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The Official Publication of The New Zealand Institute of Primary Industry Management Incorporated

DAIRY FARMING OWNERSHIP STRUCTURES EXTENSION NEEDS OF SMALL FARMERS
RETAINING SKILLED MIGRANTS **NEW TECHNOLOGY IN AGRICULTURE**

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NZ Institute of Primary Industry Management

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The Journal is the quarterly publication of the New Zealand Institute of Primary Industry Management. *The Journal* is provided free of charge to NZIPIM's members from across the rural profession including farm management advisors, rural bankers, farm accountants, fertiliser consultants, rural valuers, specialised service providers, farm managers, representatives from industry good organisations, CRIs and universities. *The Journal* is a quality assured publication for rural professionals providing professional services within New Zealand's primary industries. The opinions of the contributors are their own and not necessarily those of NZIPIM or the Editor.

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STEPHEN MACAULAY CEO

CEO's comment

The Institute's strategy focused on developing and growing the capability and business networks of the membership

In response to the challenges before the primary industry, the Institute has redefined its future focus in providing quality services to the membership over the next four years.

The skills and knowledge base of rural professionals servicing the farming community will continue to adapt, to be able to effectively service the ever-expanding needs of an increasingly sophisticated farming clientele going forward.

The Institute's membership base is also reflecting the changing demands for professional services on-farm, as demonstrated by a larger number of rural professionals with specialised expertise joining the membership.

The Institute continues to grow in scale, with membership numbers reaching 900 for the first time. In addition to this the Institute has 230 student members enrolled in agricultural-related courses.

As the peak professional body for the rural profession, the Institute and our regional branches have an important role to play in building the skills and knowledge base of its members, to be better able to provide professional services to their farming clients in new and developing areas within the primary industry.

We are also mindful of the need for the Institute and members to be informed and respond quickly to issues and events impacting upon the farming community.

The rural profession and the primary industry are faced with significant challenges, some of which include:

- Building more resilient farming systems in farming businesses better able to absorb increased volatility in global commodity markets
- The lack of integrators with whole farm systems knowledge represents a challenge to the primary industry
- The ability for rural professionals to keep up with the technological advances and information platforms farmers are interacting with on a daily basis
- The increasing farmer uptake of on-farm professional advice and recognising the value of such
- The limitation of extension activities and pathways of research from universities and CRIs into the rural profession and the farming community
- Keeping up to-date with increased compliance and regulatory requirements on-farm (e.g. environment, employment matters, health and safety, animal welfare etc)
- The increasing need to have recognised career development pathways for rural professionals.

In response to the challenges before the before the primary industry, and to cement our place as the peak professional body for the rural profession, the Institute has developed a four-year strategic plan. Under the strategic plan, the Institute's five strategic platforms will be:

- **Thought leadership** – providing thought leadership to the rural profession and the primary industry that challenges existing paradigms and encourages debate
- **Professional development** – expanding the skills and knowledge base of rural professionals in new and developing areas within the primary industry to meet the needs of an increasingly complex farming business
- **Growing NZIPIM's branches** – building the scale and reach of NZIPIM's branches to provide business networking opportunities and deliver high-quality events to the membership
- **Career development** – supporting the career development of young rural professionals and those considering a career within the rural profession
- **Building constructive partnerships** – building strategic partnerships with like-minded organisations that benefit and develop the membership base.

To deliver on the objectives outlined under each strategic platform, we are rolling out our annual business plan which continues to build on the gains made by the Institute over the last three years.

Whilst there are a number of challenges ahead, the Institute is well placed to provide business networking opportunities and an information hub to enable members to expand their knowledge and professional skill base within the primary industry.

The future looks bright for the Institute and the rural profession. We look forward to your continued support of the Institute and encourage you get behind and attend branch events held in your region in the year ahead.

MARK TOWNSHEND

Dairy farming ownership structures in New Zealand and Chile

Over time dairy farms have become larger and ownership more consolidated, which has had an effect on rural towns. Other farmers have also invested in farmland overseas and Mark Townshend relates his experience in Chile.

Corner dairies and smaller grocer shops have been gradually replaced by larger chains, as have family electrical appliance shops. Veterinary clubs around the country have been slowly bought up by corporate veterinary entities. In the 1960s, running a few laying hens to support a dairy farm operation was common, but these have been replaced by the efficiencies of large-scale dedicated egg-laying operations.

That dairy farms have become larger and ownership more consolidated should not be a surprise and it is not unique to New Zealand – most serious dairy-producing countries have fewer dairy farms milking more cows each year. The trend is likely to continue and should be embraced as the reality of producing food commodities.

Types of structures

The types of dairy farm ownership structures in this country are set out below.

Established farming families growing their enterprises

Experienced farming families will work their own farms and grow their enterprises. Some will succeed for generations, others for one generation, and some will fail and return to the market. Some skills can be transferred generation to generation, but affinity for operating dairy farms cannot be. Lack of affinity, passion or interest will have an eventual cost of not keeping up with the relentless demand to operate dairy farms more efficiently.

Established farming families retaining passive land ownership, but engaging tenant lessees or other means to manage their land assets

After one generation some families will retain ownership but transfer their year-to-year operations to more capable farm management, as they are shrewd enough to analyse they do not have the passion or affinity to stay on the efficiency conveyor belt. Several years ago, the average New Zealand farm transacted every nine years. Compared to parts of Europe and England or Ireland, where some farms have been in families for several hundred years, this is unusual. As New Zealand matures, land transactions will reduce and tenant farming structures will become a key part of this trend.

Corporate ownership

Whether New Zealand or foreign-owned, corporate ownership will increase its market share of dairy land in this country and the success of these operations will be wide and varied. Many will struggle because they have been set up by people more interested in milking humans of their funds rather than milking cows. In their best form, corporates are effective and financially successful operations. Operated at sub-optimum levels, they invariably end up back on the market through a period of low capital gain. Shareholders will tolerate little or no dividends while there is capital growth, but patience will have its limits with the lack of cash without asset value

As New Zealand matures, land transactions will reduce and tenant farming structures will become a key part of this trend.

Manuka farm in Chile

Fourth generation 900 cow Townshend farm – White Pine Dairies at Ngatea

While the success of dairy equity partnerships is mixed, the failures are often more to do with managing the expectations of shareholders and the quality of the partnership constitution.

growth tending to lead to an exit. While the percentage of prime land owned by foreigners probably needs some monitoring and limits, the issue is not as significant as some fear. Running a loss-making dairy operation from Germany, Canada or China will have limited palatability and tenure.

Equity ownership operations

This type of structure will continue where an equity operator manages an operation along with non-active investment partners. While the success of dairy equity partnerships is mixed, the failures are often more to do with managing the expectations of shareholders and the quality of the partnership constitution. Constitutionally well set up with the appropriate partners, equity partnership farm ownership with an operating partner has a far better chance of top quartile performance than the three ownership models mentioned. The first two models may have a long and enduring lifespan, but a well-run and profitable equity partnership might have a life of 5-15 years as the motivation of shareholders changes over time and it is wound up with a logical and successful conclusion.

Traditional smaller family farms

These smaller farms still have an important role in the dynamics of dairy farm ownership and may have 100-150 or up to 500 cows. The smaller ones are more likely to be viable and economically sustainable where there is some additional off-farm income coming in through a family member working off-farm. These dedicated family farms will be over-represented in the top quartile of economic performers on a per hectare basis. As a generalisation, smaller family farms will need to be run slightly more efficiently to offset the lack of large-scale farm input purchasing power.

Effect on rural towns

In 1970, our home town of Ngatea had approximately the same number of shops (30) as today. The nature of the shops has changed markedly because the banks, post office, and electrical appliance, clothing and shoe shops, have gone as consumers go further afield to get such services or buy such items. They have been replaced by food shops, galleries and knick-knack shops. Ngatea is fortunate as many small rural towns have gone into decline.

More significant than the change in types of shops is the impact of ownership and human horsepower to run the town and its sports clubs, churches and service amenities. The two bank managers have gone, the lawyer is gone, the accountant is gone, the chemist is owned by a Hamilton chain, the two service stations are now owned by corporate owners, and the two agri-rural retailers have been replaced by RD1 / Farm Source and Hammer Hardware. Through this period since 1970, the pool of committed local professionals or business people with 'skin in the game' residing in the town has reduced from about 40 to 15.

Throughout the same period, if we draw an 8-10 km circle around Ngatea the number of dairy farms has reduced from around 125 farms averaging 40 ha in size to approximately 40 farms averaging 130 ha. After allowing for both multiple ownership and absentee dairy farm owners, the number of local community 'skin in the game', committed farm owners is now around 25. The combined town business people and farm owners number has shrunk from 165 in 1970 to 40 in 2016. The pool of people who generally volunteer to take leadership roles to run schools and local service amenities has therefore been somewhat ravaged.

Just like farm operations, towns with good vision, leadership and adaptability will thrive in the cyclical nature of the financial fortunes of rural New Zealand. Those that do not adapt will die.

One conclusion that can be reached is that if the 25 dairy farmers want to maintain their town and services, they will need to heavily invest both time and capital to maintain meaningful viability. Failure to do so will see a gradual run down in the quality of medical, educational and service facilities. Should the quality of such services decline, those people with healthy financial means talk with their feet, and administrative capabilities and funds go elsewhere, further eroding the capability of the town.

Rural towns are unlikely to endure prosperity without visionary leadership and financial support. Farming leaders will need to help in writing their town plan, contributing themselves and leaning on absentee owners to also financially support the towns where their farm employees live and exist. There is a strong value proposition to have successful towns. Excluding the agricultural variables that set the per hectare land value of dairy land in New Zealand, where there is poor local schooling, medical facilities and the lack of luxuries that affluent people enjoy around social events, arts and food, there is a discount of about $10,000 per hectare or $1.3 million per farm.

Just like farm operations, towns with good vision, leadership and adaptability will thrive in the cyclical nature of the financial fortunes of rural New Zealand. Those that do not adapt will die.

Canterbury Grasslands, Missouri, USA

Ninety percent of our due diligence was country research around the ability to free-flow cash, a tax treaty with New Zealand, confirming a very low level of corruption, free trade agreements with whom and in which products, and of course people safety.

OVERSEAS INVESTMENT – MANUKA SA – CHILE

We are often asked why we have invested in dairy land in Chile. Having looked outside of the Waikato as land values escalated, investing in Southland in the early 1990s was a good trial run. Southland in 1990 was somewhat behind the key North Island dairy areas. Not only was the land cheaper, but services were inferior in rural retailing. Dairy companies were developing, and there was the limited availability of an experienced labour pool. Contractors, such as dairy shed builders, at the time had no desire to work on a Saturday if a project was running behind time.

However, the key point was that strategically the farming model in Southland was very attractive on land price, productive capability and economic return on investment, and these are the things that were guaranteed. The little frustrations around rural retailers or agri-contractors were only a point-in time-issue. These frustrations would always diminish, as the model in Southland grew to the point where the services and skills in that region today are equal to anywhere in New Zealand.

The one mistake we made in Southland was not buying sufficient land when prices were cheap. Through the late 1990s and early 2000s, while distracted with community service in dairy industry governance and also listening to those financial advisors who prescribed diversity of investment, we entered into various non-dairy investments. There were no disasters, but the returns were inferior to our farming returns.

We knew we were good at dairy, and maybe we were no better than average at investing outside of our core competency. So around 2003 we started looking at pastoral dairy opportunities outside of New Zealand. Apart from identifying cheaper, quality, safe land options, there was the logic that while we are very committed Kiwis, like any savvy Kiwi investor, it was prudent to have part of our investment outside of New Zealand for risk mitigation purposes.

Chile was not on the radar, but the good fortune to be on a trip through the middle of winter in Southern Chile took me to a farm growing the most beautiful sward of perennial rye and clover. They were cutting the grass and carrying it to barned cows in a climate half-way between Waikato and Southland. Yes, there were all the support service challenges of early Southland, but the model of growing 16-17 ton of high octane rye-clover pasture was robust.

Our agri due diligence was relatively simple around soil type and climate extremes within any year. Ninety percent of our due diligence was country research around the ability to free-flow cash, a tax treaty with New Zealand, confirming a very low level of corruption, free trade agreements with whom and in which products, and of course people safety. Rather proudly, we can say that 10 years on our country research was meaningful and we have had no major surprises.

With another 12 shareholders we purchased our first farm in 2005 and Manuka had 13 farm dairies by 2008. In 2008, we acquired arguably the best pastoral dairy land in the world with regard to soil type, contour, climate and scale. The acquisition of the 19,000 ha Hacienda Coihueco has us now milking 30,000 cows and with enough land to get to 55,000 by 2023. Four cornerstone families own 60% of the

Manuka farm in Chile

operation, but the shareholder register now exceeds 100.

Most on the register are connected by family, sport, social or professional ties with the original 13 shareholders. While 90% of the shareholding is held by farming families, 50% of the shareholders by numbers are non-farming professionals. The value of this is the access to a range of legal, banking, accounting, valuation and veterinary skills at a phone call. The Manuka family has a strong social aspect, which has intangible benefits for shareholders, but of course it is principally a commercial investment.

Financially, the Chilean Manuka project has been a strong success. With regard to where we are 10 years on from our 2005 outset, on-farm productivity levels against New Zealand best practice are perhaps two years behind where we should be with the challenges of very large scale and also the developing dairy environment. However this has been more than offset by stronger than anticipated capital gains in land value. The major acquisition of Hacienda Coihueco occurred just prior to the global financial crisis in 2008. In the period since, New Zealand land values have increased by 30-40%, while land value in Chile has trebled over that time. Over the 10 years since the initial investment of NZ$10 million, a combination of equity raising, bank debt and value created has the business with an enterprise value now of approximately NZ$0.5 billion.

The operation is providing sufficient cashflow back to New Zealand shareholders and this substantially increases as more land is developed. Any share trading is at some discount to current market value, but well above entry point. Somewhere in between 2020-2023, a full value liquidity event will be arranged. Some of the shareholders see the Chile Manuka project as a committed 50-year player, others as a superannuation fund, and many will sell a portion at the liquidity event but retain a meaningful holding.

In the period from 2003-2008, several New Zealand-based dairy farming enterprises ventured into Uruguay, Argentina, Chile and several states in United States. Most struggled and some failed. The two key reasons for some of those disappointing results were corporate people who had no skill or passion for farming, or good farming people who underestimated the challenges of cross-border and scale operations.

Conclusion

The type of dairy farm ownership structure has changed markedly since the 1970s in New Zealand and will continue to evolve. Formerly robust rural communities are experiencing some pains with the change and require both planning and support to thrive. An attractive option for farmers or investors to expand is investing offshore. There are additional risks associated with offshore farming investment, but the prize is attractive if done well.

MARK TOWNSHEND is a farmer and company director based in Ngatea. He has more than 40 years of farming experience in both the North and South Islands of New Zealand, North America, South America and Eastern Russia. Email: markgtownshend@xtra.co.nz

PHIL JOURNEAUX AND JEREMY SAVAGE

Dairying – the cost of production – an update

This article follows up on the December 2015 articles by Phil Journeaux and Jeremy Savage and examines dairying costs in the Waikato, Bay of Plenty, Canterbury and Southland.

Phil Journeaux

Waikato/BoP and Southland results

Reduction in farm expenditure

The articles showed that farmers had reduced farm working costs significantly compared with the 2014/15 season, spurred on by the expectation of a lower payout. Note that the Fonterra announcement of a $4.15/kgMS payout for 2015/16 was made just after the survey was completed.

For the Waikato/BoP farmers, average farm working expenses per kgMS had been reduced to $3.40, compared with $4.07 in 2014/15, a drop of 20%, and compared with $4.31 in 2013/14, a drop of 36%. The Southland farmers had reduced their expenditure less; $4.03/kgMS in 2015/16 compared to $4.40/kgMS in 2014/15, a drop of 9%. Reductions in expenditure have been largely across the board, as shown in **Table 1**.

Differences between regions

As can be seen in **Table 1** there are some similarities and some differences. Points to note:

- The reduction in total feed costs is very comparable; Waikato/BoP down 17% and Southland 18%. Much of this is a reduction in bought-in feed, while cropping costs for Southland have increased, with a number of farmers intending to winter cows on crops on the milking platform.
- The reduction in fertiliser expenditure is much greater on Waikato/BoP farms (25% compared to 6% in Southland). This would largely be due to the difference in base fertility on farms in the two regions.
- Repairs and maintenance is down significantly, as could be expected.
- There is a difference in vehicle costs, with Waikato/BoP up 3% compared with a 25% reduction in Southland. Possibly the reason behind this is that there is less machinery on the average Waikato/BoP farm, being half the size of the average Southland farm, so reductions show more readily in Southland.
- Fuel costs are down on both farms, but this has largely been driven by the reduction in the pump price.

Table 1: Percentage reductions in farm working expenses compared with the 2014/15 season

	Waikato/BoP	Southland
Total labour expenses	-8%	-2%
Animal health	-17%	-25%
Breeding	-13%	-13%
Dairy shed expenses	-25%	-18%
Electricity	-8%	-7%
Feed (hay and silage)	-8%	-36%
Feed (feed crops)	-36%	37%
Feed (grazing)	0%	-9%
Feed (other)	-46%	-74%
Fertiliser	-25%	-6%
Freight (not elsewhere deducted)	-26%	-32%
Regrassing costs	-9%	2%
Weed and pest control	-23%	-47%
Fuel	-33%	-29%
Vehicle costs (excluding fuel)	3%	-25%
Repairs and maintenance	-43%	-25%
Communication costs (phone and mail)	-37%	-36%
Accountancy	16%	-48%
Legal and consultancy	20%	-55%
Other administration	-14%	-26%
Rates	7%	0%
Insurance	-14%	-13%
ACC employer	4%	3%
Other expenditure	-14%	510%
Total farm working expenses	-20%	-9%

Table 2: Net cash position (NCP) relative to debt level

Waikato/BoP	Debt $/kgMS	10	21	30
	Net cash positon	-$25,600	-$102,200	-$168,800
	NCP/kgMS	-$0.21	-$0.83	-$1.37
Southland	Debt $/kgMS	10	22	30
	Net cash positon	-$88,600	-$242,700	-$353,000
	NCP/kgMS	-$0.39	-$1.06	-$1.55

- There is some variation between the regions for standing charges. While communication and insurance costs are down somewhat equally, accountancy and legal/consultancy are up in the Waikato/BoP and down significantly in Southland.
- Many of the Southland farms monitored had relatively large and relatively unidentifiable expenditure under 'Other Expenditure', which is presumably where farmers had lumped expenditure they couldn't readily differentiate. If this is excluded, total farm working expenses drops to $3.78/kgMS.

