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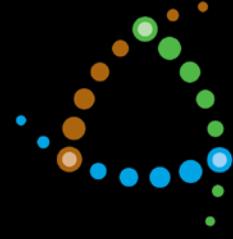
Precision agriculture
Governance skills
The Dutch disease

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Primary Industry Management



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

PROPERTY SIZE	OWNERS	DISTRICT AND REGIONAL PLANS	RATEABLE VALUE	SOIL TYPES	FORESTRY
EROSION RISK	FERTILITY	RAINFALL	TEMPERATURES	SUNSHINE HOURS	WINDSPEED
GROWING DEGREE DAYS					SLOPE
Don't Buy an RD Without an REV™					STOCKING RATES VEHICLE AND IRRIGATION ACCESSIBILITY DISTANCES TO SERVICES LAND USE CLASSIFICATION PLANNING RULES
 <h1>Don't Buy an RD Without an REV™</h1>					
<h2>Orientate clients to the fundamental facts of the land, instantly.</h2>					
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<p>A Rural Evaluation (REV) gives you a headstart in productivity analysis, risk management and investment due diligence.</p>					
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<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Detailed Land and Soil Information</p>  </div> <div style="width: 45%;"> <p>Farming Systems</p> <p>GROWING DEGREE DAYS: This property is best suited for cold-tolerant perennial pasture crops may require irrigation. With less than 600 growing degree days above sensitive crops, and some pasture crops such as white clover and bar years. Frost-sensitive plants (e.g. stonefruit, olives, ornamentals) may be deciduous exotic species with low water requirements (e.g. poplars) home or for border strips.</p> <p>PASTURE AND CROPS: <small>Excessive irrigation is the most critical to the health of this property.</small></p> </div> </div>					
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Planning Rules and Risks</p> <p>APPLICABLE REGIONAL PLANS: Otago Regional Plan: Water</p> <ul style="list-style-type: none"> Under the proposed plan change 6A, operative from 1 April 2012, the intensities provided the following standards are met: <ul style="list-style-type: none"> No more than 30kg of N per Ha applied per year All discharges of sediment off this property into water cannot exceed 5 NT Water availability <p>There are no existing or planned minimum flows on any of the streams sum dry nature of the country, it is unlikely that any of the streams will be able to other than dry stock needs. Applications to take water from these streams</p> </div> <div style="width: 45%;"> <p>Climate - Growing Degree Days</p>  </div> </div>					
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<p>NEIGHBOURING LAND USE MAPS AND SATELLITE IMAGING EXTENSIVE PRODUCT SUPPORT</p>					

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Julian Bateson

Smarter is better

Working a smarter is a significantly better way of improving profitability than just working harder. Precision agriculture, the subject of the first two articles in this issue of *Primary Industry Management*, is one way of working smarter. Much of this is not rocket science, although as we require satellites for the GPS system used for precision agriculture, we still need rocket science.

Better management and governance is another way of being smarter in business, particularly when changes have to be made, as with the use of new technology. Peter Allen in his article on governance, outlines some of the ways in which improved governance will add value to primary industry.

The article on the Dutch disease by John Walley explains how the effect of a particularly dominant sector can crowd out other areas of the economy. It results in problems if this sector ends up being less profitable or obsolete. The value of a large dominant and profitable industry is that we can use the knowledge gained to develop better and more effective products in a more efficient manner. The risks are that we depend too much on one industry which will not necessarily be as resilient as having a number of different ones. We need to be a lot smarter.

The pathway to farm ownership is dissected and analysed in an article by James Allen. Sharemilking has been, for many years, the main route for young farm workers to move into buying their own dairy farm. However, as farms increase in size, up by an average of 100 cows in 10 years, and the number of sharemilking positions fall, by about 30 per cent in the last 10 years, it becomes more difficult to make the transition to owning a farm. If a dairy farm costs many millions to buy, as they do, it makes the process even harder. Where are future owners coming from other than large corporates? Is being smarter enough?

North Island conference

The recent conference for North Island members of NZIPIM was another opportunity to learn how to work smarter. The conference was well attended and had some excellent speakers providing hope for the future, and not just for the dairy industry.

However one industry which was notable for lack of much of a mention was forestry. Forestry is the third biggest earner for primary industry exports, and even with the ups and downs of prices, it is still a very important industry for the future of New Zealand. It was particularly disappointing to hear the speaker from the Ministry for Primary Industries talk for an hour about New Zealand primary industries and only mention the word forestry once – this was only to casually dismiss some information on a graph. I must admit to having a vested interest in forestry, but I think it needs to have its importance raised, particularly if MPI appear to be mildly disinterested in the value of trees and timber to New Zealand.

Other matters, still being smarter

Biosecurity will continue to be a top priority for New Zealand and for MPI in ensuring our borders are more secure from introduced pests and diseases. I make no excuses for repeating such concerns in editorials in this journal. The kiwifruit industry has had a hard lesson in the risks of having many of its eggs in one basket and having faith in biosecurity control. The Psa-V infection now appears not only to have caused the destruction of older varieties, it is infecting kiwifruit varieties which until now were thought to be resistant. The details are not very clear at the time of writing, but some growers I know seem to accept they may have to leave the industry completely.

We have been also concerned about the effects of varroa mite on honey bees, now for about 11 years, and the reduced value of honey bees in pollinating crops. Although varroa has been a disaster for honey bees and beekeepers, we now know that there are effective alternatives for pollination in the form of bumble bees. These are better pollinators and they work in harsher conditions than the honey bee – they go out in the rain and the wind. Unfortunately they live in small colonies which do not overwinter, so a lot more management is required. Plant and Food Research are developing artificial nests for bumble bees and working out ways of improving their numbers. This is an example of the importance of alternatives, how vital research is and in general being smarter at what we do.

Colin Brown

Precision agriculture and related software systems



Precision agriculture is not a term many people associate with our pastoral farming systems. However, we commonly farm using methods which adopt the principles of precision agriculture. As electronic products and associated software systems have become cheaper and more widely available, the challenge for farmers has moved from the financial and time cost of capturing information and implementing increased precision to coping with the sifting of information and associated decision-making. This article discusses some examples, with particular reference to achieving better targeting of fertiliser on pastoral farms.

Precision agriculture

I that expect most perceptions of precision agriculture fall into two camps –

- Variable rate maps and autosteer tractors, as is becoming increasingly common in cropping operations
- Not applicable, too hard, or too much work.

In fact, New Zealand farmers are actually widespread adopters of precision agriculture systems. So how do we define precision agriculture in a New Zealand pastoral farming context? I suggest that an appropriate definition is – farming using technology at the best level of precision that management differences can be justified.

Some examples are –

- Every dairy farmer who uses the Protrack and Minda system to draft cows into calving dates is at the leading edge of precision agriculture
- Every K-line irrigation system using a timer on the pump to shut off when a set amount of water has been applied is adopting precision agriculture
- Every fertiliser application based on a nutrient budget using Overseer, and applied by a truck using GPS guidance, is adopting precision agriculture at the most intensive level appropriate to today's technology.

Possible and realistic

It is technically possible to monitor the average soil moisture deficit, predict the likely net soil moisture draw-down over the next few days, and alter the timer for the day's pumping. It is also possible to divide each dairy paddock up into 40 metre squares, soil test each cell, calculate the level of phosphorus and nitrogen required, and apply fertiliser at varying rates to suit.

However, there are significant time demands on today's farm managers and their staff. With the additional time required to calculate the varying treatments, along with the cost of capturing the information and applying fertiliser differently to each 40 metre grid, the cost savings and pasture response cannot justify this intensive approach.

What is realistic continues to evolve, just as it has since we first constructed fences to control the grazing of stock and apply selection pressure to breeding

programmes. It was only 30 years ago that the concept of rotationally grazing sheep to achieve better pasture production and nutrition management was accepted.

The benefit had been demonstrated for years by dairy farmers, but until the development of high impedance electric fence energisers, the subdivision costs meant it could not be justified. Now it is a common management tool, and every sheep farmer who adopts it is carrying out precision agriculture in that they are managing to a level where differences can be achieved and justified within the constraints of time and budget. Scanning in-lamb ewes for multiple births is another example made possible by the availability of affordable portable scanning equipment.

The future?

So what is the potential for pastoral farms? The rapid advances in microprocessor electronics, broadband internet and wireless communication systems are opening up new opportunities where it is realistic to apply management differences to a farming operation. For example, sensors to measure and report soil moisture variations are robust and reliable. Electronic ear tags and smart stock scales to obtain and measure individual live weight change are increasingly common.

The problem is how to sift and decide what management change to implement as a result. Most of us have heard the term and experienced 'drowning in data'. The precision agriculture challenge for farmers has changed. In the past it was the cost of obtaining the information, or having the infrastructure to implement differential management. Today, it is the time cost to store, sift and analyse the information. One of the important ways of achieving precision agriculture in the future will be smart software systems which overcome the time cost for today's farm manager.

The software

The last few years has seen the rapid development of software specifically to deal with the time problem for today's farm manager. If we confine ourselves to pasture and land management there are now integrated systems which –

- Capture, store and do most of the decision-making on where and when to apply effluent on dairy farms
- Predict and recommend irrigation scheduling
- Obtain individual paddock pasture covers and calculate feed surpluses and deficits

- Obtain and store all fertiliser and spray treatments.

There are others, but the rest of this article will focus on the business of smart software for managing fertiliser.

Three systems

In New Zealand there are three systems which automate obtaining information of fertiliser history – TracMap along with similar systems developed by Ravensdown and Precision Tracking. All are good systems which, for very little cost, automatically determine what fertiliser was applied, where and when, and transfer that information to a web-based database using a cellular modem. The benefit for farmers is that the time required by them to obtain the data for future use is zero – it happens automatically.

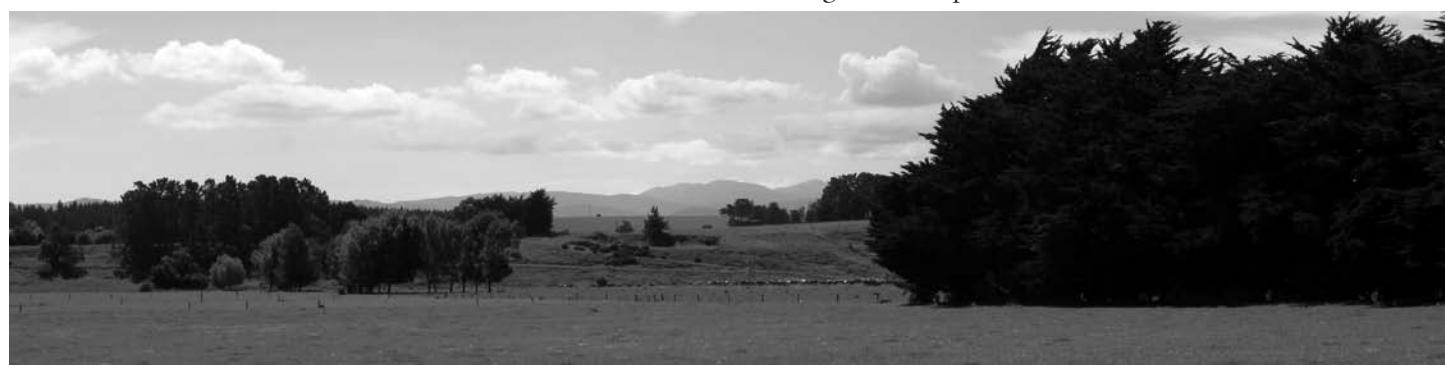
The TracMap and Ravensdown systems also incorporate an integrated screen display which directs drivers to the correct fields, while the Precision Tracking system uses third party hardware for this. We are told by our customers that TracMap's Traclink system is the simplest and best, but no doubt our competitors are also told the same by their customers.

In addition to the above, the Overseer nutrient budgeting programme continues to improve the ability to match planned fertiliser inputs to actual need. TracLink was recently launched, and we believe it is the simplest online system available for managing and storing fertiliser and spray treatments.

Implications for pastoral fertiliser applications

Earlier in this article the impracticality of differentiating fertiliser applications across individual paddocks was mentioned. But with the latest web-based software systems, and associated hardware in the spreading truck, it is rapidly becoming a realistic option. By the end of 2012 the TracMap system will allow farmers to differentiate fertiliser rates to suit the need to a far greater degree than ever thought possible.

Consider the ability for a dairy unit manager to apply greater levels of nitrogen to the far end of dairy paddocks, and a reduced amount at the race end to match the level of nutrient transfer occurring. Or for a hill country sheep farmer to 'geofence' all the stock camps, and also apply high rates of super phosphate to the steeper faces which are constantly subjected to nutrient stripping as a result of grazing. Then to organise that process in under two minutes.



The two photographs below show an example. On the TracLink website you load both your farm map and the areas to be treated at the various rates. In this case we have defined from previous work the stock camps with flat and steep country to receive the two different fertiliser rates.

Traclink variable rate order

TracLink Situation Awareness Made Easy

Live Tracking | Maps | Jobs | Reports | Dispatch

Accounts: Colin

Maps History New Order

Load Order Reset

1 2 3

SARS Mode:

Customer: Jacob Smith

Supplier: Jones Farm Supplies

Product: Super

Order No: Demo 333

Rate: kg

Date Range: 30/07/2012 - 03/08/2012

Notes:

This creates an order which transfers automatically to the spreading company. They preview the order, and then send it by cell phone link to the spreading truck. The next photograph shows the resulting map as it appears on the screen of the TracMap unit in the truck.

Preview order

TracLink Situation Awareness Made Easy

Live Tracking | Maps | Jobs | Reports | Dispatch | Admin

Pending Assigned Returned Complete

Columns: 3 selected All Urgent Show Archived Search:

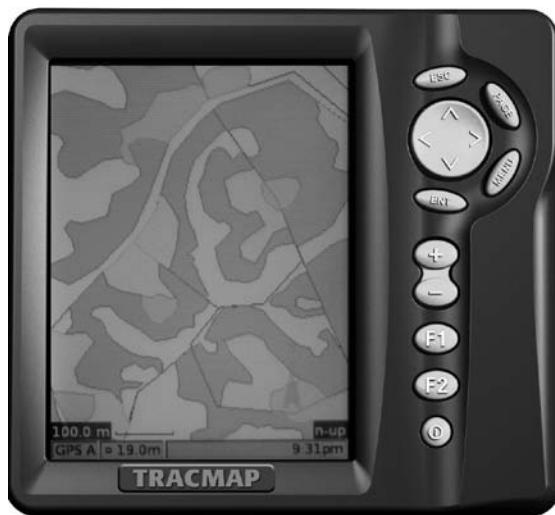
Customer Name	Order ID	Gross Coverage Area
Jacob Smith	5572	78.71Ha

Preview Download Wireless Send Archive Order

Order Details

Name: Jacob Smith	Order Date: 29-07-2012
Status: Order Placed	Phone: N/A
Due Date: 30-07-2012 - 31-07-2012	Email: colin@trac...
Product: Super	Order ID: 5572
Rate: kg	
Approx. N/A	
Area: Notes	

The final photographs show the resulting view as the truck drives around, with the spread rate changing and



Variable rate example



Variable rate spreading

automatically turning off as the truck travels around the property. This capability will be available by the end of 2012. Its introduction should provide pastoral farmers with a new level of precision agriculture approach to their farming operations. It overcomes the time constraint associated with variable fertiliser application to their farming operation.

Colin Brown is a past member of the NZIPIM and was a registered farm management consultant for 20 years before starting TracMap NZ in 2005. TracMap is an agricultural GPS business.



Dan Bloomer

Precision agriculture and soil compaction



Technologies associated with precision agriculture are at the core of an agriculture revolution. GPS monitoring of precise locations and spatial technology have particular relevance. There are opportunities for major efficiency gains along with economic and environmental benefits. However, precision technologies have only been slowly adopted.

The digital revolution is a change which means you need to significantly alter thinking and practice. This creates a number of challenges. Some farmers have been relatively slow to adopt the use of computers, even as a communication medium. The reply 'Fax me, I'll have to wait for my wife to download the email' is not uncommon.

Extension theory and technology adoption tell us that only about one farmer in eight is happy with disruptive technologies. These farmers are the innovators and early adopters. The majority of us want incremental advances and not a leap into the unknown. The rest, the so-called laggards, will only use it when it is so deeply embedded they do not even know it is there.

Innovators and early adopters are using precision agriculture opportunities. It is hard to keep up with them, but there is little sign of the mainstream following. Mainstream use of precision agriculture needs encouragement which allows incremental adoption. Then a step-by-step pathway which builds small change on small change must be available. The benefits at each step must outweigh the costs, otherwise why would anyone bother?

Everything farming

Precision agriculture can be thought of as everything farming with a lot of information technology. The biggest benefits will vary by farm type, size and collective knowledge. Dairy farms have a lot of information technology in the milking shed and increasingly it is part of standard equipment. Sensors monitor numerous aspects of each cow, and the data is recorded and provides a database with information ripe for picking.

One use is to determine how much supplement to feed each individual. Very few farms actually use the data to understand their system better, so a significant opportunity is waiting.

Leading viticulturists use sensor technologies to monitor crop vigour, create vigour maps and use them to optimise management and harvest to extract the best possible juice quality. Case studies show this can have very large financial benefits for the winery.

GPS guidance

In broad acre cropping, one of the biggest pay-offs, and by far the most widely adopted precision technology, is GPS guidance. A relatively simple light bar GPS system gives similar guidance to a marker arm or a foam marker on the ground. But the GPS guide can be seen in the dark and does not blow away in the wind.

Almost all cropping farmers and contractors in Hawke's Bay now use automatic machine guidance or self-steering tractors in their operations. This is also true across the North Island and increasingly around the country. Self-steering seems to have crossed into mainstream adoption.

Reduce fatigue, avoid compaction

Why spend \$40,000 to take your hands off the steering wheel? Most farmers justify the cost of the first conversion because of the ability to do some task either better or one which was previously not possible. Driving very straight at planting allows fast mechanical weeding without crop damage. The second tractor conversion is often justified by the ability to work correctly with the first. The third is because you would not be without it.

One of the big paybacks is reduced fatigue. Driving straight is hard work and self-steer tractor operators find they are less tired and cranky after a long day. In addition, freeing attention from steering allows the driver to focus on the operation at the back of the tractor – which is where the money is.

Perhaps the biggest payback from self-steering is that it enables growers to manage compaction and reap enormous benefits by doing so. But despite promise of 50 per cent savings in equipment capital, labour and fuel, and many farmers having the technology, few have actually changed cultivation practice. Driving straighter, and being able to focus on implements instead of steering or weeding fast at night, is really just doing the same things easier and a bit better. It makes life more convenient and is only an incremental change.

