribution is unevenly spread throughout the country. In some areas such as the East Coast of the North Island and Bay of Plenty, Maori land makes up around 25 per cent of the total land area. These regions also support relatively high populations of Maori and their land makes a significant contribution to the local pastoral sectors.

In these regions and others throughout the country however, there are hundreds of small blocks of land that go

largely unnoticed. Many are leased to neighbouring farmers while others lie idle because of restricted access or constraints with owner decision making. As individual parcels of under-used or idle land the problem seems minor. Collectively these blocks create enormous frustration and embarrassment for the many thousands of owners that cannot use, access or live on land that they have an ancestral right to.

Legislation and its legacy

Maori land is made up of over 26,000 Certificates of Title that are administered under its own separate piece of legislation – the Maori Land Act 1993. These titles have an average size of around 60 hectares, although most are much smaller. Around half are less than three hectares and almost 70 per cent are less than 11 hectares in size. Their small area means that they are well below the threshold of an economic unit. Grouping titles into a block of land large enough to form a self-sustaining unit is the key to survival. However, over 60 per cent of these titles representing around 20 per cent of Maori land, or over 280,000 hectares, has either not been formed into an economic unit or the owners have not been able to form a structure that can administer the land.

For the landowners in this category forming a structure is not as straightforward as it sounds when the average number of owners is around 80 per title. Large numbers of people are costly to get together and even more costly for them to arrive at a decision. Most owners in this predicament give up. The difficulty of owners coming together to discuss options is exacerbated with only a third of all names on the titles actually confirmed with proof that they exist and with current contact details.

This remarkable statistic has serious consequences for land administration and development. Maori Land Court regulations state that any major decision such as forming a structure requires a clear majority of support from the owners. A result like this is obviously difficult to achieve where the details of the registered owners are absent or out of date. In other cases the incorrect entry of names and details of the original owners, dating as far back as the late 1800s, has resulted in errors that should have been removed. The passing of several generations has since made it difficult and costly to verify owner details, so inaccurate and obsolete information therefore persists.

Two million owner interests

To make the problems worse, the number of owners is increasing at an alarming rate. The original 1860s legislation made it mandatory that all descendents had an equal right to the land. This arrangement not only went against customary systems of transferring rights to specific individuals or families but at the time also contradicted English Common Law.

The corollary is that children now have an absolute right of ownership to the land interests of both parents and there has been an explosion of registered owners in the last few generations. There are now approximately two million owner-interests or registered owners with an annual increase of 185,000 new owners added to the list every year.

This exponential increase is easily illustrated in the following example. A parent of four children has interests in four blocks of land and decides to transfer equal shares to each child. The number of new owners in each of the four blocks of land has now increased by four to give a total of 16 new owners. If the other parent of the four children in our hypothetical family had the same number of interests in four other blocks of land and did exactly the same transfer there would be an additional 16 new owners added to give a grand total 32. When this situation is multiplied out to the following generation, the numbers get very large very quickly.

The need for ownership structures

Given the large number of Maori owners the most effective mechanism to administer and manage collectively-owned land is through trusts or incorporations. These two structures control close to 65 per cent of all Maori land. Trusts, or more correctly Ahuwhenua Trusts, account for around 750,000 hectares and incorporations around 210,000 hectares. The largest concentrations of incorporations, 64 out of 129, are located on the East Coast of the North Island and the largest proportion of trusts, 1,500 out of 5,000, are in the Bay of Plenty.

Too many small entities

While there are a large number of entities, particularly trusts, a small number dominate. A recent document put out by Te Puni Kokiri in March identified 40 incorporations greater than 2,500 hectares in size and 100 trusts larger than 1,500 hectares in size.

At the other end of the spectrum there is a different picture with thousands of trusts managing very small land blocks. Almost 2,000 trusts manage less than five hectares and an even greater number manage land between six and 50 hectares.

Confusing figures

The Te Puni Kokiri document referred to above gives the total area of Maori land as 1.17 million hectares. The figure most commonly quoted is 1.515 million hectares from the Te Puni Kokiri 1996 Maori Land Information Base. However, a 2003 report from Garth Harmsworth identified the Maori land area as less than 900,000 hectares. The lack of consistency and accuracy in Maori land statistics does little to promote confidence in policy development.

Consequences of good governance

The constraints facing the owners of small blocks of land without a management structure are quite different for an organisation that has a structure in place that can carry out fundamental administration and management functions. Larger organisations with a track record in business, along with a diversified asset portfolio and a capable management team have a greater chance of surviving as a farm business.

This is particularly so if the debt levels are kept to a manageable level. All of the Ahuwhenua Maori farmer of the year winners in recent years have demonstrated these characteristics – good governance and sound management practices. The owners of blocks of land without a management structure, on the other-hand, face an uphill battle to make any decisions, let alone manage the land in manner that meets the expectations of the owners.

Given the legislative system governing Maori land there is not much that can be done, in the short-term at least, about the large numbers of owners or the large number of small trusts. However, the decision to form an ownership structure or to increase land area by blocks clustering together or farming collaboratively depends almost entirely on the capabilities of the landowners in question. That said, there are some constraints that will be difficult to overcome such as landlocked blocks which make up approximately 30 per cent of structure-less and small entity land.

A framework to improve

The most serious constraint facing the landowners of small trusts and land blocks without a management structure is the lack of capability in two key areas –

- Agricultural production and management
- Governance and decision-making.

While farm training programmes have been around for some time Maori have historically had low participation rates. In recent years the level of involvement has increased mainly due to innovations in presentation and greater investment by the government. This effort must continue for Maori to devise creative solutions to overcome the ‘small-block-with-too-many-owners’ problem.

Raising the skill level in on-farm production and management is a key platform in the long term strategy to improve the prospects of small blocks. The greater the number of Maori with relevant expertise in the industry, the higher the chances of finding relevant solutions to long-standing problems.

The second area, also not new, is improving governance and decision-making capability. Governance programmes for trustees and committee of management members have been run in various parts of the country for over 20 years. These programmes have been very successful in lifting committee and trustee performance.

What has been missing from these courses is a process and tools where the assessment and development can be done within a framework that accounts for socio-cultural aspirations along with environmental and economic factors.

Increasing capability

Maori played an integral part in establishing agriculture in this country in the late 18th and 19th centuries but the land tenure system has made it difficult for them to stay connected to their farms. Multiple ownership has produced generations of Maori who have lost the ability to farm as owner operators.

In spite of this the collective contribution to pastoral industries is significant, although difficult to confirm because of the lack of data collected on the ethnicity of producers. A best estimate is that production from Maori land is around 12 per cent of the sheep and beef sector and around 10 per cent of dairy.

Farming by committee

Maori involvement in the pastoral sectors is now largely confined to sitting on a committee. Maori make up around seven per cent of the workforce in the pastoral sectors of dairy, sheep, beef and deer. But there is a clear under-representation in key professions including farm consultants and technical advisors, researchers and policy analysts. The number of Maori owner-operators, sharemilkers, shepherds and farm managers is also low and these numbers need to increase. Jobs are there for the taking and increasing the number of Maori with production and managerial experience will also improve the calibre of people that sit on the committees.

While tertiary enrolments for Maori have steadily increased in recent years most of the increase has been in certificates and diplomas. The higher number of Maori enrolling in tertiary qualifications in recent years is a good trend but a concerted effort needs to go into encouraging more into degree level science and technology qualifications.

Financial support is often not the constraint. AgResearch's Maori undergraduate and postgraduate scholarships, for example, struggle to find applicants. Greater support is needed from iwi, hapu and whanau to encourage young Maori to consider careers in the agricultural sector. More employed in the agriculture sector at all levels will improve the governance quality for an increasing number of structures that are likely to be established over the next 10 to 20 years.

Bigger farms and better employment prospects

The opportunities for Maori to participate in the dairy sector are positive. As the average size of herds increases from 350 cows to an estimated 460 in 10 years, labour requirements are also expected to increase from 2.5 to 2.9 full-time equivalents. Because of increased labour and managerial efficiencies herd sizes are expected to increase by 30 per cent and labour requirements will also increase, but by only 15 per cent.

The upside to this is that the trend of fewer and larger farms is also likely to see a rise in the number of farmers who employ labour and managers. Dairy NZ projections over the next 10 years expect owner operators to reduce by six per cent and the number of owner operators who employ managers to increase by five per cent.

The situation in the sheep and beef sector is similar. With approximately 15,600 farms nationally almost a third employ farm managers and permanent staff and over half use casual

labour. This is likely to increase as the average number of stock units per full-time equivalent worker of around 3,500 is set to increase over the next 10 years to 4,000. Staff turnover of around a third is high and the challenge for the sector is to attract and retain good staff.

Education and training

Training and skills development is the key to cementing the future of Maori in the industry. For anyone that goes to a trust or incorporation annual meeting there will always be a plea from an owner who will ask why they are employing others to manage our farms.

The answer is obvious when we look at the career paths that young Maori are choosing. Ministry of Education statistics for 2004 show that 75 per cent of the subject choices taken by Maori tertiary students are in social sciences, cultural studies and business programmes. The enrolments for food technology, agricultural, environmental and natural sciences are less than five per cent.

Getting people back on to the land is a priority and the old adage learning by doing has never been truer than at the present time. In recent years programmes have been established that focus on group learning and mentoring such as the Te Arawa Farm Cadet scheme. This is an arrangement between five Rotorua-based incorporations and trusts, the Waiariki Institute of Technology and Agriculture ITO.

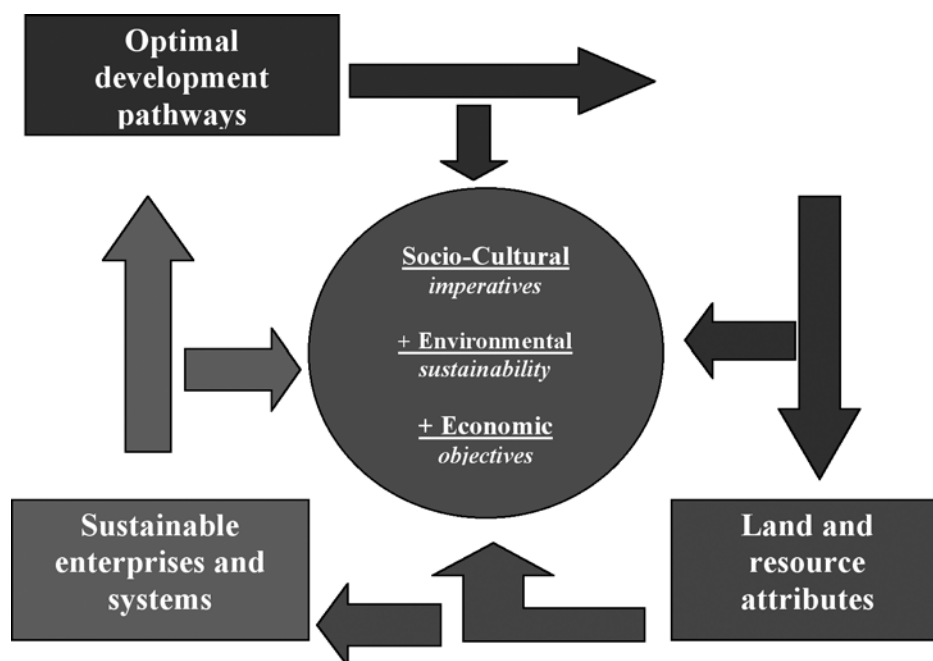
The concept is sound and the programme has been a great success with 12 of the 14 trainees that started in 2007 graduating the following year. Other initiatives with a similar philosophy include the Waipapa and Tuaropaki scheme with 16 trainees in 2007 and the Te Kuiti Maori farm managers with eight graduating in 2005.

