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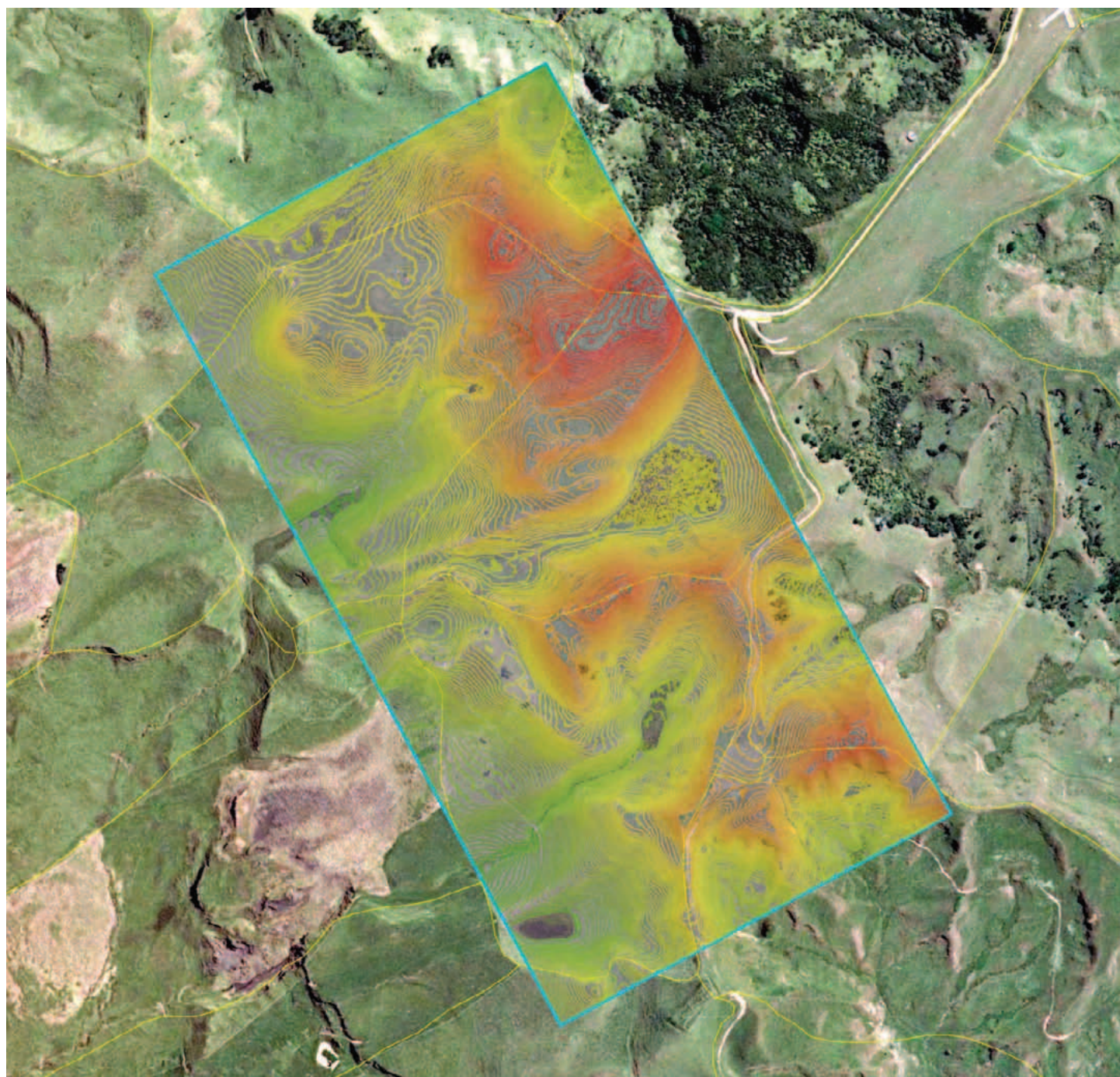
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Unmanned aerial devices

The use of tall fescue

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Primary Industry Management



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

From the Chief Executive

It is difficult to believe that another year is almost behind us. When I reflect on 2014, I believe the NZIPIM and regional branches have had a successful and eventful year. We continue to experience strong membership growth and have just clocked over 800 members, which represent a 15 per cent increase for the year ending November 2014.

This year 42 NZIPIM branch events were held throughout the regions, up from 22 events in 2013. Not only are these numbers impressive, but the quality and range of events have improved. It is also pleasing to see Hawkes Bay/East Coast, Central Districts and Wairarapa/Wellington branches reinvigorated and organising more events within their regions. I would therefore like to thank branch chairs and committees for their tremendous efforts in initiating and organising a range of high quality and well supported events within the regions during the year.

I am firmly of the view that the NZIPIM needs strong and active regional branches in order to have a strong national office. This keeps the NZIPIM grounded in understanding the needs of members and wider farming community in the regions and the less Wellington centric. We also like to encourage members to get involved with local branch committees to build a knowledge base and hone leadership skills. Using a boating analogy, the NZIPIM has a full sail and it is important to keep up the momentum if we are to meet the growing expectations of our members and industry partners.

Over the last twelve months we have held discussion with leading agribusiness entities on establishing strategic partnership arrangements. The purpose of establishing such arrangements is to develop the capability of the rural profession and provide thought leadership on important issues within the primary industry.

Without doubt, the rural profession and farming community is faced with a greater range of challenges in the future. With increasing scale and sophistication occurring on-farm, and the level of scrutiny of our natural resources intensifying, rural professionals need to expand their skills and knowledge to successfully transition their clients into this new business environment.

To facilitate change on our own is extremely difficult and costly to implement. Developing strategic partnership arrangements with likeminded agribusiness entities provides an opportunity to initiate meaningful change by collective action. Discussions with strategic partners has also tested the NZIPIM as the mirror has applied to our role in primary industry and how we add value to our members and become more relevant to primary industry.

In closing, I would like to thank members and our industry partners for supporting the NZIPIM in 2014 and wish you a safe and enjoyable break over the holiday period.

Stephen Macaulay



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Good decisions needed for a safer future

The Safer Farms project led by WorkSafe NZ is a six year plan of action, starting in February next year. Last year 20 people were killed while working in all forms of agriculture, with 11 of them on dairy farms. This total of 20 deaths is more than all those who died in forestry, construction and manufacturing combined. Unfortunately added to these figures each year is at least the same number for farmers who commit suicide.

Health, safety and welfare are important in all workplaces and need action. The recent Independent Forest Safety Review was published at the end of October. This review was instigated because of the high number of deaths linked to forestry work in 2013. The good news is that the serious accident rate and number of deaths in forestry has already been significantly reduced during 2014. It is expected that the implementation of the recommendations from the review will continue the decline in accidents and hopefully reduce the deaths to zero.

There are more workers in agriculture than forestry, but improvements are required if there are to be no deaths in the industry, which is the obvious target. Safer Farms will have to make significant inroads into improving safety on farms. Otherwise there may be a need for another independent review, this time into farm deaths and injuries. Farming may be a risky business but everyone should expect to be able to return home safely each day after work.

The first article in this issue of *Primary Industry Management* covers the results of a survey on how farmers make decisions. Good financial decisions also need to be good for health, safety and welfare. The survey indicates how many farmers use professional consultants and for how long, and it may not be a surprise to discover that the majority of farmers do not invest in paid advisers. However, the data shows that on average, a farmer gets a return of around four dollars for every dollar spent on paid professional advice. It seems clear from this research that professional advisers have an important role to play in ensuring that farmers in New Zealand can run a better business.

Linked to better advice is making sure that your business is not taking on too much debt. Kevin Wilson

in his article takes a detailed look at rural debt and how it may have changed over the years. He asks, and answers, a number of questions with an important one being – is the level of on-farm debt better or worse than 40 years ago? As usual with his articles, Kevin Wilson analyses the figures well and provides some very useful information.

We are never far from the dairy industry, especially at the moment with low international milk prices. However, the Prime Minister in recent comments has indicated the government is confident that the future for dairy is looking good. Ian Proudfoot, in his article, speculates in a little more detail on the future for New Zealand dairy noting that it has been the largest exporter for only 20 years. In 1985 red meat and wool exports were more than twice the value of dairy exports, so a lot can happen in less than 30 years. He suggests adopting a ‘delicatessen strategy’ targeting affluent customers. He also indicates that the industry needs to respect and respond to the concerns which the wider population has about dairying.

Still with dairying, Adrian van Bysterveldt and Michael Murphy look at what is happening in Ireland. In March 2015 milk quotas will be abolished and Irish farmers are poised to increase their milk production rapidly, with government support. They will be able to produce high quality milk at an internationally low price. The news is not a surprise, but with tax concessions and grants available, it is the best time for Irish farmers to capitalise on their opportunity.

If New Zealand is to continue improving its primary industry production, we need to future proof against biosecurity problems. The article by Philip Hume covers this topic by looking at the changes expected in biosecurity systems over the next 10 years. The loss to the primary sector from pest, weeds and disease account for two per cent of gross domestic product, bearing in mind that primary industry contribute only just over six per cent. Climate change will exacerbate existing biosecurity problems as pests move south and new pests find our climate more suitable. The changes will increase uncertainties about future risks.



Kevin Old and Peter Nuthall

Who makes the decisions on New Zealand farms?

To work with farmers in improving their decision-making and financial situation it is important to have information about the on-farm help used in making farm decisions, as well as the off-farm help which farmers use. To understand the situation better, a nationwide survey was conducted over the latter half of 2013. Starting in June, survey schedules were mailed to over 2,000 randomly selected farmers throughout New Zealand. Over 800 satisfactory replies were received giving a response rate of 36.1 per cent.

The sample was selected from regions, farm types and farm size with the intention of surveying full-time farmers. Responses from part-time operations were discarded. The farm details were compared with the national statistics to ensure the sample was representative and the differences were minimal. The financial arrangements of the farm managers and horticultural property managers in the replying sample are shown in the table.

Despite comments in the agricultural media, most farms are managed by traditional farmers either as sole traders or in partnerships, which leaves 14.5 per cent in various other arrangements. The remaining sections consider the amount of professional help farmers use in their decision-making overall and according to the farm types, as well as on other categories. Expenditure made in purchasing advice is also listed.

Short-term, strategic and long-term planning arrangements are all also provided to help make decisions. Finally, summary data on the use of formal boards of directors and advisory committees is provided. The

conclusion provides an overview as well as the return farmers receive from their investment in consultants.

Management arrangements – percentage of the sample falling into a range of categories

Paid manager with no financial interest in the farm	1.70
Paid manager with some financial interest in the farm	5.70
In a partnership and receive a share of the profits but no salary	44.1
In a partnership and receive a share of the profits and a fixed salary	12.8
Receive profits but no salary and not in a partnership	28.6
Sharemilker with some ownership of assets and receive profit share	1.50
Sharemilker with little ownership of assets but receive a share of profits	0.20
Other or missing	5.30

Sources and quantity of professional help

Not all farmers use professional consultants, but those who employ assistance use them for quite a wide range of hours each year. The table below provides the details of the use of consultants, as well as a range of other professionals, although the trusted person is often not a professional. In the question on assistance the farmers were given the possibility of nominating 'other' and most talked about a relative or friend. These are listed under trusted person. The data covers a range of assistance because the question asked the farmer to give the hours spent on their affairs. Some personal problems could be included but later tables are restricted to just farm matters.

Use of mainly professional help – percentage using the stated number of hours each year for discussions on 'your affairs'

Annual use hour ranges	Farm consultant	Accountant	Lawyer	Business consultant	Banker	Company representative	Trusted person
0 to 10	52.3	89.3	97.8	85.7	87.5	62.5	25.9
11 to 20	18.3	8.0	1.1	3.6	9.4	25.0	22.2
21 to 30	10.4	1.0	0.0	4.7	0.0	6.3	7.5
31 to 40	7.5	1.0	0.5	1.2	0.0	0.0	7.4
41 to 50	4.7	0.7	0.0	1.4	0.0	6.2	18.5
51 to 60	0.7	0.0	0.0	1.2	0.0	0.0	3.7
61 to 70	1.1	0.0	0.0	0.0	0.0	0.0	0.0
71 to 80	1.8	0.0	0.0	0.0	0.0	0.0	0.0
81 to 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0
91 to 100	2.1	0.0	0.6	1.2	3.1	0.0	3.7
over 100	1.1	0.0	0.0	0.0	0.0	0.0	11.1
Average	20.74	5.68	2.95	7.64	8.75	13.56	50.59

Most farmers use professional help sparingly. The last row in the table gives the average hours each year with the trusted person category being significantly more than the others. However, 11 per cent use over 100 hours a year which increases this average significantly. It is probable that help from, for example, a retired father living on the farm and some spouses would be in this category. The next most used professional is the farm consultant, but most farmers only use a small number of hours – 52 per cent using fewer than 10 hours a year. The users of 50 hours or more make up 6.8 per cent of farmers.

Following on are the company representatives with an average of 13.6 hours a year. This use of what would mainly be well-trained specialists is quite common in many parts of the world, according to international data. Many become trusted advisors.

The use of professionals does vary according to farm type. The next table provides a breakdown of the average hours used each year. Dairy farms are relatively heavy users of farm consultants, but cropping farmers use more. Sheep farms, and in particular horticulture, are also heavy users. When it comes to accountant, lawyer and banker use the levels do not vary much except for cash cropping, whose managers clearly have many banking concerns

Use of various advisor types according to farm type – average hours each year

Farm type	Farm consultant	Accountant	Lawyer	Business consultant	Banker	Company representative	Trusted person
Sheep	17.33	5.94	3.93	8.93	5.10	9.33	54.86
Sheep/beef	13.06	5.08	1.67	5.31	7.67	18.14	64.17
Deer	4.00	9.00	10.00	N/A	N/A	N/A	N/A
Cattle	8.92	3.87	2.68	2.20	1.12	20.00	60.00
Dairy	24.93	6.07	3.32	4.18	6.60	6.00	47.70
Cash crop	27.92	4.00	0.40	31.17	53.00	20.00	25.00
Hort and other	22.46	7.11	2.33	11.75	3.39	1.55	8.63

Where the term not applicable is used it usually means no answer has been provided or there are no farmers in the category. It is to be expected that the use of professionals would vary with the size of the farm and the age of the farmer. The next tables provide this information.

Use of various advisor types on farm advice according to net asset investment – average hours each year

Asset range in dollars	Farm consultant	Accountant	Lawyer	Business consultant	Banker	Company representative	Trusted person
under \$5 million	15.64	4.95	1.91	6.86	5.70	13.67	64.92
\$5 to \$10 million	21.84	6.67	3.33	11.06	21.57	12.67	62.33
\$10 to \$15 million	30.74	6.62	3.00	5.83	6.00	15.00	37.00
\$15 to \$20 million	28.86	11.50	1.50	15.75	N/A	N/A	40.00
\$20 to \$25 million	76.67	10.50	20.00	10.00	N/A	N/A	10.00
over \$25 million	79.43	10.20	22.40	6.67	1.00	N/A	5.00

Other than for trusted persons, and possibly for the business consultant, banker and company representative categories, the use of professionals tends to increase with the net asset size of the business. However, when it comes to the effect of age, consultant use tends to decline with greater age as would be expected, but there is not much change in accountant use.

On the other hand, there tends to be a slight increase in lawyer use with age, due probably for succession matters to be dealt with. In addition the younger managers use bankers more as they arrange purchases and loans as well as ownership matters. Business consultant use is significant, and probably relates to off-farm investments. Older farmers make greater use of business consultants than their younger colleagues.

Use of various advisor types on farm advice according to age of farmers – average hours each year

Age range years	Farm consultant	Accountant	Lawyer	Business consultant	Banker	Company representative	Trusted person
26 to 35	41.82	5.56	1.80	0.0	52.5	10.00	N/A
36 to 45	24.26	5.12	1.39	9.50	4.25	28.33	55.00
46 to 55	17.02	6.30	3.26	9.35	6.04	8.20	28.57
56 to 65	21.09	5.50	2.83	4.47	6.32	10.67	74.25
over 65	21.68	4.90	3.58	11.83	4.00	13.00	27.50

Who makes the decisions?

As well as looking for outside advice, farmers also use a range of support systems to help in their decisions. The questionnaire split the decisions into long and short-term ones as it was thought there might be differences. For long-term and strategic decisions, the next table gives the percentage of farmers relying on the sources listed and also the percentage who rely on just their own resources.

In the questionnaire the farmers were asked to rate sources of help on a one to five scale. One represented that it was 'true' that they used the help, whereas five meant they did not use the source. To summarise the data, the percentage of farmers rating a source one or two, indicating the question is mainly true, was calculated to give the table results. The columns have abbreviated names with the meanings shown below –

- 'Make all' means they make all decisions but with advice from family, friends or colleagues
- 'Confer' means they frequently confer and take advice from a professional consultant
- 'Partnership' means that as a partnership we make most decisions
- 'Sole decider' means they make decisions without discussions with others
- 'Trustees' means a farm is owned at least in part by a trust and you consult the trustees.

Percentage of farmers in each category in decisions and assistance provided for strategic and long-term policy by net investment level and scoring each category between 1 true that assistance provided and 5 not true

Asset range dollars	Make all	Confer	Partnership	Sole decider	Trustees
under \$10 million	78.01	35.34	55.17	61.32	27.86
over \$10 million	59.68	53.97	62.29	30.51	36.07
over \$15 million	53.57	62.07	55.17	25.93	28.57

The columns and rows do not add to 100 per cent as there are some cross-overs. Use of the trustees is relatively stable across farm sizes as are the partnership discussions.

To relate this information to farm type, the next table was created in which the average scores are provided. The last row gives the percentage of farmers rating the source one or two on the five-point scale – they make serious use of the source of assistance.

Degree of farmer involvement in decisions and assistance provided by farm type – a scale of 1 means true to 5 not true

Farm type	Make all	Confer	Partnership	Sole decider	Trustees
Sheep – intensive	1.84	3.35	2.76	2.45	3.69
Cattle	1.83	3.71	2.61	2.03	3.94
Sheep and beef	1.78	3.52	3.02	2.43	3.64
Cropping	1.96	2.46	3.22	2.28	3.35
Dairy	2.09	2.62	2.34	2.80	3.55
Deer	1.71	3.57	2.86	2.29	3.57
Other livestock	2.00	3.33	1.33	1.67	4.00
Flowers or ornamental	2.67	4.67	3.00	2.67	5.00
Vegetables	2.22	3.50	2.50	2.86	4.71
Fruit and viticulture	1.79	3.02	2.18	2.07	3.32
Other	1.80	2.50	2.41	2.53	4.19
Column average	1.92	3.11	2.62	2.49	3.68
Per cent with score less than 2	74.87	37.42	55.56	58.53	29.37

The importance of decisions across all farm types is reinforced by most ratings in the first column being less than two, and the ‘sole decider’ column is not much higher with an average of 2.49. The ‘confer’ column is much higher, reflecting that farmers do not confer much with others, and this applies across farm types. Overall, there are few distinctions between farm types.

When it comes to short-term decisions there does appear to be more significant differences across farm types, at least in some cases as shown in the next table. Some of the horticultural properties seem to rely more on themselves, but there are exceptions. However, overall the differences between the farm type and farm size data is not major.

Degree of farmer involvement in decisions and assistance provided for tactical or short-term questions by farm type – rating on a scale of 1 true that assistance is provided to 5 not true

Farm type	Make all	Confer	Partnership	Sole decider	Trustees
Sheep – specialised	2.00	3.02	2.83	2.73	3.89
Beef cattle	2.09	3.49	2.60	2.46	4.16
Sheep/beef	2.04	3.20	3.02	2.52	3.87
Cropping	2.07	2.27	3.21	2.64	4.35
Dairy	2.48	2.55	2.35	3.31	3.62
Deer	1.43	2.86	2.86	1.86	3.71
Other livestock	2.33	2.00	1.67	2.67	3.67
Flowers/ornamental	3.67	5.00	3.75	2.67	5.00
Vegetables	1.83	4.17	1.86	4.33	4.71
Fruit and viticulture	1.89	2.64	2.46	2.71	3.61
Other	2.06	2.78	2.48	2.90	4.17
Column average	2.17	2.92	2.64	2.86	3.85
Per cent with score less than 2	68.19	45.37	54.43	48.41	24.01

Percentage of farmers in decisions and assistance provided for tactical or short-term questions including day-to-day decisions by net investment level and scoring each category on a scale of 1 true that assistance provided to 5 not true

Asset range dollars	Make all	Confer	Partnership	Sole decider	Trustees
under 10 million	69.13	45.33	54.41	50.94	23.23
over 10 million	53.22	52.45	50.00	20.69	30.36
over 15 million	55.17	60.71	46.15	22.22	20.00

Other forms of help

In recent times there has been talk of using formal boards and advisory committees to help with the more strategic questions. The next table gives the percentage of farms of various sizes which use this form of assistance. For the smaller farms, little use is made of boards as might be expected, but rather more have committees. This tends to reverse as farm investment increases, but is still generally minimal except for the very large farms, of which there are few.