A fundamental change to cultivation practice requires different equipment, different processes and most of all a different approach. This is disruptive change, and few go there willingly. Knowing about the technology is not enough and knowing the financial advantage is not enough. Having to

review and replace everything you know and have done for years is inconvenient and it is scary – there lies the problem.

Soil compaction

Soil compaction is probably the biggest cause of insidious losses in agriculture. Badly compacted areas may show up, but the effect of widespread compaction is masked when it covers the whole paddock so it often goes unnoticed. Numerous studies have shown the effects of traffic and its subsequent effect on yield. However, few growers set out to manage compaction in a strategic way. It is seen as an inevitable result of cultivation and something to be remediated, but it need not be.

During the life of a crop many different machines will pass over the field. Under conventional cropping systems it is common for each machine to have a different wheel track and to work a different width. As a result, most of the paddock is driven over at some stage. The compacted soil causes poor plant growth and is costly to restore. With conventional techniques, matching guess-rows is imprecise and row spacing is variable. It results in overlapping with wasted inputs and gaps in which yield is lost and pests and weeds are allowed.

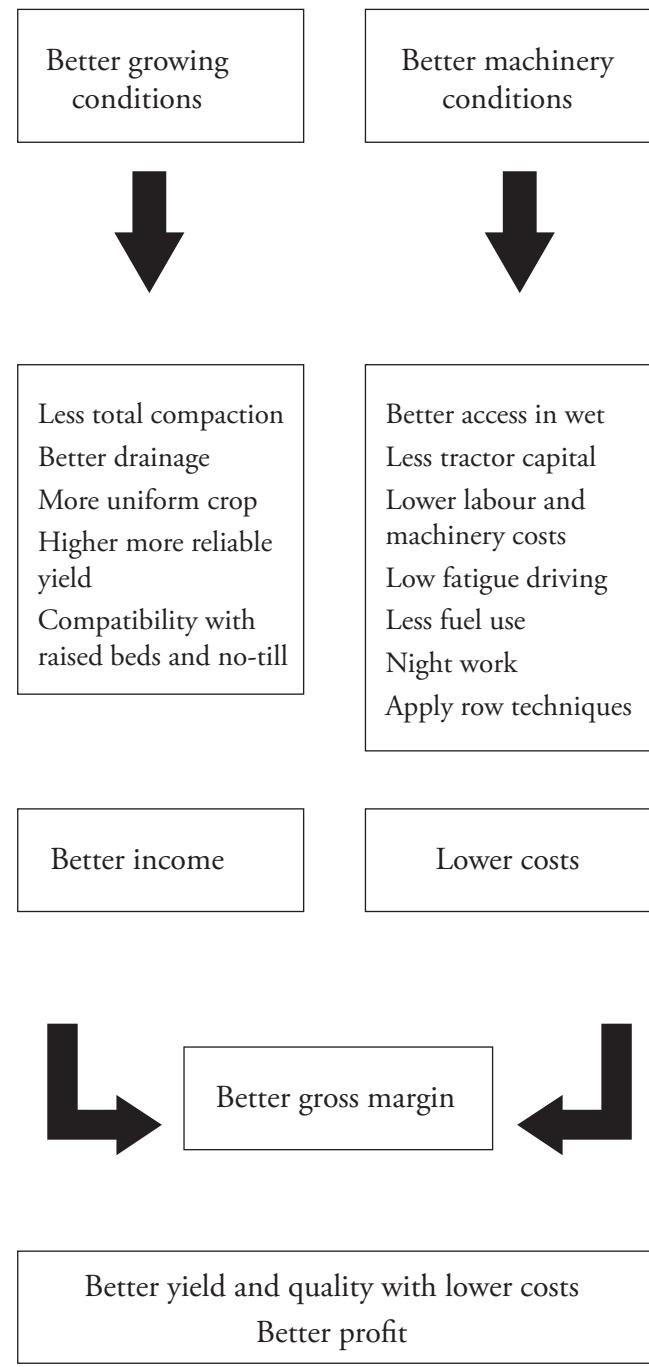
Tramlining

Controlled traffic farming is an alternative approach which keeps all traffic to defined wheel tracks. Also known as tramlining, controlled traffic farming allocates separate areas for machinery and plants so that ideal conditions are maintained for both driving and growing.

Think of it as roadways and gardens. The defined wheel tracks provide the best surface for machinery to operate on, and all soil compaction is kept to those tracks where it is useful. The soil not driven on will remain in optimal condition for plant growth, reducing or eliminating the need to cultivate.



Controlled traffic farming



Permanent wheel tracks or tramlines are retained year after year. Permanent tracks may include raised bed systems or harvest lanes for trucks. Controlling traffic can bring big changes in soil quality, reducing cultivation requirements and costs, while potentially lifting yields. The benefits will depend on the level of system adoption.

Controlled traffic farming is not just the process of using GPS, although this makes controlled traffic easier and offers

many more revolutionary opportunities. Perhaps the first benefit of controlling traffic is that it reduces or eliminates overlap. Many studies suggest this alone reduces the cost of inputs such as seed, fertiliser and agrochemicals by up to 10 per cent.

Controlled traffic also avoids misses, so all the field is used effectively, with increases in output. Vegetable growers report that they have the right number of rows in the paddock each time.

Better gross margins

Keeping traffic off the growing area helps keep soil in prime condition for crop growth as fewer passes are required. In non-compacted growing areas, minimal cultivation is required to obtain a suitable seed bed. Soil with improved structure has better internal drainage and copes better with adverse weather conditions. Crops experience less stress, resulting in higher yields.

Consolidated tramlines have lower rolling resistance and wheel slip than cultivated soil. Firm ground can support higher axle loads, so tramlines also allow safe machinery access in wetter conditions. Under normal conditions, narrower tyres can be used to carry the same loads. Consolidated wheel tracks and un-compacted growing soil increases traction and reduces cultivation draft. Less horsepower, less time and less fuel are required and all lead to better gross margins.

Widths to be the same

The main direct costs associated with controlled traffic farming are making machinery fit the tramlines and investment in guidance systems. Machinery working widths and wheel track widths should be the same, and some method of establishing and keeping to the tramline is required.

Full implementation can take time as a number of changes may be necessary and can involve significant capital. Machinery replacement policy has to be considered, with a plan to guide purchase decisions that result in a controlled traffic farming system. Machinery matching is critical for the controlled traffic system. Only when each machine has the same width, or works to multiples of the same width, is tramlining possible. When wheel tracks are the same the lines can be used.

Conventional cropping usually has a wide variety of machinery working widths. Plant row spacing varies between crops and the number of rows per pass varies between operations. Tractor and equipment wheel track widths vary considerably, even in a single tractor machine combination, so converting to controlled traffic usually requires significant changes.

In most arable and process cropping systems, the harvesting machinery sets the wheel track widths in a controlled traffic system. Combine harvesters, whether for cereals or maize, usually have a three metre wheel track. This is the same as a standard outer wheel track on a tractor fitted with dual wheels.

Rather than reduce the width of the harvester, common practice increases the width of the tractor. The simplest



modification is to remove the inner wheels, and retain the outer ones with the track width that matches the harvester. Usually the rear wheels are easy to set and require no significant engineering. Similarly, the front wheels on two-wheel drive tractors can often be altered quite easily.

The front wheels on four wheel drive tractors are more complicated to extend, particularly if suspension is fitted. Proprietary solutions include extending front axles, or fitting spacers to push the front wheel track out to three metres. With controlled traffic tractors on well-formed wheel tracks, duals or extra wide tyres are not normally needed. There is opportunity to reduce tyre width, and the width of the compacted tramline, leaving more un-compacted soil for plant root development.

Simple guidance such as marker arms can be used to establish a crop. The same wheel tracks can be followed for all other operations. This may work for temporary tramlining, but does not unlock the full benefits of permanent controlled traffic.

Precision agriculture and soil compaction

Global positioning and automatic machine guidance in the form of self-steering tractors simplify controlled traffic farming. If the implements are matched for size and wheels for track-width, the system does the rest. Every time the tractor enters the field, it starts from the same base line. Every pass is carefully controlled to exactly the right spacing. The operator just follows machine instructions and keeps an eye on the equipment to make sure it is working correctly.

Simple GPS equipment will guide you to a few metres most of the time but this is not sufficient for controlled traffic applications. Differential GPS uses correction signals

sent from the GPS satellites and reduces error. Most of the time it will guide you to within 300 mm of your target point. This is a full tyre width, and between one-third and two rows off-line depending on the crop.

High accuracy GPS

To get the full benefits of controlled traffic you need to have the high accuracy GPS and automatic guidance. Real time kinematic GPS using ground base stations and radio links allows tractors and equipment to be positioned to within one or two centimetres. This is more accurate than even a very good driver can maintain.

High accuracy GPS with automatic steering is the full adoption solution. All operations can be repeated along exactly the same wheel tracks with very precise tracking time and even with full ground cover or in the dark. In addition operators suffer less fatigue, make fewer mistakes and find it all gets easier and is a lot more convenient.

The use of GPS and self-steer for tractor guidance is an entry point into precision agriculture and the digital revolution. Familiarity with GPS, computer interfaces, software packages, electronic maps, data sharing, file types and everything that goes with them grows as capability is developed by staff in the office and in the field. The tractor cab is the office.

Direct contact with farmers, helping them catalogue vehicles and equipment and develop a plan for controlled traffic is beneficial. Support to take the first steps helps towards reduced costs and better soil and helps them progress along the path of digital revolution.

Dan Bloomer is from Landwise Inc in Hastings. Landwise informs farmers and industry of trends, good practice and technologies that support sustainable crop production. Voluntary membership is at www.landwise.org.nz/join

James Allen

The pathway to farm ownership



The New Zealand dairy industry has often been regarded as innovative and progressive. This does not occur without having innovative and progressive people involved in all phases and stages of the industry, whether that is on-farm or off-farm.

In the past, there has been a relatively clear progression path for those wishing to progress from a farm employee to farm owner, if that was their desired end goal. There has been some concern voiced in the industry that this traditional pathway is under threat, and the path to succession has become more challenging.

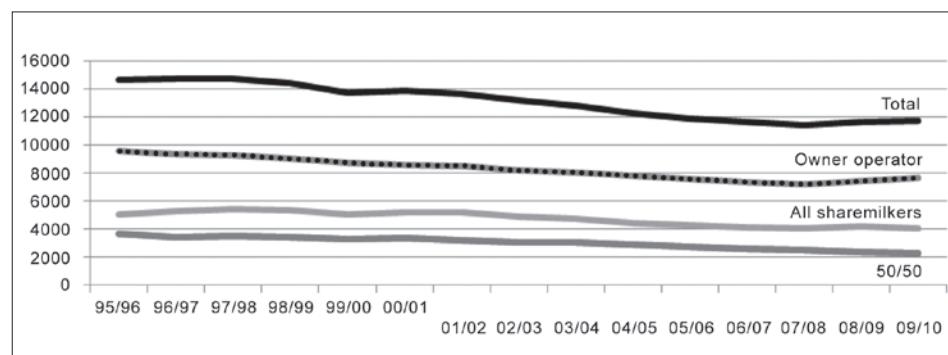
In response, Dairy NZ funded a project to explore these concerns, looking at current and future pathways, pros and cons of pathways, and providing recommendations for those making decisions regarding career progression. The project was commissioned by Federated Farmers and undertaken by AgFirst.

Current trends

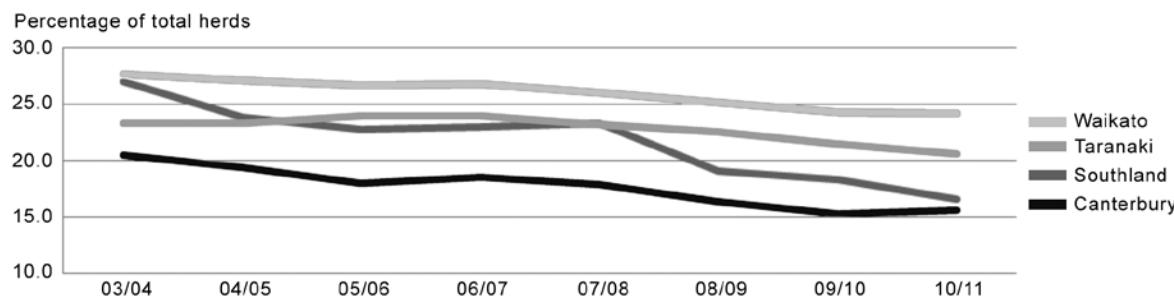
Sharemilking

Sharemilking has long been considered a vital step in the career progression path for young farmers. A total of 35 per cent of farms were managed by sharemilkers in 2009/10 and 20 per cent by herd-owning sharemilkers. Although there has been only a minor reduction in the percentage of dairy farms managed by sharemilkers, there is a more noticeable trend in the declining number of herd-owning sharemilkers, particularly in the South Island.

Main reasons include higher debt levels on farms, more corporate farm ownership, and the difference in financial returns to the farm owner between using a herd-owning sharemilker and a variable order sharemilker or contract milker. The total number of herd-owning sharemilker positions available has dropped from 3,331 in 2000/01 to 2,303 in 2009/10, a drop of 30 per cent in total numbers. However, this can be misleading as the total number of dairy farms has also dropped by 16 per cent over the past 10 years.



Farm numbers grouped by operating structure

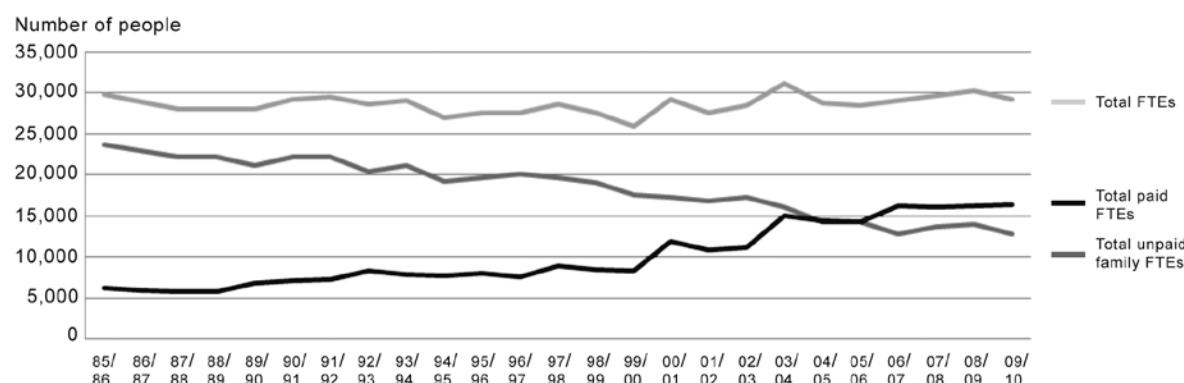


Percentage of herds with a 50/50 sharemilker based on region

There has been a trend away from 50/50 sharemilking towards variable order sharemilking and contract milking over the past four years. This is more pronounced in certain regions of the country, particularly Southland.

Labour

Over the past 20 years the labour environment in the dairy industry has also changed significantly. The total number of people working on dairy farms, both employed and unpaid family labour, has remained relatively constant over these two decades but the proportion of paid versus unpaid has changed.

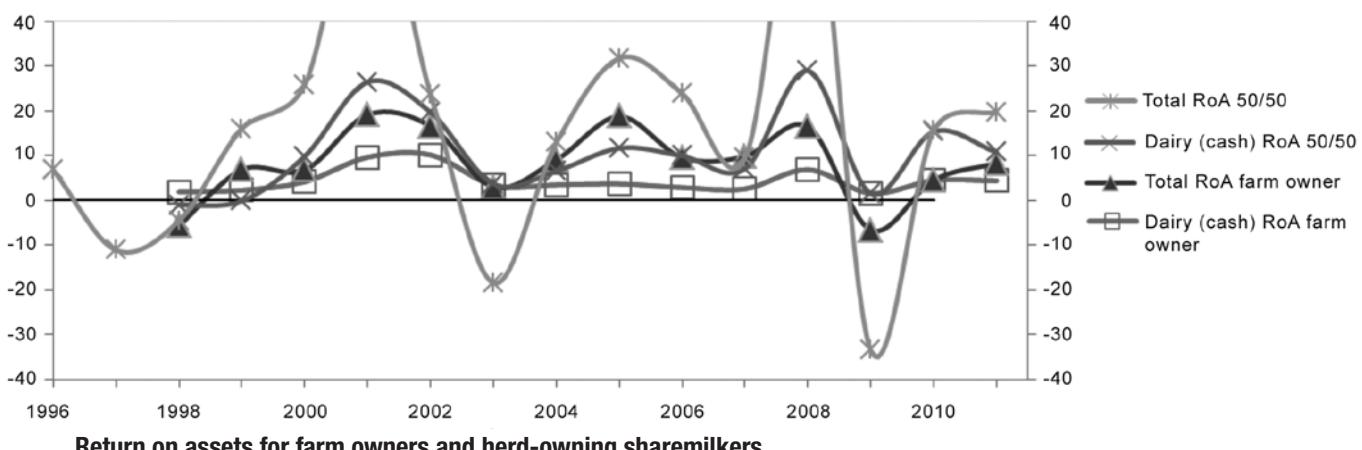


Total number of full-time equivalents working on dairy farms

The fact that the number of full-time equivalents has remained static, while the number of herds in New Zealand has declined, indicates that there is more competition for the opportunity to manage, sharemilk or own these herds. The average herd in 1985/86 required an average of 1.89 full-time equivalents and this would consist of one full-time management position and an 0.89 full-time equivalents farm worker. In 1985/86, half of the positions on-farm were management positions. Management positions include those of farm manager, contract milker, variable order sharemilker, 50/50 or owner operator. By 2009/10, this had declined to only 40 per cent of positions on-farm being management.

Financial returns

Herd-owning sharemilkers averaged 20 per cent return on total assets over the 13 years ending 2010. In the same time, farm owners averaged an 8.4 per cent return on assets, including changes in asset values.



Return on assets for farm owners and herd-owning sharemilkers

The return on total assets includes changes in the market value of the herd within the year, a change which can be large. It also includes any capital gain on other assets. Sharemilkers might do well with a 20 per cent economic return on total assets, but the comparatively low cash return from owning a farm, possibly due to over-valued land prices, exacerbates the equity required for a first farm purchase.

