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The revised ETS

Forty years for consultants

The US dairy industry

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# Primary Industry Management



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OF PRIMARY INDUSTRY MANAGEMENT INCORPORATED



NZ Institute of  
PRIMARY INDUSTRY  
MANAGEMENT

# New Zealand Contacts in Agriculture, Forestry & Fisheries 2010

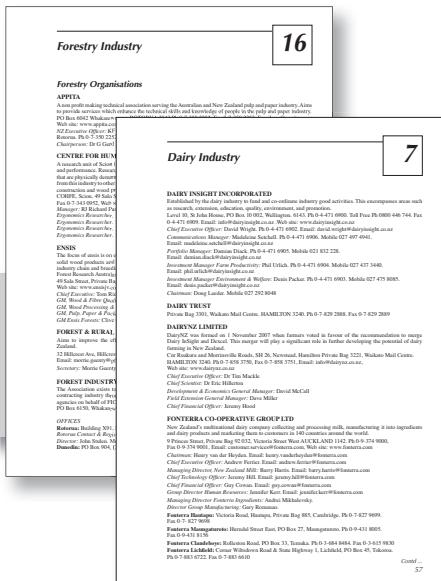


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*Primary Industry Management* is dedicated to the publication of articles on all aspects of agricultural science and the management of primary industry resources. The opinions of the contributors are their own and not necessarily those of the publishers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

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## Editorial

# PLANNING FOR THE NEXT HALF CENTURY

**Julian Bateson**

The lead article in this issue of *Primary Industry Management* looks back to the beginning of farm management consulting over forty years ago. Therefore now is a good time to consider what might happen over the next half a century or so, and what we should plan for.

If I had even part of the solution for the next fifty years I would not be sitting here writing an editorial. I would probably be rich enough to be on my solar powered super-yacht or in my environmentally neutral mansion surrounded by trees building up their carbon stores. But the answers are out there, somewhere.

As this issue of the journal goes to press, a meeting of world leaders in Copenhagen, considering ways of saving the human race, will be in progress. The revised version of the Emissions Trading Scheme has been passed by Parliament so that New Zealand representatives can attend the conference and say they have a scheme in place. However the New Zealand Emissions Trading Scheme is unlikely to do very little to help reduce climate change, as the article by Piers Maclaren on page 14 indicates. The scheme seems to be designed to compensate polluters and charge the taxpayer for the privilege, although a few extra trees may be planted in the process and someone may make some money from carbon farming. Hopefully the Copenhagen conference can do a lot better.

Even if the conference can produce something significant towards mitigating the effects of climate change – whether caused by humans, sunspots or random events – the next 50 years will be difficult for all of primary industry in New Zealand. Climate change is already happening and the extremes of floods and droughts will continue, and become more extreme. There will be more droughts on the east coast of the North Island, more

storms in the north and perhaps flooding of low lying coastal land as sea level rises.

What should we do? Farm consultants are in a prime position to help farmers plan for the expected as well as the unexpected. This should not just be a business plan for up to five years with the aim of good bottom-line return. It has to be for a sustainable long term income and benefit for the farmer and for New Zealand. It needs to be a more holistic approach, especially in light of the expected climate problems. Consideration needs to be given to wider issues.

For example, recent results from a survey of the Manawatu River suggest that it is the most heavily polluted river in New Zealand and bad even by world standards. Some farmers are unhappy that they are getting much of the blame even though part of the effluent causing the problem is sewage discharged by local authorities. It may be unfair on farmers, but they would have a much better case if their record on nitrogen run-off was squeaky clean. Consultants need to make sure that in the long term, nitrogen run-off from farming is as close to zero as possible. Then farmers can quite justifiably claim the moral high ground and insist that local authorities get their house in order. Otherwise other industries, such as tourism, will suffer which is big business that we cannot afford to lose.

The future has always been a challenge, but for agriculture we are facing one of the most challenging periods in our history. The sea level may rise, the temperatures may increase and the droughts become more frequent. But we must learn from others, plan carefully, consider the full picture and make sure the whole of New Zealand benefits. And we could also plant a few more trees.



# FORTY YEARS OF THE SOCIETY OF FARM MANAGEMENT AND THE INSTITUTE OF PRIMARY INDUSTRY MANAGEMENT

Vince Ashworth

*This article is a summary of the presentation made by Vince Ashworth at the dinner celebrating the combined 40 years of the Society of Farm Management and the Institute of Primary Industry Management*

Before discussing the progress or otherwise of the NZIPIM I will first briefly examine just where farm management consulting has come from in the last 60 years. This will lead to why the society was formed. I will then summarise our original goals and finally make some judgements on how much we have achieved.

## LOOKING BACK 60 YEARS

Why 60 years you may well ask? Because the early 1950s saw the beginning of the dramatic changes that have occurred in professional farm management practice since that time. Except for the Lincoln Farm Advisory Service and the newly established Franklin Farm Improvement Club, farm management consulting as we know it today, did not exist in the early 1950s.

The provision of technical advice to farmers was dominated by the state through the Department of Agriculture. Other sources included the farmer-owned Dairy Board Consulting Service which focussed as it does today, entirely on dairy farmers, and almost exclusively in the North Island. Another important source of technical information were the lamb buyers and various stock and station agents of commercial firms such as Dalgetys and Wright Stephenson. Any financial advice came from bank managers, accountants and lawyers, very few if any of whom had much if any concept of a holistic approach to farming as a business.

Farm advisors were not considered to be true professionals, a view that was conveyed, inadvertently of course, by the presentation of the advisors themselves. Most seemed to take pride in conveying a sort of 'gumboots down on the farm' look.

## THE IMPORTANCE OF LOOKING THE PART

The importance of at least looking the part, I learned from our rugby coach at Massey, the fearsome Dr Stewart. On one occasion when we were getting ready to play he came and stood in front of me with a rather forbidding glare. 'Ashworth' he said, 'I don't care if you are the worst halfback ever to have played for this team, but you will at least look as if you are the best. If you ever come here again with gear like that [dirty boots] then you will never play again.'

It was a lesson I have never forgotten and which has served me well throughout my professional career.

As an example of what I considered the unprofessional look, I recall the reaction of former Farm Improvement Club

colleagues when I went into practice and produced a business card. Universally the view was 'Who does he think he is?' And then I had the audacity to try looking professional and wore a suit to various functions. The reaction was probably even more abhorrent. In my view, these reactions represented a negative mind-set that I am pleased to say the NZIPIM has been largely instrumental in changing.

## CHARGING FARMERS FOR ADVICE

Before 1950 the idea that farmers might be prepared to pay for professional farm advice was considered nonsense and indeed abhorrent to the great majority of those serving the community, but especially by the state servants. When addressing one of the meetings I convened for promoting the idea of the society, I recall one very senior state servant angrily telling me that it was totally wrong to be charging farmers for advice. Farmers he seriously claimed, had a right to a free service.

At that time also it would have been difficult to find an adviser who had any idea of the cost of a professional's time. It was something that was free. Even in the late 1960s when the Farm Improvement Club movement was well established and after the establishment of the society, understanding of the real cost of time was limited. Productive hours and charge-out rates were foreign words and concepts.

## THE ADVENT OF THE SOCIETY OF FARM MANAGEMENT

By the late 1960s the then well established Farm Improvement Club movement and the small but growing number of private consultants had begun to hold an annual advisers conference as a forum for in-service learning and exchanging experiences and ideas. We were, in most cases, excluded from participating in any of the regular forums provided by the Department of Agriculture for its employees.

The great majority of Farm Improvement Club advisors were holders of the Diploma of Valuation and Farm Management. The minimum membership qualification for the Institute of Agricultural Science was a degree in agricultural science or its equivalent. The main sources of information for those in the non-state sector were the publicly available Department of Agriculture journal, the *New Zealand Farmer*, the annual farmers' conferences at Ruakura, Massey and Lincoln, and the individual contacts with researchers.

The establishment of the Society of Farm Management in 1969, grew out of a perceived need for a professional organisation that would cater for the growing numbers of farm advisers who did not qualify for membership of the New Zealand Institute of Agricultural Science. There was also a strong belief that professional farm management practice was something distinctly different from purely agricultural science and should be recognised as such.

#### ORIGINAL GOALS OF THE SOCIETY

The primary goal of the Society of Farm Management was to have professional farm management practice recognised and accepted as a separate identifiable profession. The aim was to establish a professional organisation which would, among other things –

- Guide the development of farm management as a profession
- Facilitate the availability of continuing education opportunities
- Set ethical and behavioural standards of practice
- Take whatever steps were deemed necessary to have the profession widely recognised as such.

The tools to be used to achieve these aims were to be –

- The periodic production of a professional journal providing relevant information
- Periodic professional seminars and conferences which would allow an exchange of information and in-service learning opportunities
- Liaising with the universities of education needs
- Establishment of a Consultants Registration Board which would set standards of professional practice to be achieved in return for recognition as registered farm management consultants.
- Providing information to sister and related professional organisations about the qualities of the profession and the advantages of using registered consultants.

#### WHAT HAVE WE ACHIEVED?

After 40 years it is time to ask how far we have progressed towards achieving these aims. In my view we have made significant progress towards achieving the over-riding goal of having farm management recognised as a separate identifiable profession. But before we start on an orgy of self-congratulation, however, let us also recognise that we still have a long way to go.

In an age of increasing specialisation, the multi-disciplinary profession of farm management still struggles for recognition. An example of this is the continuing problem the universities have with defining farm management. While Lincoln, for example, has led the field in farm management teaching, the farm management department continues to be shuffled between a number of faculties and divisions. Note also that, in spite of its lead in the farm management teaching, it was not until 1965 that the first Chair of Farm Management was established, Professor Sir James Stewart being the first occupant.

In my view, we ourselves have not helped. What are we? The profession of 'Primary Industry Management' or the profession of 'Farm Management'. Changing the name of the organisation is perhaps an indication that we ourselves are not certain of our status or name. A change, incidentally, I considered to be a mistake.

#### OUR MEMBERSHIP

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

The overall membership is widely diversified. Some 37 per cent are practising consultants. Of the total membership of 903 of the NZIPIM, 87 are employed by banks, 30 are practising accountants, 10 with the fertiliser industry and 30 with DairyNZ. In addition, four per cent of the membership are farmers, 23 in total, signalling as it does the trend for today's farmers to be much better educated and informed and consequently much more challenging than those of 40 to 50 years ago.

#### REGISTRATION

Registration was originally conceived as a key tool in not only maintaining professional standards among consultants, but also in gaining wider recognition of farm management consulting as a true profession. It was considered that registration would 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, to take appropriate disciplinary action against the individual or individuals concerned. It was anticipated that sufficient support for, and recognition of, the concept of registration as a guarantee of professional competence would ultimately achieve legislative status similar to those of the old established professions.

Registration has not achieved all that for which it was established. The numbers of practising consultants actually registered to date amounts to only 24 per cent of the NZIPIM consultant membership. A challenge now 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.

#### PROFESSIONALISM – THE CHALLENGE AHEAD

Over the past 40 years the society and institute can claim to have played a lead role in upgrading the competence of its membership and to have successfully changed the mind-set of farm management consultants. Compared to 40 years ago, we now act and for the most part look professional, and we are seen to be more so.

The challenge now is to complete the recognition process and take whatever steps are needed to continually improve the status and quality of the NZIPIM services and its especially that of the members. In this regard we all have a role to play. The public and fellow professions will judge us on the standards of our professional behaviour, on how we look and on the standard of our professional practice.



# ARE WE GROWING THE FARM MANAGEMENT CONSULTANTS WE NEED FOR TOMORROW?

**Mark Paine and James Morrison**

This article is designed to stimulate debate and suggests that farm management is in need of renewal. This renewal will stem from a strategy to develop professional knowledge and competence. As a profession we cannot look to the golden era of farm management, in the 1970s when universities hosted strong departments for teaching and research. We must look to a new future that appreciates the change that has brought us to this position and which gives clues as to how we rebuild. NZIPIM is well placed to lead the charge on this programme of renewal.

## **ARE WE A PROFESSION?**

Most people working in the field of farm business management, whether as managers or consultants to managers, value the practical. This usually means getting on with the job, the assumption being that desired results are as a result of this activity. To stop and ask if we are a profession could be viewed as a distraction from the main game. Alternatively a failure to periodically reflect on our identity as a profession may have contributed to our current status.

In 1982 Professor Bob Townsley, at the time head of the Department of Agricultural Economic and Farm Management at Massey, instigated a workshop series to look into the role of university education and research in relation to farm management in New Zealand. As a junior staff member this proved to be a seminal moment for me, experiencing first hand a critical debate into the discipline that I had largely taken for granted.

One of the lasting memories from this time was the discussion surround the definition of farm management. A popular summary at the time was 'the process by which resources and situations are manipulated by the farm manager in trying, with less than full information, to achieve the goals.' Apart from the fact that not all managers are male, this definition suggests management is an individual rather than a team performance – something that is less common in today's farming businesses. The definition focuses on what managers do. It does not give much insight into the practice of farm management consultants or researchers. As a profession we need to not only act, we also need to reproduce ourselves by teaching and research.

## **WHAT IS THE CURRENT STATE OF OUR PROFESSION?**

An excellent overview of farm management was provided by Nicola Shadbolt and Sandra Martin in *Farm Management in New Zealand* published in 2005. They show how we have evolved from the debt restructuring of the 1930s, through the production expansion of the 1960s and deregulation of the mid 1980s to arrive at what they refer to as a style of farm management which is a hardnosed commercialism with a strategic focus.

The scope of this text is indicative of what academics deem the essential elements in a balanced farm management curriculum. Theoretical frameworks including systems thinking, farmer learning and marginal analysis underpin a toolkit for strategic, marketing, human resource and financial management. Topics also

cover project management, wealth creation, risk and investment analysis, suggesting the profession has a broad agenda. Because of this diversity the authors point out that farm management is not so much a discipline as a trans-disciplinary field of work – an important distinction which we will return to shortly. I was living in Australia when *Farm Management in New Zealand* was published. From a distance it appeared the profession had come of age with Lincoln and Massey Universities collaborating to provide a balanced contemporary and distinctively New Zealand perspective of farm management. Unfortunately the reality is less encouraging.

## **NEEDING AN IDENTITY**

Earlier this year DairyNZ, in collaboration with the Partnership for Excellence, from Massey and Lincoln Universities, commissioned NZIPIM to undertake a scoping study assessing the need for a Centre of Excellence of Farm Business Management. Several sector risks were reported, particularly with respect to low demand for farm management training at a tertiary level which has a flow-on effect reducing the capacity of universities to reinvest in the discipline. According to the report we have come to a point where the sector lacks an identity around which a focus on agribusiness management leadership, excellence and service can be created.

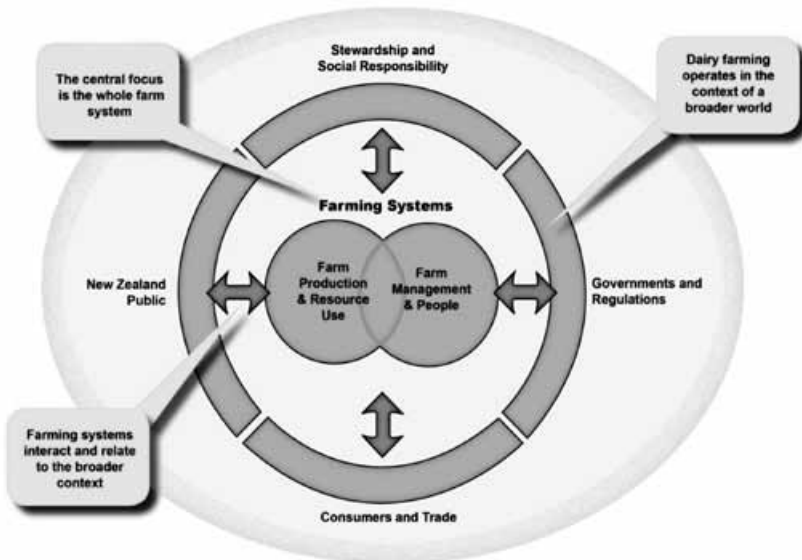
This issue of identity relates to the trans-disciplinary approach in farm management – it is easier to build identity when focused on a discipline rather than spanning several disciplines. The authors suggest that insufficient farm business management skills in the primary sector are costing our industries in terms of productivity and profitability. They predict the situation will become more serious because the market failure in succession planning for farm consultants will contribute to a reduced network of advisors to assist farmers maximise performance in ever increasingly complex farming systems.

We are falling behind in bringing on the next generation of farm management consultants and this poses a threat to the competitive advantage of our primary industries. This threat comes at a time when industries are positioning themselves to have greater dependence on people with the skills to think systemically, competent in the agricultural sciences and appreciative of the commercial operating environment for agricultural enterprises.

## **Industry expectations of farm management consultants**

Strategies have been published for the dairy and horticulture industries through to 2020, with the release of the Meat and Wool strategy likely within a few months. The strategy for New Zealand dairy farming is looking for five outcomes that include an internationally competitive industry with a positive reputation based on profitable farm businesses and skilled people.

Farm management professionals will immediately recognise the dependence that this strategy has on the use of a farming



**The dairy farming systems approach**

systems approach. Here we see an explicit reference to the role of farm management. Farm management operates on the production resources of pastures, livestock, plant and equipment, while bounded by a world comprising markets, the public and the regulatory environment. Farm business performance is an adaptive process, with the better managers continually learning new ways to improve business performance in a complex and uncertain world.

**TARGET MANAGEMENT**

Change characterises the farming systems approach. Longer timeframes introduce greater uncertainty into the planning process. Recent trends in New Zealand dairy farming have placed greater debt burdens on many businesses which will, in turn, require careful management of future investments and the use of appropriate capital structures. Tight management of cashflow is necessary as marginal returns diminish.

Farm businesses are coming under closer scrutiny from the public, particularly in terms of environmental and animal welfare practices. As farm businesses expand with multiple properties and increasing herd size there is more pressure placed on management to cooperate as a team, with clarity of roles, development of capabilities and implementation of performance management systems.

**Estimate of the number of full time agricultural and horticultural consultants involved in on-farm work**

Organisation	1973	1996	2008
MAF	300	-	-
Other government	120	-	-
Industry Such as producer boards	50	65	65
Regional councils	-	10	20
Private	70	250	220
Commercial companies such as banks	60	100	120
<b>Total</b>	<b>600</b>	<b>425</b>	<b>425</b>

Adaptive management characterises the dairy business, with farm management consultants helping the use of rigorous analysis, planning and control methods to underpin decision making. New Zealand has a number of professional farm management consultants with the expertise to facilitate change at the level outlined above. In 2009 it was estimated that there are over 200 private consultants working in the agricultural and horticultural sectors. The private sector has taken up much of the public sector provision of advisory services since the mid-1970s. What these figures do not show is the issue revealed in the NZIPIM scoping study. It is that this group is not renewing itself at a sufficient rate to ensure we have the type of expertise necessary for effective adaptive management.

**Development of professional knowledge in farm management?**

Developing a shared body of knowledge in farm management, whether for farming or consultancy work, depends on a process that is common to most professions. A profession builds knowledge by combining experience and formal knowledge. The provision of education and research can accelerate the advance of the profession when strong partnerships exist between the professional practitioners, academics and industry organisations.

Some insight into what we might require for the farm management profession can be acquired by looking to other professions like engineering and veterinarians. These are self-regulating professions that promote their interests to industries and the general public.

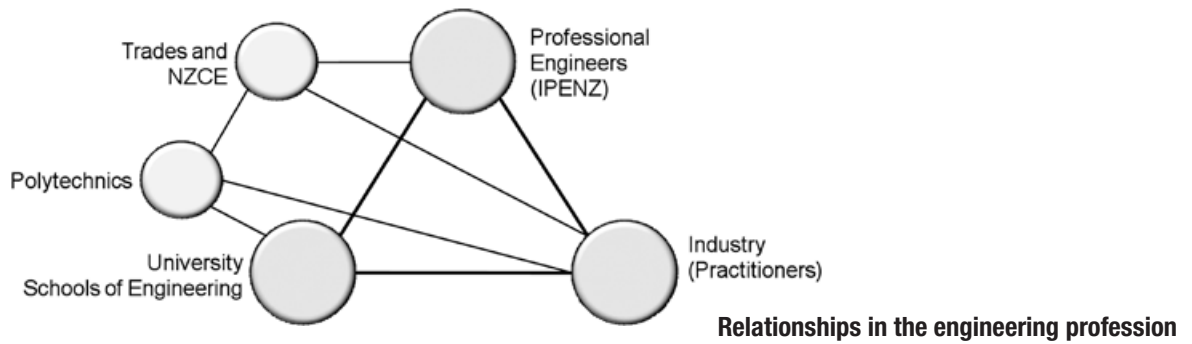
Engineering is probably more like farm management as it has many diverse disciplines. What engineering has achieved is the maintenance of a coherent identity within this diversity. Engineering expertise is formally recognised at different levels of vocational training. Similar to agriculture, the engineering profession differentiates between trades and polytechnic certification – NZCE versus university degrees. IPENZ, the professional body for engineering, manages the linkages between different educational providers by managing control over the standards of practising professional engineers as demanded by industry. Engineering consulting companies recruit from tertiary institutions and provide support for vocational training through their relevant industry training organisations. These organisations also provide professional development services to consulting firms.

**POOR ALIGNMENT**

Does agriculture, and the farm management profession in particular, have an equivalent arrangement to the engineering profession? Agriculture has many of the same elements as engineering although our current situation is more fragmented. The NZIPIM is the equivalent body to IPENZ, yet without the capacity to register professionals. Education and training providers span the AgITO, polytechnics and universities. There are loosely affiliated bodies of practitioners such as the New Zealand Young Farmers (NZYF) organisation.

In summary, all the elements on the supply side of the profession exist but these are not well aligned due to weak demand at several levels. An example of this at the farm level





arose in a recent conversation I had with an AgITO training provider who stated the Diploma in Agribusiness Management should be the jewel in the crown of the AgITO system. However it suffers from very low enrolments with only 13 for year ending Decemembr 2008.

Lincoln and Massey universities have retained agricultural schools but reduced their degrees from four years to three, with a consequent reduction in capacity to emphasise the integration of knowledge using the case study analysis approach on farms. These reductions are a direct result of economic pressure due to low enrolments.

#### STIMULATING DEMAND

This brings us to the crux of the issue. How can demand be stimulated for training and professional development in farm management? Demand needs to be created on-farm and in professional organisations. At a farm level the NZYF have demonstrated strong growth in its network in recent years. A main focus for the organisation has been to capture the hearts and minds of the next generation of farmers and instil a desire to grow as leaders. Support to this network could focus on the development of professionalism in farming, particularly by linkages with the AgITO, stimulating demand for diploma-level training.

At a consultancy level the NZIPIM could investigate a strategic partnership with IPENZ to fast track the development of a strong professional identity in farm management. Industry organisations such as DairyNZ and Meat and Wool NZ could help with an integrated professional development programme. They could work with tertiary institutions to adapt existing resources, such as training modules in post graduate certificate and diploma courses to fit the requirements of consulting organisations. Incentives like scholarships, effective career pathways and recognition of prior learning schemes could further stimulate demand.

Professional identity is also dependent on a strong programme of research and development. Intellectual leadership could be provided through a centre of excellence as a joint venture between Lincoln and Massey universities, headed by a professorial chair and accommodating a strong post graduate research programme. Industry organisations and government agencies could support specific programmes of work through the centre which could co-opt expertise from CRIs such as AgResearch or from overseas organisations.