Percentage of farms with a formal board or an advisory committee according to their net asset range

Asset range dollars	Per cent with board	Per cent with committee
under \$5 million	1.74	5.04
\$5 to \$10 million	3.97	6.35
\$10 to \$15 million	14.71	11.76
\$15 to \$20 million	16.67	8.33
\$20 to \$25 million	50.00	0.0
over \$25 million	36.37	0.0

The next table reflects the reasonable trust farmers have in their advisors, at 56 per cent, but 27 per cent are not sure, and 10 per cent are quite dubious about their advisors or potential advisors. The numbers using consultants to a serious degree is less than 56 per cent, so potentially there should be a significant demand currently lying dormant. The table also shows that 52 per cent believe they need help in making risk decisions, but 26 per cent believe they do not need help in controlling risk. This is more than the percentage having little trust in advisors.

Farmers' views of the trust they have in advisors and their need to request help from others in controlling risk. Percentage of farmers scoring on a 1 to 5 scale whether they have trust in advisors 1=complete trust, 5=no trust in advisors

Score on degree of belief	Trust in advisors	Need others to control risk
1	27.3	28.7
2	28.8	23.4
3	27.3	21.7
4	7.2	11.6
5	9.4	14.5
Average score	2.42	2.59

In the next table the reported mean expenditure on consultants is most important in dairy farming, followed by extensive sheep and cattle farming. But the greatest expenditure is from cash cropping farms. These are mean figures. Therefore as many farmers do not employ a consultant at all, the expenditure on consultants by employing farmers is much higher.

Expenditure on decision help by farm type and net investment

Farm type	Mean expenses dollars	Asset range dollars	Mean expenses dollars
Sheep – intensive	1,407.91	less than 5 million	1,327.72
Sheep and cattle	2,686.73	5 to 10 million	3,806.12
Deer	0.00	10 to 15 million	6,361.76
Cattle	635.33	15 to 20 million	13,300.33
Dairying	4,237.81	20 to 25 million	5,133.33
Other animal	1,200.00	over 25 million	17,725.00
Fruit and viticulture	1,649.90		
Cash crop	5,818.18		
Flowers/ornamental	0.00		
Vegetable	0.00		
Other	1,481.25		

Conclusions

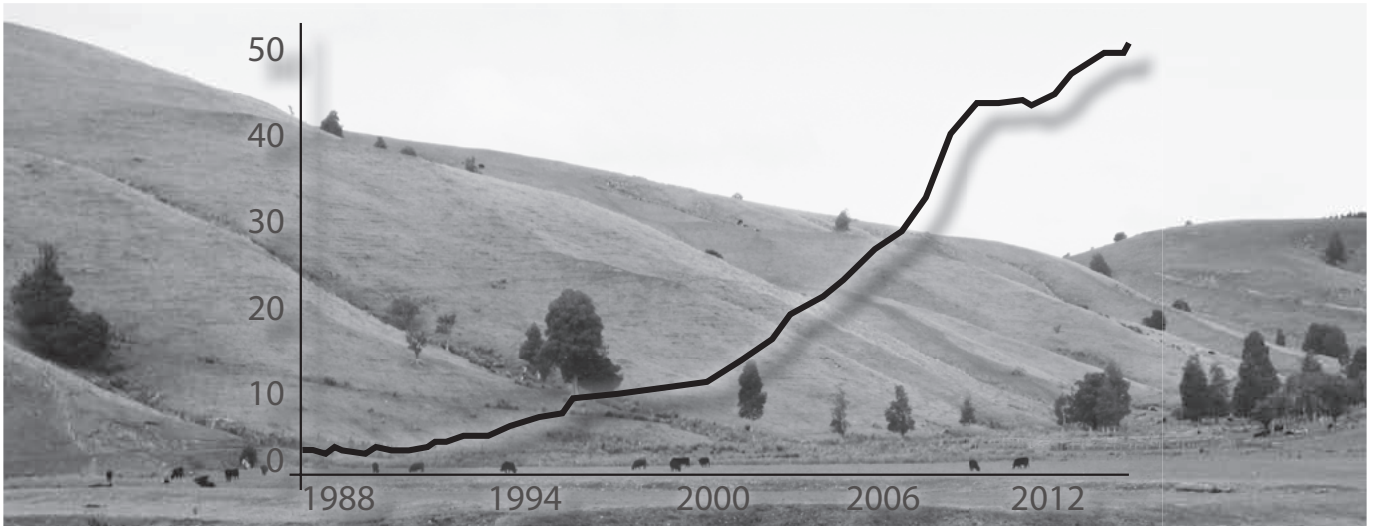
Obtaining help with decisions is very important for many farmers, but the majority do not invest in consultants. Presumably they do not believe it would be economic to use paid advisors beyond what is legally required. However, a statistical analysis of the data makes it clear that more farmers should be looking for paid assistance. Analysis shows that, on average, farmers obtain a return of approximately four dollars for each dollar spent on consultants, relative to people not employing consultants. Some, of course, would not receive this level of return but others would get more.

While the return will decline as more is spent on advice, the figure is still impressive. The range was from near zero to over \$40 per dollar invested depending on the farm. In reality farmers already making a big investment in consultants will obtain a smaller return at the outer margin.

The figures also reinforce the fact that the majority of farmers still rely on their own resources for making most decisions, although no doubt many make use of publicly available information. Industry-funded extension systems are also important, although they do not commonly provide one-on-one written reports and advice. The data available does not show just how much advice comes from these areas. It is also clear that farmers do help each other quite significantly in their various associations.

This report does not take into account farmer objectives when commenting on the low level of consultant use. In some cases farmers will be content with their current workload and output, and feel no need for professional help. In such cases, however, they may be able to maintain output with lower work and expenditure following professional help and advice.

Kevin Old is a senior lecturer in farm management research at the Department of Agricultural Management and Property Studies at Lincoln. Peter Nuthall is a research fellow at the Faculty of Commerce at Lincoln, also lecturing in farm management.



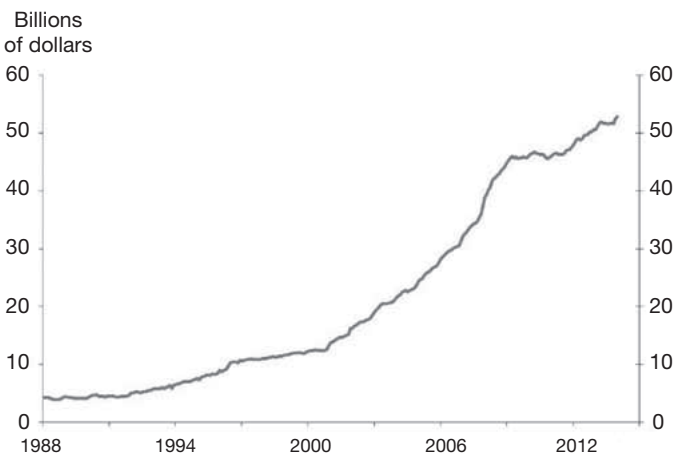
Kevin Wilson

Rural debt in New Zealand

The size and rate of increase in rural debt in New Zealand has attracted the concerned attention of many commentators over the past decade including The Reserve Bank. The global financial crisis in 2008/09 added to the concerns being expressed. This article initially suggests that the average farmer's debt has not changed much in relative terms. But the relative shift in the average dairy farm debt becomes more pronounced when it is measured against a benchmark payback period. While a tipping point has not been reached it is getting closer.

The topic is considered in four parts looking at trends in –

- Aggregate debt
- On-farm debt
- A benchmark for measuring farm debt
- A critique and comments on the application of the derived benchmark.



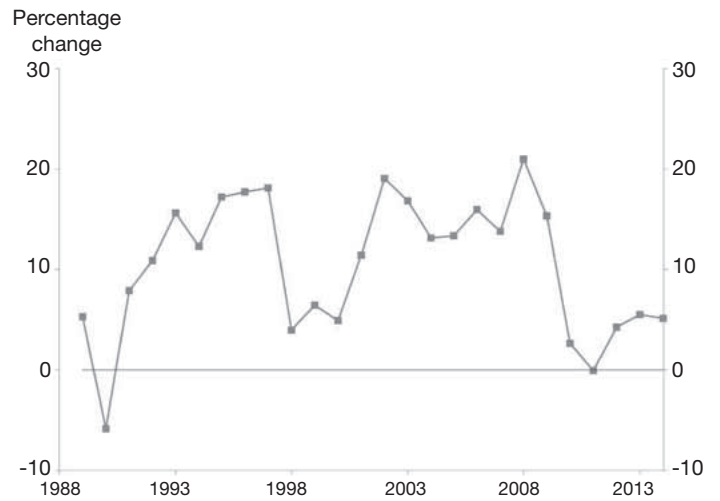
Trend in rural debt as at June

Aggregate debt

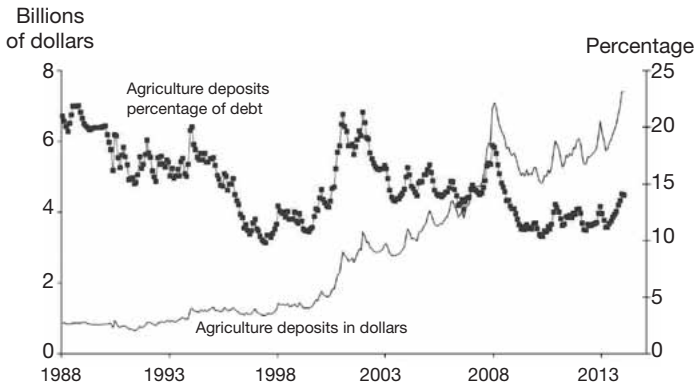
Rural debt at 30 June 2014 was nearly \$53 billion. This amount is an incomprehensibly large stack of \$100 notes. The rate of increase has been well documented and brief statistics are repeated here to put the topic into context. The RBNZ changed the method for measuring rural debt in May 1998 and again in December 2004. In the author's opinion, the changes do not materially alter the longer term trends in rural debt.

The period of double digit annual percentage growth in rural debt extended from June 2001 to June 2007. After a brief period of no annual change it is back to growing around four per cent a year.

Very few, if any, commentators mention the extent of deposits attributed to agriculture and held by financial institutions. These funds are not insignificant in absolute



Growth in rural debt as at June held by registered banks



Rural deposits and liquidity as at June

terms and have not grown at nearly the same rate as debt which has consequences for on-farm liquidity and funding for the sector as a whole.

On-farm debt

Debt on the average dairy farm has increased from \$29,000 in 1971 to \$3.1 million by 2013. The comparable figures for sheep and beef farms are \$36,000 and \$783,000. While factual, the bare average debt figures far from tell the whole story. Farms in both sectors have increased in scale and intensity of production in the intervening 41 years.

Broad-brush comparison between dairy and sheep and beef farms 1971 to 2012

Dairy			
Year	Debt in thousands of dollars	Size hectares	Cows
1971	22	50	110
2012	3,100	141	400
Sheep and beef			
Year	Debt in thousands of dollars	Size hectares	Stock units
1971	36	515	2,840
2012	783	640	4,150

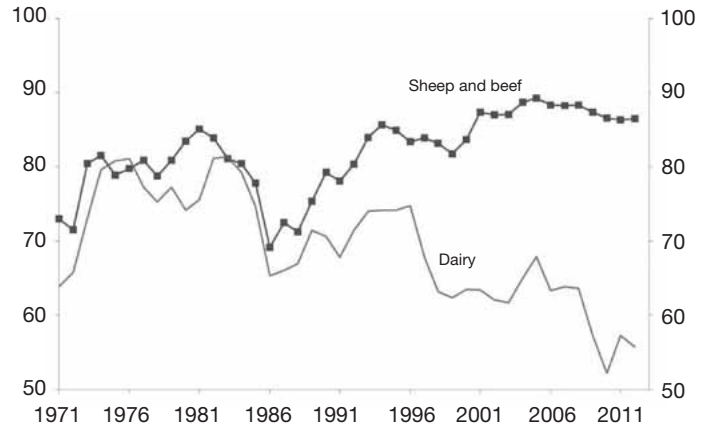
Considerable time could be spent discussing the reasons for the trends and absolute differences in the table, but that would not answer the real question – is the level of on-farm debt any better or worse than 40 years ago and how to measure that?

Potential debt relativity measures include –

- Debt relative to total assets or its converse, the percentage equity
- Debt relative to production
- Debt servicing relative to nett farm income or net profit
- Debt relative to nett farm income.

Debt relative to total assets

The proportion of debt to total assets has increased on dairy farms and decreased on sheep and beef farms. This



Percentage trends in equity on dairy and sheep and beef farms

measure is flawed as an indicator of relative indebtedness. Debt can remain unchanged but the value of assets change for reasons beyond the control of the borrower or lender. The value of sheep and beef farms is now less to do with the future income from traditional sheep and beef systems and more to do with the potential to convert to dairy farms or be used as a dairy support property.

Gross and net debt for dairy and sheep and beef farms

Year	Dairy		
	Gross debt thousands of dollars	Net debt thousands of dollars <small>Excluding dairy company shares</small>	Net percent gross
1992	251	230	92
2013	3,107	2,660	86
Year	Sheep and beef		
	Gross debt thousands of dollars	Net debt thousands of dollars <small>Excluding dairy company shares</small>	Net percent gross
1992	191	125	65
2013	766	403	64

The relative measure is also arguably distorted by an increase in the components of current and off-farm assets which are significant in dollar terms. Finally, the measure may just indicate the amount of equity comfort that banks require for lending.

Debt relative to production

Debt relative to production as a measure has no value on its own without an indication of what the unit of production is worth. The long used and misused measure of stock units for sheep and beef farms has also lost meaning. The benchmark on which the stock unit was based has changed. The original stock unit benchmark was the amount of dry matter required for a ewe with a live weight of 54 kilograms.

The average ewe is now heavier and has a lambing ranging between 120 and 130 percent. In addition, a number of sheep and beef farms include farming

enterprises with stock the farmer does not own, such as lamb finishing, dairy grazing or crops for sale. The calculation of stock unit equivalents is never clear in these situations.

Debt servicing

Debt servicing is a function of interest rates as well as the amount of debt. Over 40 years, interest rates have ranged from six per cent in 1971 to over 18 per cent in 1989 and back to under seven per cent by 2013. Nett farm income and nett profit is also very variable for both sectors and very close in its variability for both sectors.

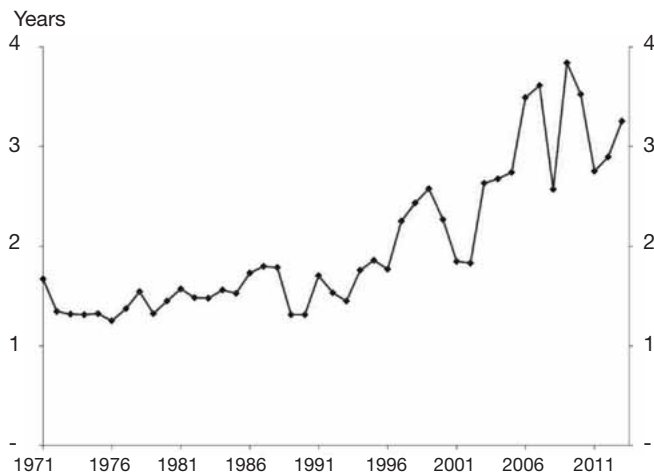
Nett profit can also be distorted. Farmers tend to increase tax deductible expenditure in good income years, often with a carry-over of expenditure when incomes drop. True nett profit can therefore be under-estimated in good and bad years making the relative measure of debt quite erratic and at worst, misleading. The definition of true nett profit is also subject to a wide difference in opinion.

Debt servicing relative to gross income per unit of production as a measure is again sensitive to interest rates and takes no account of the costs of production. A nett profit per unit of production suffers from the limitations mentioned.

Debt relative to nett farm income

This calculation is favoured by the author and is similar to a simplistic payback period. It takes account of increases in production and scale, increases in product prices, and other sources of on-farm income. It is independent of swings in tax deductible expenditure and interest rates. It makes no allowance for the cost of production. It is a moderately volatile series between years but it is the overall trend which is at issue. Perhaps it is over simplistic.

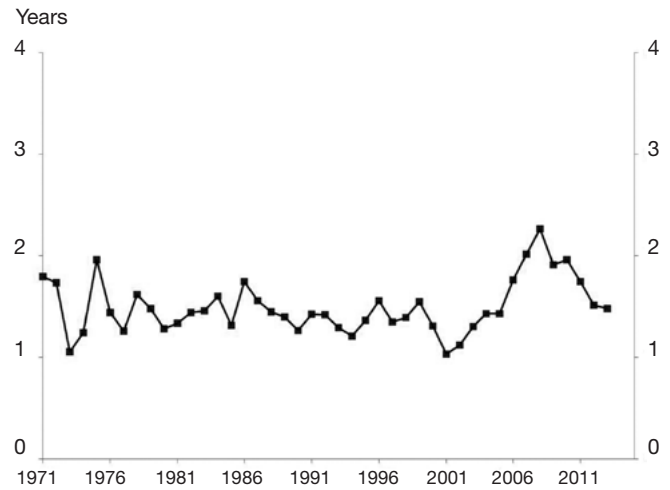
The payback period for dairy farms has increased from 1.4 years in the 1970s to average 2.9 years since 2000. The payback period by this measure appears short



Payback period for dairy farm debt in years

and the increase is not major. An increase from 1.4 years to over five years might be considered major.

Including all current assets and off-farm investments brings the 2000 to 2012 average payback for dairy farms down to 2.3 years. In contrast, the payback for sheep and beef debt is mainly unchanged at around 1.5 years over the past 40 years.



Payback period for sheep and beef farm debt in years

On the surface, average farm debt appears little different from 40 years ago. That conclusion does come with a caveat or two. The conclusion says nothing about where a tipping point for payback might be or what the distribution of rural debt is – especially relative to scale.

Tipping point for the payback period

A payback period exceeding four years is suggested as a bench-mark tipping point for a farm business. The payback period gives one indication of the vulnerability of the farm business to shocks of any sort.

A tipping point should not be based on any one year's data but take a longer term view. How long is a moot point. A robust analysis requires a view on a number of measures including income, costs and interest rates. A simpler approach is advocated only needing a view on debt servicing as a percentage of nett farm income and interest rates.

Debt servicing as a percentage of nett farm income is one common measure of the vulnerability of a farm business to fluctuations in combinations of production, product prices and costs. Debt servicing at 25 per cent of nett farm income is usually considered just acceptable, 30 per cent is considered marginal, 35 per cent is near maximum subject to ownership scale and over 35 per cent is heading into unsustainable and very vulnerable territory.

Example

One dollar of nett farm income can be used as an example. The percentage debt servicing then become a monetary equivalent, which means the debt servicing at 25 per cent

Interest rate able to be serviced at combinations of years payback and debt servicing

Years payback	Percentage debt servicing				
	20	25	30	35	40
2	10.0	12.5	15.0	17.5	20.0
3	6.3	8.3	10.0	11.7	13.3
4	5.0	6.25	7.5	8.8	10
5	4.0	5.0	6.0	7.0	8.0

of one dollar nett farm income is 25 cents. Capitalising the monetary equivalent of percentage debt servicing at an interest rate gives a dollar amount of debt which can be serviced by one dollar of nett farm income a year, the equivalent years of payback period.