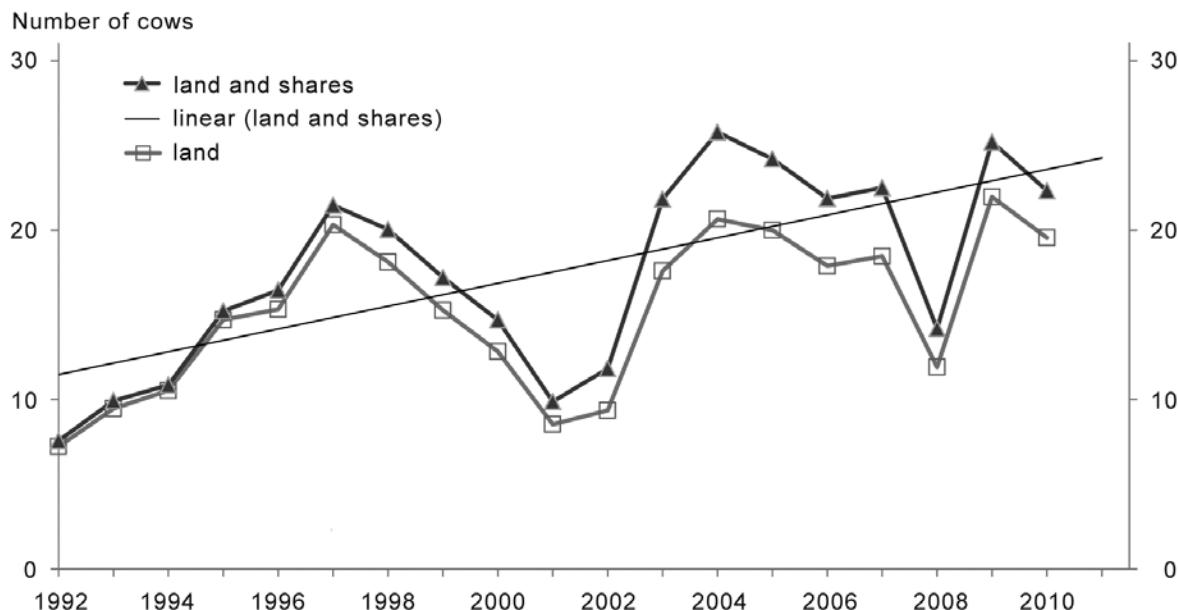
There is a substantial variation in return on assets between farm owners and herd-owning sharemilkers. Although there needs to be a greater return for the sharemilker, the differential is more pronounced at high payout levels. Herd-owning sharemilking produces a good return on investment, although there is significant variability between years, and timing is important.

Profit and return on asset by operating structure three-year average 2007 to 2010

	Operating profit per hectare	Return on asset
Owner includes owner operator and those employing a farm manager	\$1,942	4.5 per cent
Owner with variable order sharemilker	\$1,827	3.9 per cent
Owner with 50/50	\$1,105	3.1 per cent
50/50 sharemilker	\$924	16.9 per cent

Land prices and cow values

The number of cows to purchase a hectare of dairy land doubled between 1992 and 2010. Adding in the purchase of dairy company shares further increases the number of animals required.



Cows to buy one hectare of land

How is this all worked out? The closing dollar value of land and farm investments held by owners is divided by the closing value of 50/50 sharemilker livestock and then divided by the number of 50/50 sharemilker cows. The graph highlights the classic issue of timing of entry and exit for an investment. The ratio in the years 2001 and 2002 were not far from those in 1992 when livestock values escalated faster than land.

Value of a sharemilker to the industry

There are several reasons why sharemilking is good for the industry. Sharemilking –

- Provides a medium in which young people are required to gain the financial skills to manage and run a business
- Can build a mentoring relationship, helping younger farmers gain the necessary skills to run a farm business
- Attracts people to the industry with good returns and the opportunity to be their own boss
- Provides a method of wealth creation which ensures potential purchasers of farms for the future
- Has the perception of building leadership capability in the dairy industry
- Usually produces a track record of higher production.

Milk production per hectare by operating structure

	Kilograms of milksolids per hectare		
	20 to 29 per cent sharemilker	50/50 sharemilker	Owner operator
1992/93	688	683	630
1994/95	724	699	657
2000/01	864	851	803
2004/05	912	895	842
2010/11	945	938	907

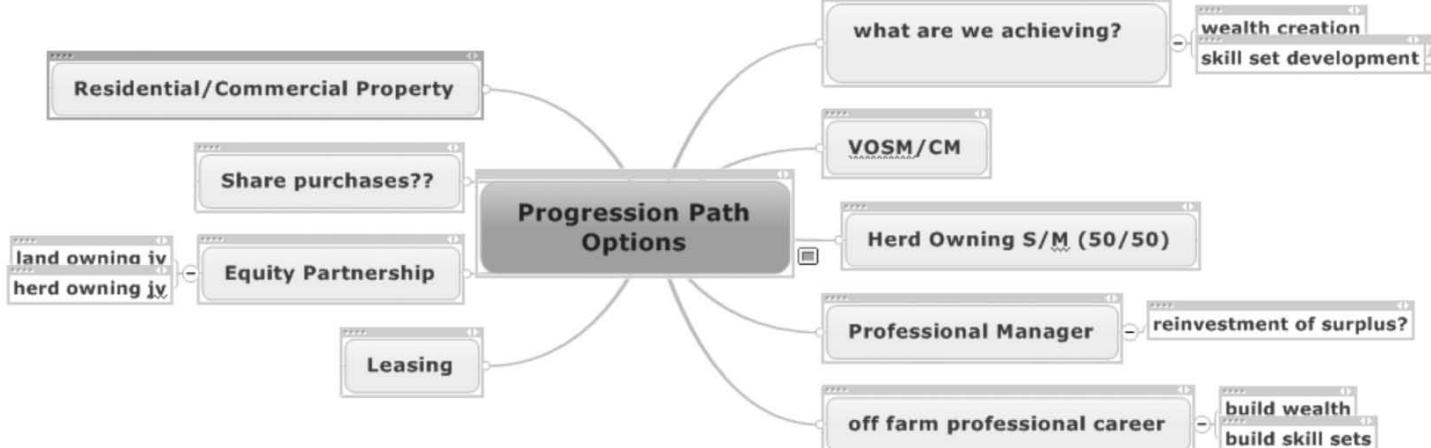
Sharemilkers on average have higher stocking rates and higher levels of production per hectare than an owner operator. However, the financial return data suggests that an owner looking to maximise financial returns is better served by using a variable order sharemilker or contract milking structure rather than a 50/50 structure. The conclusion can be drawn that 50/50 sharemilkers are engaged for reasons other than financial returns.

Value of a herd-owning sharemilker

As previously discussed, a farm owner will, on average, produce a better financial return by using a variable order sharemilker, contract milker or farm manager rather than a herd-owning sharemilker. However there are non-financial reasons why a herd-owning sharemilker might be involved –

- On average, a herd-owning sharemilker produces more per hectare than an owner operator, but no more than a variable order sharemilker
- Release of capital
- Less worries about machinery, especially damage to it
- Equity stake in the business
- More incentive to perform in main areas of livestock management, such as reproductive performance
- Removes the needs to make a lot of daily decisions about stock and animals
- Easier to remove a non-performing sharemilker than an employee if the contract has finished
- Helps farmers progress through the industry as the farm owner themselves may have done

Progression path options



- Reduced risk from fluctuations in livestock values and stock deaths
- Less day-to day-input required, compared to a variable order sharemilker or manager position – an absentee owner with a variable order sharemilker or farm manager will often need to enlist the services of a consultant or farm supervisor
- Avoidance of staffing issues
- Generally longer-term agreements of three or more years compared to managers or variable order sharemilkers
- Owner possibly feels more comfortable in leaving the farm.

There are also potential disadvantages. For example, there is a risk associated with herd-owning sharemilkers due to changeover of herds. In other words, what is the quality of stock coming on to the farm? Do you have control over the breeding programme? What is the calving spread actually going to be?

Succession strategy

Sharemilking can play an important role as part of a farm succession strategy. For example, on an individual property a young farmer could progress from manager to variable order sharemilker, or contract sharemilker to herd-owning sharemilker. Then they could use the cash profits made to buy an equity stake in the property they are working on. This provides a measured approach for all concerned with the development of skills, trust and equity helping the next step in succession.

Pathways to farm ownership

In 1996, 70 per cent of sharemilkers intended to purchase their own farm after completing their sharemilking career. By 2011 this had reduced to 55 per cent. The pathway to farm ownership has become more varied, and there are more options to choose from. The pathway to progression is therefore no longer linear but this should not necessarily be seen as a negative factor.

However, with more diversity in the industry, there is a much greater need for adequate due diligence in each individual opportunity. In many cases this is not happening to a sufficient degree, and professional advice is not being sought. The progression path options available to those in the dairy industry are outlined below.

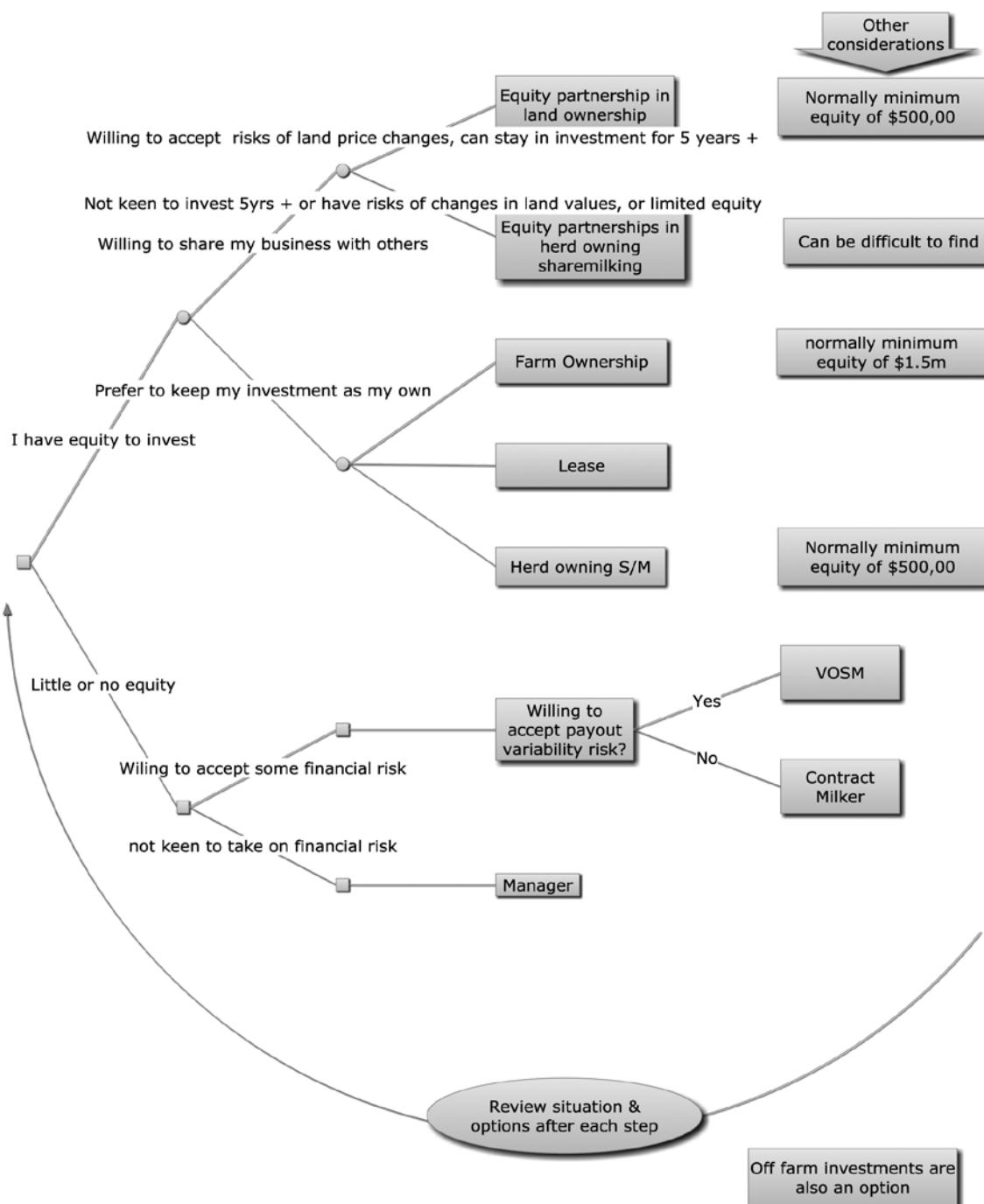
Two decision support trees have been created to help clarify the thought process for choosing the appropriate

operating structure. One is for farmers wanting to further career progression in the dairy industry and the other for farm owners looking at future business structures. Before using the trees, you need to have end goals in mind.

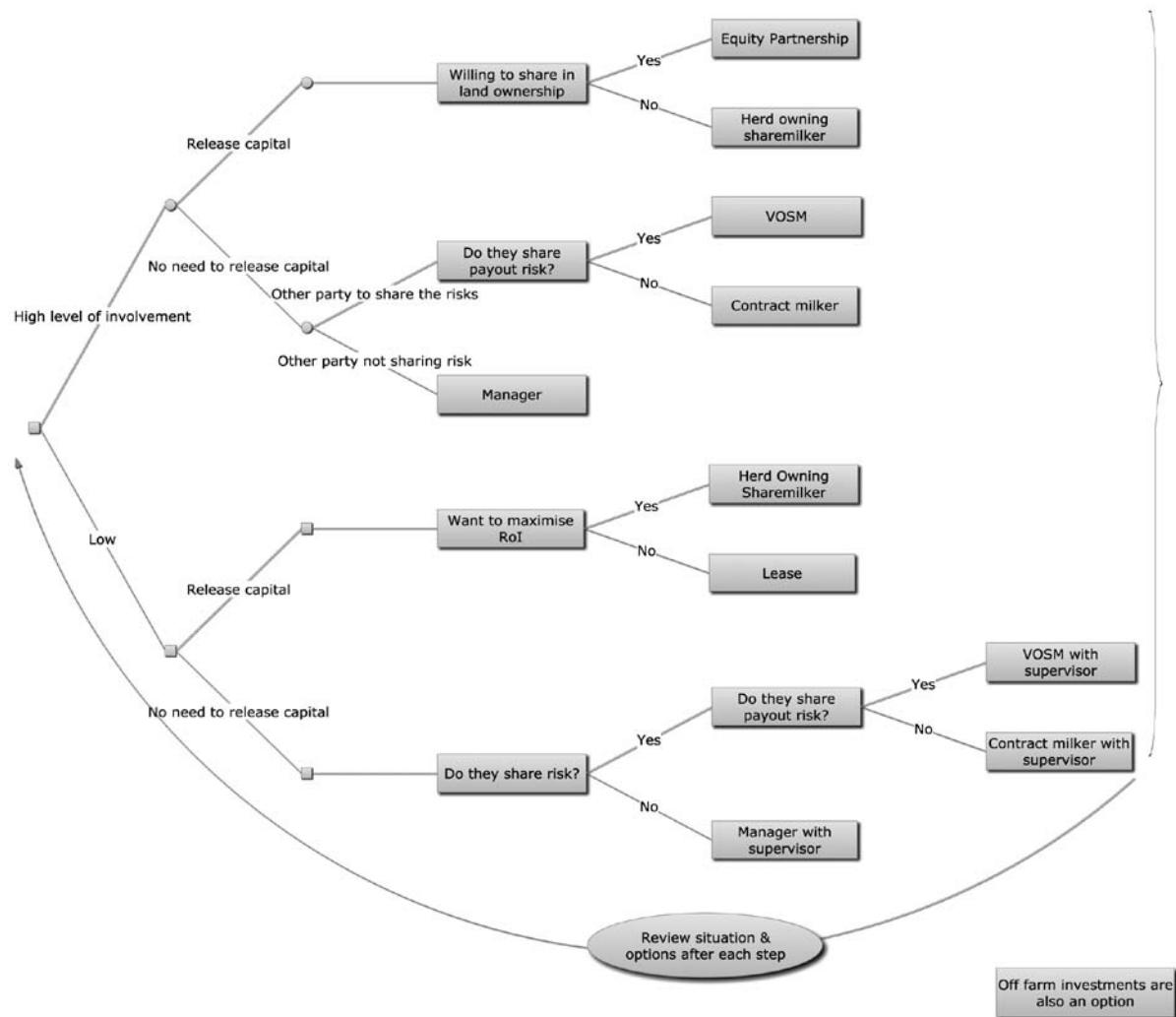
Change to the sharemilking system?

For herd-owning sharemilking the sector needs to continue to adapt. Market forces of supply and demand are at play,

What type of operating structure should I pursue for progression



As a farm owner, what type of operating structure should I have?



and the balance of power is currently in the hands of the farm owner. If the herd-owning sharemilkers cannot accept that there may need to be rebalancing of clauses within the traditional herd-owning agreement, farm owners will make the decision to recruit contract milkers, variable order sharemilkers or farm managers.

There is no need to re-write the herd-owning sharemilking agreement. If sharemilking is to continue both participants must be open to making changes to the variables within the standard clauses. Recently this has included changes to sharing of Fonterra dividends and grazing expenses for young stock. In the future it may include changes to the percentage spilt of milk income between the farm owner and sharemilker.

As the dairy industry continues to evolve, the variability seen in sharemilking agreements will continue to increase. This highlights the need to find independent advice. For example, it is highly likely that there will be a mixture of agreements that do and do not provide a share of the milk company share dividend to the sharemilker.

Equity partnerships

Equity partnerships or joint venture farm ownership are

now an accepted option for progression in the dairy industry. While there is a significant amount of literature and expertise available regarding their formation, there is also a general lack of understanding among farmers about how they work. Although there are a significant number of farms owned by equity partnerships, there is little quantitative evidence about their success as a form of progression.

Financially, logic suggests that, in the long run, returns will be similar to those of the average farm owner, which is three to seven per cent return on assets with five to 10 per cent capital gain each year. In comparison, a herd-owning sharemilker agreement will generate on average a 20 per cent return on assets for the sharemilker, although there is a greater degree of annual variability in this figure.

Some points for those considering having equity partnerships are –

- Due diligence, for the farm and for the people involved
- Ensure adequate entry and exit strategies are included in the agreement
- Opportunities to incentivise the minority equity manager through guarantees
- Ensuring equity managers are receiving fair returns for their efforts, particularly transparency in wealth creation

- opportunities
- Need for better governance structures
- Build trust in the relationship between equity partners
- The partners have similar goals.

It is also very important that the company is well set up with a shareholders' agreement, a business plan which is sound, understood and supported by all partners, a property which is able to support the farming business, and managers who are skilled and able to fulfil the requirements of the business plan. Additional requirements are sound reporting with interpersonal communication essential to maintain the trust.