Of the 4,700 trainees in on-farm agricultural training 3,600 are in the dairy sector and 1,100 in the sheep and beef sector. Maori comprise 10 per cent of the dairy trainees and 14 per cent of the sheep and beef. The efforts of Peter MacGregor, AgITO's strategic relations manager, and the staff of AgITO to increase the involvement and build relationships has seen a steady rise in the number of Maori trainees in the industry.

Increasing decision-making capability

In 2008 a FRST-funded research programme titled 'Iwi futures: An integrated framework for decision-making' was established with Massey University. The university was the contracting organisation and research provider with collaboration from AgResearch, Landcare Research, Scion and the Te Arawa Lakes Trust. The research programme is a first of its kind with significant input from Te Puni Kokiri and the Federation of Maori Authorities.

The aim of this programme is to develop an integrated framework that comprises modules of tools specifically designed to meet the needs of Maori landowners. The framework will help to increase the use and economic potential of their collectively-owned lands. The framework needs to be flexible enough to be used by landowners of large incorporations and trusts as well as small landholdings. The diagram on the next page outlines the four key components or modules of the framework.



Iwi futures framework

A key focus of the programme is the blending or integrating of various knowledge systems, including traditional landscape knowledge alongside bio-physical and socio-economic simulation models. For the diverse needs of Maori landowners the framework is primarily a decision-making guide that contains examples that have come from the development and application of the framework in collaboration with four organisations – Ngati Hine Health Trust Whangarei, Paehinahina-Mourea Trust Rotorua, Waimarama Incorporation Hastings and Aohanga Incorporation Dannevirke.

The framework emphasises visualisation tools and techniques to give examples on accessing owner and land information and then the analysis of this information using a variety of existing models including GIS and system simulation models like Farmax. The programme will also develop two new models. These are an agent based model to show the consequences of collaborative behaviour and a multiple-enterprise risk optimisation model to illustrate the advantages of planning and coordinating multiple investments.

A unique element in this programme is the inclusion of tools that will allow decision-makers to identify long range goals for the land and its owners, then simulate various development options to show the likely consequences. The ability to visualise and simulate development options is a powerful tool that builds capability and confidence to overcome institutional difficulties identified earlier.

Future challenges

A key finding of the Iwi futures programme is the recognition that standard farm management tools are insufficient for a committee or trustees that need to look beyond the farm boundaries. Understanding the influences on the system includes working with the decision-makers to identify social pressures and cultural aspirations along with market changes, regulatory restrictions, consumer attitudes and societal pressures.

Many organisations are currently facing expectations from landowners that their representatives blend or integrate other factors into the normal farm business framework. For example, more Maori owners are demanding that cultural values be incorporated into business practice and that cultural landscape knowledge be incorporated into farm business plans.

These expectations cause a significant problem for trustees and committee members, especially in balancing mixed objectives. Cultural values of the land-owning community usually play a significant part in influencing decisions. Economic objectives must therefore be juggled alongside the group's cultural imperatives. Land has an important role to play in economic advancement, particularly as a key source of capital. But it is also a source of identity and centre of cultural pride, which imposes a major influence on the decision-making processes.

Because of the small stake that many Maori landowners have in their ancestral lands the financial return is often negligible. As unemployment increases there are already signs that landowners are demanding more tangible benefits from the representatives that administer their ancestral lands. Health and medical grants, education scholarships and marae grants are regular investments by incorporations and trusts.

However, there has been an increase in the number of partition applications in recent years. These are often granted to owners who wish to build a dwelling on the farm property. The land is surveyed and partitioned and a long term lease drawn up. This is always a difficult decision as it sets a precedent for more partition applications, and when refusal happens there is the risk of unauthorised settlement. The trust or incorporation needs to balance the interests of the few with the needs of the majority and tools that can help in planning will be needed more than ever in the very near future.

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MxG FOR SUSTAINABLE RENEWABLE ENERGY

THE CROP YOU KNOW NOTHING ABOUT

Peter Brown

The proprietors of Taharoa C Block started working on a wind power project in 2004. The location of this project was to be on their land which was covered with mature or semi-mature radiata plantation forest. Because trees and wind power do not mix well, plans were made to harvest the trees and not replant.

Taharoa did not want to have the land under the turbines lying idle, so investigations were started into determining how the land could be used productively in a way that did not impinge on the wind power. Growing a bioenergy crop was one of the areas of interest for this land use. The criteria for such a crop were that it had to be able to grow well on low fertility land, did not get more than a few metres tall, and was sufficiently productive to give a satisfactory economic return. It had also to be compatible with and useful as a feedstock in processing technology that is existing or imminent.

The plant MxG

The plant that was settled on was *miscanthus x giganteus*. This is sometimes erroneously referred to as elephant grass. However we decided to refer to it as MxG as a unique and distinctive name that also distinguishes it from the species of miscanthus, some of which can be invasive plants.

MxG is a naturally occurring sterile triploid hybrid that originated in Japan. It was taken to Europe in the 1930s and has been grown in trial areas throughout Europe, in some cases for over 30 years. It is grown commercially in the UK with supply in the order of hundreds of thousands of tonnes being produced and marketed to end users.

Once planted, MxG is harvested annually with full production being reached after three years and being maintained for at least the next 15 years. It does not need replanting each year. Because of its ability to translocate nutrients from the leaves to the rhizomes in the autumn, the winter harvest removes very



Four-year-old MxG in Illinois

few nutrients. As a result, fertiliser application is generally not needed, or if needed, is required in very small quantities.

The plant MxG drops its leaves after the nutrients have been translocated to the rhizomes and it forms a very thick mulch layer that suppresses weeds. As a result, after the first year, weed control is generally unnecessary.

EXCELLENT FOR SOIL STABILITY

MxG grows to a height of between three metres and three-and-a-half metres when in full production. To do this it requires a minimum rainfall of at least 600 mm. Because it is very deep rooted it can withstand dry periods once established. Also due to this deep rooted nature and the network of rhizomes that it establishes near the surface, it is excellent in terms of soil stability.

In other countries it is almost always grown from rhizome cuttings but it has to be imported into New Zealand in tissue culture form. The initial establishment will therefore be from plantlets that have been developed in the laboratory and then grown on and multiplied in the greenhouse.

Potential use

One of the advantages of MxG is that it is very versatile. The original thinking of Taharoa was aimed purely at production of liquid fuels. As we have learned more we have realised that the potential is considerably greater than this. There is existing technology and there are existing markets that would happily take all the MxG that we could now produce.

The original thinking towards liquid biofuels centred on cellulose ethanol production. New Zealand technology has been developed with the objective of converting salix, or willow, into bioplastic precursors and bioethanol. Samples of MxG that we have had tested through the system have shown that it is extremely suitable and may in fact be better than the salix. This technology is currently at the stage where a pilot plant is being built.

Research work being done internationally, particularly at the University of Illinois, has shown that it is also possible to make biodiesel from miscanthus. By using rapid pyrolysis it is also possible to make the liquid fuel bio-oil, a fuel that can be used directly for electricity production or with further processing as potential to make biodiesel.

BIOCHAR

Internationally, direct firing is the most common current use. A large power station in the UK currently takes around 300,000 tonnes a year of MxG and has plans well advanced to expand this significantly. They use MxG to take the place of some of the coal that they previously burnt and have also signed up to construct three stand-alone 300 megawatt biomass fired power stations in the next several years.

MxG, along with almost all other organic materials, can be made into biochar. Biochar itself has a myriad of uses. The most interesting is application to agricultural soils to enhance fertility

while also permanently sequestering the carbon in the soil. The first biochar production plant in New Zealand should begin construction this year. The whole subject of biochar is relevant to New Zealand primary industry businesses but would require a separate paper to cover it properly.

MxG also has the capacity to be used for the production of biogas through a fermentation process. It could easily be combined with various forms of effluent to enhance the production of biogas.

It is also understood that MxG is palatable to animals so one of the things that we will be looking at is its potential for being grown as a supplementary animal feed. To that end, we will be getting samples of our initial trials assessed for nutrient content at various stages during the growing season.

Progress with Taharoa

Having identified the plant that seemed to be the most suitable for our purposes, the challenge was to get permission to bring it into New Zealand. Several people and some major organisations have considered doing this for MxG and all have considered it to be too difficult. Taharoa did not consider that to be a valid reason for not at least trying to negotiate the process. As a result, progress has been made as outlined below.

REGULATORY APPROVAL FROM ERMA

Regulatory approval was required from two agencies. The first was the Environmental Risk Management Authority (ERMA). As soon as anyone mentions making an application to ERMA to bring a plant in New Zealand, the response tends to be looks and comments of concern at how difficult and expensive it will be. This seems to be because none of these people have actually had any dealings with ERMA.

Our experience did not support this concern. The staff of ERMA proved to be professional, very good at their jobs, and to have a strong appreciation of commercial realities. As a result the application process was relatively straightforward and happened much more quickly than we expected.

All the costs were also very reasonable and because we made an application for a fast track approval, although a little risky to us, the fee was extremely low. The ERMA staff helped us where they could, insisted quite correctly on things being done thoroughly, and then wasted no time in getting independent corroboration from international sources and making a final decision.

The only real opposition came from a very small, relatively unprofessional group within the Department of Conservation who had a very large axe to grind against all bioenergy crops. The paper presented by this group in opposition to our application was so poorly written, ill informed and non-specific that the only thing it achieved was to introduce a small element of delay as ERMA staff diligently responded to each of the points one at a time.

BIOSECURITY NEW ZEALAND

The second agency from which we required regulatory approval was Biosecurity New Zealand – a division of MAF. In order to bring any plant into New Zealand, once it has been approved by ERMA it has to have an Import Health Standard written. This is a document that describes how a particular plant can be brought into New Zealand so as to ensure that there is a suitable level of

biosecurity protection in the process. It is an important part of import control, but the section within MAF that deals with this is not well staffed and has a huge number of applications each year. It is bound by a very bureaucratic system – invented apparently by Jim Anderton – and is severely constrained by the system in how quickly such work can be completed.

We were informed that if we paid for the biosecurity risk analysis to be completed and the Import Health Standard to be written, it would happen more quickly.

We agreed to this having been told that this would be very straightforward. Having paid the fee that was 32 per cent greater than the most expensive ERMA fee – the work was done. Government departments and independent experts who knew little about MxG itself were consulted at great length, but the final release of the health standard was then held up at the last hurdle by a Court of Appeal decision relating to honey imports. Once amending legislation had been passed and further bureaucratic obstacles overcome, the standard was finally approved in August 2008 – 18 months after we had agreed to pay to get it done.

PLANT IMPORT

In order to speed things up, we had received approval from both ERMA and MAF to jump the gun a little by bringing some MxG into New Zealand in advance and placed into a Level 3 quarantine laboratory. This enabled us to begin work on tissue culture multiplication pending the approvals coming through. We



MxG plant showing root development.



MxG in the greenhouse ready for planting

were conscious of the fact that if approvals were not granted we would have to either destroy or re-export the material.

This enabled us to get a certain amount of commercial advantage by being the first mover. We needed this advantage in order to justify the expense involved in obtaining the ERMA approval and getting the health standard completed.

TECHNOLOGY DEVELOPMENT

In the laboratory, the staff developed new ways of multiplying MxG in tissue culture. The most exciting part was the development of the ability to take somatic embryogenesis tissue and get it to form plants. This had not been done anywhere else in the world and there is already international demand for access to this technology.

At the same time, the standard multiplication of organogenesis was being refined with the aim of being able to produce large numbers of plantlets in a relatively short time at a reasonable cost.

As soon as the initial plants were available and the approvals were in place, we got plants out into a greenhouse and proceeded to start work on multiplication of plants within the greenhouse.