For example 25 cents debt servicing at 8 per cent is equal to \$3.10 of debt covered by one dollar nett of farm income, so the payback is 3.1 years. Reversing the maths gives the interest rate able to be serviced for a given debt servicing and years payback. Therefore 25 cents debt servicing over 3.1 years equals 8 per cent interest able to be paid on debt.

The long-run of 58 years carded floating term debt interest rate is estimated at 8.3 percent. The carded term is the starting rate before risk premiums are added or subtracted. The calculations indicate that payback has to be four years or less if long-run average interest rates are to be serviced and debt servicing is to be less than 30 per

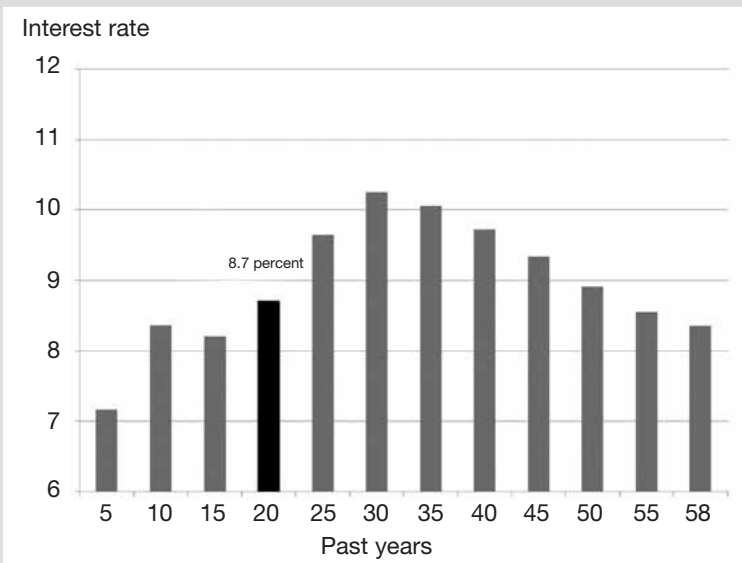
cent of nett farm income. Payback over four years could be regarded as a tipping point on the above criteria. The payback tipping point quickly shortens to towards three years if your view is that long-run interest rates are higher than eight percent or you are more comfortable with a lower percentage debt servicing.

Averages

Using the benchmark payback against an average debt and average payback period tells you little about how many enterprises, how much debt and what production associated with that debt is vulnerable to short or longer-term shocks of any kind. Knowledge of the distribution of payback and the above listed associated data would allow much more informed comment on the agricultural debt than has been made historically and is still being made.

Long-run rural interest rates

Carded floating rural interest rates in New Zealand have averaged over eight per cent for varying intervals of past to present except for the past five years. Interest rates in New Zealand were de-regulated in December 1984 along with implementation of other economic reforms. It took about seven years to around 1991 for the economy to shake off the worst of aftermath of those reforms, although you can argue that the effects of those reforms are still being felt in some sectors of the economy.



The rural floating interest rate has averaged 8.7 per cent for the past 20 years ending June 2013 and 9.6 per cent if you take account of the past 25 years.

The writer had often discarded data before 1991 for long-term analysis, considering it to be unduly influenced by government policies of the time. You could argue that the last five years is atypical as well. Central banks have gone to extraordinary measures in attempts to minimise the fallout from the global financial crisis during this period, the unintended consequences of which are still continuing.

Scale also comes into the benchmark but with a another caveat. The writer has a view, based on limited data, that benefits from scale in agriculture on farm working expenses are limited. The main benefit from scale comes from the number of owners in the business. Two families on a farm with 600 dairy cows will be little, if any, better off than one family with 300 cows, all other things being equal. But one family with 600 cows has scope to be sustainably leveraged to a greater level than the family with 300 cows.

Application to a business

The first judgment required is what entities are included in the measure, the part of the business or the group. Another judgment is then necessary about the income to apply in individual cases for a spot calculation. But the main issue is the actual level and trend in the payback measure. The benefit of the analysis comes from understanding the underlying reasons for the trend which may include –

- Favourable or adverse trends in product prices
- Favourable or adverse trends in physical production
- Unprofitable enterprises within the farm business
- Spending more than is earned which leads to where is the spend out of line
- Combinations of the above, all of which require a whole farm business approach.

This raises another question. At what level should on-farm debt be measured to calculate the payback period?

Measuring point

There are now more large scale dairy farms than in 1970. Dairy farm businesses now range from 150 cows to enterprises with over 10,000 cows. Similarly, there may now be more large scale sheep and beef farms than in 1970. Entities range from 1,500 ewes or fewer to over 100,000 ewes with supporting cattle.

Many farm businesses today are also made up of more than one legal entity in the form of combinations of companies, trusts and partnerships. Each entity may own combinations of land, livestock and plant and each entity may have debt owing to a registered bank. The picture gets further complicated when the business has more than one farm which may be farmed as completely stand-alone operation or may be farmed in a complimentary manner with the home block perhaps as a finishing block or dairy support unit. Banks tend to aggregate all bank loans associated with an individual, in whatever legal form of ownership, into a group.

What debt to use

Then there is another issue – what debt to include? The complicated entities referred to above often have inter-entity debt where the debt in one entity may or

may not be exactly matched with a corresponding asset in other entity. Some farm businesses borrow against the farm to purchase off-farm assets which may or may not contribute income to the farm business. The off-farm asset may or may not be owned by one of the legal entities of the farm business.

Revenue has some similar issues. Rent paid by one entity to another becomes part of nett farm income for the latter. It goes on. Gross debt or nett of current assets and investments? Simplistically, it is easiest to count only debt, business assets and investments owed to or by institutions, firms or people outside the owners of the group. The main point is to be consistent with the measure of debt, current assets and investments within the business and interpret the payback trend accordingly.

But little additional meaningful comment can be made on the vulnerability of agricultural debt to any shock without knowledge of the distribution of debt against payback period, associated production and the number of groups involved. The comment has to include a discussion on the proportion which rural debt is of total advances by banks, provisions made for bad debt and capital adequacy.

Distribution of payback period

A series of matrices of payback periods against bands of debt, against numbers of businesses in the bands of debt and against production in each segment would be helpful in determining just how many businesses and debt are vulnerable to a shock of any sort. You also need a time series of such matrices to see if dairy farm businesses are more or less vulnerable than the past. The suspicion is that the situation does not change over time under normal circumstances. The life cycle of business means there will always be some who have just started or expanded a business with high debt and more vulnerable than more established entities. There are always some who, for whatever reasons, have more debt than they can cope with.

That said, dairy farming systems have intensified and there is a higher proportion of costs which are now fixed such as grazing and bought-in feed. The ability to reduce spending in harder times is reduced.

Source of shocks to dairy businesses

What are the shocks which higher indebted farms are vulnerable to and what is their frequency and duration? There have been three major price shocks to payout since the abolition of the Dairy Industry Reserve Accounts in 1988 and a fourth one looming for the season ending in 2015. In each one, the fall of over 30 per cent was from a record nominal high payout the previous year. The payout recovered in the following year but not back to its previous level. Since 1988 the average percentage

change in the payout between years has been plus or minus 20 per cent.

Droughts occur in normally safe North Island dairy regions more frequently than most will recall. The carry-over effect of a drought may roll into the next one or two years depending on the timing and duration of the drought. There are also combinations of negative price changes and adverse weather.

Some would argue that the increasing reliance on China as a buyer of New Zealand dairy products is creating another market concentration risk. Have we changed our reliance on a major market from the UK to China after an interim period of selling to more diversified markets? Other potential major risks to individual dairy businesses, which thankfully have not happened, are associated with food safety and animal diseases. But the kiwifruit industry experience with PSA illustrates just how vulnerable New Zealand agriculture is to imported disease risk.

The banking sector

Nett loans to agriculture, after provision for bad debt, have marginally increased from 17.2 to 18.9 per cent of total loans between 2008 and 2013. Five highly credit rated registered banks in New Zealand hold over 95 per cent of the debt in the dairy industry. A rigorous analysis of the five is a major exercise and beyond the scope of this article – it is one of the roles of the Reserve Bank. Obviously profitability, the quality of loan assets, sources and stability of funding, liquidity, the level of provision for bad debt and capital adequacy are all important amongst many other characteristics to be considered.

Only a limited high level review of the banking industry is possible from a rural viewpoint as disclosure statements do not provide details of provisions and debt

Aggregate data for five main New Zealand banks

Indices	2008	2013
Nett loan assets in billions of dollars	260.0	283.2
Total assets in billions of dollars	314.9	348.0
Nett agriculture loans in billions of dollars	44.6	53.6
Nett agriculture loans as percentage of total loans	17.2	18.9
Shareholders funds in billions of dollars	22.6	30.2
Shareholders funds as percentage of total assets	7.2	8.7
Provisions for bad debt		
Amount in billions of dollars	1.3	2.0
Percentage of gross loans	0.5	0.7
Percentage of shareholder funds	5.8	6.7

write-offs by sector. Changes to accounting standards and to the information required in disclosure statements also limit the period comparable time series can be prepared.

Provisions for dairy industry debt are estimated to allow for total write-off of around 80 average loans to dairy farmers. The big assumption in the last calculation is that the provisions on dairy debt are at the aggregate average for overall provisions. Does this sound like a big enough provision for bad debt in the dairy sector?

The bigger question is what circumstances would trigger the need to write-off that much dairy industry debt in one year and what would the implications be for the availability of finance for the rest of New Zealanders. The banking sector has demonstrated that it can quickly rack up the annual charge for provisions in the income statement. The annual charge went from \$232 million in 2007 to \$2.14 billion in 2009. The annual charge in 2013 was back to \$348 million.

Conclusions on the benchmark payback period

The method for a benchmark payback is simple relying on only two decisions – prudent debt servicing as a percentage of nett farm income and a longer-term interest rate. The decision on what the actual income and farm costs to be used is avoided. It is mainly independent of the type of pastoral enterprise.

Is the benchmark robust in application to individual business? Again, it requires only two generally factual figures – nett farm interest and total debt. As with all analysis, prior adjustments to both measures can be simple or complicated. Be consistent and interpret accordingly.

The angst in the dairy industry in the period 2006 to 2009 and the payback measures for the same period suggest that payback has some merit, at least as a first approach in determining how much debt is too much debt. The year 2014/15 may be another test.

Four years appears a short payback period. The measure is quite sensitive to the percentage debt servicing used and the interest rate. That makes the shift in the payback for the average dairy farm from 1.4 years in the 1970s to 2.9 in the past decade more significant than the difference between the two absolute numbers suggest.

Data from the Reserve Bank of New Zealand shows that lending to dairy farms has increased from 47 to 67 per cent of total rural debt between 2003 and 2013. Perhaps it is industry concentration risk that is the issue rather than the high level of debt held by dairy farmers, or both?

Kevin Wilson is a semi-retired rural economist and a Life Member of NZIPIM.



Ian Proudfoot

Speculating on the future for New Zealand dairy

There are few who would question the contribution which the dairy industry has made in protecting New Zealand from the worst effects of the global financial crisis and propelling the economy to rock star status in the last 12 months. Given the dominance of dairy to our current tradable exports, it is important to remember that the industry has held the mantle of being our largest export category for less than 20 years. Before that, exports were dominated by the red meat and wool categories.

If someone had sat down 30 years ago to write a similar article to this it is likely they would have struggled to envision a situation where the dominance of the red meat, particularly lamb, and wool sectors as our leading export categories could be challenged. The value of red meat and wool exports were two-and-a-half times greater than dairy in 1985. The reality, however, is that times have changed and recent figures suggest that the export value last year of dairy products was almost double that of red meat and wool combined.

It is therefore entirely possible that in 20 years' time our primary sector exports could have a completely different composition from today. Dairy, at least in the powder formats which currently dominate our exports, may account for only a fraction of the volume and value of the portfolio of food, fibre and timber products we export to the world in the future.

In the 2014 *KPMG Agribusiness Agenda* it is suggested that if the primary sector is to perform against

the growth expectations held for the sector, it will require growth in volume and value as well as using the industry's intellectual property more extensively. Value growth relies on a detailed understanding of the changing expectations of the ultimate consumers of our products and an offering with attributes aligned to meet these needs.

The future as the world's delicatessen

The future of New Zealand's primary sector lies in the adoption of a delicatessen strategy, specifically targeted at increasingly affluent consumers in Asia, but not ignoring the many valuable customers we still have strong relationships with in our traditional northern hemisphere markets. A delicatessen is a store or a counter selling top quality and premium priced foodstuffs which improve the lifestyles of discerning people. They offer a wide choice, introducing new



products and innovations, and presenting their wares in such a manner as to tantalise the customer. At the core of a delicatessen strategy is an ability to provide a variety of premium products which improve the consumer's lifestyle, resulting in increasingly affluent consumers across the globe wanting to enjoy them.

There is discussion around the total number of people we are able to feed from food produced in New Zealand, with estimates varying between 20 and 50 million. A delicatessen strategy provides the opportunity to spread our production across significantly more people by supplying only a small proportion of their diet. A realistic goal should be to supply around 10 per cent of the protein diet for the 400 million richest consumers in the world. This requires an understanding of our potential consumers and presenting them with food worthy of a premium global delicatessen, but it may also require us to change what our primary sector presents to the market.

Environmental challenges

The globally recognised premium dairy products – French and Dutch cheeses, Danish butter, Italian ice creams – command higher prices in international markets and are goods which consumers want. The reality is that while many New Zealand dairy products provide food processing companies with world class, tailored and technically advanced ingredients, there are few domestically produced dairy products that international consumers want to consume to improve their lifestyles.

The challenge of doubling primary sector exports will mainly be achieved by increasing the value generated, given the increasing focus on the primary sector's stewardship of the environment placing challenges on growing more volume. Concerns over water quality, animal welfare, intensification of farming systems and loss of biodiversity are real threats to the growth of the primary sector, and the dairy industry in particular, to continue to increase production in New Zealand over the medium and long term.

Responding to these environmental challenges will increase the costs of production in this country. It will also result in a milk pool that over time will become less significant to the total global supply of milk, as it will be unable to keep pace with the international growth in demand for dairy.

An evolving global production scene

At the same time as the operating challenges for the New Zealand dairy industry increase, the global demand

for milk is expected to grow at unprecedented levels as wealthy consumers in Asia develop their taste for dairy products. Fulfilling this demand will see the dairy industry evolve globally –

- European producers will benefit from reforms to the Common Agriculture Policy
- The Chinese government is investing heavily in the development of a world class, safe dairy industry
- Agricultural systems in many developing regions of the world are moving from traditional, almost feudal, production to larger scale more corporatised models as governments look for greater certainty over the security of food supply.

The European Union

The potential for the reform of the Common Agriculture Policy to disrupt premium agricultural product markets is significant. Comprehensive European Union regulations mean the production systems in many of these countries are designed to ensure the sustainability and efficacy of production for premium consumers. Production levels in many countries have been frozen at quota levels for decades. Producers are planning to grow their output after April 2015 and are innovating and investing ahead of the rule changes.

European products, which are also often backed by historical reputations and regional appellations, will therefore potentially be preferred by premium consumers to alternative sources of supply. It is likely that increased European supply will increase the competition for premium consumers in emerging markets, therefore increasing the competition to do business with the customers New Zealand companies are also targeting to grow the value of our exports.

The United States

The effect that the political process can have on agriculture is apparent across the world. For example, the compromised Farm Bill which was finally agreed in Washington will change the economics for dairy businesses across the United States. The debate over the Farm Bill reflects concerns in many developed countries that the cost of supporting farmer incomes, in effect subsidising the cost of food, has become too much for many governments to bear in a post-global financial crisis world.

The Farm Bill dials back on a number of support measures that have been enshrined in the United States system, particularly food subsidies by way of food stamps and the crop insurance measures which have been available to farmers⁷. The result is that many traditional small-scale farm businesses may find it difficult to



survive. It is therefore apparent that the United States industry is looking at the opportunities to expand its export footprint to take advantage of the global growth in demand for dairy products, creating a further sizeable export market competitor for New Zealand producers.

China

The growth in demand for dairy products in China, together with wide consumer concern over the integrity and safety of the products available in the market, has seen the Chinese government actively encourage an upgrade of its domestic dairy industry. The government, directly or via state-controlled companies, has sought to obtain global best practice to produce world class safe milk. It has developed partnerships with many of the world's leading dairy companies to look for technology and insights about milk production, processing and distribution with the aim of increasing domestic production and providing higher quality products.

Pressure on land and water, the ability to find sufficient quantities of affordable feed stocks, and growth in demand make it unlikely that the Chinese domestic industry will ever be able to fully meet local demand. It is likely to focus on satisfying higher value categories, such as fresh liquid milks and cultured products, leaving imports to meet commodity demand.

Other countries and regions

Traditional dairy production countries will also see their industries evolve. The growth in demand for food caused by population expansion, and an increasingly wealthy middle class, will put pressure on traditional agricultural systems. This will result in consolidation to form businesses with greater scale and more ability to meet consumer demand. We therefore expect a traditional dairy country, such as India, to see a rapid growth in production as herd sizes increase and the industry becomes more structured.

Other regions, such as parts of the former Soviet Union, the Middle East and South America, will see existing industries develop in maturity and sophistication. They will have the benefits of availability and access to capital and technology as multi-national investors look for opportunities in the global agri-food growth story. We also expect to see new dairy production regions emerge, supported by seed funding from development agencies and sovereign investors looking for 'edgy opportunities' to provide food security to their domestic consumers. These regions could range from Mongolia in Central Asia, to south east Asia and into Africa.

Growing future milk production

There appears little doubt that the demand for dairy products will continue to grow into the future, and there will be a substantial global supply response to this increase in demand. It is also likely that production, processing and delivery to customers will also evolve significantly in the coming decades. In a world facing many problems there is no option but for production systems to adapt rapidly in response to –

- Severe water constraints
- A climate which appears to be becoming more unstable, and most probably starting to experience man-made climate change
- Reductions in the amount of agricultural land available due to urbanisation
- Concerns over the unconstrained use of agricultural chemicals.

Public awareness of the environmental and societal implications of large-scale agriculture are increasing in the developed world. This places expectations on food producers to provide more while reducing their environmental footprint. The optimal environmental solution being adopted globally in the dairy industry appears to revolve around the use of contained systems which enable inputs to be tightly controlled, maximised production efficiency, and by-products managed and disposed of to minimise their environmental effect. This model of dairy farming gives a substantially higher output than the traditional New Zealand pastoral dairy farm, but also comes with much greater levels of capital investment and fixed operating costs.

Closing gaps

From the work we have done, it is apparent that for the wider population, housed farming systems create concerns about animal welfare and are seen as inconsistent with the clean, green perception that people have of New Zealand. If our industry wishes to maintain relevance in global markets it needs to continue to manage a significant share of globally traded dairy products. However, with international competitors increasing supply faster than the domestic industry which continues to operate pastoral farms within tighter environmental limits, it is probable that the share of globally traded milk which the New Zealand industry produces will decline.

This challenge suggests two important strategies for the dairy industry. The first is related to participating in fast-growing global milk availability and trading milk produced by others to maintain relevance in the global



market. The second is that the industry needs to recognise the views of the wider community in New Zealand. It needs collaborative answers to the environmental challenges which it faces to ensure any constraints placed on its licence to operate do not limit its ability to compete.

The industry is currently losing the battle for the hearts and minds of the wider population, with concerns growing that farmers are failing the country in their role as long-term stewards of the environment. Every organisation connected with the primary sector has a role to play in countering this perception and working to close the gaps that have grown between urban and rural communities.

Responding to an evolving market

The speed at which the global dairy industry is currently consolidating makes it critical for New Zealand companies to explore opportunities to internationalise their businesses, to build deeper connections with their consumers, and to increase the value which can be extracted from what we produce and trade. Long-term relationships are built mainly on listening. Investing in listening to and understanding another organisation will eventually develop deep insights into that organisation. You will understand their values, the problems that keep them awake at night, the attributes they most value and therefore ultimately provide well tailored, value-adding solutions to their problems.

The main attributes vary by consumer, depending on their specific needs and requirements, increasing the importance of building flexibility into the industry to provide tailored answers. For some customers the final retail price point may be the main attribute, making the ability to minimise the cost of further processing critical. Other customers may place greater value on the safety and integrity that consumers attribute to 'produced and packaged' in New Zealand. The companies which will prosper will therefore avoid a one-size-fits-all approach to the market. They will recognise that attributes as diverse as taste, quality, traceability, nutritional benefits, colour, logistics, provenance and price will affect specific customers. The challenge for the New Zealand dairy industry will be to continuously pitch the right solution.