Overall, farmers have made a commendable effort to reduce costs in the face of the reduced payout. The issue that now arises is that expenditure is currently below maintenance, which may be a necessary evil, but it can only be sustained for a couple of years before farm productivity is seriously impacted. The other issue is that it is hard to see where any further significant reductions can be made. Over the last 10 years, the average proportion of farm working expenses relative to net cash income has been 58%. For 2015/16, the Waikato/BoP expenditure is sitting at 85% of net cash income, while for Southland it is 102%. Perhaps signalling that with expenditure cut to the minimum, it is income that has to rise!

At a whole-farm level, milksolids income is down 42% and 38% for the Waikato/BoP model and Southland, respectively, with net cattle income up 10% and 15%, respectively, as many farmers cull cows early to take advantage of the good beef schedule. The Waikato/BoP model is currently budgeting for a net cash loss of $102,000, or $0.83/kgMS, on a debt loading of $21/kgMS. The Southland model is budgeting on a net cash loss of $243,000, or $1.06/kgMS, on a debt loading of $22/kgMS.

Impact of debt

The impact of debt on this net cash position is shown in **Table 2**. The trends in profitability at a farm level are illustrated in **Figures 1 & 2**. Both graphs obviously reflect the loss for the current season, and the farmers were somewhat pessimistic they would face another tough year in 2016/17. As noted, farm expenditure has been cut as much as possible, with the Southland farms caught by (generally) a higher proportion of fixed costs.

The AgFirst Farm Monitoring updates can be viewed at: Waikato/BoP – *www.agfirst.co.nz/images/uploads/Waikato_BoP_dairy_report_Jan_2016_Update.pdf*; Southland – *www.agfirst.co.nz/images/uploads/Southland_dairy_report_Jan_2016_Update.pdf*

Figure 1: Profitability trends for the Waikato/BoP model

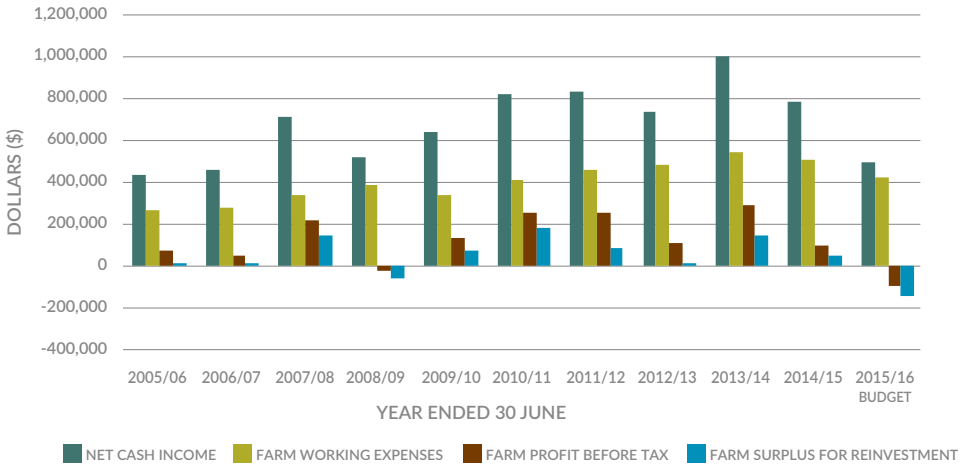
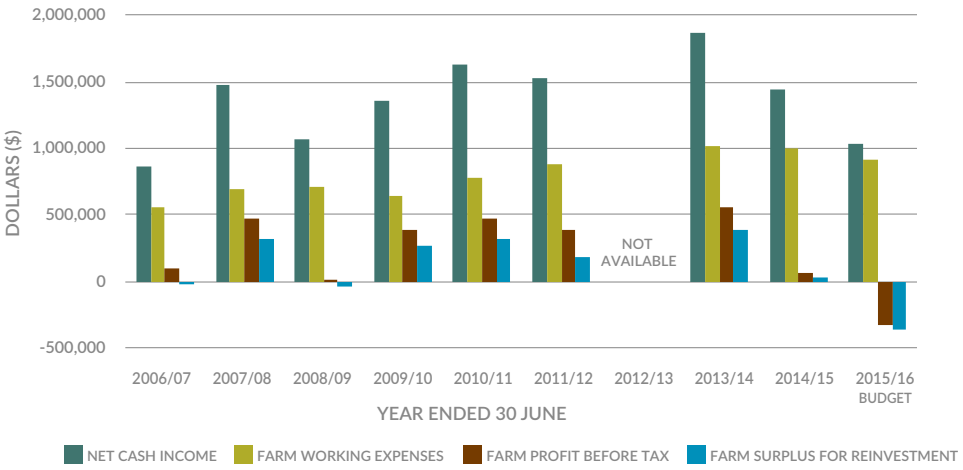


Figure 2: Profitability trends for the Southland model



The issue that now arises is that expenditure is currently below maintenance, which may be a necessary evil, but it can only be sustained for a couple of years before farm productivity is seriously impacted.

Jeremy Savage

Canterbury results

Macfarlane Rural Business (MRB) of Ashburton have completed their first analysis of profitability using the database tool Dairy Systems Monitoring (DSM). MRB analysed their client's latest revised cashflow, calibrated Farmax Dairy files, and made adjustments where necessary to reflect an operating income and expenditure. The database also includes contract and variable order sharemilkers, with their remuneration included in operating expenditure. MRB use similar procedures as those used in DairyBase to ensure consistency, but depreciation is not included in these numbers. This has been reflected with actual spend on plant and machinery below the operating profit line.

The sample of 2015/16 is similar to 2014/15, but there has been the addition of two large-scale farms that have increased the area. However their performance is similar to their peers.

Farm systems and productivity

Clients have dropped their stocking rate. A number of cows were culled in autumn 2015 in preparation for another low 2015/16 payout. The stocking rate dropped 7.3%. Clients have also responded to our advice as reported in the December 2015 article in this Journal.

Cows have increased per cow production with the lower stocking rate. More grass available per cow, coupled with good pasture management, has resulted in higher per cow production. The supplement use per cow has not changed, but supplement use for the farm has dropped with the lower stocking rate. Production per hectare has only dropped 2%. Pasture harvested has dropped, which is due to more fodder beet being planted. Fodder beet will be used in the autumn months for lactation (10 cents to grow) instead of supplements (35-40 cents to purchase and feed). These numbers are a reflection of MRB clients and subject to that bias. The per cow production is significantly higher than LIC averages and the stocking rate is lower.

There have been major savings in repairs and maintenance, typically in repairs to tracks, which may result in increased lameness of cows next season.

Table 3: DSM analysis of MRB client productivity and profitability

Comparison of Seasons	2015/16	2014/15
Production	*Revised Jan 16*	
Effective Area	289	242
Stocking Rate	3.3	3.56
Kg Milksolids/Ha	1,583	1,609
Kg Milksolids/cow	477	452
Cows	958	863
Feeding Feed Harvested – TDM/Ha	12.9	12.66
Feed Harvested – kgDM/cow	3,877	3,528
Supplement per Cow	771	761
Total Feed per Cow	4,648	4,350
Supplement as a % of Intake	17%	18%
Profitability		
Milk Price ($/kgMS)	4.19	4.50
Dividend ($/kgMS)	0.28	0.25
Gross Farm Revenue/Ha	7396	7,891
Operating Expenses/Ha	6,343	7,082
Operating Profit (EFS)/Ha	1,053	809
Gross Farm Revenue/KgMS	4.67	4.91
Operating Expenses/KgMS (exl Depn)	4.01	4.35
Operating Profit (EFS)/KgMS	0.66	0.49
Farm Working Expenses/KgMS	3.72	4.19
Return on Capital	1.5%	5%
Financial KPI's		
Labour (adjusted) – kgMS/FTE	98,729	80,472
$/cow	277	300
$/kgMS	0.58	0.67
Aninal Health + Breeding – $/cow	149	175
$/kgMS	0.31	0.39
Feed + Grazing (incl lease) – $/cow	669	764
$/kgMS	1.40	1.69
Fertiliser + Nitrogen – $/Ha	638	698
$/kgMS	0.40	0.44
Repairs & Maintenance – $/Ha	311	352
$/kgMS	0.20	0.28
Vehicles + Fuel – $/Ha	190	170
$/kgMS	0.12	0.11
Electricity (Irrig not incl) – $/Ha	155	165
$/cow	47	46
$/kgMS	0.10	0.10
Overheads – $/Ha	345	367
$/kgMS	0.22	0.23
Sharemilker Remuneration – $/Ha	383	0
$/cow	116	66
$/kgMS	0.24	0.14

Income

Income reflects a range of processors of milk across Canterbury. The drop in milk income is partially offset by a lift in stock sales, which have risen from $0.41/kgMS to $0.50/kgMS. This is a reflection of a lift in beef schedule prices for cull cows.

Cost structures

Operating expenditure is forecasted to drop from $4.35/kgMS to $4.05/kgMS. Feed and grazing costs have dropped significantly by $0.25/kgMS with the changes in the farm system. Replacement rates for heifers have dropped, and farmers are growing more fodder beet on-farm and using less supplement. There is a substitution of costs from supplements to seeds, weeds and pests with this change in policy. We expect the final costs of supplement to be lower, with silage reserves being higher than normal, and with strong summer growth and plenty of silage being made.

Labour and sharemilker costs combined have stayed flat at $0.81/kgMS (2014/15) and $0.83/kgMS (2015/16). Fertiliser costs have dropped slightly. Nitrogen use is likely to remain high. Maintenance fertiliser has dropped and this is typically on paddocks with high fertility, e.g. effluent paddocks. An increase in soil sampling this spring has helped farmers identify areas to cut inputs on.

Animal health and breeding costs have dropped as farmers focus on cost savings. This is often in monitoring rather than treatments, less herd testing, scanning, tail painting etc. There has been less reproduction intervention.

There have been major savings in repairs and maintenance, typically in repairs to tracks, which may result in increased lameness of cows next season. Capital costs appear to continue. Across the farms, plant replacement has dropped, but the capital costs have continued on average.

Table 4: Liquidity of MRB clients for the 2015/16 season

MRB DSM Clients' Liquidity		
Area	274	Ha
Total Production	422,508	kgMS
Net Cash Income	1,962,535	
Farm Working Expenditure	1,658,426	
Cash Operating Surplus	304,109	
Interest and Rent	576,897	
Plant Replacement	52,736	
Divident and Tax (refunds)	-56,324	
Capital & Development	142,891	
Net Cash loss	-412,091	
Principal (net) Drawn	313,526	
Increase in Working Capital	-98,565	
Where		
Net Cash loss	-$0.98	kgMS

The average farm in the MRB client base participating in DSM will incur $412,000 ($0.98/kgMS) of losses this season, which is similar to the 2014/15 season. Very few of the participants have taken drawings or dividends. Most clients are in equity partnerships and in some cases the managing partner is drawing a salary. The combination of tax and dividends this season has resulted in net contributions due to tax refunds.

Summary from authors

Southland and Canterbury cost structures ($/kgMS) remain stubbornly high compared to the Waikato/BOP cost structures. This is due to a higher proportion of costs in the South Island which are regarded as fixed. The significant costs are winter feeding ($0.50-$0.60/kgMS) and irrigation ($0.20-$0.50/kgMS). Irrigation costs vary – some schemes (e.g. BCI, Central Plains) have a component of interest and principal in their charges. However the demand for these charges needs to be covered.

Winter feeding as a fixed cost is a challenge faced in the South Island. To remove this cost, it is necessary to plant winter feed on the dairy platform. Fodder beet on the dairy platform is a viable option, as the high yields mean less area needs to be removed. However the removal of this area will mean that total production will drop and planning for this change needs to be 18 months in advance.

The stocking rate needs to be dropped in advance (six months) to allow the space in the farm system to plant the winter feed. This is a strategic farm system change rather than a management change. In hindsight, with two seasons (or potentially three) being below $6.00/kgMS, grazing cows on-farm would have been profitable. MRB analysis of farm systems with Farmax Dairy suggests the break-even of fodder beet with dairy farm profitability is $5.80/kgMS. This varies from farm-to-farm, depending on the impact of labour and cow numbers.

For the Waikato/BoP farm expenditure has been cut to the bone – below a sustainable maintenance level – and obviously this cannot continue for any extended period. The break-even payout required is essentially the same as for the South Island – around $5.80/kgMS. As this currently looks problematic for 2016/17, another challenging year lies ahead.

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VICTORIA WESTBROOKE AND PETER NUTHALL

The extension needs of small dairy farmers

With the constant cost price squeeze, farmers with smaller farms must constantly consider their options to maintain their purchasing power.

Some farmers will sell, others will buy extra land, some will sell and shift onto larger farms, and others will further develop their existing farm. Alternative strategies are also possible. Overall, farms in general are increasing their output. Enlarging the farm in various ways is a major factor in this rising production. With the increasing globalisation of marketing, price volatility also means farms need to have buffers through size economies.

In all these processes, and the associated decisions, extension and consulting personnel (and bankers) can provide assistance. In doing so, it is important they consider the farmers' objectives, their beliefs about the way ahead, and the challenges and problems they believe they face. This article reviews some of these questions for a sample of small North Island dairy farms. The study, carried out on behalf of the Smaller Milk and Supply Herds Association (SMASH) through DairyNZ funding, concentrated on North Island farmers as few relatively small farmers are located in the South Island.

Specifically, due to the concentrations, farms in Northland, Waikato and Taranaki were included in the study which largely involved telephone interviews of over 300 randomly selected farmers. They had to have less than 400 cows to be included. The average herd was 240 cows on 97 ha producing 86,789 kgMS at 355 kg per cow and 971 kg per hectare. Of the farms, 34% did not employ any staff.

An outline of small farmers and their farms, information on their 10-year plans, an analysis of the challenges they believe they face, together with a list of their comments and then data on the information they feel will assist them after considering some efficiency questions, is then given. Finally, conclusions are offered. In considering the material, it is useful to note that small dairy farmers spend $1,940 on advice relative to $4,660 by dairy farmers with two or more people. This compares to $2,810 for all farm types and sizes (from a 2013 survey).

The nature of small dairy farmers

To a large extent farmers' objectives control their actions and also their need for professional help. Very important to the farmers, on average, was seeking 'maximum sustainable cash returns', with a score of 4.46 out of 5 , but at the same time they rated 'reasonable time off and holidays' at 4.23. Clearly a balance is required. On the other hand, they rated the importance of 'passing the farm onto family members' at 2.93, indicating this was low on their priority list. Perhaps they believe their farm is too small for future generations.

Overall, the farmers are surprisingly relaxed over their dairying lives, scoring 'don't sleep at night worrying about decisions' a low 2.06 and, on average, they scored 'investigating new farming methods is exhilarating and challenging' a much higher 3.73. Perhaps this is also reflected in their score of 3.44 on 'don't rest till the job is completed'.

Small farmers undoubtedly have a different outlook relative to their colleagues on larger farms. This may be of necessity, but could also be because their outlooks have kept them as small farmers. Previous surveys of dairy farmers provide some comparisons. Details are presented in **Table 1** for the small farmers relative to dairy farms having two or more people in the 2006 and 2013 surveys. The data covers their age, education, objectives and management styles. The objectives are summaries of correlated items from 20 possibilities, and the management style factors from 25 items, reflecting their personal methods. The locus of control (LOC) is the farmer's belief about how much of their outcomes they can control (100% means all, and so on down to 0%).

The small farmers are younger and some are more educated than those on the larger farmers, which could well be a sharemilker effect.

Table 1: A comparison between small farmers' objectives and management styles relative to those on larger farms. Average factor scores+ for each group with the larger farms coming from survey '06 and survey '13. Mean values of a range of variables and the significance of the differences

Objective/style factor+	Small farms	Survey '06 large farms	t test (**) sign prob (column1/ column2)	Survey '13 large farms	t test sign prob (column1/ column4)
Owner's age*	3.79	3.9	.000	4.1	.000
Owner's education*	3.21	3.0	.050	3.4	.574
Objective balanced	.999	.089	.000	.034	.000
Objective anti-risk	-.193	-.007	.004	-.194	.978
Objective way of life	-.628	-.116	.000	-.157	.000
Objective reluctant farmer	.567	-.099	.000	-.227	.000
Objective community supporter	.174	.401	.007	.212	.588
Objective family supporter	.282	-.030	.001	-.085	.000
Style consult logician	-.255	-.178	.388	-.272	.819
Style correctness seeker	.185	-.062	.001	-.072	.000
Style family and friends consult	.198	-.082	.000	-.087	.000
Style conscientious	.283	.024	.000	-.038	.000
Style thoughtful creator	-.293	-.136	.031	.022	.000
Style benign manager	-.410	-.093	.000	-.076	.000
Locus of control (%)	67.22	67.55	.600	68.17	.008

* Age scored on a 1 to 5 scale with 1=20-30 yrs ... 5=60+ yrs, education similarly with 1=secondary ... 4=degree and 5=other

+ A statistical factor score based on the sum of communalities ranging from approximately -3 to + 3. The lower the value, the more akin to the description relative to the higher value. The description is a summary of the contributing variables

** Any significance probability of *less than* around 0.25 can be regarded as important, as it means there is a chance of at least 75% that the difference in the mean is real and not due to sampling chance

The small farmers are younger and some are more educated than those on the larger farmers, which could well be a sharemilker effect. While their LOC is similar, their objectives do vary. Their objectives are less 'balanced' (note that the form of the questionnaire means lower figures reflect conformity to the objective or style), less risk oriented, less 'way of life' oriented, but more directed to family and community life than their colleagues on larger farms.