The most successful equity partnerships tend to be those where the group forms before any search for property, and develops a business model and plans with a full understanding of the purpose of that business and expectations. An entry and exit strategy should also be developed at this time. Once this has been decided then a property is selected that meets the criteria required.

To help incentivise young farmers into equity partnerships, the majority equity partners are increasingly willing to guarantee an equity manager's loan, which enables them to increase their shareholding in the business. For example, a young farmer may have \$300,000 to invest. If the total equity in the equity partnership was \$3 million, this would entitle them to a 10 per cent shareholding in the business.

However, assuming that debt to equity levels were within standard lending criteria, the farmer could borrow a further \$300,000 personally, but secure this loan against the farm asset. With \$600,000 to invest they would be entitled to a 20 per cent shareholding in the business.

Where are our future farm owners?

Our future farm owners are already among us. The herd managers, farm managers and sharemilkers of today are our farm owners of tomorrow. Options to achieve farm ownership have increased and those who have a desire to achieve this goal will do so. The traditional 50/50 sharemilking agreement is a very useful method for wealth creation, a necessary aspect to build sufficient equity to purchase a dairy farm. While there is a trend away from herd-owning sharemilking agreements at present, additional opportunities have been created through the advent of equity partnerships.

Those aspiring to farm ownership need to consider their career development with regard to two main aspects. First, consider the development of the necessary skills, experience and networks to achieve farm ownership. Secondly, consider your wealth creation pathway to build the necessary equity. These may or may not intersect.

The dairy industry has prided itself on the ability to be innovative and to adapt to new ideas and market pressures. In some cases, herd-owning sharemilkers may need to adjust to current market pressures if their position is to continue in a similar structure, otherwise they could be replaced by a manager or variable order sharemilker.

With regard to equity partnerships, for some farmers this means they have achieved their ultimate goal of farm ownership, most likely at a much earlier age than they have ever imagined. For others, there is still a desire to grow the size of their wealth by expansion, or achieving sole ownership of their own farm. In this case, their journey has not ended.

Main points to consider

- Equity partnerships are now an established part of the career progression pathway in the dairy industry
- The pathway to farm ownership is no longer linear, and those aspiring to this goal need to examine all types of opportunities
- Although the number of herd-owning sharemilker agreements is under pressure, it remains one of the best methods of wealth creation
- There is no need to make substantive changes to the herd-owning sharemilker agreement. These sharemilkers may need to be more flexible in their approach to negotiating agreements. This may mean looking at varying split of income and expenditure away from the traditional 50/50 approach
- Herd-owning sharemilking can form a useful part of an integrated pathway for farm succession
- Young farmers need to lift their business skills in the areas of contract negotiation, due diligence and analysis of options
- Those entering into equity partnerships need to give more consideration to how their shareholding percentage can be lifted in future years.

James Allen is an Agribusiness Consultant for Agfirst, Waikato.



John-Paul Praat, Carla Clelland and James Allen

Farm business management for a changing climate



Mention the words climate change and eyes often roll. However, it is no longer good enough to hope for the best when it comes to assessing the increased risks to farm businesses from climate change. Environmental risks include physical damage from intense rainfall and associated floods, interrupted water and feed supply to animals and crops during droughts, floods or snowfalls. Business risks include volatility in product supply, demand and prices, as well as access to markets.

Climate change workshops

A series of recent workshops, designed by rural professionals for rural professionals, looked at these various risks and how to plan and map out options for farmer and grower clients. The workshops are part of the wider Ministry for Primary Industry Climate Change Technology Transfer Programme.

The workshops were presented by qualified trainers who had completed the agricultural greenhouse gas accounting, mitigation and emissions trading course at Massey university. These eight trainers are involved in most primary industry sectors from pastoral farming to forestry and horticulture, and are located from Whangarei to Gore.

After surveying the needs of the target audience of rural professionals, the workshop material was compiled and presented in 12 locations across New Zealand. Below is a brief snapshot of what was presented and discussed at them. Further information, along with the resources mentioned in this article, can be found on the AgFirst website www.agfirst.co.nz

Projected effects

On the whole, the news is relatively good for New Zealand as we are likely to be better off than our nearest neighbours because the projected effects of climate change are moderated by our temperate maritime climate. In general, agricultural productivity will probably increase with warmer temperatures, more rain in parts of the country and higher carbon dioxide concentrations.

However, the severity and frequency of extreme weather such as intense rain or snowfalls and prolonged dry periods are likely to increase. These effects are outlined by region in a series of fact sheets compiled by MPI and NIWA.

The increased severity and frequency of extreme climatic events will pose challenges to farm businesses as the individual effects may be compounded by reduced recovery time between them. Farmers and their advisors need to appreciate that the risks in the future will be different from those experienced in the past.

Farm productivity may be higher, but the swings between seasons will probably be greater, requiring farmers to either adjust livestock management policies or increase the transfer of feed from one season to another. The main message is that

while farmers can do little about the projected changes, they can respond strategically to minimise their vulnerability.

As changes are likely to be gradual, there is time for farmers to make planned responses. This might include matters as simple as increasing culvert sizes and better adherence to track maintenance schedules. Alternatively it could involve a large-scale response such as building a new silage bunker, developing a cropping and pasture renewal programme or buying a property with complementary characteristics.

Long-term strategic planning is already occurring in some regions. For example, some Gisborne farmers have introduced rams to their flock which are tolerant of facial eczema as the prevalence of this disease starts to increase. It is anticipated that facial eczema will become more of a problem in the future with warmer temperatures in the region.

Determining the best strategic response to a particular threat or opportunity can be learned from the experience of others, such as by looking north. Northland farmers have experience dealing with kikuyu and there are a lot of other examples of managing pests, diseases and weeds around new crops, animal breeds and farming systems in different regions of New Zealand.

Risk management planner

The use of other resources was identified as an important element in increasing the skills of rural professionals. Therefore part of each workshop was to run through a risk management planning tool. This was initially developed by Tony Rhodes of PGG Wrightson in conjunction with groups of farmers. The resource is an A3-size planner, designed to be used by farmers, agribusiness consultants, bankers, accountants and regional council staff. It is very useful for the main task of considering how to build farm system resilience in an increasingly variable climate.

Eight areas of influence are considered. Climate related ones include rain and snow, dry spells and increasing temperature or carbon dioxide. Farm related areas of influence are livestock genetics, animal welfare, changing land use, government regulation and customer perceptions.

The probable effects of these are listed in columns in the planner, along with what can make a difference by accentuating or minimising effects, what it might mean for a farm system, what is relevant and the intended action plan. A copy can be downloaded from the Agfirst website mentioned at the start of the article.

Question and answer session

Workshop participants were asked to write down specific questions which they had before attending the workshop. The most common were –

- What will the effect of climate change be on farmers and their businesses?
- What on-farm management strategies are there to mitigate the effects and reduce vulnerability?
- How do we expand from short-term profit-related thinking to long-term thinking?

These questions were answered as the regional summaries were discussed and after working through the risk management planner using specific farm examples. Extending response timeframes will be a continuing process, helped along by the information and ideas exchanged at these workshops.

Regional policy effects

Participants were also interested to know how regional policies would affect the farm, and how local authorities and government were responding to the projected effects of climate change in their region. An example would be river gravel extraction bans in relation to increased flood risk from high-intensity rainfall.

The progression of water storage projects is another example. This suggests that farmers and their advisors take significant lead and respond to policy. At all workshops it was emphasised that rural professionals need to be involved in the process of formulating policy rather than being surprised or adversely affected by it.

The urban-rural divide was cited on many occasions as a fundamental problem when encouraging long-term strategic investment in improved farm business resilience. The need to educate the urban population about what happens on the farm was raised by participants at all venues. This was identified as being important to appreciation of the environmental and financial challenges which are faced by landowners.

Another problem raised was concern about how the balance between productivity from the land and the environmental footprint would be managed. There were further concerns that increasing constraints were being placed on landowners by local and regional councils. Again, it was emphasised that landowners and rural professionals need to get involved in formulating practical policies.

continued on page 21>>



Adrian van Bysterveldt

Large dairy business project

Over the last 20 years, most dairy farming business have grown in size and complexity. In response to the challenges that these businesses now face, DairyNZ has instigated the Large Dairy Business Project which is jointly funded by the Dairy Levy and Primary Growth Partnership funds. The project has two main objectives.

The first objective is to build a body of knowledge of effective business governance and management disciplines which is appropriate for dairy farmers, particularly those with large dairy farming businesses, their farm supervisors and farm advisors. The second objective is to support change in farm business practices by implementing improved knowledge and understanding of these effective business governance and management disciplines and practices.

Surveys and interviews

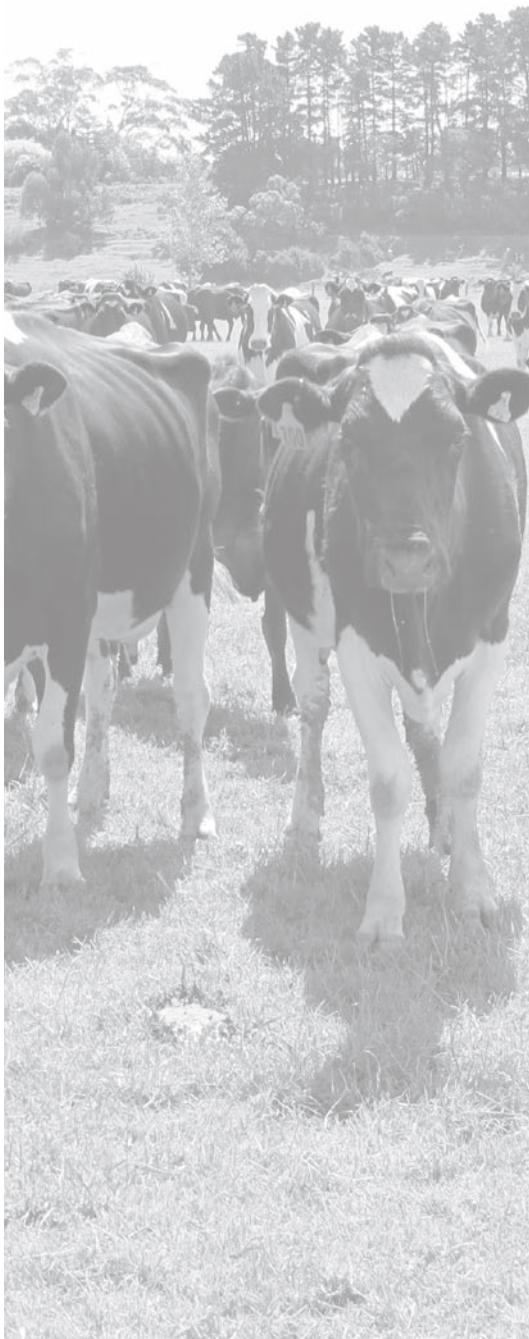
The first 16 months of the project has been a discovery phase. Farmer and advisor surveys and interviews were undertaken to understand the problems facing larger dairy farms and businesses and the current level of governance practices in them. An analysis was also carried out on an industry database to understand how farming businesses were organised. A search was undertaken for existing governance resources which could be adapted for farming families, as well as skilled professionals who are working with farmers to develop governance effectiveness in their businesses.

Increase in size and complexity has seen the herd size grow to an average of 386 cows by the 2010/11 season. This is an increase of 100 cows in just eight seasons. In regions such as Canterbury this change has been even more dramatic and the average herd is now over 750 cows. At the same time, some farming businesses have taken advantage of a more favourable lending environment to leverage the inflating equity in their land and expand into multiple dairy farm enterprises, often spread over two or more provinces.

Number of farming businesses with one or more dairy farms

1	2	3	4	5	6	7	8	9	10	More than 11
All New Zealand										
7,568	1,193	328	108	44	24	19	21	16	9	35
Taranaki region										
1163	198	42	9	5	3	0	0	0	1	1
Southland and Otago										
633	142	56	16	8	6	6	2	1	1	3

In addition to the figures above, 57 multiple farm business also have additional herd-owning sharemilking businesses. Significant variation exists between regions and reflects the recent expansion of the dairy industry with the conversion of land into dairy farming.



Number of businesses with a dairy farm outside their home region

Home farm region	Businesses which have an investment in dairy farms outside that region
Northland	16
Bay of Plenty/Central Plateau	51
North Waikato	76
South Waikato	64
Taranaki	35
Lower North Island	22
Top of the South Island	4
Westland	3
Canterbury	28
Southland/Otago	39

The way farms and herd-owning share milking businesses are owned may also be changing, although this perception is purely anecdotal. The following tables clarify this for the 2010/11 season.

Ownership structure of herd-owning sharemilker businesses

Sole trader	Trust	Family partnership	Family company	Syndicates
190	305	766	839	70

Individual New Zealand dairy farm ownership

Sole trader	Estate	Trust	Family partnership	Family company	Syndicate	Maori trust or incorporation	Government
All New Zealand							
832	86	1940	3361	4308	985	93	66
Taranaki							
111	22	712	581	294	33	3	na
Southland/Otago							
38	0	192	168	501	225	0	na

There are distinct regional differences not explained just by the rate of dairy expansion. The influence of local professionals and their advice on issues such as asset protection and tax planning seem to be more evident in regions where farms are smaller and the average age of the farmer is older.

Trading entity of multiple dairy farm businesses

Sole trader	Trust	Family partnership	Family company	Syndicate	Family company and syndicate	Mix of company and non- company	Maori trusts and incorporations
All New Zealand							
49	233	240	638	217	244	387	25
Taranaki							
9	91	48	42	10	2	93	2
Southland and Otago							
2	22	15	78	69	46	54	0

It appears that multiple farm businesses across New Zealand are more commonly associated with company structures. A total of 1,099 businesses are opting for all their ownership to be within companies and 934 business including non-company entities in their ownership profiles. When Dairy Holdings, Landcorp and Fonterra are excluded, multiple farm ownership is dominated by the family corporate. However, there are big regional differences reflecting the influence of local professionals.

The development of farming syndicates has added a new dimension to farm ownership and for many people this has made ownership in much larger operations possible. These farming businesses are using the full range of possible management relationships to employ the actual farm operator.

Farm operator for land-owning syndicates

Salary manager	Variable order sharemilker	Herd-owning sharemilker	Salaried equity manager	Equity manager on variable order	Equity manager as herd-owning sharemilker
210	102	84	480	80	37

The trend to larger farms, more multiple farm business, and more farms in these businesses is continuing. The change to this increasingly complex situation has occurred in a relatively short time. As a result many businesses have outgrown the ownership and governance structures as well as the management skills of their owners. New Zealand dairy farmers are not alone in this phenomenon, which has been found in farming businesses across the world as well as in urban businesses which are successful and growing.

Unfortunately when these large growing businesses fail, the repercussions extend beyond the immediate financial losses to family and business relationships, environmental mismanagement and failures in animal welfare. The media interest in these events affects all dairy farmers.

Improved business governance and the implementation of good business disciplines in dairy farming businesses will continue beyond the end of the current global financial crisis. The increased scale of farming businesses and expectations of labour management, animal welfare and environmental management is increasingly putting constraints on businesses to operate their farms. This may be helped by the adoption of either advisory or formal governance boards and both of these would require new skills by farmers and advisors alike.

Over the next 12 months the Large Dairy Business Project will be focussed on building capability with the development of written resources, building partnerships with skilled professionals and piloting workshops on governance and supervisory management. These will then be organised into a range of farmer opportunities as part of an extension and adoption plan which will be rolled out across New Zealand. This includes working with AgITO and a wide network within Maori farming interests to develop training opportunities in dairy agribusiness for Maori trustees.

It is very important for farming businesses to have good governance. Not only are banks now closely considering this when assessing the risks within the business, but it is influencing the availability of capital and the marginal interest rate that they are charging. Many farmers, when considering the issue of family succession within the business, are finding that good governance structures and disciplines helps this process. For many farmers it results in them being able to retain equity in a business which they understand and that has produced excellent returns.

Adrian van Bysterveldt is the Development Project Manager for DairyNZ

>> **Farm business management for a changing climate** continued from page 18

Conclusion and the future

Some farmers are responding to specific challenges brought by a changing climate. Increasingly, lenders and underwriters will take more interest in what plans are in place as part of assessing the farm business. Rural professionals need to be leading change and asking questions such as –

- How can a farm business be affected by projected climate changes?
- How vulnerable is this proposal?
- How well do they understand the risks and possible consequences?
- Is there a plan for coping with expected variability?

The answers to these questions need to be as objective as possible and based on the best possible knowledge. There is a large resource of information available and access to this is improving – the workshops and their content are an example of this.

The main risks posed by a changing climate include increasing frequency and severity of extreme weather as well as concern in international markets that problems with

the environment are being actively addressed by suppliers. Research shows that implementing good farm practices as a response can increase the efficiency, profitability and resilience of the farm business. However, such results are more likely to be from a considered strategy rather than knee jerk reactions.

If you missed these workshops take a look at the AgFirst website to download the presentation and supporting documents such as the risk management planner. The trainers are available to present to small groups within your organisation or to clients.

A new series of workshops is currently being planned for next year. Topics will include more customised information for each region and the latest national and international research and developments. Continuing Professional Education points will be again be available to NZIPIM members attending the workshops. We hope to see you there.

John-Paul Praat is from PA Handford and Associates Ltd, Carla Clelland and James Allen are from AgFirst NZ Ltd.

Peter Allen

Governance – new skills required by farmers and advisors

In the article on the Large Dairy Business Project, Adrian van Bysterveldt talks about some of the constraints and opportunities which are being experienced by dairy farmers in New Zealand. External changes such as the global financial crisis, societal expectations concerning labour management, animal welfare and environmental management bring situations that farmers have little choice but to face and respond to. Desired internal changes on the farm, such as the growth and scale of the business, different structures of business ownership and family succession are opportunities which also need to be dealt with proactively.

Proactive response

Changes like those outlined above have an effect on every dairy farming business and bring an assault on financial performance and health, how the farm is operating, how it is managed, as well as on lifestyles. Good governance practices meet and handle these assaults. The complexity that is added by the constraints and opportunities of today's dairy farming can also be successfully tackled by adopting governance practices.

With complexity comes new information which is often outside the normal comfort zone and experience of business owners or directors. Yet decisions need to be made about the new information and circumstances. In order to continue to make good business decisions, in spite of the complexity and assaults on financial health and performance, farm business directors need to deliberately and purposefully apply good governance practices.

Making good decisions

The challenge is that if governance is an answer to these problems, it may require new skills by farmers and advisors. Governance is the system by which those who have been entrusted with directing and leading a company consistently make good decisions. The greater the complexity, the greater the need for better decision-making to match it.

Dairy farm owners and their advisors can face these changes and even relish them, like a surfer riding a wave, if they grow in their ability to make good decisions. This is the essential core of governance practice.