INITIAL TRIALS

Initial small-scale trials are at several sites around New Zealand. Most are on Maori land, because this type of land ownership is ideally suited to the growing of a longer term crop like MxG. You know who the owner will be in 15 years time, unlike general title land. Also Maori land tends to come in larger lumps making cultivation of large areas in one locality much more straight forward. Maori properties also have a disproportionate amount of marginal land, which is exactly the niche land type on which it is intended to base an MxG industry.

It is too early to give any results of these trials, partly because their establishment took place much later than intended for a variety of reasons. Providing the work of bulking up plants continues to be successful, the intention is to plant larger operational-scale areas in the spring of 2009.

INTERNATIONAL INTEREST

As mentioned earlier, there is already international interest in some of the technology we have developed. However we have also discovered that there is a significant international shortage of MxG plants and we have already received our first order for supply of plants to the United States.

There is also international interest in buying the harvested product of MxG that we will be growing in New Zealand. This interest is serious enough that representatives of a large overseas coal-fired power generation company have already visited New Zealand twice to discuss the potential for us to supply them with feedstock in the future. A very big overseas pellet producer is in discussions with us regarding the possibility of their expanding into New Zealand to set up a pellet-producing plant that is based at least partly on MxG.

CARBON BENEFITS

For the people who are interested in reducing the amount of carbon dioxide going into the atmosphere, we can also claim that there are significant carbon benefits. In order to quantify the magnitude of these benefits, we worked out how much carbon dioxide would be absorbed over a 28-year cycle on one hectare. Comparison can then be made both with a radiata pine plantation

and with willow being grown as an energy crop. The results are shown in the table.

Crop	Carbon dioxide absorption over 28 years
Miscanthus MxG	1230 tonnes
Radiata pine	725 tonnes
Willow	450 tonnes

The key assumptions are that the MxG is harvested and used to replace a fossil fuel such as coal or petroleum. The same assumption is made with the willow. Information on the carbon dioxide absorption for the radiata pine plantation comes from the MAF carbon sequestration tables.

What is not stated is that radiata pine figure is the amount of carbon dioxide that is absorbed over 28 years and is then considered by the rules of the Kyoto Protocol to have all been released back into the atmosphere at harvest time. So if a radiata plantation is harvested at 28 years, the net carbon dioxide absorption is considered to be zero even though this is obviously not the case if the wood is not immediately burned. Therefore the figures for radiata pine need to be considered with caution.

NEXT STEPS

With a project such as this there is always further work to be done. Some of these next steps are as follows. We now need to –

- Continue to assess the trials
- Make a decision whether to continue with bulking up large numbers of plants with the associated significant level of expenditure, so that operational-scale planting can be carried out during the spring of this year
- Establish appropriate commercial structures for this expansion and identify the large production areas that will be needed
- Continue to market our technology and our capacity to carry out international production and sales of plants
- Guard our intellectual property carefully
- Continue to cultivate commercial partners who can add value to what we are doing and who can benefit from the new MxG industry that we are establishing in New Zealand.

Conclusion

This is a very exciting new crop which has huge potential for New Zealand. It is particularly relevant to farmers who are struggling to break even with conventional farming on land that is not arable. With the qualification of having to be able to cross the land with machines for harvesting, there appears to be quite a large amount of suitable land in many areas of New Zealand that is well located with respect to potential MxG utilisation plants.

With our focus beginning with Maori properties, we are working on a solution that may help solve some of the problems of New Zealand farmers. With our other focus being on reduction of greenhouse gases in the atmosphere, we are heading rapidly towards a point where we may be able to contribute significantly to shrinking the overall agricultural carbon footprint. In the process this will help landowners, primary industry and New Zealand as a whole.

Peter Brown is the Managing Director of PFS Consultants Limited.

MAORI FORESTRY AND THE EFFECT OF TREATY SETTLEMENTS

Fred Cookson

The CNI Forests Iwi Collective Settlement is the largest Treaty of Waitangi settlement in New Zealand history. On 1 July 2009 iwi from the central North Island Collective will have the following assets returned to members –

- All of the licence rentals accumulated on the settlement lands since 1990
- A total of 90 per cent by value of the 176,000 hectares of Crown forest lands in the central North Island, most of this land being part of the Kaingaroa Forest
- Three million New Zealand Units of accumulated carbon credits.

Otherwise referred to as the ‘Tree Lords’ settlement in recent newspaper publications these assets arguably have a current dollar value of in excess of \$250 million. The proportionate share of this settlement to each of the iwi groups involved has been calculated. Each group will take a shareholding in the collective commercial entity, in the first instance to deal with the efficient management of forest annual rentals derived from the forest lands.

The important issue of *manawhenua*, or who actually owns the land, will be dealt with and agreed to amongst the collective members over a seven year time frame. The commercial opportunities to be derived from this settlement will include not only forestry but the eventual trading of carbon credits, geothermal energy generation and tourism.

Deed of Settlement

The Deed of Settlement notes the importance of ‘the maximisation of long term, sustainable economic development and return to CNI iwi’. This was an acknowledgement that the future economic prosperity of iwi is as important as settling the grievances of the past.

Growing the economic asset is the cornerstone of each iwi member’s strategic plan. Before each member can receive

its proportionate share of the settlement assets the Crown needs each to have pre-settlement governance entities to be mandated and put in place. To a large extent each of the iwi groups has achieved this and most will be able to participate in the signing of their respective deeds of settlement on 1 July.

A new approach

Distrust has always featured in the relationship between Maori and the Crown. In recent years the Treaty settlement process has rekindled past grievances. Many found the Crown’s custodial approach to Maori-owned assets patronising and disempowering. However during the CNI negotiations process a relationship of mutual trust has been forged between the Crown and iwi affiliates as each observed the honest motives and goodwill of the other.

Economic development

We have long been thought of as smart and innovative commercial operators. Maori were successfully exporting to world markets back in the 1800s. Recent history has seen the error of poor commercial returns for Maori, partly as a result of government custodianship of Maori owned assets. However as we have seen, the CNI settlement process shifted away from custodianship towards partnership. The CNI Iwi Collective has quickly recognised the opportunity to participate commercially on the world stage and has created its own economic development strategy.

Vision and aspirations

The Collective’s vision is to protect and promote our culture and values by generating the income necessary for social, cultural and economic development.

Its aspirations are to –

- Maximise the economic benefits from our assets in a sustainable manner





- Develop strategic relationships with other parties and organisations
- Become an integrated part of the global economy
- Leverage the power of the Collective to achieve economic success
- Protect and safeguard the land for the long term, as the foundation of strategic investment
- Demonstrate the benefits of Maori being active participants in the global economy
- Contribute to the New Zealand forestry industry.

Commercial opportunities

In line with the iwi Collective's aspirations it was decided to undertake a commercial discovery process. The purpose of this discovery process was to investigate the opportunities for economic development that the Collective would have once the settlement assets were transferred. From this CNI Iwi Discovery Ltd was formed in August 2008 to carry out the commercial discovery process.

A small project team was assembled made up of commercial experts from around the world. The team's task was to develop commercial strategies for iwi and the Collective, based on the return of Kaingaroa Forest and the lump sum of accumulated rentals. This was to be done to the highest standard in accordance with commercial best practice. The process would be guided by the Collective's aspirations, but at the same time it needed to take into account the individual interests of each iwi in the Collective.

Looking beyond forestry

The CNI discovery team began to work alongside iwi in the Collective. It saw iwi participating in a number of land-based activities in the region, in addition to forestry, such as farming, and the generation of renewable energy. Some iwi pointed out that these interests are as important to them as forestry. The CNI discovery team realised that it needed to prepare strategies that would assist iwi in a wider range of commercial areas.

This approach went beyond the deed of settlement model, which was focused on Kaingaroa forest. However the Collective's leadership and its Crown partners agreed that it was important to recognise and build on each iwi's priorities for the future.

The forestry opportunity

Kaingaroa Forest is a world class forestry resource. It is one of the largest continuous blocks of plantation forest in the world. From 1 July 2009 the land that Kaingaroa forest is planted on will be owned by the iwi in the Collective. We can also assume ownership and control of the forest itself. This puts us in a unique and valuable position as natural owners of New Zealand's largest integrated forest and wood products enterprise.

From July 2009 the iwi Collective will own and control the land that Kaingaroa forest is planted on. The trees are owned under management by Kaingaroa Timberlands, a separate corporate entity.

The Collective can choose to end the agreement that gives ownership of the trees to Kaingaroa Timberlands and establish either replanting of plantation forestry or alternative agricultural use under respective iwi control. This process has a 35-year life in which the existing leases will be owned and managed by Kaingaroa Timberlands.

Forestry strategy

Members of the Collective are each considering the elimination of the forest licences with Kaingaroa Timberlands after July 2009. This would allow the land blocks which are returned to be replanted by the Collective over the next 35 years, at the end of which the final licences owned and controlled by Kaingaroa Timberlands will expire.

The Collective members are considering the formation of a forestry company to manage and replant the returning land blocks until such time as the Collective owns both the land and the forest. Once the resource is controlled then downstream wood fibre processing and product development will be considered. Wood product technologies will be examined and matched with global demand to determine the commercial viability of existing and potential new business.

This strategy has the potential to transform the iwi Collective into the largest forest and wood products operator in New Zealand within 25 to 35 years. The potential value of such a large scale integrated forest wood product operation is estimated to produce an annual turnover of between \$100 and \$120 million with a three billion asset base.

Other commercial strategies

The potential for power generation is also being assessed, along with carbon farming, leisure and tourism activities and ecosystem services. Each of these potential areas for commercial development can be captured by the iwi Collective members, some of whom already operate in these business sectors.

In summary the overall effect of the upcoming settlement will be significant to the central North Island iwi and the community as a whole. The Collective members are currently putting in place the structures and personnel required to permanently manage and develop these assets. The benefits and opportunities will not only accrue to iwi members but also the wider regional and domestic economy, with opportunities for service industries and related labour force capacity expected to increase.

Fred Cookson of Ngati Uenukukopako is a trustee of the Te Pumautanga O Te Arawa Trust.

REALISING THE POTENTIAL OF AN ISOLATED RURAL COMMUNITY IN THE BAY OF PLENTY

Wira Gardiner

Whangaparaoa is a small community that sits at the eastern most point of the Bay of Plenty. The community shelters under the lea of Tihirau, the land mass that is the eastern-most boundary of the Mataatua confederation of tribes. It is a community of less than 100 where the main source of income is derived from tourism, farming and some forestry. It is an area of high unemployment. While the area is rich in history and the stories and deeds of ancestors, it is relatively impoverished to meet the challenges of the market society of the 21st century.

MARGINAL FARMING OPERATIONS

Most members of the community belong to the Te Whanau-a-Apanui tribe. The major farming operation in the area is carried out by the Potikirua Incorporation. This was once a thriving beef and sheep station but by the late 1990s it was barely surviving with little or no surplus income to carry out basic farm operations.

Income from farming operations is marginal and the trustees are constantly looking for alternative sources of income. They were quick to capitalise on carbon credits and sold a parcel to a major corporate entity. The Potikirua station has large tracts of manuka growing on it and the surrounding areas have an abundance of manuka growth. Throughout the 20th century manuka was considered a weed and when they could afford it farmers hired labour to cut it down.



Whakaari beekeepers extraction plant



Ora honey

On the eve of the 20th century, through the work of Dr Peter Molan of Waikato University, the popularity of manuka honey began to take off as a result of the health benefits of its anti-bacterial properties. Towards the end of the 1990s Eddie Matchitt, Chairman of Potikirua and Chairman of Te Runanga o Te Ehutu, observed the growing numbers of hives being trucked into the eastern Bay of Plenty. He had hives on his property and noted that the practice of beekeepers leaving the occasional jar of honey for the use of his land was changing and that beekeepers were now offering cash payments to secure access to the land.