Clean water

Over the years, there have been many examples where the industry has not pitched the right product at the expense of profits and farm gate returns. The focus on a spreadable butter to sell more butter was driven by supply, rather than first gaining consumer insight, such as a growing

demand for a healthier spread for breakfast. Recently the industry has been slow to respond to the demand for New Zealand branded nutritional food products for infants and growing children.

This means that a focus on supplying them has only yielded a fraction of the return generated by branded consumer products. However, our producers have been able to avoid the associated marketing and promotion costs. In both cases closer alignment with the consumer may have sent clearer signals back through the supply chain about the type of innovation and investment the industry should be making to create value.

The constraints on accessing clean, safe water are becoming a problem for many consumers around the world. This challenge will change their purchasing habits over the next decade or so. Whether a dairy product requires rehydration or not is likely to become important and will shape the purchasing decisions many consumers make. As a result, the industry should be actively questioning whether an industry model that has billions of dollars invested in removing water from milk will provide the products which water-constrained customers are looking for in the future.

The question also needs to be answered about whether future investment decisions on innovation and processing capacity should be aligned to alternative distribution models for dairy products. Examples include long-haul fresh milk supply, UHT products, shelf-stable dairy foods, and items that do not require rehydration. This is to ensure that we have the flexibility and innovation to meet the needs of tomorrow's dairy consumer.

Looking further into the future

The way we consume dairy products in the future is only one variable the industry needs to be looking at. The way they supply them will evolve rapidly over the coming decade. At the recent Consumer Goods Forum many of the presentations were focused on the effect that technology will have on the supply chain for consumer products. Technology will be used to assure quality, to handle logistics, to inform consumers and help the final sale to the customer. The consistent message is that we are currently only seeing the tip of the iceberg in terms of technology-driven process transformation.

Technology is currently being used to simplify and aid traditional supply chain processes. However, as companies start to challenge themselves to think more widely about how technology can disrupt their traditional business models the status quo will evolve in ways which we cannot

yet fathom. It is important for the industry to ensure it allows sufficient time to develop a deep understanding of target customers, to think about the problems they are faced with, and create solutions to these challenges.

Increasing health problems

One area where consumers are looking for the food industry to provide practical answers is the growing health problems many societies face such as obesity, diabetes, cancers and stress-related disorders. The ability of specific proteins and other constituents of natural dairy products to be made in larger quantities by evolved dairy genetics is being explored by dairy companies around the world. This is to grow the value of milk produced and develop new categories of nutraceuticals.

The question being posed by researchers, which the industry should not ignore, is whether reaching these nutritional solutions may be achieved faster and manufactured more consistently by increasing dairy and other protein products using a chemical process in a laboratory rather than dairy cows. It cannot be overlooked that artificial answers minimise the environmental problems associated with dairy production. As a result the threat of substitution is growing.

Consumer concerns around the environmental challenges of dairy production must remain a priority for the industry, especially one which is focused on meeting the requirements of the world's premium consumers. These consumers like to understand where their food comes from. They often have a preference for buying local and look for direct relationships with the producers which they develop using farmer's markets and boutique food stores. The industry needs to recognise the desire that premium consumers have for a close relationship with the producers of their food, and explore how technology can be used to help this. Geographic remoteness means New Zealand food will never be local for most of the world's consumers.

It also cannot be overlooked that these consumers often have a preference for organic products and are prepared to pay a premium for them. Continually reviewing the product mix presented to the world, to ensure it is meeting the needs of premium consumers, may require more producers to obtain organic certification for their farms and the establishment of a more developed infrastructure for providing organic products to the global market.

Change will be the only constant

It is a cliché but it is true – we live in a world where change is continual. More dairy products are being produced around the world each year. Demand is expected to continue to grow faster than supply, putting pressure on prices and forcing innovation across the supply chain. Consumers will aim to consume dairy products in a wider variety of formats, with those prepared to pay a premium focusing increasingly on the integrity of the production process, the traceability of the supply chain, and innovation in presentation. Premium consumers will look for the best

products available globally as they improve their lifestyles.

New Zealand's dairy sector will need to change in the coming years to maintain its relevance to consumers and its significant contribution to primary sector exports. The meat and wool sector's decline in significance to the export portfolio over the last two decades demonstrates the risks of continuing to do the same things the same way as consumers and markets change. As global markets evolve, what people consume will also evolve, meaning new products will be demanded, while others we have historically made will fall out of fashion and their returns will decline.

With investors in agricultural assets increasingly looking for profit returns, rather than relying on long-term capital gains, land use will be directed towards products which will meet the return expectations of professional investors. Land will only be used for dairy if it continues to give a higher return than other production options, making innovation across the supply chain from inside the farm gate to the customer's plate critical to the industry maintaining its global leadership position.

What does this all mean?

First and foremost, it is critical for farmers to be clear that they are part of an integrated supply chain through to the final consumer and maintain awareness of what those consumers are demanding. Understanding how markets are evolving will help farmers make investment and production decisions which will maximise the return they are able to generate from their business. Farmers need to visit the markets their products go to and understand more about their ultimate customers.

Maximising value also requires farmers to be open to assessing and, if appropriate, carrying out innovation within their business. Historically, the primary sector has led New Zealand in making productivity improvements, but much of the gain has come from implementing technology developed decades ago. The speed of uptake of new technology remains too slow for the industry to achieve its aim of providing more from smaller inputs, and creates real risks to its ability to operate under its current relatively unfettered model.

The industry also needs to recognise, respect and respond to the real concerns that the wider population has about agriculture in general, but the dairy sector specifically. Every farmer has a role to play by ensuring that they are adopting best practice in their business as well as being involved with the community. Ensuring awareness, innovation and involvement are central to the activities of every farming business and this is critical to the dairy sector maintaining its relevance into the future. As a result, the collective effect of the decisions made by every farming business will determine whether dairy remains the powerhouse of the New Zealand economy or if the land is being used in alternative ways in 20 years' time.

Ian Proudfoot is Global Head of Agribusiness, KPMG New Zealand based in Auckland.

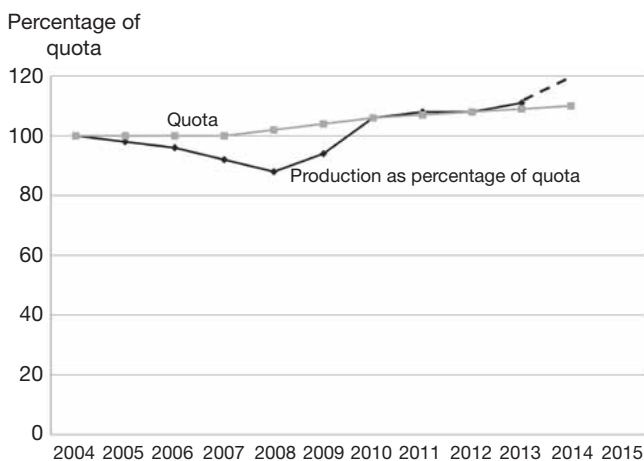
Adrian van Bysterveldt and Michael Murphy

What is happening in the Irish dairy sector?

In 2010 the Irish government adopted a vision for Irish agriculture and fisheries which was jointly developed by industry and government and is called Food Harvest 2020. The opportunity to increase dairy production has been identified many times in the past, but the difference this time is that restrictions on production will be gone and the Irish government is looking to agriculture to lift the economy out of the recession which followed the global financial crisis.

Food Harvest 2020 has dominated industry and government planning in agriculture. It acknowledges that low-cost grass-based production systems are an important strength and are aligned to improved environmental targets of a lower carbon footprint and improved water quality. The production lifts are based on raising stocking rates by growing more grass and other forage due to improved land and forage management practices and better genetic quality animals.

The graph below shows that from 2007 there has been a lift in milk quota as part of a European Union objective to provide a transition into the abolition of quotas from March 2015. For the first three years this increase was two per cent a year and from 2010 it has been one per cent a year. Up to 2012 production above quota attracted a super levy which was 120 per cent of the milk price, but since 2012 the European Union has dropped this to 80 per cent.



Irish dairy production as a percentage of 2007 quota

The steady decline in national milk production until 2007 was reversed by improved returns and with farmers losing the opportunity for off-farm incomes which were available before the global financial crisis. There was an initial jump in production of 18 per cent in two years to reach the national quota, but then production increases matched the increase in national quota until 2014 because of the super levy of 120 per cent. With the reduction of the super levy to 80 per cent of milk price, farmers with aspirations to expand are already increasing production, even though this will be at a loss. The current situation is that the country is expected to end the 2014 season 10 per cent above quota. This is despite a large amount of spring milk being fed to an increased number of replacement calves, many herds adopting once-a-day milking to retain higher numbers of productive animals, and cows being dried off early.

The graph shows that Irish farmers have already demonstrated the ability to increase production rapidly. If the current industry projection that Ireland will exceed its production quota by 10 per cent is correct, it means that it will have achieved a rise of 32 per cent in production even before quotas are lifted. This also means that only another 18 per cent rise is required in the next five years to meet the Food Harvest 2020 target of a 50 per cent increase.

It is important to realise that 10 per cent of Irish dairy farmers produce nearly 50 per cent of the milk and that these farmers are very focused on expansion. The more likely reality is that the Irish dairy production will exceed the 50 per cent increase target before 2020 and that increases in milk production of two to five per cent a year could continue for many years. Dairy company surveys of suppliers strongly support the view that



farmers are positioning their businesses to dramatically increase production beyond existing levels once quotas disappear, and the rapid production gains in 2009 and 2010 underline the ability.

Community and government support

The Irish dairy industry, along with the rest of the farming sector, enjoys very strong support from the public and government. Most urban Irish have close family connections back to family farms. In the world following the global financial crisis many young people are either going overseas to find employment or looking to come back to the family farm. In addition to this, many farmers themselves have lost their sources of off-farm income.

There has been a large rise in student numbers enrolled in agricultural colleges and undertaking agricultural degrees in universities. These courses are full with many young people not able to get in. Moves are being made to re-open agricultural colleges which had previously been closed. In Ireland, formal training in agriculture is a requirement if they are to borrow money from a bank. Many young people interested in managing the home farm are also spending time learning more about low-cost larger-scale farming by working on New Zealand farms before they return home to put this into practice.

This has brought a lot of focus back on farming businesses to perform financially. The Irish government has moved to deal with two potential limitations to dairy expansion. The first is the problem of an ageing farmer population and the second is that of small land-holdings and a reluctance to sell family land. The government is also looking at the problem of good land which is suitable for dairy farming but currently tied up in much less profitable agricultural sectors such as beef, arable and sheep production.

Currently only 20 per cent of the land suitable for dairy farming is in dairy, 60 per cent in beef, 10 per cent in arable and 10 per cent in sheep. The government has moved to solve these critical problems by instigating the New Entrants programme and passing tax legislation.

Instigating the New Entrants programme

Part one meant that young farmers taking over a non-dairy farming family business were given free milk quota sufficient for 50 cows. They were given detailed training and support by the Teagasc advisors and the farm systems research group at Moorepark. Over 400 family farms converted to dairy using this process and most of these farms already have the land-holdings to expand further.

Moorepark research station at Fermoy is the base

for all the farm systems research in Ireland. Teagasc is the government and industry-funded organisation which owns Moorepark and many other research sites in Ireland.

Part two replaces part one outlined above and starts in 2015. In this scheme farmers are given a one-off €84,000 grant if converting land from non-dairy to dairy farming. This scheme has no cap on the number of applications and is expected to be in place for several years.

The tax legislation passed means that if an older farmer leases their land to a farmer who is less than 35 years of age for a period exceeding five years, then the first €40,000 of lease income is tax-free. For most non-dairy farmers this would result in more money for the family to live on than they had after receiving subsidies and trading for the year.

These interventions are indicative of the very strong support the dairy sector has from the government and they have several benefits –

- It is keeping older retired farmers living in rural areas
- Small holdings of family land are able to be merged into larger-scale, more economically productive units
- The length of the leases allows sufficient time for younger farmers to invest in the development of this land and to get a good return from that investment
- It reduces the capital requirements for young farmers wanting to expand
- It encourages young farmers with energy and new knowledge to take up farming and revitalise their family businesses
- It is encouraging land use change from unprofitable uses to dairy production.

Demonstration farms

To support these initiatives the dairy research and extension group from Teagasc at Moorepark have established two demonstration farms. The first is the Greenfield Dairy Farm near Kilkenny, established in 2010 at a cost of €1.1 million, a conversion from arable to dairy. The farm has a basic herringbone milking parlour, a bark stand-off pad and effluent holding capacity for five months. The cost for the whole conversion, excluding stock, was two-thirds of the cost which existing farmers were paying to build a new free stall wintering barn.

The project was one-third funded by equity from Glanbia Dairy Company, the FBD Trust and the landowner, and the rest was an €800,000 loan from AIB Bank. The land was leased for 15 years and the Department of Agriculture provided access to milk quota so that the project could start. The second was Shinagh Dairy Farm near Bandon in West Cork in 2012, which was a conversion from beef into dairy for a much lower cost as it uses much of the existing infrastructure.

The purpose was to demonstrate the application of current research and extension farm system knowledge which would show –

- How to expand dairy production on to non-dairy land in a cost-effective way which would provide an excellent financial return for both the landowner and the person leasing the land
- How to lower the cost of milk production to a level that would improve Irish dairy industry profitability and make it internationally competitive
- That this would result in the bank loan being paid in full within the 15-year term of the lease, provide a good living for the manager as well as an average investment return of six per cent for that timeframe.

The Greenfield farm is in its fourth year of operation and Shinagh farm in its second year. Both are exceeding all the profitability targets required to meet the project financial objectives as well as meeting or exceeding all environmental, health and safety, animal welfare and disease control requirements. Open days attract thousands of farmers and the farms regularly feature in the *Irish Farmers Journal*, a weekly publication which has the highest readership of any newspaper in the country.

Revitalisation of the dairy industry by Teagasc

Over the last 10 years the farm system research at Moorepark has been focused on developing a highly competitive dairy industry which meets environmental targets. The research is taken to farmers using an extensive extension and advisory programme. Irish farmers are now reaping the benefits of having –

- Access to ryegrass varieties that reliably grow between 16 and 19 tonnes of highly digestible feed under a 10 month grazing management system compared with previous pasture mixes which would grow eight to 12 tonnes
- A renewed focus on land and pasture management where Teagasc has worked with 400 farms across Ireland, providing them with free seed, development advice, drainage, liming, and other inputs to support pasture yields exceeding 16 tonnes

- A renewed focus on pasture management and use of appropriate stocking rates and weekly pasture measuring
- An economic breeding index system which identifies genetics that result in very profitable fertile cows, with farmers now achieving over 95 per cent in calf rates with no intervention and nine weeks of mating
- Winter grazing forage systems which provide feed at less than five Euro cents per kilogram of dry matter
- Low capital cost off paddock wintering support systems
- The confidence to select cross-bred cows with higher milk solids which are more efficient grazers and can be run at higher stocking rates with earlier condensed calving.

The top one per cent of farmers in profitability are not achieving as high per cow production as Moorepark but have lower costs. The Moorepark system has evolved and there has been very detailed environmental and soil monitoring. The results of this clearly show that this system change to a higher stocking rate and lower input system based on growing more grass also results in reduced nitrogen leaching.

Reduced environmental footprint

The associated greenhouse gas modelling also shows a reduction in greenhouse gas emissions per kilogram of milk solids. The Irish government has taken a strong stance, supported by the public, that it is better for the world if Ireland increases its dairy production rather than having increased world dairy demand being met by production systems in other countries which have a much higher greenhouse gas footprint. This is a view supported at a European level.

The result is that production increases by this method of intensification would not be restricted by environmental considerations or restraints. If by 2020 the average farmer adopted the Moorepark farm system, there would be an increase of 276 per cent in dairy production just from land currently in dairying. This starts to put into perspective just how achievable and profitable the Food Harvest 2020 target of a 50 per cent increase is, and that this target is probably just a milestone on the path of expansion of the Irish dairy industry.

Summary of the potential effect of farm system changes compared with 2008

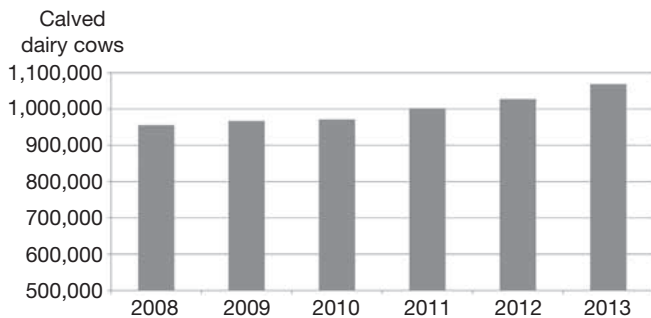
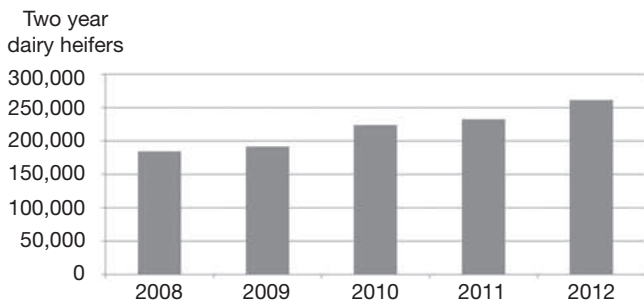
	Average dairy farm 2008	Top discussion group 2008	Moorepark farm system 2013	Top farmers one percent 2013
Pasture grown	8 tonnes	12 tonnes	16 tonnes	18 tonnes
Stocking rate	1.4	1.9	2.8	2.9
Cow type	Friesian	mixed	Friesians x Jersey	Friesians x Jersey
Fat and protein	7.14 %	7.5%	8.4 %	9 %
Kilograms of milk solids per cow	300	412	445	440
Kilograms of milk solids per hectare	450	990	1,246	1,275
Concentrate per cow	1,500 kg	480 kg	300 kg	Less than 200 kg
Profit per hectare at 2008 milk price	€ 400	€ 2,100	€ 2,500	€ 2,800



Artificial breeding

In the years leading up to 2008 the number of replacements reared in Ireland was insufficient to maintain the national herd. The use of artificial breeding was also low and 80 per cent of replacements had been bred from stock bulls. This has now completely changed.

Data collected by the Irish Cattle Breeding Federation, which has 87 per cent of all the dairy records for herds in Ireland over 10 cows, shows that over 80 per cent of current replacements are the result of artificial inseminations of high economic breeding index bulls. The number of heifer calves retained from birth in 2008 was 250,000 and this increased to 380,000 by 2012, with further increases in 2013 and 2014.



Trend in cow numbers

Since 2008 the national herd has increased slowly at an average of only 23,000 a year – between one and three per cent. This has resulted from increased numbers of replacements reared and increased retention of adult cows. The latest projections from the Moorepark economic group suggest an increase in cow numbers after the quota of between five and six per cent. The practical implication for this is that the average herd size would increase from the current 63 cows to over 120 cows in about five years. If this is accompanied by the lower input, more profitable system proposed by Moorepark then lack of labour will not be a constraint.

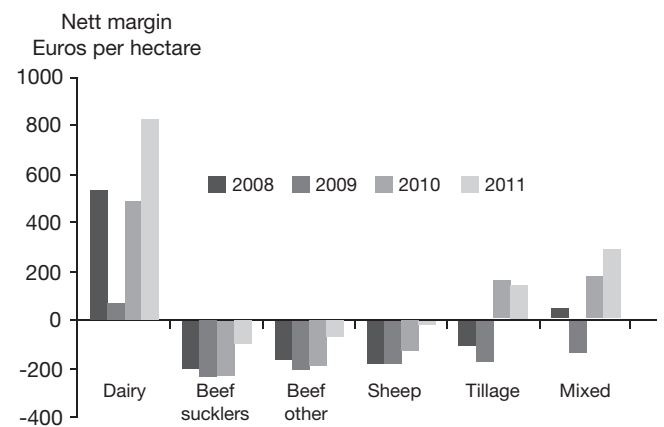
Moorepark’s world-leading research is complemented by a farming newspaper which is owned by the FBD Trust

and which is dedicated to furthering the interests of farmers and the sector. The *Irish Farmers Journal* arrives in farmers’ hands every week and will only publish validated objective information from research and not supply readers with the misinformation supplied by advertisers and others with vested interests. This trust also sponsors and invests about €10 million in other agricultural extension events.