In terms of management style, small farmers are more inclined to consult and more thoughtfully creative and benign than their colleagues. However they do not talk to their families and friends on professional matters, and are less concerned with doing the right thing and being conscientious relative to their colleagues on larger farms. Overall, there are clear differences, but just how important these are in keeping them as small farmers is not obvious, although likely in some cases.

Also relevant is that the small farmers' equity averages out at 67%, and 35% have non-farm financial interests and 23% a financial interest in at least one other farm. The financial level of these interests is not known. But what is clear is that most small farmers are very familiar with country affairs in that 79% are 'born and bred in a rural area'.

When comparing sharemilkers with owner/operators they are much younger, as you would expect, less are 'born and bred' in the country, and more have increased their herd by at least one-third. The critical production per hectare is also significantly higher, although by just 19kg/ha. This information is a snapshot from 2014/15. Sharemilkers tend to be mobile and have greater opportunities to increase output and improve their longer-term prospects, provided they are efficient.

Having off-farm investments and an interest in other farms is age-related. In part, this will mean time does enable building up sufficient assets to allow these investments. Equity is similar. Ownership type does marginally impact on off-farm investments (closeness to owner/operator), but not interests in other farms. Similarly, a desire to reduce debt impacts slightly on off-farm investing, but not other farm interests.

Farmers who find managing staff more of a challenge than others are less likely to have off-farm investments and interests in other farms. These farmers are likely to be more financially aggressive and capable. Finally, farmers with other farm interests tend to agree that 'they don't rest until the job is done'. Farmers who do not have non-farm investments tend to seek maximum sustainable

cash as an objective relative to their counterparts. Again, these farmers are likely to be determined and very interested in maximising profit within reason.

Farmers' 10-year plans

The farmers were asked to rate a number of possible 10-year plan activities with a view to assessing their intentions and, accordingly, guide where help should be focused. **Table 2** contains a summary of their responses (average score on each possibility from a 1 to 5 rating with 5 meaning a top priority). Assuming their plans might relate to age and their belief in their powers of control, the rating on the plans was compared for the high and low values of these variables.

The farmers are not particularly interested in selling their farm and buying bigger, nor in simply selling the farm. Enlarging the current farm is also not popular, nor is passing the farm to their children. However the farmers are very interested in increasing production on their current farm and presumably either getting in a sharemilker or employing extra labour – all, no doubt, to make their life easier. They are also very keen on reducing debt. Diversification and off-farm investing are not popular. The pattern is clear – the farmers wish to stay on their current farm and increase production through intensification, using help if they can. Of course, this is the average picture and some will be different. Note that age does impact on their ratings in several cases, but the farmers' LOC has less of an effect.

The least important challenge is communicating with the next generation – perhaps this stems from the lack of interest in passing the farm onto their children.

Challenges faced relative to the 10-year plans

Knowledge of the hurdles the farmers believe they will face in increasing production is clearly important from an extension point of view. **Table 3** lists the suggested challenges presented to the farmers together with their rating of them (1 to 5 scale with 5 representing a large challenge).

The biggest challenge is the regulations and issues surrounding environmental factors, which is a common theme. Finding suitable staff is also dominant, as is the profitability of their likely 10-year plans, and the cash returns from the last four years poses a problem. These concerns are all understandable and are no doubt common to all farmers, as is the next most important challenge – managing staff. Also on the same rating is the capital/debt requirement in the plans. The least important challenge is communicating with the next generation – perhaps this stems from the lack of interest in passing the farm onto their children.

The farmers' objectives do influence their concerns, as shown by the contrast between farmers with a high interest in cash returns. Similarly, whether or not the farmers are of an anxious disposition impacts on some of the scoring.

Table 2: The relationship of the farmers' prediction of their 10-year changes relative to age, education and their LOC*. Average scores+ and the significance probability of the differences

Change item	Ave score+	Age <45 yrs	Age 45+ yrs	Sign prob**	LOC* <67.5%	LOC* 67.5%+	Sign prob
Sell farm	2.52	2.06	2.84	.000	2.70	2.34	.066
Sell and move to larger farm	1.80	2.07	1.60	.003	1.77	1.89	.429
Enlarge current farm	2.40	2.64	2.22	.018	2.38	2.44	.749
Transfer farm to children	2.33	1.93	2.59	.000	2.40	2.22	.331
Employ worker/sharemilker	3.42	3.39	3.44	.776	3.42	3.42	.984
Largely do work myself	2.79	3.24	2.24	.000	2.87	2.66	.185
Invest in labour saving device(s)	2.80	2.93	2.66	.082	2.83	2.86	.846
Increase production by 10%+	3.60	3.92	3.22	.000	3.48	3.77	.042
Diversify production	2.15	2.25	2.04	.149	2.24	2.01	.124
Invest in additional farm	2.79	3.03	2.51	.001	2.68	2.99	.063
20%+ of income from off-farm	2.29	2.28	2.32	.802	2.26	2.38	.435
Reduce debt to low level	3.77	3.58	4.01	.002	3.78	3.72	.697

+ Scoring 1=very unlikely ... 5=very likely

* The LOC is a measure of a farmer's belief about how many of the outcomes they can potentially control

** A figure of *less than* .25 can be considered important, with more than a 75% chance that the difference is not due to sampling chance

Table 3: The relationship of the farmers' attitudes to the challenges they face over the next 10 years relative to an important objective (priority of cash returns) and concern/worry levels. Average scores+ and the significance probability of the differences

Challenge+	Ave score	Cash return not priority	Cash return is priority	Sign prob*	Do not worry	Worry about plans	Sign prob
Cash over last four years	2.93	2.52	2.98	.017	2.82	3.52	.000
Cash from 10-year plans	3.04	2.62	3.10	.005	2.98	3.33	.024
Capital/debt required by plans	3.11	2.5	3.20	.000	3.08	3.31	.205
Risk in plans	2.74	2.17	2.82	.000	2.70	2.98	.075
Lack of plan knowledge	2.47	2.31	2.50	.256	2.44	2.70	.088
Environmental regulations/issues	3.44	3.21	3.47	.203	3.38	3.81	.022
Lack of suitable technology	2.58	2.37	2.61	.159	2.53	2.84	.049
Poor next generation communication	2.02	1.98	2.02	.800	1.95	2.36	.015
Finding staff	3.21	3.03	3.23	.356	3.13	3.67	.008
Willingness to manage staff	2.76	2.52	2.79	.203	2.71	2.94	.231

+ Scoring 1=not challenging ... 5=very challenging

* Any significance probability of *less than* around 0.25 can be regarded as important, as it means there is a chance of at least 75% that the difference in the mean is real and not due to chance

Farmers' comments on challenges to 10-year plans

Farmers were also asked to provide comments on the issues they felt were impacting on their future plans. **Table 4** contains summaries of the comments and the percentage of the farmers noting each factor was important. Each farmer gave up to three factors. Where more than one answer was provided, the percentage of farmers noting the factor is given in the second and third columns in the table.

Table 4: A list of the comments made by the farmers on the factors that concern them regarding their future plans. Percentage of farmers selecting each comment (precis given) out of those answering

Summary of comments	First comment	Second comment	Third comment
Answered 'No comment'	4.8	0	0
Staffing factors/problems	19.5	23.5	56.3
Limitations due to age	1.8	4.4	0
Environmental/effluent problems	19.2	17.6	18.8
Debt/equity considerations	13.2	19.1	6.3
Problem of generating sufficient cash	12.0	16.2	0
No family to take over farm	1.8	1.5	6.3
Getting out of the industry	2.1	0	0
Low milk solids price and volatility	6.0	8.8	0
Land prices too high and local supply poor	2.7	1.5	0
Children too young now	5.1	4.4	6.3
Droughts and weather	1.5	2.9	6.3
Miscellaneous – risk/stress/indecision	10.2	0	0
Total percentage	100	100	100
Number of farmers answering	333	68	16

Overall, the familiar challenges occur, namely, staffing, environmental/effluent, debt and finance factors, and profitability levels.

Information requested to assist in the farmers' plans

The farmers were also asked to note the additional topics they would like information on and their preferred methods of delivery. **Table 5** contains this information for both the farmers' primary comment and their second one where they had an additional suggestion. It is clear that overall succession, effluent management and financial management factors dominate in their interests. As might be expected, the farmers are keen to learn about 'skill development'.

Table 5: Farmers' comments on the topics or tools they would like provided. Percentage of farmers making each listed comment (precis given) out of those answering

Summary of comment information on ...	Primary comment % of farmers	Secondary comment % of farmers
Succession	10.7	4.6
Animal nutrition	3.3	0
Effluent disposal	7.8	14.9
Pasture management	3.7	3.4
Stock replacement	1.2	2.3
Labour management	8.6	14.9
Financial management	14.0	13.8
Technology/robotics	3.7	6.9
General information	3.7	0
Herd homes/housing	9.9	2.3
Networks and discussion groups	9.1	8.0
Off-farm investments	2.1	1.1
Ownership systems	3.7	2.3
Farmer organisations	4.9	1.1
Skill development	9.1	4.6
Mental health/depression	1.2	1.1
No suggestion/no idea	3.3	0
Total percentage	100	100
Number of farmers answering	243	87

When it comes to the method of information delivery farmers preferred, they were generally eclectic in their choices. On a 1 to 5 scale they rated 'expert speakers' 4.14, 'one-day workshops' 4.02, 'farmer case studies' 3.91, 'discussion groups' 3.58, 'booklets' 3.40, the 'worldwide web' 3.17 and, finally, 2.88 for 'computer-based "what if" scenario simulations'. The younger farmers did, however, give higher ratings on the last two than the average. The feature of this data is that most extension methods other than computer systems were found to be more useful to the farmers.

Efficiency and expansion

Farming efficiency is reflected in a number of variables. The one available from the survey was production per hectare, which was used as the dependent variable in a statistical regression equation. This relationship provided further pointers to where extension should be directed.

The results suggest that risk and community/family support objectives both have an important impact on efficiency. As would be expected, the farmer's LOC is important in reflecting the need to work with them on creating realism over what they can control. While it seems being rurally born and bred is a disadvantage, this is no longer a factor. Perhaps such people are somewhat complacent and this could be a target for extension work.

To assess whether farmers who increased production were inherently different from the others, and therefore providing targets for extension/advisory work, those who had increased their herd by at least one-third were compared to the others. **Table 6** shows the results, where age is clearly a factor, with older farmers being more likely to have increased their herd size by at least one-third. This is to be expected simply because they have had more time. Equity is also a factor, as would be expected, but whether these farmers have saved more, are more efficient at earning debt repayment money, or are simply older is not clear. Also, their average education level is less, because with each decade students tend to stay longer in formal education. Perhaps it is a combination of all three factors.

But what is clear and relevant is that the 'increasers' have a different style, being more conscientious and keen on doing things correctly, as well as being more benign in their outlook compared to those not increasing their herds. They also have a more balanced objective set and a slightly higher LOC. Accordingly, these factors are targets for assistance if indeed a farmer wishes to increase production. However even if not expanding their herd, all farmers want to improve their productive efficiency, so again changing these factors may help.

One clear conclusion is that a significant number of the farmers are not concerned about handing on their farms to the next generation or in expanding production or diversifying.

Table 6: A comparison between farms who have increased their herds by at least one-third. Mean values of a range of variables and the significance of the differences

Variable	Herd increase by one-third – mean values	Herd not increased – mean values	Sign (t test) probability***
Age*	3.3	2.7	.000
Born and bred**	1.15	1.24	.076
Education*	3.1	3.4	.046
Equity %	71.4	64.9	.055
Style + consultative	-.333	-.221	.215
Style + correctness seeker	.322	.125	.009
Style + family/friends consult	.233	.183	.143
Style + conscientious	.216	.313	.049
Style + thoughtful creator	-.292	-.293	.987
Style + benign manager	-.472	-.382	.148
Objective + balanced	1.07	.970	.181
Objective + anti-risk	-.15	-.21	.297
Objective + way of life	-.66	-.61	.476
Objective + reluctant farmer	.62	.54	.398
Objective + community supporter	.17	.18	.873
Objective + family supporter	.23	.31	.392
Locus of control %	67.8	66.9	.089

* Age scored on a 1 to 5 scale with 1=20-30 yrs ... 5=60+ yrs, education similarly with 1=secondary ... 4=degree and 5=other

** 1=born and bred in country, 2=not born and bred in country

** Any significance probability of *less than* around 0.25 can be regarded as important, as it means there is a chance of at least 75% that the difference in the mean is real and not due to chance

+ A statistical factor score based on sum of communalities ranging from approximately -3 to +3. The lower the value, the more akin to the description relative to the higher value. The description is a summary of the contributing variables

Conclusions

Despite the economic imperatives, one clear conclusion is that a significant number of the farmers are not concerned about handing on their farms to the next generation or in expanding production or diversifying. It appears many are happy to accept their small operation and see out their farming days as best they can, with paying off any debt as a priority if surplus funds are available. This strategy provides the maximum capital for inevitable retirement.

Farmers who have increased their herd by at least one-third since starting tend to be more efficient, and they also happen to be newer to farming. The farmers have relatively high equity and are very keen to be debt-free. But what is interesting, and probably expected, is that efficiency seems to decline as equity rises. Perhaps the farmer becomes more comfortable with their position as the net assets rise above what is regarded as a critical position.

It is also clear that about one-third of the farmers have off-farm financial interests, although the size of these investments is not known. The off-farm investors are not bothered with managing staff, are relatively determined, and are also interested in maximising profit. This again is to be expected, but at least the data confirms this.

Overall, the farmers rate both maximum sustainable cash returns and leisure time quite highly as objectives, even though one can compete with the other. Also, given the reluctance to pass the farm to family, perhaps the small nature of their farms makes them believe their offspring would be better off in another occupation. However this conclusion does not apply to all the farmers, with some rating setting up their children on the farm highly.

The lack of expansion plans comes out in the farmers noting that selling their current farm, and perhaps purchasing a larger one, is not high on their agenda with respect to their 10-year plans. Nor is the possibility of adding to their current farm area by buying locally. However the farmers note they would like to employ labour (who would not like to hand over some of the chores?), but they doubt whether they would invest in labour-saving technology. Perhaps they do not have the throughput to justify the expense – or at least this is their perception of the situation.

Despite these negative reactions, the farmers still believe they will increase output by at least 10% within 10 years. This is where they would, on average, want to concentrate their efforts, being 'lukewarm' over diversification, purchasing another farm or investing off-farm. As noted, their 10-year plan is heavily concentrated on reducing debt. This would provide stability, a buffer and, of course, retirement income when the time comes.

When it comes to the challenges to their 10-year plans, the main concerns are questions relating to environmental regulations and requirements and finding suitable labour, which has been a major problem generally for many years. As expected, the other major question in the farmers' minds is the availability of cash and finance in its various guises.

For the preferred extension methods, the farmers rated most methods listed in the questionnaire relatively highly, except for computer-based systems. When asked for further comments no new methods were suggested. However the concerns over environmental, debt and financial matters, and also succession questions, were reinforced.

Given the data available from earlier surveys it was possible to compare the objectives and management styles of the farmers relative to large dairy farms, which showed quite large and significant differences. Similarly, age also has an impact, particularly on the objectives as the various stages in the typical life-cycle evolve.

The data was also used to examine the farmers' efficiency using the only efficiency variable available – production per hectare. This showed that the farmers' LOC, as well as their objectives, impacted on efficiency, i.e. their belief in what they control and their specific goals. Also, when analysing the farmers who had increased production by at least one-third, this rise was explained by the farmers' LOC and their level of anxiety. Effectively, LOC, objectives and personality were influential in more ways than one.

All the analysis makes it clear the farmers can be grouped using two basic attitudes. One group are largely content with their current situation, and another are keen on expansion to improve their finances and cover themselves for future cost price squeezes.

The conclusions, which are reinforced by earlier studies (Parker et al. (2000) and Westbrooke (2013)), lead the way to extension groups developing systems to assist the small farmers. Examples include providing workshops on environmental planning, mentoring groups to assist succession, and on retirement planning. In addition, financial management would be of interest to the 'expanders'. Both groups need to be catered for in the interests of national efficiency.

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FARMSTRONG
SUPPORTING FARMERS TO LIVE WELL, FARM WELL

The dairy industry and supporting industries are facing some tough times at the moment, with rural professionals seeing first-hand the stress this places on their farming clients. To assist farmers during these difficult times, FMG and the Mental Health Foundation have undertaken a joint initiative and developed the Farmstrong programme.

Farmstrong's purpose is to shift the focus of mental health from illness and depression to one of how to live well and farm well. It aims to highlight that farmers are the most important asset on the farm, and that by taking proactive steps to look after their mental and physical health, they're better prepared to run their business and support their family, staff and community.

Through www.farmstrong.co.nz farmers can access practical tools and resources that will help them take care of themselves with information on topics such as: nutrition, managing fatigue, exercise, healthy thinking, the importance of getting off the farm, and coping with pressure.

As rural professionals who are on-farm regularly and seeing the challenges facing the sector, Farmstrong's messages and resources can offer them the tools to help their farming clients in managing the ups and downs of farming.

If farming clients need help beyond Farmstrong's focus, then please call other support services such as the Rural Support Trust (www.rural-support.org.nz).