It is beyond the scope of this article to outline the research agenda that such a centre might undertake. Suffice to say a trans-disciplinary approach could characterise the work of the centre. It could employ a mix of quantitative and qualitative methods to address contemporary issues including system resilience and

adaptive management practices relating to water resource use or managing under conditions of extreme climate variability.

### Consultants of the future

At the start of this article we referred to the 1970s as a golden era for the farm management profession. Much has changed since then. Some of these changes provide significant opportunities for the renewal of the profession. We have experienced increasing privatisation of knowledge with the use of commercial incentives such as plant variety rights and biotechnology patents. Globalisation has broadened our perspective of the world and farm management expertise is increasingly an exportable commodity.

Five intellectual developments seem to have had a particular influence on the evolution of farm business management over the past 35 years – these are suggestive of areas where developments need to continue in future. The first of these is systems thinking which started to affect farm management from about the mid-1970s. In recent years systems researchers have addressed the management of complexity using methods to integrate different types of knowledge.

The second area is experiential learning which affected the profession from about the mid-1980s. This added a formal inquiry into the way farm managers learn by doing, and indeed how management consultants do the same. The third area is a greater use of qualitative research methods that enabled researchers to observe the actual practice of management. Fourth, agricultural knowledge systems have emerged as pivotal to understanding the place of science, technical innovation and management at a regional and global level. Finally, the digital age has revolutionised data capture, analysis and reporting for managers.

One message we can take from previous studies is that we having been living on borrowed time as a profession. A failure to adequately renew ourselves by attracting a sufficient number of the best and brightest has resulted, and will continue to result in, a gradual dwindling of capacity. To rectify this situation we need to stimulate demand for entry into the profession and for ongoing professional development. The efforts of several organisations will need to be coordinated to grow the profession. New Zealand has a proud international history in farm management. We can build on this for our future.

*A full list of references used in the researching and writing of this article is available from the editor of Primary Industry Management or directly from the author.*

**Mark Paine works for DairyNZ and James Morrison for James Morrison Consulting Ltd.**

# GOVERNANCE IN FARMING

David Baker

*The governance principles required in farming are similar for a large scale corporate type operation to those that should be exercised for an individual owner or operator. This article reviews the key components of governance, explains the difference between governance and management and provides a simple example structure based on absentee ownership operations that have been shown to work effectively.*

## Principles and key features

Governance is primarily policy setting – providing leadership direction and sets culture. Management is the implementation. Governance planning should be geared to ensure that the person implementing the plan knows what is required and gets all assistance and support required to ensure that this is effectively implemented. The person usually responsible for the practical farm operation in an absentee situation is the farm manager and they become the key pivot. For an owner and operator they are one and the same and results will depend on the effectiveness of management implementation, whatever the structure.

The leadership attitude and approach will set the culture that is established and this will filter down through to all those involved in the business. This is particularly relevant for absentee owners where personalities become important and team work must be encouraged.

There will be a requirement for an increased level of delegation of responsibilities for the larger scale operations as scale increases and the number of stakeholders rise. The level of accountability will change and a more formal business governance structure becomes appropriate. Whatever the size of the farm business, its success and the results will finally reflect the leadership direction provided and the quality of decision making. This is governance.

Clear goal setting, sound planning and effective monitoring are the governing pre-cursors to enable effective implementation in the day-to-day management of a farm business. It helps to have chosen a property that has good soils and a favourable climate, but after that it all comes down to effective management.

## Observation made by Professor Stewart

I clearly recall Professor Stewart from Lincoln commenting on one of the first corporate farming operations when it was listed on the stock exchange. Pastoral Holdings was established with two properties acquired in the King Country. When asked to comment on likely success he said that at the time, the success will depend upon whether recognition is given to the two aspects of management – the word governance was not used at that stage.

The first he identified, involved establishing the right structure that has compatible people setting policies. The second component he identified was effective implementation in day-to-day management. He noted that the management structure would need to be one where the manager was able to feed

back his views on work priorities and opportunities as well as taking direction. He also correctly identified that the investment expectations needed to be realistic – and this is where I believe it finally fell down.

An owner operation should be easy to operate due to its simplicity with no time delay between decision-making and implementation. However experience has shown me that many fail to achieve the full potential from their farm resources because governance planning has not been undertaken effectively.

Additional skills can be employed in the form of an agribusiness consultant, accountant or in specialist areas such as soils, fertiliser or agronomy. But unless some third party such as the bank manager starts asking questions there is only self-accountability possibly backed up by a questioning wife or extended family.

The top operators typically plan and act in the same manner as a corporate or advisory board. This may be with the help of employees or they have the skills themselves that they exercise in the making of sound decisions. For a corporate board that requires a high level of accountability, the team might involve three to six people. My point is that the planning and implementation processes should be no different.

## Governance

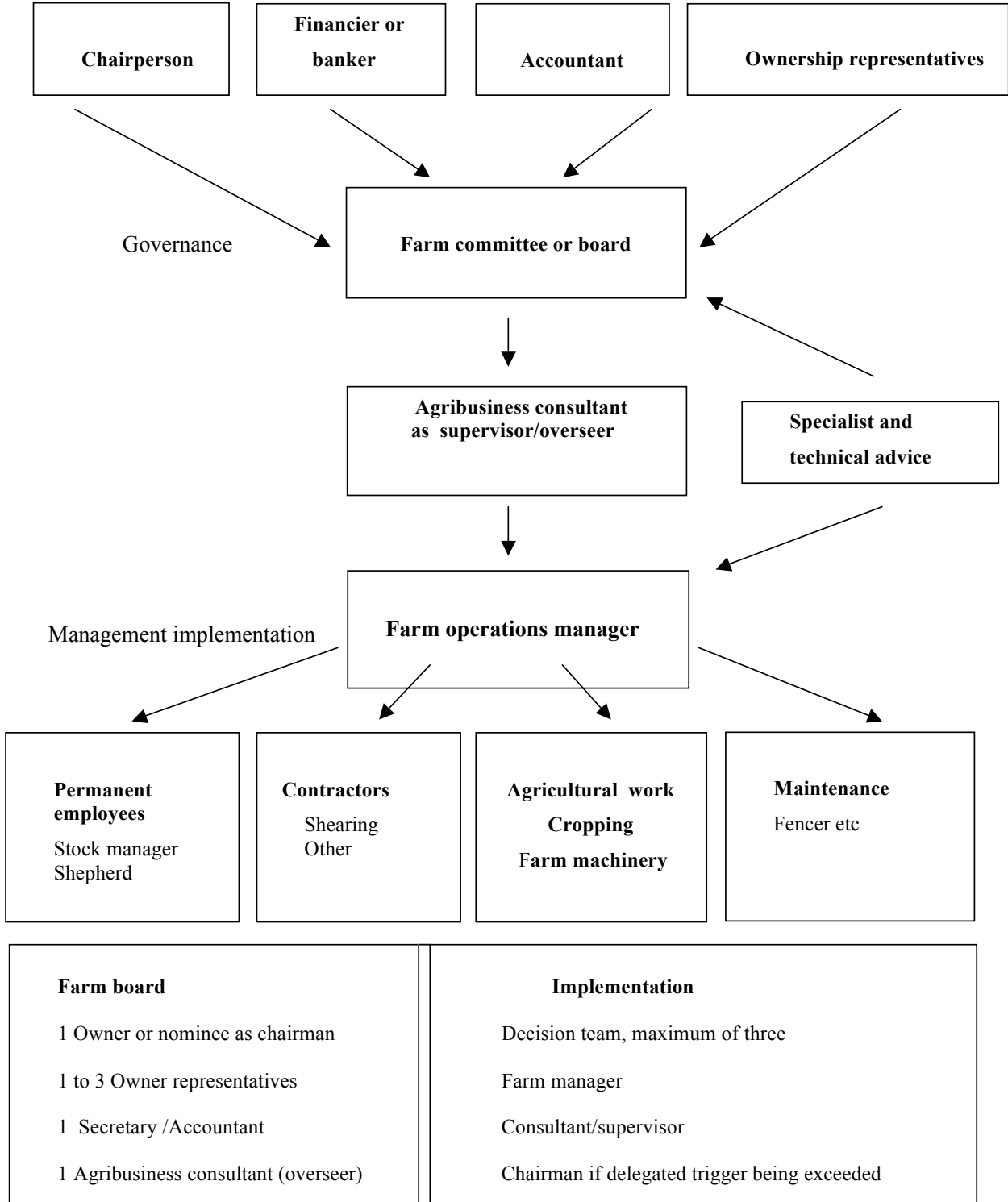
Governance should involve –

- Clear goals and objectives being established
- Planning for the medium term rather than season by season
- Identifying the skills required and being prepared to acquire them if necessary
- Establishing an effective means of communication, both down and up, that encourages innovative thinking and initiative
- An ability to create a team culture where a large scale operation is involved
- Coaching where the principles of what is being required are explained rather than instruction by direction
- Careful monitoring of actions and results will enable both accountability and subsequent decisions to be more soundly based
- Needs to be people focused as much as technical and financial.

## PRACTICAL LESSONS AND OBSERVATIONS

The role of the farm manager and quality of the person who is responsible for farm policy implementation needs to be recognised and supported. This person should be part of any board structure

**Farm governance structure**  
**People resource involved**



and also be involved with any major governance decisions that might affect the manager's area of responsibility.

For all those involved in governance, personal attitudes, motivation and commitment are as important as technical knowledge and skills. The leadership needs to establish a compatible team and is responsible for the workplace attitudes and culture. The prime role of governance is to clearly establish the guidelines and the process for delegation or allocation of responsibilities.

The farm manager responsibilities should be set out in an employment agreement that has a job description that identifies the areas of responsibility. The manager is finally responsible to the board but generally reports first to the supervisor. Any employment review should measure achievements against the job description.

Timing of actions are as important as getting the policies correctly planned. Effective implementation of plans will be what will finally achieve the desired results and meeting set performance indicators. You should avoid a hierarchical directional structure and promote a flat management team approach. This can involve weekly or monthly meetings when the farm policies and programme ahead can be discussed.

## Role of the agribusiness consultant

In general the consultants input and responsibilities will be to –

- Act as an independent professional consultant and facilitator, be responsible to the board and attend all board meetings
- Be a motivator and sounding board as well as a board member who might also act as secretary to the farm committee or board
- Generally be responsible to supervise the manager by involving the manager with the preparation of the budget, coordinating and monitoring progress against the financial plan or feed budget, helping the manager directly with any decision making changes or dealing with problems that might arise and helping implement policies for the year once the financial plan has been approved
- Confirming and monitoring of monthly payments against the financial projections
- Liaison with others involved in the business eg bank manager or accountant.

The consultant should also recognise that their input should be as much focused on people as the technical and financial. They should adopting the whole farm approach which recognises that any decision made needs to have regard to all the farm resources involved such as land, labour, finance and the management requirements as we were taught at Lincoln. Input will involve matters that are undertaken for any farm consultancy client such as undertaking a SWOT analysis so the opportunities and options can be identified, providing specific technical advice, completion of a strategic plan and a five-year plan that schedules capital expenditure.

The input required will vary depending upon the understanding and experience of the owners. Each farm enterprise will have its own specific requirements so the role cannot be defined by prescription.

## EXAMPLE STRUCTURE

The diagram on the previous page shows a simple structure that identifies the components and the people that make up any farming operation. An owner or operator might undertake all roles but larger operations require delegation with accountability defined. The structure should be geared to support the farm manager as the central pivot. Then the planning should help the allocation of responsibilities and monitoring so that that plans are effectively implemented. The whole process needs to ensure accountability.

The farm board make-up and the delegated responsibilities to the operations farm manager and the people below are shown along with the make-up of the implementation team. This should be a maximum of three people to ensure timely decisions.

## Random observations

While some farmers in the past were regarded as good judges of stock, in many cases this led to conservative operation. Stockmanship is still important but there are new tools available that can enable quicker and more effective responses to changing circumstances, such as use of a pastoral monitoring tool programme that is linked to forward feed budgeting. This can enable decisions to be made for pastoral operations on the assessment of the net return per kilograms of pasture dry matter that is available. This is a true measure of management efficiency as it is the efficiency of grass use as well as animal performance and marketing.

I do not necessarily direct who the manager should buy or sell from. We provide a clause in our employment agreements which define a manager's duties and responsibilities by stating that all actions shall be undertaken to the best net benefit of the farm. I have an aversion to give-away promotions. I prefer to see a cheaper price negotiated but if provided a prior agreement is required on who gets these.

I operate at my best when I can act as a sounding board, able to assist by scoping and promoting a changed policy or idea. I avoid becoming the effective farm manager. They are finally responsible to the board and must accept their delegated responsibilities and then stand and fall by their results.

In summary there are five key points –

- Recognise the different components and inputs required in a farm operation.
- Governance and management should be recognised as two separate functions.
- People are the important component and the farm manager is the central pivot for effective implementation, a good working relationship between members of the board, consultant and the farm manager is crucial.
- Judgement of results should be based on what is achieved rather than how implementation is undertaken
- An agribusiness consultants input is best used as a facilitator, team player and sounding board.

*David Baker is a foundation member of the NZSFM. He served as President and Councillor for the Wairarapa Wellington Branch and from 1979 to 1981 was National President. David has worked in the Wairarapa since 1969 as a Registered Agribusiness Consultant and Registered Valuer and founded the firm of Baker and Associates (Wairarapa) Ltd.*

# RURAL MENTOR PROGRAMME

Nicola Waugh

*The spread of information initiates innovation. New Zealand farmers are well known to be innovative people. Over the years they have built up an extensive knowledge base from trial and experience. The rural mentor programme is a farmer-to-farmer mentoring scheme which was launched in 2009 in the Waikato, Canterbury and Southland. It caters for both organic and conventional dairy and sheep and beef farmers. It is an industry funded programme funded by Sustainable Farming Fund, Dairy NZ, Organics Aotearoa NZ, and Meat & Wool NZ. The aim for the programme is to expand to become nationwide and include horticulture and viticulture.*

The programme is designed to help farmers to grow and develop both their career and business by using a mentor as a sounding board and to help provide focus on certain aspects of their career or business. Farmers learn well from each other by sharing information and expertise.

There are benefits of the rural mentor programme not only to the mentees, but also to the mentors and the wider industry. The mentees obtain structured support and encouragement in a non-threatening environment, and extend their networks within the industry. Mentors benefit from having their business challenged and processes questioned. This programme also helps to develop confidence and leadership for both the mentors and those mentees who may progress through the programme to become mentors.

Industry benefits include encouraging more entrants into the industry, retaining current farmers going through certification, and increasing the capability and leadership skills of those within the industry. There are many stages within a farmers' career where a change is required or where the farmers could benefit from having a sounding board to bounce ideas and provide support and encouragement. The rural mentor programme can provide the linkage to a mentor who has been there and done that and is able to help the mentees through these times.

## **AVOID THE SAME MISTAKES**

Sharing information in any industry leads to innovation. Farmers often learn well from listening to and discussing other farmers' experiences. Sharing these experiences can mean that they are able to avoid the same mistakes that other farmers have made. This can lead to rapid personal development.

A mentoring partnership can harness the experiences of the mentor and encourage the development of innovation of the mentee. The mentoring partnership can also aid learning from mistakes. It can provide a safe environment in which time is set aside to reflect on mistakes that were made and what was learnt from these mistakes, and what would or could be done differently should a similar situation arise.

## **THE BEGINNING**

The rural mentor programme was launched early 2009 in the Waikato, Canterbury and Southland. It is based on three pilot schemes – a sheep and beef pilot in the Waikato/King Country, a dairy industry pilot in the South Waikato, and one in the organic sector run predominantly in the South Island.

These pilot schemes provided some of the processes and templates for the rural mentor programme. Results from these pilot schemes showed benefits not only to the mentees involved but also to the mentors and the wider industry.

Currently the main focus areas for the programme are the Waikato, Canterbury and Southland in the sheep, beef, dairy and organics sectors. This scheme has the potential to include other sectors such as the rural professional sector. The frameworks, training and systems have already been developed and would only require minor adaptations to include other areas.

## **What is the programme?**

The rural mentor scheme is a formalised farmer-to-farmer mentoring scheme designed to provide support and encouragement to farmers in particular areas of their business by fellow farmers. It is an off-line programme which means that the mentoring partnerships are not employee/employer based partnerships but outside the current working environment.

Ideally the mentees and mentors that are matched are not within the same immediate network. Feedback from the two Waikato pilot schemes showed that this was a benefit as some of the mentees felt more comfortable opening up their business, particularly the financial side, to someone who was not in their immediate networks. Other feedback from both the mentees and mentors also showed that there was great benefit in the resultant extending of networks.

The programme is designed so that certain aspects of the business can be targeted. For example, some mentees are looking for a mentor to focus on technical aspects of farming or dealing with staff. Others may be looking for more of a focus on goal-setting, wealth creation or financial management.

The application process is designed so that mentors are matched to mentees based on the requirements of the mentee and the skills and experience of the mentor. This ensures that the mentor is able to provide assistance in the areas required. In addition this opens the opportunity for people to become involved in the programme as both a mentee and a mentor. There are, for example, some participants that have skills and experience in the technical aspects of the business and are therefore able to provide a mentee with mentoring in this area. But they may also be looking to develop their skills in the financial and goal setting aspects of their business and therefore have a mentor for these areas.

**FLEXIBILITY**

Although the programme is structured it is flexible enough to allow for different methods of communication with no set number of visits or meetings. These can be held off the farm or even by telephone during busy periods.

The programme starts with training for both the mentees and mentors which has been developed with the assistance of the Mentoring and Coaching Centre specifically for the rural participants. This sets out the framework and expectations of the programme as well as explaining and demonstrating the mentoring process and skills. The partnerships are set up for a year with a review part of the way through the year and an opportunity to reflect on the partnership at the end. At this point participants can decide whether they want to remain in the programme with the same mentee and mentor for another year, get a new mentee or mentor or progress from being a mentee to being a mentor.

**The benefits of the programme**

There are three main benefactors of the rural mentor programme – the mentees, the mentors, and the wider industry.

The mentees obviously have direct benefit by gaining knowledge, expertise, support and encouragement. They also benefit from having assistance in developing goals and direction for their career and business with accountability for actions put in place. They are also provided with reassurance which can be particularly beneficial for those in the process of converting to organic production. The programme provides a non-threatening way of seeking support without the feeling of pestering or badgering someone.

Feedback from the pilot schemes showed that the mentors also had significant benefits. The programme provided them with the opportunity to share their skills and expertise with someone coming through the industry. They found that their current business practices were being challenged as a result of the mentee questioning how and why things were being done the way they are.

Leadership skills are also developed through the one-on-one mentoring process. The programme also provided some semi-retired and retired farmers another link back into the industry in which they are passionate about.

**WIDER BENEFITS**

The wider industry also benefits from the programme. The process of mentoring helps to build and develop leaders from within the industry. The programme helps show an attractive industry where experienced farmers are happy to help out those who are less experienced by sharing their knowledge. This leads to more people coming into the industry and greater retention of people in the process.

The dissemination of information is not limited to the mentee mentor partnership. Skills and information gained by the mentee are often then discussed with friends and neighbours and there is a ripple effect of information spread throughout the industry.

**Current support and attendance**

The rural mentor programme has significant support from all areas of the industry with funding for the first three years being provided by Sustainable Farming Fund, DairyNZ, Organics

Aotearoa New Zealand and Meat and Wool New Zealand. Additional in-kind support has been provided by the New Zealand Young Farmers Club.

Currently there are 25 matched pairs around the country with participants from dairy, sheep and beef and organics. Interest has initially been greater from mentors than mentees at this stage with approximately 30 mentors trained and awaiting an appropriate mentee. There has also been interest in the programme from the horticulture and rural professional sectors.

**WHO ARE INVOLVED?**

Current mentees come from all walks of life and have different motivations for getting involved. These include young people looking to progress through the industry, sharemilkers looking to make the next step and farmers who have changed industry from sheep and beef. Some were there because they felt they were stuck in a rut and wanted to set some actions with accountability, and there were others whose main motivation was to extend their networks as they were new to the area or country.

In volatile economic and climatic times it can be quite difficult to take a step back from the business to make strategic choices about the direction in which the business is heading. By setting up a mentoring partnership this encourages the decision-makers to set aside time with their mentor to take a step back and work on their business. The mentor is also often able to give a different perspective to the business and sharing their experiences and knowledge may provide additional options that the mentee was not aware of. Having follow-up meetings in which the mentee is held accountable to discussions in prior meetings can also often lead to goals being achieved.

The mentors had a wide range of reasons for getting involved. Some want to give back to the industry as they have had a lot of help from others as they have progressed. Others had taken a step back from their properties or had semi-retired but were still keen to share their knowledge and experience. Some just want the opportunity to watch others grow through the industry and to help them through this process.

**Summary**

Everyone has mentors at different stages of their life whether they label them mentors or not. The rural mentor programme is designed to provide some structure for these partnerships and introduce the opportunity to obtain a mentor from outside the current networks.

Mentoring is all about providing support, encouragement, a sounding board and accountability. It enables the development of a safe confidential partnership in which mentees can open up their business, goals and aspirations and start putting together an action plan to achieve goals. The programme provides someone in which to bounce ideas off and an additional network of people that may be able to help mentees achieve what they want to achieve whilst developing leadership skills.

Further information about the programme can be found by visiting the website [www.ruralmentor.co.nz](http://www.ruralmentor.co.nz) or emailing [info@ruralmentor.co.nz](mailto:info@ruralmentor.co.nz) or 0800 787 256.

*Nicola Waugh is a member of the AgFirst Waikato team. She has a keen interest in business and environmental management and rural mentoring.*

# THE EFFECT OF THE MODIFIED ETS ON A DRYSTOCK FARM

**John-Paul Praat and Clayton Wallwork**

*After this article was written and before publication the government has passed the latest Parliamentary Bill on the ETS with a significant number of amendments, some of which may affect comments made.*

This article is an update from an article that appeared in the March 2009 edition of *Primary Industry Management* which outlined the costs of the existing Emissions Trading Scheme (ETS) for typical farms in New Zealand. The goalposts have moved significantly in terms of the agricultural targets for the ETS.

Instead of accounting for all emissions by 2030, the amendments target 50 per cent of emissions by 2050. In addition entry is postponed from 2013 to 2015 and liabilities will be calculated and paid at the milk or meat processor level. Farmers may be able to report at a farm level at a later stage, indicating that implementation of the ETS is a work in progress.

Of further significance is the change to an intensity based system. This means that liabilities will not reflect carbon management practices on the farm.

Unlike the existing ETS, farmers with the highest carbon footprint per unit of output, for example per kilogram of meat, will have no specific incentive to improve the efficiency of carbon use as compared with low carbon footprint farms. As it stands, all farmers will be lumped together in an averaging process. In practice, reductions in emissions are unlikely without mechanisms to reward greater carbon efficiency, for example international recognition of nitrification inhibitors as a greenhouse gas reduction technology.

## SHEEP AND BEEF EMISSIONS

Annual farm emissions for an average size sheep and beef farm are shown in the table below at 1,802 New Zealand Units (NZU) for the example farm with 5,300 stock units. An NZU is the standard measure used for carbon accounting and is equivalent to a tonne of carbon dioxide. Therefore the farm produces just over 1,800 tonnes of carbon dioxide each year.