Maori involvement in the honey industry

Over the next two years he started to ask questions and began to learn more about the growing phenomenon of manuka honey. The more he learned the more he realised that Maori land owners in the area were looking at significant tracts of manuka that had now become valuable because of the manuka honey produced by bees. He was keen to capitalise on this trend so that employment opportunities could be created in the Whangaparaoa area.

Along with Tuihana Pook, principal of the small local school, they chaired a number of Maori organisations. With Harry Satchell, an administrator of several land blocks, they approached their respective organisations and raised about \$350,000 to buy a stake in the beekeeping industry.

By the end of 2001 Whakaari Beekeepers Limited was established and in operation. The company had purchased three small beekeeping businesses and started to build a storage shed and extraction plant. The name Whakaari was taken from the volcanic island known as White Island sitting 35 kilometres off the coast.

Whakaari Beekeepers Limited suffered from the classic mistakes of many start-up companies. The company was relatively asset rich but cash poor. The equipment and vehicles it had purchased were second-hand and in some cases barely operable. Very soon the company faced the prospect of closure as it had



East Coast beekeepers outside Te Araroa

no cash to meet its commitments of wages, GST and the usual costs associated with any small business. In addition the directors had little or no experience in the industry and were held captive to beekeeping staff.

These two factors forced directors to look for external capital assistance. This was provided by Hekia Parata and Wira Gardiner who introduced the necessary capital and brought a wide range of business and governance experience to the board of directors. One of the first obvious tasks for the new board was to begin the process of upgrading the old equipment in the extraction plant. This took a number of years and was funded from cash flow, placing additional stresses on further expansion. On reflection directors would have been better off borrowing the capital at the outset to fund the expansion plans.

Export strategy

The directors were keen from the outset to export their product. There was no experience in the group about any aspect of marketing and the more complex documentation and processes surrounding the export of product. Nevertheless the directors persisted and its first product label was designed by the local school children of Whangaparaoa School. At the time it looked



Les Stowell GM Whakaari International

fantastic, but on reflection it was terrible. More importantly, the company had no-one to take control of its export development. Directors knew what they wanted but they had no clue about how to go about its execution.

This problem was solved when the proprietor of the Waihou Bay Camping Ground, Les Stowell was asked to help out. Les had 15 years' experience in exporting squash and knew how to export products to the market. Again at this early stage Whakaari Beekeepers Limited had no export markets. This matter was solved by Les Stowell who had one of his Japanese friends staying at the camp at the time. He agreed to take a pallet of honey and would try and sell this honey in Osaka his home city. Whakaari Beekeepers Limited was on the way.

In 2003, Eddie Matchitt and Wira Gardiner went to Japan to see at first-hand the efforts of their Japanese buyer to sell their product. In one supermarket in Osaka, a small display of Whakaari's manuka honey in 250 gram jars looked really forlorn sitting alongside Comvita's large range of products.

There was a sense of pride from the two directors that within two years the company has achieved what few other honey growers had and that was to develop its own products and have it on the shelves in one of the most competitive markets in the world. Photographs of that first display were viewed with pride when shown to members of the Whangaparaoa community and to shareholders.

PRODUCTION AND TEETHING PROBLEMS

Through the early 2000s the production levels were variable. Whakaari Beekeeper's first harvest was 26 tonnes. The following year it was six tonnes. Fortunately for the company the focus on medical honey saw prices soar as high as \$20,000 a tonne and the company was able to sell half of its first crop of 13 tonnes. The price levels fluctuated and the company struggled to maintain its independence during this period. Rather than sign up to contracts on future crops at agreed prices to honey buyers, Whakaari decided to rely on spot market prices.

By 2002 the company had built a large storage shed and had installed its first extraction plant which was comprised of second-hand equipment. It was hardly surprising that extraction was a difficult and arduous process and often saw staff hand scraping honey from the frames. Through this experience the lesson was reinforced for the directors that future expansion had to be properly planned and where equipment was to be purchased, it had to be the best.

ALTERNATIVE INCOME STREAMS

To offset strained cash flows the company began to move hives into pollination in the kiwifruit orchards in the Te Kaha area. The numbers of hives placed in pollination were a modest 200 in the first year, but the returns of \$120 a hive were very welcome and indicated a further line of income generation as the company developed. At the same time the growth in acreage of kiwifruit orchards in Te Kaha was also trending upwards and the future potential to put more hives into pollination was looking attractive.

The upside provided by pollination also had its potential downside as advice received by the company suggested that hives placed into pollination would be weak and not capable of taking a strong honey harvest. The jury is still out on this matter. In any case it has become an essential income stream for the company.



Harvesting honey

ESTABLISHMENT OF EAST COAST BEEKEEPERS LIMITED

By 2003, most of the teething problems had been identified and resolution of these was underway. In 2003 East Coast Beekeepers was established to focus on the area from Ruatoria on the East Coast through to Hicks Bay and then across to Whangaparaoa. The hard lessons learned with the establishment of Whakaari Beekeepers Limited were noted and East Coast Beekeepers Limited had a smoother start-up. A year later Whakaari International Limited was established to focus on marketing and exports.

Together the three companies are linked by common whakapapa (lineage) shared by the directors and by ancestral connections. The companies are also associated closely with the tribal groups Te Whanau-a-Apanui and Ngati Porou. The inter-linking of shareholdings has made it possible for the two bee companies to enjoy synergies, sharing staff on critical tasks. For example staff and vehicles of both companies combine to ensure that hives are placed efficiently during the pollination season.

By the end of 2008 Whakaari Beekeepers Limited had been in business for seven years and was continuing to build and stabilise its operations. East Coast Beekeepers Limited had stabilised its operations at 1,000 hives and looks forward to gaining greater efficiencies from these hives.

Whakaari International continues to expand its export markets and Les Stowell has visited China on a number of occasions in the past two years. This has helped build strong relationships with New Zealand based Chinese who export a wide range of New Zealand products to China.

Challenges

Initially it was intended to build a major commercial operation of between 5,000 and 10,000 hives. However these plans have been hampered by the lack of beekeepers. It has been a real challenge for directors to encourage local young men and women to take up a career in beekeeping. It is a physically hard vocation and requires a significant commitment from those interested in working in the industry. There is a continued reliance on bringing beekeepers into the area including foreign beekeepers who have obtained work visas to work with New Zealand companies.



Local girl tastes our product

Directors have decided to maintain hive levels at 2,000 and by better beekeeping management and cost efficiencies to aim for greater return to the shareholders. Over the next two years this stabilisation policy will be maintained and then reviewed once the bottling plant has been integrated into the overall business.

Another significant challenge for directors is to ensure that the companies can access the best manuka areas where UMF levels of production are highest. While the companies have access to more than adequate manuka stands, there is a need to continue to improve access to sites and to ensure that servicing of the hives can be carried out efficiently.

For some time the directors have tried to encourage Maori landowners to participate more actively in the industry beyond collecting the annual rentals. Regrettably this has been harder than imagined and more work needs to be done to enter into joint ventures where the landowners have a share in the integrated business.

The way ahead

Directors of the three companies are in the process of establishing a bottling plant to complement the current range of facilities at Whangaparaoa. With the establishment of this plant the companies' operations will be fully integrated from harvesting honey, its extraction and bottling and onwards to markets established by Whakaari International.

There is a continued aim to improve all aspects of governance and management. Given the Maori ownership of the three businesses in such a relatively isolated area, the companies have attracted local television and international commentators and photographers. The directors have learned from the hard lessons of the past and have set out to establish a first class complex. The elements will come together over the next two years and it is anticipated that the Whangaparaoa area will have a model of operations that could be transported to other similar parts of the country. It is an example of a Maori community working against all the odds to create an international business.

Wira Gardiner is the Chairman/Director of Whakaari International Limited, East Coast Beekeepers Limited and Whakaari Beekeepers Limited

QUANTIFYING THE EFFECT OF CARBON TRADING ON FARM BUSINESSES

John-Paul Praat, Peter Handford and Clayton Wallwork

Carbon Farming has received a lot of publicity in New Zealand forestry and agriculture with reports likely of both great opportunities and significant financial penalties. The truth is likely to be somewhere in between.

Landcare Trust and NZ Farm Forestry Association are an integral part of the rural community. They have partnered with PA Handford and Associates using a MAF sustainable farming fund grant co-funded by the Carbon Farming Group. The aim is to help farmers, agribusiness managers and farm foresters to understand carbon farming, and how it can be integrated with current agricultural production systems.

Understanding the carbon cycle on pastoral farming enterprises, greenhouse gas emissions, carbon footprinting and the requirements of the Kyoto Protocol are improving. What is less clear is how these issues might affect or fit within the farm business and how government regulations and afforestation programmes will affect profitability.

This article provides an overview of the basic concepts of the carbon cycle on farms and shows how credits and liabilities might be managed.

Climate change background

There is wide international science and governmental agreement on climate change that Man's activities have led to an unnatural rate of warming in the biosphere. The key human effect identified as influencing climate change is the increased concentration in the atmosphere of greenhouse gases that trap the sun's heat. The main greenhouse gases, apart from water vapour, are carbon dioxide, methane and nitrous oxide.

A profile of greenhouse gas emissions from New Zealand shows agriculture as a key factor. It is key because agriculture, predominantly methane and nitrous oxide from livestock, forms almost half of the greenhouse gas emissions and we rely heavily on agriculture for export earnings. In all other developed countries agricultural emissions are currently much less prominent, typically 12 per cent of national emissions with energy emissions dominating.

Greenhouse gas levels

The Kyoto Protocol is an international initiative aimed at reducing greenhouse gas emissions. New Zealand ratified the Kyoto Protocol in 2002 and, along with other developed countries, agreed to limit greenhouse gas emissions at 1990 levels. New Zealand must achieve this target by 2012 or take responsibility for emissions above this level.

Between 1990 and 2006 greenhouse gas emissions had risen 26 per cent. During that time emissions from agriculture had risen by almost 16 per cent. Trend projections indicate New Zealand will have a net deficit of carbon credits payable in 2013. The Kyoto agreement indicates that climate change is being

taken seriously worldwide and farmers here need to be seen to do the same.

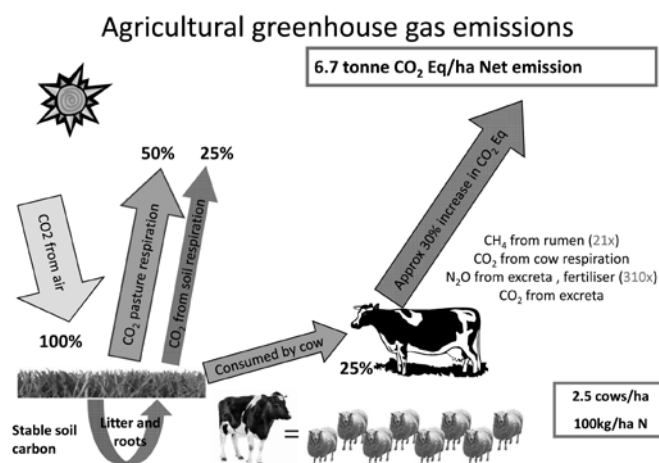
Trading of greenhouse gas emissions has developed internationally as a means of limiting emissions. Significant market trading of so-called carbon credits has risen on the back of this from \$68 billion in 2007 to \$118 billion in 2008.

Carbon cycling in a grazed pasture

Plants take carbon dioxide gas from the atmosphere and about half is converted to a more complex form of carbon and the rest is returned to the atmosphere as carbon dioxide through plant respiration. The diagram provides a schematic of carbon flows for pasture grazed by ruminants, in this case a dairy cow. About half the carbon in herbage is stored as plant roots while the other half is consumed as shoots.