FARMSTRONG™
Live Well Farm Well

www.farmstrong.co.nz

SOME OF THE SIGNS OF STRESS TO LOOK FOR IN FARMER CLIENTS INCLUDE:

- BECOMING ISOLATED OR WITHDRAWN
- BEING NOTICEABLY NEGATIVE ABOUT THEIR JOB
- GOING THROUGH OBVIOUS MOOD CHANGES
- SAYING THEY FEEL WORTHLESS
- APPEARING TO BE DRINKING MORE

PHIL JOURNEAUX

The effect of environmental constraints on land prices

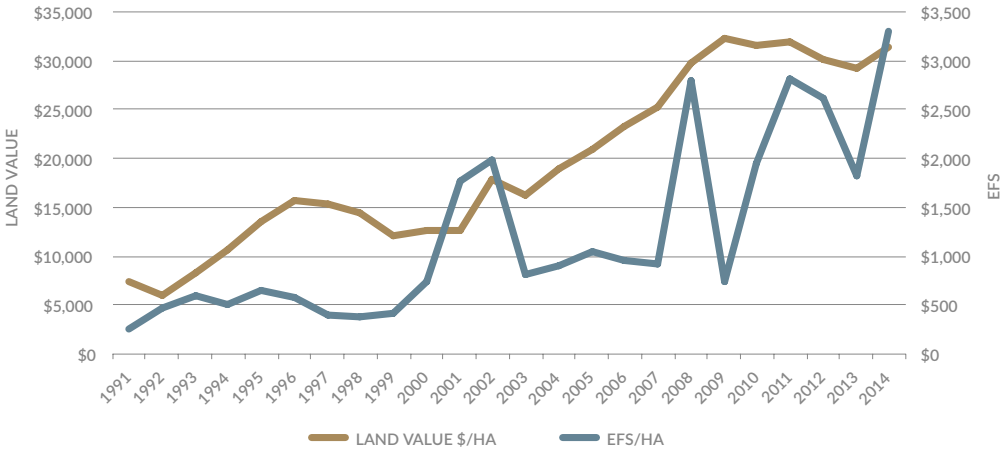
The value of land is often the largest balance sheet item of any farming business and is likely to be adversely affected by environmental constraints.

Land is also the key determinant of farm ownership, and (usually) a key factor in the level of debt a farming business incurs. The advent of environmental constraints is likely to have an adverse impact on land values via a variety of factors. As per my article in the September 2013 issue, there are three fundamental drivers of land value:

- **Productive value** – the value relative to the rent, or profits, obtainable from the land
- **Consumptive valu**e – this includes amenity factors such as recreational opportunities and scenery, plus intangibles such as the countryside is a nice place to live, a great place to bring up children, you're your own boss, and farming is a great lifestyle
- **Speculative value** – the ability of an asset to retain its value/the return on the asset as an investment.

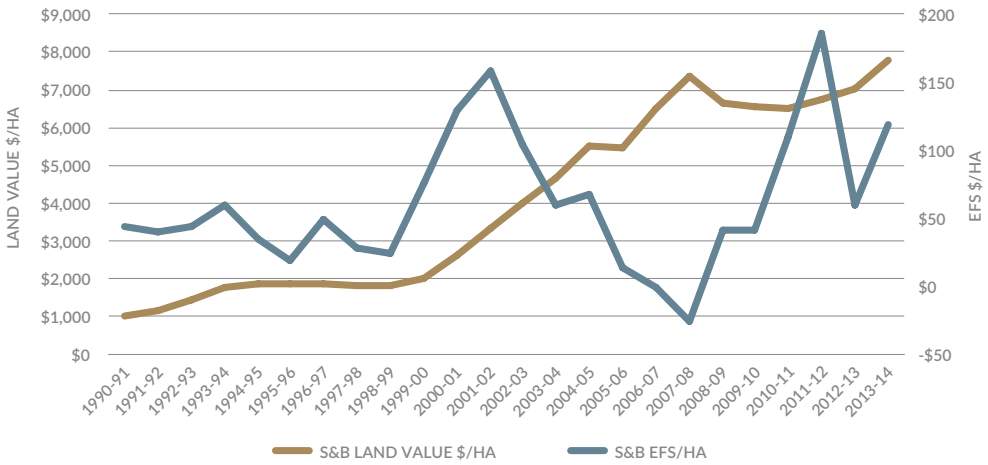
In addition, there is a lesser fourth component – transactional factors – which may affect the price on the day, such as forced sales and family transactions.

Figure 1: Dairy land value relative to economic farm surplus (EFS)



The advent of environmental constraints is likely to have an adverse impact on land values via a variety of factors.

Figure 2: Sheep & beef land value relative to EFS



Productive component

Of the above, it could be expected that the productive component has the biggest impact – that land values are largely driven by the profitability of the land being farmed. Analysis using DairyNZ and Beef + Lamb NZ data for the last 24 years at a national level is shown in **Figures 1** and **2**.

The correlation between these factors is shown in **Tables 1** and **2**.

Table 1: Correlation and regression analysis on land values vs EFS

	Correlation	R^2
Dairy land with EFS	74%	0.546
Dairy land with EFS lagged one year	71%	0.50
Sheep & beef land with EFS	13%	0.017
Sheep & beef land with EFS lagged one year	9%	0.01

This shows the relationship between dairy land values and profitability as moderate, while for sheep & beef land the relationship is poor. Further analysis relating sheep & beef land values with dairy profitability showed a much stronger relationship, which is perhaps not totally surprising given the amount of conversion over the last two decades. This also held for a comparison of North Island Class 3 hard hill country, which is unlikely to be converted to dairying any time soon.

Table 2: Correlation and regression analysis on sheep & beef land values vs dairy EFS

	Correlation	R^2
National sheep & beef land with dairy EFS	75%	0.56
Class 3 sheep & beef land with Class 3 EFS	17%	0.03
Class 3 sheep & beef land with dairy EFS	49%	0.43

So while there is a moderate influence of profitability on dairy land values, sheep & beef land values have been more strongly influenced by dairying compared to its own profitability. In essence, there is an expectation of intensification/land use change.

Consumptive component

The intangible values which make up this aspect of land values are hard to measure generically, as they vary both with respect to the individual and to the farming situation/location. But they can be a significant influence on farm values, with studies in the United States showing:

> *(New Mexico) ranch income was a statistically important determinant of land value, but yet a relatively small percentage of ranch value was explained by income earnings. Ranch location, scenic view, and the desirable lifestyle influenced ranch value more than ranch income. Consumptive demand applies significant upward pressure on rural land values and plays an important role in determining farm and ranch structure in Texas. Population density, proximity to major metropolitan centres, quality of deer hunting, and aesthetic differences across the state explain the majority of the differences in rural land values. On the average, only about 22 percent of the total market value of rural land in Texas can be statistically explained by its productive value.*

Over the period 1992 to 2014, nominal dairy land values have increased by 421% at a compound rate of 7.4% per year, while sheep & beef land prices have increased by 483% at a compound rate of 9% per year.

In another study, 66% of the value of the land was due to non-agricultural factors, particularly access to urban-based services and amenities.

Speculative component

This is the ability of land as an asset to retain its value and the return on the asset as an investment, and the analysis has shown that farmland in New Zealand has performed spectacularly well in this area over the last two decades. Over the period 1992 to 2014, nominal dairy land values have increased by 421% at a compound rate of 7.4% per year, while sheep & beef land prices have increased by 483% at a compound rate of 9% per year. At the same time the CPI is 61% larger in 2014 relative to 1992. In other words, land values have more than held their real value.

In noting this, the degree of capital gain is dependent on the time period under investigation. Over the last two decades, land prices have turned negative at different times and a person buying a farm in 2008, for example, will have gained 5% in value in a dairy farm or -8% in a sheep & beef farm relative to a 13% movement in the CPI, through to 2014.

Impact of environmental constraints

Since the advent of the Resource Management Act 1991, there has been an increasing emphasis on reducing the environmental footprint of our farming systems. This has been reinforced with the National Policy on Freshwater Management 2011, which directs regional councils to implement policies to improve water quality in their regions. The end result of this is that many councils are looking to impose limits on diffuse discharges on nutrients (nitrogen and phosphorous), microbes and sediment, from farmland.

On the assumption that dairying is currently the 'highest/best use' for suitable pastoral land, then while the advent of environmental constraints will reduce the profitability of dairying, it will also severely impact on the ability of forestry and sheep & beef land to be converted.

In addition to this is the Emissions Trading Scheme (ETS) with respect to carbon emissions. Currently agriculture in New Zealand is exempt from this, although its likely inclusion is a matter of time and politics. Both these factors will have an impact on farm profitability and the flexibility of land use change, and hence on land values. In meeting discharge constraints, farmers will need to implement a number of mitigation practices (e.g. improved effluent systems, fencing off streams, developing riparian margins, developing wetlands), and/or changes in management systems (e.g. reduced/changed fertiliser inputs, altered grazing management practices, reduced/changed supplementary feeding regimes, and reduced stocking rates). All of which impose a cost of some degree on the farm business and reduce profits. These can vary significantly depending on region, soil types, farming system etc. Examples include those set out in **Table 3**.

Similarly, the impact of any carbon charges is likely to have an adverse impact on farm profitability, although again this will vary.

So the overall situation can be complex and the impact on farm profitability can vary between different farms. Given the wide variability of the impact of discharge constraints on profitability, and the less-than-perfect relationship between profitability and land values, it is not possible to be too definitive about the relationship between discharge constraints and land values. But the likelihood of constraints having an adverse effect on land values, via impacts on farm profitability, is high.

A more significant effect is likely via the reduction in the ability to either intensify land use or achieve land use change. One of the strengths of New Zealand agriculture has been the ability to rapidly change land use, largely driven by the relative profitabilities involved. With the advent of environmental constraints, this ability will be curtailed.

As noted earlier, the value of sheep & beef land has been more closely correlated with dairying profitability than its own profitability. If the conversion to dairying, or another more intensive land use, is curtailed (a high probability) then there is likely to be an adverse impact on sheep & beef land values.

On the assumption that dairying is currently the 'highest/best use' for suitable pastoral land, then while the advent of environmental constraints will reduce the profitability of dairying, it will also severely impact on the ability of forestry and sheep & beef land to be converted. In this sense, therefore, the biggest proportional impact of environmental constraints on land value could be on the value of forestry, under-developed land and sheep & beef land.

This impact can be illustrated via the Taupo and Rotorua Lakes catchments, both of which have been operating under nutrient limits in recent years. Based on the (limited) data available, the value of drystock farms within the catchments is 37% less than farms just outside the catchment, while the value of dairy farms is 27% less.

In regions that have recently applied discharge constraints, e.g. Canterbury, purchasers are becoming much more cautious and are looking closely at factors such as soil type, nutrient discharge allowances and proximity to sensitive water bodies. In many instances, farm auctions have ceased due to the problems of carrying out due diligence. In some regions, the economic

Table 3: Impacts on environmental mitigations on farm profitability

Source	Year	Mitigation	Impact on profit
Howarth & Journeaux	2015	Low N feed	0 to -7%
		Change N fertiliser usage	-1 to -10%
		Use of feedpad	+14 to -11%
DairyNZ	2014	Range of mitigations to reduce N leaching from 10% to 40%	-4% to -35%
McDowell et al.	2013	Range of mitigations	No $ costings given, although relative costings varied from 0 to 100

modelling on the impact of environmental constraints has assumed a degree of 'reverse' land use change in order to meet the required 'water quality requirements' e.g. dairy ➜ sheep & beef ➜ forestry.

This is yet to happen, but if it does it will result in a (potentially significant) loss in land value. An indication of the land value differential is outlined in **Table 4**.

Table 4: Differences in farm land values (land & buildings)

Farm type/source	Year	Value $/ha
Dairy: DairyNZ – national average	2013/14	36,365
Sheep & beef: Beef + Lamb NZ – national average	2013/14	8,182
Forestry: Telfer Young – North Island average	2013/14	2,486*

*Net of trees

Given the degree of loss of value as a result of such land use change, it could be expected that this 'reverse' land use change would be resisted and hence be very sticky.

Conclusion

Environmental constraints, in the form of reduced discharges of contaminants to water and (potentially) greenhouse gases, will have a two-fold effect on farming:

- By increasing costs/decreasing profitability, which affects the productive component of land value, and
- By significantly reducing the opportunity to intensify production, both in-situ and via land use change, which affects the speculative component of land value.

The impact via consumptive factors is again difficult to determine generically. While, for example, an improvement in water quality within a river or lake may result in improved consumptive value for properties bordering the river/lake, quite possibly this value for those properties was already high and an improvement in water quality may only result in a relatively small increase in land value. Alternatively, if the pre-existing water quality was very poor, and the improvement in quality as a result of the constraints meant that the river/lake was now swimmable and/or fishable, the rise in consumptive value could be high.

Given the complexity of the interactions between the factors affecting land value, it is difficult to readily quantify the degree to which environmental constraints will impact on land value. However the probability of an adverse impact is very high, which in turn will affect the credit risk of farming.

Overall, though, this will be a transitional effect – current land owners will bear the brunt of this before a new equilibrium is reached. Also, it is likely to take some time for impacts to work through the system. There is also a potential antidote to this impact – innovation into high-value low-environmental impact farming systems. A topic for a future article.

PHIL JOURNEAUX is a Consulting Agricultural Economist with AgFirst Waikato based in Hamilton. A paper on this issue can be found at: www.agfirst.co.nz/images/uploads/The_Effect_of_Environmental_Constraints_on_Land_Prices.pdf
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GAVIN McEWEN

Has information technology failed to deliver for New Zealand agriculture?

What are we getting right, what's going wrong, and what do we have to look forward to in the future?

History of agricultural IT

Has information technology (IT) failed to deliver expected results for pastoral agriculture in New Zealand? For years, and in some cases decades, we have been led to believe that advances in the application of IT would lead to significant increases in productivity and profitability. Each year millions of private and public dollars are invested in agricultural IT, yet pastoral farming remains relatively unchanged from 20 years ago. There are some significant developments, but in most cases uptake by farmers is snail-paced – so what's happening?

IT involves the development, implementation and maintenance of computer hardware and software systems to organise and communicate information. Since the use of computers became mainstream in modern society and business, which is generally accepted as the late 1980s and early 1990s, applications for agriculture have also been developed. Starting initially in research and tertiary educational institutions, fast followed by enthusiastic farmers who dabbled with computers and software, there has always been a stream of software applications targeted towards farming businesses.

The adoption of IT for financial management has been one area of relatively widespread acceptance by farming businesses. Another has been herd performance recording in the dairy industry. Livestock Improvement Corporation's MINDA application has over 90% market share, a dominance few others can rival in any industry, with the possible exception of Microsoft's Office suite.

Resistance to change

Unlike most modern businesses today which would struggle to operate without computer systems – a reflection of the widespread adaption of IT – most New Zealand farms can still operate effectively without bits and bytes. Speaking generally, because there are always exceptions, there is still a suspicion and reluctance to fully utilise IT on-farm: 'Listen, no bloody computer is going to tell me how to farm!'

No doubt intuition and gut feeling has served well in general, but can the reluctance to fully embrace IT last? Will the increasing pressures being faced by New Zealand farmers this century, such as environmental compliance, increased drought frequency and fluctuating prices, force more reliance on modern day tools like computers and IT?

Software applications

There are three main categories of software applications applicable to New Zealand farmers (see **Figure 1**):

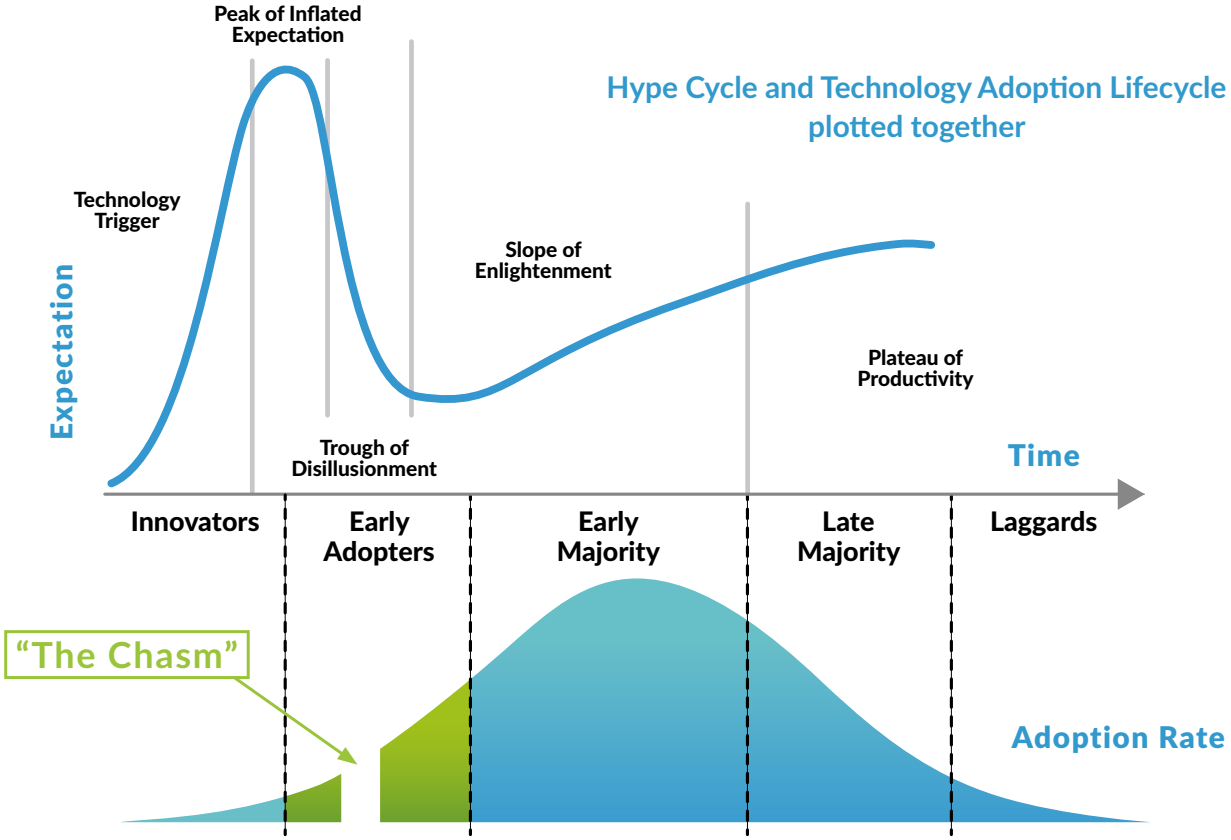
- Financial applications like Cashmanager RURAL and a more recent contender, the Figured/Xero combination, are relatively widely used and focus on prudent cash management and the need for all farm businesses to submit statutory accounts.
- Data recording and geospatial applications seem to attract the most attention by developers and include MINDA, AgHub, Farm^{IQ}, Smartmaps, Land and Feed, and Agri360. This category focuses on providing a container to store the myriad of data that can be collected off a New Zealand farm, and also gives the ability to display it in a spatial format.
- The last category is comprised of applications that model different aspects of a farm business. By using scientifically validated principles, these applications forecast or predict likely outcomes given certain parameters of real or hypothetical farms. Examples are the environmental output model Overseer and farm system models like Farmax and UDDER.