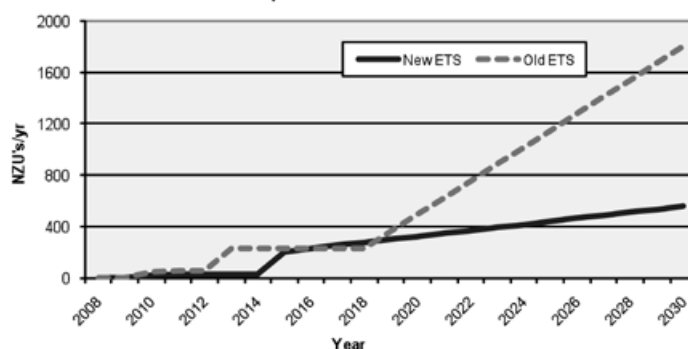
This total includes fuel, electricity, fertilisers and livestock. Livestock are the source of 97 per cent of total emissions. For this farm the sheep to cattle ratio is 54 to 46. The carbon farming group calculator was used for these calculations.

The graph compares the quantity of emissions this example

Greenhouse gas source annual emissions		Tonnes carbon dioxide NZUs
Petrol	2,540 litres	6
Diesel	52 litres	0
Electricity	19,660 kWh	5
Nitrogen	8 tonnes	45
Sheep	2,862	944
Cattle	469	802
TOTAL		1,802

farm will need to account for under the existing ETS and the new modified ETS. Initially, only 10 per cent of emissions will be accountable and 90 per cent of emissions are provided as an allocation by the government. This is in line with the increase in agricultural emissions of about 10 per cent since 1990. The final percentage increase for the Kyoto period will not be known until after 2012. At \$25 for one NZU this equates to a reduction in returns of 2.8 cents per kilogram of beef and 6.8 cents per kilogram of sheep meat. For the example farm, the annual cost may be about \$5,000 in 2015 and \$14,000 by 2030. The existing ETS was to have cost significantly more at about \$45,000 by 2030.

**NZU's Required under Old and New ETS Rules For a Typical Sheep and Beef Farm to 2030**



## ON-FARM EFFICIENCIES

Improvement in farm productivity is a continuous process. Techniques for cost reduction and improving profitability will continue to be found and are likely to also reduce carbon costs on the farm. Maximising the pasture production gain from efficient fertiliser use, especially nitrogen, by optimising timing, rate and accuracy of application and improving pasture use will translate to lower emissions and cost per unit of output.

It is likely that farming systems will also adapt by altering the stock policy and perhaps the feed type offered. Animal selection is emerging as a potential tool for reducing greenhouse gas emissions. There will be no silver bullet and a range of technologies and strategies will be required to make a difference in greenhouse gas emissions at a farm level. Given New Zealand's exposure to agricultural emissions, farmers will need to be given the tools to understand and innovate in this area.

## DRYSTOCK FARMERS IN THE BOX SEAT

Drystock farmers are in the best position to benefit from the ETS. The forestry provisions of the ETS are largely unchanged so farms with new forests planted after 1989 on land which was previously grazed can start accumulating carbon credits from January 2008 onwards. No new investment is required apart from registering as a participant in the ETS and establishing an account on the emissions unit register.

The NZUs can be banked for later use when livestock emissions become payable from 2015 onwards or sold to other

Continued to page 15

# THE REVISED ETS – WHAT IT MEANS TO YOU

Piers Maclaren

*Emissions trading – a godsend for foresters or the last straw for farmers? Both optimists and pessimists are wrong, as I will explain.*

*In 1992, we had the Rio Earth Summit. Every nation including the United States agreed to limit greenhouse emissions and the air was full of waffle and weasel words. In 2005 the Kyoto Protocol finally took wings with firm dates and ‘binding’ targets for developed countries. These were mostly ignored, despite averaging a paltry 5.2 per cent reduction target. In December 2009 there is to be the Copenhagen Conference. My prediction is that absolutely nothing will be agreed, except for a world-shattering surprise announcement to hold yet more discussions.*

## Is it all too late?

By the time you read this, the results of Copenhagen may be on the news. If I have misjudged the outcome, feel free to scoff. It is not that the issue is a laughing matter – the basic science has a long and noble pedigree. If you have internet, try googling Joseph Fourier 1824, John Tyndall 1859 or Svante Arrhenius 1896. It is just that humans and nations are not capable of suppressing their avaricious individualism and innate conservatism just to forestall a distant, globally shared and poorly understood catastrophe.

China and India both agree that climate change will have a major effect on the life-giving water flowing from rapidly melting glaciers in the Himalayas. These countries will attempt to reduce their rate of emissions growth, and their emissions relative to their GDP, but the absolute amounts? Goodness me, no. That would be politically impossible. Developed countries are historically responsible for most of the pollution and they can undertake a lion’s share of cuts, as well as providing compensation for anything we are supposed to do.

On the other hand, I suspect Russia believes that global warming would be a good thing – for Russia. This would be particularly important if they are given credits for closing down all their grossly inefficient power stations after the collapse of the Soviet Union. Meanwhile Africa holds a large block of votes and refuses to sign anything unless there are generous aid packages, no doubt to be sent to numbered Swiss bank accounts. Brazilians want credits for not deforesting the Amazon jungle. The Saudi Arabians want compensation for a reduction in oil demand.

As for the United States, are congressmen likely to ignore the lukewarm participation of China and India, and vote to sacrifice some of their national sovereignty? Will they impose financial hurdles on their voters, many of whom have not even got around to accepting evolution and metric measurements, let alone climate change? Only the Europeans and possibly the Japanese seem capable of responding to the collective good, rather than solely to their own local parochial concerns.

### COPENHAGEN THE KEY

Without a successful Copenhagen meeting, all component agreements will collapse, including the New Zealand Emissions Trading Scheme. Instead of anticipating constraints on the transport, energy and industrial sectors in mid-2010, we

should expect John Key to announce a postponement of the implementation date as a result of international uncertainty. You read it here first.

A restriction on farming in 2015? Get real. The world is splitting apart with seven billion people, and any move to reduce food production is just not going to happen. Methane and nitrous oxide are short-lived gases, so they are not in the same long-term league as carbon dioxide, most of which will disappear only in geological time.

What if I am totally wrong, and it is full steam ahead for the ETS? Now that the National Party have supported Labour’s basic idea, albeit in a watered down version, there is no longer any major political opposition. With regard to farming, other people have the expertise to comment on the likely success of nitrate inhibitors and methane-reduction research, so I will concentrate on the area I know best, which is forestry.

## What you should do

Suppose that you planted a block of pine trees on farmland sometime in the 1990s, and want to decide whether to join the ETS. What should you do?

The tools you will need are a bright 15-year old and an internet-capable computer. Get the teenager to download the MAF Lookup table guide from [www.maf.govt.nz/sustainable-forestry](http://www.maf.govt.nz/sustainable-forestry). It is written in Adobe Acrobat, but the 15-year old should be able to manage that. If that option fails, I expect MAF will post you a printed copy.

Now go to page 29, where you will find Schedule 6, Table 1. Use this to find how much carbon your woodlot possessed in 2008 and how much it will have in 2013. This will vary from region to region. For example a radiata pine stand planted in 1995 in the Bay of Plenty will be 13 years old by 2008 and will have 239 units of carbon dioxide equivalent per hectare. In 2013 when it is 18 years old it will have 401 units. Do not worry about confusing terms such as carbon dioxide equivalent – it is the number of units that you need to know.

### NOT COUNTING

Your woodlot has absorbed a sizable quantity of carbon between the date of planting in 1995 and 2008. But you get no credit for that. In fact your carbon up to 2008 was a free gift from you to



the rest of the world. Congratulations on your generosity. It is only the increase after 2008 that is counted, and then only up to 2013. The reason that carbon-absorption after 2013 does not yet count is that the international community has so far not come up with any rules for subsequent periods. And if Copenhagen and its successors fail, it never will.

The difference between the figures in 2008 and 2013 is the amount of units you can claim from the government under the revised ETS. In this example, it is a total of 162 units a hectare. But wait, there are some catches.

#### **ROUGH GUIDE**

First, the lookup tables are designed be an interim solution. They are a quick, rough, and conservative estimate that you can use for planning and trading until more robust systems are developed. For example, your woodlot may not be typical of the regional average. In the longer term, MAF are hoping to issue a set of rules to help you measure your woodlot in an approved fashion so that you can calculate your carbon more exactly.

Second, there are some fishhooks to joining the scheme. The main one is that you must pay back most of your units when you harvest the trees. You only need to pay back the units actually disappearing on the back of the logging truck, and you do not have to pay back more units than you got in the first place. Nevertheless, if you sell your carbon at a cheap price you might find it is considerably more expensive to re-purchase or surrender that carbon at harvest.

How many units do you need to surrender at harvest? The lookup guide will help by telling you how much carbon is typically left behind after clear felling. Table three gives the carbon in the 'above-ground residual wood and below-ground roots'. For example, if you were to fell your trees at age 18, some 198 tonnes a hectare would remain. Because you had 401 tonnes to start with, you would need to pay back 203 tonnes in harvesting liabilities. This is more than the amount you expected to make from carbon absorption. For that reason, the government would bill you only for the 162 tonnes you originally received.

#### **PAYING THE FEES**

So why join the ETS, accept and sell the units, and then be forced to buy them all back again at harvest? Although you have the advantage of using that money during the interval there are also some disadvantages. Getting your carbon is not free. You will need to pay \$550 registration, \$100 filing fee, as well as \$130 an hour of MAF time including travel. The carbon may need to be insured, it may cost you something to find a buyer, and it gets taxed in the year of sale.

Most importantly, by joining the ETS you have committed that land to being in permanent forest cover – it would cost you too much in carbon liabilities to return it to a non-forestry land use. So by joining the ETS you have effectively devalued your land by eliminating many prospective buyers. If the current value of your land is, say, \$5,000 a hectare, and good forestry land is worth only \$3,000, you will need to make at least \$2,000 from carbon just to break even.

If the ETS is extended beyond 2013, you will obviously get even more units by delaying the harvest – not many woodlots are felled at 18 years old. Your harvesting liabilities will also increase but not proportionally. The longer you postpone harvest, the better the system looks.

### **Being a carbon farmer**

What price will each of your units be worth? There is currently a \$25 a unit cap. If more people are forced to buy units than want to sell them, then \$25 is the price they will fetch. Multiply the units you have calculated by \$25 to get the value per hectare. It is good money if you are planting your trees right now, but not so flash if your trees were already middle-aged by 2008 and you deduct the harvesting liability.

And what if you do not want to harvest those trees at all? What if you cannot see yourself – or for that matter anyone – wanting to impose a non-forestry land cover on that particular patch? You could become a carbon farmer. You harvest a crop of units every year until whenever. Who cares, you will be dead by then. The trees will eventually stop packing on the carbon, and most likely they will overshoot and lose a lot of carbon in some gigantic storm, but that may be a headache for future MAF technicians, not for you.

#### **TWO WAY BET**

You could bet on both horses by accepting the units and not selling them. Bank them with the New Zealand Emissions Unit Registry and see which way the wind blows. If timber continues to be uninspiring and you desperately need the money, you could sell them. But if things go the other way and timber or land prices seem better value than carbon, you could return them to the government and opt back out of the scheme.

Despite all this kerfuffle, one thing is certain. Greenhouse gases are going to increase, and the world is going to get warmer with a wide number of climate-related consequences, some of which we cannot predict or even guess at. We are about to enter a time of disturbances. I hope your 15-year old makes it through all right.

#### **The effect of the modified ETS – continued from page 13**

emitting industries such as electricity, liquid fuel and industry next year. This may provide an opportunity to retire areas of drystock farms which are performing below average, and require regular costly maintenance to remove shrub growth, to a more profitable and sustainable land use.

#### **LAND USE CHANGE**

Even in the current climate of uncertainty around carbon trading, whole farms in New Zealand are being converted to forestry, as occurred in the 1990s. Forestry provides a 30 to 50 year solution to New Zealand's carbon balance. However, forests

should be integrated into the rural landscape – established on land unsuited to sustained agricultural use, rather than blanket conversion of whole properties that unnecessarily removes agricultural production.

Agriculturalists need to think about integrating forestry into their business. It is a happy coincidence that the growth curve of trees matches the profile of rising emissions costs. This should be taken advantage of wherever possible on New Zealand farms.

*John-Paul Praat works for PA Handford and Associates Ltd and Clayton Wallwork works for Greenco Ltd.*

# BIOCHAR – THE NEW ZEALAND POTENTIAL

Jacqueline Rowarth, Marta Camps, Jim Jones  
and Mike Hedley

This article is a general introduction to biochar. It covers modern pyrolysis technologies, the range of biochar properties and its effect on soils, how it may be included in carbon markets amendment, and a list of the researcher and interest group networks.

## SOME BACKGROUND

Biochar, an advanced technology charcoal, is being hailed for its potential to mitigate global warming. In the natural carbon cycle atmospheric carbon dioxide fixed by photosynthetic organisms, mostly plants and algae, is returned to the atmosphere when the plants die and decay. Biochar technologies uncouple this natural carbon cycle by sequestering carbon, locking it up in a stable form so that part of the carbon does not return to the atmosphere as carbon dioxide.

These avoided emissions will be, it is hoped, tradeable on the carbon market in the same way that replacement of fossil fuels with renewable fuels creates a tradeable carbon credit. In addition, when biochar is added to soil, it may reduce emissions of nitrous oxide, the most potent of greenhouse gas emissions from nitrogen rich grazed pastures. Therefore biochar has a double effect where it both avoids and reduces emissions. This is particularly attractive because, from an international perspective, New Zealand is liable for net emissions that exceed an agreed level. If large tonnages are involved, biochar has potential to significantly affect New Zealand's carbon balance. To achieve this, two sectors of the economy are important, forestry and agriculture.

## THE OBVIOUS WAY

Until recently, forestry has been seen as the most obvious way to gain offsets by sequestering carbon. Net emissions are equal to emissions minus offsets. For this reason forestry is the first sector to enter the Emissions Trading Scheme (ETS). During growth, trees take up more carbon than they emit and so offer prospects for receiving a credit of carbon units. These credits are recorded on the New Zealand Emissions Unit register.

However, when harvest occurs, these credits are debited and forest harvest residues decompose to carbon dioxide. Herein lies the problem. Commercial forests have a long term zero balance of carbon. This leaves New Zealand exposed to the liability of increased emissions in other sectors of the economy. To sequester carbon permanently, a mechanism is needed to turn the forest residues left after pruning and each harvest cycle into a recalcitrant form of carbon. Biochar is such a mechanism, creating charcoal and bioenergy from forest waste.

## DATE DELAYED

Agriculture accounts for 48 per cent of New Zealand's emissions profile, but is more complex than forestry to include in an ETS. For this reason the date agriculture will enter the ETS has been delayed to 2015 and the exact form of the rules, such as where the liability for emissions occur and how offsets apply, are still under debate.

Within an ETS, biochar manufactured from waste



biomass currently represents a tradable avoided emission. At the international negotiation level, of particular interest to agriculture is a possible post-Kyoto mechanism of including carbon sequestered in biochar and soil. While Copenhagen 2009 is the next milestone, this outcome is probably some years away. However, when this happens, it will provide the financial reason to farm biomass to make biochar for carbon sequestration to claim carbon credits. In the meantime, soil amendment with biochar appears to have agronomic value that, in the Australian context, may render the economic evaluation positive without resorting to carbon markets or government intervention.

## SLASH AND CHAR

Interest in the agronomic value of biochar stems from the *Terra Preta do Indio* in South America. It is referred to as black soils in Portuguese, but also from other soils such as plaggen soils in coastal areas of central and northern Europe. These anthropogenic soils have a higher fertility, organic matter and charcoal contents than adjacent natural soils from similar parent material. The *Terra Preta* soils range in depth from half a metre to two metres deep, and can contain as much as 250 tonnes of carbon per hectare in the first 30 cm and 500 tonnes per hectare up to one metre.

They were formed over a short time span of only 40 to 50 years several thousand years ago by pre-Columbian indigenous farmers using slash and char to bring soils into production. Slash and char sequesters about half the carbon in the vegetation. In contrast, slash and burn sequesters less than five per cent of the carbon. The result of slash and char has been dug into the soil with food scraps and waste materials. Plaggen soils originated from the use of sods from heathland that were used as bedding material in animal husbandry and the resulting mixture was disposed on the fields. As heathlands were periodically burned, plaggen compost brought charcoal into the soils.

## BIOCHAR

Biochar is similar to char formed during wild fires or burning associated with clearing land. It is manufactured from plant material such as wood or straw by a process known as pyrolysis at temperatures between 400°C and 700°C with partial or complete oxygen exclusion.

Identifying appropriate material such as forest residues, fast-growing vegetation, crop residues, urban green waste or sewage sludge, and the time-temperature profile needed to create safe biochar efficiently, is the subject of research in various places in New Zealand. The MAF-funded New Zealand Biochar Research Centre at Massey University is working on pyrolysis, char chemistry, agronomic evaluation and the greenhouse gas footprint for biochar technologies.

Mode	Conditions	Liquid	Char	Gas
Fast	Moderate temperature ~500°C Short vapour residence time ~1 s	75%	12%	13%
Moderate	Moderate temperature ~500°C Moderate vapour residence time ~10 to 20 seconds	50%	20%	30%
Slow	Moderate temperature ~500°C Very long vapour residence time ~5 to 30 minutes	30%	35%	35%
Gasification	High temperature above 750°C Moderate vapour residence time ~10 to 20 seconds	5%	10%	85%

#### Modes of pyrolysis

### Pyrolysis

Pyrolysis produces carbon dioxide, carbon monoxide, methane and hydrogen, a liquid bio-oil comprising relatively short chain hydrocarbons and solid products. Although the main interest is on the solid biochar, it may be that the success of any pyrolysis industry hinges on the uses found for the syngas and bio-oil. Syngas can be burned for energy or, via the Fischer-Tropsch process, turned into a range of petroleum products. Bio-oil can be separated and blended with diesel, or used as a feedstock for chemicals extraction or synthesis.

The pyrolysis process has four steps –

- Feedstock is sealed to control ingress of oxygen
- Feedstock is heated, gases start evolving, some can be condensed and the remaining carbon dioxide, carbon monoxide, methane and hydrogen are non-condensable.
- The reaction becomes exothermic and self-sustaining, the heat is an energy source that can be harnessed. Volatiles and gases continue to be produced, and the composition depends on heating rate, temperature and degree of contact between the volatiles and char.
- The pyrolysis reaction goes to completion, leaving the biochar to be processed.

The endothermic and exothermic reactions are affected by the composition of biomass – the hemicellulose, cellulose and lignin, and the net heat of reaction depends on the temperature and yield of the char. The volatile reaction pathway dominates at lower temperatures and the reaction is endothermic. As temperatures increase, gas and char reactions dominate and the reaction is exothermic. The operating conditions for the pyrolysis process can be changed to produce biochar, bio-oil or bio-gas

#### SLOW AND FAST PYROLYSIS

Slow pyrolysis involves a drum using a rabble arm or a rotating screw to transport the biomass, or a rotary drum where gravity provides the driving force. Both systems require limited air and have off-gas removal systems with a condenser to separate the liquids from the non-condensable gases.

Fast pyrolysis involves rapid heating of the biomass and rapid extraction of the vapours to produce bio-oil rather than gas or biochar. To get rapid heat and mass transport requires dry biomass, small particle size and tight control of temperature and residence time.

Optimising biochar production requires a process that is continuous to avoid energy losses and downtime, exothermic so that useful heat energy is produced, and allows capture and use of any bio-oil and bio-gas produced. It also needs to be flexible in order to be able to handle a range of feedstocks while

producing biochars of optimal and repeatable quality. Designing a reactor to meet these requirements will take a considerable amount of research involving chemical reaction kinetics as well as engineering, physics and biology.

### Char and soil

Char is 70 per cent to 80 per cent carbon and is resistant to decomposition because its molecular structure is very difficult for micro-organisms to attack. The recalcitrance of carbon depends on the production conditions, as well as on type of feedstock. Biochars produced above 550°C are mainly condensed aromatic carbon unlike those produced at lower temperature.

In spite of its general high stability it is not inert – it can hold plant nutrients, including nitrogen. The nutrient content of biochar generally depends on the type of feedstock, whereas the availability of nutrients in biochars depends on the element involved. Nitrogen is mostly present as heterocyclic nitrogen so-called black nitrogen, which is not considered as readily available. Phosphorus is mainly found in the ash fraction with pH-dependent reactions controlling its solubilisation. Potassium is fully available to plants. The ash also has a liming value, increasing soil pH and, in the otherwise acid conditions, rendering the nutrients more biologically available.

It is probably these properties, together with the addition of manure and food waste, that has resulted in reports that the addition of char produced a doubling of crop production in the highly weathered soils of Brazil and the sandy soils in parts of Europe. As manure and food waste are broken down by microorganisms, the nutrients released but not immediately immobilised by micro-organisms or taken up by plants, are retained by the char reactive surfaces. Therefore the char provides a source of nutrients that did not come from the char, but are plant available. This also explains the synergic beneficial effects observed when simultaneously adding fertilisers and biochars.

#### SOIL MICRO-ORGANISMS

Micro-organisms are able to colonise biochar relatively rapidly, and have been found growing on particles within a month of application. The interaction between biochar and micro-organisms has been proposed to involve a change in –

- Nutrient availability
- Signalling dynamics between plants and micro-organisms
- The activity of different soil micro-organisms in different ways allowing some to flourish.

Biochar may also act as a refuge for colonising fungi and bacteria by protecting them from predation and desiccation. The consequences of the addition of biochar on the turnover rate of

existing organic matter – more abundant in temperate areas, such as New Zealand – is still unclear. Some studies show an increase in the decomposition of native organic matter caused by the stimulation of soil micro-organisms. Others indicate an increase in the stabilisation of organic molecules from reaction on biochar surfaces, becoming protected from decomposition. Therefore, while the effects of biochar on soils and plant growth has been shown in unfertile soils, the effects on more fertile temperate soils have still to be demonstrated.

#### FURTHER RESEARCH

The Bioprotection Centre at Lincoln University is examining biochar and soil microorganism activity, partially funded by Agmardt. The research involves examining how different types of biochar stimulate different fungi and bacteria in the field, gas emissions and biochar's chemical properties, and increases in plant health and vigour associated with application of biochar and beneficial micro-organisms.

A further use of biochar could be in remediation of contaminated soils. Plant growth has been shown to increase in contaminated soils when biochar is added, suggesting that biochar has potential to help in rehabilitation of soils and waterways. Similarly, biochar applied to soils has been shown to reduce nitrous oxide emissions significantly. As nitrous oxide is approximately 320 times more effective as a greenhouse gas than carbon dioxide, biochar could be very important in mitigating emissions.

Researchers at Lincoln University are working on the nitrous oxide interactions, supported by MAF funding. Decreased nitrous oxide emissions from urine patches have been reported when biochar is applied in pastoral dairy farming situations, the associated soil physics are yet to be explained.

Yet another area being studied is that of energy balance and greenhouse gas foot printing. Life cycle assessment is needed to calculate full energy costs and gains, as well as the carbon balance and to determine whether there are any unforeseen negative consequences. Scale of operation, distance of feedstock from pyrolyser, location of suitable soil and incorporation method all have costs associated which must be assessed. In theory biochar can be a carbon sink, but the practicalities have yet to be investigated. MAF has funded research in life cycle assessment at Massey University, as it has in biochar and pyrolysis. The three programmes interact closely.