Potential land use change

Currently only 20 per cent of land suitable for dairy farming is in dairy, 60 per cent in beef, 10 per cent in arable and 10 per cent in sheep. The effect of the global financial crisis has resulted in changes to payments from farming support subsidies of the Single Farm Payment and Rural Environment Protection Scheme. The latter paid farmers to reduce production by lowering stocking rates and fertiliser inputs and is being phased out. The major change to the Single Farm Payment is that it now differentiates between full-time and part-time farmers. Full-time farmers continue to be supported, but part-time farmers face major reductions in subsidy support.

A high percentage of beef, arable and sheep farmers fall into the part-time farmer category and they face a significant drop in subsidy income. The effect of this loss of support is critical because for a long time sheep and beef farmers have been farming at a loss. Even when subsidies were in place, these farmers ended up having about 75 per cent of the subsidy left for the family to live on after a year of farming, and this was much less than dairy farming families even though they got fewer subsidies.



Profitability of different farming enterprises in Ireland

The difference in profitability between farming enterprises shown in the graph above has been the norm for a long time. This is despite the fact that beef and

tillage enterprises are usually on the most productive land in Ireland. The presence of milk production quotas prevented any conversion of this land until 2004 when total milk production started dropping below the national quota. However, from 2004 to 2009 there were plenty of off-farm employment opportunities as a result of the rampant Celtic Tiger economy and this option was chosen by most sheep, beef and tillage farmers. These no longer exist, and with the removal of milk production quotas from March 2015 there is the opportunity for farm enterprise change by these farmers.

In recent times the international price for beef and lamb has improved, but unlike New Zealand farmers, Irish farmers have not benefitted from this. The reason is because this sector is dominated by the Goodman Group, which is a privately-owned business which controls the price farmers get and gains most of the revenue gained in the market.

Food Harvest 2020 does not factor in a major land use change, but the reality of repeated financial losses and the reduction in subsidies for non-dairy farmers will result in land use change, and the government New Entrants initiative is supporting this. Predictions are that this could result in a land use change greater than experienced in the South Island and there are no environmental or regulatory constraints to this change.

Capital available to convert to dairy

From 2008 to 2014 the Irish banks were virtually broke, but now they have money to lend. They have reduced their lending from 180 per cent to 110 per cent of deposits and have dramatically reduced their exposure to non-productive sectors of the economy. Since the beginning of 2014 banks have become focused on funding profitable businesses and have been targeting large multi-nationals and the agri-food sector, particularly dairy farming. This change is aligned with government policy.

The banks are obtaining money at 0.35 per cent from the European Central Bank and there is little on the horizon that would suggest any appetite for this bank to raise this low rate. The marginal interest rate that each bank adds to this when on-lending varies depending on the farmer. When farmers with a track record of excellent communication with the bank and profitable farming are looking for funds to expand or convert land, the margin added is as low as 2.5 per cent. This means they can access capital at 2.85 per cent. For other less business-focused farmers with a history of poor cost control and profitability, they are finding it very hard to get capital and the interest rate is as high as seven per cent if the bank agrees to lend them money.

Dairy industry ready to take increased milk

Over the last five years there has been a lot of discussion at the farmer and processor level about how to handle

the increased milk when the quota ends and how to get maximum returns to farmers. The result is a greater degree of cooperation between dairy companies and the development of a plan of new plants to meet this need. Even more significantly, dairy companies have agreed to accept all additional milk from their suppliers and most have also announced that there will not be any capacity charge for this extra milk.

Before the 2014 production year the Irish dairy industry was supplying 18 per cent of the world's infant formula production. In the current year –

- Kerry PLC has bought into production an additional powder plant and formed a partnership with Beingmate, a Chinese company, to supply it with dairy ingredients for its infant nutrition
- DairyGold has formed a joint venture with Danone and doubled the capacity of its infant formula production
- DairyGold and Glanbia have entered an agreement to build four new powder dryers, each with the capacity of 7.5 tonnes an hour.

This extra dairy production is mostly destined for Africa and the Middle East markets, although the extra baby formula is for the Chinese market.

Summary

The raising of the production quotas is an opportunity for expansion which has not been available for more than a generation of farmers. This event in March 2015 has been anticipated by the industry and by all farmers for many years. Farmer interest in cost-effective ways to expand production or convert to dairy has been high and there has been a well-planned research and extension programme to support this. In addition, there are no environmental or regulatory constraints to expansion or land use change. The Irish government has shown its support with the provision of important tax concessions and grants which could provide a mechanism to overcome the hurdle of fragmented land-holdings.

This is the best opportunity which has existed for Irish farmers to capitalise on a climate ideal for growing very nutritious ryegrass and producing high quality milk at an internationally low price. For the 10 per cent of farmers who currently produce 50 per cent of Ireland's milk, the appetite for expansion is strong and they have been active in making changes so they can expand rapidly. The only hurdle getting in the way of exceeding the target of a 50 per cent increase in milk production by 2020, and continuing to expand beyond that, is a possible lack of farmer enterprise above the motivated 10 per cent to take advantage of this opportunity.

Adrian van Bysterveldt is Large Business Project Leader at DairyNZ based in Lincoln and Michael Murphy is an Irish dairy industry leader living in Castlefreke in West Cork, Ireland.

Philip Hulme

Future proofing the biosecurity of New Zealand

Biosecurity is widely viewed by industry to be critical to the economic prosperity of New Zealand. This article is an overview of the challenges this country faces in preventing and managing pest, weeds and diseases. The next 10 years will see dramatic changes in how scientists, industry and the general public contribute to the biosecurity system. These changes should lead to a more efficient and coordinated approach, but they will also increase uncertainties about the way we predict and respond to the future risks we might face.

Biosecurity describes the strategies, regulations and activities involved in the exclusion, eradication or effective management of risks posed by pests, weeds and diseases to the economy, environment and human health. There are at least three good reasons why biosecurity is arguably more significant to New Zealand than any other country in the world. First, relative to most developed countries, our economy depends on vibrant agriculture, horticulture and forestry sectors – making up 70 per cent of our export earnings.

Second, our primary industries mainly depend on the productivity of exotic species, be they livestock, pasture grasses, pip fruit and stone fruit, forestry trees or aquaculture species such as salmon and Pacific oysters. The fact that these species do so well in New Zealand is partly a reflection that they have left many pests and diseases behind in their regions of origin. Third, the long isolation of New Zealand and rapid transformation of our landscape to support primary production means that our agricultural and forestry systems are very simplified and lack effective native predators and parasites which might stem the incursion of new pests. This can result in severe outbreaks of pest species which are viewed overseas as relatively benign.

Such is the case of the eucalyptus tortoise beetle, which is rare in its native Australia but is the most serious defoliator of eucalypts in New Zealand, virtually curtailing the planting of several species. In general, the relative freedom from pests and diseases combined with excellent growing conditions in this country has made the primary sector highly competitive globally. However it also means that even a single incursion of a high profile pest or disease could have major economic effects.

The Reserve Bank of New Zealand has estimated that an outbreak of foot-and-mouth disease would reduce

gross domestic product by \$8 billion after one year and \$13 billion after two years, effectively devastating our economy. How well are we doing in protecting the border and securing our market advantage? This overview aims to summarise recent developments in biosecurity, examine how best we can judge the performance of our biosecurity system, discuss the roles of citizens, scientists, industry and government in preventing and managing incursions, and show some of the future challenges.

The cost of protecting our border

Not surprisingly, maintaining a world-class biosecurity system to protect New Zealand is often the top priority among leaders of our primary industries. Nevertheless, our current awareness of the importance of biosecurity has come at a cost of learning some tough lessons. For example, pastoral weeds are conservatively estimated to cost the New Zealand economy \$1.2 billion each year in lost animal production and control costs. Annual production losses attributable to invertebrate pests have been estimated to be around \$880 million. Overall, the losses to the primary sector from pest, weed and disease incursions account for almost two per cent of gross domestic product. This might not sound much, but given that primary industries contributed 6.4 per cent of total gross domestic product in 2012, it represents a substantial loss of the potential value that primary industries could bring to the country.

It is against such biosecurity challenges that the government's Growth Agenda aims to increase the ratio of exports to gross domestic product from 30 per cent to 40 per cent by 2025. The considerable efforts of primary industries to rise to this challenge could easily be offset by one or more pests or diseases.



The financial effect of a Queensland fruit fly incursion on New Zealand's kiwifruit industry could cost as much as \$430 million if it triggered a severe market reaction. This would jeopardise the short-term financial viability of the \$1.5 billion industry. Reducing biosecurity risks helps encourage investment in primary industry and freedom from pests and diseases makes us a more attractive exporter. Undoubtedly, biosecurity must play a critical role in such potential productivity and economic growth.

Significant investment

New Zealand therefore invests heavily in biosecurity activities to protect its economy, environment and people from the risks associated with the introduction of new plant and animal diseases, pest insects and weeds. There is a wide range of biosecurity activities along a continuum which starts offshore and ends in our own backyards. Work beyond our borders aims to reduce the risks posed by our trading partners and includes undertaking risk assessments, developing import health standards, and negotiating favourable trade agreements.

The most visible aspect of biosecurity concerns is at the New Zealand border where inspection and screening are in place to stop pests, diseases and weeds from entering our country. Within the border, a range of additional activities is in place to detect, locate, eradicate or manage organisms which have crossed the border and established in this country. This all requires considerable investment from the border to the boardroom.

The government invests around \$200 million a year in biosecurity via the Ministry for Primary Industries. However, this is a fraction of the public funds spent on biosecurity by other government departments, regional, city and local councils, Crown Research Institutes and universities. Industry invests significantly by import and export compliance as well as crop and livestock protection. For example, importers contribute between \$80 million and \$125 million annually to the cost of biosecurity management in New Zealand using levy income as well as compliance and clearance costs.

How well are we doing?

Is New Zealand getting good value for its investment? Arguably, MPI is the most important Ministry in terms of its role in securing a positive economic future for this country. As a result it probably receives more detailed scrutiny than any other ministry and when it occasionally

drops the ball the ramifications can be dramatic. Few can be unaware of recent incursions which have had major implications for primary industry –

- The introduction of PSA, the cause of bacterial kiwifruit vine disease, has had a significant effect on the sector and will probably cost the economy between \$310 million and \$400 million over five years
- The tomato-potato-psyllid, a sucking bug, which has wiped out \$86 million in potato production in just one year
- In aquaculture annual production losses from a single species of sea squirt, *Styela clava*, have been estimated to be \$15 million.

No national biosecurity system can be 100 per cent effective and it is easy to focus on the few species which have breached the border rather than the countless many that have probably been kept out by effective risk assessment, inspection and surveillance procedures. Yet it is impossible to estimate the effectiveness of MPI biosecurity operations in simple percentages of incursions avoided and they are therefore often judged against what slips across the border.

It is also easy to forget the successes which MPI, and its predecessor the Ministry of Agriculture and Forestry, have had in responding to incursions and preventing the establishment of economically important pests. The net economic benefit of eradicating forestry pests such as the white tussock moth, painted apple moth, gypsy moth and fall webworm are estimated to be as much as \$870 million.

Ministry performance

The Office of the Auditor General examined the performance of biosecurity management by the Ministry of Agriculture and Forestry and MPI in 2002, 2006 and 2013 and in each case has found there is considerable room for improvement. This is not surprising given the thoroughness of investigations undertaken and the transformation of New Zealand agriculture, trade and tourism over the last decade. The regular checks and balances on the performance of the New Zealand biosecurity system are at least a good sign that the government takes the problem seriously and it has resulted in continuous improvements in the way MPI operates.

MPI has also continued to support a Biosecurity Ministerial Advisory Committee to provide independent advice on the performance of the overall biosecurity system. Drawing on experts from across primary industry sectors, biosecurity scientists and leaders in

regional government, the committee focuses on how the biosecurity system can help in creating an environment which supports growth and sustainability across primary industry. It also helps to identify opportunities to improve the performance, efficiency, cost-effectiveness and capability of the biosecurity system.

The committee's current work programme is focused on assessing progress towards adopting the recommendations of the most recent report from the Office of the Auditor General. These include –

- Lifting the profile of biosecurity nationally to ensure citizens take personal responsibility for biosecurity
- Establishing suitable performance measures for MPI
- Assessing national readiness for future incursions
- Discussing how best to manage compliance and enforcement.

It is our place to protect

MPI is the lead agency responsible for biosecurity, but preventing the introduction of harmful species into the country is the responsibility of everyone. An independent review of the PSA incursion highlighted that a systemic lack of communication and information exchange among industry, science providers and MPI was at the heart of the problem. Ensuring that there is a well-connected national capability for biosecurity is essential. There are at least four groups which need to be mobilised and coordinated to ensure a robust biosecurity system –

- The general public
- Science providers
- Biosecurity specialist organisations, including central and local government
- Industry.

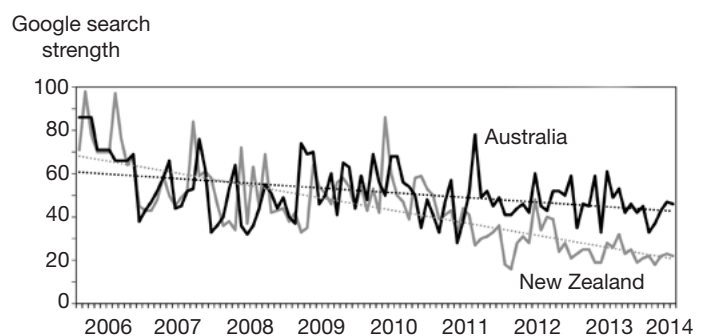
Role of the public

A fundamental question is how much involvement is there from the general public? Episodes of the TVNZ *Border Patrol* reality programme, depicting inspections at the New Zealand border, are popular and may be seen by up to 10 per cent of the population. We might therefore expect New Zealanders to be well informed and important contributors to the biosecurity system. However, much of this emphasis has been on ensuring citizen compliance with regulations about the importation of goods and movement of risk organisms, either deliberately or unintentionally.

It is often stated that we do not make enough of the over four million pairs of eyes and ears that could support national surveillance programmes. Many incursions are first detected by members of the general public. With increasing pressure from new incursions, can the contribution of citizens be made significantly more effective and widespread to secure greater biosecurity benefits? As yet, this potential is not fully recognised. Understanding the limits of citizen involvement and the barriers to participation are essential to maximising their contribution to the biosecurity system. The public role

in surveillance may often be limited in scope due to a mostly urban population with little knowledge of pest identification as shown in the graph.

Similarly not all management programmes meet with public sympathy, as is the case for aerial spraying of pesticides, the release of bio-control agents, or the prohibition of the sale of certain species. Maintaining awareness of biosecurity among the general public and the role they may play is essential. MPI has run several successful social marketing campaigns to change citizen behaviour and a similar effort should be invested in encouraging them to be active members of the biosecurity system. Unfortunately, certain lines of evidence suggest that interest in biosecurity may be waning, at least compared to Australia.

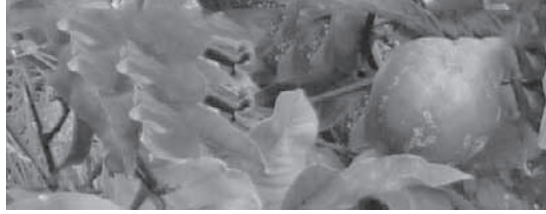


Relative search strength of the term biosecurity using Google in Australia and New Zealand

There has been a marked decline in online interest since 2011, a period which coincided with the retirement of the Biosecurity New Zealand brand. This brand was synonymous with the Ministry of Agriculture and Forestry. However, perhaps further thought should be given to a brand which is not institution-specific and could be used on all biosecurity relevant materials produced by MPI as well as primary industry sectors, regional councils and other government departments. It would give a better idea of how biosecurity impinges on the everyday activities of each of us in New Zealand and that we all have a role to play in protecting the country.

Working together

New Zealand benefits from a productive scientific community researching biosecurity problems. This includes scientific teams in government departments and ministries as well as those employed by industry, the Crown Research Institutes and universities. Individual teams undertake excellent science, but research is often sector-specific, it addresses different targets such as animal, aquatic or plant health, and it is mainly based within the natural sciences. The different groupings do not currently communicate effectively with each other and often approach biosecurity from diverse perspectives using different emphases and methods. There remains considerable scope to bring these research communities together to help improve ideas and approaches, ensuring a more consistent approach to biosecurity.



One example of where a more collaborative method has proved successful is Better Border Biosecurity, a science cooperative which researches ways to reduce the entry and establishment of new plant pests and diseases. The joint venture integrates investment and expertise from five science agencies – Plant & Food Research, AgResearch, Scion, Landcare Research and the Bio-Protection Research Centre at Lincoln University. There are three end-users – MPI, the Department of Conservation and the New Zealand Forest Owners Association.

Much of the research undertaken in New Zealand is still focused on only one aspect of the biosecurity system such as pre-border or post-border. An overall perspective is required which bridges the gaps between these research activities, provides the necessary context and appraises the biosecurity research portfolio. Biosecurity is an interdisciplinary topic which requires the involvement of social scientists, veterinarians, epidemiologists, economists, geographers, political scientists and information technologists. It has been weak on research.

New programme

These limitations may be about to be resolved with the recently launched National Science Challenge, a 10-year programme to fund research in New Zealand. Biosecurity is represented in the Biological Heritage Challenge, which focuses biosecurity research on a series of important concerns including –

- Inspiring citizens to contribute to biosecurity surveillance and compliance
- Looking ahead for future threats
- New management methods and strategies
- Improved risk assessment
- Increasing the resilience of productive systems to pest, disease and weed threats.

Using new money and existing funding, the Biological Heritage Challenge will use scientists from different institutions and disciplines for common aims. It will be important for the primary industry sector to be involved and kept abreast of this important change in the way biosecurity science is directed.

Another option is the National Biosecurity Capability Network. This is a joint initiative between MPI and AsureQuality to manage a network of people and facilities which can be deployed in response to a pest incursion. Support has grown rapidly in the last year and appears to be settling at around 120 organisations.

Most partner organisations are involved in animal

capability, which reflects the concern that New Zealand resources would be stretched should a foot-and-mouth disease outbreak occur. However, the horticultural and forestry sectors still need to improve, particularly in relation to surveillance and organism management. The network was found to function effectively in the recent Queensland fruit fly incursion response in Whangarei, but the robustness of the network to different types of incursions or responses in less populated areas has not been assessed.

Government industry agreements

A further option is the government industry agreement on biosecurity readiness and response which aims to improve joint decision-making and cost-sharing between primary industry and MPI. Closer collaboration should help ensure a more coordinated response and better results when incursions happen. Most industries have welcomed the opportunity to have a greater say in how incursions are managed. However several have expressed concerns that their responsibilities only start this side of the border rather than influencing import health risk assessments and border interventions. Kiwifruit Vine Health signed the first government industry agreement in May 2014 and more than a dozen other industry partners have signed a preliminary memorandum of understanding.

There is still uncertainty around how the government industry agreements will work. The government has agreed that industry will pay no more than 50 per cent of any response costs, but these costs can run into tens of millions of dollars. Once an incursion has taken place an industry sector may be facing not only lost production, but also market access problems. Bearing the costs of responding to a major incursion could be one financial challenge too many. Greater involvement by industry in decision-making cannot be a bad thing, but it will probably take an actual incursion to test how well the government industry agreement model might work. Let us hope it is not a big one.

Working together

What we can see is that as the scale of the biosecurity challenge facing New Zealand increases, the responsibility for managing the threat of risk organisms is becoming progressively devolved, particularly within our borders. As organisations take on responsibility for biosecurity, the dynamics of the system will change from a mainly centralised government responsibility to a wider network of participants.