Given the dominance of the agricultural sector in the New Zealand economy, it is understandable that the market of farmers has attracted a lot of attention from software development companies and entrepreneurs over the years.

Figure 1: Main categories of farm software (examples of applications not exclusive)

FINANCIAL	HISTORICAL DATA RECORDING & MAPPING	MODELLING & DECISION SUPPORT
» Cashmanager RURAL	» Farm^{IQ} FMS	» Farmax
» Figured / Xero	» MINDA	» UDDER
» iAgri	» AgHub	» Overseer
	» SmartMaps	
	» Land & Feed	

Figure 2: The hype cycle vs technology adoption curve



Given the dominance of the agricultural sector in the New Zealand economy, it is understandable that the market of farmers has attracted a lot of attention from software development companies and entrepreneurs over the years. Every year during the National Fieldays at Mystery Creek a new software application set to revolutionise the farming sector is released. Sadly, very few have ever achieved that promise.

At around 25,000, the market size of 'professional' New Zealand farmers is relatively small on a global scale, and is notoriously hard to get to what is called the 'tipping point' of market penetration. This is a concept popularised by Malcolm Gladwell in his 2000 publication, *The Tipping Point*, which hypothesises that a product or idea will reach the mainstream once 15-20% of market penetration has been reached.

In the uptake of technology products, the agricultural industry is no different. A market can be segmented into stages or groups of consumers with common attributes that tend to reflect the market penetration of a new technology or product. As shown in **Figure 2**, the innovators consisting of 2.5-5% of the total market are the first to buy in. These are the risk-takers or enthusiasts who pride themselves on being first and having a go.

The early adopters come next, an informed group who are often industry leaders and like to keep ahead of the pack. This group consists of around 15% of the market and it is in this phase of market development there exists 'the chasm', a glass ceiling that many technology products fail to push through at somewhere between 5-15% market share. This is where many attempts at delivering software solutions to New Zealand farmers have ended. They cannot get over the chasm to achieve a market share that makes their investment worthwhile and sustainable.

In the past three decades it is estimated that $200 to $400 million has been invested by the public and private sectors in IT software applications focused on the agricultural sector.

The hype cycle

The tipping point theory also coincides with another about market dynamics called the hype cycle, and it is something most people are familiar with, but farmers in particular seem highly attuned to it. Most new technologies are met with high expectations fuelled by savvy marketing, media hype and increasingly social media. Take for example robotic milking; a decade ago it had the potential to revolutionise dairy farming, yet we are still waiting. The innovators and a few early adapters have bought into it, but market share is small and the majority are still yet to be convinced.

New technology has a habit of being constantly over-hyped and expectation can rapidly peak before crashing into the trough of disillusionment – this often coincides with products trying to cross the chasm. There are a great number of products that face this challenge and software-based products are no exception. So what's going wrong? Why are IT products often struggling to cross the chasm and become mainstream? It is not through lack of trying and investment. In the past three decades it is estimated that $200 to $400 million has been invested by the public and private sectors in IT software applications focused on the agricultural sector.

Apart from a few notable exceptions the return on investment is very poor. The first question that needs addressing is: are we on the right track? Can IT products really add value to farm businesses? Anecdotally, yes. But there is no silver bullet; great agricultural software systems do not transform a farm business from average to upper quartile overnight or in isolation.

IT has been most successful where it is used as a tool in combination with other factors such as motivation, regular data collection and following good business principles. Software systems are just modern tools, in many respects no different to any other farm implement, but good software systems leverage information. Information that leads to sound, efficient and timely decision-making.

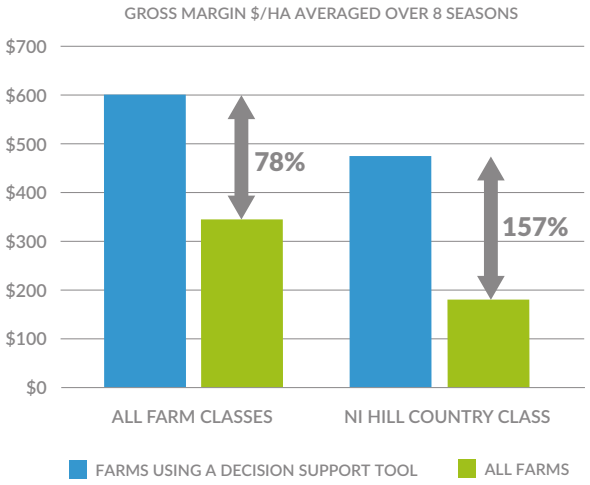
Examples of IT adding value

An example where IT has helped improve farm profitability is the MINDA system. The modern dairy cow produces a vast amount of data during her productive lifetime. Through analysis and benchmarking of that data – a job almost impossible by hand as the average herd size is now over 400 – herd owners are constantly skimming off the poor producers and replacing them with animals of higher genetic merit and production potential. Over the last 20 years, IT has contributed to the performance of the national dairy herd, achieving 1.3% per year increase in milksolids production through genetic gain.

Another example is found in the sheep and beef industry when comparing the performance of farm businesses who utilise decision support tools (DSTs) against the average performance of all drystock farms. Gross margin per hectare is used as the benchmarking indicator, because it filters out any noise or bias introduced by including farm expenses that are highly variable and dependent on the type and intensity of the farm.

Comparing farms using modelling software to all other farms over eight seasons from 2004 to 2011, Farmax statistics show average increase was 78% – $600/ha gross margin compared to the national average of just over $300/ha. For North Island hill country farms, the difference was a staggering 157% (see **Figure 3**):

Figure 3: Comparison of sheep & beef farms that use a decision support tool vs the industry average (all farms)



Why then, when there are excellent examples of innovators or early adopters getting substantial financial benefit from incorporating these IT tools into their farm businesses, isn't everyone doing it?

Reasons for failure and lack of uptake

It is easy to generalise about farmers, but in truth they like simplicity and reliability. Why? Because it makes business sense. They get more work done, quicker. There is no better example than the humble tractor; it starts first time, it is reliable, and it gets the expected job done. Unfortunately, you cannot say the same thing about computer hardware and software. There are too many examples of overly-complex, difficult-to-use, error-ridden software.

Software developers are often guilty of being too clever for their own good. Developers love the challenge of converting real-life procedures and practices into

computer code and early adapters get caught up in the hype. Before long we have bloated, complex, difficult-to-use software that turns off all but the most dedicated and persistent users. There are some rules or guidelines that all software developers targeting the agricultural sector need to keep in mind:

- **Rule No. 1:** Keep it simple and intuitive, and hide complexity so I can find it if I need it. The popularity of the iPhone and apps have done all average Joe users a huge favour in setting the standard for user-friendly, simple-to-use applications. A lot of software on the market today has so many functions and features it ends up confusing and discouraging users. Agricultural software is no different, and to encourage uptake and maintain use the application should not require a large investment in time to learn.
- **Rule No. 2:** Do not waste my time by making me enter data twice. Your average computer user, let alone time-poor farmers, do not like having to enter copious amounts of data into a computer, even worse doing it twice.
- **Rule No. 3:** Unless it adds value to the farm business, don't bother me.
- **Rule No. 4:** Just tell me what I need to know and forget the rest. There is a science to the display and interpretation of information. Take, for example, a herd test report for an average-sized herd of approximately 400 cows (see **Figure 4**). With over 10 pages of data, and numerous rows, columns and cells to navigate, misinterpreting the data is easy. But mistakes are costly.

The value proposition of IT-based products increases if the information being delivered is understandable, easy-to-comprehend, and often visual. A good example is the new way of displaying somatic cell count results from a herd test, as shown in **Figure 5**. In other words, feed in the relevant data, turn that data into information, and deliver it in a way that promotes action.

Solutions for greater uptake

IT tools can and do make a difference in farm businesses, so what can we do to encourage their greater utilisation?

Education and awareness

Education and awareness are the cornerstone of adoption. First, it makes farmers aware of what is out there, and second, users can be trained in how to best utilise the tools. While it is obvious to introduce agricultural IT tools at secondary and tertiary levels to prompt generational change, there are plenty of older generation farmers who are willing and motivated to attend workshops or training seminars provided by industry organisations and private enterprises.

Ongoing training opportunities, backed up with excellent help desk support, are ways to help new users stay motivated and engaged. An increasing trend now that broadband internet is becoming more widespread on-farm is using remote control software for support and training. The ability for the support person to view and share the user's screen is a leap forward in the way help desk services are delivered. As a vehicle for either individual or mass training, webinars are also proving popular and use similar technology allowing live, interactive questions and discussion.

Figure 4: A typical herd test report

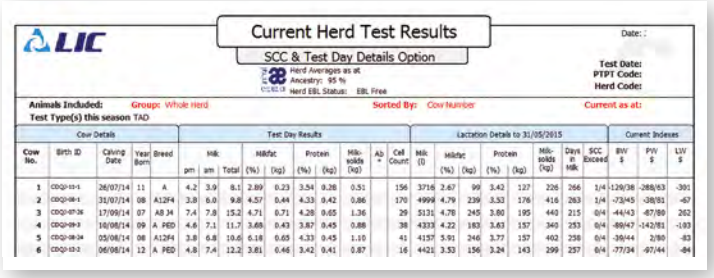
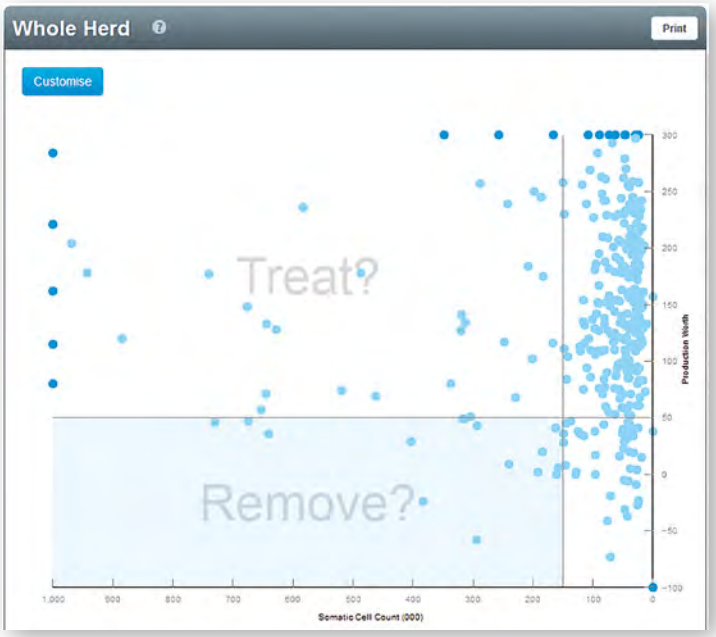


Figure 5: A more graphical and interactive way of displaying a large amount of information – each dot represents a cow in the herd



Data sharing

Careers in farming appeal to those who enjoy the physical challenge and freedom to work outdoors as opposed to being pinned to a desk. Spending extended hours in front of a computer screen is not something most farmers would say they enjoy, so the less time entering data into software applications the better. The paradox is that most applications being promoted today to New Zealand farmers have an insatiable need for raw data before they deliver any true value.

'Automagical' is a term coined to explain data that 'just appears' from other sources and knows where it belongs. The best example of this is automatic bank feeds: transactions from the bank that automatically end up in the user's financial application and, better still, are

The need to link farm system modelling tools with environmental modelling tools like Overseer has been demanded for years by practitioners.

often coded from the chart of accounts. Remember the days when it was necessary to wait for the paper bank statement to arrive, then laboriously enter all the data into the cashbook application again, and then the need to code it? No more. It now automagically appears in the application.

Other examples are appearing in the fertiliser industry. On-farm fertiliser application information is automatically fed into paddock recording and mapping software, showing date of application, what was applied, and even where it was applied thanks to sophisticated GPS technology.

We are starting to see carcass weight information being linked with livestock sales, milk production data appearing shortly after collection, pasture cover data being uploaded via the internet to create instant feed wedge graphs, and animal health information from vets being populated into animal recording software. The list of possibilities goes on.

Mobile applications

An emerging trend that farmers are ahead of the bell curve in is the mobilisation of computing power. Smartphones in combination with clever, intuitive apps and enhanced internet connectivity have broken the shackles of computing power only being available at the farm office. Observe any meeting of New Zealand dairy farmers in a local hall nowadays and they will be pulling out their smartphones to check daily milk production, what the somatic cell count was, and how the whole milk powder price fared at the latest auction.

Integration and collaboration

While many of these changes are gathering uptake momentum, we are not there yet; there are huge gaps in functionality, user-friendliness and capability. There is no shortage of world class applications directed towards the farming market. There is, however, historically a real lack of integration and collaboration between the providers of software applications. This is without doubt one reason why most farmers have been slow to adopt, in particular, paddock recording and farm modelling software. Linking applications from different vendors is too hard and frustrating, prompting inaction and eventual apathy towards these tools because of the difficulty and lack of benefit.

New applications like Xero and Figured have it engineered in by default. Companies like FarmIQ are pushing boundaries through sharing data with NAIT and processing companies. Even established players like Cashmanager RURAL and Farmax have collaborated to enable the transfer of data between their systems, resulting in less double entry of data by their shared customers.

There are some glaring gaps in integration capability. The need to link farm system modelling tools with environmental modelling tools like Overseer has been demanded for years by practitioners, who are increasingly analysing farm systems changes for environmental output and associated profitability impact, but it is yet to happen. It is up to the software vendors and industry to collaborate and allow better integration because the outcome will be more productive, profitable and sustainable farms. On a national and global scale there is opportunity for New Zealand to produce to command premiums, not only through quality, but also by integrated IT systems underpinning and validating those market premium attributes.

Who's got my data?

A side effect of data sharing and integration is increasing concern by farmers around guarding and understanding who has access to their data and how it is being used. The Farm Data Code of Practice is an initiative funded by DairyNZ and FarmIQ that puts in place an agreed minimum best practice where member companies will apply for certification. Companies able to show their Code of Practice membership will help demonstrate to farmers that their data is being handled in a responsible and ethical manner.

Another industry-based initiative is the Data-Linker, a mechanism that will give farmers direct control over who they share data with. It relies on most information system vendors being party to the Data-Linker system and having a reasonable level of data standardisation and sharing ability built between them. This is a work in progress with a prototype expected in 2016.

More profitable farm businesses

How all that computer-generated information could be amalgamated and used for industry good, or to solidify our position as a high-quality food producer suppling global markets, is another opportunity waiting to be tapped. New Zealand farmers are fortunate to have some of the best IT systems in the world available to them. However lack of integration, ease of use and value proposition are hindering uptake for many farmers. Apathy towards and difficulty of data collection creates further issues.

IT on New Zealand farms is at a crossroads, but steps are being made in the right direction. The future of agricultural IT is looking brighter with better education, collaboration and integration. This, in turn, will drive a faster than generation change to enable more profitable, sustainable and resilient farm businesses.

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James Brennan and Richard Scholefield of Whangara Farms near Gisborne with the Tru-Test indicator that sends information to the Farm[IQ] System

COLLIER ISAACS

Putting farmers at the centre – improving productivity with farm management software

New software is creating new opportunities for farmers and their advisers.

A farmer wakes up in the morning, and there's a message on their watch saying the farm has been thinking overnight. The farm's message says it has identified a number of issues, solutions and opportunities based on the latest data from sensors on the farm, fertiliser and livestock futures prices, as well as the most recent 12 month weather run and interest rates. It gives some conclusions and options and asks if the farmer wants to do anything.

In the past 10 years technology like tablets, mobiles, more powerful personal computers, high-speed internet, new coding languages, computing in the cloud and sensor technology have changed the software scene dramatically. I don't know of any farmers waking up to the above messages yet, but it cannot be far away.

It is important to note that when the software system reports it has been 'thinking', it would still work within parameters set by the farmer. Also, it is working with information, assumptions and goals that directly reflect the physical farm and the real-world operation of the farm business. In the longer run, farm advisers will need to make sure they stay ahead of the watch in communicating with their farmer clients.

It seems every week now you read about a farmer experimenting with a drone – and it makes a lot of sense because a drone can potentially carry all kinds of sensors to provide objective information about land, animals and feed. It can help overcome distance as a barrier to regular visual assessments on sheep, beef and deer farms.

Soil moisture sensors as part of weather stations are reasonably commonplace now, but there is a whole new generation of sensors in development, e.g. to measure water quality. The rapid pace of this development is why there is so much new farming software now.