### Involvement in carbon trading

Including biochar in a carbon trading scheme is relatively straightforward in comparison with trying to include soil carbon which is fraught with difficulties. The hurdle yet to be overcome is determining the proportion of recalcitrant carbon in the biochar, that is, the proportion that will not decompose in soil. In addition, we do not know the effect biochar has on the native organic carbon in the soil. These are not straightforward and so biochar is unlikely to be included as a mitigation mechanism in the Copenhagen round of climate change negotiations.

However, when the recalcitrant carbon content has been determined and the effect of biochar on native organic carbon is known, the manufacture of biochar and its incorporation into soil can be monitored and soil analysis can be used for verification in

any trading scheme. To ensure that New Zealand makes the most of the biochar potential, research is needed to identify the most efficient methods of production, and the conditions under which adding biochar will be beneficial to soils and plant growth.

It is clear that New Zealand has good reason to lower agricultural greenhouse gas emissions. Two mechanisms have been proposed to achieve this by the government ETS Review Committee –

- Agriculture joining the ETS
- Spending money on directed research.

These are covered by the following recommendations of the Review Committee that 'the agricultural sector be included in the NZ ETS with the long-term goal being that the point of obligation is placed at farm level, once issues relating to the number of participants and the ability to verify farm-level information are resolved' and significant investment be made to reduce agricultural emissions and improve efficiency of pastoral systems'. Specific to biochar, the report also stated that soil carbon sequestration is considered to be an important area for research. Specifically, there is a need to determine its advantages with a thorough and impartial assessment based on relevant New Zealand science.

#### NETWORKS

Researchers in New Zealand are part of an increasing effort to understand the role that biochar might play in the future. Our focus is on investigating New Zealand's unique combination of waste materials, soils and environment to ensure that carbon sequestration using biochar will benefit soils at the same time as allowing carbon credits to be gained.

Transfer of knowledge on New Zealand research and technology developments is being provided by the New Zealand Biochar Network, which also offers a forum for discussion on biochar issues and stakeholders needs. As part of this, a biochar workshop is planned at Massey University in February 2010. Another group, the Australia and New Zealand Biochar Research Network, provides an excellent opportunity for collaborative research with the final aim of advancing in the understanding of biochar properties as soil amendment and carbon sequestration.

### Conclusions

Translating the vision of carbon neutral primary production into reality will take considerable research. The challenge is feedstock and appropriate technology of pyrolysis, effects on soil, and whether the cradle-to-grave calculations indicate an overall benefit in carbon terms. The global protocols, national regulations and the carbon market in which New Zealand might operate are also a vital part of the considerations.

It has been suggested that understanding biochar and using it appropriately is comparable to the effort that was needed to develop fertilisers last century. That being the case, and given the unintended consequences associated with fertiliser use, it is commendable that the effort is being made.

*Jacqueline Rowarth, Marta Camps, Jim Jones, Mike Hedley from Massey University and the New Zealand Biochar Research Centre*

# THE EFFECTIVENESS OF NITRIFICATION INHIBITOR TECHNOLOGY TO IMPROVE THE SUSTAINABILITY OF AGRICULTURE

Keith Cameron, Hong Di and Jim Moir

As reported widely in the general media and also in recent editions of *Primary Industry Management*, there is increasing recognition of the need to improve the sustainability of New Zealand agricultural systems. For example, Fonterra's Mark Leslie stated that the success of New Zealand's dairy industry depends on its continued sustainability.

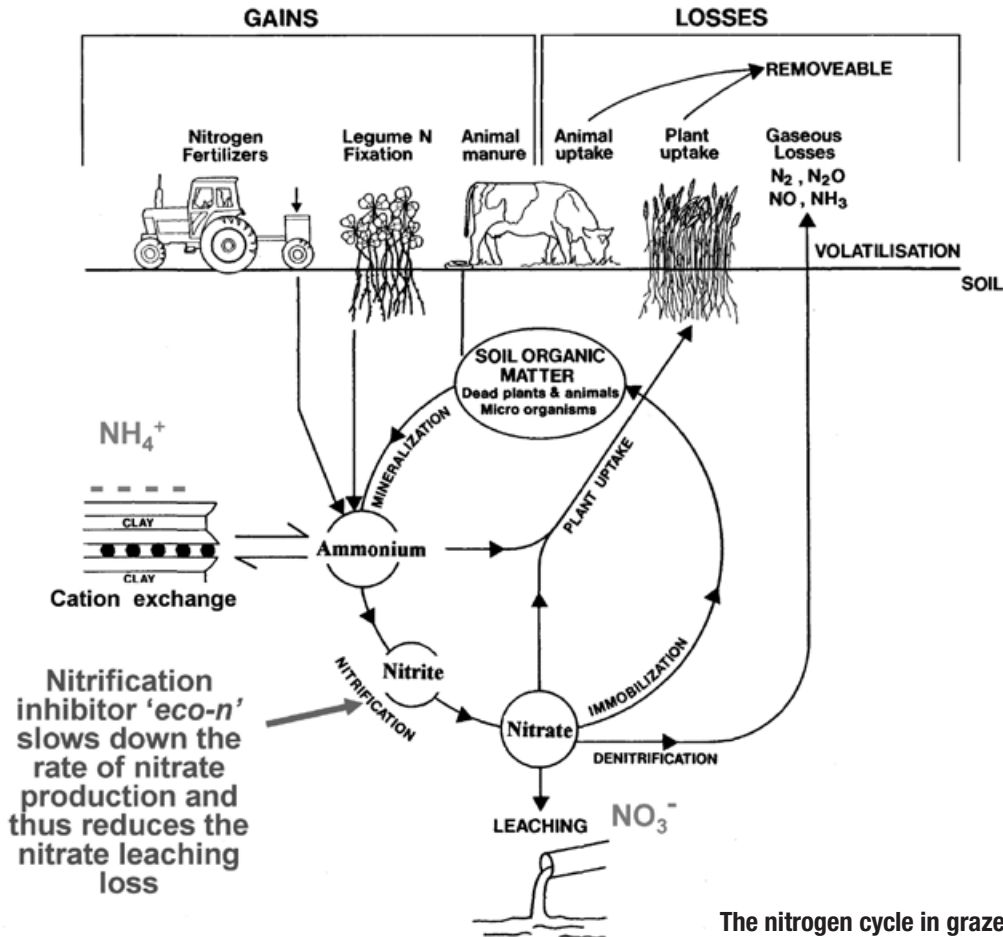
Sustainability issues around greenhouse gas emissions are front of mind for many. Mark Aspin, Manager of the Pastoral Greenhouse Gas Research Consortium recently said 'Global attitudes towards climate change have changed considerably. There is now much greater acceptance of the view that human activities are altering the composition of the atmosphere to such an extent that the planet's energy balance has been changed. The accumulation of greenhouse gases are causing the planet to retain more solar radiation, trapping more of the energy that previously would have been emitted back into space'. It is clear that international agreements between governments will result in a charge for greenhouse gas emissions and that New Zealand will either have to pay for excess emissions or reduce them.

## A REAL RISK

Tim Groser, Minister of Trade, has recently said that there was a need to deal with new environmental and climate change demands in traditional markets in Europe and North America and that the real risk is not about governments. It is that customers, or rather retailers that make the crucial decisions on sourcing, may walk away from New Zealand over environmental, climate change or other production processes and methods. It is a real risk that we must not treat lightly.

Sustainability issues relating to nitrate leaching into rivers, lakes and groundwater are already having an adverse effect on agricultural development. Major irrigation development projects are being delayed because of fears about the environmental effects that will be caused by the intensification of agriculture.

Progress to address those environmental concerns has been made through the development of the draft Canterbury Water Management Strategy released in August 2009. This strategy relies heavily on new technologies, such as nitrification inhibitors, to give the public confidence that threats of agricultural pollution can be reduced. The strategy states that 'Land use practice is changing and there are technologies available such as nitrogen



The nitrogen cycle in grazed pasture systems

## Peer reviewed scientific papers showing the effectiveness of DCD in reducing nitrate leaching

Reference	Season	Soil	Location of soil	Rainfall/ irrigation (mm/y)	Urine rate (kg N/ha)	DCD	Nitrate-N loss (kg N/ha)	Reduction (%)
Di & Cameron (2002) <i>Soil Use &amp; Management 18,</i> <i>395-403.</i>	Autumn	Lismore	Canterbury	1,360	1,000	No	516	-
	Autumn	Lismore	Canterbury	1,360	1,000	Yes	128	75
	Autumn	Lismore	Canterbury	1,360	1,000	No	488	-
	Autumn	Lismore	Canterbury	1,360	1,000	Yes	112	77
	Spring	Lismore	Canterbury	1,360	1,000	No	397	-
	Spring	Lismore	Canterbury	1,360	1,000	Yes	230	42
Di & Cameron (2004) <i>NZ Journal Agricultural Research 47, 351-</i> <i>361</i>	Autumn	Templeton	Canterbury	1,600	1,000	No	85	-
	Autumn	Templeton	Canterbury	1,600	1,000	Yes	20	76
	Autumn	Templeton	Canterbury	1,600	1,000	Yes	22	74
Di & Cameron (2005) <i>Agriculture, Ecosystems and Environment 109,</i> <i>202-212.</i>	Autumn	Templeton	Canterbury	1,200	1,000	No	134	-
	Autumn	Templeton	Canterbury	1,200	1,000	Yes	43	68
Di & Cameron (2007) <i>Nutrient Cycling in Agroecosystems 79,</i> <i>281-290</i>	Autumn	Lismore	Canterbury	1,260	300	No	60	-
	Autumn	Lismore	Canterbury	1,260	300	Yes	10	83
	Autumn	Lismore	Canterbury	1,260	700	No	188	-
	Autumn	Lismore	Canterbury	1,260	700	Yes	75	60
	Autumn	Lismore	Canterbury	1,260	1,000	No	255	-
	Autumn	Lismore	Canterbury	1,260	1,000	Yes	139	46
Di et al. (2009) <i>Soil Use and Management</i> (in press)	Autumn	Lismore	Canterbury	1100	1,000	No	400	-
	Autumn	Lismore	Canterbury	1100	1,000	Yes	177	56
	Autumn	Mataura	Southland	1100	1,000	No	436	-
	Autumn	Mataura	Southland	1100	1,000	Yes	142	67
	Autumn	Harihari	West Coast	1100	1,000	No	123	-
	Autumn	Harihari	West Coast	1100	1,000	Yes	36	71
	Autumn	Mataura	Southland	2200	1,000	No	457	-
	Autumn	Mataura	Southland	2200	1,000	Yes	257	44
	Autumn	Harihari	West Coast	2200	1,000	No	68	-
	Autumn	Harihari	West Coast	2200	1,000	Yes	30	56
<b>Average reduction</b>								<b>64%</b> (s.e. =3.6)

**Peer reviewed scientific papers showing the effect of DCD on the reduction of the nitrous oxide emission factor in New Zealand trials**

Reference	Season	Soil	Location of soil	Rainfall/irrigation (mm/y)	DCD	EF3 (%)	Reduction in EF3 (%)
Di & Cameron (2002) <i>Soil Use &amp; Management</i> 18, 395-403.	Spring	Lismore	Canterbury	1,360	No	3.8	-
	Spring	Lismore	Canterbury	1,360	Yes	0.7	82
Di & Cameron (2003) <i>Soil Use &amp; Management</i> 19, 284-290	Autumn	Lismore	Canterbury	850	No	2.2	-
	Autumn	Lismore	Canterbury	850	Yes	0.6	73
	Autumn	Lismore	Canterbury	850	Yes	0.6	73
	Autumn	Lismore	Canterbury	850	Yes	0.4	82
	Spring	Lismore	Canterbury	850	No	1.5	-
	Spring	Lismore	Canterbury	850	Yes	0.4	73
	Spring	Lismore	Canterbury	850	Yes	0.4	73
	Spring	Lismore	Canterbury	850	Yes	0.2	87
Di & Cameron (2006) <i>Biology &amp; Fertility of Soils</i> 42, 472-480.	Autumn	Lismore	Canterbury	1,050	No	1.9	-
	Autumn	Lismore	Canterbury	1,050	Yes	0.7	65
	Autumn	Lismore	Canterbury	1,050	Yes	0.6	70
	Autumn	Lismore	Canterbury	1,050	Yes	0.5	73
	Spring	Lismore	Canterbury	1,050	No	2.6	-
	Spring	Lismore	Canterbury	1,050	Yes	0.7	73
	Autumn	Templeton	Canterbury	1,050	No	3.1	-
	Autumn	Templeton	Canterbury	1,050	Yes	1.2	61
	Autumn	Templeton	Canterbury	1,050	Yes	1.4	56
Di et al. (2007) <i>Soil Use &amp; Management</i> 23, 1-9.	Winter	Templeton	Canterbury	1100	No	2	
	Winter	Templeton	Canterbury	1100	Yes	0.5	73
	Autumn	Lismore	Canterbury	1100	No	0.8	
	Autumn	Lismore	Canterbury	1100	Yes	0.3	63
	Autumn	Horotiu	Waikato	1100	No	0.6	
	Autumn	Horotiu	Waikato	1100	Yes	0.2	67
	Spring	Taupo	Taupo	1100	No	0.1	
	Spring	Taupo	Taupo	1100	Yes	0.02	80
Di et al. (2009) <i>In press</i>	Autumn	Lismore	Canterbury	1100	No	3	
	Autumn	Lismore	Canterbury	1100	Yes	1.4	54
	Autumn	Mataura	Southland	1100	No	2	
	Autumn	Mataura	Southland	1100	Yes	0.9	55
	Autumn	Harihari	West Coast	1100	No	1.9	
	Autumn	Harihari	West Coast	1100	Yes	0.8	58
	Autumn	Lismore	Canterbury	2200	No	3.9	
	Autumn	Lismore	Canterbury	2200	Yes	1	74
	Autumn	Mataura	Southland	2200	No	1.5	
	Autumn	Mataura	Southland	2200	Yes	1	33
	Autumn	Harihari	West Coast	2200	No	1.4	
	Autumn	Harihari	West Coast	2200	Yes	0.4	71
	Average EF3 reduction (%) for all trials						
							(s.e. = 2.5)

inhibitors that have the potential to reduce nitrogen inputs into water. Modelling suggests that it will be possible to substantially increase agriculture output while maintaining groundwater quality within acceptable limits as long as technologies that reduce nitrogen are applied across the region’.

There is a lot at stake and we need to provide the public with confidence that future agricultural practices will reduce environmental effects. Therefore it is timely to review the effectiveness of using eco-nitrification inhibitor technology to reduce nitrate leaching losses and mitigate nitrous oxide emissions. The technology also grows more grass which is an extra financial benefit today. In the long run it is the environmental benefits of this technology that will be of greatest value to the future growth of New Zealand agriculture.

**THE SCIENCE BEHIND NITRIFICATION INHIBITOR TECHNOLOGY**

The nitrogen cycle in grazed pasture systems is known to be leaky. Excessive amounts of nitrogen are deposited in animal urine patches causing leaching losses of nitrate and also emissions of nitrous oxide, a greenhouse gas

The eco-nitrification inhibitor technology slows down the nitrification process and reduces the rate that ammonium

is converted into nitrite or nitrate in the soil. Ammonium is adsorbed on to the negatively charged cation exchange sites on soil clays and organic matter, protecting it from leaching and allowing it to be taken up by plants, or be immobilised into soil organic matter. In contrast, nitrate is easily leached from the soil because it has a negative charge and is repelled by the negatively charged sites on the clay and organic matter. Reducing the rate of conversion of nitrogen from ammonium to nitrate can help to retain more nitrogen in the soil for plant use.

It is well known that in a grazed pasture system the direct leaching losses of nitrate or nitrous oxide emissions from applied nitrogen fertiliser are relatively small compared to the large losses that occur from animal urine patches. A typical cow urine patch may contain the equivalent of 1,000 kg nitrogen per hectare while a typical application of urea may only apply around 25 to 30 kg nitrogen per hectare for each application.

In order to reduce nitrate leaching and reduce nitrous oxide emissions from grazed pasture systems, such as dairy farms, it is essential that the losses from the urine patch areas are reduced. The development of eco-nitrification inhibitor technology provides a significant opportunity to increase the sustainability of New Zealand agriculture by reducing the nitrate leaching losses and nitrous oxide gas emissions especially from urine patch areas.

**Pasture yield increases measure in scientific trials and in on-farm and paddock pasture plate measurement comparisons**

Site (& reference)	Time period	Trial type	Measurement method	DCD	Pasture production (t DM/ha)	Increase (%)
<b>Full year Trails</b>						
Lincoln (Temuka soil)	2002-2006: 4 year average	100 m <sup>2</sup> plots	Pasture cuts & modelling	No	10.6	
				Yes	12.8	21
<i>(Moir et al. 2007 Soil Use &amp; Management 23,111-120)</i>						
Lincoln (Templeton soil)	2005-09: 4 year average	100 m <sup>2</sup> plots	Pasture cuts & modelling	No	11.8	
				Yes	14.7	25
Southland	2005: Aug to Dec	½ x ½ paddock	Pasture cuts	No	7.3	
				Yes	8.9	22
Temuka	2008/09: May-May	100m <sup>2</sup> plots	Plate meter	No	10.5	
				Yes	12.7	21
<b>Average increase for full year trials</b>						<b>22%</b>
						<b>(se = 1.0)</b>
<b>Spring Trials</b>						
Oxford	2006: Aug to Dec	½ x ½ paddock	Plate meter	No	3.6	
				Yes	4.3	19
Rangiora	2006: Aug to Dec	½ x ½ paddock	Plate meter	No	4.4	
				Yes	5.6	27
Ashburton	2006: Aug to Dec	½ x ½ paddock	Plate meter	No	5.1	
				Yes	6.7	31
Clydevale	2008: May to Nov	½ x ½ paddock	Plate meter	No	4.1	
				Yes	5.2	27
Otago	2008: Sept to Nov	½ x ½ paddock	Plate meter	No	3.5	
				Yes	4.9	40
Otago(Taieri)	2008: May to Nov	½ x ½ paddock	Plate meter	No	3.4	
				Yes	4.8	41
<b>Average increase for part year trials</b>						<b>31%</b>
						<b>(se = 3.5)</b>



There has been extensive research work conducted to develop this nitrification inhibitor technology for New Zealand farmers. The results of this research have been submitted to, and accepted for, publication in internationally peer reviewed science journals. The process of international peer review is very rigorous and is widely recognised as the primary quality assurance process for science. We can examine the results that have been accepted for publication on the effectiveness of nitrification inhibitor technology to improve the sustainability of New Zealand agriculture.

## Consistent information

The previous pages have detailed tables of scientific papers. We have published 14 sets of data in internationally peer reviewed journals which show that DCD based nitrification inhibitor technology reduced nitrate leaching from urine patch areas by an average of 64 per cent, with a standard error of plus or minus 3.6 per cent. The small standard error indicates that there is a high level of consistency in the effectiveness of the inhibitor technology in reducing nitrate leaching losses.

We have also published 23 sets of data in internationally peer reviewed journals which show that the nitrification inhibitor technology reduced nitrous oxide emissions from urine patch areas by an average of 68 per cent, also with a small standard error. This indicates that there is a high level of consistency in the effectiveness of the inhibitor technology in reducing nitrous oxide emissions.

### PASTURE PRODUCTION

Pasture yield increases occur because of the reduction in nitrogen losses from the soil and significantly more plant-available nitrogen remains available for plant growth. There is understandably some variability in the pasture yield data, similar to the variable responses to nitrogen fertilisers, but whole paddock measurements under dairy grazing show significant annual production increases on-farm. The data are particularly consistent in the South Island.

## Consistency and variability

The data in the tables shows that when used according to the specifications the eco-n nitrification inhibitor technology can produce significant environmental and pasture benefits. It is important to emphasise that the technology must be used according to specification.

From talking with farmers and consultants, it is our experience that the most common reason for variability in on-farm performance of the inhibitor is that the inhibitor has not been used correctly. The following are examples of where we have heard of pasture response variability and when we followed this up we have found one or more of the following reasons –

- Only a single application of the inhibitor was made in the autumn and not two applications in autumn and spring
- The inhibitor was applied too late in the spring such as October rather than August
- The inhibitor was not applied within seven days of grazing.

Other reasons for a perception of variability in the effectiveness of the inhibitor are that –

- The pasture growth response was only assessed by eye rather than by direct measurement using a rising plate meter, it is

not possible to see a pasture growth response of less than 20 per cent by eye

- The pasture was grazed more frequently than usual but this was not included in the assessment of effectiveness
- More stock were used to graze the inhibitor area and this was not included
- More silage was taken from the inhibitor area but this extra pasture was not accounted for in the assessment; and last but not least
- Pasture growth was limited by other factors, such as moisture for example, because of insufficient irrigation.

It is essential to use the extra pasture grown. This can best be achieved by grazing down to a low pasture residual of 1,480 kg dry matter per hectare, or about seven 'clicks' on the rising plate meter, and to graze farm paddocks according to a feed wedge.

The specifications for the correct use of eco-n nitrification inhibitor on milking platforms are –

- Apply within seven days of grazing. This requires the spray contractor to arrive at least once a week at the farm and to spray the paddocks that have been grazed within the last seven days. This is particularly important for the autumn application.
- Apply in late-autumn and again in early spring
- For paddocks that are not likely to be grazed until mid-September then the second application can be made in late-July because the inhibitor will be washed into the soil before grazing.

## Conclusions

The peer reviewed international literature shows that nitrification inhibitor technology can be used to reduce nitrate leaching and nitrous oxide greenhouse gas emissions from New Zealand dairy farms and at the same time increase on-farm productivity. The consolidated data shows that the use of the nitrification inhibitor on grazed pasture soils can –

- Reduce nitrate leaching from urine patch areas by an average of 64 per cent
- Reduce nitrous oxide emissions, a potent greenhouse gas, from urine patch areas by an average of 68 per cent
- Increase on-farm pasture production by up to 20 per cent in the South Island.

### ACKNOWLEDGEMENTS

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# SOME OBSERVATIONS ON THE UNITED STATES DAIRY INDUSTRY

Kevin Wilson

*Some commentators use various measurements from the United States dairy industry to justify why or why not the farm gate milk solids payout in New Zealand will go up or down. Similarly, commentators use various measures from the US dairy industry to establish a longer-term global outlook for dairy products and by default, the New Zealand industry.*

*This article attempts to explore some of the measures and their relevance for the New Zealand dairy industry. It concludes that several indicators from the dairy industry in the US are not good at predicting milk prices or the profitability of dairy farms. Nor can they be extrapolated to a New Zealand farm gate price for milk with any confidence.*

## Background to the US dairy industry

In the US in January 2008 there were 9.3 million cows in 57,127 licensed herds. The cows produced 6.4 billion kilograms of milk solids for the year end December 2008 at an average milk solids test of 6.6 per cent by weight. The comparable New Zealand numbers for year ending May 2008 are 4.1 million cows and 1.2 billion kilograms of milk solids from an estimated 11,300 suppliers.

Total US production has been growing at over two per cent a year for the past decade. The rate of expansion in milk production has now almost stopped as a consequence of a combined squeeze from higher input prices, lower output prices and a drop-off in demand. Five states produce 54 per cent of total milk although milk production is recorded in all 50 states including Alaska. The variation in the number of herds per state and the average number of cows per herd in the five key states is huge. Two states, California and Idaho, account for seven per cent of total herds and 28 per cent of output.

