



PATHWAYS TO FARM OWNERSHIP
Kellogg Rural Leadership Programme

Course 37 2018

Nick Giera

I wish to thank the Kellogg Programme Investing Partners for their continued support:

NZRLT PARTNERS

Strategic Partners



Programme Partners



Media Partners



I also wish to thank the support of Bayleys Real Estate South Island and the Mid Canterbury Farmers Charitable Trust.

Contents

1. Introduction	1
2. Objective of the Study	4
3. Research Approach	4
4. Project methodology	5
5. Results of the Research.....	5
5.1 Operating Performance	6
5.2 Capital required for dairy farm investment	8
5.2 Volatility of returns	11
6. Summary and Conclusions.....	11
7. Appendices.....	13

Pathways to farm ownership

Nick Giera

1. Introduction

Changes in dairy farm ownership and overall industry growth has occurred at a rapid pace in the past 25 years. This has largely occurred due to strong returns from dairy farming driving a “dairy boom” in most regions of New Zealand. The dairy boom has been particularly evident in the South Island where farmers and investors have converted dryland sheep and cropping farms to irrigated dairy making use of a supportive banking sector and low interest rates, availability of reliable water for irrigation and a statutory requirement on Fonterra to collect all new supply.

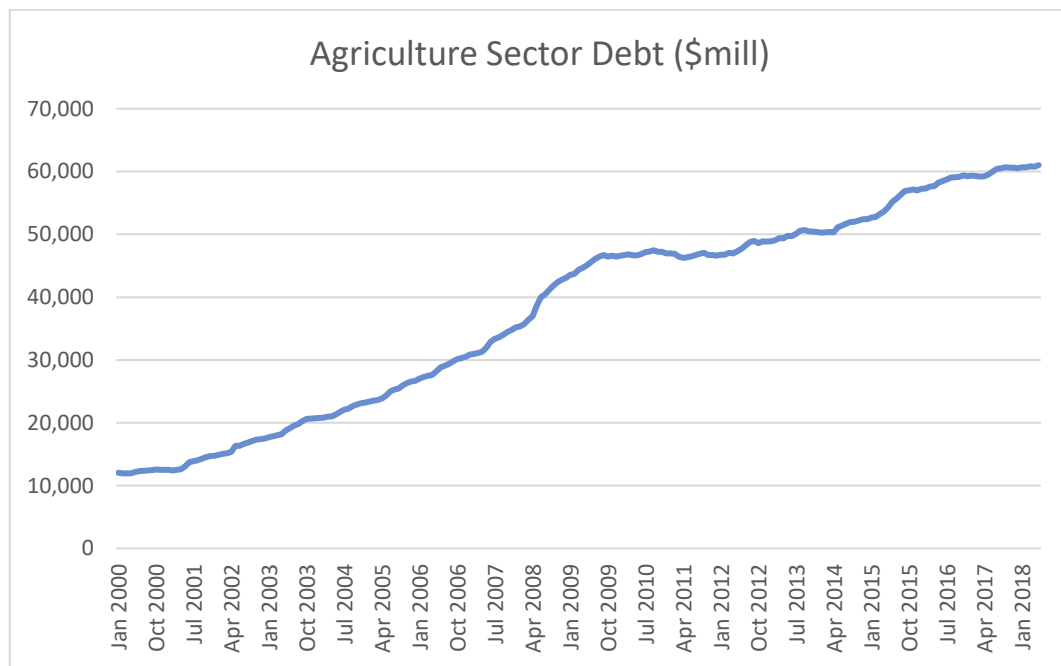
The dairy boom and the conversion of farm land to dairy has led to significant wealth creation through a change in land values (e.g., from dryland sheep and cropping to irrigated dairy) that exceeded the cost of conversion. These one-off gains are tax-free and despite the high levels of debt that many took on, there was, in general, an expectation that land values would continue to rise long enough to resolve the low equity position that many farmers had during this period.

Some regions have proven more popular with dairy farm investors than others. There are a number of reasons for investor preference however, high debt levels (financial risk) were managed by investing in areas with reliable production and lower business risk. Essentially, areas that could reliably grow enough high quality feed each season (such as irrigated Canterbury and Southland) were favoured over regions with more variable performance. Demand for farms in the premium regions continued to rise over other regions and this demand was reflected in price premiums (See Figure XX).

Since 2008 farm gate milk prices have been volatile and included periods of low payouts when most farmers ran their farms at a loss. Those farm businesses with high debt levels had to manage costs and production very carefully or risk breaching bank loan covenants. The down turn also increased dairy farm debt levels. In the ten years from 2007 to 2017 dairy farm debt increased from \$18.8 billion to \$41.2 billion as a period of land development, business growth and investment in farm conversion was followed by record low milk prices. The graphs below depict the effects of the dairy boom and dairy downturn on rural debt and scale of growth in the dairy industry and equates to \$22 a kilogram of milksolids (Woodford, 2017).

During the recent downturn, bank lending to the dairy sector increased by \$5 billion or 15 percent, mainly for working capital purposes. Farms also borrowed almost \$400 million through Fonterra Co-operative Support Loans. With leverage in the dairy sector already high, this growth in debt has left the sector more vulnerable to another period of low dairy prices (Reserve Bank of New Zealand, 2017).

Figure 1.



Source: RBNZ June 2018

The dairy boom also saw a change to the type of investor in the industry. Corporate and institutional “type” investors were attracted by the strong returns from the tax-free capital gains that were available through the change in landuse, from land development and from farming cashflows. This interest increased the demand for existing dairy farms and their support farms and also for those farms with potential to convert to dairy helping to underpin the market for farmland.

While there is no official data on the proportion of New Zealand farmland that is now owned by “corporate” type companies (vs traditional family owner operated farms), Foreign Direct Investment (FDI) can be used as an indicator for this type of investment activity. NZIER reported in 2016 that FDI in New Zealand almost doubled between 2001 and 2015 from \$55 billion to \$100 billion and while FDI in farmland represented only 5.9% of all FDI in 2015, this share has risen from 1.3% in 2001. This represents an increase of 16% per annum and is above rate of the 13.5% annual rise in farmland values over a similar period (Gawith, Andrew, New Zealand Herald 2010). Since 2001, 15% of agriculture and forestry transactions have involved some form of FDI of which 58% was forestry (ANZ Agrifocus December 2017).