But there is a rationale behind all of this that I believe will work well for farmers and their advisers. The thinking is that between all the companies working in this area we want to produce the full range of software that farmers

It is one thing for a farm to be getting more data, but are they getting the right data, and do they have the capacity to interpret it and come up with useful options? This is where rural professionals can help.

and their advisers need, with as little overlap as possible. And it is working fairly well. There is some excellent software being developed, e.g. to help a farm record animal genetics, manage nutrients and finances, and plan feed allocation. We also want to build integration between the different software so that farm information can be shared and farmers then only have to enter information once.

Opportunities for rural professionals

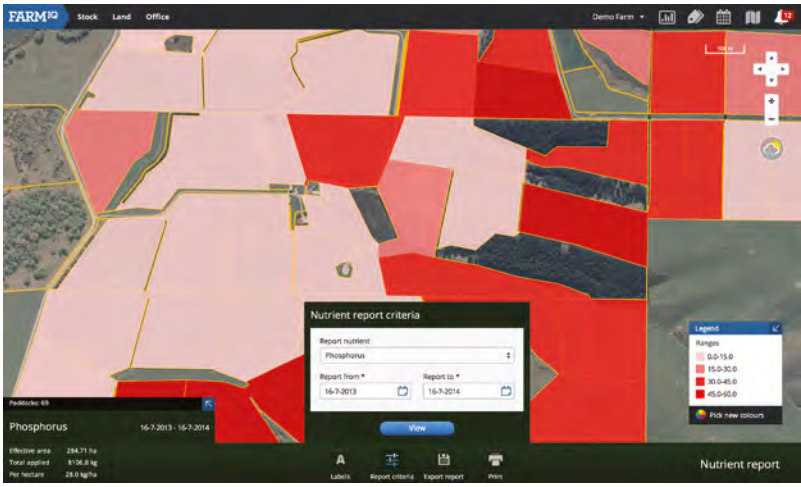
The development of farm management software presents new opportunities for rural professionals. It is one thing for a farm to be getting more data, but are they getting the right data, and do they have the capacity to interpret it and come up with useful options? This is where rural professionals can help.

Farm management software companies need to build alliances with rural professional groups, including farm advisers and vets, to explore the opportunities. To date, we have found that advisers and vets are using the recording and reporting functions of farm management software to help them manage farms or mobs of animals they are directly responsible for.

To work in an advisory capacity with farm owners and managers, it helps if rural professionals are using the same farm management software as their clients. Cloud computing makes this possible because farmers can give log-in access to others, including their off-farm professionals. The farm adviser can then look through what is being recorded and use the reporting and analysis tools to spot problems and opportunities.

Cloud-based farm management software can easily pull together reports for any period of time or number of mobs. Over time the software can build up a valuable set of aggregated data as well, which can used for developing benchmarks, either within the farm or across similar farms that are using the software.

An example of this is collated disease and defect data. This information from the processors is of itself not new, but some software has been designed to bring it together and present it in a way that makes it easier to see trends and



Farm^{IQ} System screen shot showing nutrient mapping

compare a farm's performance with relevant benchmarks. This can show farmers the areas that are costing them money and need attention, but it often takes an adviser to draw it to their attention.

What can be challenging for farmers is developing on-farm comparisons. Farm management software can be a perfect tool for comparing things like animal breeds, suppliers, forages or health treatments. This is something new – the ability to objectively measure the effect of any of these things on performance within the farm setting. These comparisons are largely based on EID tags as these enable things to be detected at a finer level. Farmers can see things they never had a way of viewing before – like comparing one lambing block to another, or identifying individual ewes that consistently under-perform year after year.

The right information needs to be collected at the right time, probably at several stages during the year, and then it needs to be analysed and interpreted. That is when farm advisers can have an important role working with farmers. An adviser could work with their client to determine what aspects of the farm operation should be investigated and design the data capture plan.

Some software has planning functionality that can be used to set up plans. These plans can automatically initiate tasks to get things done during the year, allocating tasks to the relevant staff, contractors or professionals.

Data integration

No farm management software should be standalone. Instead, it needs to be designed to integrate with a range of data capture devices and data suppliers to make it easier for farmers to record, analyse and report animal and land data. This integration makes it accessible and realistic for farm businesses to use. For example, a mobile app with online and offline capability lets farm staff record into their farm database as they work on-farm, reducing the need for after-hours office time. Integration with weigh indicator boxes enables easy data capture during stock-handling activities such as weighing.

A 2012 survey by Farmax showed that around 65% of sheep and beef farmers were frustrated by having to separately enter

the same data into a number of software programmes and they wanted to see integration between software systems. It is about making farm data work for farmers, rather than farmers working for their data.

As one farmer commented, 'If you have multiple systems, you tend to keep one up-to-date; not all of them. Using… two together will give a more full picture of what is happening on the farm… I will be able to use the combination [of two systems] to test a thought. I'll be able to see the impacts of a production scenario on all the aspects of the farm operation and the farm business.'

To back the integration between systems, technology companies are supporting the Farm Data Code of Practice, which guides ethical practice in data sharing (see www.farmdatacode.org.nz).

Assurance and compliance

When starting with farm management software, several farmers have noted it is a good idea to identify a few issues to start with and then develop from there. For many users, their initial focus is covering off assurance and compliance requirements. Some of them no longer use paper notebooks at all for recording key farm information.

Health and safety is an area of increasing importance. Recently Farm^{IQ} Systems released a new health and safety module, which was developed in consultation with Worksafe New Zealand. It is intended to help farmers meet their requirements as an employer by providing recording and reporting functions. The new module includes recording staff training and meetings, inducting contractors, handling visitors, and registering hazards and incidents. Users can create map layers showing hazards. Land and environment management is another key area and a new module has also been developed for creating a Land and Environment Plan.

The Farm^{IQ} System

This software is a tool that farmers can use for recording and analysing information about their land, feed and animals. In doing so, it brings the farmer and their farm management to the centre of the farm software scene.

The aim of the Farm^{IQ} System is to drive farm productivity and profitability and deliver consistently high-quality meat cuts to export markets. We see this as the key to developing sustainable returns for sheep, beef and deer farming, which is particularly important for the long-term viability of hill country farming in New Zealand. For individual farmers, the system is an information hub enabling comparisons and benchmarking of farm performance, including meat quality, providing them with linkages to the red meat consumer and supporting their planning and decision-making.

Flexibility means farmers can use it to help achieve their own goals. At its simplest, they can use it as a handy diary and task planner on a mobile. Beyond that they can also use it to record a range of inputs and measurements of paddock and animal performance, including carcass performance, and then apply the analysis and reporting tools. It also includes an interactive farm map.

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FARM ADVISER CASE STUDY

Software helps advisers work effectively

Southland farm adviser Graham Butcher says the Farm^{IQ} farm management software can help advisers work more effectively with farmers. Based in Gore, he has been on the steering committee for local farmers Barry and Julie Crawford's Farm^{IQ} technology project since it started in 2011. The Crawfords have set very high targets for their farm to achieve and Graham enjoys working with that challenge.

He notes that the on-farm recording the Crawfords do with Farm^{IQ}'s online farm management software is fundamental. Farmers can pick the level of recording they want to do. Once information is in the farm database, they can find it quickly. Graham recently took 40 local farmers from two discussion groups to the Crawford's Rosebank Farm to give them a sense of what is possible.

The software can help address the fact that farmers vary in their ability to give an adviser hard data about what is happening on the farm. Graham says, 'Often what you get is anecdotal – you ask a question and they will give facts like average kill dates and weights. Some can give it to you off the top of their head and others have to go away to find it – and if you didn't ask they wouldn't.'

He was looking at the block of red clover the Crawfords put in three years ago as a specialist finishing crop and wanted information on how many kilograms of lamb per hectare it grew versus the rest of the farm. Using the software, that information was instantly available. To get that figure any other way would have involved a lot of work.

Graham Butcher, Southland farm adviser

BRIDGIT HAWKINS

Using the digital revolution in agriculture to improve the environmental footprint and profitability

Dairy farming has changed a lot since each farming family had a few cows hand-milked into a bucket, hand-churned it to butter, or the milk was taken a short distance to a collection point and the end product consumed within a small radius of the farm.

Digital revolution

Now 1,000 cow herds are not uncommon, newly-built dairy sheds have as much automation as a sophisticated manufacturing plant, and the milk can travel hundreds of kilometres to where it is processed and thousands of kilometres to where it is ultimately consumed. A lot of this change was driven by the industrial revolution – now we are in the digital revolution. So what change is this bringing?

The terms big data, analytics, data mining, the cloud, convergence and connectivity are what we are all grappling with now. On today's farm, data is being collected at an ever-increasing rate, often automatically. Individual electronic tags on animals, weigh scales, milk meters, GPS tracking on anything that moves, computer chips in every piece of equipment or machinery, satellite imagery, pasture measurement, soil mapping, water metering, animal health – the list is extensive.

As broadband speeds are improving through rural New Zealand, combined with increased cellphone coverage and the large number of smartphones users, all this data can get to the cloud with an ease, speed and reliability that even five years ago would not have been possible. All the ingredients for digital disruption are in place.

Changing consumer trends

Running alongside the digital revolution is a change in how consumers want to interact with food. Food security is not something we worry about in New Zealand, but is increasingly important in many of our export markets. Food safety and sustainable production are also significant considerations – as are eating locally, eating in season, and eating food that has not required any type of exploitation in production.

Social media

The other major change to put into the mix is social media. We now live in a world where an event, real or fabricated, can be known all over the world in a few short hours. Along with the speed and spread of messages they are largely driven by ordinary people, not controlled or monitored or massaged, but just what these individuals actually think.

This can be positive and empowering – those consumers who on the other side of the world want to feel connected to the food they eat can follow the blog of a farmer in New Zealand – complete with pictures of green grass, happy cows and smiling children. However they can also read stories of when things do not match up to their expectations of sustainable, local and ethical production.

Reducing environmental footprint

So what does all this mean for New Zealand agriculture and for businesses that help farmers manage nitrogen, effluent and water? There are three important drivers that will influence the scope and rate of change:

- Farmers still need to go out every day and do farming activities – like irrigate effluent and water – to be profitable businesses and to generate the economic activity New Zealand depends on and wants to grow
- Technology is enabling many of these day-to-day activities to be done better, smarter and faster – and the underpinning technologies are changing at an ever-increasing rate
- There is a burning platform for changing practice in New Zealand agriculture driven by the National Policy Statement for Fresh Water Management or NPSFWM – doing the same or more of the same is not an option.

Put simply – farming has to keep evolving to meet the values and needs of our consumers. Today that means we have to

The operation of the effluent irrigator can be monitored to ensure that if it is switched on when the recommendation is not to irrigate, then an alert text is sent.

reduce our environmental footprint and create more value for each unit of output. Technology is an enabler that will play a large role, but to have an impact on changed behaviours it has to connect to what farmers do every day.

Smartphone services

Regen has developed three services for farmers that are designed to bring the science and technology needed to farm sustainably right to the farmer's pocket – through their smartphone. Each of the services was designed starting with the farmer in mind – how do they currently do this job, when do they do it, how do they make the decision to do it? With that knowledge, the relevant science was packaged up with farm-specific near real-time data to generate daily decision support.

Effluent management

Regen Effluent sends a daily text to the farmer letting them know if it is appropriate to irrigate effluent or not, and if so how much. This is driven from a farm-level soil-water balance and the specific consent conditions for the farm related to effluent disposal. Following the daily recommendation reduces the risk of over-irrigation causing drainage or run-off, and gives staff the confidence to irrigate and so keep the pond level as low as possible. The text gets sent each morning at 8:15 am and is also available via email. Each month a summary report is emailed which collates the entire metrics for the month and year-to-date.

In addition to the daily text recommendation, the pond level can be monitored and reported against monthly target levels. The operation of the effluent irrigator can be monitored to ensure that if it is switched on when the recommendation is not to irrigate, then an alert text is sent. All of these services ensure that the effluent infrastructure on the farm is being used day-to-day as well as it can be.

Effluent is a resource that via appropriate irrigation is returning valuable nutrients back to the soil. But when the irrigation is inappropriate – when the soil is too wet – it becomes a pollutant. Simply having a large storage pond is not the answer to good effluent management – the effluent still has to go out on the right days. As all the data to provide the recommendation and to record when irrigation did happen is automatically telemetered, it provides a comprehensive, auditable record that best practice is being carried out 365 days a year.

Nitrogen management

Regen Nitrogen aims to make the fundamental principles of using nitrogen fertiliser easily accessible for farmers and linked to what is happening on their farm. Using the data that is being collected via the weather station on the farm, the simple mobile app displays where the current soil moisture and temperature is sitting compared to the optimal conditions for growing grass (see **Figure 1**). The user enters the type of nitrogen fertiliser they are planning to use and the application rate. The app calculates what response is likely and converts that to a cost per kgDM.

There are many factors that contribute to the ultimate pasture response to an application of nitrogen fertiliser, but for grass to grow there needs to be adequate moisture and temperature. Over the last decade farm practice has seen a lot of nitrogen applied when these fundamental conditions are not met – the soil is too wet, too dry or too cold. In these circumstances the nitrogen will gradually be leached or volatilised. This has the double negative of releasing nitrogen to the environment and increases the real cost of the grass that has been grown.

Water management

Regen Water enables farmers to irrigate water at the right time to ensure soil stays in the optimal zone for pasture growth while avoiding over-irrigation or under-irrigation. The service is based on running an irrigation block-level soil-water balance and is specific for the major soil type in that block and the irrigation capability. The service takes into account the current soil-water deficit, and along with the forecast weather generates a five-day irrigation recommendation which aims to keep soil moisture at the top of the optimal zone.

Over-irrigation leads to higher nitrogen leaching, uses more water and electricity, and causes wear and tear on the irrigation equipment. Often, however, a farmer's default behaviour is that it is better to get water on than risk under-irrigation, especially if there is the risk of water restrictions later in the year. Every soil has a maximum amount of water it can hold, but this is not easily visible to the farmer. The service enables farmers to have a clear view of the recommendation and current soil moisture status via the simple mobile app (see **Figure 2**). Showing

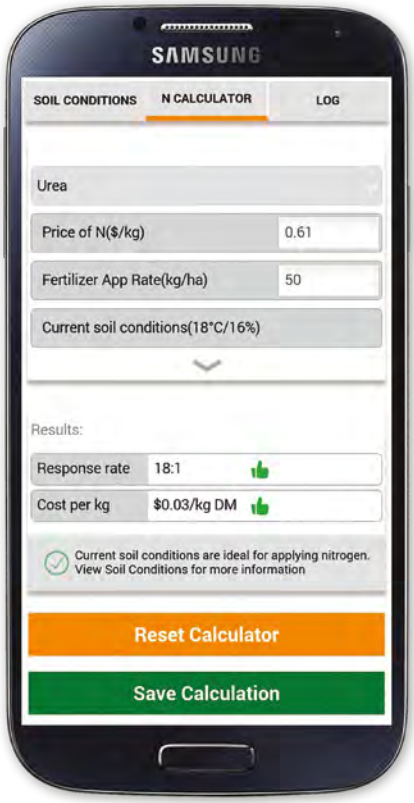

Figure 1: Regen Nitrogen app

Figure 2: Regen Water app

Providers of technology solutions for farmers have to ensure that how we package it up fits with the people concerned and how they work day-to-day. Get that right and there are significant advances in profitability and environmental outcomes to be captured.

not only the daily irrigation recommendation, but also the current status, gives the farmer confidence that the recommendation is appropriate and they can link it back to what they observe in the field.

In addition to the day-to-day benefit of having an irrigation recommendation available at their fingertips, the service has all the information required to demonstrate that the farmer is operating good management practice for water irrigation and has reporting that can be provided when the farm is audited.

Technology benefits

One of the challenges of getting significant changed practice in any area of farming is convincing individual farmers that by doing things differently their outcomes will not be negatively impacted. While there is the burning platform of the requirement to reduce leaching to meet the goals of the National Policy Statement for Fresh Water Management, convincing farmers that being more efficient with resources will also improve productivity, and profitability will amplify the rate of change. Technology should also enable this by allowing wider and wider sources of data and information to be brought together to build the story of the real gains that can be achieved.

Matching up efficient irrigation with pasture growth and milk production and then, for example, reporting on the value of milk per unit of water used will reinforce the economic value of efficiently using water. If at the same time as knowing what the right action is for today the economic value of yesterday's right decision also appears, this reinforces the new behaviour and gives confidence that they are not being disadvantaged – but the opposite.

The services above are delivered via a smartphone. This is because farmers do not spend hours in front of their computers, but are out and about and need key information in an instant. Smartphones are really mini-computers, and this has opened up the ability of software developers to develop sophisticated tools that are literally at the farmer's fingertips. Processing power, screen resolution, robustness of the device, along with gains in cellphone reception across rural New Zealand have transformed what is possible to deliver.

Embracing change

Another key aspect that needs to accompany the growth in technology underpinning farm decision-making is that it is not an either/or scenario. There is a lot of discussion on the development of artificial intelligence and what this might mean in the future. But right now there are limitations on what a computer programme can know, just as there are on how much data and complex relationships the human brain can store and process. Put together, the outcome is the best. A farmer who has access to farm-specific data, science and best practice management, and puts this alongside what they see and hear and feel when out on the farm, will come to the best decisions day-to-day for their farm and the environment.

Ultimately it is farmers who go out and day-to-day undertake the jobs that lead to growing grass, and making milk and meat, who generate value for the whole economy. There are already many powerful technologies and solutions available to farmers to do these jobs better, smarter or faster. However farmers are people and have the same barriers to change as everyone else. Providers of technology solutions for farmers have to ensure that how we package it up fits with the people concerned and how they work day-to-day. Get that right and there are significant advances in profitability and environmental outcomes to be captured.

Digital disruption has brought us, for example, Uber which is transforming how we get from place to place without driving ourselves. This is using technologies like GPS, connectivity, Google maps and smartphone apps. Its spread throughout the world in a very short space of time has leveraged the internet, social media and the psychology of tapping into what makes us comfortable with change.