Unharvested herbage dies and goes on to the soil surface as litter. Soil respiration also returns carbon dioxide to the atmosphere as roots and litter are cycled by soil microorganisms. If the harvested shoots were left to decompose and return to the atmosphere as carbon dioxide then there would be no net release of greenhouse gas emissions, only cycling. However, it is the fate of the consumed herbage which makes the difference as ruminants transform carbon in the herbage to more potent forms of greenhouse gas than carbon dioxide.

This is the defining factor from a climate change point of view because methane, emitted from the rumen, is more efficient at absorbing infrared radiation than carbon dioxide. Nitrous oxide, also released from grazed pasture, is similar in this respect. In order to compare the relative efficiencies and residence times of these gases the global warming potential expresses them on a common scale. The use of global warming potential s for this purpose is not perfect but is sanctioned by the United Nations



The carbon cycle under grazed pasture net annual agricultural greenhouse gas emissions

Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol.

The warming effect of one kilogram of methane emitted into the atmosphere is the same as that of 21 kilograms of carbon dioxide emitted over the following 100 years. In this respect, one kilogram of nitrous oxide has equivalent effect to 310 kilograms of carbon dioxide. Approximately two thirds of agricultural greenhouse gas emissions are as methane and one third is nitrous oxide.

The greenhouse gas emissions shown in the diagram were calculated using the online Carbon Farming Group calculator. Fuel, electricity and capital development were omitted from this calculation. The result is that from 2.5 cows per hectare and with the application of 100 kilograms of nitrogen per hectare there is a net annual release of greenhouse gases equivalent to 6.7 tonnes of carbon dioxide.

Soil carbon

Soil carbon under pasture is essentially stable unless there are changes in fertiliser policy, stocking rate and productivity. There is scope to increase soil organic carbon in pasture soil, but not indefinitely. In all cases the observations are that soil organic carbon tends towards a new equilibrium representing a balance between inputs and outputs.

Where changes in soil management do occur, changes in soil carbon levels are unlikely to become apparent or measurable for up to 10 years and are subtle. In contrast activities such as cultivation may release 40 tonnes of carbon dioxide equivalent in the first year or during the growth of a forest which may accumulate as much as 35 tonnes of carbon dioxide equivalent.

Adaption and mitigation

It is crucial that agriculture takes measures to adapt to and where possible reduce greenhouse gas emissions. There are several measures which can be taken including –

- Using nitrification inhibitors to reduce nitrous oxide emissions from saturated soils
- Improving the accuracy of fertiliser applications to improve efficiency
- Examining profitability per stock unit more closely as compared with production per hectare
- Moving to higher production per stock unit
- Improving energy use by improved irrigation water use efficiency
- Heat recovery in cowsheds
- Using alternative on-farm electricity sources such as solar, wind or biogas.

Significant research effort is going into the development of techniques to suppress methane emissions. At this stage technology is at least 10 years away from practical application at farm level. Research into systems incorporating biochar may also provide strategies for reducing the effect of greenhouse gases. However, most of these strategies will have minor effect or are not currently practical. Current opportunities to offset carbon emissions lie in afforestation either on or off-farm.

Afforestation

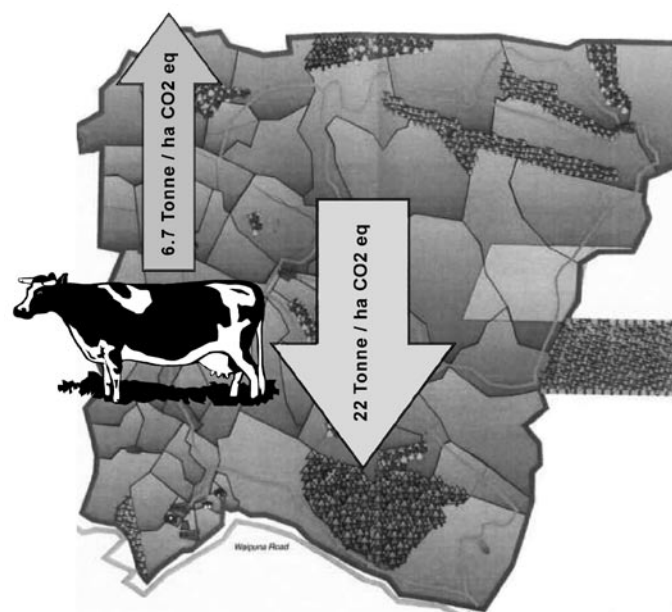
New Zealand has set in place three schemes which capitalise on carbon accumulation by trees as an offset to increased greenhouse gas emissions since 1990. Three schemes, the Permanent Forest Sink Initiative (PFSI), the Afforestation Grant Scheme (AGS) and the forestry aspect of the Emissions Trading Scheme have been implemented and are starting to function.

The Emissions Trading Scheme (ETS) is under select committee review and the analysis here relates to current legislation. The AGS offers a grant to establish new forests in return for government ownership of the credits for carbon accumulated for the first 10 years of that forest's life. The PFSI allows carbon credits from accumulation of forest biomass to be claimed while allowing some harvest without attracting carbon liabilities as long as carbon accumulated in other areas matches that quantity harvested. This provides a mechanism to maintain a forest as carbon storage and avoid the necessity to clearfell a forest.

Offsetting carbon credits

The ETS was set in train by legislation introduced in September 2008. Under the ETS, agriculture will be required to purchase carbon credits to offset carbon liabilities. Activities such as forestry generate carbon credits which can be entered into the ETS and used to offset emissions, or traded for cash. There is no restriction on forest species or harvesting regime. The only catch is that at the point of harvest all carbon taken from the forest in the way of stem wood is treated as an emission and credits need to be purchased to offset this.

There is scope to conservatively manage sales of carbon credits through the life of the forest so that sufficient credits are retained to balance the emission at harvest. MAF are currently taking applications to the ETS so that carbon credits can be claimed for new forestry established after 1989.



Principle of using forestry as an offset to greenhouse gas emissions

Staged introduction to the ETS

At present various sectors of the economy are scheduled to enter the ETS at different stages. Forestry has entered the scheme and carbon liabilities are due for forests which existed before 1990 and were deforested in 2008. In the context of agriculture the stationary energy and industrial process or fertiliser sectors will have obligations from January 2010, followed by the liquid fossil fuels sector in January 2011.

The final sectors, agriculture, waste and synthetic gases, will enter the scheme in January 2013. Carbon will be traded within the ETS as a New Zealand Unit (NZU) which is equivalent to one tonne of carbon dioxide. Agriculture will initially receive free allocation to reduce the immediate effect of participating in the ETS. The amount of free allocation will be determined as 90 per cent of the sector's total 2005 emissions. Obligation will ramp up from 2019 until 2030 when liabilities for all emissions will be due and agriculture will ostensibly be carbon neutral. The relationship between greenhouse gas emissions, a farm business and carbon credits from forestry are best understood by case studies.

Case studies

Two South Waikato farming operations were chosen as a basis for case studies to assess the effect of the ETS on farm businesses. These were a sheep and beef farm which mainly traded cattle and a dairy farm operation consisting of three properties, a dairy farm, a dairy run-off and a sheep and beef farm. For the third case study, a stand-alone dairy farm with no forestry, the data from the sheep and beef operation was omitted from the dairy, sheep and beef operation described above. The table below outlines the basic farm data.

Outline for three case study farm operations

	Sheep and beef with some forestry	Dairy, sheep and beef with some forestry	Dairy with no forestry
Stock units	5200	7436	5564
Area in hectares	520	580	220
Nitrogen use tonnes	7	45	40
Post-1990 forestry hectares	30	30	0

The next table shows the carbon balance for each case study from greenhouse gas emissions and forestry credits in terms of tonnes of annual carbon dioxide equivalents. Actual quantities of fuel, electricity cattle and sheep are not shown.

Carbon liabilities for electricity, fertiliser and liquid fuels are likely to be dealt with by the processor or supplier and passed on to the farmer as an increased cost of energy or fertiliser. However, it is unclear if carbon liabilities arising from livestock will be charged at the farm gate or to the processor. For this analysis we have assumed that the farmer has the option to submit an emissions return at the farm gate but that only livestock emissions are able to be offset against forestry credits as all other liabilities are paid by the supplier.

An example analysis of how carbon liabilities and credits will occur until 2030 for the dairy, sheep and beef operation with some forestry is shown in the next table. For this example

Carbon balance

	Sheep and beef with some forestry	Dairy, sheep and beef with some forestry	Dairy with no forestry
Petrol	8	5	4
Diesel	13	33	29
Electricity	15	15	14
Nitrogen	39	252	187
Dairy cows	0	1321	1321
Sheep	165	429	0
Cattle	1551	1130	513
Forestry	-660	-660	0
Net emissions	1131	2525	2068

animal stock levels in 2005 are assumed to be the same as those in 2008, and the price of an NZU has been set at \$25. Credits from forestry at 22 tonnes carbon dioxide equivalent a year have been calculated based on indicative forest sequestration tables for pruned and thinned radiata pine plantation on medium fertility site. Sequestration rates may vary as they depend on several factors such as species, location, climate, soil fertility and management.

Using accumulated forestry credits

On the assumption that the farmer can submit an emission return at the farm level, credits from forestry can only be offset against agriculture livestock emissions. As forestry has already entered the ETS, these carbon credits may be accumulated or banked in anticipation of future livestock emissions liabilities. The forestry credits calculated accumulate at a rate of 660 tonnes a year, offset livestock emissions until 2027 and insulate the business from the cost of livestock emissions.

After this time when credits are used up, substantial livestock liabilities will be due. By 2030 when agriculture is expected to be liable for all livestock emissions, a further 101 hectares of forestry will be required to offset the shortfall of 2,221 tonnes a year. The analysis also shows that 90 per cent of greenhouse gas emissions from this farming operation arise from livestock.

The cost of the ETS

The next table summarises the effect of time and farm structure on the annual cost of the ETS up to the year 2030. For sheep and beef with some forestry the farm business is totally insulated from the liabilities from livestock but exposed to carbon liabilities from electricity, fertiliser and liquid fuels.

For the dairy, sheep and beef operation with some forestry, the farm business is insulated from the cost of livestock emissions in 2018. However, by 2030 they will be paying liabilities net of

Effect of ETS on three farm businesses

	Sheep and beef with some forestry	Dairy, sheep and beef with some forestry	Dairy with no forestry
2012	\$1,875	\$7,629	\$5,851
2018	\$1,875	\$7,629	\$10,437
2030	\$1,875	\$63,148	\$51,712

forestry credits worth \$16,500 a year – 660 tonnes of carbon dioxide equivalent at \$25 a tonne. At this price of \$25 a tonne, the value of carbon credits from 30 hectares of radiata pine forestry to each farm will be \$330,000 over the period until 2030.

Carbon price effects

The addition of forestry as an offset to livestock emissions has an important role to play in insulating the farm business from future increases in the price of carbon. Last calendar year Kyoto compliant credits traded on the European Climate Exchange at an average of over \$40 a tonne of carbon dioxide. The current price is half that.

The true price of carbon will not be known until commitments to the first Kyoto period are traded in 2013 but is likely to recover to at least last year’s levels. The next table shows the effect of an increase in the price of carbon for the three farm operations between 2010 and 2030. The sheep and beef farm is only affected by increased costs of electricity, fertiliser and fuel.

The dairy, sheep and beef operation with some forestry will be faced by a 50 per cent increase in the cost of carbon liabilities. The cost of carbon liabilities for the dairy farm without forestry will double. The analysis shows that even having some forestry will significantly reduce the exposure of the farm business to changes in the price of carbon. Typically a stand-alone dairy farm operation would have to invest off-farm to include forestry in their portfolio as land suitable for dairying should not be considered for afforestation.