### USA herds and production

State	Herds		Milk production		Cows/herd
	Number	Percent total	Million kg ms	Percent Total	
California	1,905	3	1,378	22	970
Wisconsin	13,730	24	819	13	91
New York	5,620	10	415	6	111
Idaho	635	4	411	6	864
Pennsylvania	7,670	5	355	5	72
Sub total	29,560	52	3,378	53	163
Other	27,570	48	2,977	47	127
Total	57,130	100	6,355	100	163

About a third of total US milk production is sold in fluid form at retail outlets. An estimated 40 per cent is used in cheese production and 15 per cent is used to produce butter, both with very high use in the domestic market. Export volumes are larger than one might expect from a domestically focused industry.

## Main USA dairy exports by volume

Product	2007 Thousand tonnes	2008 Thousand tonnes
Skim milk powder	266.4	402.5
Lactose	181.4	185.7
Cheese	99.5	131.4
Whey protein concentrate	139.4	121.0
Butter	32.9	80.1
Whole milk powder	12.4	29.3

Volumes for skim milk powder, cheese and butter in 2008 show a large jump over 2007 which are more typical of levels between 2004 and 2006. Arguably, US production significantly exceeded domestic demand in 2008.

## MILK PRICING

Raw milk is paid for as a dollar value per 100 pounds classified into four classes for payment purposes. Complicated regional Federal Milk Orders establish the minimum monthly price of each class by formulas. Market prices for each class maybe marginally higher. Milk orders are administered by the Agricultural Marketing Service, a division of the US Department of Agriculture.

Class 1 is used for retail fluid milk and cream sales. Class II fluid milk and cream is diverted to commercial food processing. Class III milk is used to produce cheese, anhydrous milk fat and

## National average milk prices in US dollars per 100 pounds weight

Period Year ending	Class I	Class II	Class III	Class IV	All milk
May 2004	14.50	10.10	14.00	11.45	13.40
May 2005	15.80	15.00	14.80	12.90	14.50
May 2006	14.15	13.40	13.00	12.20	12.70
May 2007	14.15	13.60	13.40	12.65	12.50
14 months to July 2008	20.25	19.55	19.20	18.30	18.50
July 2009	14.85	14.25	13.40	12.00	15.50

**Milk prices by selected state in US dollars per 100 pounds weight**

Period Year ending	Wisconsin US dollars	California US dollars
May 2004	15.00	13.40
May 2005	16.10	14.50
May 2006	14.25	12.70
May 2007	14.40	12.50
14 Months to July 2008	20.20	18.50
July 2009	17.95	15.50

butter oil. Finally, Class IV is used to produce butter, condensed milk and any milk product in dried form. Simplistically, the price of each class is based on end use product prices applicable in the previous month. California has a similar but different system with five classes of milk.

Underpinning the Federal Milk Order system is a minimum floor price for cheese, butter and skim milk powder at which level the Commodity Credit Corporation will buy in the product. The minimum prices were increased on 31 July 2009 for three months

for block cheese from US\$2,490 to US\$2,890 a tonne and skim milk powder from US\$1,765 to US\$ 2,030 a tonne.

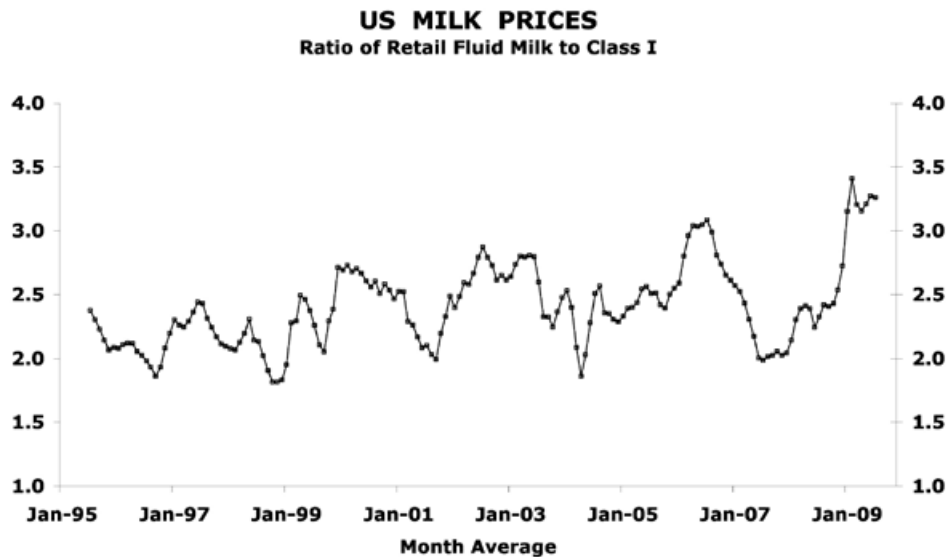
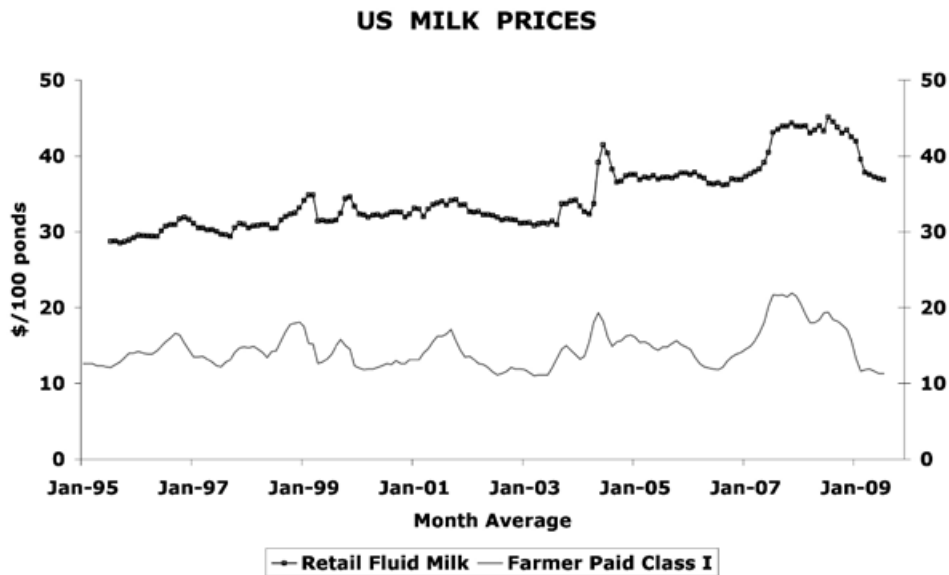
The national average difference between the highest and lowest price in any one year is in the order of two to three dollars per hundred pounds weight or US\$0.65 to \$1.00 per kilogram of milk solids

The farmer receives a weighted market price of the four classes with the weighting determined by the use of milk in that state. Wisconsin milk has a high weighting on the price of cheese. California has a higher weighting on skim milk powder. The actual price paid as a result of all the above is commonly referred to as the mailbox price.

**SIGNIFICANCE OF THE RETAIL PRICE OF FLUID MILK**

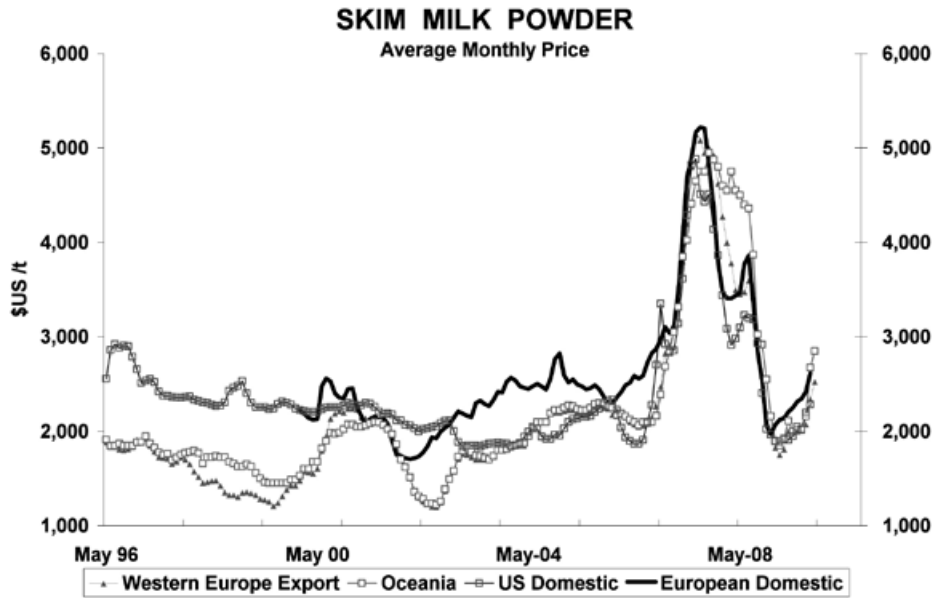
Trends in the retail price of fluid milk are only a fair indicator of the farm gate Class I milk price. A graph of the two price series suggests a reasonable correlation. But the ratio of the retail price to Class I has slowly widened.

The Class I milk price would have been 30 per cent higher in 2009 had the ratio between retail and Class I milk been maintained at the levels applying in 2005 and 2006. The Class I milk price formula also includes a butterfat component.



**US and New Zealand milk prices NZ\$/kg ms**

Period Year ending	All US milk	NZ payout		
		Actual	Adjusted for foreign exchange hedging	NZ payout adjusted for exchange hedging per cent US milk
May 2004	7.76	4.25	3.25	42
May 2005	7.67	4.59	3.95	51
May 2006	6.98	4.10	3.94	56
May 2007	7.01	4.46	4.62	66
14 Months to July 2008	8.81	7.66	7.64	87
July 2009	7.92	5.20	5.20	66



**RELATIVITY OF US AND NEW ZEALAND MILK PRICE**

The US farm gate milk price is not a good indicator of the New Zealand payout. The ratio of the New Zealand payout to the US has narrowed but the range is very wide. The narrowing range could be partially explained by the domestic price of some US products becoming more closely aligned with international prices, particularly those with a moderate export component.

But is that a long shot? Skim milk product exports are only a small proportion of total production, although 2008 was an exception, and unlikely to be a major influence on the average milk price. The price alignment is more likely to do with the spike in the international price of skim milk products exceeding the US floor price and allowing the US to meet the export market without export subsidies. That in turn raised the US domestic price of skim milk products.

The above infers that the ratio of New Zealand payout to the US equivalent could just as easily widen again as US supply and demand become re-aligned. There can only be a very low confidence from predicting a New Zealand farm gate milk price from the US farm gate milk price.

**SIGNIFICANCE OF THE MILK TO FEED RATIO**

The milk to feed ratio is often used to justify why the US milk price should rise. But the ratio is not a good indicator of the profitability of US dairy farms.

The ratio is the weight of a composite feed equal in value to one pound of milk, or the price of milk divided by the cost of one pound of feed. A ratio above three is said to generally indicate positive returns for dairy farmers. The cost of feed is based on the price of corn, soybeans and lucerne hay prepared at a commercial feed mill. The standard 16 per cent protein feed is composed of 51 per cent corn, eight per cent soybean and 41 per cent alfalfa hay.

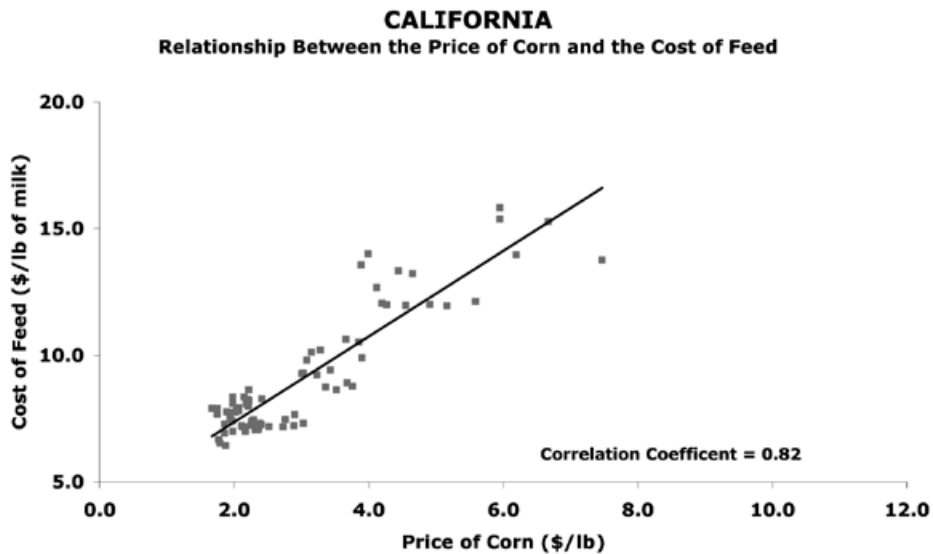
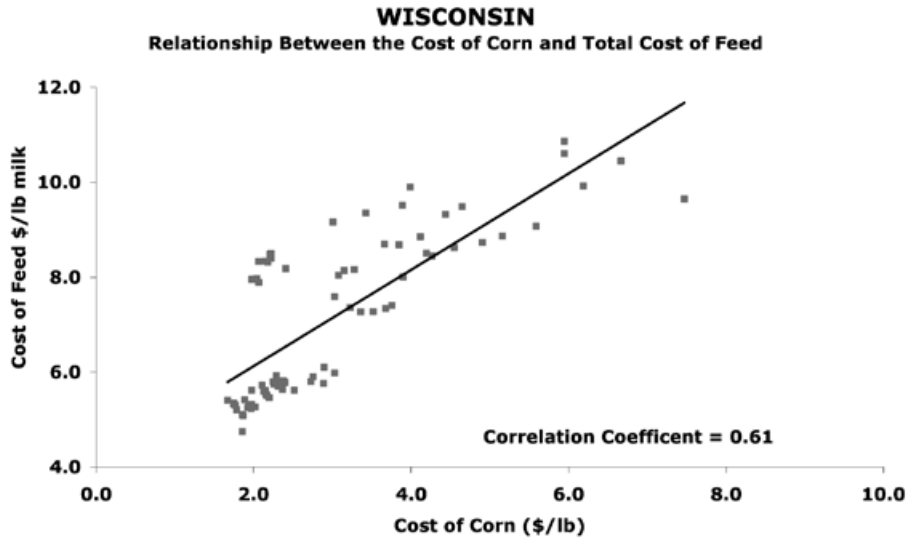
The ratio is obviously a function of the price of the feed components and the price of milk. A ratio of three could be the result of unsustainably low milk prices at a time of very cheap feed. Similarly, a ratio of less than two could be the result of a very good milk price. The ratio also assumes 100 per cent use and conversion into milk.

The ratio appears overly simplistic. An indication of profit requires a second calculation or assumption about the actual amount of feed to produce a pound of milk.

What really matters is the dollar margin of the milk left from the price of milk after a deduction for the cost of feed needed to produce that volume of milk. US researchers estimate that it takes 0.78 pounds of the 16 per cent ration to produce a pound of milk at 100 per cent use. The following table shows three examples highlighting the limitations of the milk to feed ratio and illustrating the margin over feed. The data is for the month of April in the years shown

**Profitability indicator in US dollars**

	<b>Milk</b> dollars per 100 lb	<b>Feed</b> dollars per 100 lb	<b>Milk to feed ratio</b>	<b>\$ Feed/ 100 lb milk</b>	<b>Margin over feed</b> dollars per 100 lb
2001	14.40	4.34	3.32	3.40	11.00
2003	11.00	4.89	2.25	3.80	7.20
2008	18.00	9.52	1.89	7.50	10.50



The table shows April 2008 with a greater margin over feed on a lower milk to feed ratio than 2003.

**SIGNIFICANCE OF THE PRICE OF CORN**

The price of corn is an important influence on costs and hence profits but how important depends on the location of the dairy farm. Farms in the east can supplement the composite feed with varying levels of pasture. Larger units further west may rely on a total purchase regime and the total feed cost is more sensitive to the price of corn. The correlation of the price of corn to the total cost of feed per 100 pounds of milk is accordingly lower in Wisconsin than California.

While the cost of corn is important so are the prices of oilseeds, cotton seed, other grains and lucerne hay.

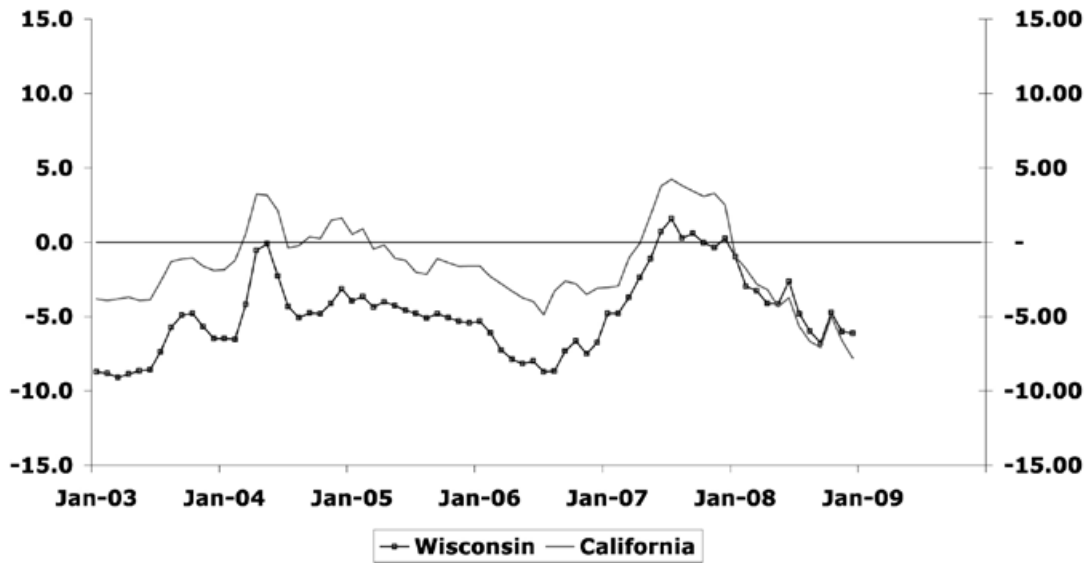
**SIGNIFICANCE OF TOTAL COST OF PRODUCTION**

The US farm gate milk price does not necessarily reflect the economic cost of production. This is illustrated by a negative margin in most months in the past five years.

The buyers may only start to recognise the cost of production once supply is less than demand and that has not been the case in the US in recent times. The analysis is based on a US Department of Agriculture cost of production surveys. The net margin is derived by subtracting the total economic cost of production from the milk price.

The above analysis suggests US dairy farmers have not made an economic profit for the past six years. However, the above analysis may not represent actual net margins. The revenue and cost data used for the analysis made no allowance for the sale

**ECONOMIC NET MARGIN  
(\$/100 lb Milk)**



of cull cows. Other data suggests these items could add up to a US\$2.00 income per 100 pounds of milk.

The analysis does not use actual interest paid but an opportunity cost of interest on working capital and for rent on land. Similarly, wages of management are calculated as the opportunity cost of unpaid labour or what that family labour could earn off-farm. The data does include an allowance for the capital recovery of machinery and equipment, the depreciation and an interest charge on the capital invested in these items including capital livestock.

Many US dairy farmers are still in business because –

- The accounting depreciation allowances have not been spent and the farm and its plant and equipment are being run down
- Drawings have been less than the calculated opportunity cost of unpaid labour
- There is other farm income
- There is off-farm income
- Some combination of one or more of the above.

All strategies are unsustainable and are contributing to the steady attrition of smaller dairy farms from the industry. So why did US milk production continue to increase in the face of apparent losses? The above analysis is all based on average cost

and returns. It is surmised that larger entities continued to expand on marginal cost per marginal return analysis. Basic economics suggests that marginal cost per marginal return analysis gives a different and higher point on the production curve. Indeed, the average herd size is steadily increasing.

**SIGNIFICANCE OF BREAK-EVEN ANALYSIS**

The US farm gate milk prices have to be around 25 per cent higher in 2009 for dairy farmers to have an economic break-even. The economic break-even milk price in 2009 for Wisconsin and California equates to US\$7.90 and \$7.35 per kilogram of milk solids respectively. Wisconsin generally has a lower feed cost per pound of milk than California because of a greater use of harvesting pasture direct with cows instead of cut and carry as in California.

Total costs per pound of milk were lower in California as scale lowered the costs of depreciation and unpaid labour. Feed costs in California escalated faster than Wisconsin in 2009 from the effect of the higher cost of corn.

**IMPLICATIONS FOR NEW ZEALAND**

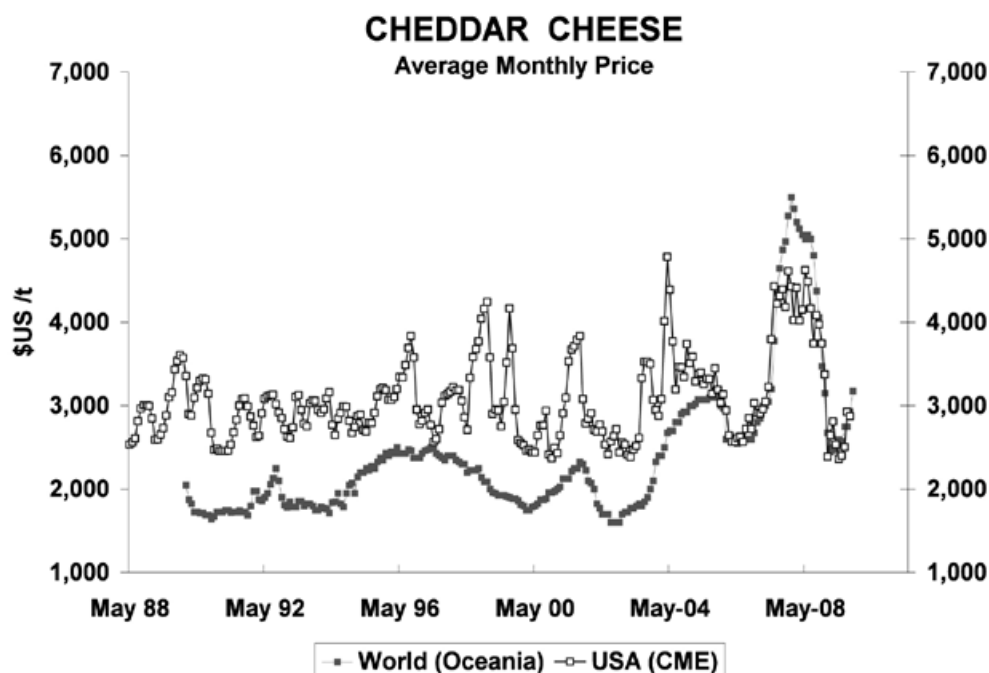
Do the US break-even figures have any relevance for New Zealand and if so, by how much and when? A look back at the table on US and New Zealand milk prices suggests the relationship of US milk prices to the New Zealand payout is quite variable even when expressed in the same exchange rate.

Perhaps one observation is that the US industry will undergo a quite large structural change. Smaller herds will continue to disappear and the growth in milk production will be very low or even decline until demand exceeds supply. Only then will buyers be prepared to pay a price that at least maintains production and look for more preserved milk products from other sources.

The dynamics of the change will be interesting to follow. Smaller herds are in the east where the large part of the population resides and a high volume of milk is required for liquid milk and cheese. Large herds are in the west where manufacturing has a bigger, but not total emphasis on the production of lower value skim milk powder but with a similar on-farm cost structure.