Historically, dairy farming has provided viable pathways for farmers to create wealth over time enabling many to achieve farm ownership. The development of the industry over the past 20 years has increased land values at a faster pace than cow values and, as a consequence, is reducing the use of traditional structures such as 50/50 share-milking favouring instead the use of other arrangements such as equity partnerships, contract milking and variable-order sharemilking (see Figure 2). The low milk prices of 2015 and 2016 seasons added impetus to this trend as farm owners were forced to consider all options to reduce operating costs. This has included a move away from sharemilking to directly employing farm managers and contract milkers. The table below shows that there are approximately 800 less sharemilking jobs (from 4,044 to 3,208) in New Zealand than 10 years ago. Other data from DairyNZ shows that in 2017 82% of all sharemilking job were on farms of less than

600 cows, indicating that farm owners prefer straight management roles for large scale farms. Anecdotal evidence also suggests that large scale farms are preferred by corporate investors.

Table 1.

Operating Structure										
	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Owner-operators	7,215	7,384	7,616	7,677	7,764	7,679	7,812	8,059	8,315	8,503
SM< 20%	119	177	147	233	234	224	206	179	153	134
20-29%	1,045	1,206	1,222	1,274	1,173	1,140	1,151	1,050	821	586
30-49%	198	207	200	273	193	170	177	171	174	157
50/50	2,483	2,381	2,303	2,249	2,218	2,229	2,201	2,050	2,001	1,925
SM> 50%	199	207	169	29	216	417	346	429	421	406
All SM	4,044	4,178	4,041	4,058	4,034	4,180	4,081	3,879	3,570	3,208
Other/Unknown	177	56	34	0	0	32	34	32	33	37
Total	11,436	11,618	11,691	11,735	11,798	11,891	11,927	11,970	11,918	11,748

Source: DairyNZ Industry Statistics 2016/17

The changes outlined above meant that herd owning share-milkers lost ground to land owning farmers on a proportion of asset value that was contributed to a traditional share-milking partnership and could no longer expect to share in 50% of the milk income (less their costs). Historically sharemilkers had been able to grow their equity at over 30% per year (DairyNZ Economic Survey 2017). This compared with owner-operators return on equity (from 2008 – 2017) averaging 6%. More recent entrants to the industry are having to work with land owners to develop new models for wealth creation to achieve farm ownership. For others, farmland values have reached such high levels that the goal of farm ownership seems attainable and have exited the industry.

While farm ownership through dairy farming is becoming harder in high land value regions and where the dairy land development cycle is at a mature stage, there are regions that have suitable land for dairy farming although have attracted less interest from corporate investors. One such region is the West Coast of the South Island. Land values on the West Coast haven't reached the same levels as in premium regions such as Canterbury on a per hectare and per kg milksolids basis. There are a number of reasons for the difference and this study seeks to identify how this has affected investment returns for investors and emerging farm owners.

Understanding and comparing investment returns for both Canterbury (as an example of a high value region) and the West Coast (as an example of low value region) is important to farmers exploring new ways to create wealth in the dairy industry. As a recent entrant to the dairy industry (less than 10 years) it is an area of particular interest to me and I hope that this study will contribute to the pool of knowledge for many other farmers in a similar position. Bayleys Real Estate also has a particular interest in the findings of this study and has contributed to the Kellogg Rural Leadership course fees.

2. Objective of the Study

This study seeks to compare and contrast financial returns from dairy farming from two regions: Canterbury and the West Coast of the South Island. This analysis will provide information on a discussion of strategies for farming investors and emerging farmer owners to grow their wealth through farming. It seeks to do this by analysing the financial returns from farming in regions with lower land values (second tier) and compare these to high value regions such as Canterbury. Bayleys South Island has an interest in understanding this area and is looking to be more active in working with the next generation of farm owners. Dairy farm values in second tier regions such as West Coast are currently discounted on a \$/kgMS basis compared with Canterbury and this may presents buying opportunities for investors, including emerging farm owners.

Opportunities to reduce milk price risk in regions like the West Coast may also exist where alternative land uses and land development can be part of the strategy for wealth creation. These opportunities are likely to require cooperation with a supportive landowner nearing the consolidation/exit phase of their careers.

3. Research Approach

The approach to this research has been to analyse industry financial returns through a combination of:

- -quantitative analysis of farm sales;
- financial analysis of dairy industry statistics;
- interviews with stakeholders in Canterbury and the West Coast

Industry data and statistics and a small number of interviews has sought to answer the following questions:

1. What factors affect dairy farm values in second tier regions compared with comparable operations in premium regions such as Canterbury using interviews with farmers and industry stakeholders (e.g., valuers, consultants) on the West Coast.
2. What are the average return on investment for the West Coast compared with Canterbury?
- Using some statistical data e.g., from DairyNZ Economic Farm Survey and some other survey work on the West Coast
3. What opportunities exist in regions like the West Coast for emerging farmers to diversify income to reduce milk price risk?
4. Does a second tier region such as the West Coast provide better investment returns than a premium region such as Canterbury?

4. Project methodology

A review of historical DairyNZ economic survey data was undertaken to assess average returns per hectare for the Canterbury (North and South) as examples of high land value regions to compare with the West Coast (low value region).

The data was reviewed to develop an understanding (based on the annual economic survey) of the following:

- Land value per hectare
- Average income per hectare (based on average MS production, other income, and milk price)
- Average return on investment on a return on equity basis.