If managed well, this should ensure greater connection and that appropriate funding is allocated to the risks of greatest concern. Working together should also ensure responses to biosecurity incursions are run more efficiently. Several important questions arise about this new model of biosecurity management –

- How robust and dependable will it be?
- Will it possess the necessary information flows and feedbacks to perform effectively?
- What will be its emerging properties and could they impede biosecurity management?
- Will multiple partners delay response times so that opportunities for eradication are lost?

Recent failures in the biosecurity system have been attributed to the frequent restructuring of the ministry responsible. However, we should ensure that the efforts to make this more devolved biosecurity system a success do not divert resources from future threats.

Looking to the future

The dynamic nature of biosecurity risks faced by New Zealand over the medium to long term requires foresight and the ability to apply this in response to emerging biosecurity risks. Foresight is more than simply keeping abreast of potential problems reported overseas. It should apply climate, economic, demographic, agriculture and trade forecasts to identify future events which might result in new threats to the New Zealand biosecurity system. For example, climate change is likely to exacerbate the existing problems as pests, weeds and diseases in the North Island move further south and will also open up the country to new threats that previously found the environment unsuitable.

Population growth, increasing urbanisation, novel crops, changing agricultural practice and the exploitation of terrestrial and marine resources will alter the resilience of the productive environment to established and potential future pest species. As an example, native manuka beetles have become a serious pest on recently developed pastures on the West Coast. Flipping soil to improve pastures has exposed sandy soils, which appears to be a perfect habitat for the pest.

The future will become increasingly uncertain and the biosecurity system should be designed to deal with this uncertainty. This means that risk assessments need to be dynamic and account for future uncertainty, including preparing for worst-case scenarios. These scenarios need to be worked up with industry partners, not only to secure the most effective response in the event of an incursion,

but also to adapt their practices to minimise future risk and build resilience into their production systems.

Preventative measures addressing the risks outside the border, along with surveillance and interceptions at the border, are widely viewed as the most cost-effective method to manage future threats. However improving border biosecurity is not a foolproof strategy as it can never hope to be 100 per cent effective. In addition, many future pests, weeds and pathogens may already be established, although at low density. They may become increasingly important as a result of contemporary evolution, such as pesticide resistance in the varroa mite, or relaxation of environmental constraints as a result of climate change.

There are considerable economic, environmental and social benefits in the early identification of future post-border threats, of containing outbreaks and slowing their spread before their effects can be fully realised and management required. Insufficient effort has been made to increase the cost-effectiveness of post-border interventions. Too often a species is deemed too widespread for the benefits of a response to outweigh its costs. In many cases the benefits of mounting a response may be under-estimated. This is relevant where a particular pest species may limit future options for the development of new crops, or be found at a later date to be an important vector of plant pathogens.

Finally, the ability to respond to these threats is progressively being weakened as a result of rising instability in current biological controls and the falling rate of pesticide registrations and public acceptance of chemical residues in food. Withdrawal of older broad-spectrum pesticides will reduce the arsenal available to control pests, but New Zealand's small market cannot support the development costs of replacements, particularly for niche crops. As a result, our primary production systems face increased environmental regulation and international markets demanding green credentials.

There is also the reality that, as intensifying production reaches its technical limit, resilience to damage is lost leading to higher sensitivity to the effects of pests. These increasingly complex and threatening interactions will require new and integrated approaches to biosecurity and will depend on new technology for managing pests, diseases and weeds to stem a rising tide of threats. New Zealand must invest strategically in this area.

Philip Hulme is Professor of Plant Biosecurity at the Bio-Protection Research Centre at Lincoln University and is a member of the Biosecurity Ministerial Advisory Committee.

Graeme Harrison

No phony war

The New Zealand meat industry is in a battle

Professor Keith Woodford of Lincoln University observed in a newspaper comment that the New Zealand meat industry was currently in a phony war and it was 'all quiet on the Western Front.' For those in the industry front line, there is nothing phony or quiet about the battle of attrition currently taking place. Processing and marketing companies are in survival mode as each endeavours to live on thin margins until some others around them succumb.

At the overall collective industry level it is a battle to stem the tide in land use change from traditional sheep and cattle farming to dairying. Both are interconnected as reducing livestock numbers result in ever-increasing industry excess processing capacity and greater competition for available livestock. A processing and marketing sector operating in survival mode has little or no capital surplus to invest in innovation to help the industry's relative competitiveness.

Processing and marketing companies have been engaged in the latest battle to the death for at least the past five years. The last time such a sustained period of survival pressure occurred was before the collapse of the publicly listed Fortex in March 1994, followed by the British Vestey family-owned Weddel New Zealand five months later.

I have had lengthy governance roles in other primary sector businesses and founded one of the current four major companies in the New Zealand meat industry, ANZCO Foods. I am in no doubt that the meat processing industry is this country's most competitive business and the most exposed to external market forces. Few business or political commentators really understand its competitive nature. Brian Gaynor in a 2008 column came close to the real problems when he said:

... the basic problem in the meat processing industry is a flawed business model. Meat companies are middlemen. They do not own the product, they act as agents between producers and buyers. They only receive a small margin yet often have to take large risks that are totally inconsistent with this margin. Meat processors have huge financing requirements,

particularly during the height of the killing season. [They] also have a huge exposure to foreign exchange and derivative markets. For example, they often sell product forward but may have to purchase from farmers at a higher price if their price forecasts are incorrect.

Land use competition and technology changes do result in business failures and plant closures. Short of a highly regulated industry, which existed from 1939 to 1981, building new plants and closure of others is inevitable. With the most diversified markets now being served since the start of the domestic meat export industry in 1882, and the prospect of strong future growing demand for beef and sheep meat in the emerging economies of Asia, a return to a heavily regulated processing sector makes no economic sense. And it will not comply with New Zealand trade agreement obligations. This article provides an insider's perspective on the evolution of the modern New Zealand meat industry, market access and technology change consequences, farmer ownership, the different market profiles for sheep meat and beef, the challenges of adding value, and the future outlook.

Numerous external reports

Contrary to recent farmer debate, no other industry in New Zealand has been more externally examined than the meat industry. I was recruited as an economics research officer by the Meat Producers Board in 1973 to help with the preparation of the submissions, as well as to review and analyse more than 100 other submissions that were made to the Nordmeyer Commission of Inquiry into the

New Zealand meat industry. This inquiry was an election pledge by the incoming Kirk Labour Government in 1972 and was sought by the meat workers' unions.

Subsequent examinations included the Glendinning Report on the United Kingdom lamb market in 1983, the Papas Carter Evans & Koop Report in 1986, the Garway Report in 1988, the Boston Consulting Report in 1993, the Southpac Report in 1994, the Ernst & Young Report in 1996 and various industry taskforces. The Red Meat Sector Report of 2011 did not try to examine industry structures. Common themes in these reports have been –

- Industry ownership and are farmers the natural owners?
- Seasonal supply and lack of extended kill
- Slaughter processing over-capacity
- Burden of plant closure costs
- Cyclical pricing
- Destructive market place competition
- Lack of market diversification
- Changing consumer trends
- Growth of supermarket purchasing power
- Value adding opportunities
- Lack of vertical integration.

During my time associated with the New Zealand meat industry there have been common themes during each producer income crisis. These have been –

- Lower price returns
- Inflationary cost pressures on and off-farm
- Higher regulatory costs
- High interest rates
- Exchange rate pressures
- Droughts and the lack of killing space
- Poor meat company performance
- Lack of industry leadership.

Choice

I worked for a producer board as an executive for the first 10 years of my career in the meat industry, then founded and ran a company for the next 11 years which was majority farmer-owned. I have therefore had first-hand experience observing farmer politics. Like it or not, sheep and beef farmers are traders. Individual choice is a core belief in our society. Farmers want choice and they have determined the industry structures which are in place.

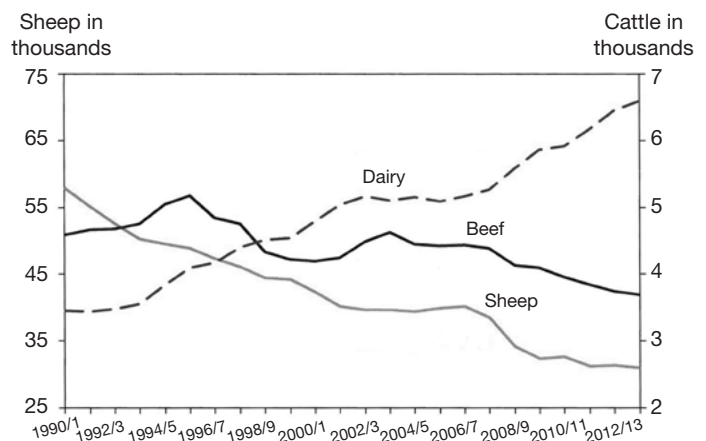
Sheep farmers opposed producer organisation leadership attempts during the so-called Great Wool debate of the early 1970s. I witnessed the Meat and Wool Boards' electoral committee throw out wool reform proposals and at the same time criticise poor meat company performance.

Sheep and beef farmers opposed, or at best tolerated, the market intervention activities by the Meat Producers Board in the 1970s. The introduction of supplementary minimum prices by the Muldoon government as their answer to continuing inflationary pressures was supported by Federated Farmers and some producer boards but opposed by the Meat Producers Board.

Give any business sector inflated price signals and

it will soon respond. Sheep and beef farmers did exactly that during the supplementary minimum prices era. Yet with access to the European Union market restricted by quotas from 1980, where was the sharp rise in sheep meat production to go? The industry's export lamb slaughtering rose from around 24 million annually in the 1970s to 31 million in 1980/81, before peaking at over 39 million in 1984/85. The climb in the mutton kill was just as dramatic.

As the Meat Producers Board grappled with this challenge, its activities were opposed by the leadership of Federated Farmers and meat industry commercial players. Subsequent developments since the mid-1980s have been left to market forces, with the Meat Producers Board eventually withdrawing from all commercial activities and in the 1990s losing legislative capacity to intervene. In the meantime the scale of reduced livestock numbers processed by the New Zealand meat industry is evident, showing a 47 per cent decline in sheep numbers and a 20 per cent fall in beef cattle numbers between 1990/91 and 2012/13. The dairy industry has become a larger source of animals, but well below previous throughput numbers.



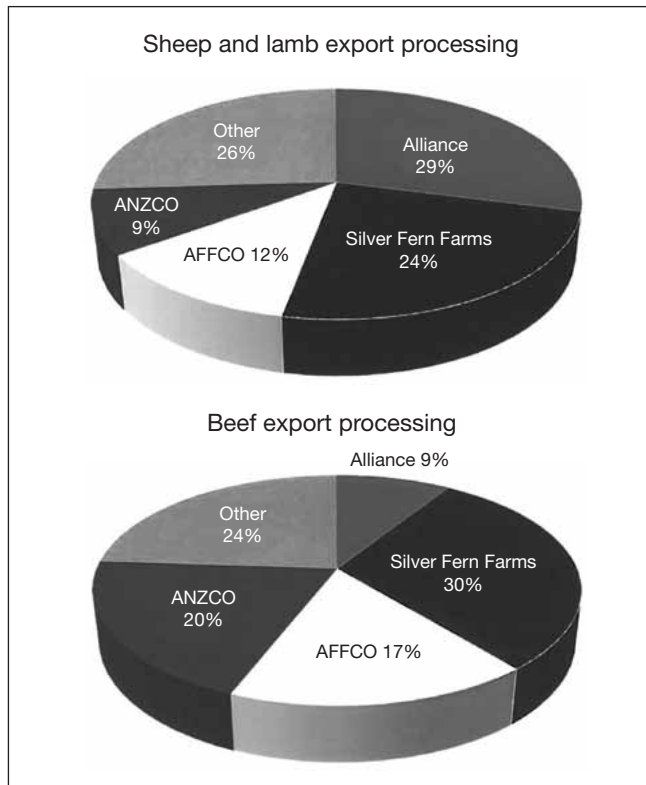
New Zealand industry livestock numbers 1990/91 to 2013/14

Transformation of the meat industry

Comments have been made in recent years that weaker sheep and beef farmer incomes and the inability of the meat industry to compete with dairying has been due to tired old companies. It is easy to get the impression from the rural press that sheep meat dominates industry behaviour and that two companies, Silver Fern Farms and Alliance which are both farmer-owned, are the only major ones. In reality, the face of the New Zealand meat processing industry has been transformed in the past 30 years by deregulation and market access changes.

Today ownership of the New Zealand meat processing industry is more concentrated than it ever has been during the past 100 years. Four major companies have around 75 per cent of the industry's throughput. Although annual sales turnovers range from \$1.1 billion to \$2 billion, in reality each of the four majors have similar equity backings. Each company has different business practices and market profiles but all are exposed to the

vagaries of climate, which is the main determinant of livestock flows, and have minimal investment in their greatest input cost – livestock.



New Zealand meat industry ownership

	Turnover	Plants
Silver Fern Farms	\$2 billion	15
Alliance Group	\$1.4 billion	7
ANZCO Foods	\$1.3 billion	7
AFFCO	\$1.1 billion	8

Companies other than the four majors account for 26 per cent of export sheep meat processing and 24 per cent of export beef processing. There are significant smaller operators, all founded in the modern New Zealand meat industry, including Progressive Meats in sheep meat and Greenlea Premier Meats in beef.

Market access change consequences

Contrary to public perceptions, the New Zealand meat industry has responded swiftly to market access changes. During the first 75 years of the export trade practically all shipments were in frozen form, and went to the United Kingdom as carcasses for lamb and mutton or as bone-in quarters for beef. It was the opening of the United States market which transformed the New Zealand beef industry.

Boneless beef exports to the United States started in 1957. The 60 pound or 27.2 kilogram carton became the standard packaging, just as 25 kilogram bags have for New

Zealand milk powder exports. As with milk powder, the bulk of New Zealand beef exports are used as ingredients in manufactured foods and in the United States are usually blended with domestic grain-fed trimmings.

The mutton trade changed after Japan provided quota and tariff-free access for non-processed carcasses in the early 1960s. Carcasses were shipped to Japan and Korea for processing into boneless forms for the manufacturing of pressed ham, sausages and other items. At one stage Japan accounted for over 95 per cent of New Zealand mutton exports, but by the mid-1970s pork and chicken increasingly replaced both mutton and horse meat.

More changes

New Zealand had quota-free access for sheep meat to the United Kingdom until 1980. The United Kingdom joined the European Union in 1973, with the Common Agricultural Policy extended to cover sheep meat in 1980. From that point the New Zealand meat industry no longer had a backstop market to sell whatever was produced. Sales of lamb and mutton carcasses to the Middle East and the Soviet Union became essential from the mid-1970s but these trades were unpredictable and often destinations of last resort.

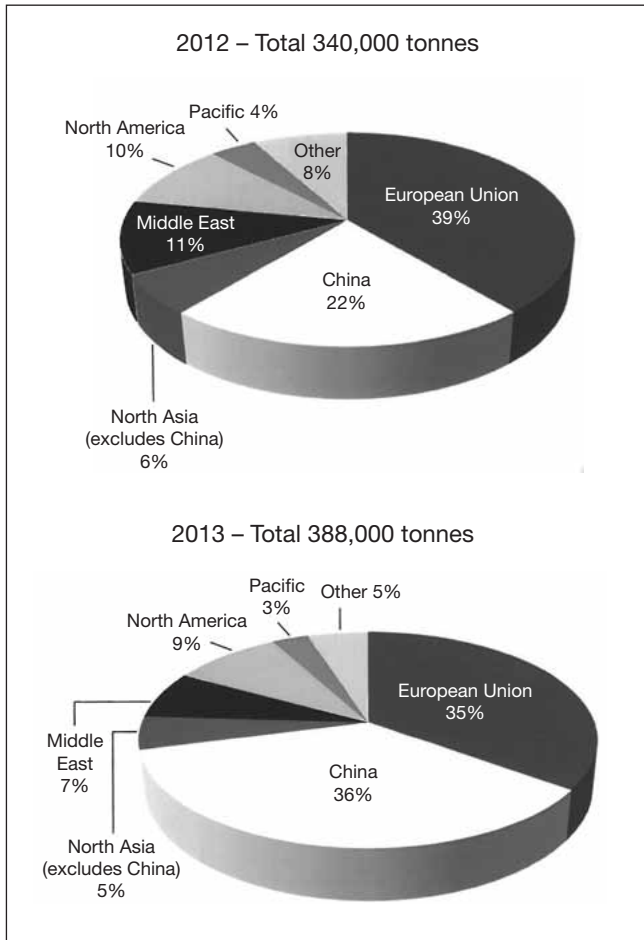
The next major market access changes occurred in the north Asian beef markets of Japan and South Korea in the 1990s. Quotas were replaced by tariffs, which were phased downwards, although to the high current levels of 38.5 per cent in Japan and 40 per cent in South Korea.

The most significant trade liberalisation in the past two decades was the result of the WTO Uruguay Round and the current opening of the China market. The Uruguay Round bound access terms for beef into the United States and Canada, tariff levels into Japan and South Korea, and resulted in the phasing out of European Union beef export subsidies. For sheep meat it provided the breakthrough which enabled chilled lamb access to the European Union and guaranteed New Zealand's overall sheep meat access on favourable terms to that market.

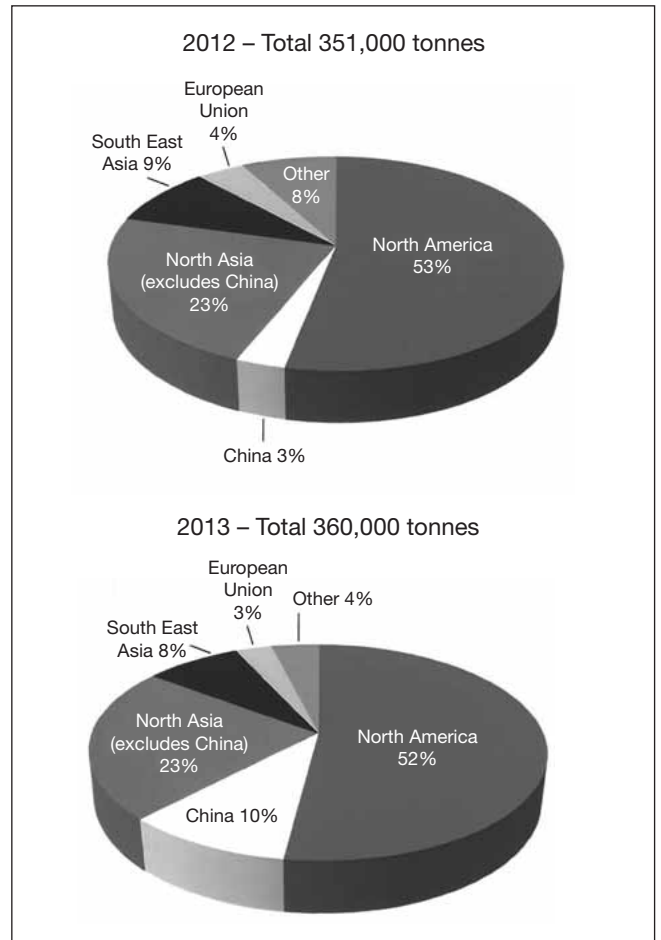
Export transformation

Although ANZCO Foods made a small shipment of 500 tonnes of mutton to China in 1985, New Zealand's sheep meat trade in its current began in 1996. From low-value lamb and mutton breasts and flaps, China is now rapidly moving up the value chain. It has become New Zealand's largest sheep meat market, both by volume and value. The graphs on the next page highlight the transformation in New Zealand sheep meat exports by region. In the year ending 30 September 2013 China accounted for 36 per cent of the total, heading off the European Union at 35 per cent.