**Economic break-even analysis for selected states  
US\$ per 100 pounds**

Period Year ending	Wisconsin			California		
	Break-even	Actual	Shortfall	Break-even	Actual	Shortfall
May 2004	20.10	15.00	(5.10)	14.20	13.40	(0.80)
May 2005	20.20	16.15	(4.05)	14.10	14.50	0.40
May 2006	20.10	14.25	(5.85)	14.75	12.65	(2.10)
May 2007	20.30	14.40	(5.90)	14.95	12.50	(2.45)
14 Months to July 2008	21.40	20.20	(1.20)	17.95	18.50	0.55
July 2009	23.70	17.95	(5.75)	22.00	15.50	(6.50)



Conclusions at this point include –

- At some point the price of milk in the US will increase but that may take GDP to pass pre financial crisis levels and a reduction in US unemployment.
- A proportion of the higher indebted farmers with large herds in the west may have to go out of business.
- The volume of skim milk powder produced and exported by the US might fall, reducing the influence of US export subsidies on international market prices. US export subsidies have been capped by the last World Trade Organisation agreement but can still be influential, especially in depressed markets. The US had 102,000 tonnes of skim milk powder at the last reported data in July 2009.
- A significant structural shift in the US industry may result in new and cheaper technology to transport liquid milk.
- There might be increased opportunity for New Zealand to export preserved milk products to the US if we can land product in the market place at a competitive cost and a bigger if US trade restrictions on New Zealand dairy imports are relaxed.

#### SIGNIFICANCE OF CLASS III MILK FUTURES

Some market watchers use the trends in Class III milk futures to postulate that the price of cheese will go up or milk production will increase. Neither necessarily occurs on the movement in the price of milk futures. Cheese prices might vary by the day or week, but milk production is governed by biological cycles. Supply cannot be immediately cranked up or reduced just because of a daily or even monthly shift in futures prices.

The trends in the price of futures express market sentiment and appear to follow mean reversion theory. Futures prices tend to be less than current spot prices when the spot prices is above a perceived average and the similarly, the converse applies.

Class III milk futures are available from CME Group on a monthly basis maturing for a period up to two years' time. Approximately half of open contracts are for three months or less and 75 per cent for six months or less. A one month futures contract is a reasonable guide to the Class III milk price in one

month. But the ability of longer-term contracts to predict the actual milk price at the close is poor as are all longer maturing commodity futures. The CME Group is an aggregate of the Chicago Board of Trade, the Chicago Mercantile Exchange and soon the New York Mercantile Exchange, and is the only exchange offering futures for milk and SMP.

The correlation of the price of Class III milk to the US domestic price of block cheese is very high as one might expect by definition. The correlation of the block cheese price to the Oceania export price for cheese between 1999 and 2004 was only modest at 0.46. The relationship has since strengthened. As for skim milk powders, the price alignment of cheese has likely more to do with the spike in the international price cheese.

#### SIGNIFICANCE OF SKIM MILK POWDER MILK FUTURES

The domestic price of skim milk powder in the US is now more closely aligned with the international price as previously mentioned, but the volumes of open skim milk powder milk futures on the CME Group exchange are low. Similar mean reversion tendencies can be observed and a one month skim milk powder future is a reasonable guide to the spot price of skim milk powder in one months' time.

### Overall conclusions

The dynamics of milk prices in the US and elsewhere are complex. The farm gate milk price is a combination of government policy, markets, supply and costs of production. The emphasis of each changes over time.

Several indicators from the US dairy industry are not good at predicting a US farm gate milk price or the profitability of US dairy farms. Nor can they be extrapolated to a New Zealand farm gate price for milk with any confidence. These may be obvious conclusions given the high domestic focus of the US industry and its quite different production systems but the indicators need to be explored to expose the facts or fallacies.

*Kevin Wilson is a rural economist.*

# SHAREMILKING LEGISLATION

John Gardner

*The May 2009 issue of Dairy Alert, the newsletter from Federated Farmers Dairy Section reported that a joint committee had been formed from both the sharemilkers and the sharemilkers employers sections of Federated Farmers to review the 2001 Sharemilking Agreements Order, the 2001 Order. It was stated that there had been many responses to the March 2009 Dairy Alert, which sought submissions on the 2001 Order and that the information had been passed to the committee.*

*The July 30 Dairy Alert advised that the committee had made some very minor changes to the 2001 Order, while other issues were clarified. It was reported that the committee hoped to have the changes ready to go through the parliamentary process by the end of this calendar year, presumably for a new Order commencing 1 June 2010.*

This article outlines the background to the sharemilking legislation, the principal features of the Sharemilking Agreements Act 1937, its mode of operation through an Order in Council, and significant amendments. The problems associated with the 2001 Order are also discussed.

## IMPORTANT LEGISLATION

The Sharemilking Agreements Act is an important piece of legislation for the New Zealand dairy industry covering about 1,500 Variable Order sharemilkers and their employers. Approximately 4,120 farms have a sharemilking operating structure, of which 36 per cent are Variable Order sharemilkers. Variable Order sharemilking constitutes about 13 per cent of all operating structures in the dairy industry. This statistic underestimates the importance of Variable Order sharemilking as herds farmed under these arrangements are larger than average.

In terms of industrial legislation, the Act is unique. The purpose of industrial legislation is to protect employees and ensure minimum rights as found, for example, in the Employment Relations Act 2000, Holidays Act 2003 and numerous others.

The focus of the Sharemilking Agreements Act is on safeguarding the interests of sharemilkers who are independent contractors, not employees. Indeed many are themselves employers, and while enjoying certain rights under the Act, must manage employees who are in turn protected under the Acts mentioned previously.

## History of sharemilking legislation

Legislation to give rights to sharemilkers was foreshadowed in the House in October 1937 by P Coulter during the term of the first Labour Government who said 'Now I want to say a few words in regard to sharemilkers in dairying districts. Like agricultural workers, their rights have not been previously recognised. However the Government is determined to see that they too shall be guaranteed a reasonable and proper standard of living...'

It was not until March 1938 that the Sharemilking Agreements Bill was introduced, eventually passing under urgency. New Zealand in those times had a legislature with an Upper and Lower House. The Bill finally became law, coming into effect on 1 August 1938.

Speaking in Parliament, the architect of the legislation, the Hon Tim Armstrong, Minister of Labour, explained the reasons for the legislation and the process followed in formulating the Schedule to the Bill.

## NEEDING PROTECTION

In 1936 the Agricultural Workers Act had improved pay and conditions for farm workers. This Act made no provision for sharemilkers and representations to the Minister were very soon made by them, many complaining bitterly because they had not been consulted but nevertheless had to pay the increased wages. They contended they were just as much entitled to protection as the farm workers, but had been given no protection.

Essentially the sharemilkers were asking the Minister to amend the Industrial Conciliation and Arbitration Act to allow them to form a union and to bring their case for better pay and conditions before the Court of Arbitration. The problem for the Minister was that the master/servant relationship does not exist in the sharemilking relationship and that the sharemilkers had no standing under arbitration law. Rather than amend the law to allow the sharemilkers to register as a union and knowing that the sharemilking business was difficult and complicated for a Court of Arbitration to deal with, the Minister asked to meet farmer representatives to discuss the problem.

Before the meeting the Minister instructed officials in his department to collect sharemilking agreements and to come up with a reasonable agreement. At the meeting with representatives of the Farmers Union as the employers, the Minister presented this agreement to the representatives and asked them to take it to the sharemilkers to see if they could reach agreement. Agreement between the parties was obtained and this version became the Schedule to the Bill, no alteration having been made to it. It was published in newspapers throughout the country before Christmas 1937.

In the debate, the Minister emphasised that 'all we are asking the House to do is to give legal sanction to the agreement entered between the parties.' The government would not accept any amendments to the Bill although some were proposed by the opposition.

It is of interest that in the draft Bill first presented to the Farmers Union, provision was made to include herd owning



sharemilkers, but both the workers and union representatives considered it unwise to make provision in the Bill for that class of sharemilker. The Act therefore only covered the sharemilking scenario where the land and buildings, livestock and plant and machinery were supplied by the landowner.

## The Sharemilking Agreements Act 1937

The Act contained nine sections and a schedule. The schedule consisted of the 39 clauses agreed to by the Farmers Union and the New Zealand Workers Union of Industrial Workers. The long title makes it clear that the purpose of the Act is to provide for safeguarding the interests of sharemilkers only under sharemilking agreements. Therefore the intentions of the Act are met if sharemilkers' interests are safeguarded, even if these come at the expense of sharemilkers' employers. The Act is for sharemilkers.

Section three of the Act requires that sharemilking agreements not contain conditions less favourable to sharemilkers than those specified in the Act. No term in an agreement can be less advantageous to the sharemilker than those specified in the Act. Therefore even if overall the effect of an agreement is beneficial to the sharemilker, the farm owner cannot enforce any individual term that is less advantageous than those specified in the Act. As Ian Watson, a lawyer with an interest in sharemilking put it, 'There is no give and take. The Act sets a base level. The sharemilker can use the Act as a shield while the farm owner cannot use it to his advantage.'

Section four provided for variation in the terms and conditions in the schedule from time to time by the Governor General, if satisfied that they had been agreed to by organisations representing the interests of sharemilkers and employers. The Act also enabled other classes of sharemilking agreements to be brought within its scope if standard terms and conditions had been agreed to by organisations representing the interests of sharemilkers and employers.

The Act was to be administered by the Department of Labour and sharemilking agreements were enforceable, although not made in writing. Finally, section six empowered inspectors, employees of the Department of Labour, to take proceedings on behalf of sharemilkers to enforce the rights of the sharemilker under any sharemilking agreement.

## The 1945 amendment

In 1945 sections four and five of the Act were amended. The amendment to section four meant that a new Order could come into effect if recommended by the Arbitration Court and approved by the Minister. This was a significant change. No longer was it necessary for there to be agreement between the organisations representing sharemilkers and employers for there to be a new Order. In the event of an inability to reach agreement, either party could go to the Arbitration Court, which could make a recommendation to the Minister who needed to decide whether to adopt or reject the recommendation.

The amendment to section five, which provided for other classes, such as herd ownership sharemilking arrangements, to be brought within the scope of the Act, was even more significant. Before the amendment, for this to happen sharemilkers and their employers needed to agree on standard terms and conditions.

Following the amendment, herd ownership sharemilking agreements with standard terms and conditions could be brought within the scope of the Act if recommended by the Arbitration Court, and approved by the Minister.

## Debating the 1945 amendment

The 1945 amendment was controversial and was strongly opposed by employers, particularly the real possibility that the half share agreements would now be brought within the scope of the Act. In the debate on the amendment government speakers praised the 1937 Act.

'...the sharemilkers have for the first time got reasonable protection under the law of the land. Previously they had no protection, but today they feel secure in their positions.'

Government speakers also attacked farmers for their treatment of sharemilkers as noted by opposition member Hon Mr Cobbe – 'sharemilkers treated badly...undesirable features in regard to arrangements made with sharemilkers...sharemilkers getting a very bad deal...unscrupulous owners'.

Government speakers claimed strong support for the amendment from sharemilkers. Opposition members, who largely represented the owners, strongly opposed the amendment. The sharemilkers' interests at that time were represented by the New Zealand Workers Union of Industrial Workers and many sharemilkers were union members. It did not help matters that a member of the Legislative Council, the Hon R Eddy, was also the president of the union representing the sharemilkers.

Mr Eddy strongly defended the amendment and criticised those who had attacked him. He talked about the difficulty of negotiating with farmers in his role as president of the New Zealand Workers Union. 'We met the farmers union in conference. We have managed to get them up to the barrier three times since 1937, but it has been a long hard struggle. They have granted some concessions. God knows they would be tough, if they did not give us some concessions.'

He argued that the right to go to the court was valuable from the sharemilkers' point of view. He acknowledged that it was not valuable from the employers' point of view, but it would be valuable to have that tribunal to submit a case to even if the court was only permitted to make a recommendation. In discussions with farmers over the proposal to bring the half share arrangements under the Act, with a standard set of terms and conditions, Mr Eddy commented that 'The farmers say to me and the whole world ... this is freedom of contract. It is a private contract between the sharemilker and the farmer. A lot of them [sharemilkers] got notice to quit because they took an interest in the NZ Workers Union. The farmers do not like anybody who is interested in that union. Such people are given notice to quit and told to get another job. Freedom of contract. They went around like Wirths Circus, with their cows, children, wives, dogs and all sorts of contraptions. A beautiful state of affairs. All the guns are loaded against the sharemilker.'

The amendment was passed and incorporated into the Act.

### HALF SHARE CONTRACTS

In April 1946, the New Zealand Workers Union, representing the sharemilkers, and the Farmers Union appeared before the

Court of Arbitration in Wellington. The sharemilkers on half share contracts sought coverage under the Act. According to M Milliken, who undertook a thesis on sharemilking at Massey Agricultural College as part of the requirements for an MAgrSc in 1947, this was the first attempt at measuring sharemilker's incomes.

Perhaps not surprisingly there were conflicting results. The Farmers Union used the results of a farm survey in the Waikato which illustrated the good economic position of sharemilkers relative to their employers. The New Zealand Workers Union relied upon a break up of the guaranteed price which showed the reverse situation.

Following the submissions to the Court of Arbitration, the court recommended that the Minister of Labour take such steps as were necessary to have a standard half share agreement drawn up. For this to happen the other employers and sharemilkers ideally needed to agree on the clauses. Up until May 1947, according to Milliken, the employers had refused to meet the sharemilkers' representatives on this subject. The employers' contention was that a standard agreement could not be applied to the half share contract. Only the Minister of Labour could now bring the half share contracts within the ambit of the Act.

Milliken, in his thesis, wrote that there was a decided possibility that the half share agreements would be brought within the scope of the Act, despite the opposition of the employers. This of course never happened.

### The 1985 amendment

From time to time there are disputes between sharemilkers and their employers and sometimes these come before the courts. One such dispute occurred in 1967 and led to an amendment to the Act in 1985. The case first came before the Magistrates Court, but the sharemilker appealed the decision and it then went to the High Court in New Plymouth.

Briefly, the facts were that a farm owner offered a sharemilker two choices. The sharemilker, who did not own a herd, was offered a sharemilking agreement on the basis that the owner supplied the herd and the sharemilker would receive 39 per cent of the milk proceeds, or the sharemilker could bail the herd and certain implements for £500 and receive 50 per cent of the milk income. The sharemilker chose the latter alternative. The sharemilking agreement and the bailment were executed contemporaneously and were for the same term.

The issue before the court was whether the farmer had provided the herd. This was critical because if the court found this to be the case then the arrangement came under the Act.

The court found that the sharemilking agreement fell under the Act. The consequence was that the sharemilker was able to retain his 50 per cent of the milk proceeds as under the Act he needed to be offered at least 39 per cent. The sharemilker was not required to pay rent for the bailment of the herd and implements, as under the Act there was no provision for a sharemilker to be charged rent and to do so would disadvantage him, which was expressly prohibited.

The court noted the obvious injustice of allowing the sharemilker to enjoy the benefits of an arrangement which he had been offered but rejected, while at the same time retaining the benefits but without the burden of the arrangement he had

chosen. The amendment following this decision excluded from coverage under the Act of bona fide sharemilking agreements where the sharemilker receives 50 per cent of the returns and the employer for the purposes of the agreement, bails or leases the herd or part of it, to the sharemilker.

### The 2001 Sharemilking Agreements Order

The Act provides for new Orders once the government is satisfied that the new terms and conditions have been agreed to by organisations representing the interests of sharemilkers and employers. Following the passing of the Act, there were new Orders in 1939, 1944, 1946, 1951, 1966, 1973, 1977, 1982, 1990, with the most recent being 2001.

The 2001 Order differed from previous Orders in that for the first time the parties representing the sharemilkers, the sharemilkers section of Federated Farmers of New Zealand, and the farm owners the sharemilkers employer's section of Federated Farmers, were both parts of the one organisation.

Negotiations for a new Order began in 1996. There were 11 draft agreements before a facilitator was appointed to expedite proceedings. Finally an agreement was reached on 7 March 2001. The Minister of Labour then submitted the agreement to Parliamentary counsel for drafting into an Order. A draft was sent out on 30 March. The sharemilkers section approved the draft on 5 April, but the employers sought to resile from the agreement on the grounds that in signing off in March 2001, the implementation date of 1 June 2001 had been overlooked and that there was too little time to adequately publicise the new Order.

Advice from the Crown Law Office to the Minister was that the government could rely on the signed agreement and government proceeded to have the Order implemented. The Order was finally made on 30 May 2001, coming into effect two days later on 1 June 2001.

### Regulations Review Committee

At the commencement of each Parliament a new Regulations Review Committee is appointed. There are nine grounds on which the committee can draw the special attention of Parliament to a regulation. The 2001 Order was a regulation and there were two complaints to the committee. The grounds for the complaints were –

- The regulation is not in accordance with the general objectives and intentions of the statute under which it was made.
- The regulation trespasses unduly on personal rights and liberties
- The order appears to make some unusual or unexpected use of the powers conferred by the statute under which it was made.
- The regulation is retrospective where this is not expressly authorised by the empowering statute.

In a comprehensive report, the committee did not uphold the complaints. It did however recommend the government review the Act and consider –

- Who should be the negotiating parties for any agreement
- Whether Orders in Council should be retrospective

Continued on page 36

# THE FUTURE FOR WOOL

Robert Johnston

*Wool, that most wonderful of natural fibres, has clothed mankind for thousands of years, and has made a major contribution to the growth and development of both Australia and New Zealand. However, while processing amazing attributes, wool is losing its place in the textile world and becoming increasingly irrelevant as a choice for consumers and an option for growers, with profitability at an all time low.*

Thirty-five years ago I was privileged to be a member of both the New Zealand Wool Board and the board of the International Wool Secretariat, and on the executive of Wool Research and a raft of other wool industry bodies. I do not profess to have any magic solution. What I do have is an understanding of global promotion, research, product development and product marketing, and how New Zealand can benefit from well executed programmes and a collaborative approach. I offer a few thoughts which might be useful.

## HOW WE GET HERE

Before looking at the prospects for wool's recovery or revival, we need first to review where we have come from, how we got here, and the reasons for the current position. My comments are directed at the stronger end of the clip. The merino segment has successfully positioned itself with marketing initiatives and supply contracts for much of its clip, and mid-micron is quite active in this area also, although not as far advanced. The real worry is with the crossbred sector, which is more than three-quarters of the country's production.

## Profile of the New Zealand wool clip

5 to 6 per cent	Merino	23 micron and finer
16 to 18 per cent	Mid micron	23-32 micron
76 per cent	Crossbred	32 micron and stronger

Wool dominated the early development of both New Zealand and Australia and since the advent of refrigeration in 1880 we have enjoyed the twin benefits from that wonderful animal the sheep, both as a nation and as producers, of meat and wool. By 1950 there were 40 million sheep, by 1982 the numbers had risen to 72 million. Today there are around 32 million.

Production of wool climbed steadily, through 300,000 tonnes, peaked at 381,000 tonnes in 1982, and today is back to 1950 levels of around 165,000 tonnes and falling. Wool was New Zealand's number one foreign exchange earner but it is well down today. Wool represented more than half of gross farm revenue on many properties. Today it is lucky to be 10 per cent.

Prices have peaked and troughed since the boom of 1950. To equate with a 1988 price of six dollars per kilogram for crossbred fleece, today's price of three dollars would need to be \$24. Wool's place in the textile world has gone from dominance to a global spot of four per cent of world of fibre usage by 1975. It was eroded firstly by cotton and then by synthetics, and further eroded by the rising world population and lower production to just over one per cent today.

## End uses of the New Zealand wool

Merino	Men's and women's suiting materials
	Fine knitwear
	Fine apparel
	Fine scarves and shawls
Mid Micron	Knitwear
	Hand knitting yarns
	Medium apparel and socks
	Fine furnishing fabrics
Crossbred	Jackets and coats
	Carpets
	Hand knitting yarns
	Knitwear
	Blankets and duvets
	Jackets and coats
	Futons and bedding
	Insulation

## What did we have and what have we lost?

### PROMOTION AND RESEARCH

Set up in 1937 and then reinvigorated in 1961, the International Wool Secretariat was funded firstly by three then four southern hemisphere grower countries Australia, New Zealand, South Africa and Uruguay. They operated a promotion, research, product marketing and technical support programme in 55 northern hemisphere countries.

Operating from fashion and design right through to the retail counter, it linked every segment of the wool chain into programmes giving each confidence and profitability, with promotion of wool's wonderful attributes at the retail end centred around Woolmark. All that structure and expertise has been dismantled.

### RETAIL AND MARKETS

We have also lost the retail shop assistant's knowledge and commitment to extolling the virtues of wool and wool products to customers, leading immediately to lower consumer demand. In addition we have lost the advantages gained from promotional expenditure at retail, calculated at between \$0.97 and \$1.15 contribution from other segments for every grower dollar spent.

This totalled about AU\$35 million dollars in 1983 and continued to climb.

An example of political influences on a market is the Soviet Union. While we were applauding the breakdown of the Soviet Union, with that went our biggest crossbred market. For six or seven years in a row, Russia took 17 per cent of our wool. The reduction of the armed forces in the Soviet Union from 4.5 million to two million personnel reduced the demand for blankets and greatcoats, and the wool market evaporated.

Operating in both New Zealand and Australia, market support mechanisms have gone. New Zealand successfully operated its own floor price scheme conservatively, sustainably and independently of any Australian influence, for 24 years between 1951 and 1975. It could either supplement or take stock or both.

Australia's reserve price scheme, designed to give growers and economic return, could only buy in stocks below the reserve price. However they set the price too high and 4.5 million bales later the scheme collapsed in February 1991 and took ours with it. This hung over the market for more than a decade before the last bale was finally sold.

#### PROCESSING CONFIDENCE

Processing confidence was shattered by this collapse, with processors losing \$700 million overnight in stock devaluation alone. Some never recovered, and every one of those remaining reduced their exposure to wool, increasing the percentage of cotton or synthetics going through their plants. That wariness still exists.

A huge amount of processing capacity has been lost due to mill closures, particularly in the UK and more recently in Europe. The BWK top-making plant in Bremen using 1,000 bales a day has been sold and shipped to China. Another mill in the UK closed recently owing £4.5 million. Over 380,000 jobs have gone from the sector in Europe and the UK in the last year. Processing went to the low cost countries of Japan, Hong Kong, Korea and Taiwan, but the competitive environment has changed since, with China emerging in the dominant position today.

#### CONSUMER AWARENESS

We have lost consumer awareness and with it consumer appeal and demand. Millions of people do not know about wool

attributes for apparel wear or for interior furnishings. They do not need to buy wool. They go from their heated house, in their heated car, to their heated office, and make purchasing decisions based on price, not on fibre origin.

Wool's attributes are amazing as we know, but the synthetic fibre industry has spent millions on promotion and research. Today nearly all of wool attributes such as warmth, dye-fastness, fibre strength, flame resistance, wearability, durability, water repellency, handle and drape, washability, softness and comfort, have all been emulated. Wool still has them but so do the competitors.

#### INDUSTRY FUNDING AND RESEARCH

The New Zealand Wool Board turned down an offer of a \$20 million a year contribution towards promotional activities from the New Zealand industry following the establishment of Fernmark. What enlightened thinking that was.

The capital funds of the industry are now virtually decimated. When I left in 1983 the capital funds of the Wool Board stood at around \$415 million, made up of cash and wool stocks of \$260 million, minimum price funds of \$135 million, and wool stores another \$20 million.

Growers were paid back \$35 million, new ventures took \$85 million, price support about \$100 million. The balance of \$245 million has been lost, frittered away and gone, an absolute disgrace.