Effect of an increase in the cost of carbon

	Sheep and beef with some forestry	Dairy, sheep and beef with some forestry	Dairy with no forestry
\$25 per tonne of carbon dioxide	\$38,824	\$330,687	\$472,888
\$50 per tonne of carbon dioxide	\$77,648	\$502,324	\$941,190

Other benefits from incorporating forestry

While on-farm tree planting can reduce exposure to external carbon costs imposed by markets or governments it can also form part of a sustainable land management strategy with positive environmental and economic outcomes. Farming operations which integrate forestry can become more resilient to climatic and market changes.



In some farming situations the incorporation of forests into the farming business may offer resilience to climatic events. Examples include soil stabilisation, waterway protection or emergency stock fodder from poplars during drought. Income from forest harvest can provide resilience to fluctuations in prices of other farm commodities. The timing of harvest is flexible so forests can be retained when income from other commodities is good, and then harvested in a year of poor returns from other commodities.

Retiring less productive areas of the farm to forestry can improve overall profitability as inputs are focused on the more productive features. This can in some cases free up more time for leisure. Additional benefits from tree planting include provision of shelter for stock, increasing on-farm biodiversity and improvement of the amenity or aesthetic values of a property.

Relations with regional council are also likely to be improved in recognition of improved on-farm environmental performance. The carbon footprint of farm products should also be considered. While planting forests to reduce the carbon footprint of a product is not accepted internationally the carbon released by deforestation is attributed to products arising from that area for a period of 20 years.

Farm forestry a solution?

All ruminating agricultural livestock are considered net emitters of the critical greenhouse gases, most notably methane and nitrous oxide. New Zealand has obligations as signatories to the Kyoto Protocol to take fiscal responsibility for rising GHG levels. The bulk of agricultural emissions are difficult to mitigate.

Establishment of forestry offers a potential solution for integrating carbon management and internalising business risk over the medium term while new greenhouse gas mitigation technologies are implemented. Consideration should be given to this approach now as several government schemes encourage development of forestry to reduce the potential effect of future obligations. Inclusion of some forestry has been shown to have significant financial benefit to farm businesses based on livestock production under the current ETS.

Farmers and farm foresters need to understand where carbon farming might fit within their agricultural business and how such activities might fit with agricultural production systems and forestry activities. Any strategy involving forestry should be investigated thoroughly, integrated into the business and not simply seen as a risk management tool for carbon as it is a long term investment and not easily altered.

The authors work for PA Hardford and Associates

Accounting for carbon credits - case study

This describes how a farmer might go about accounting for carbon credits and liabilities within the Emissions Trading Scheme. It is a traditional sheep and beef operation with around 5,300 stock units. The effective grazing area is 600 hectares and the production base is 2,200 ewes and 140 beef cows.

Annual greenhouse gas emissions

Annual greenhouse gas emissions from the case study farm are in the table. One New Zealand Unit (NZU), the standard measure used for carbon accounting, is equivalent to a tonne of carbon dioxide. So as the table shows, the 469 cattle on the farm produce 802 tonnes of carbon dioxide a year. Livestock are the source of 97 per cent of emissions from the case study farm.

Greenhouse gas	source annually	Liability NZU
Petrol litres	2540	6
Diesel litres	52	0
Electricity kWh	19660	5
Nitrogen tonnes	8	45
Sheep	2862	944
Cattle	469	802
	TOTAL	1802

Staged introduction

Various sectors of New Zealand's economy are scheduled to enter the ETS at different times. Forestry has entered the scheme already and will be followed by the electricity, fertiliser and liquid fossil fuel sectors. Agriculture will initially receive a free allocation of units to cushion the impact of entering the scheme. The level of this free allocation is 90 per cent of the sector's total 2005 emissions. Obligations will ramp up from 2019 until 2030 when liabilities for all emissions will be due.

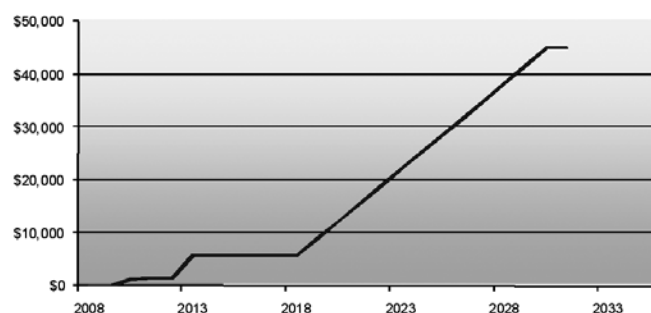
The total cost to the farm has been calculated for a carbon price of \$25 for each NZU. The graph below shows that the full cost of the ETS is likely to be around \$45,000 for this farm system by 2030.

Potential annual credits from forestry

Carbon accumulated by trees can be claimed as carbon credits for forests planted after 1990 on land not previously planted. The rate of carbon accumulation or sequestration varies with species, climate, age and management regime. For the case study, we have used a conservative average accumulation rate of 22 tonnes of carbon per hectare per year for a radiata pine forest on a medium fertility site. Using this rate, 30 hectares of forest would potentially yield annual credits of 660 tonnes of carbon dioxide equivalent each year over the life of the forest.

We have assumed that the farmer has the option to submit an emissions return for the farm and claim forestry credits. That being the case, credits can be offset directly against livestock emissions. The carbon liabilities for electricity, fertiliser and liquid

Total Cost Over Time Under Current ETS Policy @ \$25/NZU



fuels are paid by the supplier and passed on to the farmer. The table below shows the cost to the case study farm from 2010 until 2030. The table compares the situation with and without 30 hectares of new forestry having been planted.

Total cost to case study from 2010 to 2030

Carbon price	No forestry	30 hectares of forestry
\$25 per tonne of carbon dioxide	\$363,104	\$29,096
\$50 per tonne of carbon dioxide	\$726,208	\$58,192

Carbon price effects

Changes in the carbon price will have a direct effect on the final cost implications. The market price for carbon is very uncertain and will continuously vary like other commodity prices. The NZUs will be traded on a New Zealand market which is unlikely to start operating until a enough sectors have entered the ETS to provide sufficient buyers and sellers. This should occur from around 2013 when all sectors are included.

The addition of forestry as an offset to livestock emissions has an important role to play in insulating the farm business from future increases in the price of carbon, significantly reducing business risk. The addition of only 30 hectares of forest to this 600 hectare property reduces the cost of the scheme to the case study farm by 90 per cent in the period 2010 to 2030.

Conclusion

The bulk of agricultural emissions are difficult to mitigate. Establishing forestry, either on or off an existing farm offers an opportunity to reduce emission liabilities and costs over the medium term while new greenhouse gas mitigation technologies are implemented. Consideration should be given to planting new forests now. Several government schemes encourage the development of forestry to reduce the potential effect of future obligations.

EMISSIONS TRADING ACROSS THE DITCH

Guy Trafford

The Australian Farm Institute held a conference in early May to discuss the effect of the Carbon Pollution Reduction Scheme (CPRS) on agriculture. The Australian government had just announced changes to the proposed scheme so the conference was well timed. This is an edited summary of what the author said at the conference.

If there is to be cross-Tasman trading of credits in a common market then both Australia and New Zealand will need consistent schemes. As it now stands, the Australian CPRS will begin on 1 July 2011. In the first year the permit price will be fixed at \$10 per tonne of carbon dioxide equivalent, with the transition to full market trading occurring on 1 July 2012. The term carbon dioxide equivalent refers to carbon dioxide along with the carbon dioxide equivalent of methane and nitrous oxide emissions.

The aim is to reduce Australia's carbon emissions by five per cent of 2000 levels by 2020. But if the world agrees, and this includes developing countries, to stabilise levels of carbon dioxide equivalent in the atmosphere at 450 parts per million or less by 2050, then Australia will lift the level of reduction to 25 per cent of 2000 levels by 2020.

EFFECTS FROM 2011

The effect on agriculture will be immediate from 2011, with farmers being exposed to the upstream effects of higher power, transport and input costs as the energy sector and industry pass on their charges. For livestock farmers, at this early stage costs have been assessed at six dollars per cattle carcass from added processor costs and the additional on-farm costs. Forestry has been treated in a similar fashion to New Zealand with reforestation able to participate from day one.

The charging of direct emissions from agriculture will have a delayed start and the level of free permits that will be allocated to the sector has yet to be decided. However, the delayed start time has given the agriculture sector time to assess what they do and do not know and work to fill in the gaps.

The areas that were seen as offering the most potential for mitigation and reduction were forestry plantings and the incorporation of biochar into the soils. However, Australia's climate is not as benign to trees as New Zealand is. A widely quoted figure was that 47 per cent of the area of livestock farms would need to be converted to forestry although there is a lot of uncertainty around this figure.

Biochar is currently not recognised by the Intergovernmental Panel on Climate Change and still requires considerable research before being able to be used as a measurable reduction technique. This is also the situation with the use of de-nitrifiers. In any case, in much of Australia the current evidence is that de-nitrifiers will have little positive effect.

The dairy processor Murray Goulburn Co-op believes that the income reductions they would be required to pass on to their suppliers would range from A\$5,000 to A\$10,000 per dairy farm. This would be from the upstream costs being passed on, with additional costs for metering and auditing so they can monitor their systems to assess the costs and returns of the various products being produced. Under the current proposals, Murray

Goulburn Co-op would, according to their understanding of the situation, receive no assistance from the government. However, according to their calculations Fonterra, their major competitor in international markets, would receive 90 per cent free credits in New Zealand.

The whole concept of which industries would receive free credits was believed to be flawed, with many major non agricultural emitters potentially receiving assistance while many of the agricultural processors, which were competing with off-shore processors, receiving little help. The issue of not operating on a level playing field has been raised many times.

FINANCIAL LIABILITIES

Another issue that concerned conference participants was the potential lack of clear market signals as to what the financial liabilities are likely to be. The recent volatility seen with the EU emission trading scheme, with the price of carbon dioxide equivalent dropping from \$30 to \$10 within a twelve month period, meant that costing the economic benefits of any mitigation and reduction schemes would be difficult. Accordingly, an emissions tax at source rather than trading credits was discussed.

There was also concern about the lack of research and advice about what farmers could do to reduce their emissions and the downstream effects of these mitigation techniques. For example, if tree planting was the answer then what was the likely effect on water availability? The government's commitment to greenhouse gas emissions reduction was also questioned when there were shiploads of coal being sent offshore but agricultural research funding was being reduced.

IN THE USA

In the USA agriculture has been included in their proposed carbon emissions scheme with the exception of livestock emissions. The effect of this upon Australian and New Zealand ruminant livestock farmers would be to reduce the competitiveness of both countries' beef, dairy and lamb products relative to USA domestic production. While the USA may impose border tariffs on imported goods which are competing against domestic goods which are emission taxed, this is not likely to occur with beef, sheep meat or dairy when USA domestic producers are not liable to an emission tax.

The reasons why the USA is proposing to not tax livestock are in part due to the complexities and cost of measurement, and in part due to a strongly held belief that livestock emissions are highly prone to leakage. If there is any reduction in beef production in the USA it is likely to be taken up by a non-liable country. This external uptake gets worse as there is a possibility that the extra cattle carried within these non-liable countries will be at the expense of rainforest leading to an increase in the total global emissions to obtain this beef.

Guy Trafford is a Lecturer in Farm Management and Agribusiness at Lincoln University. Previously he had a 30 year career in sheep and beef cattle farming.

NEW ZEALAND DAIRYING – DEVELOPMENT AND FUTURE PROSPECTS

Matthew Newman

During the last 30 to 40 years the New Zealand dairy industry has been through substantial changes. On farms these changes have occurred as a result of productivity improvements, rapid expansion of dairying in the South Island, business size and structures. In manufacturing, the changes are in company and sector developments, diversification in export markets and product development and mix. Direct government support was also removed.