Until the early 1990s, the United States and Canada dominated New Zealand beef export shipments. However, in 2012/13 this share had fallen to 52 per cent with north



Sheep meat exports by region



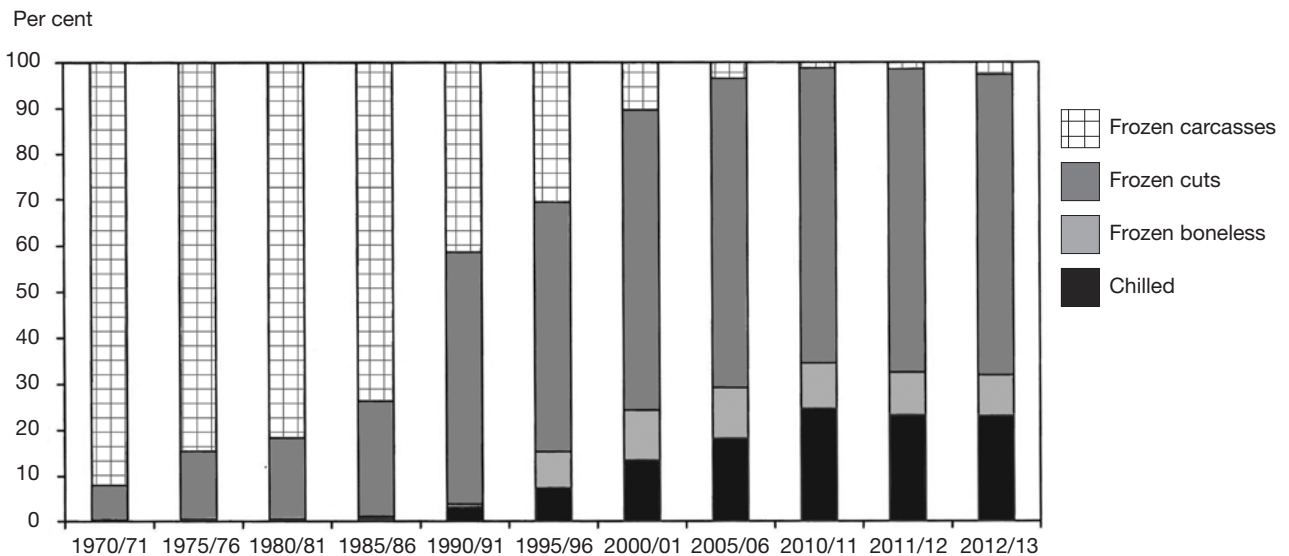
Beef exports by region

Asia, including Japan, South Korea, Taiwan and China, at 33 per cent. Beef shipments to China through official import channels are still in their infancy but growing fast.

The graphs above show the spread of beef shipments by region in the separate years of 2012 and 2013. There has been a big change in the product mix, especially for

lamb. The transformation began in the mid-1980s with an increasing switch from carcasses to bone-in cuts and boneless forms.

In 1970/71 practically all mutton and 92 per cent of lamb production was exported as frozen carcasses. However, today chilled products account for over a



Technology and market access changes export lamb product mix

fifth of all shipments and frozen carcasses had virtually disappeared by 2010. Due to Chinese demand frozen carcass exports have been on the rise, now at six per cent of total production.

Beef used for manufacturing and described as processing or ingredient beef has changed very little since the opening of the United States market. Beef, like milk powders and other bulk products of the New Zealand dairy industry, has seen standards become more specific to individual end users. Young bull beef has had a major role in this over the past 25 years.

Of New Zealand's chilled beef export markets, Japan has been by far the most significant since the early 1990s and the dominant supplier has been one company, ANZCO Foods. The largest individual supply source has been New Zealand's only large-scale cattle feedlot, Five Star Beef located near Ashburton. It is Five Star Beef, more than any other single influence, which has been responsible for reinvigorating the place of Angus cattle in the New Zealand herd.

Farmer ownership

At the end of World War I farmer companies owned 58 per cent of New Zealand's meat export slaughter plants. Farmer influence was enhanced by the passage of the 1921/22 Meat Export Control Act establishing the Meat Producers Board, but by 1932 producer-owned plants had reduced to just 13 or one-third of the 37 operating plants.

More significant was legislated change in the Meat Act 1939. This gave farmers the right to have livestock processed at any export slaughter plant on their own account, with the meat then sold to best advantage on farmer's account. This open door policy enabled farmer ownership presence throughout the licensed industry era until 1981. It was the reason that producer groupings, including PPCS and its North Island equivalent, Producer Meats, were able to prosper without the need to have funds invested in slaughter plants.

All four of the current New Zealand meat industry major companies have at some point been farmer-owned. All four received producer board loan funding or seed capital, along with regulatory support. Dairy industry success, with its cooperative ownership, has been periodically promoted by farmer representatives as the business model which will solve meat industry shortcomings. However, there are fundamental differences at the farmer supply end. Cooperative ownership of the dairy industry in some producing countries has been born of necessity, reflecting milk being a perishable item requiring guaranteed regular pick-up and processing into intermediate or finished forms.

Meat producers, in contrast, usually have multiple selling options. Only in a severe drought, without access to modest cost supplementary feeds, do those options disappear. Usually there is no pressing need for specific livestock to be slaughtered on a particular day. It is for this reason the trader mentality of the meat industry has

been in farmers' hands.

Cooperative meat processing ownership only persists in countries where there has been a history of import protection or industry regulation, with Scandinavian countries notable examples. In the major beef and sheep meat export-producing countries no leading processing companies are cooperatively owned, other than in New Zealand. As the New Zealand meat industry evolves towards servicing markets throughout the year with chilled and manufactured meat items, the traditional cooperative model will be on a collision course with corporate owners needing to vertically integrate back into livestock supply sourcing.

Different sheep meat and beef market profiles

In rejecting the 2008 Alliance promoted mega merger proposal to consolidate around 80 per cent of the New Zealand meat industry into one entity, the then chairman of Silver Fern Farms, Eion Garden, claimed New Zealand lamb and beef were sold to the same customers. This was a misrepresentation of the real situation. Consider the following facts –

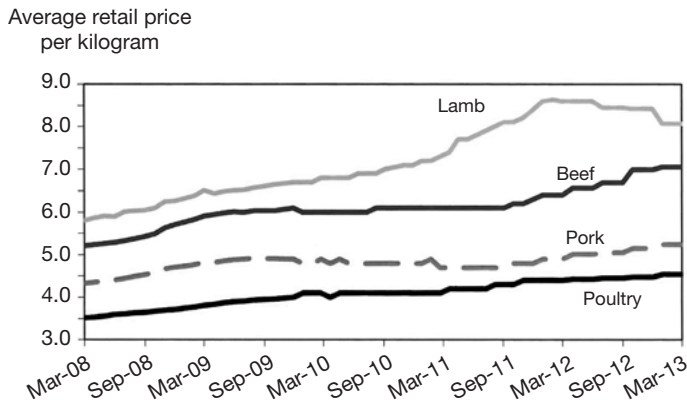
- New Zealand accounts for five per cent of world sheep meat production and 45 per cent of the cross-border sheep meat trade
- New Zealand supplies two-thirds of world lamb exports
- In contrast to sheep meat, New Zealand has only one per cent of world beef production and six per cent of the world cross-border beef trade.

The market profiles are quite different. The European Union accounted for over a third of New Zealand sheep meat exports in 2012/13 but only three per cent of beef exports. In contrast, North America was the major destination for beef exports at 52 per cent, but accounted for only nine per cent of sheep meat exports. Lamb is a table meat sold to the retail and food service sectors, while beef is mainly used for further processing and manufacturing. The largest individual customer of New Zealand beef, McDonalds, purchases practically no sheep meat.

Lamb price changes

Very little New Zealand beef is sold in United Kingdom supermarkets. Lamb is the dominant item in retail sales of New Zealand meat in that market. One of the most annoying myths is that New Zealand lamb is poorly market positioned. This is untrue and does not recognise the change which has occurred in the past two decades. Back in the 1970s, when I was based in the United Kingdom, New Zealand lamb was an economic meat for shoppers. It was sold either frozen in supermarkets or thawed in traditional butcher shops. As an everyday food item it was priced well below beef and at about the same level as pork.

As the graph shows, lamb is now the most expensive major meat in the United Kingdom and is priced higher than beef and well above pork. It is true New Zealand lamb generally retails in the United Kingdom below domestic production price, but apart from China there is no major beef or sheep meat consuming market in the world where imported products consistently sell at a higher price than the locally produced meat.



British retail meat prices domestic and imported

Future outlook

In 2009 the United Nations Food and Agriculture Organisation published forecasts for global food demand through to 2050. New Zealand has had a dairy boom as a result of higher demand for dairy products and improved market access. Yet the projected growth in meat demand is expected to outpace dairy. Most of the new meat demand will be supplied by chicken and pork, but competing demand for feed will open up unprecedented opportunities for New Zealand meat, especially beef.

The speed at which these opportunities become significant will depend on improved meat access, with the successful result of a Trans Pacific Partnership agreement seen as a forerunner to a wider Asia Pacific region agreement. As markets outstrip the regulators, hopefully a strong move at the World Trade Organisation multilateral level will put farm products on the same footing of minimal tariff and non-tariff barriers as has applied to industrial goods for some time.

Niche market supplier

With lamb now a high price food, and beef also on the rise, New Zealand has become increasingly a niche market supplier of meat. Both items, along with co-products derived from cattle and sheep, will need to ensure value is added and not cost. An essential element in achieving this will remain our biosecurity and animal production systems supplying safe foods. There will be a need for profits to be generated throughout the value chain to ensure investment funds are available to innovate and produce new products.

A lot of New Zealand's primary production is still exported as basic raw material, such as logs, fish, and recently a return to mutton carcasses for shipment to China. Intermediate products, such as whole and skim milk powders, manufacturing beef and hoki frozen fish blocks are leading export earners. Adding profitable value is much more difficult than imagined. Most of New Zealand's current high-volume export opportunities to add value actually add cost, with little or no unique intellectual property involved. Such efforts are hampered by high commodity values and undermined by a strong New Zealand dollar.

What is overlooked is that the costs for labour and other inputs in New Zealand are often above those of many of our customers. Much of what is consumed is supplied fresh, be it yoghurt, lamb or fish which requires further processing in the market before sale at retail. Where New Zealand has unique intellectual property, export volumes tend to be small. Most of this country's existing primary sector intellectual property is about on-farm production systems, efficient factories, especially in dairy and meat, and educated farm service providers.

To date, New Zealand has had limited success in adding value due to the small domestic market, trade barriers, distance from export customers, capital constraints and entrenchment in the commodity business. There will be increasing opportunities to add value to meat-derived products. However, with commodity demand from China and other emerging economies pushing food prices up, the implementation of a serious strategy of adding value by any New Zealand-based meat company is an article of faith.

Change needed

Important elements for success require developing a credible providence story based on deep integrity systems, which are linked to specific consumers, often via a partnership value chain. For this to grow true partnerships will be vital between farmers, processors and other links in the value added chain. The trader and transactional relationship which has characterised the New Zealand meat industry to date will need to change.

ANZCO Foods has taken such a leap in faith. The jury will be out for another decade, or even more, before it will be clear whether this was a wise move. In the meantime, the New Zealand meat industry at the slaughter and processing level can be expected to consolidate further and continue to be responsive to market signals.

Graeme Harrison is mid-Canterbury farm raised, founder and Chairman of ANZCO Foods, Chairman of the New Zealand International Business Forum, and a director or past director of companies such as Sealord Group and Westland Milk Products and the New Zealand-China Council.



Ian Yule

Unmanned aerial devices on farms

There has been a great deal of media attention about the use of drones, unmanned aerial vehicles or remote piloted aerial systems on farms. They seem to be a very good idea, but the acid test will be what benefit will the technology provide for farmers and others in the primary industry sector? We are on the crest of a wave of possibilities which are emerging, but it may be some time before a full range of practical or beneficial applications for these devices are developed.

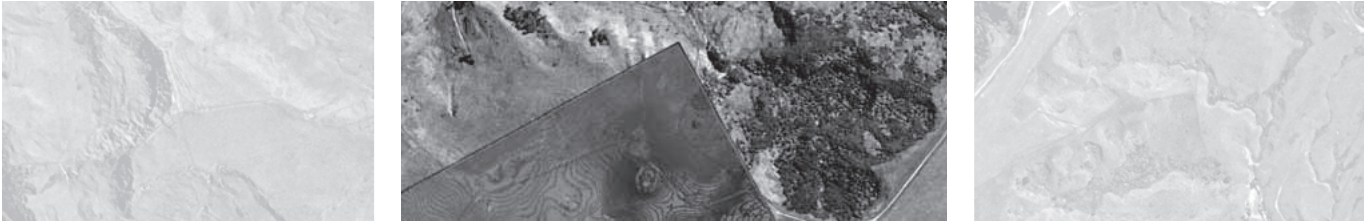
There are three factors which have brought about the rapid increase in this technology –

- It was developed from the nerdish but skilful pastimes of flying radio-controlled model aircraft
- The pilot was in constant control, and this required a level of concentration and skill most of us would find very difficult to achieve and maintain
- These devices could do many interesting things but remained out of reach of most people.

The application of GPS navigation technology has meant that these devices are now more accessible to a much wider market, which has led to an accelerated level of development making previously difficult tasks accessible.

GPS navigation and improved stability make this wider technology much easier to apply and a significant level of automation of flight can be achieved. Stability has been improved and a much greater range of tasks can be undertaken.

The military use of drones has caught our imagination in demonstrating that very complex tasks are possible with unmanned vehicles in the sky, with very few limits. However disturbing the use of drones has been, they demonstrate that large craft can be flown around the world to complete reconnaissance and take photographs, or carry out live streaming of video, and this has stretched the bounds of possibility. Currently most of



the devices which can be purchased are very small with light payloads. However, if it is possible to carry a three tonne payload around the planet then we should be able to automatically fly fertiliser on to a hill country farm.

Device type

The technology currently available comes in two forms – fixed-wing or multi-rotor. Fixed-wing planes generally have a wing span of around a metre wide and are powered by a small battery-powered motor driving a propeller. They can be launched either by being thrown into the air or catapulted from a ramp and a high level of flight automation is required. The device usually follows a predetermined course and appears to be being used for either aerial photography or live video feedback.

The aircraft are capable of speeds of around 65 kilometres an hour and give a good level of stability. They come into land either by belly landing or being parachuted down into a landing zone.

Multi-rotor craft come in a number of forms. Four, six or eight rotors are the most common, and the payload they can carry is governed by the rotor number as well as the propeller size and configuration. Most companies started by offering a device which could carry less than one kilogram for a limited time. However craft size has increased due to the desire to have larger payloads such as more sophisticated camera, video and sensing equipment. Carrying capacities of around five kilograms are now readily available and some other devices have even higher lifting capacity. A range of companies manufacture these systems including two New Zealand firms Aeronavics and XCraft, and Aerobot Australia.

Not a drone

In New Zealand the Civil Aviation Authority prefer the term remote piloted aerial system to unmanned aerial vehicle, and prefer it to drone, which has negative connotations due to its military use. The term remote piloted aerial system identifies that there is a pilot, but it is just that they are remote from the craft and on the ground.

Both forms of craft have a controller used by the operator which connects wirelessly with the craft, and that puts an obvious limitation on the range and terrain that the craft can be used in. There is also a requirement from the Civil Aviation Authority that the craft be flown within the line of sight and the pilot must be able to view it at all times. The level of feedback to the operator varies, as does the level of automation and control from the controller.

Applications

There are many potential applications. One useful way to think about it is that there are three levels of sophistication and therefore system requirement.

A simple eye in the sky

In this type of application the system is used to record on-farm activity and usually report back in real time. It has been used to monitor stock, water troughs and other farm infrastructure. Neil Gardyne, a Southland farmer, has shown the practicality of this approach through a number of presentations to Beef and Lamb in a series of demonstrations.

The technology has many other applications at this level, for example crop scouting, where the user has direct control of the survey and is not limited by satellite availability and cloud cover. Other uses include search and rescue.

Mapping and measurement

Mapping has a much higher requirement in terms of being able to ensure the sensor is placed in exactly the right place and pointing straight at the target. This is because the information obtained is then placed in a correctly geo-referenced map. If this is not achieved then it can make it very difficult to work with multiple aerial surveys over the same property.

Secondary processing of the information is needed and there may be a requirement to set target control points at known positions to ensure the survey can be registered to the farm map. The advantage of this is that multiple surveys can be made and the resulting measurements used for farm management purposes. Fixed-wing systems, such as the Trimble UX5, can be used to form very accurate farm maps and digital elevation maps of a property.

There are a number of sensors and multi-spectral cameras being developed to be used on remote piloted aerial systems. The use of such systems can allow above-ground biomass to be estimated and mapped by measuring the reflectance from the surface in the view of the camera or sensor. However, there is a number of problems to be worked through to achieve consistent results between consecutive surveys, with different lighting and environmental conditions. Geo-referencing, or ensuring subsequent surveys are properly positioned, is another problem being researched.



Action or application

The most obvious example of application would be spot spraying in remote areas. This type of service is being launched in New Zealand where the target is identified from a previous map or a video feedback to the operator and only the target area is sprayed. Where small areas are being used this may be an economic alternative to hiring a helicopter. It is assumed the pilot would need to have the same chemical rating as an aerial operator.

The regulations

New Zealand air space is controlled by the Civil Aviation Authority. Regulations are being developed and guidelines produced, the first source of information for anyone considering flying these devices or having them fly on their property. They should start by viewing the airshare.co.nz website, created to give information to potential users, and further links are provided. There are also navigation guides which show a user what, if any, restrictions there are in any area of the country.

The Civil Aviation Authority's approach seems reasonable in that the safety of manned aircraft and the general public comes first. They must ensure that the use of remote controlled aircraft does not interfere with other air traffic. There have been a few overseas incidents of accidents and inconsiderate use causing problems, and there is the potential for serious injury or death should one of these devices result in a crash. In the United States their use has been banned in national parks because they were becoming a nuisance, or rather their operators were, to other park visitors.

The Civil Aviation Authority is trying to develop new rules and regulations around the use of remote piloted aerial systems. Getting the balance right between the benefits of the technology and ensuring that safety is not compromised is not an easy task. In the United States the Federal Aviation Authority has been placing a much higher level of restriction on their use until new regulations are developed. The fear in America is that it will take any government body a long time to work out what the regulations should be.

Height, safety and privacy

Under normal circumstances most of these devices can be flown below 150 metres above ground level – pilots know this as AGL 500 feet. All other aircraft, with the exception of topdressing aircraft, should not be in this airspace. When going between jobs normal aviation rules apply and they should be above 150 metres. If you need to

go above this height with a remote piloted aerial system then permission is required.

These machines are not 100 per cent reliable so there is a need for safety rules. The most common problem is loss of wireless connection between the controller and the device, and some now have a return to base command if this were to happen. Failure of batteries powering the device can also be a problem.

Drop a few kilograms from a high level and at great speed and you have the potential for damage. Fortunately in agriculture we are usually working in remote areas with few people or other craft around. There are already fewer restrictions on manned aircraft in this environment than a built-up environment. A similar situation may arise in the use of remote controlled aircraft where there is a greater level of regulation in built-up areas.

Privacy is another potential problem, and spying over your neighbour's fence may well cause problems. There is still much uncertainty around the ownership of data and its ultimate use. Farmers can believe that if they own data then they control its use, but this is not necessarily so. You would need to look closely at your contract, as you might find tucked at the bottom of a page that the company can use the data for their own purposes.

This could be a seed company wanting to look at the development of certain cultivars and they may be able to use the accumulated data. There are a number of examples of this happening around the world. Data ownership is becoming a major debate and the use of this type of potentially invasive technology is adding to it.

Costs of operating remote piloted aerial systems

Using a multi-rotor craft for aerial observation is the cheapest option. Craft are available from a few thousand dollars up to \$20,000 for a highly automated system. If you are doing it yourself, there is the basic equipment cost and not much else. Cameras and video links can be purchased and real-time viewing is possible with an appropriate wireless link. This will allow you to view stock, water troughs and other farm resources with the range of camera options available. A safety assessment or hazard identification should also be completed and hazards such as power lines, trees and overhead threats identified.

Fixed-wing systems vary in price, but tend to be more expensive, most probably because of the control systems on board. To operate a fixed-wing craft you need



to have someone operating the tablet, laptop, or radio controller and a second person constantly viewing the craft in the sky and capable of reporting its position to the pilot at any time. Large areas can be covered quickly when in flight, but each survey would need to have ground control points established and marked as well as a landing area identified and checked.

Again, a safety assessment or hazard identification should also be carried out to identify any potential hazards before the flight takes place. The survey is more labour-intensive than you might imagine.

Devices should be insured for public liability, which comes at an annual cost of around \$600 for a cover of approximately five million dollars. Users may also want to consider insuring the sensors or cameras they are using. If flying someone else's sensor, you might want to think about the possibility of a disclaimer over liability if something goes wrong.