Wool Research is sitting on \$30 million of industry money with vultures circling, waiting to get their hands on it. That money should never be transferred to a private player. Previous work centred in Dunedin was consolidated at Lincoln in 1961 with the opening of Wool Research. This grew and developed to become the world's centre for crossbred wool research, and has made a huge contribution to processing technology and product development. The tufting technology soaked up massive quantities of crossbred wool and the current collapse could have been 15 years earlier without it. Similarly, its scouring technology has improved efficiency all over the world. However, Wool Research has gone from \$30 million annual budget and 200 staff down to 25 staff and I am told is likely to close its pilot plant. We are at risk of not having a research and product development centre at all.

Just recently growers voted an emphatic no to the continuation of a wool levy for another five years. That outcome

## Factors affecting wool price

#### OVER WHICH WE HAVE NO CONTROL

- The economic health of our major consuming markets – the degree of domestic buoyancy in the northern hemisphere
- Political stability and influences – the dismantling of the Soviet Union had a huge effect
- Exchange rate relationships
- Exchange rate relationships between processing country and end user
- Inflation rates
- Interest rates
- Profitability for processors in continuing with wool
- Wool price relative to other fibres

#### OVER WHICH WE HAVE SOME INFLUENCE

- On farm quality – breeding and clip preparation
- Product marketing initiatives
- Consumer awareness and preferences
- Raw wool marketing initiatives
- Product development
- Research programmes, both in New Zealand and globally
- Promotional expenditure, both generic and at retail

was not a surprise given the prices being obtained, the lack of obvious benefits and positive results, the lack of transparency, and the confusing structures emerging, all claiming to bring crossbred growers salvation.

#### MAJOR MARKET DESTINATIONS

In 2005/06 New Zealand wool was exported to 85 countries. In 2008/09 New Zealand wool was exported to 56 countries, a net loss of 29 destinations. Overall, exports in 2008/09 fell by 21,508 tonnes or 15 per cent. New Zealand mills consumed around 12 per cent last year.

### Where are we now?

Fortunately we still have a committed and efficient network of buyers and exporters actively involved in marketing. Their efforts account for the disposal of about 80 per cent of the wool produced and 70 per cent of exports, but their contribution is little understood and under-valued, particularly by growers. Once they have made the purchase, they guarantee payment in 10 days and then proceed to take all the risks from that point on to final delivery. This might be in six months time on the other side of the world. From my perspective their role is crucial.

We still have very effective wool testing services for pre- and post sale testing and must not put this in jeopardy. Grower returns are at uneconomic levels. Now 90 per cent of farmers do not run sheep for wool and production has halved to the level of 60 years ago. Wool Research has been sold to AgResearch and wound right down and global wool research is at minimal levels. Declining global processing capacity is a reality.

Fragmented initiatives see various players, such as Wool Partners International, Elders and Wool Services International, all putting schemes into place, all hoping for success. China now dominates 80 per cent of the world's textiles, and dictate the price of 70 per cent of the world's wool. A third of New Zealand's wool goes to China along with three-quarters of Australia's production. New Zealand is lucky, we have a better spread, but Australia is dangerously exposed.

### What should we do?

Drawing from 50 years as a grower, including 10 representing growers on boards and industry bodies, I offer the following suggestions –

- Learn from our mistakes and do not repeat them, 'there is nothing new in this world, it just happens to new people.'
- Think globally and work collaboratively on a global strategy,

and link back up with Australia, South Africa, and Uruguay if possible, and other countries if we can. You cannot just promote New Zealand wool on its own. As soon as you have some success, someone else will put together an equivalent but cheaper blend from elsewhere. Other wool is not our enemy it is other fibres. The Elders and WPI initiatives are fine for the few growers that sign up, but collectively they will not amount to more than a tenth of the crossbred wool. That is fine if they want to organise some contracts, but there should be a co-ordinated and collaborative approach to promotion, promoting wool. This should also be focussing on wool's environmental advantages and clean, green attributes.

- Forget that the world owes us a living, or needs our wool. It is quite possible to create international blends using wool from New Zealand, the UK and Uruguay.
- Remember that all remaining processing companies have multi-fibre capability and can switch to other fibres at will. Their only loyalty to wool is whether it is profitable for them. The same applies to all the other segments in the chain. If they cannot make a profit from wool they will not remain loyal to the fibre, just like sheep farmers and dairy conversions.
- Forget that we produce the best wool in the world. Except for some crossbred, we do not. It is good but so is Australian merino whose genetics dominate New Zealand merino, and the South American wools are very well grown and of very high quality.

#### FUNDING AND MARKETING

We need to work towards a funding package involving all players, not just a grower levy, but contributions from growers, exporters, scourers, brokers, processors and the New Zealand government. We need a total package to take out globally, promoting wool not just New Zealand wool.

We must re-create consumer awareness and consumer preference. This can only be done in two ways – promotional initiatives about wool's attributes, both generically and at the retail counter. We should be looking to promotional and advertising campaigns that are in tune with today's technology. A talk with Steve Bayliss, Air New Zealand's new head of marketing might be a good start, or Michael Hill Jeweller. Bill Vines who launched Woolmark came out of the paint industry. There is no price advantage synthetics will always be cheaper. Wool must be wanted because it is better.

#### UNECONOMIC NUISANCE

Meanwhile, how far has the flight from sheep gone in New Zealand? Farmers need two reasons to run sheep, meat and

#### Largest volume destinations 2008/09

Country	Percentage of total	Volume change tonnes	Percentage change by volume	Percentage change by value
Australia	4.25%	-953	-16%	-12.3%
Belgium	2.8%	-47,854	-59%	-56%
China	35.9%	+4,238	+11.4%	+21%
India	9.3%	-1,938	-15%	-12.4%
Italy	8.4%	-1,709	-15%	-12.3%
Japan	3.45%	-1,565	-28%	-16.7%
UK	11.4%	-4,600	-25%	-21.9%
USA	2.3%	-851	-24%	-6.5%

wool. For many, wool is an uneconomic nuisance contributing very little to a property's economic farm surplus. We are back to 1950 sheep numbers.

Will land use change continue at the current rate? Perhaps, depending on water availability and dairy prices.

In general wool is not a productive component of choice. It is really only an appendage being held together by the increased productivity and reasonable prices in the lamb segment which is not all that wonderful. Even \$100 a lamb is only a third of the farm gate returns of the 1960s. I hope we can change that because somehow we have to find a way.

We need to activate the research effort and not wind it down further. Do not close the Wool Research pilot plant, or there will be nothing left to test anything. Find out what global research is still being done and coordinate a global effort if possible to avoid any duplication. Actively research new uses and seek out new users.

We also need to encourage the government to examine the effect of the speculative component of foreign exchange traders. Being the first exchange to open each day, it could be argued that most of our trading is for the benefit of others, not New Zealand's. A 40 per cent change in the value of the New Zealand dollar since March is impossible to cope with and has probably taken a dollar a kilo off returns.

#### GO GLOBAL

Our links with the International Wool Textile Organisation (IWTO) must be expanded. Many New Zealand companies and exporters are members. It would be good value for grower interests to gain a 2009 perspective of the IWTO's role and work for the betterment of wool. The IWTO is a global body

of wool processors, continually working for the future good of the wool industry.

The decision to vote 'no' against the wool levy was quite understandable, given the current appalling market returns. Recent expenditure on industry good activities has been pretty blurred with no clear direction articulated to growers and an apparent lack of transparency and accountability. While this decision must be respected, it is in my view essential that a funding package should be brought together involving all players to actively start promoting wool's virtues again. Failure to do so will lead to further erosion of the already parlous state of the industry.

The Ministerial task force appointed in response to the levy vote and the dire state of the industry has a collection of wise heads. It is to be hoped that their collective wisdom will produce something really positive and constructive. They will need to take advice and I am happy to help.

In summary, we have a major industry segment, the large part of which is uneconomic and in serious decline. It is still there, but almost only by default. Do we want to do something positive, or do we go the way of Irish linen – grown in India and processed in China? Or French mustard – grown in Canada and shipped back to Dijon? A huge amount will rest on the task force team. We need to give them all the support we can.

*Robert Johnston began wool classing at the age of 14, earned a diploma of farm management in 1961 and then toured the wool growing regions of Australia in 1962. He was Grower Director for the NZ Wool Board and on the Wool Research Executive for eight years. He is currently working part time as an RMA Commissioner.*

#### Sharemilking legislation – continued from 32

- Whether to require public consultation during the negotiations of an agreement under section four of the Act
- Whether to require a period of notice before an Order comes into force
- Whether the Act should prescribe a negotiating process
- Whether there should be transitional arrangements before a new order comes into force.

In its response, the government noted that the Act had been in place for many years without substantive amendment and its provisions could benefit from a review. The government also noted that some issues raised by the committee. For example, whether the parties should seek independent legal advice before concluding their negotiations and the development of protocols to guide the process of producing an agreement between the parties, could be accommodated within the current Act. Other issues, in the view of government, were more substantive and went to the heart of the Act itself, such as who should be empowered to agree to changes to minimum conditions set out in the Act, the nature of their mandate, whether they should be required to consult publicly before agreeing to changes in the statutory minimum conditions in the Act, and whether the Act should allow for Orders made under it to have retrospective effect.

The government, in January 2002, agreed with the committee's recommendation that the operation of the Act

should be reviewed and undertook to do this when policy and legislative priorities permitted. The Act has never been reviewed as the previous administration had higher policy and legislative priorities.

#### CONCLUSION

The problems in the Act, identified by the Regulations Review Committee in 2001 and acknowledged by the Government early in 2002, remain. The parties to the negotiations are part of the one organisation. Sharemilkers and their employers who are members of Federated Farmers are able to have some influence on the new Order as each has representatives acting on their behalf.

Federated Farmers members, as noted earlier, did have an opportunity to provide ideas on a new Order by responding to *Dairy Alert*. If the procedure followed in 2001 is adopted, any new Order agreed to by the negotiating parties will not be made available for public comment before becoming binding. Sharemilkers and their employers who are not members of Federated Farmers have no opportunity to provide an input into any new Order, but are nevertheless bound by it.

At this stage, the only difference between the process now and that followed in 2001 is that hopefully any new Order will be made rather earlier than two days before its commencement, as happened in 2001.

# MANAGING OUR WATERWAYS

## A JOURNEY FROM THE MOUNTAINS TO THE SEA

**Ken Taylor and Miriam Robertson**

Water is a scarce resource that is often taken for granted. Land managers can make a significant contribution to both the quantity and quality of water as it proceeds towards the coast. This article will follow the journey of a waterway from its source high in the mountains to its entry to the ocean. We will consider the practical value of water and how and why land managers can contribute to a product to satisfy these uses.

### THE MOUNTAINS

This article arose from consideration of the Meridian Energy television advertisement which traces the journey of a twig from the mountains through a river system. We will consider this journey in two sections, the first dealing with the mountain zone and the second the valleys and lowlands. The first will be the contribution to water yield and to a lesser extent quality, whereas the second will deal with quality and to a lesser extent quantity through the management of riparian areas. We are considering land management as it affects water in a positive context.

At the Institute of Primary Industry Management conference in 2006 one of the themes related to water. The focus was water allocation and use rather than the fundamentals of water supply and quality and the appropriate management of this aspect of the resource. Water is more subject to the law of the commons than most other resources. Usable water begins its life somewhere high in the mountains as it falls out of the cloud. Generally not much is thought about that drop of water until it reaches the plains where there are competing uses for its life for irrigation, effluent disposal, drinking and industry.

Because water passes through the hands of so many agencies and individuals on its journey, no one individual is prepared to take responsibility for it. Therefore the actions of one can be completely at odds with the other but no element of responsibility occurs. In reviewing the literature relating to water I found myself retreating to publications from the 1960s, the 1970s, the 1980s, and the 1990s.

### INDIFFERENT ATTITUDE

In April 1968 the Water and Soil Conservation Act became law and for the first time in New Zealand's history, water resources were controlled by one authority, the Crown. J Hayward, in 1969 in an article 'Water for the future' reported on that Act and noted 'In general our attitude towards water has been one of indifference. With plentiful supplies we have tended to use, or control it, for the most immediate and obvious need.'

He then reviewed such issues as pollution, domestic and town water supplies, water for industry, water for agriculture, water for hydro-electric power and proposed a case for river based planning. Unfortunately once again Hayward, in dealing with his river based planning, focused on how we allocate the resource, not how we enhance or protect it.

To be fair to him he subsequently investigated catchment behaviour as part of his research. In 1980 a soil conservator

with the Otago Catchment Board, J P C Watt, reflected on the management of the Silverstream catchment which is one of the tributaries of the Taieri River. In this report he looked at such matters as land use that would reduce rather than enhance flooding potential downstream on the Taieri Plain. He noted that multiple use techniques should be devised to ensure that land resource in the catchment is being used to its optimum potential.

By the late 1970s the debate had heightened with opposing views as to what, if any effect management had on water yield from upland catchments. In fact in 1977 I had the privilege of attending a workshop dealing with high country soil and water problems. In paper present to the course TL Fancourt noted that river control in New Zealand concentrated on the lower reaches and the question why is often asked. His answer was that early settlers generally concentrated on the rich alluvium soils. The fact that these were flood plains did not deter them but acted as a spur to their ingenuity in finding ways of controlling floodwaters.

He also pointed out that water has to flow from higher altitudes to sea level. Depending on the volume of water and the fall, 'we have an amount of energy which has to be dissipated.' This was part of a growing debate about stream dynamics and the balance between stream sediment loads and streambed stability. The Forestry Research Institute picked up on this issue and noted that if you reduce sediments into upper catchments you may actually cause major problems with the river downstream.

As the debate continued it became clear that individual catchments behaved in vastly different ways. Therefore understanding the basics of geology, geomorphology and soils is critical to making meaningful decisions in upper catchment management. In the 1970s there was a major push to remove all livestock from the rangelands of New Zealand to reduce erosion and improve water yields. The debate relating to this continues to rage today, except that there may be other imperatives such as protecting bio-diversity and public recreation. It is inappropriate for me to enter that debate in a paper on water management.

### MORE RAIN?

Picking up on the theme of catchment dynamics the research provides varied results.

JA Hayward, in a paper presented to the Soil and Plant Water Symposium in 1976, noted that in the porous soils of the Torlesse catchment the area contributing to flood flows was close to the stream channel. Therefore the greatest effect of and management would be in this zone. He concluded that changes to vegetation may have limited effect on low flows as supply of water from rainfall may be the limiting factor.

In a paper in 1980 he concluded with the statement 'There is clear evidence that some land uses affect water yields. The problem to be faced, however, is not the general truth of this evidence but its relevance and significance for mountain lands. Put simply, if we want more water from our mountain catchments, we should pray for rain.'

Mark, Rowley and Holdsworth in the same publication concluded that it was clear that vegetation type and condition can affect water yield within the zone of high-altitude snow tussock grassland. But it will be more difficult to determine whether a differential yield response to the vegetation at a site really means that there is an important difference in total catchment yield. They also note that the interception of fog may be a significant contributor to yield. This is challenged in a 1995 publication which suggests the contribution of fog in trial areas is less than two per cent of total precipitation and that this may be no higher for tussock grassland than pasture.

The 1995 publication referred to above also reviews research into the effect of pine forests on peak flows and water yields in the Waipori catchment of Otago and notes that peak flows are lower under forest than tall tussock by 50 per cent to 70 per cent but that low flows are also 20 per cent lower.

#### POSITIVE APPROACH

This has been a very limited scanning of the literature, but where does it leave us? We believe that from the research, along with many years of observation in the high country, that land managers need to take a sensible and positive approach to the use of water catchments. The first need is to appreciate and understand the resource rather than make emotional statements that may be based primarily on our own prejudices.

The upper catchments of our rivers range from snow fields, scree slopes, upland bogs, sub alpine vegetation on skeletal soils, forests, mid altitude swamps and wetlands, tall and short tussock grasslands, grey shrublands and pastures at various levels of development. Each of these contributes different dynamics to the water model. While the research offers varying views, the lowland dwellers rely on water delivered in appropriate quantities, at appropriate quality. So let us return to our life of a river.

**Snow fields** Management has little effect on the contribution of natural snowfields to the water system. Skifields may do, however, as the consolidation of snow may delay yield in the spring. Snowmaking may also delay the release of existing water resources until snow melt occurs.

**Scree slopes** Management will have little effect as these areas have high infiltration rates. Compaction by tracking that concentrates run-off must be appropriately managed.

**Upland bogs** These capture and store water from snow melt and rainfall, releasing the water progressively between precipitation events. They are sensitive areas, easily damaged by recreational use and excessive stock pressure. Management is required to retain the integrity of these areas.

**Sub alpine** These are generally on soils with inherently high infiltration rates. Riparian areas contribute to peak flows and should be managed to retain their integrity. Concentration of water by tracking should be managed. Invasion of harmful organisms such as didymo and giardia is a management responsibility for everyone in this and other zones.

**Forests** These possibly moderate peak flows and reduce low flows. The management of these is possibly more important to meet other objectives.

**Wetlands** These are often the safety valves that moderate water flow through a catchment, reducing peak flows, maintaining low flows and acting as a filter to the water. Management of these to retain the inherent characteristics will significantly affect what happens downstream.

**Tall tussock** These were a focus of much of the literature. The management of them affects water yield and water quality. The Dunedin City Council was convinced of this in their contribution to protecting the Deep Stream and Deep Creek catchments — the source of a significant component of Dunedin's city water supply.

**Short tussock** Management of native short tussock may have limited effect on water yield. But as it attracts higher livestock use and amendment for farming, the ground may be consolidated, increasing peak run-off. Quality may also be affected from increased faecal matter entering the water. In this zone riparian management is increasingly important.

## Looking to the lowlands

When riparian systems are properly managed, they make substantial and positive contributions to clean water as well as to ecosystem and human health. Riparian management is an important topic for modern and management and production. As New Zealanders we are proud of pristine lakes, clear streams and rivers rushing down for the mountains. However, as Environment Canterbury noted it is an acknowledged statement that in most circumstances water quality within a catchment will decline as it progresses from source to the sea.

The topic is not as daunting as it often appears and five simple queries can easily convey a solid basis of base information. They are the six words who, what, when, where, how and why, which form the subtitles for the next part of this article.

#### WHAT?

As previously noted water quality declines as water progresses towards the sea. This is due to the changes in geology, accumulation of contaminants, reduced riparian vegetation, natural and induced low flows and higher intensity of land use in lowland areas. In Canterbury alone, over 75 per cent of lowland water bodies are deemed to be in poor to very poor condition.

PA Memon in a 1996 research paper commented that for our population New Zealand has alarmingly high water pollution levels in lowland agricultural and coastal areas. Not that this is true for all lowland waterways, as some lowland water bodies have water quality equalling that of forested catchments. However, lowland water bodies are more prone to eroding banks, problems with silting, weed infestation and general quality issues. On the positive side, almost all the water pollution is due to diffuse pollution, meaning there are very few sites now in New Zealand where pollution is directly put into waterways.

#### WHY?

There are many reasons to improve the management of riparian areas. Top reasons include —

- Improved water quality, riparian management does not achieve pristine water quality, but it can cause substantial improvements which means better water for stock and for irrigation.
- Improved environmental values such as better habitat for native or valued species such as trout
- Better stock management
- Reduced stock losses, particularly from drowning or sick animals being caught in water bodies.
- Aesthetic and recreational values
- Riparian areas are often migration routes for both plant and



animal species due to their uniqueness which comes from being the boundary between water and land

- Help control floods
- Control erosion, and reduce sediment inputs into waterways up to ten times as much soil is lost from pasture than from forest
- Filter polluted air
- Create a mild microclimate in the surrounding area
- Plantings can produce useful side effects such as shelter, shade or strategic grazing for stock or diversifying farm income and potential timber sources
- For improved end product and marketing advantages
- Ecological engineering advantages by providing shelter for beneficial insects
- Reducing water weed issues as well as algal blooms by appropriate riparian plantings and if woody vegetation is present they act as carbon sinks.

Ultimately it is essential for our land based production systems that New Zealand has clean water and productive soils.

#### WHO AND WHERE?

Anyone can make a difference to water quality in New Zealand, either positively or negatively. However those who have water bodies contained within their properties are ideally situated to make a substantial difference and to reap the benefits of such a difference. Though all water bodies are important and unique it is possible to identify some key priorities in lowland areas as a general rule.

Wetlands are vital and every step should be taken to protect them. They recharge groundwater supplies, attenuate flood peaks, store water to provide summer base flows, filter sediments and nutrients, provide spawning habitat for a wide range of aquatic species particularly whitebait and provide a suitable environment for denitrifying bacteria. According to the Wellington Regional Council publication *A beginner's guide to wetland restoration*, wetlands can break down up to 90 per cent of the nitrogen in run-off. Landowners will also be able to reap huge rewards from protecting these areas, particularly in drought prone areas.

Flowing water bodies such as creeks, streams, irrigation ditches, ponds, and small lakes. These are very important because these are the water bodies that most people identify with and have a great number of demands placed on them. Riparian management is an important issue to be considered regarding flowing water bodies, and can provide many useful benefits apart from altering water quality. One management issue commonly encountered is that they often flow through numerous properties, making combined efforts essential for overall success.

Gullies, seeps and channels are the bottom of the list not because they are the least important. They are one of the main pathways in which excess nutrients and soil reaches waterways but they are the hardest to protect so altering their management is the most difficult.

#### How?

There are six main measures that are regularly advocated for use in the working landscape.

Fencing off the waterway to keep stock out of the waterway. This would normally need the additional costs of water troughs. If this is not a desirable or viable option, allowing restricted access

to the waterway is an option, which although not ideal, is still an improvement on unrestricted access,

Fencing off a buffer strip of grass to keep stock out and reduce run-off is well acknowledged. An effective width of the buffer strip required will be directly related to the slope, soil type and drainage conditions.

Active replanting of a fenced off strip keeps stock out, reduces run-off and reduces nutrient and sediment loading. Replanting leads to a variety of benefits, not the least of which include aesthetic and recreational values. However, to replant a strip of land can be labour intensive and financially demanding. Many regional councils and landcare organisations offer financial assistance for active replanting.

Alternative measures to keep stock out of waterways recommend allowing light stock, such as sheep, to graze riparian areas. This can be beneficial due to the removal of biomass, but without the problems typically associated with heavier stock, particularly cattle or deer.

More traditional soil conservation methods reduce nutrient and sediment loading. Contour ploughing where pertinent does a lot to reduce sediment movement, as does planting trees in gullies to slow run-off and trap sediments. In addition there should be appropriate placement of drainage tiles and tracks as well as directing the run-off into suitable locations. Maintaining suitable ground cover may necessitate lower stocking rates

#### WHEN?

It is generally agreed that the most crucial time to protect these areas is during the winter. Even if it not practical to establish a permanent fence, a temporary barrier or reducing stock could do a lot to improve these areas. If looking at replanting, autumn is the most appropriate time to look at getting things into the ground, this also should mean by the subsequent summer that plants are established and can survive a dry spell without assistance.

### Summary

In the words of Environment Canterbury 'A well managed riparian margin performs a number of important functions making it a crucial buffer between land use activities and waterways.' Management of the waterway is the responsibility of every manager and user. Management of the land beside waterways can improve a resource for individuals, for companies and for society as a whole.