From April to June 2018 a small number of interviews were undertaken with experts in the West Coast dairy industry to assess the factors that affect dairy farm returns and included a visit to the region to view farms and speak with stakeholders directly. Other aspects of the investment environment were also assessed during these interviews and included:

- Production risks, including climate and land use capability
- Milk price risks including the current financial performance of Westland Co-op Dairy
- Environmental risks and regulatory factors that affect land-use options

5. Results of the Research

The table below compares the operating performance of three representative West Coast dairy farm models to comparable models in Canterbury from the period 1997 - 2007. The main differences relate to larger sized farms and difference in pasture DM production per hectare in Canterbury whereas expansion of West Coast dairy farms can be constrained by topography and geographical barriers.

Table 1

Productivity Comparisons (2016)

KPI	Canterbury		West Coast		
	North	South	Buller	Grey	Westland
MS production per hectare	1,454	1,336	729	729	729
MS production per cow	431	412	327	327	327
Six-week in-caf rate (%)	66.5	66.5	68.6	68.6	68.6
Cows per hectare	3.37	3.24	2.34	2.31	2.10
Scale factors					
Peak cows milked	770	748	395	479	385
Effective hectares	228	231	169	207	183

Source: DairyNZ Economic Survey; DairyNZ Dairy Industry Statistics

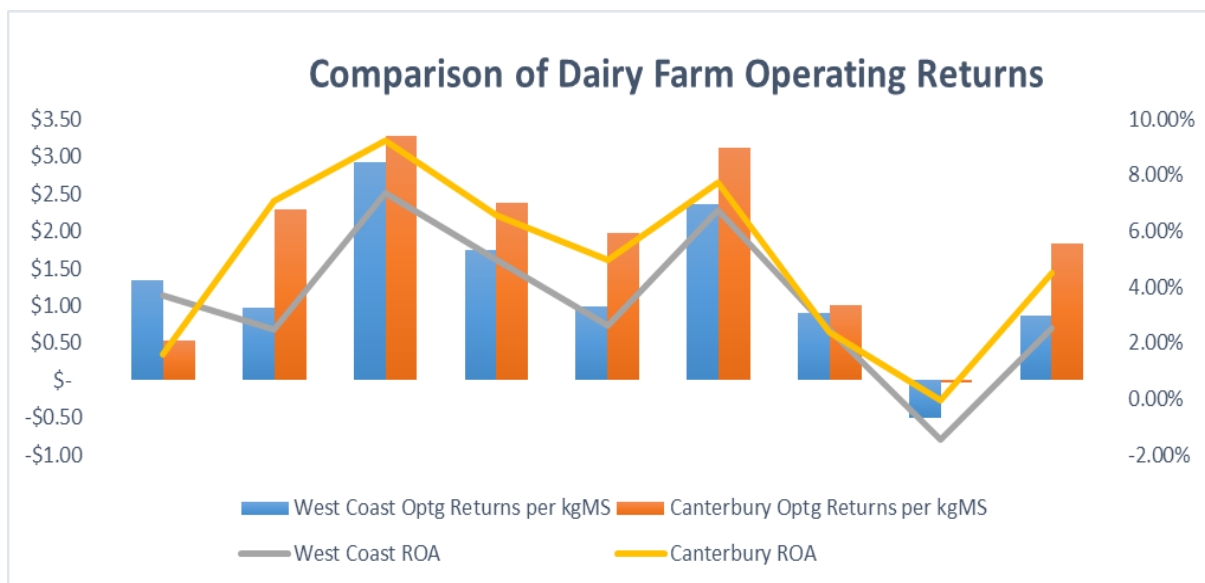
The main differences are described below and relate to three main areas, physical performance (production, income and costs per kgMS), capital required per kg MS and volatility of returns (both operating returns and asset value growth).

5.1 Operating Performance

Table 1 shows key measures of physical productivity between the comparison regions. It shows that farms in the Canterbury region have higher milk solids production per hectare and milk solids per cow although not reproductive performance. The table also shows a difference in cows per hectare with Canterbury model farms being stocked 47 percent higher than on the West Coast. While not included in this table, various sources (including DairyNZ Dairy Statistics) show that irrigated pastures in Canterbury produce 14.0 – 20.0 t DM/ha without nitrogen compared to 10.0-16.0tDM/ha in the West Coast region or 30% higher.

DairyNZ Economic Survey data (2017) also shows that, while physical production per hectare is higher in Canterbury, there is little difference in farm working expenses per kg milk solids between Canterbury and the ranging from \$3.64 to \$4.50 from 2013/14 to 2016/17. In some years average West Coast FWE per kg MS is lower than in Canterbury and other years higher. The main factor in the fluctuations seems to be weather related driven by the need to purchase additional supplementary feed during low pasture growth periods and fluctuation in total production, where Canterbury farms are more consistent from year to year.