In agriculture we are using the same things – GPS, connectivity, Google maps and smartphone apps. The advances in technology in the areas of GPS, sensors, telemetry, the cloud, connectivity and analytics are enabling data collected at the farm to come together with science knowledge and best practice guidelines to provide farmers with near real-time decision support tools. With these tools New Zealand farmers should be able to meet the challenge of reducing their environmental footprint while improving profitability – meeting our consumers' expectations and aspirations for the food they consume.

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CATHERINE POULTER, JANET SAYERS AND RUPERT TIPPLES

The importance of retaining skilled migrants in the New Zealand dairy industry

This article focuses on a model of the retention process developed by the authors in conjunction with a self-completion questionnaire for retained migrants that has been distributed through four industry organisations.

The retention of skilled migrants is a critical issue for the future of the New Zealand dairy industry. From the data collected from the questionnaire the six most important retention factors were identified as pride in the industry, opportunities for career advancement, skill and knowledge enhancement, commitment to the industry, enjoyment of the job and good work relationships. The ways in which industry improvements could be made were identified around work practices and pay, a coordinated communication and policy strategy for the industry and integration, and more efficient government immigration practices are also suggested.

Background

The New Zealand dairy industry is this country's largest exporter earning $18.068 billion in revenue in 2014 and contributing approximately 6.5% to gross domestic product. Over the past decade dairy farming has expanded substantially due to conversion of other farmland to dairying, more corporate ownership of farms, increased herd sizes and technological advances. There are now approximately 4.92 million cows in New Zealand in some 12,000 herds, with the average herd size 410, and approximately 36,200 people work in dairy farming. Inside the facts and figures about dairy farming is a human element: the increasing reliance dairy farm managers have on skilled migrant labour to sustain these levels of productivity.

Skilled migrant dairy workers orginate from 62 source countries including Argentina, Sri Lanka and Ireland

Dairy farming has long been considered a challenging and dangerous occupation, with high employee turnover. Since 2008 there has been a human resource crisis in dairy farming due to a lack of skilled labour and since then the industry has undergone a demographic transformation. The dairy industry has recognised the importance of human resources, including it as one of its strategic objectives in the *Strategy for Sustainable Dairy Farming 2013-2020*: 'Talented People: Attract, develop and retain highly skilled and motivated people throughout the industry'. Skilled migrant labour is now essential to the sustainability and global competitiveness of the industry.

Migrants have flowed into the industry throughout its development, most notably with the influx of Dutch migrants in the 1950s. However, over the past decade reliance on migrants has accelerated and the source of migrants has diversified. Migrant workers now originate from some 62 source countries. Between 2009 and 2013 these migrants predominantly came from the Philippines, Fiji, South Africa, India and Great Britain (see **Figure 1**).

Over the past five years an average of 1,900 temporary work visas have been approved annually to migrant workers for employment on dairy farms. A number of these visas are re-issued to migrants currently working on farms in New Zealand due to the ongoing need to renew visas upon expiration of their initial temporary work visa. In 2012, some 4,600 non-New Zealand born staff worked on dairy farms. This number is not an indication of the total number of skilled migrant dairy workers (SMDWs) employed on farms at any one time as temporary work visas are issued for periods of up to three years.

New Zealand dairy farmers are competing globally in efficiency, product quality, and now for skilled migrant labour (see Jackson, *Primary Industry Management*, 18(3), 9-12, September 2014). Skilled migrant labour is an increasing component of the labour markets of many economies and global competition has intensified. Retaining human resources is one of the most pressing challenges for dairy businesses, particularly competing with Australia and Canada.

As the competition for skilled migrant labour intensifies, human resource management practices of a high standard within the dairy industry in New Zealand will be critical. Attraction to the industry will not continue if they are less attractive than other host nations. The dairy industry needs to retain skilled and motivated people because of the lack of New Zealand originating skilled dairy workers and international competition.

Migrant retention model

A comprehensive model of migrant retention was developed with five key process stages and four contexts (see **Figure 2**).

Using a process stage model allows focusing on migrant experience from the perspective of migrants themselves. **Figure 3** provides a holistic process model which focuses on retention. Using this model enables key points of tension for migrants in their experiences to be identified. These tensions, according to existing research literature, may involve cultural, social, psychological and employment factors and also barriers from key institutions which migrants interact with. This framework for understanding migrant experience considers migrants as valued employees of both the state and the dairy industry.

Figure 1: Visas approved for dairy farming occupations 2009-2013 – top 20 nationalities

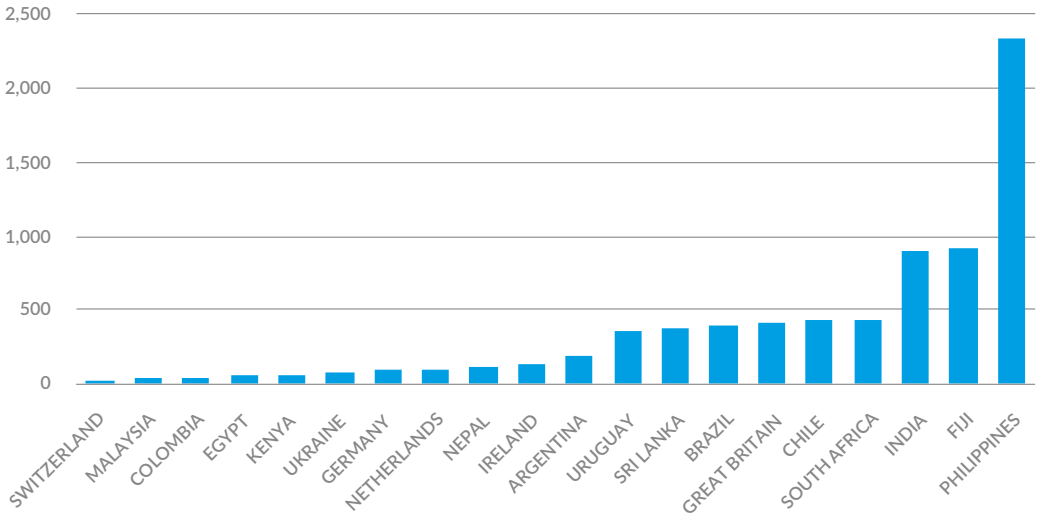
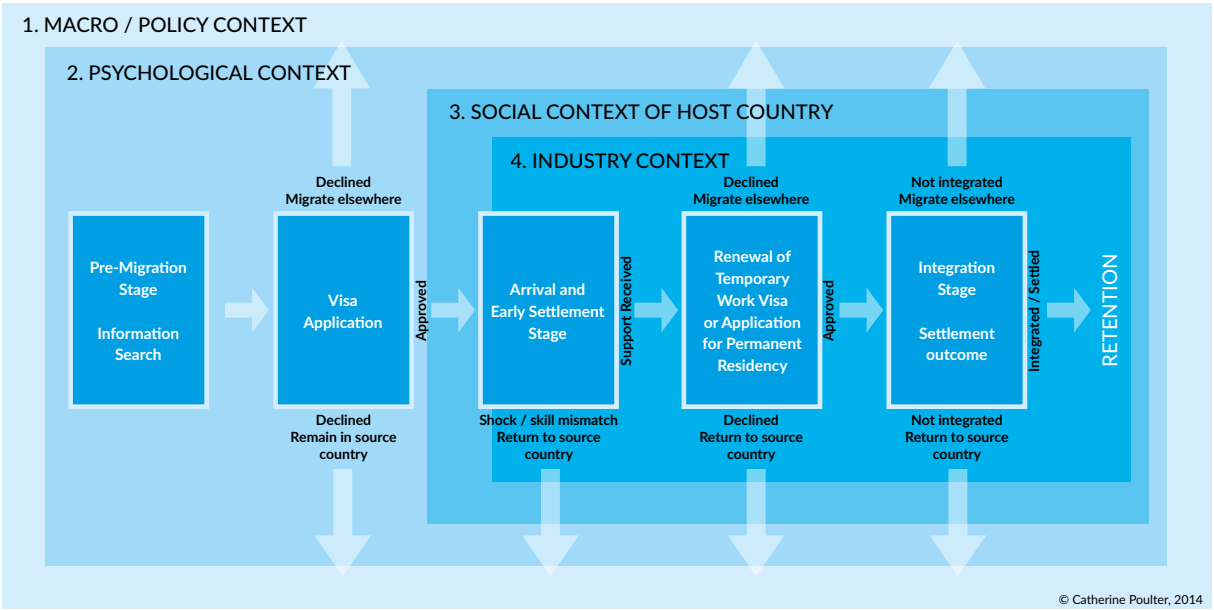


Figure 2: Retention of skilled migrants model



Research design

The purpose of this research was to identify the factors that permit the integration and retention of skilled migrants who have moved to New Zealand to work in the dairy industry. A survey was designed to gather information across a broad range of possible factors that impact on migrant dairy workers' experiences. Textual fields were added to the survey to gain information from participants about their experiences with migration and integration at key process stages. Collecting both quantitative and qualitative information enabled a comprehensive picture to be gained about the overall experiences of retained migrants, as well as more specific information about where improvements could be made.

Most of the questions in the survey were answered on a Likert scale. Qualitative data were thematically analysed in relation to the five key process stages. In the following passages we confine discussion to the six most important factors that impact on retention revealed by the study. We use comments from the qualitative data to illustrate dairy workers' opinions about these factors and discuss suggestions for improvements using comments where migrants note dissatisfaction or mixed feelings about their experiences.

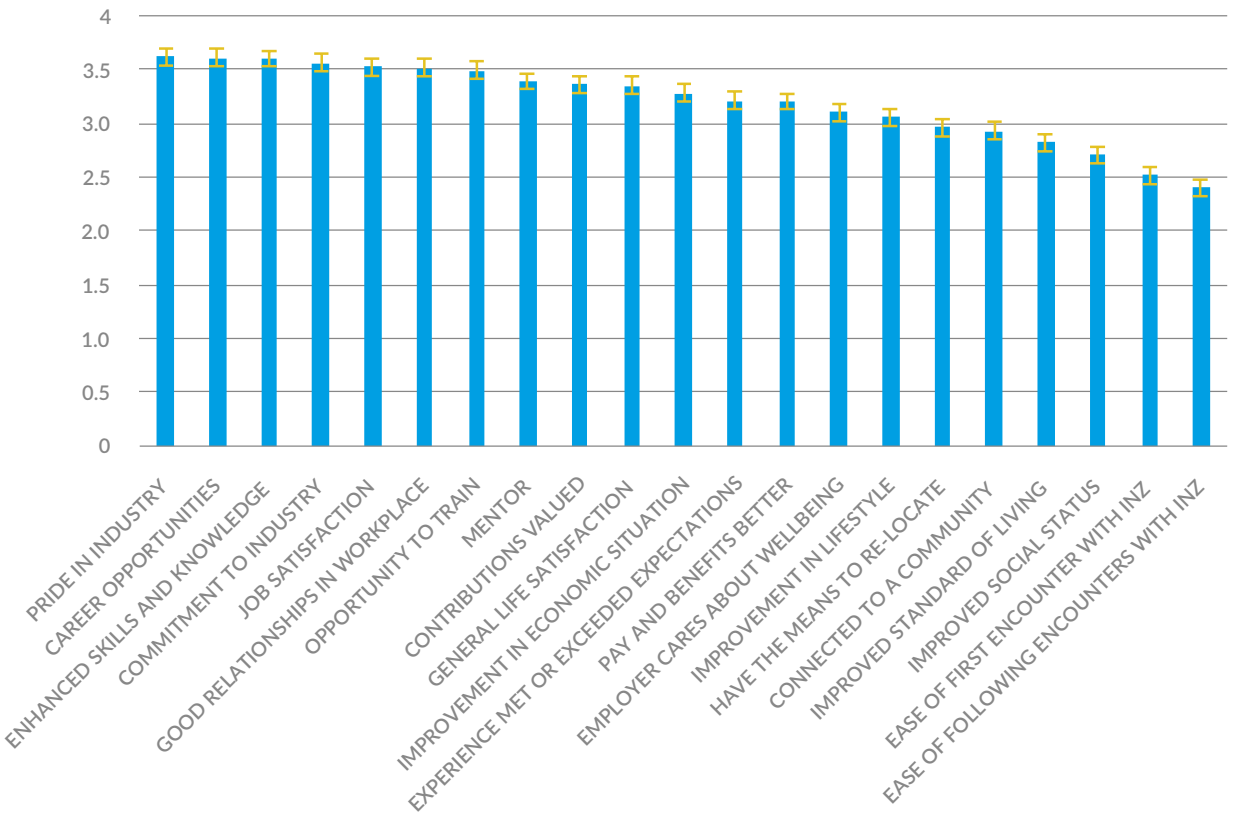
A sample of skilled migrants was obtained from foreign-born individuals who had been working in the New Zealand dairy industry for more than three years. For the purposes of this research retained skilled migrants were defined as foreign-born workers who migrated to this country to work in the dairy industry, who hold a relevant qualification or have undertaken two years of work experience in a related job prior to coming to here, and who had spent three years or more working on dairy farms in New Zealand. This research did not identity migrant source countries and so cultural differences were not investigated.

Migrant dairy workers are a diverse and geographically distributed population. There is currently no unified professional body representing their interests. Consequently, the questionnaire was delivered through social networks most likely to reach the target population. The self-completion questionnaire was distributed through the following organisations:

- Federated Farmers of New Zealand – direct email to members
- Primary ITO – link within their online newsletter
- Filipino Dairy Workers of New Zealand Inc – Facebook
- Settlement Services, a division of Immigration NZ – link within their online newsletter.

Participants were asked to forward the survey if they knew of migrant dairy workers who might be interested in participating in the research. The survey was distributed in February 2014. In total, 98 responses were collected over three weeks and 73 fitted the criteria of retained skilled migrant workers. Sufficient responses were received to give significant results.

Figure 3: Mean value of factors of retention for retained skilled migrant dairy workers



Jaun Grisanti of Argentina has animal health skills and passion which ensure healthy calves this season

Gonzalo Rivera of Mexico has experience of working in the USA, Australia and New Zealand

Results and discussion

Figure 3 combines all 21 factors of retention identified from the literature and asked about in the survey. The most important factor has the highest value mean and the least important factor the lowest value mean. Migrant farm workers in this country indicate that the strongest factor impacting on their retention was the pride that they felt as part of the New Zealand dairy industry. Ninety-six percent of retained migrants strongly agreed or agreed that they were proud to be working in the dairy industry. The degree to which an industry is perceived to be well regarded and reputable is a significant factor in retention. The second most important factor was opportunities for advancement. Eighty-two percent strongly agreed or agreed that their economic status had improved compared to that in their source country. Many respondents commented on the economic opportunities they had realised working in the dairy industry, progressing from waged migrants to farm ownership.

One said: 'I came… to New Zealand in 2002. Worked myself from the bottom up as farm worker up to 2005, being farm manager. Now I am farm owner in New Zealand and permanent residence since 2005. We think it is very hard work here (with working in the early hours and growing numbers of cows) but very rewarding.'

The third factor is opportunities to enhance skills and knowledge, which is closely related to the second factor of opportunities for advancement. Ninety-six percent of all respondents strongly agreed or agreed that they had the opportunity to undertake training. Migrant workers in this study clearly valued opportunities to enhance their skills. A respondent commented: '… going to the ITO helps to meet people in our industry plus making friends. I just finished Ag ITO course Level 3 supplied by my employer and he is permanently training me. I am being paid very well.'

The fourth factor is commitment to the New Zealand dairy industry, which indicates the high level of intrinsic motivation that migrants bring to this industry and the need for similar commitment from the dairy industry to migrants. Comments that indicate this commitment include: 'I really enjoyed working on a farm here in New Zealand, although dairy farming is a hard work that requires dedication but there's a lot of rewards. At the end of a long day, we take great pride, we are happy knowing the work we do matters to so many families. Dairy farm experiences are the key to following our dreams, to survive and to succeed in life.'

A more ambivalent comment about commitment was: 'My employers have been supportive to me, but they still trust local kiwis as managers which unfortunately have always been unreliable and disappointed them.'

The fifth ranked factor was job satisfaction. Even though this was ranked fifth, it was still at the 90% level. Comments included: 'Dairy farming in New Zealand is much more advanced than in my home country, more focused, and very particular to health and safety which actually is very good. I have learned a lot and I am still willing to learn more.'

The sixth ranked factor was having good relationships with supervisors and co-workers. Positive relationships create support which leads to commitment and retention. Mentoring programmes and 'buddies' significantly enhance the likelihood of success. Relationships with employers are very important to dairy workers because the employer acts as the primary gate-keeper to further advancement.

In addition, the employee is often living on and in the employer's property. Isolation also intensifies the importance of the employer and co-workers. One respondent said: 'I am very satisfied with my job experience with my employer here in New Zealand. They are very supportive to us and very sensitive with our well-being – we are very grateful for them.'

This initial positive experience on arrival appears to have a very positive effect on the work experiences of migrants in the dairy industry, reinforcing the importance of this early stage.

Other factors of significance to our discussion include the issue of lifestyle. Studies investigating migrant motivations for moving to New Zealand have shown lifestyle as the primary motivator, but it was not so important for dairy workers compared to career opportunities. Extrinsic rewards such as pay and benefits were previously thought to be very important, but in this study they were the 13th highest determinant for retention. Comments include: 'Even if I can relocate internationally, I'd rather not think about it. I am very

The first area which needs attention is working conditions and pay, as rural migrant workers sometimes exist in poverty despite being skilled.

satisfied with my job, my compensation, my family and life in New Zealand.'

Despite this seeming satisfaction, many dairy migrants were ambivalent about working conditions in the dairy industry here: 'They need to look into dairy… workers' future here because at the moment a residency visa is quite hard to have. It's not long from now when the majority of us decide to move to Australia or Canada for a much more chance of having security for their family having residency.'