*A full list of references used for this article can be obtained from the editor*

**Ken Taylor is a Fellow of NZIPIM. He has spent over 30 years working in the South Island High Country with pastoral lease management. Miriam Robertson has recently completed her Masters of Natural Resource Management and Ecological Engineering. Her speciality includes wetland and riparian areas.**



# A SMORGASBORD OF AGRIBUSINESS CAREERS IN AUSTRALIA BUT TOO FEW STUDENTS

**Mark Frost and Zelma Bone**

A perplexing conundrum exists within the Australian agribusiness sector. There are strong career opportunities and a healthy number of job vacancies but fewer students entering higher education to study in this area. A lack of responsiveness, inflexibility and the undesirability of current higher education courses have been suggested as one reason for this enigma. It is time for some reflection on how higher education can meet the needs of the agribusiness industry in producing job-ready graduates.

This study reflects on the issues at hand as a result of having canvassed the views of other major stakeholders, including employers, students, careers advisers and academics. It identifies the role of the agribusiness industry to the Australian economy and its growing need for highly trained and educated professionals.

## Reaching a crisis

The shortage of highly skilled and educated labour for the agriculture business sector in Australia is well documented. Despite there being strong opportunities, the number of people choosing a career in this area is declining. The decreasing number of students entering into agribusiness and agriculture is reaching a crisis stage in some universities, as courses will be forced to close, and the resulting collapse of tertiary graduates could create even further major problems for farming and associated agribusinesses.

This article mainly concentrates on the decline of agribusiness education in Australian universities. Agribusiness is recognised as being largely post farm gate, such as in the agricultural support and service industries including banking, insurance, grain marketing, futures trading, fertilisers and farm machinery.

The peak body of the Australian agricultural sector is the National Farmers' Federation (NFF), a non-profit organisation representing farmers and industry specific associations at a national level. In 2008 the NFF released a report outlining future labour requirements for the sector and a proposed action plan. Tertiary institutions have been identified as not meeting the needs of the farming community in relation to the development of highly skilled and educated professionals in business management, agricultural scientists and farm production. To date NFF efforts have largely focussed on improving the vocational skill base of farm labour workforce. The priority is now to improve the business and management skills of farmers with appropriate tertiary qualifications.

At the same time higher education institutions have been trying to grapple with how to attract more students into their agriculture courses. Reflection within Charles Sturt University, has sought to establish how this university was catering to the needs of the sector given that there is healthy job and career prospects but too few students coming in to study. Product analysis and suitability was an obvious step as part of an internal review

process. In addition, many external factors had to be considered such as the cost of study, the effects of the prolonged Australian drought, competition from other institutions. In addition there is competition from mining and services sectors of the strong Australian economy as well as the migration from rural and regional centres to the major urban areas.

This article is a reflection on how Charles Sturt University is performing within the wider agricultural higher education sector. It has involved gathering information from the main stakeholders by interviewing agribusiness employers, discussions with the NFF, a survey of graduating students from agribusiness courses, a revisit to previous research conducted on farmers' attitudes to tertiary education, and reflections from academics involved in designing and teaching of agribusiness courses.

## Agriculture within the Australian economy

There is a natural bias to consider agriculture mainly at a farm gate level. However, this sector now only represents a small portion of the total agricultural sector in the Australian economy. While Australian farm production represents approximately three per cent of Australian GDP and employment, the first stage and second stage agriculture processing sectors of the sector contribute a further nine per cent of GDP and 14 per cent of employment.

The total agricultural sector contributes some 12 per cent of GDP and 17 per cent of total employment. In addition, approximately 50 per cent of sector employment is located in metropolitan areas.

The role of the processing component of the sector is further highlighted by the fact that of total Australian farm production 18 per cent is exported, 14 per cent consumed immediately and the remaining 68 per cent used in other stages of production, either for domestic consumption or export of processed goods. The agriculture sector has also become more diversified. For the financial year ending 30 June 2006, total Australian farm production totalled gross AU\$37.3 billion. Of this cattle production contributed \$7.7 billion, wheat production \$5.1 billion, dairy \$3.3 billion, wine \$3.0 billion, horticulture \$2.5 billion and wool \$2.2 billion.

## EXPORTS

Agricultural exports as a percentage of total Australian exports have remained largely unchanged over the past two decades – from 18 per cent of total exports in 1982/83 to 14 per cent in 2006/07. However the composition of these exports has changed, supporting the structural change in the Australian agricultural sector. In 1982/83 wool, wheat and beef exports comprised 17 per cent of the total 18 per cent in agricultural exports. However in 2006/07 these three commodities only comprised four per cent of the total agricultural exports of 14 per cent. Wine, dairy, cotton and rice exports had increased to be largely similar in size to the original three commodities.

In 1982/83 total farm debt was \$5.4 billion against a total gross value of farm production of \$11.7 billion across 178,000 farming enterprises. In contrast in 2006/07 total farm debt was \$53 billion against total gross value of production of \$ 34.4 billion across 130,000 enterprises.

In short, over the last two decades agriculture in Australia has diversified, developing in industries that require significant capital infrastructure that include irrigation for cotton and rice and development of vineyards for wine. There are also associated financing requirements, increased business and management skills in logistics, people management skills, marketing as wine and dairy are not homogenous commodities and require different marketing skills, and inventory management. The farm gate sector now only constitutes a third of the agricultural sector.

## The need for educated and skilled workers

The agricultural sector requires a labour force with the appropriate skills and attributes at all levels – entry level, skilled labour, research and development, entrepreneurial, management and leadership. Agricultural and agribusiness professionals are crucial in the ability for farming to feed and clothe the world as it adapts to climate variability.

Entry level labour generally relies on on-the-job learning for skill development. If they need further formal training it is gained from short courses, either within industry participants or by vocational educational providers. The latter providers are linked to rural traineeships and produce certificate and diploma programmes. This is the preferred Australian model for vocational occupations such as plumbers, electricians, builders and hairdressers. These courses tend to be more flexible to meet the demand of its learners but are competency based.

Universities provide higher level training and professional education in agribusiness and agricultural science careers such as commodity traders, agricultural economists, agribusiness managers, marketers, veterinary scientists. There is a clear division of provision.

### HIGHER EDUCATION AND AGRICULTURE

In Australia there are 38 universities, of which 16 use the University Admissions Centre for undergraduate admissions into their courses. Of these, six offer courses in agriculture. Based on their titles, 61 courses are related to the science and production of agriculture and 21 courses relating to agribusiness, management and agricultural economics.

In a report to the Council of Australian Agricultural Deans, it was suggested that the number of agriculture graduates dropped by 30 per cent in the five year period from 2001 to 2006. This report provides similar findings to an unpublished internal benchmarking report by Morgan et al in which suggested that between 1998 and 2003 total Australian university enrolments in agricultural courses had fallen by 40 per cent from 2,941 to 1,751 students.

This decline in university enrolments creates uncertainty in the future supply of suitable graduates in the agricultural sector. The Holmes Sackett Farm Staff Report indicates that annual available agricultural graduates now total 1,000 students against around 2,200 available positions. Even adding graduates from agribusiness related courses and other areas, there were

significantly insufficient graduates to meet the demand from the industry. The NFF acknowledge there is anecdotal evidence confirming there are two to three jobs for every agricultural graduate. The NFF identified that the expected collapse of tertiary graduates would create major problems for farming, especially in research and agronomy and will have debilitating effects on our international competitiveness.

### GROWING DEMAND

While these comments focus largely on science and production, the shortage is widespread across all agricultural industries and all skills. Over the next few years it is expected that 92,400 new staff will be required in the agricultural sector together with a further 15,600 staff needed to replace existing staff who may retire. These figures highlight the perplexing conundrum. There is growing demand for qualified and professionally trained graduates in the agricultural sector but universities are facing declining enrolments.

Interviews with employers outlined that there are many contributing factors to the shortage of labour. Firstly, the ageing population means that many of the baby-boomers will be leaving the workforce in the near future. Secondly, the continuing drought conditions highlight the hardships facing the agricultural industry and make it a less attractive career choice for some.

Some parental and careers advisers' attitudes towards recommending an agricultural career suggest the same. Parents may comment that it is all too hard on the land, to go and do something totally unrelated to agriculture or that the less academically gifted child should be encouraged to stay and work on the land. Careers advisers can indicate that farming is in drought and there are no jobs. This is despite findings that agribusiness salaries and lifestyle are comparable with similar occupations in other industries. The majority of Australians still hold the old-world view of farming. It is perceived a sunset industry with no future.

## Criticisms of current higher education courses

Many agricultural courses remain focussed on agricultural science but there is a growing recognition that farms are businesses and the agricultural service industry is huge and a growing sector of the economy. Many technology skills become dated very quickly or many can be learned on the job. Increasingly, financial, marketing, and economic skills are needed.

An area long neglected, and often avoided, is people management. Employers are looking for graduates who have good communication skills, organisation and time management skills, the ability to work as a team, have a customer focus, a flexible attitude and the ability to learn quickly. This is highlighted by the agribusiness graduate selection processes of employers such as ANZ Bank, National Australia Bank, Graincorp Limited, and Elders Limited. These businesses all have graduate processes that involve simulations that involve group work, problem based decision making, communication and critical thinking.

The NFF report summarised three key criticisms of current higher education courses – the lack of responsiveness, inflexibility and the undesirability of current higher education courses. These criticisms have been levelled at the entire higher education sector and it is difficult to determine if specific criticisms are pointed

at all universities or some criticisms are more relevant to some universities.

#### **LACK OF RESPONSIVENESS OF COURSES**

One of the criticisms of higher education has been the seemingly unresponsiveness to new ideas and change. A study by WRTAC in 1995 identified that many farmers want information about, and access to, the latest technology promptly, but the time to develop new technology into courses is not meeting farmers' needs.

More recent studies found that there is keen interest by educators in modern farming, especially when it is related to the environment and sustainability. However, there is still a long way to go before the university programmes offer more than ad hoc studies within their agriculture programmes. There have been some attempts to introduce an approach using financial, environmental and social outcomes, but with mixed success. They tend to be part of individual subjects rather than providing an over-arching course philosophy.

Population growth and demand for food make the shortfall of agricultural graduates a national concern and an agricultural education meets these changing needs. The challenge for universities is to design new courses with sustainability issues at the forefront, where agriculture is part of the solution rather than the cause of the environmental problems.

Experience has shown that attempts to change the curriculum can be limited by internal processes such as the long lead time needed to have changes progressed through the approval hierarchy. On average, a course review process will take 12 months and then a further 18 months to have the changes approved. Universities need to act quickly to re-design courses to reflect the key issues that face Australia – climate change, water allocation and food security. Graduates are needed in agriculture and agribusiness to address these issues. At the present time, universities are not responding quickly enough.

#### **INFLEXIBILITY**

The university is, and was already, addressing many of the issues raised by the NFF. The 12 hour face-to-face in some courses belies the hours that are required outside the class room. The minimum expectation of the university is that the student will spend the equivalent hours in self-directed study and assessment preparation.

There is a misconception that the 12 hours of contact time per week is all that is required for a university degree. Vocational educational providers have greater face-to-face contact but their courses are largely competency-based training. Such courses provide the much needed skilled labour. However, the industry also needs the leaders and professionals in the field that are the products of universities. Higher education develops generic attributes such as critical thinking and communication skills that helps life-long learning.

Contact with students in rural and regional areas reveals requests for the design of the university year to take into account the seasonal work of farm businesses. There may be possibilities for fast tracking degrees as more universities employ a three session per year model. Moving away from the traditional 13 week semester models to more seasonal friendly models is being considered.

Charles Sturt University has promoted itself as Australia's inland university, with several campuses in regional New

South Wales, and prides itself on offering an excellent learning opportunity to rural and regional students. As the majority of its students study by distance, the university has invested in an innovative online learning programme.

This programme is used by all students, regardless of mode, and has opened up much needed opportunities for using the internet for course delivery and for keeping in contact with students. Access to the internet and the speed of the internet in some areas are still issues that the university is dealing with. However distance students study part time and an undergraduate degree is completed in six years of study, compared with three years full time study. An inability to exit with a minor award earlier from the course can be a deterrent from enrolment.

#### **UNDESIRABILITY OF CURRENT COURSES**

This is arguably the most critical of the key issues and questions the prevalence of science and production based courses for a segment that only constitutes one third of total employment and economic contribution of the agricultural sector. Graduating students from Charles Sturt University agribusiness courses have high employment rates and receive comparable starting salaries compared to other new graduates.

Graduating students are required to undertake an exit interview and prepare a course portfolio. The courses have identified seven key graduate attributes including creative and critical thinking, communication, ethical values, self-efficacy and sustainability. Students are required to monitor their development through their portfolio and present this at the exit interview with industry and academic representatives. This process gives the students a solid preparation to starting their career.

Analysis of Charles Sturt University retention rates show that the agribusiness courses retain 80 per cent of the students over their enrolment, which compares favourably to an average retention of 59 per cent for the agricultural production and science based courses. The retention rates are supported by evaluations received from students at the completion of the interview and portfolio process.

In 2008 only 16 on campus students have graduated, which is the smallest number to date for the campus. This compares with a typical group of around 35 graduates. Two-thirds of the students stated that they would recommend their course and a future in agribusiness for the following reasons –

- Excellent teachers with a broad knowledge and life experience
  - Good insight into the agricultural industry
- The course was very broad – production to business based
- It is a great degree that can open many doors into the agribusiness industry
  - The opportunities that the course offered.

Most students commented that they would like to more business related subjects, particularly financial subjects. Only two students recommended more technology subjects in livestock breeding and crop management.

However the agribusiness courses at Charles Sturt University still suffer from declining enrolments. This is a reflection of the wider conundrum in that once they enrol, students have a high retention rate and upon completion, are highly sought. However, there remains a perception that agricultural related courses are staid and old school.

**Continued on page 44**

# THE LAKE TAUPO PROTECTION PROJECT

Graeme Fleming

*The Lake Taupo Protection Project arose from scientific evidence that the Lake Taupo water quality was slowly deteriorating due to increased nitrogen flows into the lake. The water quality has been monitored by Environment Waikato scientists and others over many years.*

Despite frequent variations in quality due to temperature and weather conditions it had become apparent that there has been a steady increase in nitrogen levels that have caused increased algal growth in the lake. This has resulted in a gradual loss of lake clarity and the added potential to seriously affect the overall water quality. Unlike other land catchments, Taupo sub-soils are predominately pumice and therefore act as a large sink draining to the lake. Reducing diffuse flows through the sub-soils became one of the main problems to be addressed with an emphasis on reducing nitrogen at source rather than mitigation.

## **NO COMPROMISE**

Lake Taupo is internationally recognised and forms a keystone for both national and local tourism ventures. Other than its economic benefits it is of iconic status in New Zealand, culturally imperative to Ngati Tuwharetoa and it should be unconceivable that New Zealand should in any way accept any deterioration in its quality.

Scientists identified that over 90 per cent of the manageable nitrogen entering the lake came from urine discharges from stock, mainly from cows. Other sources such as sewerage systems while minor also form part of the overall strategy but are not included in this article.

Geographically the catchment for the lake covers over 270,000 hectares running from Mount Tongariro around each side of the lake and ending just north of the town of Taupo. The eastern side of the lake is mainly planted in forestry with the southern end and western side a mixture of pastoral land, native vegetation and some forestry.

The existing owners have invested extensively in riparian planting and there are considerable numbers of Department of Conservation reserves interspersed with farmland. The focus of the project was on nitrogen flows from approximately 52,000 hectares of pastoral land made up of mostly sheep and beef farms and a small number of intensive dairy farms.

The project was developed jointly by Environment Waikato, Taupo District Council, the Ministry for the Environment and Ngati Tuwharetoa. Despite a lengthy involvement the project was eventually launched using a two tier approach to the problem.

## **HEADING**

The first approach was to ensure that nitrogen levels did not increase. Environment Waikato took the lead and introduced what is known as Variation 5 to the regional plan. This variation introduced for the first time a cap or maximum nitrogen levels which farms could operate under. A system of benchmarking or

determining existing nitrogen levels has been introduced using farm management data. A prediction model worked through the Overseer farm management computer system gives farms a resulting maximum nitrogen level to farm under.

Initially the cap was to be determined as the average of the farms nitrogen levels over the years 2001 to 2005. This was subsequently changed to the highest year during the Environment Court hearings. This regulatory system has been subject to intense debate both through legal channels and in the farming community.

It is interesting to note that in the Environment Court judgment the judge found that he was not convinced by arguments that farming should be treated differently from any other activity having an effect on the environment. In that respect the judgment has clearly brought farming into line with the expectations placed on any other commercial or industrial activity. At the time of writing the court is in the final stages considering minor issues on the judgment and it is expected that the full variation will be finalised before the end of 2009.

## **REDUCE BY 20 PER CENT**

The second strategy was not only to hold levels but to target a 20 per cent reduction of the estimated manageable total nitrogen level. The process eventually agreed to achieve this target was by using direct economic intervention in the market by forming a public fund and an independent charitable trust to administer that fund.

The Lake Taupo Protection Trust was formed with independent trustees and with a trust deed aimed at securing the 20 per cent reduction primarily by introducing low nitrogen land use. This trust has been in existence for approximately three years but only been in the last 18-months has it been able to be active due to delays in achieving the variation. The public fund is paid in sums annually by the Ministry of Environment, Environment Waikato and Taupo District Council and amounts to approximately \$72 million over the term of the project which ends in 2018.

## **BUYING FARMS**

To date the trust has purchased six farms and subsequently transferred and sold these farms with land covenants and agreements in place to ensure low nitrogen use in perpetuity. Purchasing of farms has not been compulsory and all trust purchases were after approach by the land owner. After this, the trust arranged independent valuation before making an offer.

This system of purchase has been widely accepted within the farming community in the catchment. Four of the farms are

now being developed by a new owner into an eco-farm venture involving eco-tourism opportunities with some forestry and a cut-and-carry operation. These farms have a requirement and agreement to a policy of no stocking and therefore create a visible trial on a different farming operation.

An additional 950 hectares of land is being converted to forestry by the existing owner. The trust is buying the nitrogen reduction and ensuring continuance of that reduction by a land covenant, private contract and default forestry right.

To date approximately 25 tonnes of nitrogen have been purchased towards the target of 153 tonnes with the projection that this could increase rapidly as the opportunities from the Emission Trading Scheme come into play. The approach of retiring low productivity farmland, reducing nitrogen and receiving a carbon off-setting income is becoming very real and an excellent business opportunity to farmers in the catchment.

This is now being recognised and the trust is in active negotiations with a number of major landowners. There could be substantial changes of land use and changes in farm management practice to achieve both good business outcomes and reductions in nitrogen.

## BUSINESS OPPORTUNITIES

The project is on course but has some significant challenges ahead. Despite this, the local farming community are now recognising the business opportunities available. Much of the initial concern about working under a capping system is disappearing and being replaced with innovative ideas. There has never been a doubt that all parties involved have wished to safeguard the lake. The issues have been more centered on methods, stakeholder involvement, compensation, communication and a demand for fairness in application of rules and processes.

The project has been controversial as some parties see this as the potential start to requiring resource consents for farming throughout New Zealand. Whether that happens or not will be determined by the farming community's voluntary response to environmental issues as they arise. In very sensitive environments it would appear, however, that to get reasonably quick results programmes similar to the Taupo project using a mixture of regulation and economic intervention can be very effective.

*Graeme Fleming is the Chief Executive Officer of the Lake Taupo Protection Trust*

## A smorgasbord of agribusiness careers in Australia but too few students – continued from page 42

### RECOMMENDATIONS

There are several potential solutions to increase the number of agribusiness students into higher education studies.

There needs to be greater links between the university and industry using cadetships, internships, and industry experience. There are many successful models that can be used but industry must have proactive role in providing opportunities for students – the future of the industry rests with Generations Y and Z. More needs to be done in catering to the career needs of these generations and an acceptance that their needs will differ from many of the baby-boomers that are retiring from the workplace. The younger generation has increased mobility and the desire to change jobs many times and careers several times.

The NFF is proactive in its work to improve the education and training opportunities in the agricultural sector. They have developed working relationships with the Australian Institute of Agricultural Science and Technology, the Australian Council of Agricultural Deans and other key stakeholders. The NFF need to expand its relationships to include the Australian Business Deans Council as this would recognise the importance of business management education within agribusiness.

There could be a national plan for the provision of agri-related courses whereby universities specialise in different agricultural disciplines, allowing undergraduates to mix and match to suit their needs with online courses. One might have irrigation technology, another could have agricultural economics.

A redesign of existing agriculture courses could ensure the employability of graduates so they can hit the ground running as well as developing the discipline expertise required by their professions. This means careful redesign of the curriculum. These job-readiness initiatives need to be embedded within the curriculum and not an add-on. Industry will need to play a collaborative and supportive role in this initiative. The NFF stated that the higher education sector needs closer alignment with industry and become more receptive to marketplace needs and pressures.

The agriculture sector should be promoted as an industry and career path as well as highlighting the advantages of studying at inland and regional universities. This could reduce the natural attrition to metropolitan areas given that once a regional student departs for a city-based education there is only a 40 per cent likelihood that they will return to their regional area.

## Conclusion

The increasing difficulty many in the higher education sector are experiencing in attracting students into agribusiness related courses is in contrast to the strong employment and career opportunities in agribusiness. There is a real need is for universities to review their courses they have on offer in order to attract more students.

Training for the professions is the domain of the universities and the degree remains the common currency when looking for graduate placement. Therefore, university academics must look at how to produce timely, relevant and leading-edge agriculture courses that meet the changing demands in the agricultural sector.

With the strong employment and career opportunities in agribusiness, with competitive salaries and lifestyles, the real need is for universities to review their courses they have on offer in order to attract more students. Training for the professions is the domain of the universities and the degree remains the common currency for graduate placement. University academics must look at how to produce timely, relevant and leading-edge courses that will prepare graduates for not only the workplace but wider society.

*The article is a modified version of the paper supplied for the IFFMA conference A full list of references for this article can be obtained from the editor of this journal.*

*Mark Frost and Zelma Bone are at Charles Sturt University Australia*

# Are you a member of the NZFFA?

The New Zealand Farm Forestry Association has been around for over 50 years. There are 29 active branches and around 2500 members.

The cost of joining if you have less than 10 hectares of trees is only \$75 a year.

## Why join the NZFFA?

### Tree Grower



You will get four copies a year of the *Tree Grower* – the best source of information about growing trees in New Zealand.

### Field days



Your branch will hold regular field days where you can see what other farm foresters have grown, where they may have made mistakes, and what trees grow well. This is an opportunity to mix with other like-minded tree growers

## Special interest groups

If you want to know more about cypress, eucalypts, redwood, blackwood or indigenous trees, then you can have the opportunity to join one or more of these groups. Some have their own magazines, such as *Indigena* for the indigenous group. Many are involved in field trials that you can join and help with. For example the eucalypt group are trying to find the best places to grow ground-durable eucalypt poles to supply the vineyards.

## Annual conference



This is held in a different region every year. The conference is mainly field days and gives attendees the chance to visit farm forestry properties, QEII Trust covenanted areas, logging sites or other places of interest. It is also an opportunity to attend the AGM, meet up with over 200 other members of the NZFFA and have a good time.

## How to join

Joining is very simple. Copy the form below, complete the details and send it to NZFFA, PO Box 1122, Wellington. You will get some free back issues of *Tree Grower* and all your membership privileges.

If you have less than 10 hectares of trees the membership cost is only \$75

For 10 to 40 hectares the cost is \$120 a year.

For over 40 hectares of trees the cost is \$180 a year.



I would like to join the NZFFA  \$75 a year  \$120 a year  \$180 a year

I enclose a cheque payable to NZFFA

Please debit my credit card:  Visa  Mastercard

Number:  Expiry date:

Name on card: \_\_\_\_\_ Signature: \_\_\_\_\_

Address: \_\_\_\_\_

Postcode \_\_\_\_\_