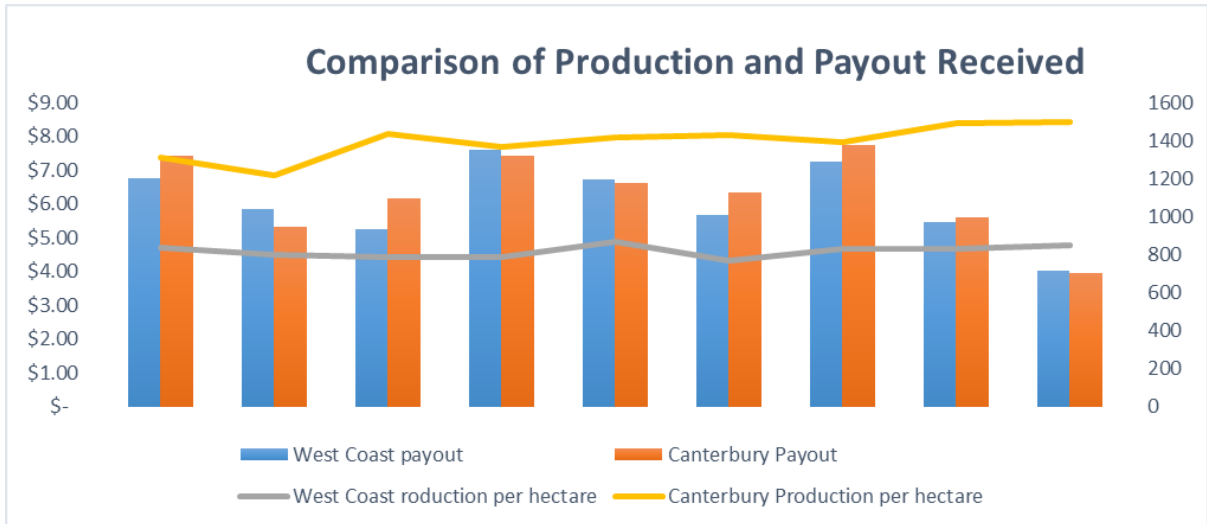
Figure 2



Source: REINZ 2018

The West Coast’s geographical isolation means that farmers are limited to Westland Co-op Dairy for their processor. The lines in the graph below represent the average milksolids production per hectare while the bars are the farmgate milk price received. In general, Westland has been slightly behind Fonterra on payout received by farmers and this factor contributes to the lower returns.

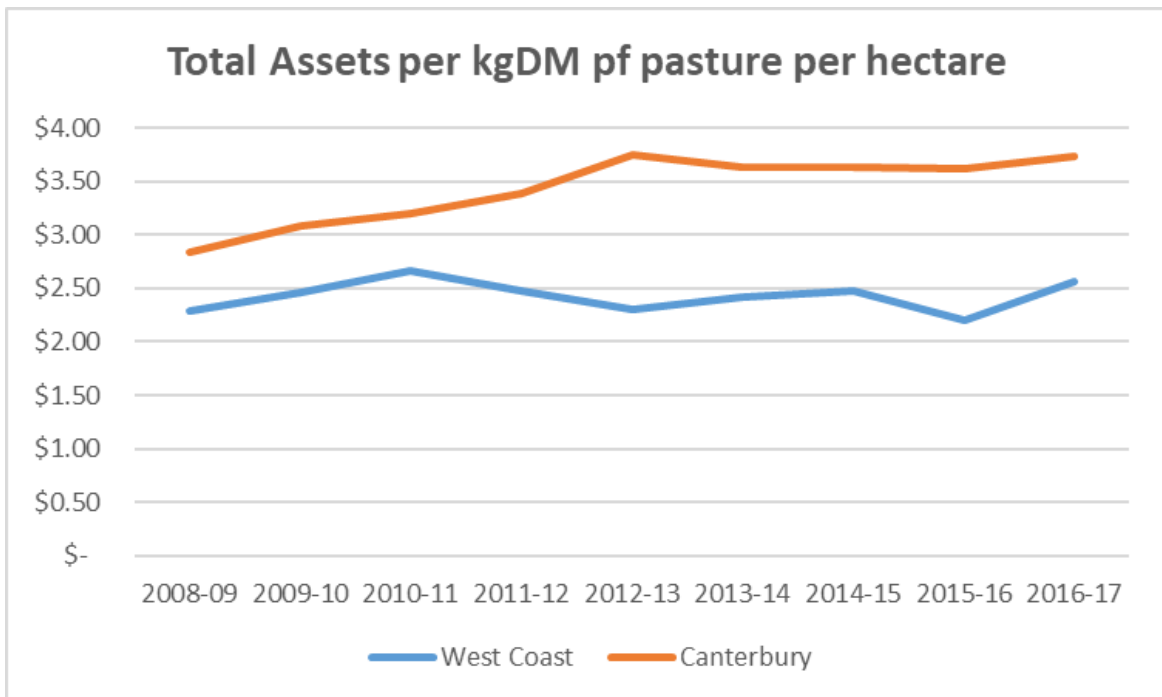
Figure 3



Source Dairy NZ Economic Survey 2017

It can also be useful to compare the two regions on a farm capital value per kg DM grass grown. This is a basic metric of productivity for farmers with the ability to take a strategic view of farm purchase decisions seeking regions where the economics of convert grass to protein are strongest. The graph below shows that on this basis, the West Coast farm price per kg DM grown ranges from \$2.25 to \$2.50 compared to more than \$4.00 per kg DM and should be a more capital efficient region to grow grass and convert it to milk. With lower production per hectare and a slightly lower milk price, one would expect the market to price farm land to reflect the lower expected returns, although this is not evident in reality. Further discussion of investor return on assets is included in Section 5.3.

Figure 4



Source: DairyNZ 2017

5.2 Capital required for dairy farm investment

Capital required for first farm purchase or is one of the main concerns for emerging farm owners. The table shows that between 1996 and 2018 that dairy farms in Canterbury have been on average 1.8 times higher value than on the West Coast. Anecdotal evidence indicates that because of the lower entry point, second tier region like the West Coast have been more popular with first time farm buyers as a stepping stone into a larger farm.

First time farm buyers tend to be leveraged higher than average and reduce drawings to a bare minimum to make their capital “stretch” as far possible. The table below shows that the equity required to purchase a 50% share in the average dairy farm on the West Coast (with a Loan to Value Ratio of 60%) was \$134,000 in 1996 and had increased to \$614,993 by 2018, a factor of 4.6 times. This compares to an eight-fold increase in Canterbury.