Advisors to farmers can have a leading role in this. By guiding farming families and their businesses into the use of good governance practices, farmers will increase their decision-making capability and be able to respond to change proactively.

What does governance look like?

Governance for dairy farmers at its highest level is a formal board of directors. In this situation, directors assume responsibility to direct the company towards achieving its fundamental purpose in the context of acting solely in its best interests. How formal governance works is well described by many authors, and most usefully by the New Zealand Institute of Directors' recent publication *The Four Pillars of Governance Best Practice for New Zealand Directors*.

If farm advisors are called to understand governance practice, and guide their clients into it, a very useful method is to be involved as a member of an advisory board of their client. This is the next level down in terms of governance practice. The advisory board would comprise at least one external advisor, along with its directors.

There are situations where the formal board of directors of a company asks for opinions from an advisory board made up entirely of independent people, with none of the company's directors involved. That is not the use suggested here. It should be an advisory board where the directors of the farm, who are usually also the owners, meet regularly with their chosen advisors and run the meetings like board meetings.

In this case the advisory board members who are not directors have no power of instruction, direction or veto. They can only offer advice or opinion without directives. The directors of the company are using the advisory board to gain additional perspectives about strategic planning, business development, and especially to learn governance.

Governance principles

In this context it is useful to boil down governance principles to a level which is very practical. There is a good chance that successful governance will happen when the advisors lead

the directors to do the following basics –

- Clearly articulate the purpose and strategies of the business.
- Create an effective governance culture
- Understand roles and responsibilities of directors as being distinct from the other roles
- Run effective board meetings including the use of an agenda
- Maintain a disciplined schedule for board meetings
- Use a decision-making framework which includes systems to record learning from mistakes
- Have a commitment to continuous learning and the demonstration of progress in governance capability.
- Hold themselves to account by ensuring relevant timely reports and that key performance indicators are produced.
- Manage risks effectively.

A valuable practice is to formulate these basics into a system which the client agrees to. The system starts as a thinly populated handful of pages and grows as the client develops understanding and commitment to each practice. As they explore the topics, they learn to record refined and improved ways of working. They then discover that each page can be filled and developed.

The challenge for them is to put it into practice, and the challenge for the advisor is to keep promoting and selling the vision of a strong governance system which adds value to the business. All governance practices must add value to the business, not weighty bureaucracy or unrecoverable cost.

Decision-making framework

One basic governance practice which is of particular benefit in a small to medium-sized dairy farming business is the development of a decision-making framework by which future decisions are made. The directors agree that, in specific circumstances, for example for expenditure over a certain value, they will follow certain steps. This one practice alone can save a family business from the disastrous consequences of hasty or ill-informed decisions, not to mention restoring the confidence of family stakeholders in the decision-maker.

The result of following these basic governance practices is a governance system which is specially adapted and effective. This form of governance can take them as far as they want to go.

Good for small businesses

When people say governance is good for business it would be easy to jump to the conclusion that 'it is not for me' based on the common view that it is only for large organisations. Larger organisations use governance practices because they know the best decisions cannot be made without it. Smaller businesses can equally benefit from appropriately scaled governance practices.

Governance for smaller businesses does not mean unnecessary and costly bureaucracy. Costly big company governance systems do not have to be rigidly applied to a smaller business. But a good governance system for smaller farming businesses can start with the fundamentals and

enable the directors to learn and grow into even better decision-making. Governance, as a decision-making system, is beneficial and value-adding to all smaller businesses when rightly applied.

Deemed director

A common mental hurdle that advisors come to when considering being part of an advisory board is whether participation would make them a deemed director. Section 26 of the Companies Act 1993 is sobering when it says a director includes 'a person in accordance with whose directions or instructions the board of the company may be required or is accustomed to act'. Could an aggrieved stakeholder such as a bank use this clause as a weapon against the member of an advisory board to find someone to blame?

Section 126 may seem dangerous until you look closely at the wording, in particular the words 'directions or instructions'. In practice, the kind of situations that would indicate a person could be a deemed director are when –

- The advisor gives directions or instructions rather than their opinion or advice
- The advisor provides clients little choice without stating alternatives
- The advisor does not leave the choice to the client
- The advisor does not have a terms of appointment document which defines clearly the advisory capacity and its difference to 'director'
- The client does not understand the difference and defers to the advisor to make decisions
- The advisor does not bill monthly and services are not well described
- A dependent relationship develops from client to advisor
- The advisor purports to third parties they are effectively a director, for example, by becoming a signatory
- The advisor is not interested in helping the client learn better governance and decision-making
- The advisor has in mind to control, especially strategic direction, rather than to advise and empower the client.

Summary

The environment for dairy farming businesses is changing, whether by external factors or internal desires, and with those changes comes complexity and an assault on financial health and performance. These challenges can be successfully met with good governance practices. The challenge is that this may require both farmers and advisors to use new skills.

An appropriate way for farm advisors to get into governance practice, and guide their clients into it, is to be involved as a member of the client's advisory board. This should be run using the fundamental principles of governance and where a learning approach is adopted.

Peter Allen is the Managing Director of Business Torque Systems Ltd, small to medium enterprise governance specialists

Nick Dalgety

Top of the South Island innovations

An MPI perspective

All New Zealand regions have examples which show that innovation is alive and well in our primary industries. This article identifies some high profile examples of innovation at the top of the South Island. These are helping to keep New Zealand primary industries at the forefront of sustainable growth.



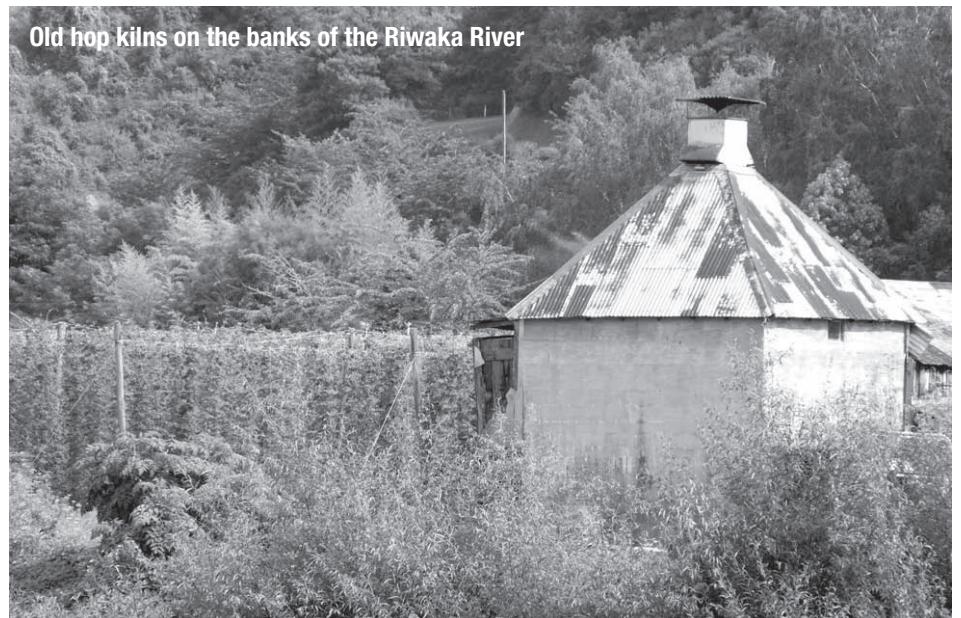
Primary industries play a fundamentally important role in New Zealand's economy, particularly in the export sector and employment. Every region will have stories to tell about innovations, arising from their local communities, which are now helping to set best practice in other parts of the country or even overseas.

In this article I have initially selected examples which confirm the diversity of industry groups at the top of the South Island. Secondly, and where appropriate, I note where the Ministry for Primary Industries (MPI) is playing a role in enabling some of that innovation. Primary industries included in this article are hops, pipfruit, viticulture, dairying, dry land farming, the wood processing arm of forestry and aquaculture.

Nelson where novel crops grow

In and around Motueka and Riwaka, located in the lower reaches of the Motueka valley, New Zealand's only commercially produced hops are grown. At one time this area also cultivated tobacco, but that crop disappeared in 1995 as a result of low international leaf prices and declining tobacco use.

European settlers were responsible for the first plantings of hops in the Nelson area more than 150 years ago. Innovation, in this instance, was a willingness to plant



and grow a crop in a completely new environment. The area soon became the centre of hop production in New Zealand. Hops are harvested in March and April and then packaged into several forms – notably cones, pellets and hop extract.

Growth is due to the increasing popularity here and overseas of craft and premium beers. This is very good for hop growers because both premium and craft beers tend to use more hops. New Zealand hop growers are producing specialty varieties with unique flavours and characteristics which are well suited to these styles. New Zealand hops go all over the world and into household name beers such as Heineken, Guinness and Coors.

The development of these distinctive hop varieties is supported by intensive research at the Hop Research Station. This was established in 1949 in Riwaka and is now overseen by Plant and Food Research. The Hop Research Station has also undertaken research into other significant horticulture crops over the years, notably kiwifruit, pipfruit and berryfruit.

A collaborative working relationship between the research station, growers and the then Department of Agriculture, ensured important results for the associated industries. This legacy of valuable research continues today.

New apple varieties face challenges

Nelson, along with Hawke's Bay, is a prominent region for growing pipfruit. The main plantings occurred in the early 1900s in the area including the Waimea Plains, Moutere, Tasman, Mahana, Motueka and Riwaka. Science has been integral to the development of Nelson's apple industry since the first trial shipment of several hundred cases of apples was sent to the London market in 1907. But so was the development of fruit grower associations, co-operative packhouses, improved cool-store facilities, and collaborative marketing through the Apple and Pear Marketing Board which was established in 1948.

However, market returns for export apple growers in the Nelson region in 2005 were disastrous. Major factors

leading to this included the selling of mainly commoditised varieties such as Braeburn and Royal Gala, a relatively high New Zealand dollar and the depressed nature of the European market.

At a crossroads

The poor market results that year acted as a catalyst for many local growers to turn to orchard redevelopment as a way out. Over the next three to five years growers pulled out older, less productive blocks of Royal Gala, Braeburn and Fuji. They planted Jazz, Tentation and other club varieties – a club variety is one in which production rights are limited in order to manage supply to the market.

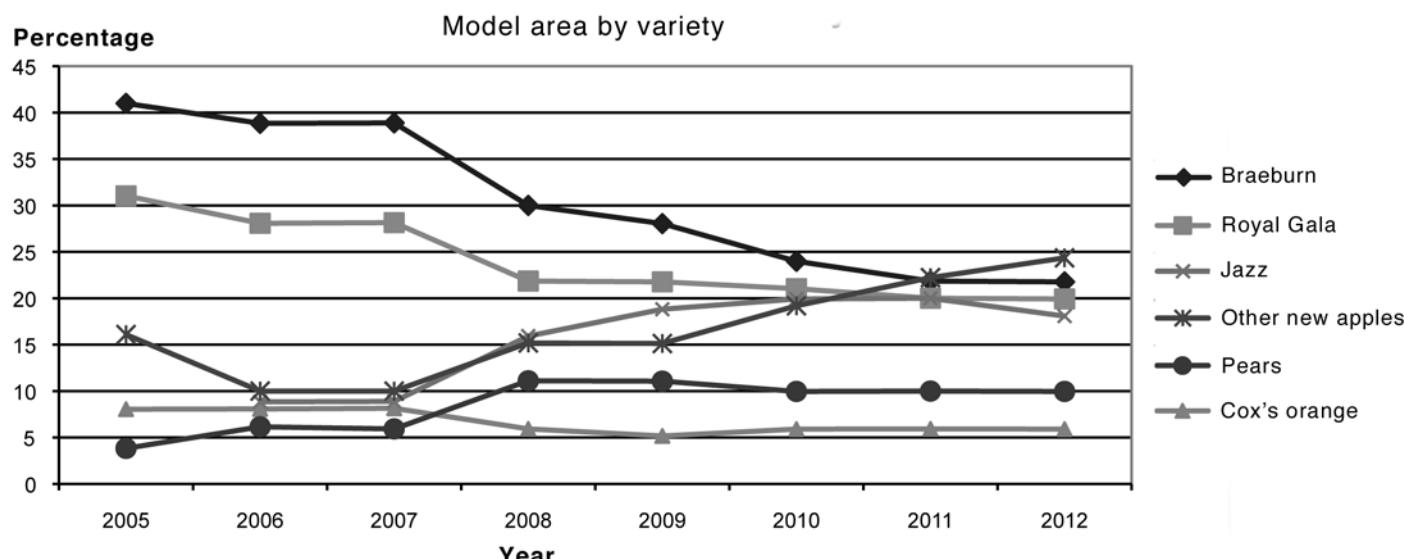
The graph, based on 2012 Nelson pipfruit monitoring, demonstrates this trend. It shows a steady reduction in the proportional area of Braeburn and Royal Gala varieties and a measured increase in that of Jazz and other new apples. Initially growers received very good market returns for the Jazz variety. For example, in 2006 prices for this variety averaged approximately \$33 for each export carton compared to an average across all export varieties of less than \$20.

However, in more recent years the average export return has been \$19 to \$22 a carton, which is inadequate to cover the substantial cost of redevelopment. Marketers for this variety are working hard to get a more sustainable return for growers.

The apple industry in Nelson is now at a crossroads. Historically, the varieties in this region have been best suited to the European and American palate. However, in coming years MPI expects to see increased effort going into growing and marketing varieties which find favour in the more lucrative Asian markets.

There is also a trend towards larger and more vertically integrated businesses in the pipfruit and other related horticulture industries. Such businesses have the advantage of economies of scale and tend to have more advanced distribution and marketing networks.

The rise in new apple variety plantings in Nelson



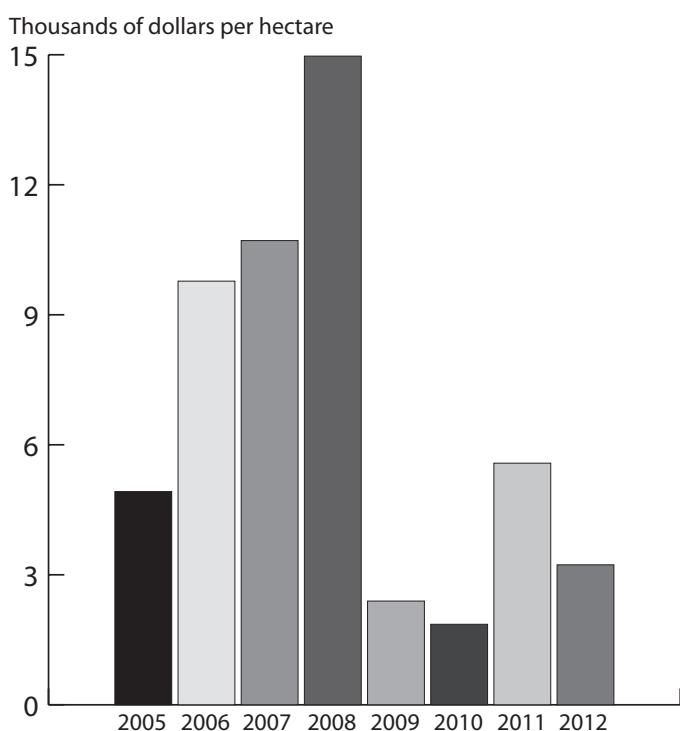
Sauvignon Blanc

Viticulture is the largest industry in Marlborough and lays claim to the two prime production locations in the country in the Wairau and the Awatere valleys. Marlborough usually accounts for about 70 per cent of New Zealand's total wine production.

The past decade has seen phenomenal growth in vineyard area and wine production, with a total of \$1.2 billion in wine exports in the year to 30 June 2012. This growth has mainly been due to demand for Marlborough Sauvignon Blanc. However, an unexpected surge in fruit volume, coupled with the economic recession of 2008, resulted in a significant correction to vineyard economics. A smaller 2012 vintage, due mainly to a cold spring affecting flowering, should help bring back some balance in the supply and demand equilibrium.

MPI has monitored the growth of this industry in Marlborough since 2004 through its viticulture monitoring programme. The graph shows the size of before-tax profit being made since 2005. Wineries have significantly reduced payments to contract growers and set targeted yields per hectare in line with softened international demand and the need to sell down large wine inventories. However, grower expectations of price paid per tonne for the 2013 vintage are more positive with better alignment between supply and demand.

Trends in Marlborough vineyard profit



The challenging times have had positive spin-offs, notably the shedding of discretionary expenditure in the vineyard. A particularly important innovation to help in

Grape plantings in the lower Awatere valley



reducing vineyard labour costs was the development of two locally designed mechanical grapevine strippers, branded under the names Klima and Langlois. They are particularly cost-effective for growers with larger vineyard areas as they can help spread the cost of the machine over greater total production.

Grape growers are also actively investigating alternative and potentially more environmentally friendly ways of growing grapes. A recently approved grant from the Sustainable Farming Fund is for a national organic focus vineyard project. This is in partnership with New Zealand Winegrowers, with one of the three focus vineyards in Marlborough. At each vineyard site, over a three-year period, an organic block is being compared to an adjacent conventional vineyard block growing the same varieties. Vine and soil health, harvest yields and vineyard operating costs will be compared.

Takaka dairying and water quality management

In 2004 it came as a surprise to farmers in the Aorere to learn that bacterial run-off from their pastures was affecting water quality in the river as well as the ability to harvest mussels in coastal marine farms. This led to farmer action and the formation of the Aorere catchment group in the Takaka region. Supported by the NZ Landcare Trust, the dairying group obtained a Sustainable Farming Fund grant to identify best steps for the Aorere to reduce negative environmental effects.

The dairy farming community agreed that they needed to reduce the levels of bacteria reaching the waterways, that the high rainfall environment presents a real challenge, and that their community was committed to protecting their environment and lifestyles. Working with scientists, the dairy farming community put together and implemented a plan to reduce bacteria leakage into the bay.

The shellfish industry managed to lessen the number of harvest days lost, with only wild weather restricting harvest. However, the risk is continuing and the Aorere catchment

group remains vigilant to protect the future of dairying in this region. Another positive result of this project is that other New Zealand catchments with a strong presence of dairying are learning from this community initiative.

Three main actions for the Aorere catchment are –

- Keep stock out of waterways

Every farm needs a plan to fence off waterways and use bridges to keep stock out of water and every paddock needs a water trough

- Adequate effluent storage

Every farm needs sufficient storage to prevent the need to irrigate to saturated soils which is easier if ponds are emptied in the dry times

- Low rate effluent application to land

Every farm needs to irrigate effluent to land at low rates to prevent run-off, with the bonus of an increase in the uptake of nutrients by grasses.