Data processing

Using high definition photography or video creates a lot of data and the main overhead is processing the information. Aerial photography or aerial video work is relatively straightforward, but if mapping is required this becomes more time-consuming.

For example, an 80 hectare survey using a craft such as the Trimble UX5 might take up to 1,400 photographs to develop a digital elevation model, and processing this information can take time. This system is capable of taking imagery where the each pixel covers only 2.5 centimetres on the ground. This equates to 1,600 pixels per square metre or 16 million pixels per hectare. This is very spatially dense data which has a high data processing overhead, even though it is obtained by relatively straightforward and simple to operate technology.

This problem is further exacerbated if you consider a series of surveys. High resolution and visually appealing images may be produced, but their value in scientific or management information terms is limited because of changes in lighting and limitations with the sensor or camera. Care must be taken, and it highlights the problem of how to use these systems to make better informed decisions. The quality of information important to the decision is governed by the accuracy and consistency of information allowed by the lighting and environmental conditions, rather than the resolution of the data.

Conclusions

Unmanned aerial vehicles and remote piloted aerial systems are developments which have the potential to bring video and photographic reconnaissance to farmers and other land users. The technology is available now and a few farmers are starting to use it in New Zealand and around the world. Other groups managing large areas of land such as forestry, conservation and regional authorities are also interested in their application.

The research community is also showing a lot of interest in these devices, but are tending to focus on the more complex sensing and mapping options. There is growing awareness about the limitations of present imaging and sensing systems and these are being rapidly developed. The data collection part of the operation is being commercialised, but there is growing awareness about the demands for data processing and these are also being researched and developed. Many of the techniques used in interpretation of satellite and other remote sensed data will be adapted.

Data ownership and privacy need to be given further thought, as does the regulatory framework surrounding the use of remote piloted aerial systems. Changes to regulations are required and these are being worked on by the Civil Aviation Authority. The reality is that regulations will lag behind technological developments. For example, automation may allow a single operator to fly a fixed-wing system, and multi-rotor systems could be used outside the line of direct sight if alternative systems can be shown to be safe and reliable.

Simple eye in the sky applications are now being used on a few New Zealand farms and these early adopters seem to be achieving a benefit. However, for remote piloted aerial systems to achieve wholesale use and gain common acceptance, it seems probable that their application will have to include more technically challenging tasks such as mapping and remote sensing and a high level of automation in flight. Remote sensing has traditionally been a very specialised field, and it is likely that it will take some time to adapt these methods to remote sensing from remote piloted aerial systems. This will come and there are already a number of clear examples of its application.

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Steven Cranston

The use of tall fescue by Northland dairy farmers

In the summer of 2013 a qualitative investigation was conducted into the use of tall fescue pasture by Northland dairy farmers. The study was motivated by anecdotal reports about the low usage of tall fescue in Northland despite what appears to be benefits over other grass species suitable for that climate. This report was conducted to complement work by Gavin Ussher of Clover Consultancy with farmers on the Aupouri peninsula region.

Eight Northland farmers were selected as a result of recommendations from seed companies, DairyNZ and research consultants. All but one of the properties studied were dairy farms with the remaining farm being a beef property. Farmers were questioned on their understanding of the positives and negatives of establishing and managing tall fescue pasture, especially in comparison to perennial ryegrass.

The Northland environment places significant limitations on perennial ryegrass persistence and production and tall fescue has been suggested as a suitable alternative. There have been significant improvements in tall fescue performance in recent years with the development of improved cultivars, endophytes and management techniques, but adoption of tall fescue by dairy farmers remains low.

The potential

There has been some research on tall fescue as an alternative pasture to perennial ryegrass with results showing good potential for use in areas such as Northland where ryegrass persistence is often limited by high temperatures, summer dry and pests. Drought tolerant pastures will play an increasingly important role in Northland dairy systems with NIWA predicting annual rainfall in the region to drop by up to five per cent. Droughts are predicted to become more frequent and evidence from a previous farm survey in Northland found four out of five farmers rated their experience with tall fescue as good. However, the uptake of tall fescue as a dairy pasture in Northland is low compared to the more traditional perennial ryegrass.

Tall fescue has been shown to have superior summer and autumn production compared to perennial ryegrass.

It has a temperature ceiling which allows it to continue growing at temperatures where ryegrass would suffer heat stress. Its optimum growth temperature is 26°C and it will continue to grow up to 30°C. Perennial ryegrass has an optimum growth temperature of 20°C and growth declines above 24°C.

Researchers have found tall fescue to have one of the deepest rooting systems of all the perennial pasture species, extending as far as two metres into the soil allowing it to draw moisture from much deeper than other pasture species. This complements companion pasture species such as clover by reducing the competition for water in the upper soil profile. Evidence also suggests the upright growth tall fescue allows more space for clover to grow compared to perennial ryegrass which can crowd out other species. Research in Australia showed tall fescue provided a consistent feed supply for six weeks after the spring peak. Ryegrass production declines rapidly after this peak.

Establishment

The farmer study reinforced some perceptions of growing tall fescue while dispelling others. The slow establishment of tall fescue was evident across all farms surveyed. The best results were with a light first graze after six to eight weeks, but 10 weeks until first grazing was more common for most farmers. The main reason for the time required to first grazing appeared to be sowing date.

Generally, where tall fescue was sown in March or earlier, establishment was faster. Where the sowing date was delayed to mid-April or later, establishment was significantly slower. Major factors around planting date included the weather and the harvest date of maize when used as a break crop. Although establishment was slow



cover was considered good and even in nearly all cases.

This suggests that the common method of direct drilling after a cultivated break crop is sufficient. Farmers generally used higher than recommended sowing rates. Agricom suggest 20 to 24 kilograms per hectare although farmers sowed an average 30 kilograms per hectare with a range between 22 and 40. Farmers generally found higher sowing rates improved establishment.

Reducing other grass species

The use of break crops was employed by all farmers to reduce the influence of existing grass species. This worked well in most cases although ryegrass was still evident in some new pastures. Re-invasion of ryegrass did occur slowly in some cases but was not a major concern, although kikuyu was more difficult to keep out. On two farms where there was a lot of kikuyu, the tall fescue persisted for three years and five years.

It was suggested that the more open growing form of tall fescue allows more kikuyu in to compete against it. The persistence of tall fescue in these situations was still similar to that of ryegrass but cost becomes a factor when regrassing. Tall fescue is approximately 70 per cent more expensive than ryegrass to sow, depending on sowing rate.

Farmers noticed low levels of broadleaf weeds invading the tall fescue pastures during establishment but this was solved with sprays and did not pose any long-term problems. Other weed species such as annual poa were mentioned but only at low levels. Early planting was said to reduce this problem.

Persistence

In addition to the drought resistant qualities, tall fescue has high pest tolerance which has proved to give increased persistence compared to perennial ryegrass. The large root system of tall fescue provides greater tolerance to grass grub while also making it more tolerant of pugging damage from cows. Tall fescue is also more tolerant of waterlogging which is a particular advantage in Northland with high winter rainfall and where clay soils are common.

Tall fescue has some natural tolerance to pests but when infected with novel endophyte strain Max P in a recent Northland trial, the yield advantage over

non-endophyte tall fescue was over 50 per cent in years two and three. Max P provides protection against black beetle, grass grub, Argentine stem weevil and pasture mealy bug.

There are some significant disadvantages to tall fescue which are known to have reduced its uptake by farmers. It is slower to establish than perennial ryegrass. Seedling vigour is also less, which has been attributed to the difference in the ability of tall fescue and perennial ryegrass to mobilise and use endosperm reserves. These factors contribute to lower first year production than perennial ryegrass and can allow for the invasion of weeds. Nevertheless, the slower establishment can be beneficial when sown in a mix with other slower establishing species by reducing competition.

Management

Tall fescue requires quite different management from ryegrass pastures. Farmers were usually grazing tall fescue pastures every 12 to 14 days during the peak season compared with 20 to 24 days for ryegrass. The differing growth rates were said to complicate grazing management. To maintain quality, pre-grazing targets were around 2,500 kilograms of dry matter per hectare compared to between 2,800 and 3,000 kilograms of dry matter per hectare for ryegrass.

Tall fescue pasture quality was said to drop off dramatically if grazing period or cover targets were exceeded. One farmer indicated that being as little as two days late grazing significantly reduced pasture quality to the point where cows were rejecting it. The palatability problem can be managed effectively by fast rounds, good grazing management and taking feed out for silage. The risks of getting the grazing management wrong are significantly greater than with ryegrass which is comparatively more palatable once mature.

One of the greatest extra demands on farmers was getting around their farms to monitor the pastures. The size and location of tall fescue pastures becomes important. Having one or two tall fescue paddocks at the back of the farm can lead to the paddocks being overlooked until it is too late. It was recommended that tall fescue paddocks are sown in large blocks, preferably in more central locations so they can be more easily be monitored and managed. Farmers suggest that having



a reasonable proportion of their farm in tall fescue will improve grazing management. Tall fescue was said to complement the grazing requirements of kikuyu with both requiring about 14 day rounds.

How much is too much?

The requirement for 14 day rounds during peak growth has also posed the question of how much tall fescue is too much? With tall fescue currently making up between seven per cent and 50 per cent of the pasture on the various farms, the views of the farmers varied with respect to the practical limit of tall fescue pastures. Two farmers were keen to move to all tall fescue, while others were managing sufficiently with their current percentage of tall fescue and feel there is a limit to how far they can expand this and still maintain pasture quality over the peak season. Several farmers suggested that half of pasture in tall fescue might be the limit.

Farmers felt that topping may be required over a longer period than with ryegrass as the reproductive phase of tall fescue lasts much longer. The reduction of pasture quality caused by seed head production is viewed as less dramatic than ryegrass as it is spread out over several months compared with ryegrass which tends to lose quality all at once causing its own management problems.

Most farmers used their tall fescue paddocks for silage and found this an effective method of managing quality while also providing stored feed. Tall fescue silage was generally considered good quality. However, the long reproductive phase can overlap with silage production and reduce quality in some cases. One farmer suggested tall fescue would be especially suited to cut and carry operations where its good growth could be precisely managed.

One of tall fescue's main advantages is its ability to stay green and productive during a drought. This has, on occasion, led to farmers over-grazing tall fescue which has significantly reduced the following season's production. The pastures did recover but the short term gain did not compensate for drop in production the following season.

Performance

Most of the farmers were very positive about the performance of tall fescue once established. They

estimated tall fescue produced between 20 per cent and 30 per cent more dry matter annually than ryegrass, with production being as high as 50 per cent more over the summer period. Winter production was generally the same or slightly less than that of ryegrass.

Cows were said to perform well on quality tall fescue with most herds showing a preference for it, or treating it the same as ryegrass. Several farmers commented on a noticeable boost in milk production after cows had been grazing tall fescue. Tall fescue pastures tended to have a higher percentage of clover than ryegrass pastures which could be a factor in increased palatability and performance.

Tall fescue had a generally positive influence on animal health with several farmers noticing a reduction in the risk of facial eczema due to lower spore counts. Ryegrass staggers was also said to be reduced. Tall fescue was said to have significantly less fungal rust than ryegrass. Fungal rust is often associated with reduced palatability and productivity.

The risk of bloat was mentioned on one farm to have increased with tall fescue, possibly in relation to increased clover content. Some reservations were held about the endophyte Max P used in tall fescue. One farmer has associated endophytes in general with health problems including reduced fertility and another noticed that cows would not graze Max P tall fescue as hard as non-endophyte tall fescue. In a paddock with a block of both varieties, the Max P pasture would be left visibly longer.

The surveyed farmers' perception was that DairyNZ has a strong focus on ryegrass. Increasing the poor persistence of ryegrass in Northland is a priority, yet they felt little attention was given to the potential of tall fescue to increase pasture persistence even though it appears more suited to Northland conditions. DairyNZ are investigating ways to improve kikuyu management as part of the Northland Agricultural Research Farm trial. Farmers felt considerable potential still exists for research into the use of tall fescue in Northland.

Steven Cranston is employed as a consultant for AgFirst in the Hamilton Office. Guy Trafford is a Lecturer at Lincoln University based in the Department of Agricultural Management and Property.



Profile

Erica van Reenen

Erica van Reenen is the environment extension manager for Beef + Lamb New Zealand. This is a national position which involves providing extension to integrate good environmental management into farming practices. The role was established in early 2014, recognising the importance of natural resource management to farmers and to ensure there is adequate information and services available for them to make informed decisions.

Growing up in Wanaka, Central Otago, helped Erica develop a passion for the land, the bush, the rivers and the mountains which were on her doorstep. Living on a small farm surrounded by high country stations and deer farms encouraged her early interest in animals, farm animals in particular. Frequent sorties into the hills with her father, Gilbert, and younger brother, Brook, added to her enthusiasm, with trips to Fiordland and Aspiring National Parks as favourites.

Erica attended Mt Aspiring College in Wanaka, and was a keen participant in cross-country skiing, white-water kayaking and rock climbing. Her parents, Robyn and Gilbert, have been strong supportive influences in her life. Robyn was an agricultural journalist before becoming executive officer of the NZ Deer Farmers' Association, and Gilbert was a vet.

Agricultural science beckoned

A career choice was obvious from a young age. With a love of animals and science, and her father for inspiration, Erica wanted to be a vet and had never considered anything else. On leaving school she headed to Massey University. A month into the vet selection course, having been exposed to a world of other possibilities within the sciences, she realised that a career in agricultural science was where she wanted to go.

She often reflects on the influence that school teachers have on teenagers making career choices. Agriculture is often ignored as a worthwhile field for an academic student and tends to be actively discouraged. However, Erica maintains that we need bright young

people coming into the sector from business and science, including knowing one end of a fence-post from the other.

Towards the end of her final year of a bachelor's degree majoring in agricultural science, the opportunity arose to obtain a masters' degree in merino wool production. Over the next two-and-a-half years she shared her time between an office and the wool lab at Massey and her research farm, Lincoln University's Mt Grand Station at Lake Hawea in Central Otago.

Policy work

Throughout her undergraduate and post-graduate degrees Erica included as many ecological and conservation papers as she could. She recognised that there was an emerging gap between conservationists and farmers and could see that both were reliant on each other. She was keen to find a job which combined these two areas. In 2008, after finishing her second degree, she was offered a position with the Ministry of Agriculture and Forestry as a policy analyst in the climate change team in Wellington.

Over the next three years she was a member of the team required to bring agriculture into the Emissions Trading Scheme. She also worked on the new rental system for Crown pastoral lease land in the South Island high country. Her role as a policy analyst involved writing regulations, primary legislation, working with select committees, and providing advice for Ministers. The Emissions Trading Scheme can be controversial in agricultural circles, but the experience she gained in this role helped her to understand the political and legislative

Profile

process and build her Wellington networks. For her final six months she worked in the sector performance team based in Hamilton on a range of different sector projects including animal welfare policy, financial farm monitoring, adverse events and Primary Growth Partnerships.

Beef + Lamb experience

Being in the Waikato, Erica thought that she was saying goodbye to the sheep and beef industry until she learned that Beef + Lamb New Zealand were looking for an extension manager in the Waikato region. She had come to realise that effective extension was necessary to make a difference to farmer practices.

The farmers in the mid-north were willing to give a southern girl who had come from government a fair trial and she had a rewarding two years working with sheep and beef farmers across the Waikato, the King Country, Taupo and Bay of Plenty regions. Erica enjoyed getting back to grass roots and the autonomy to make the role her own and provide extension for farmers.

Sheep and beef farmers in the region had been facing increasing land use pressure in recent years, added to which climatic conditions had been challenging, especially with the drought in 2012/13. She saw at first hand the resilience and passion of farmers in her patch who were mostly positive and keen to work with Beef + Lamb to improve their businesses. Water quality was another major problem facing farmers in the area, as well as nationally, and it was becoming increasingly significant. Erica's environmental concerns could not be quelled for long.

Kellogg Rural Leaders Programme

In 1992 Erica's father Gilbert had attended the Kellogg Rural Leaders Programme run by Lincoln University. He often spoke of the value he received from attending the course and encouraged his daughter to apply. In 2012 she attended the programme, which changed the way

she worked and further developed her skills, confidence, awareness of self and others, and building networks.

Part of the programme involved completing a research project on a subject of your choice. Her project was 'Increasing the uptake of environmental practices on sheep and beef farms'. The completed project provided the basis for her current position within Beef + Lamb New Zealand as the environment extension manager.

Environment plans

Part of the role is managing the uptake of Beef + Lamb's Land and Environment Plans across the country. These plans are discussed at workshops with 10 to 15 farmers who are guided through the process by trained facilitators to develop their own farm plan and meet their needs, constraints and farming systems. Erica has seen many farmers become successful because they are clear about their aims and how they are going to reach them.

These farmers also tend to adapt to changes in the industry much better as they usually have buffers built into their systems. In her view, the Beef + Lamb plans work because farmers write their own and are therefore more likely to carry them out. She is looking forward to helping more farmers develop these plans and put them into action in the coming years.

Young Farmers Club

Erica is always looking for the next opportunity to add value to her roles and the wider community. In 2008 she joined the Wellington Young Farmers Club and became chairperson in 2010. When she moved to the Waikato in 2011, she and Tim van de Molen established the Hamilton City club modelled on Wellington.

Having spent five years involved with the Young Farmer contest, mostly on the organising committees, she decided to compete. With a lot of study and training in the lead-up to the final she came second. She felt it was good to learn more practical skills including shearing,

Erica van Reenen

harvesting timber and driving a digger. Helping young people in agriculture get involved with Young Farmers early on in their lives is something she is very keen on.

Erica continues to undertake professional and personal development when time allows. She completed the advanced sustainable nutrient management certificate with Massey University early in 2014. She has also been selected as a recipient of the Woolworths agribusiness scholarship, involving a two-week agribusiness course in Sydney.

On the home front

Erica lives on her partner's sheep and beef breeding and finishing farm in the Rangitikei just north of Marton, and works from the office in Feilding when she is not travelling. Weekends are generally spent helping out on the farm if the opportunity arises. Being back on a farm has been a good step for her and she enjoys rigorous debate about industry problems around the dinner table. She occasionally gets her kayak out and will head into the hills given a chance.

Her mother taught Erica how to sew. If outside activities are not an option, she enjoys designing and making clothes and other textile pieces, and she finds this creative and design thinking can also apply to everyday challenges on the job. She is also on the Waikato Trust of Te Araroa, the national walkway from Cape Reinga to Bluff. Her involvement gives the opportunity to gain some governance experience and to work with a group who are committed to encouraging visitors and locals to get out and see New Zealand.

Where to from here

In Erica's view the biggest opportunity in the industry is how natural resources are managed so that future generations are still able to farm profitably. For her, farming and the environment are two sides of the same coin. She maintains that how we deal with water quality

and quantity, climate change, and the increased loss of biodiversity in this country will define the industry for the next 100 years. She says we need to maintain our clean, green image. It gives us a ticket-to-play in most of our international markets. We need to not just say the right things, but do the right things, and have a stronger personal connection with the consumer.

There are things we can do on the farm to manage these elements and many of these add value to the farm rather than coming at a cost. For example, she knows of several farmers who have retired less productive areas for ease of management and environmental protection. They have improved productivity and profitability on the remaining areas without reducing stocking rates because they are farming to the capability of the land and wasting fewer nutrients.

She believes that it will not always be easy. Farming within limits has been compared with the removal of subsidies in the 1980s, and for most people change is really hard. But she feels that if we do it right, we will have more efficient businesses with fewer losses, more resilient systems and a healthy ecosystem. Our grandchildren will be able to keep producing top quality New Zealand food. One of Erica's favourite quotes sums up the opportunity. 'The secret of success is not in predicting the future; it is creating people who will thrive in a future that cannot be predicted.' She hopes to continue helping farmers and the primary sector to thrive for many years to come.

Benefits of NZIPIM membership

Erica has been a member of the NZIPIM since 2011. She finds that it is good to be a member of an organisation supporting rural professionals and providing strong networks across the agricultural industry. The excellent local events are very accessible to members. Erica also says that it is very beneficial to have access to a range of people with different skills and experience across many disciplines within the primary sector. There is a high standard of professionalism within the membership.