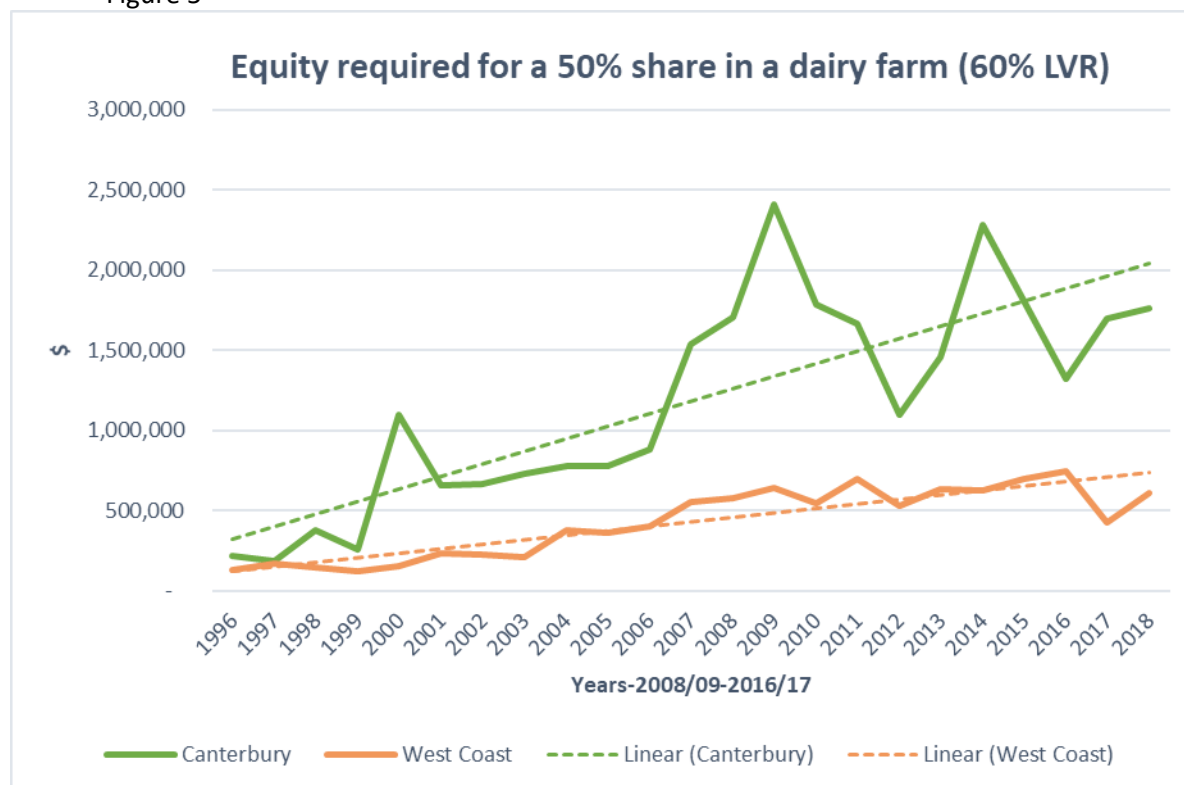
Table 2

Equity required for a 50% share of dairy farm

Year	Canterbury	West Coast
1996	\$ 219,200	\$ 134,000
2018	\$ 1,761,600	\$ 614,993

The graph below depicts the movement dairy farm prices and the capital required for a farm purchase and shows that the gap is widening as dairy farms become comparatively larger in Canterbury.

Figure 5



Source: adapted from REINZ 2018 data

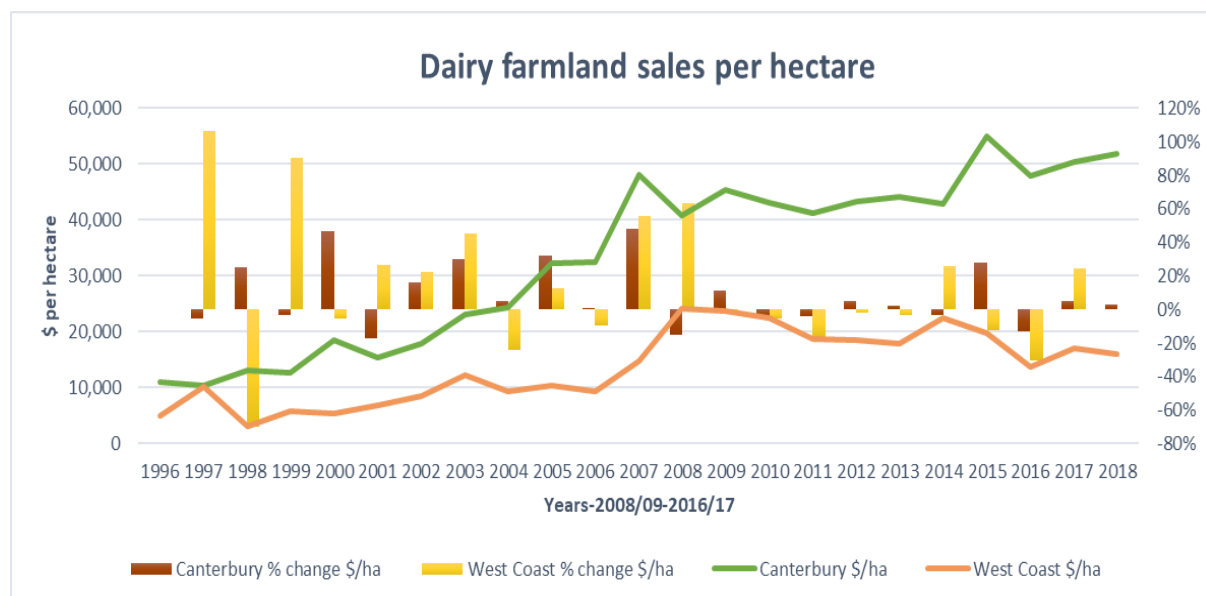
In terms of wealth creation from capital gain however, despite the higher average value in all years Canterbury farms have risen at a higher rate than on the West Coast. The graph also shows that there has been more volatility in dairy farm sales value on the West Coast ranging from -60% to rise of 70% although it is unclear how much of an effect sample size has on this range (the number of sale on the West Coast being lower than in Canterbury). This volatility can represent opportunities to buy in low years and sell in high.

The line graph below shows the average sale price for dairy farms in both regions in nominal terms. The bars in the graph represent the annual shift, in percentage terms, of prices paid per hectare.

The graph uses REINZ data on actual sales on dairy farms in both Canterbury and the West Coast regions to compare change in land value per hectare over time. The graph shows that Canterbury dairy farms have increased from an average of approximately \$11,000 in 1996 to \$51,858 in 2017 or an average increase in sale price of 17%. This compares to an increase from \$4,945 to approximately \$16,000 on the West Coast or an average of 14%.