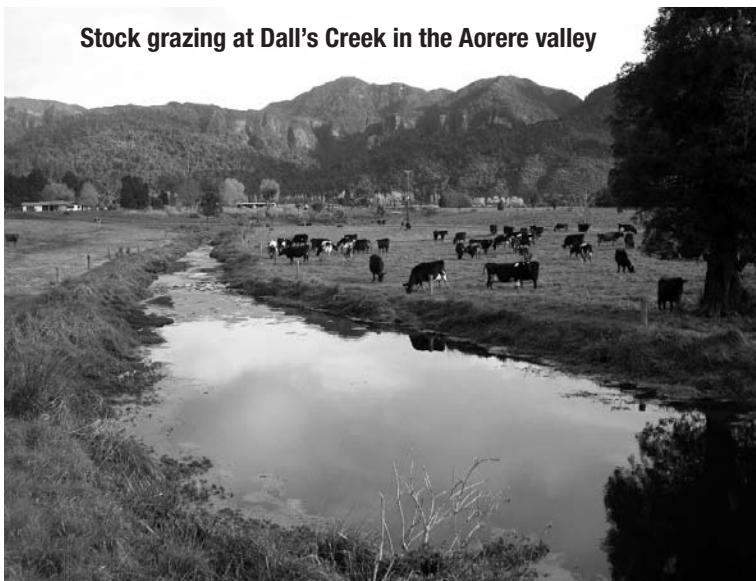
The best in Marlborough farming practice

The Starborough-Flaxbourne district on Marlborough's east coast has always been drought-prone, but years of rainfall well below the 570 mm district average was taking its toll on local land and those farming it. This district is known as one of the driest in the country. Westerly winds, and the traditional practice of grazing on hilly country, were leading to bare land and erosion.

Doug Avery of Bonavaree saw that his farm's financial, environmental and social viability was under threat. Repeated drought meant farming the property was no longer financially, environmentally or socially sustainable. He undertook some changes, and as a result, between 2004 and 2008, profitability on the Avery farm improved by more than 50 per cent despite 12 years of below average rainfall on their property.

The way of improving profits was to looking at old farm systems, especially the management of lucerne. A third of the farm has been converted to lucerne, with a crop rotation from annual fallow, to barley or annual grass, to fallow to

Stock grazing at Dall's Creek in the Aorere valley



Lucerne growing at Bonavaree



barley or annual grass and finally lucerne.

The family now farms to the strengths of the property, making the most of what the climate offers. Revenue, risk and recovery periods are identified and managed accordingly. Improved profitability means there is money to invest in restoring eroded hill country by planting saltbush and tagasaste, and protecting remnants of native vegetation. The work at Bonavaree has been shared with the local and farming community via a soil conservation project and hosting public field days.

Adding value to local timber

Forestry is a mature sector in the region where there are competitive advantages of a moderate climate, stable soils, a well-developed processing capability, and close proximity to port facilities in both Nelson and Picton. Forestry covers about 170,000 hectares and is dominated by radiata pine.

The industry cluster comprises two interwoven industries – panel and wood manufacturing, and logging. Panel and wood manufacturing is the larger of the two industries. There have been price increases recently as the global demand for wood products has increased. As there have not been any significant new plantings in the region, the sector's production should remain static over the next decade.

An example of adding value to the local industry is the Nelson Marlborough Institute of Technology's new arts and media building – the largest capital investment in the arts in this region. The building is a world first for both its timber earthquake-resistant design and as a unique laminated veneer lumber primary structure multi-storeyed building. It is sustainable, and local, with the design and resources all being sourced within 100 kilometres of Nelson.

The design resulted from a national design competition run as a partnership between MPI and the Nelson Marlborough Institute of Technology, with MPI providing \$1 million towards construction costs as the prize. The criteria was for a building which was sustainable, local and substantially made of wood. The building has become an important teaching tool during construction and beyond as engineers, architects, builders and the associated training providers are

The arts and media building



invited to assess the building to promote the use of wood in commercial construction.

Aquaculture an importer earner

The region is significant for New Zealand aquaculture, accounting for over two-thirds of greenshell mussel and king salmon production. This production originates from the Marlborough Sounds, although there is capacity for further greenshell mussel ventures in the Tasman region.



Cleaning mussel floats in Pelorus Sound

The aquaculture sector, with current sales estimated at \$400 million a year, has set itself a target of growing sales to \$1 billion in value by 2025. The growth required to meet this is based on a 10-point plan which aims to increase levels of production by developing new farming space while improving value from innovation and new markets.

The government supports sustainable aquaculture growth and recently released a strategy and five-year action plan which encourages the industry's aspirations to grow the sector sustainably. The strategy sets out how the government can support the growth ambitions established by the sector, complementing existing environmental and economic initiatives and upholding the obligations under the Treaty of Waitangi.

Conclusion

I have been involved with all of the projects outlined in this article. They are clear signs that creativity and innovation are alive and well in the back blocks of New Zealand. The MPI is focused on the success of our primary industries and is aware that we need to continue to enable similar innovations and growth, access for more New Zealand products into new offshore markets, increased sustainable resource use and lower biological risk.

Nick Dalgety is a Senior Policy Analyst in the Resource Policy Group of the Ministry for Primary Industries.

Anders Crofoot

Visit to China with the Food Agribusiness Market Experience programme



In early May I was part of a group of 14 Kiwis who went to China with FAME (Food Agribusiness Market Experience), a joint programme between Lincoln, Massey and Otago Universities. This was the fourth year FAME has been run following 2006, 2007 and 2009. The goal of the programme is to expose people involved with New Zealand agribusiness directly to our overseas markets, looking at a range of topics from production through to the supply chain and the physical markets

The participants had considerable diversity coming from dairy, sheep and beef, and academia. The mix of background made for stimulating discussions about what we saw. The trip was lead by Keith Woodward and Malcolm Cone from Lincoln who both have extensive experience in China.

We did a large circuit around China, arriving in Shanghai and then spending two or three days each in Beijing, Xining, Xian, Kunming and Guilin. In each location we had a mix of experiences from meeting with expat New Zealanders running businesses in China, Chinese officials and businessmen, and seeing the sights.

Modern china

One of the things that first struck me was how modern China has become. I grew up in the United States and my view of China had been stuck in the past – masses of people in their blue Mao uniforms. Walking around Shanghai and Beijing most people were dressed in western-style clothing and at a quick glance I could just as well have been in New York or London. Stores with western goods were everywhere – KFC, McDonalds, Haagen Daz and Apple.

In Shanghai we met with the Fonterra China Head of Strategy, Ming Guo, and learned about the company's operations in China. It became apparent that if Fonterra were not to introduce New Zealand know-how through the farms they were setting up, it would have a negative effect on their ability to operate in the long run. We also met with Colin Heads, Emborio Logistics, who has been helping businesses get their products into China with supply chain management.

Seeing the countryside

We took the bullet train, which can travel at speeds of 320 kilometres an hour, from Shanghai to Beijing and this was an opportunity to see a great deal of countryside. Its vastness became apparent as we saw fields of crops stretching off to the horizon. The pace of development was also obvious as we flashed by from town to town, each of which would have at least half a dozen new multi-storey apartment buildings under construction.

In Beijing we had the opportunity to visit Fonterra's recently opened farm at Yutian. Here they are milking 3,200 cows fully housed and fed. All dairy cows in China are fed on supplements, so that was not unusual, but there is a strong push to scale up from farming a few cows and aggregating the supply to larger production



units. The reason for this is food safety, as the Chinese feel that only larger organisations can afford to have processes in place that guarantee a safe food supply.

Business experience

One of the highlights of the trip for me was meeting with Jade Gray and John O'Loughlen, co-founders of Gung Ho Pizzas, a pizza delivery start-up. Delivering pizza in China is not the most obvious service to provide, but they are doing well with it. A big part of their business is training staff and they feel Gung Ho is all about attitude rather than pizza. In their training programme the first three weeks is about the company culture and learning life skills before even touching a pizza.

We also met David Mahon, a long-time investor who has many years of experience with businesses in China. His

view was that China's growth would be slower but still good at seven per cent for the next few years. However, managing expectations for increasing prosperity would be challenging for the government. We also met with some professors at the Chinese Academy of Sciences. They have excellent research capabilities, but there is not yet an imperative for getting that research into use.

As well as visiting the Forbidden City we also made the mandatory trek along the Great Wall. If anyone thinks we have challenging fencing conditions here in New Zealand they pale into insignificance with sections of this.

Yaks and sheep

We flew from Beijing to Xining on the edge of the Tibetan Plateau. We then made a trip out to the Hainan prefecture where we saw yaks and sheep being grazed. Four to five people looked after 200 yaks and 100 sheep. At high altitude and harsh climate they were not doing high production with about 70 per cent lambing and calving.



For meat a yak was worth about NZ\$900 at three years and sheep were sold to a feedlot at two years for about \$200. We visited a sheep feedlot which held about 1,000 head. They were fed a ration of corn, barley, vegetable oil residue and some hay. They came in at 45 to 50 kg live weight and were killed at 65 to 70 kg after about six months.

At an orchard we visited, one of the most impressive things was a hot-house of papaya. The hot-house was kept above 5°C through the winter without supplemental heat in spite of average winter night temperatures of -17°C going as low as -30°C. Outside they grew a variety of crops, including grapes and walnuts, and they specialised in a low sugar pear. We met officials from the prefecture where we learned about the region. It covered 370,000 square kilometres and was mainly agricultural and pastoral, ranging from wheat, fruit and flowers to fish, pigs, sheep, yaks and dairy.

Meetings

We also had a formal meeting with the leaders of the Provincial Division of Commerce of Qinghai and local

businessmen. Here, as well as learning about Qinghai, we had a very interesting session with local businessmen, learning about what they did and the sorts of opportunities there might be for New Zealand businesses. Among other things they would be quite keen on some New Zealand sharemilkers. Unfortunately from my perspective as a sheep farmer they saw New Zealand as a potential source of cheap sheep meat.

In Xian we started off with a very enjoyably bicycle ride along the ancient city wall and then visited the Terracotta Warriors. The next day we met Patrick Watene of Global Horticulture, a kiwifruit business, and saw their new packhouse, processing and research facility under construction. One of the really impressive things about the operation was that while they were doing well with packed kiwifruit, they also had a good line of juice which was allowing them to get a decent price for the lower grade fruit. They had quite a good pollen business so were involved at several levels of the industry.

Horticulture

In Kunming we met Lewis Dragger who is advising the Asian Red Pear Company. After visiting the research centre we toured around and saw various production systems for flowers, tobacco and other horticultural crops. The Yunnan province have generated about 70 per cent of their income from tobacco, but are trying to move into more flowers, fruit, rice and vegetables. We visited the Douman flower market where the lack of a cool chain means higher wastage and only about a one-week shelf-life.



In Guilin we were hosted by Dr Garth Smith of Biovittoria, who is building a business on the lou han fruit. The original market for the fruit is as a health product using an infusion of the dried fruit. The fruit has a molecule which has five glucose atoms that cannot be split off by the human digestive tract, so it is intensely sweet but has no calories. They have built an extraction plant and are working on developing markets.

They have also perfected a system of producing seedlings from tissue culture and have taken the seedling success rate from 30 per cent to 95 per cent. They also changed the production system from a perennial basis, where yields varied widely, to an annual planting which achieves 80 per cent of maximum perennial yield, but does it consistently every year. Their contracted suppliers receive a fixed price, which can return as much as 10 times what other traditional crops do.

Afforestation everywhere



A number of points occurred to me across many of the areas we visited. There were massive afforestation efforts going on as trees were being planted everywhere in great numbers. The plantings were partly to protect against the wind and dust storms, but also for amenity. New construction was going on all over, with new cities being built and new roads, even in rural areas. In Hunian a tunnel was being built to avoid the mountain pass which is 3,820 metres, higher than Mt Cook.

Although there were fields stretching to the horizon in the flatter areas, every bit of land was used. There were crops planted right up to the edges of the roads and in between highways. The terracing was very impressive. Most of the irrigation was flood-based, so even in the flatter country there were small terraces to control the flood irrigation. In the more mountainous terrain there were terraces starting at the edge of the streams and cutting up the hills and this allowed the growing of rice on hillsides.

In the regions that we visited, a great deal of agricultural work was still done on a small scale by hand. However, that is hard work and one of the reasons there is a huge migration to the cities. The combination of small land-holdings with flood irrigation – in many areas individual farmers would be farming less than a hectare – mechanisation may not be all that easy. The existing small terraces that provide the flood irrigation capability would inhibit the efficient use of large machinery.



Live there for better business

For me there were a number of take-home messages from the trip. There are significant opportunities as the Chinese are eager for ways to improve their life – although this has not always been the case. In earlier history, it was not interested in outside influence. Under Mao there was a system, which did not work out well for them.

However, today they recognise they have a great deal of catching up to do and are quite interested in picking up good ideas from wherever they can find them. They may not apply those ideas in a western way, but they will find advantages.

To be successful in business in China you need to be completely involved. For example, it is preferable to live there rather than make occasional visits. Lewis Dragger, who had been working between New Zealand and China for six years before he moved to Kunming, said he noticed a definite change in attitude towards him after he told people he was moving to China. Once he did this they placed more confidence in him.

The coastal regions have well-developed markets with a lot of competition. Look inland for better opportunities. There are plenty of cities of eight million people in China which provide ample opportunities.

China also covers a very large area, so it is best not to view it as a uniform market, rather a large array of different markets. Success will come from long-term relationships which benefit everyone, not one-off trades. This is probably good advice to doing business anywhere in the world.

Anders Crofoot manages Castlepoint Station in the Wairarapa

Tom Wilson

Shinmoe-dake eruption in Japan Implications for New Zealand agriculture



In November I travelled to Japan to assess the aftermath of the Mt Shinmoe-dake eruption of January and February 2011. This volcano is located on Kyushu, the southern-most of the three large islands that make up Japan. The purpose of the visit was to join a team from Risk Frontiers, MacQuarie University, looking at the effect of that eruption on Japan's agriculture, horticulture and critical infrastructure.

Risk Frontiers carries out work for the insurance industry on projects to estimate what the likely damage of volcanic ash fall could have on Tokyo city, and Tokyo prefecture, from future volcanic eruptions. Mt Fuji, the largest volcano near the capital, had a significant eruption in the late 1700s which affected the Tokyo region.

The work is also particularly relevant for New Zealand. The style and magnitude of the event, and the characteristics of the ash produced by this type of eruption, closely resemble those we know have occurred in the past from the cone volcanoes of Mt Taranaki, Mt Ruapehu and Tongariro. So the Shinmoe-dake eruption is a very useful analogue to see what the likely effects and management challenges are from such an event.

- The main effects of an ash fall on both urban and rural areas are –
- The difficulty in cleaning up roads in urban and rural areas for example with hard pavements it is not easy to wash the ash away
 - The disruption to transport including aviation, ground traffic and rail
 - Health issues as the ash can exacerbate respiratory diseases, contaminate food and water sources as well as cause problems for animals including starvation, respiratory issues and eye irritation.

Effect on agriculture and horticulture

The 2011 Shinmoe-dake eruption produced ash with approximately 57 to 62 per cent silica content which geologists call an andesite. This is similar to the type of ash produced during the Ruapehu eruptions of 1995 and 1996. Ash fall was dispersed in nearly all directions around the Shinmoe-dake volcano, due to the changing wind direction during the eruption. We observed a broad range of agricultural and horticultural operations affected by the ash fall.

In areas close to the volcano there is mainly pastoral farming, although not in the way we think of it. The rolling hill country produces fodder as oats and rye grasses which is fed to cows which are kept in barns all year around. Further from the event is mixed horticultural farming, including tea and various leafy green vegetables such as spinach and cabbage.

Crops affected

A main observation was that different crops were affected by ash fall very differently. Tea crops experienced minimal problems as they were not being harvested at the time and spray machines could be used to wash ash off the plants. The winter harvest of

Some of the larger ash pieces – ballistics



ground crops was more problematic. Spinach crops suffered acidic burns, UV deficiency and dehydration from the ash.

In areas where ash fall was greater than five centimetres, it had the potential to mechanically break or smother crops. Leafy vegetable crops were the hardest hit. Ash contaminated crops, even when cleaned, lost significant market value. Many crops were composted or fed to animals leading to substantial losses in that part of the local economy.

One good factor is that the eruption occurred in the northern hemisphere winter. This was when most crops other than spinach had not yet been planted and were not

in flower, so vulnerability was low. If it had happened in the southern hemisphere at the same time, it is probable there would have been more considerable effects for the agricultural and horticultural sector.

Effects on soil

Another important factor was the thin ash fall. Few farms received more than 10 cm of ash fall, and most had less than 5 cm. This was not the massive and catastrophic effect of the half metre ash fall that occurred when the Puyehue-Cordon Caulle volcano erupted in northern Patagonia in June 2011. Not only was the Shinmoe-dake ash thinner than the later South American event, it was coarser-grained. Being andesitic, when it erupted it was less explosive and had less force. This meant there was not so much fragmentation of the ash, resulting in a more coarse-grained material like sand, and because of this it did not adhere to crops so readily.

However, this did have implications for the soil. When there was 5 cm of ash or less it was recommended that farmers cultivate or mix the ash into their soils – usually by rotary hoe. However for areas with 5 cm or more, it was recommended that the ash be removed from the soil's surface. This was because the coarse-grained ash reduced the cation exchange capacity and water holding capacity of the soil, reducing its overall fertility. It was also recommended that ash be mixed with cow manure to maintain cation exchange capacity levels.



Cleaning up the ash

Acidic ash

Another problem was that the ash is acidic due to a thin soluble film of acidic minerals deposited on the ash particles during the eruption process. This reduced soil pH levels, prompting the Japanese authorities to recommend the application of magnesium and calcium-based lime on the soil at the rate of about one tonne per hectare. In the case of rice paddies, where ash could not be removed, it was recommended to add an iron-based fertiliser which helped in removing the hydrogen sulphide being produced by the ash. Again this appeared to be successful, and the implementation of both these recommendations was helped by government subsidies.

At the time of the eruption there were significant fears of a massive effect on agriculture – on the soil, crops and animals. One factor was the rapid analysis of the ash's composition and the effect it had on agricultural soils using recognised scientific methods. This could then be communicated to affected producers so that mitigation and clean-up strategies could begin immediately.

Livestock and greenhouses

In Japan most livestock is housed in barns so the animals were not directly exposed to the ash. However, there were still problems for those close to the volcano as fodder crops such as hay and oats became contaminated by the ash fall. While some fodder could be cleaned with a good shake and washing it was time-consuming and resource-intensive to do this. Supplementary feed was brought in, which averted starvation or the slaughter of animals.