These comments indicate that although the experience of SMDWs in the dairy industry is largely positive in terms of comparison with their country of origin, there are some mixed feelings and dissatisfaction evident amongst this population. Considering the competitive situation and the choices available to skilled dairy workers, these comments require further analysis in order to provide guidance for the New Zealand dairy industry about what it can do to improve its labour force's experiences.

Areas for improvement

The first area which needs attention is working conditions and pay, as rural migrant workers sometimes exist in poverty despite being skilled. In New Zealand, only 54% of retained respondents strongly agreed or agreed that their social status had improved through migrating here. Migrants worldwide often experience an initial decrease in social status upon migration, so some dissatisfaction in the area of working conditions and pay is perhaps to be expected. However, migrants' comments about the long hours worked, poor working conditions and pay rates rang some alarm bells: 'Though the pay is certainly better in the dairy industry, when compared to what the farmer/sharemilker/manager earns it's relatively modest.'

Evidence that employment conditions on dairy farms are becoming tougher is highlighted in new dairying practices. Automated drafting systems, washers and cup removers, and other technological advances, improve efficiency, which has enabled an increase in the number of cows per dairy person working from about 80 in 1991 to 180 in 2013. Work intensification is usually accompanied by decreases in employee well-being. Labour expenditure per kgMS (unit of output) has not increased in the dairy industry. Labour expenditure was at its highest in 2008 when the crisis in human resource management was first identified, and since then it has declined in relation to other 'expenses' such as fertiliser and feed.

Second, dairy farm employees appear to be getting progressively less of the benefits from the dairy industry, a point also noticed by DairyNZ. The effects of the human resource crisis – isolation, burn-out and low remuneration for hours worked – should not be transferred to the migrant dairy population. Migrants are clearly highly motivated to do well in New Zealand and are very proud of their affiliation with the dairy industry. Sharing this pride would assist the industry to communicate and share its best practices, but this strategy has to be authentic.

Issues of work conditions and rewards need to be addressed at the same time. Migrants are highly motivated to achieve, but the industry and employers need to be careful not to take advantage of higher motivation. It is well-known that the hours of work in dairy farming are challenging. Hours worked on the job have implications for both the employee's well-being and economic outcomes.

A third area for improvement relates to the Immigration NZ stages in the migration settlement process, which occur prior to arrival, but also at significant points during the employment relationship. Some very positive responses were received in relation to dealings with Immigration NZ: 'Immigration NZ is very supportive and understanding. Their decisions, so far, for my family with regards to processing our living here as well as to the granting of visitor to my eldest son were for me just and fair. They also process applications quickly.'

However, 38% of the retained migrants in the survey did not experience a smooth process in their first encounter with Immigration NZ and 49% did not encounter a smooth process with their following encounters. Migrant employees and migrants that had become employers commented that Immigration NZ needs to make the immigration process more straightforward. Respondents commented on the insecurity they felt through the process: 'There is lack of clarity about the roles, positions and what an applicant needs to have. There is confusion among employers as well as employees. Frankly speaking, there's real pressure dealing with immigration and justifying our position and status.'

In general, SMDWs initially receive temporary work visas and those with farm management experience can apply for residency in conjunction with their visa application. Assistant herd manager is a job title listed on the Immigration NZ Immediate Skills Shortage List (ISSL). A position listed on the ISSL is deemed to be experiencing severe skill shortages, enabling the work visa issuance process to be simplified. There are four dairy farming job titles currently listed on the ISSL:

- Assistant herd manager
- Assistant farm manager
- Dairy herd manager
- Dairy farm manager.

Most migrant dairy workers entering New Zealand for the first time using the ISSL enter under the title of assistant herd manager. This is because they need to adapt their skills to the New Zealand dairying system before they can progress to higher positions of responsibility. In 2012/13, only about 26% of migrants entering to work in the industry received visas as dairy farm cattle workers. Difficulties with immigration processing has been an ongoing theme. Dairy workers may not be being equally treated, with more rejections than for other occupations.

A fourth suggestion for improvement involves the implementation of communication strategies to inform potential migrants, while still in their home country, of the challenges and rewards of working in the New Zealand dairy industry. Ninety percent of the retained migrants in the present study strongly agreed or agreed that their experience had met or exceeded their expectation. Although this figure appears high, host countries should always seek to continuously improve skilled migrants' experiences. Understanding migrants' expectations is an important determinant in encouraging retention and ensuring that employers create conditions where both employer and employee expectations are met.
Migrants need realistic information about the host nation prior to migrating, which is also related to issues with Immigration NZ. Several respondents commented on their lack of success in terms of their progression towards residency. Defining the pathway to residency through dairying, and making it more accessible to the migrant in the pre-migration phase, would be beneficial to both migrant workers and employers. In this way realistic expectations can be set, which will improve the experiences of migrants and therefore the reputation of the New Zealand dairy industry.

Finally, developing industry-coordinated social integration assistance is crucial in the settlement process. Only 27% of retained migrants migrated to New Zealand with their families. Consequently, policy development needs to be cognisant of both migrants with families and those without. It is common practice for the primary migrant to come alone, establish themselves in the job, and then bring their family to New Zealand. Being accompanied by children positively impacts on the socialisation process: 'My family are warmly welcomed in New Zealand, my kids are doing well in school and they love it very much here.'

Respondents find New Zealand quieter than their home countries and commented on how they integrated and the challenges they had with this: 'Every day off I joined the Filipino society for social gatherings. People in New Zealand are very friendly – that's why I've got a lot of friends.' A number of respondents commented on the inability to become involved in community activities due to the lack of available time or energy: 'Long working hours, fatigue and geographic isolation make it really difficult to build a social life.'

A community with a limited sense of social cohesion will struggle to retain a workforce. A number of respondents referred to churches and community groups as a source of social integration and support. Although employers can help to some degree, the nature and extent of the problem indicates that a coordinated strategy from the dairy industry would assist integration and therefore retention.

Conclusions

With the increasing global need for a migrant dairy labour force, there is a need for more employer accountability and monitoring of employment practices in dairying. Sub-standard employers are not only hurting migrants and their own reputations as dairy farmers, but they are also a serious threat to the reputation and subsequently competitiveness of the industry. DairyNZ should routinely measure employee attitudes as part of their health and safety concerns as good employers and minimise potential reputational damage due to poor word-of-mouth stories.

The dairy industry's success is dependent on its ability to continue to attract and retain talent in the form of migrant dairy workers. Pride in the industry is the primary retention factor, followed by career advancement opportunities, the chance to enhance skills and knowledge, commitment to the industry, job satisfaction and good relationships within the industry. The dairy industry could develop tailored policies and practices to affirm and expand these positive associations.

The key 'take-away' from this research, however, is that communication messages will need to be authentic and simultaneously developed alongside policies to assist farmers to ensure they are doing their best to facilitate integration, fair pay and safe working practices.

While many migrant experiences are enhanced by the warm welcome from many individual employers, industry complacency should not be an outcome of the present research. Human resource issues facing the industry need to be addressed at the industry level and include: attempting to mitigate negative immigration process experiences; having a communications strategy for the whole industry vis-à-vis migrant employment; overcoming isolation and helping with integration and social life; and, finally and most importantly, addressing issues around safety and migrant well-being because of practices such as extraordinarily long hours of work.

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DANIEL SCHMIDT AND JOHN GREER

Practical steps to retaining skilled migrants in the dairy industry

Whether employees are from New Zealand or overseas, retaining quality people on farm business is about ensuring they feel valued and have interesting and rewarding jobs.

Help with immigration and visas

The research presented by Poutler et al. in this issue shows a number of factors which can encourage and support migrant employees to stay and build their careers in the dairy industry. Immigration issues can be stressful to deal with. Helping the employee stay in New Zealand through assisting them to get their work or resident visa gives employers a better chance to retain their skills (see www.immigration.govt.nz/employers/retain/).

According to the research, immigration interactions are not high on the retention list, but working to minimise stress caused by these interactions can make a very positive difference to someone's personal life. The research identified that an employer caring about well-being and general life satisfaction can help to maintain good relations in the workplace.

Fair and professional treatment

Just like any other industry, employee-employer relations are important. It may not always be smooth, and there may be a few rough days, but communicating effectively with employees is essential. Migrants make an important contribution to our dairy industry, and it is imperative we find ways to help them feel valued and integrated into the community. Achieving this will help them want to be part of the New Zealand dairy industry.

Training and career advancement

Career advancement and training rank very highly in the retention factors identified by Poulter et al. This makes sense – a strong factor in a person's motivation to uproot themselves and their family to move to New Zealand is the idea of a better life. As with all employees, understanding their motivations and needs can help to offer training, career advancement and extra responsibilities that are more relevant and engaging for the employee. Examples for migrant staff might include language lessons or cultural education.

Migrants make an important contribution to our dairy industry, and it is imperative we find ways to help them feel valued and integrated into the community.

Family first

Non-cash benefits are often valued more highly than an increase in wages. Offering things like more time off in the evening for family or social events, personalised training programmes, or flights home to see family during the winter break is likely to be well-received and appreciated.

Assisting the employee's family connect to basic services and groups, like introductions to schools and even employment opportunities for partners, will help build a happy and well-settled family. In turn this helps create a happy, well-settled and productive employee who is more likely to remain and contribute to your business.

Jonan Castillon, a pastor in the Filipino community in Canterbury, has been helping Filipino workers and Canterbury dairy farmers build a better workplace. He says that in this culture 'utang na loob' is very strong. It literally means 'debt of gratitude' and Filipinos would find ways to repay it with work loyalty and kindness.

Local community integration

Integration into local communities is a critical issue for migrants who have often left most of their support networks behind. It is important to help them find ways to pursue their interests and this can be done through local migrant groups, church, sports clubs or farming discussion groups. Any of these groups can provide a great support network for them, and often once they enter a migrant community it can be very straightforward for them to connect with many other migrants as they tend to be very well networked.

The Five Pillars of the Workplace Action Plan

Five pillars of great employment

In order to retain all staff, migrants included, a quality work environment is needed. DairyNZ and Federated Farmers have committed to the Sustainable Dairying: Workplace Action Plan (WAP), which clarifies the leadership and employment practices required to be a good and a great employer. A farm should have five pillars of great employment:

- **Balanced and productive work time** – there needs to be a work-life balance which is sustainable and enjoyable for everyone with reasonable work hours
- **Fair remuneration** – people must be paid fairly for the work they do, based on their skills, experience and responsibilities.
- **Wellness, well-being, health and safety** – the employer and employees need to work together to manage workplace risks, and ensure accommodation is in good condition and emotional and physical needs are being met
- **Effective team culture** – dairy farms require a team to be successful and having the right mix of people and talent is important for efficiency, effectiveness and fun
- **Rewarding careers** – most people in dairy farming are now employees, and the industry needs to ensure it is attractive to new employees and that it can provide them with a career path in the industry.

Under each of these pillars a set of leadership behaviours has been outlined and the aim is to get all dairy farmers to recognise and practice these. Understanding and responding to an individual employee's background and needs is fundamental to meeting the requirements of the five pillars. Great employers take into account differences in the cultural backgrounds and communication styles of their employees, and at times adapt their own style or behaviour so migrants can reach their potential as employees. Many employers already go the extra mile in supporting their employees and DairyNZ encourages all farmers to step up to the requirements of the Sustainable Dairying: Workplace Action Plan. For more information see www.dairynz.co.nz/wap.

Dairy farmers need to ensure they take culture and language skills into account when recommending training and in daily interactions.

Conclusion

Migrants are a crucial part of the dairy workforce. They come into dairying with differing motivations from Kiwi employees, which can make them extremely hardworking and loyal. Dairy farmers need to ensure they take culture and language skills into account when recommending training and in daily interactions. The Sustainable Dairying: Workplace Action Plan can be used as a baseline, which will help to retain all employees, including migrants. Finally, there is a need to ensure migrants have the opportunity to engage with the local community and are encouraged and supported to contribute as a valued and respected part of an effective team.

If you are not sure how your clients should adapt their management to provide a better work environment for migrant or Kiwi employees then a NZIPIM Certified People Management Consultant will be able to help you. Certification ensures that the consultants can cover all aspects of people management from motivating staff to complying with health and safety or employment legislation. They will ensure their suggested changes integrate into the whole farm system and support your client's business success. You can find one at: www.nzipim.co.nz/Category?Action=View&Category_id=139

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Throughout his career Sam has felt it important to create networks, keep contacts and ask questions.

NZIPIM PROFILE

Sam Bunny

What makes a successful farm manager? This profile looks at the career of young primary industry professional Sam Bunny.

Sam is currently the farm business manager at Landcorp-owned Rangitaiki Station in the Central North Island. A passion for farming and the agriculture sector is an important ingredient in becoming a successful farm manager. Growing up on a farm in Hawke's Bay is where his passion began. He had a desire early on to strive to run a successful business in farming, which meant he absorbed as much as he could from a wide range of farmers in the area.

Training and education

Following school Sam was accepted into Smedley Station, a two-year cadet training farm in Central Hawke's Bay. Vital to his development there were the practical and life skills learnt, both with stock and general farm maintenance. Smedley gave him his initial background to the core skills needed in dry stock farming. Cadets receive a solid foundation which is built on as years go by. He has since realised the importance of this not only in carrying out your job, but also when it comes to leading people from the front. Smedley created many introductions to key people, some of whom he stays in contact with today.

Becoming tertiary qualified has been very important for Sam's career progression. He completed a Bachelor of Commerce in Agriculture – Farm Management at Lincoln University in 2005 where he finished in the top 5%. This study about technical skills, budgeting, pastures, soils and animal health gave him a core background of knowledge and the ability to find answers when they were needed later in life.

After university he began his farming career, and for him the most influential aspect of this has been the people he has met, worked with and learnt from. Throughout his career Sam has felt it important to create networks, keep contacts and ask questions. He finds there are many people out there happy to help, and has learnt to use them to assist him make the right decisions.

On-the-job farm management experience

Two years after finishing Lincoln, Sam took a job as a stock manager in Gisborne and from there started work with Landcorp as a stock manager. The farm was in development for the first two years, so he was given the opportunity to run the stock and pasture on the property. He believes that the combination of having good people around you, a highly-driven attitude for success, and the

Sam believes that challenging yourself and dealing with tough situations and difficult climatic conditions is where you learn the most.

opportunity to implement practices in real life on a large-scale operation is a major recipe for development and learning in a short period of time.

Sam's first manager's job at Opouahi Station was an excellent opportunity – a good farm and good people and a solid core base of capital stock. The team worked well and successfully for three years and achieved quality results and ran a successful business. The involvement with these people and the development they offered meant he started to become heavily involved in the business and technical side of farming. This included budget management, feed budgeting, policy and business planning, and Farmax modelling. He found that much of what he had learnt at university was beginning to be implemented.

People management has been the biggest challenge of all for Sam, and Landcorp has offered him a number of courses in this area which he has found invaluable. The focus for him has been on trying to create a high-performing team who feel involved with the big picture, develop as individuals, and work together to achieve a common goal.

Some of the more memorable courses include an eight-day personal development and teamwork Outward Bound course in the Marlborough Sounds and a Rabobank farm management course in Australia. Sam was selected to return to Australia the following year to present a business plan study he had done to the following year's group. Other influential courses for successful farm management include staff and people management, time management, and business planning sessions.

Rangitaiki upskilling

Getting the farm business manager job on Rangitaiki Station two-and-a-half years ago at age 29 was a major jump in his career and has provided a significant step change in upskilling as a farm manager. Rangitaiki is a 9,000 ha sheep, beef, deer and dairy support property with 20 staff. The farm is one of 110 properties farmed by Landcorp.

Sam feels that nothing can really prepare a farm manager for a role like this and you very quickly learn through the situations encountered. For him, the best thing about Rangitaiki is that it involves so much variety including large-scale farming, complex intensive systems, numerous stock classes, a large-scale cropping and re-grassing programme, a number of policy and business opportunities, and large team people management. Sam believes that challenging yourself and dealing with tough situations and difficult climatic conditions is where you learn the most. Landcorp and other people have been key in supporting him to run the business successfully.

Rangitaiki is also involved in a number of other activities. The station has many groups and people visiting, which means a lot of public speaking experience. Sam is also involved in a lean management project, a beef progeny project with Beef + Lamb, and a smart farming animal health trial. These opportunities are also important for upskilling and involvement with different people in the industry.

Benefits of good technology

Along with all the other Landcorp properties, Rangitaiki shifted to the Farm^{IQ} System in May 2014. They breed and finish their own progeny, as well as doing some trading beef and dairy grazing. Sam believes the new system is a good asset to the farm because there is only one place to record everything and it produces a number of helpful reports. Prior to the system's establishment they had maps and papers everywhere.

The staff find it easy to navigate and Sam notes they do not have to spend too much time 'wasting time' in the office with it. He likes the fact that improvements will continue to be made to the Farm^{IQ} System, as the staff can talk about what is not working and what is good and make a change if necessary.

Rangitaiki does a great deal of spraying, a lot of cultivation, cropping and re-grassing and they have a major fertiliser programme. This is all being recorded into the map on the Farm^{IQ} System. For the paddocks they are putting in records going back to 2007 – the pasture species, cropping etc. They are also take monthly pasture measurements with a sward stick, which is a very good system for recording.

There is reticulated water over the whole farm and they are just starting to map the water system as another layer. This system has been gradually put in over the last 40 years and some of it is very difficult to find now. Their aim going forward is to have every part of the water system, including troughs and pumps, GPS-located and recorded in the Farm^{IQ} System.

Accumulated experience

Work-life balance is also essential and spending time with his family (wife Christina and three children) is important to Sam. It is therefore a mix of factors which help a person to become a succcessful farm manager. The right education and training are helped along by a good networking ability, which can lead into working for an organisation that encourages upskilling in a wide variety of areas, complemented by a work-life balance. Each role in a farm management career therefore builds on the last, so that a successful manager brings a vast array of experiences to their current position. J

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