An interesting factor in to note from the REINZ data (See Appendix 1) is that the change in prices paid per kg milk solids has been less volatile possibly indicating that farm purchasers assess value on a productive basis and that development gains are reflected in price that vendors receive for farms.

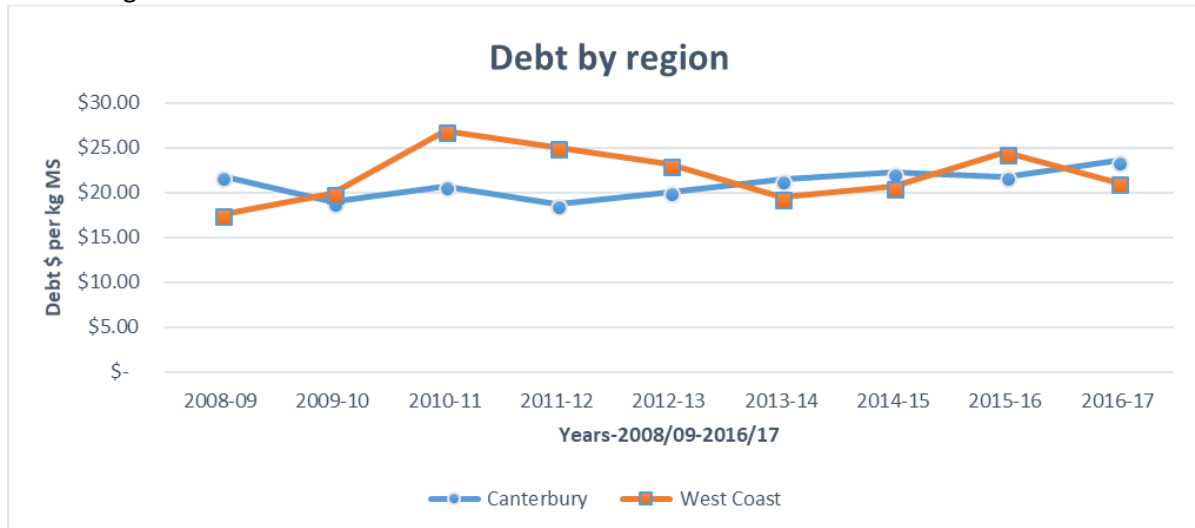
Figure 6



Source: REINZ

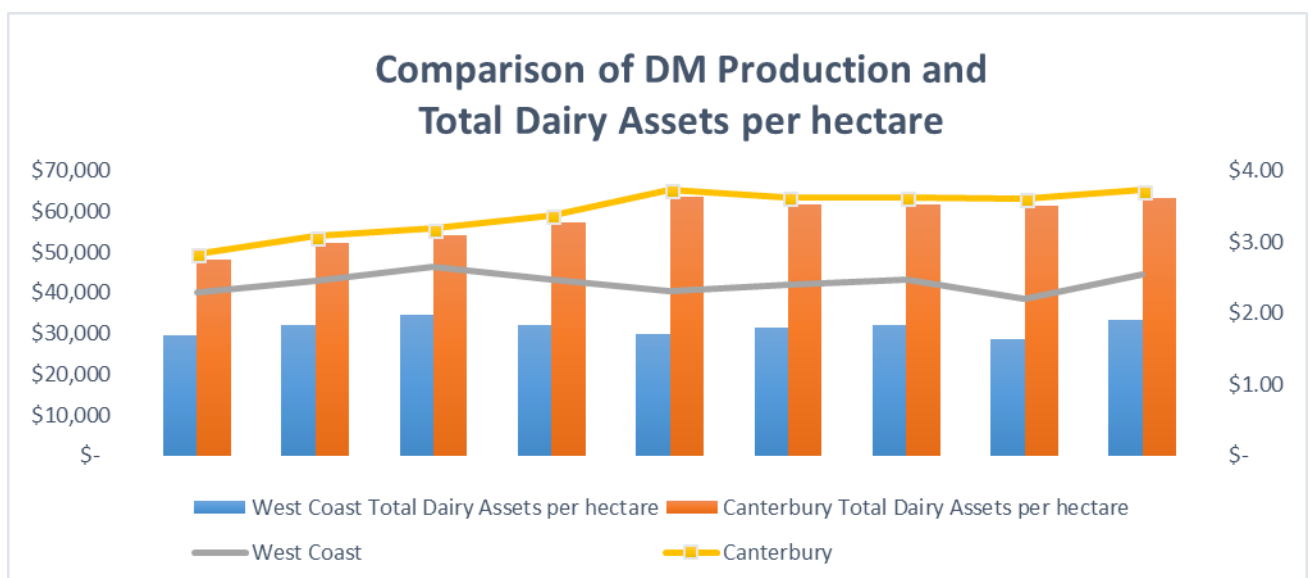
The graph in Figure 3 shows that the debt in each region on a per kg MS basis. While debt per kgMS has grown in both regions since 2008 there is not a significant difference between the regions other than debt has fluctuated more on the West Coast.

Figure 3.



Source Dairy NZ Economic Survey 2017

The combined graph below shows that dairy farm assets values have been 85 percent higher in Canterbury than on the West Coast from 2009 to 2017 yet the DM production is only 47 percent higher although the gap seems to be widening. The average dairy farm value (total assets, including livestock, plant and equipment etc) in Canterbury over the past 9 years is \$58,264 compared with \$31,508 per hectare on the West Coast. On a kgDM basis the average capital value in Canterbury has been \$3.43 per kgDM grown versus \$2.42 on the West Coast (41 percent more expensive). The challenge in interpreting this data is that despite land in Canterbury being 47 percent more productive (17tDM/ha compared to 14t/ha) it is less capital efficient being more expensive on a per kg DM and per kg milk solids produced basis.