Another eruption issue which was unsettling for livestock was that some farms close to the volcano experienced ballistics for up to a week after the event. A ballistic is defined as any material from the eruption over 6.4 cm in diameter, and these small rocks can punch through tin roofs and windows. Apart from the effect on buildings, they are very unsettling for both people and livestock. Due to stress, dairy herds experienced less weight gain and low milk output during the eruption and its aftermath.



Cleaning ash from greenhouses

There are thousands of hectares of greenhouses in Japan. They were initially thought to be a good method of farming in volcanic areas as they keep the ash off the crops. However they can also be problematic if the ash fall is so heavy that the greenhouse itself collapses or blocks sunlight to the plants inside. This did in fact happen after the Shinmoe-dake eruption, requiring a significant cleaning operation. This was time and resource-consuming and there was not enough local labour available to clean the ash from the greenhouses.

One additional consequence has been that farmers have had to take some land out of production to store the ash which is undesirable in the intensively farmed area. The prefecture has had to undertake a large ash clean-up programme in both rural and urban areas. It again highlighted that disaster waste is a significant problem in a post-eruption environment, just as the liquefaction and building waste was after the recent Canterbury earthquakes.

Lessons for New Zealand

The main message from our trip to Japan is that these events are survivable as long as farmers and agencies undertake the correct management strategies. Ten months after the eruption from Shinmoe-dake, we could barely see the signs of the eruption on most farms. However, the economic effect had been significant.



Trips like this allow us to develop guidelines and recommendations for the agricultural and horticultural sectors to use to prepare for, and respond to, a volcanic eruption. One of the lessons for New Zealand is the early analysis of ash characteristics and soil fertility response to ash deposition and mixing.

Carefully assessing effects on crops and livestock will also help both sectors successfully manage their operations through to the other side of such an event. This is currently under way with research programmes at the University of Canterbury, Massey University and GNS Science.

Tom Wilson is a lecturer in Hazard and Disaster Management at the Department of Geological Sciences, University of Canterbury.

John Walley

The Dutch disease

The term Dutch disease shows up in economic discussions. It relates to the effect of a particularly dominant sector crowding out other areas of the economy, then leading to problems if this sector becomes less profitable or obsolete.



In the Dutch case it refers to the effect of North Sea gas on the guilder, the Dutch currency before the euro. The large returns brought in by the gas industry caused the Dutch exchange rate to rise and increased the cost of labour and services, as the gas industry demanded more of these inputs and could pay higher prices to get them. The higher costs of labour and business services, along with the drop in revenue from a higher exchange rate, crowded out other Dutch export industries.

The Dutch disease has had a number of strains. In Australia the mining sector has caused problems for the rest of the economy. Labour costs in West Australia are climbing and, more generally, so is the Australian dollar. The government has responded to this by targeting taxes at the mining sector.

The New Zealand version

In New Zealand it has been mainly milk which has driven the New Zealand dollar up, with the same effect on the wider export sector. Between 2007 and 2011, export sales by companies selling more than \$25 million – 176 companies in 2007 and 230 in 2011 – increased by about 40 per cent. For all other exporters – 12,523 in 2007 and 12,205 in 2011 – the increase was less than two per cent. Our broader export sector is failing.

It is positive that New Zealand has Dutch disease based on a renewable resource. However the downside is that primary production generally produces low-margin returns and requires a substantial asset base. New Zealand farmers are more property developers than producers. All the margin from a farm must service debt to the point where an owner sells out, collecting a tax-free gain. In fact, without such a tax concession, farming would hardly be a viable proposition.

Low margin business

A typical dairy farm in 2010/2011 carried approximately \$6.1 million of assets, \$2.5 million of debt, had sales of \$1,046 million, paid \$80,000 in wages and around

	General manufacture	Dairy farm	Software company
Sales	\$10,000,000	\$1,046,000	\$1,500,000
Capital employed	\$3,000,000	\$6,100,000	\$50,000
Research and development spend	\$1,000,000	\$0	\$300,000
Jobs	80	2.6	6
Associated jobs	2.9 times	0.9 times	1.6 times
Exports	50 to 90 per cent	Over 90 per cent	95 per cent

\$36,000 in tax. Interest payments ran at \$185,000.

A software business with double the revenue would have no debt, \$100,000 of assets, pay \$600,000 in wages and \$100,000 in tax. The New Zealand version of the Dutch disease has made us poor – farming is generally a low-margin business so there are few spill-over benefits to the wider economy.

The consequences

What does this mean when the financial sector is generally attracted to low-risk ventures? The software business exists in a competitive environment, has few assets and is therefore much less attractive as a lending proposition than a tax advantaged, asset-backed farm in spite of the cash flow differences.

It is worth noting that the Australian banks soak up interest payments many times more than the tax paid to the New Zealand tax authorities on the average dairy farm. Spot the long-term threat there? More broadly, this debt bias in the New Zealand economy means that in most years, the banking segment of the NZX top 50 companies earns more than the remaining top 50 companies put together. Is that not a worry?

The macroeconomic settings which support low revenue-to-asset ratios such as farms are poison to activities which have high revenue-to-asset ratios such as manufacturing and software companies. Wildly fluctuating, over-priced exchange rates rob revenue rich companies of margin, which is desperately needed to fuel experimentation and fund creative failure.

A similar difficulty arises between resource-based activities such as fish, farms, forestry and mining, and competition-based activities such as manufacturing, software and intellectual activity. For resource-based firms the return is a function of demand, but for competition-based industries return is a function of the lowest priced viable competitor. Again the macroeconomic settings that favour resource-based activity are poison to competitive activity.

The policy settings we have now are fatal to innovation. New Zealand's macroeconomic policy framework has featherbedded high-debt, low-revenue, low-wage activities and the effect is in our economic performance. In spite of lip service to the knowledge economy and high-value activity, our policy choices demonstrate our true values.

What others do

What have others done? We have seen sovereign wealth funds in Norway to inoculate against their version of Dutch disease, and windfall taxes on the mining industry in Australia. Such solutions are not available to New Zealand because farming is not sufficiently profitable to help compensate the rest of the economy against what flows from their success.

As individuals, and as a nation, when we spend more than we earn, we must balance our current account with savings, debt or selling things. Selling things reduces income, savings run out and the capacity to borrow is not eternal. Sooner or later the cost of debt, existing and new, escalates and borrowing capacity evaporates. Look to Greece or Spain for their problems. The only way forward is to earn more and this needs a number of fundamental changes to the way we do things – for innovation to save us we have to deal with our Dutch disease.

Policy changes

If we are to improve we have to make changes in policy. We need to balance the economy and earn more by –

- Removing tax harbours on land and buildings
- Managing the exchange rate
- Matching productive incentives elsewhere.

We also need to balance the current account spending less and spending in a better way by –

- Improving savings
- Dealing with intergenerational issues such as eligibility for National Superannuation
- Lowering and broadening the tax take.

For our economy to grow in a balanced way, fiscal policy must be even-handed – tax harbours around capital gains have to be removed. A targeted mix of prudential and interest rate controls are needed for the Reserve Bank, supporting a currency management regime which controls the currency within an undisclosed band, similar to the Singaporean approach. This would support the real economy, creating a back-drop for the growth of high-wage, high-value competitive activity, not asset-based speculation.

The current account should be the focus of new government policy. A balanced or positive current account can be achieved by increasing export earnings and reducing spending, but these two factors cannot be considered in isolation. For example, the current government scrapped the research and development tax credit in 2008 to cut costs. But this also had a negative effect on our high-value export firms, those which are desperately needed to increase New Zealand's export incomes. Cost-cutting needs to be done in the non-productive areas of the economy while there is still value in investing in the productive economy despite debt pressures.

Policy changes to manage currency movements, tax asset gains, incentivise productive investment and cut unnecessary costs have been proved elsewhere. Policy changes are clear – what is missing is the will to fix our Dutch disease.

John Walley is Chief Executive of the NZ Manufacturers and Exporters Association.





Onur Oktem

Efficient pastoral production

New Zealand farmers are using less and less labour to produce a kilogram of milk or meat than they were a decade ago. This is one finding from an investigation of input and output trends in pastoral farming undertaken by the Ministry for Primary Industries' Strategy (Policy) team. They used select physical inputs and outputs to give a picture of dairy and dry stock farmers as managers of these resources. The report sheds light on intensification in New Zealand pastoral farming and the relationship with productivity.

When people talk about intensification of farming, they tend to refer to increasing animal numbers and fertiliser use per hectare. But in practice, the investigation has shown these measures seem too simplistic to capture how pastoral farm management is changing. Farming has become increasingly sophisticated, and the data and analysis need to be sophisticated as well.

The team used statistics from a range of sources including Statistics New Zealand, the Reserve Bank, the Livestock Improvement Corporation and the Beef and Lamb Economic Service. The available data was limited in some respects. For example, it was only possible to take the analysis back to 2002, and in some cases new ways were needed to analyse the data.

Production landscape

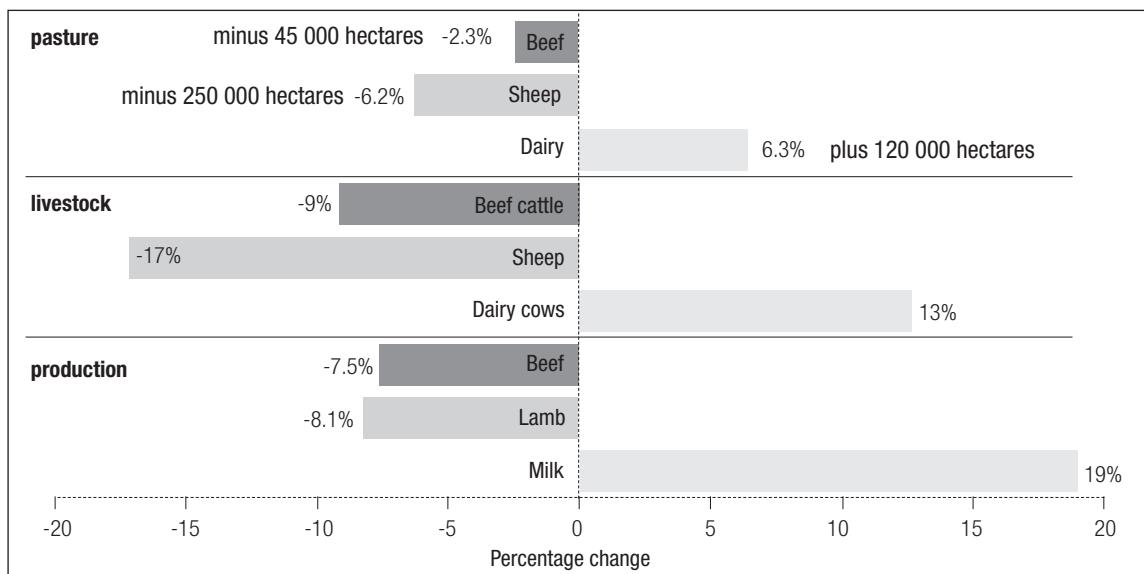
Figures show that sheep and beef farming continues to be the dominant agricultural land use in New Zealand, occupying more than four times the area used by dairying, the second largest. At the same time, there has been a noticeable move to dairying. Overall, the total area of improved pasture dropped by about 160,000 hectares in the years between 2002 and 2009.

Land losses from sheep farming of approximately 240,000 hectares, and beef farming of approximately 45,000 hectares over this period, were partially offset by land gains to dairying of approximately 120,000 hectares. It is probable that the overall loss of improved pasture is due to a mix of more use of land for urban development and arable farming.

Many pastoral farms are used for multiple farming activities, and the data showed that dairy support activity has been increasingly on properties not classed as dairy farms. For example, the number of dairy cows being run on sheep and beef properties increased by 44 per cent between 2002 and 2009. The pastoral farming landscape is becoming more dynamic and sophisticated.

The MPI team calculated numbers of animals being run on pastoral farms, allowing for factors such as dairy animals being run on other farm types for periods of time. The estimate for the average number of dairy cattle run per hectare increased by about five per cent between 2002 and 2009. During the same period, the average number of sheep run per hectare decreased by about 11 per cent and beef cattle decreased by eight per cent, while average beef and lamb production per hectare went down slightly.

Summary of pastoral production trends



The decline in sheep and beef farming in terms of land area, animal numbers and production per hectare may reflect the particular effect of extreme weather on these sectors through the period being investigated. It is also likely that the expansion of dairy and dairy support has occurred on better quality and typically flatter land. This pushed sheep and beef farming on to harder land where achieving higher production is more challenging and which may in turn be more vulnerable to drying out or floods.

Annual production of milk solids has gone up by about 19 per cent. Annual beef and lamb production each declined by about seven to eight per cent between 2002 and 2009.

Trend analysis

The second part of the analysis considers trends during 2002 to 2009 in the use of several main inputs as changes in use per hectare and for levels of outputs produced. The analysis has focused on the application of nitrogen, phosphate and potassium fertilisers, along with labour and capital measured as debt.

Fertiliser

Fertiliser is a critical input for the production of feed. In New Zealand, this feed has traditionally consisted of ryegrass and clover pastures, but farmers are increasing the diversity of feed, including the use of forage crops, maize silage and palm kernel expeller. Over the past 50 years the use of fertiliser has increased, particularly the application of nitrogen fertiliser between 1990 and 2004.

In almost all cases, fertiliser use per hectare fell between 2002 and 2009. For sheep and beef farms, average per hectare use of all three fertilisers dropped by between 37 per cent and 47 per cent over this period. Dairy farms used, on average, 27 per cent less phosphate and 38 per cent less potassium per hectare. The only exception to this trend has been nitrogen use on dairy farms, where there was a slight increase of about one per cent per hectare from 2002 to 2009.

This is also reflected in the average amount of fertiliser

applied per kilogram of output produced by these farm types. From 2002 to 2009, the average kilogram of milk solids has been produced with about two per cent more nitrogen but 25 per cent less phosphorus and 36 per cent less potassium. The trends for lamb and beef are broadly similar to each other, with an average kilogram of each having been produced in 2009 with 43 to 44 per cent less nitrogen, 48 to 50 per cent less phosphorus and 39 to 42 per cent less potassium than in 2002.

There are a number of reasons why fertiliser trends may have arisen. One factor is likely to be changing economic conditions during this period, as levels of fertiliser use may partially reflect the tendency of farmers to treat it as a discretionary item to be applied only when finances allow. According to a recent sector update from Fert Research, there has been a noticeable upswing in the application of all three fertilisers since 2009 as farm returns have improved.

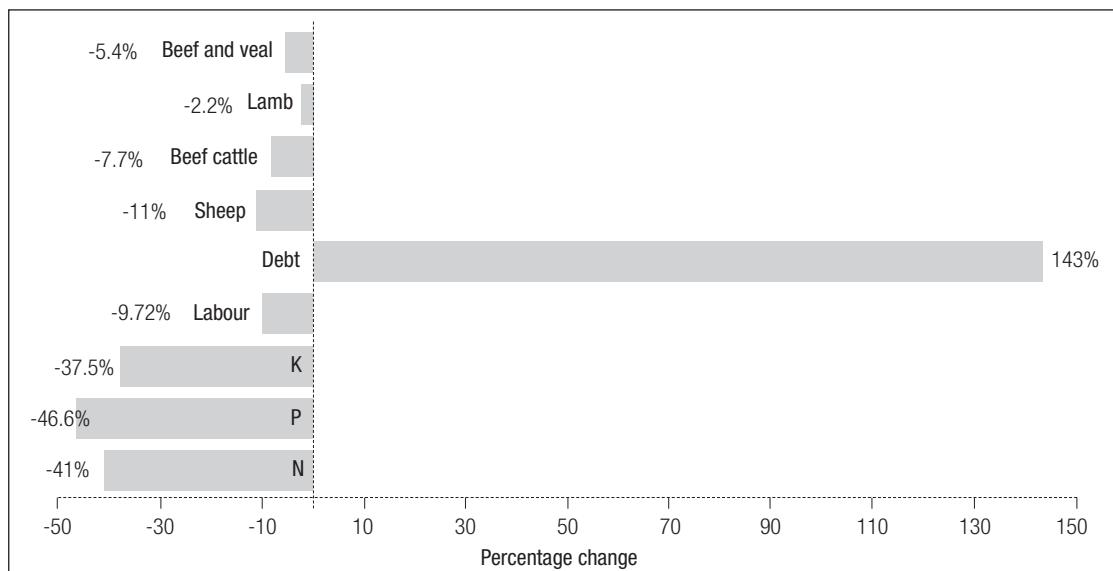
The decline in application of phosphate and potassium fertilisers may be concerning from a longer-term perspective, as phosphate and potassium persist in the soil and there is a lag between application or lack of application, and when effects on soil fertility become evident.

However, on the other hand, farmers have adopted more sophisticated management of effluent and now use more bought-in feed, both of which introduce or re-introduce a range of nutrients to the farm system. It is also possible that the rising uptake of nutrient budgeting technologies such as Overseer, particularly in the dairy industry, may reflect the increasing use of best practice and efficient and targeted application.

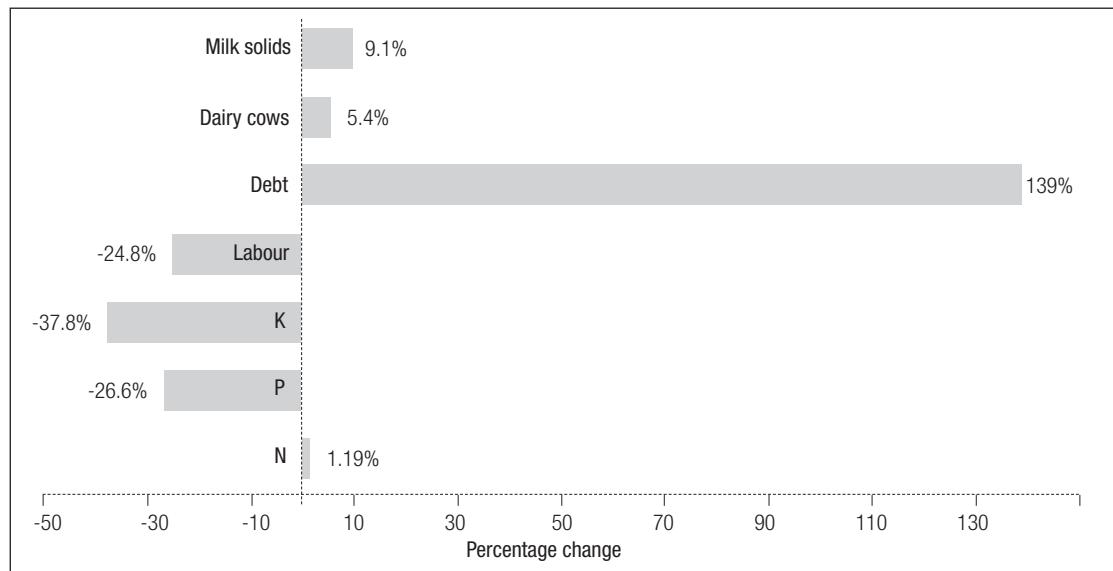
Labour

Labour is another important farm input. Between 2002 and 2009, the labour used for each hectare and for each unit of production decreased significantly on all types of pastoral farms, indicating efficiency gains in farm management. This resulted from practices such as increasing automation of milking sheds.