The result is that the New Zealand dairying industry has improved its competitive position both in terms of land use and as an international dairy producer of safe, quality dairy products, which are largely shipped to feed the ever-increasing global population. Dairying has grown to become New Zealand's most important industry accounting for more than 20 per cent of the value of merchandise exports and plays a vital role in the New Zealand economy. This success has been behind the development of economic growth in our country.

Government assistance

The season 1978/79 was significant for agricultural policy in New Zealand as this was when supplementary minimum price payments were introduced for major agricultural products. The aim of the scheme was to guarantee a minimum income level, allowing for forward planning without losing sight of long-term relativities. This scheme along with other government interventions such as cheap rural loans, fertiliser subsidies and the livestock incentive scheme hoped to retain the prosperity of the 1950s and to insulate consumers and producers from negative external factors, such as the 1970s oil price shocks. By the early 1980s, government support for agriculture was equivalent to 30 per cent of the total output from farming.

The costs to tax payers of such schemes were high and while the intention was to protect our key agricultural industries, in fact it had the opposite affect by hiding inefficiencies and eroding our competitiveness. In 1984 the newly elected Labour government withdrew agricultural supports, particularly the termination of supplementary minimum price schemes and removal of access to low cost funds for price support through Producer Boards. By 1989 assistance to agriculture had been reduced to very low levels.

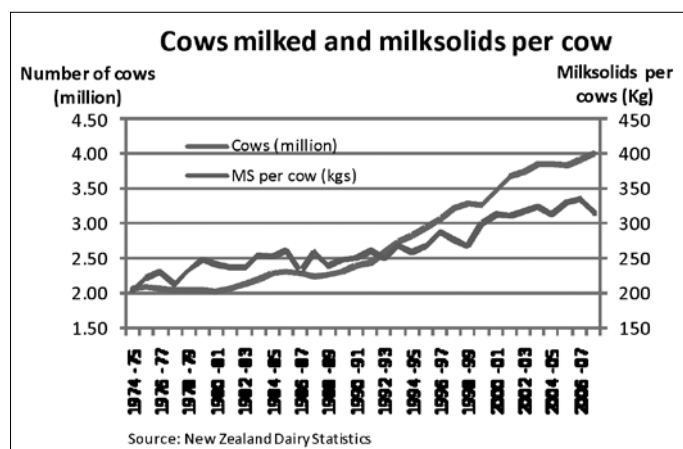
From the 1990s New Zealand agriculture was required to compete internationally, often in markets with major interventions such as subsidies, quotas and tariffs. The recent decision by the EU to increase producer subsidies is a blow to non-protected countries such as New Zealand. The USA is also likely to increase interventions as farmers feel the pressure from rapidly decreasing milk prices while costs have increased significantly. Milk powder stocks will once again rise, adding to the delay of higher prices once demand exceeds supply again. However, it is unlikely they will return to the levels recorded in the past.

Dairy industry growth

Since 1980 dairy production has shown substantial growth. Total milk production increased 33 million kilograms of milk solids per year from 490 million kilograms milk solids to 1,300 million kilograms milk solids, a compound annual growth rate of 3.8 per cent. This sustained growth in dairy production has occurred as a result of improved per cow yields, largely from genetic gains, intensification and increased supplementary feeding as well as expansion in the number of cows milked.

The national dairy herd has doubled in size from around two million cows milked in 1980 to four million cows milked in 2008. During this period the South Island has grown significantly as a dairying region with sheep and beef land converting steadily to dairying land, while herd amalgamations and higher stocking rates have characterised the growth in the North Island herd.

Between the 2000-01 and 2007-08 seasons, cow numbers in the South Island increased from a fifth of the national herd to almost one third. Nationally, average per cow production increased from 240 kg of milksolids in 1980 to around 330 kg of milk solids in 2006-07, before declining due to drought last season.



Cows milked and milksolids per cow

Despite the increase in cow numbers the number of dairy herds has declined from 18,500 in 1974 to 11,500 in 2007. Average herd size has tripled from 112 to 350 over this period. There has been an increase in employed labour on farms, increasing the demand for skilled labour, leading to a shortage in the industry. This will continue to be a major issue for the industry over the next 20 years and will increase the need for labour saving technologies such as robotic milking.

ENVIRONMENTAL CONCERNS

Intensification using supplementary feeding, nitrogen fertilisers, irrigation, grazing young stock and wintering cows off, and improved use of pasture, have contributed to stocking rates increasing from 2.1 cows per effective hectare in 1980 to 2.8 today. However, the factors that have underpinned the growth

of the dairy industry are now seen to be causing concerns to the environment.

The passing of the Emissions Trading Scheme is one of the most significant economic reforms this country has seen since the mid 1980s. Pressures such as these, as well as restrictions from land use under the RMA and restrictions to water for irrigation, are likely to restrict the growth of the dairy industry in the future. It is vital that our policy makers and wider society understand the importance of agriculture to this county and the implications these decisions could have.

COMPETITIVE ADVANTAGE

New Zealand's competitive advantage is being able to convert pasture into milk. The low cost milk arising from this has been a source of competitive advantage for land use in New Zealand. While, there are many other countries that have pasture based dairying systems, New Zealand's systems have been developed over a number of years and are unique. This contributes to the difficulty in taking New Zealand dairy systems and implementing them in other countries.

The characterising features are –

- High percentage of pasture intake
- Seasonal production
- A significant move towards crossbred cows
- A focus on milk solids production per hectare
- A single national breeding objective that is focused on the profitable use of eaten feed
- Processor payment system that incentives high milk solids, a high stocking rate and an adapted cow that has lower per head performance compared with other countries.

In addition to our favourable biophysical environment of soils and climate, the success of dairying in New Zealand has come from good productivity growth, continued investment in research and development, adoption of new technologies, the development and maintenance of infrastructure, shared knowledge and a service industry second to none in the world.

Consolidation

The processing industry began to consolidate after World War II and by the 1960s there were 168 cooperatives. By 1995 the processing industry had shrunk to just 13 dairy companies, but at the same time the industry's marketing operations were expanding. By the 1980s the Dairy Board had 19 subsidiaries and associated companies around the world. By 1995 this had increased to 80 and the New Zealand Dairy Board became the world's largest dedicated dairy marketing network.

In 1996 the Dairy Board Amendment Act transferred ownership of the Dairy Board's assets to the country's 12 co-operatives. Subsequent mergers culminated in the formation of Fonterra in 2001.

Fonterra is New Zealand's largest company and is the sixth largest dairy company by turnover in the world. One of the main strategies of Fonterra has been to position itself in key markets around the world and source milk from local supplies. Fonterra's size and dominance in trade of dairy products means that its performance is critical to the New Zealand economy.

Westland Dairy Company, Tatua Dairy Cooperative and Open Country Cheese are the other major dairy processors in New Zealand. These companies, while much smaller than Fonterra,

all play their part in the industry and provide competition and alternative milk supply options for dairy farmers. With other companies forming in recent years, domestic competition for milk supply is likely to increase over the next decade.

Global production

Global dairy production was steady in the 1980s at 430 to 440 million tonnes before declining throughout the 1990s to 370 million tonnes in 1998. Since then strong demand growth, largely in developing countries due to sustained population growth, rising urbanisation and higher per capita incomes saw global dairy production steadily recover to around 420 million tonnes in 2007. New Zealand still only accounts for around three per cent of total milk produced in the world. The big producers are the EU, India, the USA and to a lesser extent Pakistan.

TRADED MILK

New Zealand is unique, as we export approximately 95 per cent of the milk produced. Traditionally the UK has been our major market for butter and cheese. Trade slowed down in the 1970s as the UK announced it would join the EU. The increasing trade barriers motivated the New Zealand dairy industry to diversify products and seek new markets.

The EU, New Zealand, Australia and the USA are the largest exporters of dairy products. New Zealand accounts for approximately 38 per cent of global dairy exports and is the largest exporter of butter, wholemilk powder and the second largest exporter of cheese and skim milk powder.

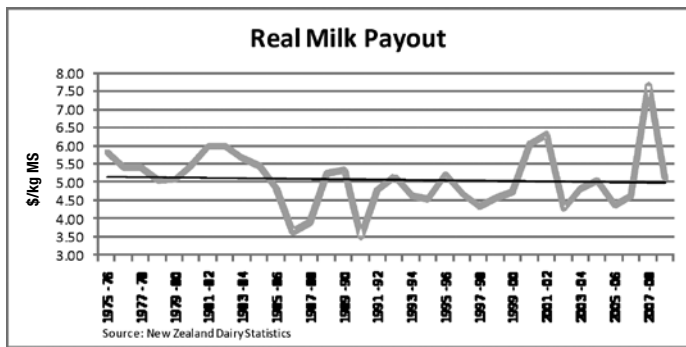
Dairy exports from New Zealand have increased in recent years in line with production and reasonable global milk prices. Dairy export revenues grew by a third to \$9.6 billion in the year ended 30 June 2008.

Milk payouts

Milk prices paid to New Zealand dairy farmers are vitally important for not only the financial success of dairy farmers, but also the rural communities and service sector that support them. Favourable milk prices not only retain our current farmers in the industry but ultimately attract new investment and expansion. Average profitability levels between years is strongly correlated to milk prices. However, it is the average cost of milk production that best characterises different levels of profitability between farms within a particular year.

The determinants of milk payouts are global supply and demand factors and exchange rates. Since 1975 the milk payout trend in real terms has been relatively flat, but since 1990 payouts have tended to increase at 12 cents a year, seven cents in inflation adjusted terms. This is to say that milk prices paid to farmers have increased at a faster rate than the increase in input prices. There is considerable volatility from one year to the next but the underlying pattern has been for milk payouts to be in the range of \$4 to \$5.50. The next decade will see more price volatility due to changes in markets and lower global stocks.

The operating returns from the dairy farming have traditionally been modest at around four per cent in the decade ending 2007, but the returns from the ownership of assets required to produce milk have allowed farmers to borrow to expand on increasing equity of the business. Dairy land prices have increased rapidly in the latest cycle driven partly by a global



Inflation adjusted average company milk payouts

property boom, but there are signs that we may have seen land prices reach a peak in this cycle.

Outlook to 2030

The long term prospect is for higher average milk prices than we had in the 1990s due to strong global demand growth led by developing countries. This is more likely to occur if new products are developed, cold storage facilities expand, shelf life improves and marketing of western fast food chains flourish. Consumption of dairy products in the OECD area is anticipated to increase modestly as a result of nutrition and health concerns.

However, pressure on inputs such as grain and oil will mean the cost of producing dairy products will also be higher. New Zealand's reliance on pasture based dairy production will place it in a strong position to capitalise on higher prices in the future provided production costs can be controlled, and debt levels managed to a reasonable level.

With increasing price volatility, dairy farmers will need to focus on operating performance and minimising increased risk exposure. The key question then becomes how well farmers will be able to cope with these new conditions and what assistance in risk management can be provided to them. Other uncertainties will continue to exist such as the effect of the weather on dairy production.

We can expect developing countries to invest, expand and increase supply, largely for local markets, increasing their competitiveness in the global dairy industry. China especially, but also the Russian Federation, Brazil, Poland and the Ukraine have had faster than average annual growth rates in their share of the value of processed milk. These are some of the countries New Zealand will need to keep a close eye on over the next 20 years.

INCREASE IN PRODUCTION

According to the OECD, world milk production is expected to increase by 140 million tonnes over the next decade with an average annual growth rate of 1.8 per cent. This is only marginally slower than the growth rate over the last decade and is based on slower milk production growth in China due to water and feed limitations. Most of this extra milk production will come from China, India, Pakistan, Argentina, Brazil, New Zealand, Australia and the USA, while the EU is expected to show static milk production growth.