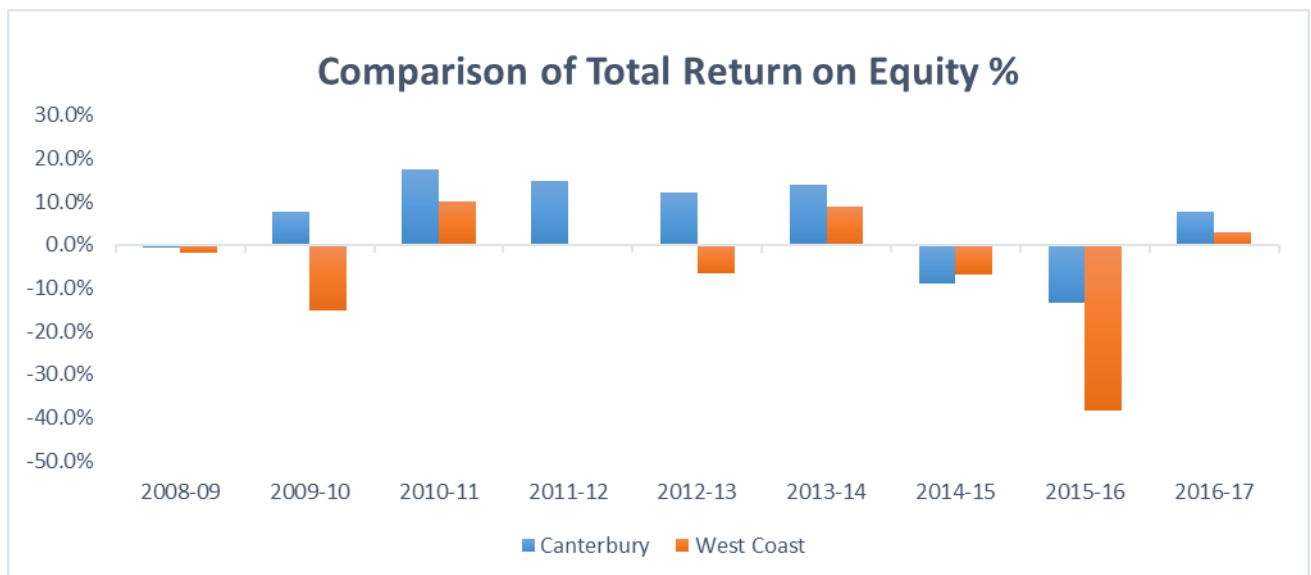
5.2 Volatility of returns

Anecdotally, the reliability of irrigated dairy farming is a key reason for premiums paid for farmland in irrigated regions such as Canterbury. This reliability often leads to higher levels of debt so that investors can maximise rates of return on equity.

The DairyNZ economic farm survey data shows that Canterbury dairy farms are 50% larger and require more capital for farm purchase. The two factors of scale and capital intensity mean that for aspiring farm owners, farm ownership in economic sized farms requires partnership with either existing farm owners or external investors.

On a Return on Equity basis, using the DairyNZ Economic Survey data, Canterbury dairy farms have provided higher return on equity than West Coast farms. The average ROE in Canterbury since the 2008/2009 season has average 5.7% compared to -4.8% on the West Coast. This takes into account increases in land values and reflects in part the difficult operating environment (including volatile global milk markets and adverse weather) that the dairy industry has had since the Global Financial Crisis of 2008.

Figure 6



Source DairyNZ Economic Survey

6. Summary and Conclusions

The historical analysis of two regions is clear that financial returns have been higher in Canterbury for investors despite the higher farm land values. We can also see that from a total Return on Equity basis that Canterbury dairy farms have been more consistent and achieved a higher rate of return of 5.6 percent return on owners' equity compared with -5.9 percent on the West Coast.

In terms of the regional preference, first time buyers can have less flexibility in where to purchase farms than corporate type investors. Unlike non-farming investors, owner operators have personal, family and lifestyle considerations to factor into farm investment decisions. Dairy farming also revolves around the seasonal cycle (June 1 – May31) and first-time farm buyers often do not have the

flexibility to cash-up their capital in livestock and wait for the right market conditions to invest in a farm.

There are also control factors to consider for emerging farm owners. Despite the higher returns from investing in a premium region such as Canterbury, the scale differences mean that becoming a minor shareholder in a large farm asset can be less appealing than the flexibility and control that smaller farm investments can offer. Equity partnerships as an alternative to sharemilking can also lack liquidity and the farm operator partner of an equity partnership is often a minority shareholder with little strategic influence or ability to increase their shareholding. An area for further study is the development of ownership and operating structures that can incentivise farmer shareholders to grow their wealth at similar rates of return on capital to 50:50 sharemilking contracts while meeting the goals of partnering farm owners.

Farmers make their returns from a combination of productivity gains (producing more from the same levels of inputs per unit of input), land development and change of landuse. Farmers make farm purchase decisions for a number of reasons and because of personal factors such as proximity to towns and family and lifestyle have less ability to be strategic than non-farming investors. Fluctuations in farmland values are closely linked to movements in cashflow. Timing of farm purchases has a large bearing on overall returns and farmers should be aware of this factor, although purchasing during a downturn is hard to achieve in practice.

The impact of demand for farmland by institutions and corporates New Zealand farmland values and therefore total returns to farm owners shouldn't be understated. Anecdotally, it is understood that institutional investors have purchased more dairy farms in premium regions like Canterbury than in Tier Two regions. In a high-level analysis and commentary on New Zealand farmland prices, Forbes Elworthy (Craigemore, 2014) noted that widespread institutional buying of farmland in the US and the UK in the late 1970s could explain the rising land value and returns to farm owners that exceeded other asset classes. The same inference could be made in New Zealand where, interest of financial investors that are less constrained by scarcity of capital than family farmers and in a better position to diversify farmland risks bid up farmland valuations.

An area for further study could be a regional analysis of the "institutional effect" on farmland values to gauge what effect the investment activity of well capitalised corporate type investors has had on farmland values. This would aid an assessment of a shift in the market if institutional farm owners become net sellers of farmland.