Changes in inputs and outputs on sheep-beef land



Changes in inputs and outputs on dairy land



During this period dairy farms used 25 per cent less labour per hectare, with sheep and beef farms 10 per cent less. The labour required to produce one kilogram of milk solids and one kilogram of meat has decreased by 18 per cent and 16 per cent, respectively. The labour trends across the dairy, sheep and beef sectors suggest that each individual working on a farm is responsible on average for more land, and the land they are managing produces more.

Capital

Debt data was used as a proxy for the input of capital to pastoral farms. Between 2003 and 2009, total debt per hectare increased 139 per cent for dairy and 143 per cent for sheep and beef. Total debt per kilogram of output increased 143 per cent for dairy and 132 per cent for sheep and beef. Overall, the dairy debt ratio is much higher than in the sheep-beef industry, but the latter industry's estimated debt ratio appears to be growing faster.

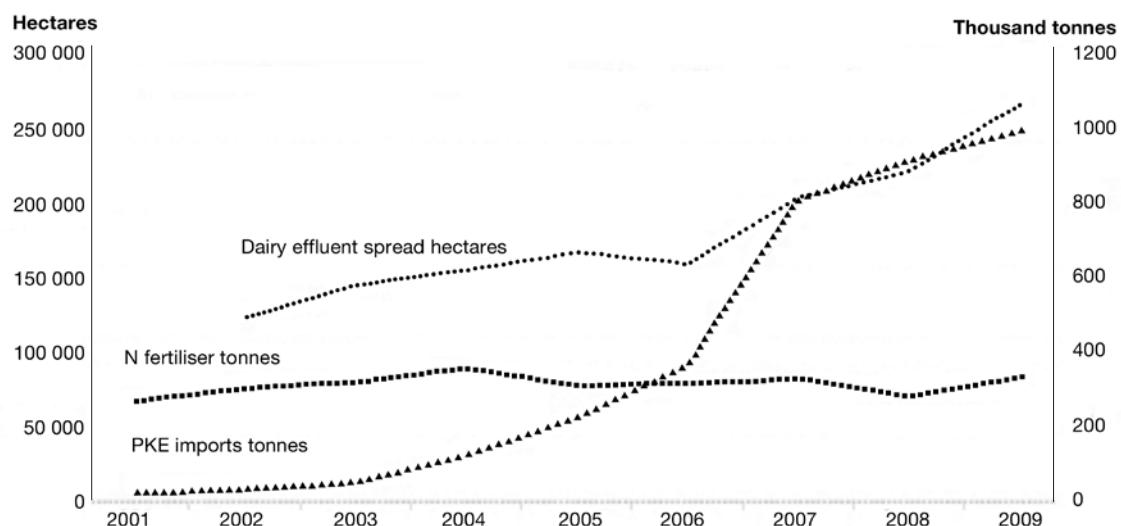
Intensified pastoral land use?

Intensification of pastoral farming is an important parameter for considering performance of farmers as managers of their resources, although it is difficult to define. It is commonly taken to refer to increasing animal numbers per hectare, usually coupled with increasing output. In practice, however, these measures seem too simplistic to capture the essence of how pastoral farm management has changed.

The management of pastoral farms has become much more sophisticated, for example, with the increasing use of practices such as palm kernel, winter grazing, feed pads and effluent management. The success of these practices contributes to increasing intensity, particularly on the milking platform where milk production occurs.

Unfortunately, there is no available data which would enable us to examine in more detail how the composition of dairy cow diets are changing. For example, the percentage

Nitrogen inputs on dairy farms



of their diets which comes from pasture, silage and other types of supplements.

We can still observe some interesting trends. Our calculations indicated an increase in land area used for dairying, including support, of approximately six per cent from 2002 to 2009, with total dairy cows per hectare increasing by two per cent. The milking platform rose by only four per cent between 2002 and 2009, and yet the lactating cows per hectare of the milking platform went up by about eight per cent over that time. In addition, while milk solids for the total estimated dairying area increased by approximately nine per cent, milk solids per hectare of milking platform went up by 12 per cent.

Changing management practices on dairy farms are also having an effect on the management of sheep and beef properties with the development of dairy support activities. The data above indicates that the number of sheep and beef animals, labour use and fertiliser application per hectare have decreased from 2002 to 2009. However, sheep and beef properties have been supporting increasing numbers of dairy cows, particularly since 2006.

Between 2002 and 2009, the number of total dairy cows being run on sheep and beef properties increased by 44 per cent. In addition, some land on sheep and beef properties is used for growing supplementary crops used by the dairy industry. All of this together suggests an increasing sophistication of management of dairy and of sheep and beef farms.

More productivity?

The companion question to intensification relates to productivity. In all cases, it took fewer animals and less labour to produce one kilogram of milk, beef or lamb during the period investigated. The overall amount of land used for beef and lamb production went down over this period, but the production of beef and lamb decreased even faster. On a per kilogram basis, beef and lamb production required more land.

For dairy, sheep and beef farming the amount of debt farmers have taken on has increased dramatically. It is important to remember, however, that some extreme weather

over this period, especially the 2008 nationwide drought, led to reductions in stock numbers and production. This has affected the overall trends from 2002 to 2009, particularly due to the short length of the time involved.

On the dairy side, an eight per cent overall reduction in the area of land that it takes to produce a kilogram of milk solids is significant. The reduction has probably been achieved by a combination of improved animal and forage genetics, better pasture management and animal health, as well as irrigation and supplementary feed.

Debt trends

The debt trends for dairy, sheep and beef farming are concerning. There are likely to be different causes in different sub-sectors. In dairying, which has performed strongly over this period, factors such as the price of land, Fonterra's share price and expectations of future product prices have influenced farm debt. Investment in other forms of capital is also likely to have had an effect. Moreover, the increase in land area under dairying indicates a higher level of conversion to dairy farming, which usually requires significant investment.

The sheep and beef sectors have had a difficult spell over this time. Their debt figures reflect low returns and the need to borrow on equity to stay in business, usually off the back of historically strong balance sheets.

Conclusions

The available data meant that it was only possible to generate trends over a period of eight years, which is not a very long time. This data cannot tell us much about why these trends have occurred and where they are likely to go in the future. We have little evidence about the quality of the inputs going into pastoral farms and of the management of these inputs.

However, it is clear that the pastoral landscape is continuing to become more dynamic. A wider question remains – which is very relevant to groups like farm consultants, investors and policy-makers. How are the trends and progress of these sectors to be monitored in future?

Onur Oktem is a policy analyst for the Ministry for Primary Industries

Tegan Jones

Synlait – making more from milk



Based in the heart of Canterbury, Synlait Milk is an innovative dairy processing company which combines expert farming with state-of-the-art processing to produce a range of nutritional milk products. The company was founded so that global consumers were able to access the best that New Zealand dairying has to offer.

Synlait Milk is a business-to-business company producing finished formulated dairy powders and a range of high specification milk powders as ingredients and for home consumption. The name Synlait comes from synergy and milk, and the idea of making more from milk. This has been the company's mission statement from the start. It is about helping farmers make more from it and helping customers make more from it.

Ten years of progress

The company grew out of a farming business established 10 years ago. Back then, Synlait's first commercial project was the purchase and development of 950 hectares that became Robindale dairies. Over two years the Canterbury farm quickly grew and operated for several years as one of the largest and most innovative of its kind in New Zealand. By 2005, Synlait owned eight farms and had the cornerstone block of milk supply for which they had been aiming to establish in milk processing.

The early thinking came from the realisation they were in a recently deregulated industry, and there were opportunities for new companies with a focus on particular opportunities. The main opportunity was adding value to milk in an industry that had commoditised high quality raw milk.

In 2006, Synlait had multiple farms, a farm development company, a farm



management company and advanced plans to develop Synlait Milk. However, each part of the business had a different ownership and operated as separate businesses. In that year the farms and the other parts of the business were amalgamated under the one company, Synlait Limited. To help fund growth plans in 2007, the new company sold its shares in Fonterra and raised \$30 million additional capital from Mitsui of Japan, who remain a shareholder today.

The new plant

In August 2008, Synlait processed its first milk in its new manufacturing plant. Success in contracting milk from third party suppliers meant an extension of the processing plant was viable, enabling the manufacture of skim milk powder and butter oil. This was completed shortly after the plant was commissioned. The size of the manufacturing operation quickly dominated the Synlait business.

By 2009, the first manufacturing plant was operating at capacity and a second small-scale spray drier had been built to accelerate the development and production of low volume high value products. This gave Synlait the capability of producing between 1,000 and 2,000 tonnes a year of formulated milk products, premium quality colostrum powders, hyper-immune powder and other high value dairy products. This was in addition to the production of 45,000 tonnes a year of ingredient milk powders.

By 2010, Synlait had established relationships with target customers and developed capability in spray drying and milk powder technology. Many of Synlait's early customers were using their ingredients for infant formula manufacture, attracted by the quality of the company's milk supply, modern plant, and food safety systems. This helped Synlait develop a strategy of moving beyond ingredients to become a global supplier of nutritional milk powders. Making this step required significant further investment.

Investment

In 2010, Bright Dairy of China invested \$81 million to fund the development of an important infant formula facility. This



was to become the largest and most sophisticated purpose-built infant formula facility in the southern hemisphere. In 2011, Synlait processed its first milk through this \$100 million plant which is capable of producing 40,000 tonnes of finished infant formula annually.

At the time of the investment in 2010, Synlait separated the farming business Synlait Farms Limited from the milk processing business Synlait Milk Limited. Juliet Maclean, one of the original founders of Synlait Limited, took over the reins of Synlait Farms as the company's CEO. John Penno continued as CEO of Synlait Milk.

Today, Synlait Farms operates 4,500 hectares of land and milks 13,500 cows on 14 farms. All milk produced by Synlait Farms is supplied to Synlait Milk. The two companies continue to work closely together in developing special milk products which require innovative on-farm practices to determine the final composition of milk required in the special milk products.

Synlait also now makes infant formula and value-added milk powder ingredients. It processes more than 550 million litres of milk a year from which 95,000 tonnes of milk powder is produced. It gets the milk from around 150 farms, employs over 130 staff and has expected revenue of \$400



million for the 2012 financial year. It has grown to become one of Canterbury's largest exporters with customers in over 50 countries, its main markets being Asia, North Africa and the Middle East.

In the future, Synlait Milk is looking to carve a larger slice of the nutritional business, while maintaining its market share of the value-added ingredients business. They are looking to increase the production of nutritional products, the most sophisticated end of dairy processing, making it from formulas with demanding specifications.

Ingredients are important

In New Zealand and around the world, there is a trend towards consumers paying closer attention to the ingredients in their food and beverages and trying to practice a healthier lifestyle. The future of Synlait Milk lies in capitalising on that trend. They expect nutritional revenues to grow five per cent to be about half of the company's revenues over the next five years.

The growth of Synlait's nutritional business is due to their ability to increase the volume and quickly move from a commodity to high-value market products. This is built on investment in the right people, plant and supply base, and from a reputation for manufacturing the products to standards above those set by the world leaders in each category.

In addition to developing tailor-made products, Synlait Milk works closely with customers to develop high-end products. These will create value for the company and the customers and will also bring value back to the farmer suppliers. Over the coming year Synlait Milk will develop their partnership model with on-farm systems which will produce more value for their milk suppliers and their customers in the market.

Top for safety

Synlait Milk's team ensure that all tailor-made products and value-added milk powder ingredients exceed internationally recognised food safety standards. They also work very closely with milk suppliers to ensure they produce top quality milk, and to provide training programmes and access to on-farm expertise in areas such as environmental management.

In terms of minimising environmental effects on the farm, Synlait were the first to introduce financial penalties for non-compliance. If Synlait find suppliers are not meeting the standards, they will work with them to help make the changes.

That commitment to environmental best practice applies to every link in the company's supply chain. For example, Synlait Milk's waste water is carefully treated and goes on to be re-used in the farming system. Waste water is not applied to non-productive land but irrigated on to high performance dairy farms. The company does this because it is the right thing to do in terms of sustaining the planet's natural resources, and because there are efficiency gains as a result. So there is a practical element to it as well.

Innovative and nimble

Internally, Synlait Milk has a fast-growing entrepreneurial culture with strong business disciplines around everything they do. The culture is defined as being fast-moving, innovative and nimble.

Synlait Milk has put as much focus into building a very capable team as they have into building a dairy processing plant. A culture of innovation, excellence and leadership is developing which is reflected in their staff, all of whom have extensive experience across all areas of their supply chain. This includes farming and farm management, manufacturing and product development, all the way through to sales and customer service. This wealth of expertise ensures Synlait Milk is offering customers the best service and quality.

Synlait Milk's success has not gone unnoticed.

- Synlait made the Deloitte Fast 50 for four consecutive years
- In 2008, the company was awarded the Fastest Growing New Entrant (Canterbury and Upper South Island), Fastest Growing Employer and Third Fastest Growing Company in New Zealand on the index
- In 2009, they were awarded the Fastest Growing Manufacturer (Canterbury and South Island)
- It was also awarded the Canterbury Large Emerging Exporter of the Year in the Air New Zealand Cargo, Canterbury Export Awards
- In 2010, the index ranked Synlait Milk as the twelfth fastest growing company
- In 2012, it was awarded the Agri-Business Award in the Sensational Selwyn Awards, which recognises business excellence in the Selwyn District.

Industry best practice

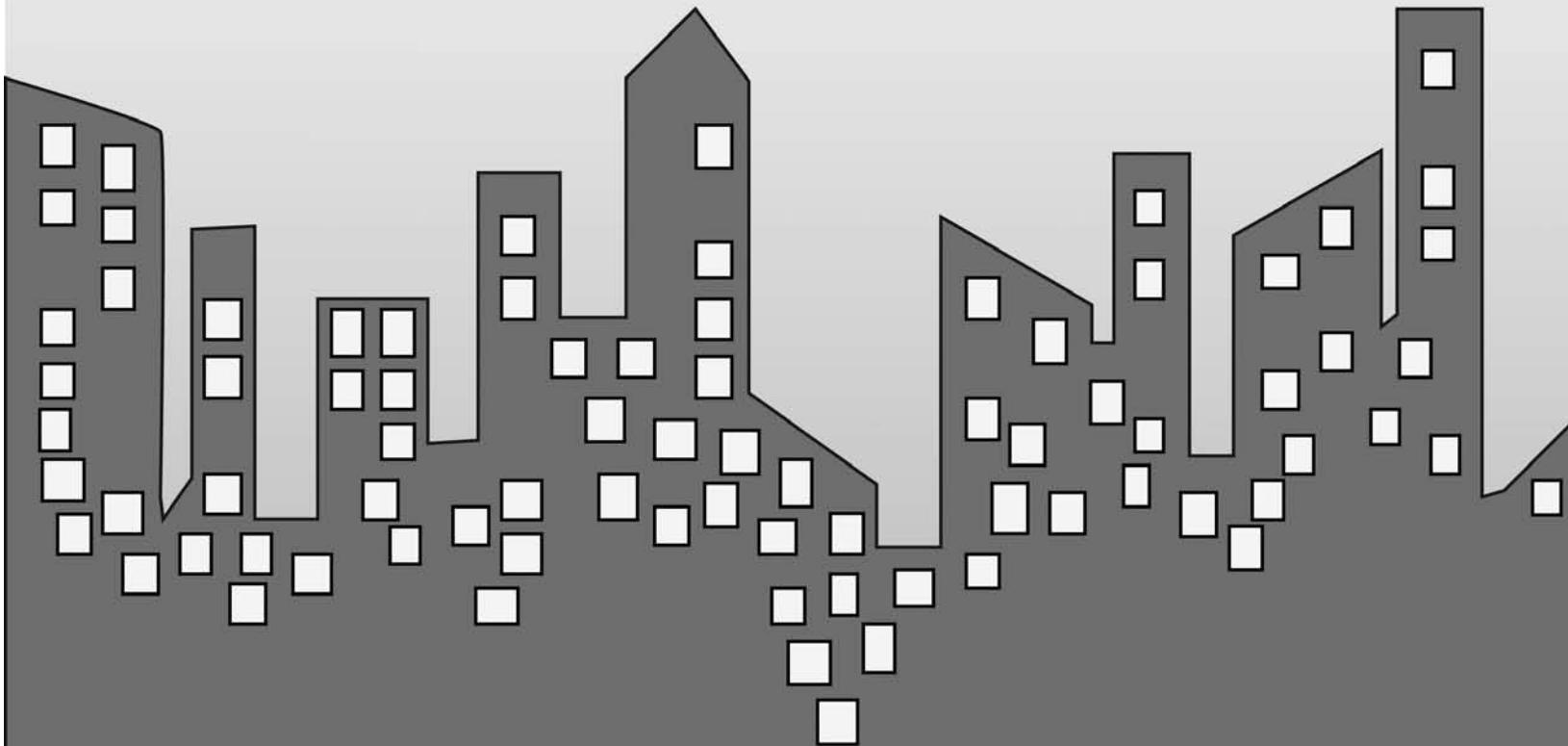
With so much achieved in a short time you would understand if the organisation looked to consolidate where they are today. However, there are big plans and goals for the future. The company's mission statement is 'making more from milk', and there is a strategy to continue to grow volume and value with an investment programme mapped out for the next five years. All investment has the aim of Synlait becoming a trusted supplier of choice for the world's best milk-based health and nutrition companies which is central to the current strategic plan.

To achieve their goals, Synlait Milk will look to grow its nutritional business, maintain its grasp on the ingredients market and aim to set operational excellence across every part of its operation. They want to be recognised as setting industry best practice enabling them to become the supplier of choice for target customers, the processor of choice for New Zealand dairy farmers, and the partner of choice for innovation in dairy. In its short company history, Synlait Milk has moved from a dairy operation, to global dairy processor, to a future where they aim to be recognised as the world's most trusted and innovative milk powder brand.

Tegan Jones is the Marketing and Communications Advisor at Synlait Milk Ltd.



Land Professionals Mutual Society
Risk Management



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