Milk production in New Zealand is forecast to increase by 2.5 per cent annually between 2010 and 2020 and slow to two per cent over the following decade. This is a lower growth rate

than the 1990s, despite stronger milk prices. Increasing operating costs, high land prices and environmental and water concerns will dampen the industry's potential expansion.

The South Island is likely to surpass the North Island in terms of total milk production by the mid 2020s. Overall, New Zealand's production growth in the next decade is expected to be faster than the global growth.

Size of the NZ dairy industry

	1980	1990	2000	2010	2020	2030
Number of Herds	16,089	14,685	13,892	10,850	9,000	8,000
Number of cows	2.03	2.40	3.48	4.25	4.65	4.95
Milk sold (million kg)	491	599	1,096	1,510	1,920	2,350
Effective ha per farm	63	70	95	140	170	195
Peak cows milked per farm	126	164	251	392	515	615
Stocking rate	2.1	2.4	2.6	2.8	3.0	3.2

Sustainable growth in production relies on herds eating between 12 and 15 tonnes of dry matter per hectare of grazed pasture each year, supported by supplementary crops grown on the milking platform and supporting land. Therefore success will rely on skilled pasture and financial management with a focus on profitability.

Farms will need to comply with strict nutrient and environmental management plans which will result in reduced use of nitrogen fertilisers and imported supplementary feeds. Increased use of automation and technology will play its part, helping to ease the labour issues currently faced by the industry.

Increasing productivity is the key to sustainable growth, profitability and the long term prosperity of the New Zealand dairying industry. However, increasing societal awareness of animal health, environmental concerns, resource use and urbanisation remain a threat. Future responses by countries to higher prices remain conditioned by extensive policy intervention and by food security concerns and environmental constraints.

Dairying a pivotal role

There have been a number of significant changes which farmers have had to overcome to survive and make returns. The first of these was the 1980s when export prices were low, government support was removed and interest rates were high. The second was the 1990s when prices were stagnant and profits were modest, although substantial capital gains were made, and the third was the 2000s following deregulation of the dairy industry and higher milk prices for dairy farmers.

The next 20 years for New Zealand dairying is for similar trends as the past 20 years albeit at a slightly slower rate. Our aim should be to increase our global share of milk production while ensuring we maintain our low cost of production advantage. Dairying will continue to play a pivotal role in the New Zealand economy over the next two decades.

Matthew Newman works for DairyNZ

MAKING OUR EXPORTS FIT FOR OTHER COUNTRIES

As an exporting industry New Zealand horticulture survives on its ability to meet the demands of biosecurity officials in our export markets. Looking at what we do for them can help us better understand our own biosecurity system and the pressure that biosecurity systems operate under globally.

Peter Silcock

The fact is that in terms of biosecurity New Zealand has a lot to lose and it is time we took a more street wise and savvy approach to our biosecurity and market access. We also need to make better use of science and technology to manage the risks that we face. Otherwise we will not be able to efficiently and effectively manage the increasing numbers of travellers and volume of goods arriving into New Zealand.

Competitive advantage

We have a natural biosecurity competitive advantage created by New Zealand's isolation and that is something we must protect. When you look at the importance of our export food industries to our economy, and the importance of our unique natural environment to Maori and our tourist industry, the government's investment in biosecurity should be much higher than it is today.

The introduction of new pests has a number of effects on the horticulture industry. It is likely to increase our production

costs, decrease our overall productivity in terms of yield and most importantly it destroys our access to global markets. It also goes against the general industry trend to reduce agrichemical use. But horticulture does not advocate for a cast iron border because a key to our commercial success is having access to seeds and other plant material from around the world. This means that the industry has an interface with the biosecurity system, both in terms of the import of plant material and the export of products.

Where we are now

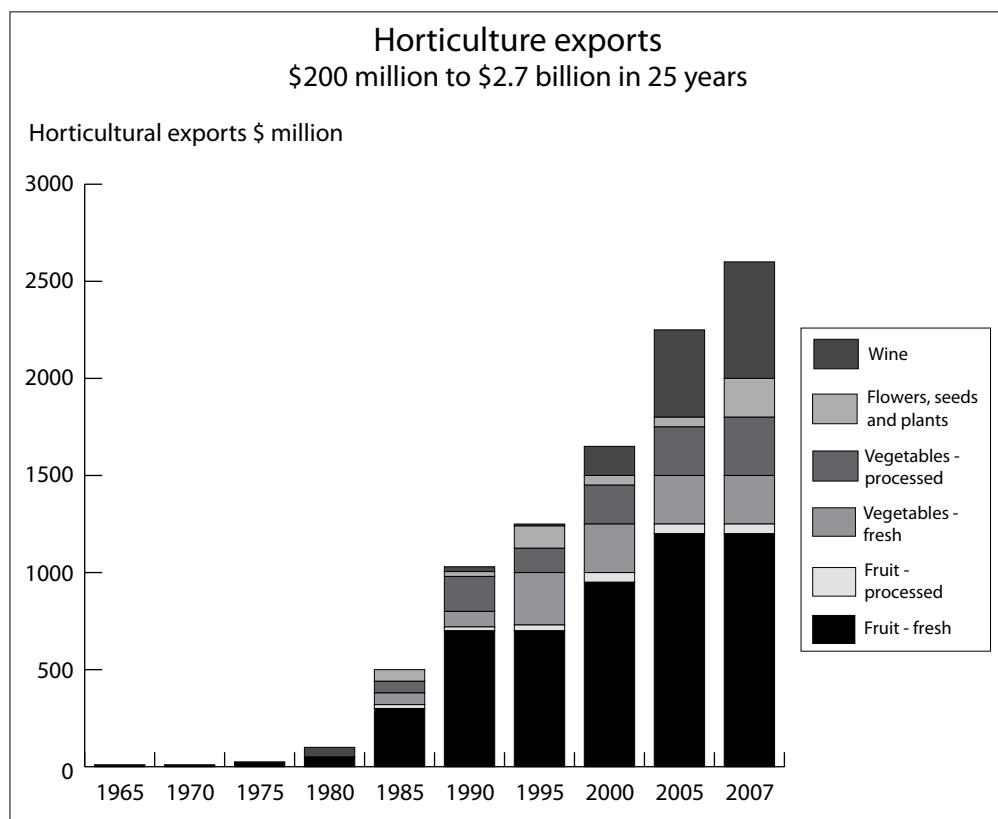
New Zealand's horticulture exports have increased from \$115 million in 1980 to over \$2.7 billion in 2007. Our success has been built on our productivity, our commitment to export, our ability to supply counter seasonal produce into northern hemisphere markets and excellent market access. But it is not easy competing with countries that have much lower labour costs, more government support and are closer to markets than we are.

It is critical that we vigorously defend any and all the competitive advantages we have. This includes, first and foremost, protecting the conditions under which we grow our products and the preferential market access we have, due to the absence of globally important pests and diseases.

At the last count, we exported to about 120 countries. This obviously shows that our traditional dependence on the markets of the EU and Britain has long gone. Last year we exported \$130 million worth of products to the UK, but \$420 million went to Japan. Australia is becoming a more significant market every year as drought and a redistribution of land use cuts into the production of food in that country. Last year New Zealand exported \$290 million worth of frozen potato, avocados, kiwifruit, processed vegetables, fruit juice and processed fruit to Australia – but no apples.

Barriers to growth

There are currently 66 biosecurity market access issues being worked on by Biosecurity New Zealand



on behalf of New Zealand's horticulture industry. The most famous and long standing of these is New Zealand apple access into Australia – 86 years worth of negotiation, and counting. Other issues include kumara access to Japan, apples, cherries and kumara to Korea, and most recently added to the list, tomatoes and capsicums to Australia.

It can take many years to resolve these negotiations, a third of the above 66 cases are more than four years old. The cost of the whole process is carried by industry including –

- Preparing technical information
- Undertaking scientific research
- Paying for visits by overseas biosecurity agents to New Zealand and
- Funding the time and travel costs of government officials to visit markets for access negotiations.

The rules

Under international convention, the World Trade Organisation's Agreement on the Application of Sanitary and Phytosanitary Measures, known as the SPS agreement, countries have the right to protect their human, animal or plant health. But this is only if the way they achieve this protection is consistent with the SPS agreement.

SPS measures must be necessary, based on scientific principles and cannot be maintained without scientific evidence. World Trade Organisation members must not use SPS measures to discriminate between countries, and between imported and domestically produced goods. The heart of the agreement is that 'sanitary and phytosanitary measures shall not be applied in a manner which would constitute a disguised restriction on international trade.'

I have often heard the comment that a small export reliant country like New Zealand must be lily-white on trade and biosecurity issues or we will face retaliation from our export markets. While I absolutely support playing by the SPS rules, I think we are kidding ourselves if we think our export markets are monitoring our every move. In many cases I think they are amused by our approach and see it as quaint and idealistic.

We operate in a very competitive environment and we need to play closer to the boundary. As an example, we recently found a new pest and voluntarily suspended our own exports. We later discovered that another major exporter had found the same beast but simply reported it in an obscure research paper. Six months later we are still negotiating.

New pests

The detection of a new pest, either in this country or on our produce in an overseas market, can lead to the immediate suspension of the trade in that product, to that market. The onus then falls on us, the exporting country, to provide all the assurances the importing country believes it requires before the trade can be resumed. While these negotiations are between Biosecurity NZ and the importing country government, all costs are met by the industry.

The consequences are added costs to meet the new requirements and this is only if an agreement can be reached on what is required to resume trade. In some cases access can be lost completely. New requirements vary but can include things such as –

- Post-harvest treatments such as fumigation, cold storage, heat treatment and irradiation used on some fruit imports but not on our exports
- Declarations of country freedom from the pest requiring total eradication
- Area freedom which would require continual grower audits and declarations
- Production protocols
- The regular inspection of products and the growing environments.

Future challenges

As we slowly grind towards freer trade in agricultural products we are likely to see increased use of technical barriers to trade such as biosecurity. There will be an increasing amount of scientific litigation around biosecurity risks. Science is always reluctant to give definitive answers and to provide absolute guarantees, and science opinion is influenced by who is paying the bill. This only serves to extend the length of time required to negotiate and settle market access issues.

There will be continuing pressure to reduce agricultural use but at the same time pressure to provide produce without pests and diseases. Our biosecurity systems rely heavily on border inspections which are reasonably good at finding insects but not well suited to things like diseases or viruses.

Increasing global trade and tourism means our borders are more exposed than ever before. We live in a global marketplace and travel is cheaper than ever before. At the same time there is increased pressure on the speed of trade due to just-in-time delivery systems and reduced stocks to minimise costs.

What we need

The only way for New Zealand to maintain the competitive advantage we have thanks to our geographical isolation and climate is to continue to invest in our biosecurity system and take a hard line on border control for products, and people, arriving in this country. We need to gather and analyse information to better profile risks, goods, packaging and travellers. This should not replace the systems that we have in place to x-ray all luggage and have accredited persons present when containers are opened, but should guide the use of specialist resources.

Imported product should be treated in its home market before it reaches our shores. In this way we move the risk offshore, rather than trying to manage unwanted pests on our door step. We need strong advocates and negotiators for market access for our own products going into other countries. We need more people, they need to be better resourced and they need to take a more savvy approach to negotiating.

Finally government needs to be better prepared to take action against incursions and to take our market access issues to the highest levels to get a resolution.

Peter Silcock has represented the horticulture industry on biosecurity and market access issues for more than 20 years. He has been Chair of the Plants Market Access Council for the past two years and is a Member of the Biosecurity Ministerial Advisory Committee.

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