Wealth creation through dairy farming has enabled many families to achieve the goal of farm ownership. This aspect of the industry is changing equally as fast as the disruption that is occurring beyond the farm gate. Modern dairy farming is not only capital intensive but management intensive and will require high calibre of farmers who can handle the complexities of food production for ever changing consumer demands. The industry needs to acknowledge the wealth created through land development and productivity gains in the past and actively develop new ownership structures that retain high quality farming families in the industry. Without new ownership and operating structures, premium regions such as Canterbury may increasingly become owned by non-farming investors with the potential for owner-operator farmers being confined to Tier 2 regions.

7. Appendices

Appendix 1: REINZ on farmland Sales Price

Region	Canterbury Region								West Coast Region							
	Dairy	Median Avg MS	Median Avg ha	Avg Sale Price	Canterbury \$/ha	Sale Price \$/kgMS	Canterbury % change \$/ha	Rise in \$/kgMS value	Dairy	Median Avg MS	Median Avg ha	Avg Sale Price	West Coast \$/ha	Sale Price \$/kgMS	West Coast % change \$/ha	Rise in \$/kgMS value
1996	6	53,500	99	1,096,000	11,071	\$ 20.49			10	40,000	136	670,000	4,945	\$ 16.75		
1997	2	56,500	90	940,000	10,444	\$ 16.64	-6%	-19%	2	46,500	83	843,000	10,218	\$ 18.13	107%	8%
1998	1	150,000	145	1,900,000	13,103	\$ 12.67	25%	-24%	2	63,500	247	749,000	3,032	\$ 11.80	-70%	-35%
1999	7	84,000	101	1,275,000	12,624	\$ 15.18	-4%	20%	5	47,000	109	628,350	5,765	\$ 13.37	90%	13%
2000	9	344,000	297	5,500,000	18,519	\$ 15.99	47%	5%	13	59,000	141	770,000	5,461	\$ 13.05	-5%	-2%
2001	20	192,000	215	3,305,000	15,372	\$ 17.21	-17%	8%	10	75,922	172	1,191,500	6,927	\$ 15.69	27%	20%
2002	8	174,964	188	3,350,000	17,819	\$ 19.15	16%	11%	17	64,700	136	1,150,000	8,456	\$ 17.77	22%	13%
2003	4	174,500	157	3,637,500	23,169	\$ 20.85	30%	9%	11	53,000	86	1,057,000	12,291	\$ 19.94	45%	12%
2004	7	153,663	160	3,900,000	24,375	\$ 25.38	5%	22%	4	92,000	204	1,900,000	9,314	\$ 20.65	-24%	4%
2005	9	150,000	121	3,900,000	32,231	\$ 26.00	32%	2%	15	78,000	172	1,800,000	10,465	\$ 23.08	12%	12%
2006	7	190,000	135	4,400,000	32,528	\$ 23.16	1%	-11%	7	71,028	212	2,000,000	9,445	\$ 28.16	-10%	22%
2007	1	195,862	160	7,700,000	48,120	\$ 39.31	48%	70%	8	107,203	189	2,775,000	14,721	\$ 25.89	56%	-8%
2008	12	260,000	210	8,552,500	40,823	\$ 32.89	-15%	-16%	18	81,151	121	2,900,000	24,066	\$ 35.74	63%	38%
2009	5	300,000	266	12,070,000	45,376	\$ 40.23	11%	22%	6	105,000	136	3,230,000	23,817	\$ 30.76	-1%	-14%
2010	3	248,000	208	8,950,000	43,029	\$ 36.09	-5%	-10%	8	91,500	121	2,725,000	22,521	\$ 29.78	-5%	-3%
2011	13	240,000	202	8,335,000	41,262	\$ 34.73	-4%	-4%	10	96,500	185	3,478,250	18,801	\$ 36.04	-17%	21%
2012	15	180,000	127	5,500,000	43,305	\$ 30.56	5%	-12%	8	101,195	143	2,640,000	18,495	\$ 26.09	-2%	-28%
2013	27	267,547	165	7,300,000	44,173	\$ 27.28	2%	-11%	9	109,000	178	3,180,000	17,865	\$ 29.17	-3%	12%
2014	25	314,701	266	11,408,000	42,833	\$ 36.25	-3%	33%	13	127,200	140	3,150,000	22,440	\$ 24.76	26%	-15%
2015	17	260,638	165	9,050,000	54,931	\$ 34.72	28%	-4%	7	95,000	178	3,500,000	19,712	\$ 36.84	-12%	49%
2016	13	265,900	138	6,625,000	47,943	\$ 24.92	-13%	-28%	3	177,000	273	3,750,000	13,736	\$ 21.19	-30%	-42%
2017	18	264,500	169	8,505,000	50,311	\$ 32.16	5%	29%	1	111,811	126	2,150,000	17,063	\$ 19.23	24%	-9%
2018	1	240,000	170	8,808,000	51,858	\$ 36.70	3%	14%		127,937	192	3,074,965	16,000	\$ 24.03		
Annual rate of capital gain					17%	4%	8.7%	4.8%					10%	2%	13.9%	3.2%

References

ANZ AgriFocus, numerous 2015 – 2018

Bayleys Real Estate; 2018. Regional production data and industry information.

Dairy Industry Investment Fund Ltd, 2010. Dairy Industry Investment Review

Dairy Industry Investment Fund Ltd, 2010. Financial Performance of Dairy farms by Region

DairyNZ Economic farm Survey 2008 – 2017

DairyNZ Industry Statistics 2001 – 2017

McFarlane Rural Business, Dairy System Monitoring: Profit Watch March 2018

Mounsey, Z. 2016, Analysis of production Systems in the New Zealand Dairy Industry

Newman, Matthew, DairyNZ Raw date from economic farm survey

NZIER report to Export New Zealand March 2016, Foreign Direct Investment in New Zealand A brief review of the pros and cons

REINZ, 2018. Sales price data from industry member database

Volatility to Explain High Historical Farmland Returns, 2014. Craigmore Sustainables

Woodford, Keith. Media commentary on New Zealand dairy debt 2017.