LAND USE DIVERSIFICATION

Challenges & Opportunities for Three North Canterbury Farmers

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OUR LAND AND WATER | Toitū te Whenua, Tolora te Wai | National SCIENCE Challenges

Rural Consulting Overview

Who?

Harry Millar – Senior Environmental Consultant

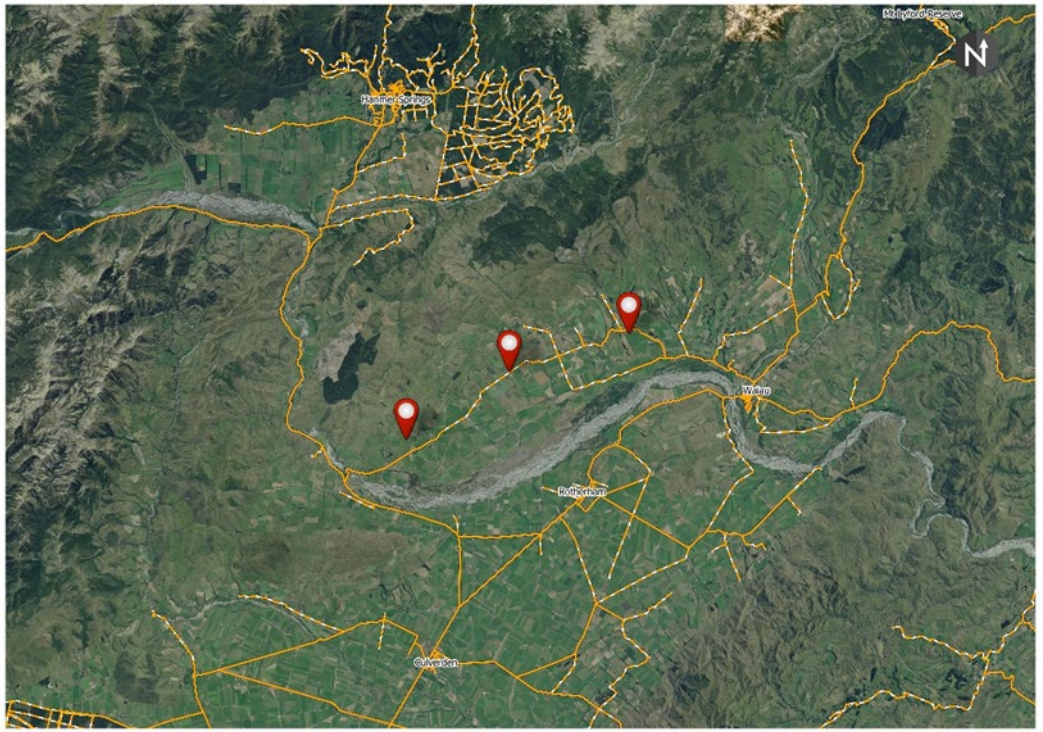
- Originally from a High Country Station up the Ashburton Gorge in Canterbury.
- Range of previous roles in the Agricultural Industry.
- Now been with RCL for 3 years.

What?

- Farm Environmental Support (FEPs, LUCs, NBs, IWG Plans)
- Catchment Group Management (HDLG, EPLUG)
- Resource Consent Applications/Renewals (Land Use, IWG, Water Use)
- ETS Assessments/Registrations
- Farm Mapping
- Due Diligence

Project Background

- Three farm businesses based in the Waiau River catchment, North of the Culverden township in Canterbury.
- Each members of the Upper Waiau Independent Irrigators group (UWII).
- Three distinctly different farm systems:
    - Leslie Hills: Two dairy sheds in operation on river flats, dairy support on terraces and easy hill, sheep and beef on steeper hill, forestry.
    - Chamrousse: Dairy support with large wintering numbers (~2,500 MA cows) and replacements (~850).
    - Edale: Mixed system including 500 cow dairy, sheep breeding and lamb finishing, arable and beef finishing.



Project Drivers

What did we want to know?

- Does land use diversification enhance environmental management.
- What are the associated economic considerations.
- Greater understanding of the cumulative impacts resulting from farm businesses adopting changes which suit the resources available to them (Human, Financial and Natural) within the same catchment.
- Process involved in evaluating potential changes which are relatively novel for the area.
- Barriers to change based on farmer feedback.

- Common themes across each business:
  - Building resilience.
  - Improving environmental sustainability while maintaining a profitable operation.

Diversification Options Investigated

Leslie Hills

The Leslie Hills property explored the option of converting 25-hectares of their current dairy platform into the production of Apples.

The farm system changes made as a result of this was to assume a reduction in total cow numbers by the current stocking rate per hectare multiplied by the area removed, in this case 25-hectares.

This saw a 5.6% reduction in total cow numbers under the new Apples scenario in comparison to the current base system.

This reduction in cow numbers also enabled an assumed decrease in Winter fodder crop area by 6-hectares and subsequent fertiliser input reduction of 7.7% of total Nitrogen applied as a result.

Diversification Options Investigated

Chamrousse

The Chamrousse farming operation assessed the impacts of introducing a specific arable crop following the final defoliation of Fodder Beet in late Winter.

This involved the proposed sowing of Barley in August to be taken through until February where the crop would then be harvested for grain.

At this point of the crop cycle, it was proposed that permanent pasture would then be Autumn sown.

This had minimal impact on stocking rates however the inclusion of the arable “catch crop” across the entirety of winter feed area grown led to significant increases in total grain yield and resulted in an estimated 4.8% reduction in total Nitrogen fertilizer applied.

Diversification Options Investigated

Edale

The construction of a composting barn for the wintering of dairy cows was investigated for Edale.

This involved changes to the feeding regime of the cows through the May, June, July and early August months and the need for additional feed to be incorporated which could be fed in the barn.

Maize silage was the option chosen due to its relatively high dry matter and metabolizable energy to dry matter ratio in comparison to other silage options.

This also reduced the total area required for barn feed production .

There were no changes in stocking rate modelled.

Winter fodder crop area reduced by 86% due to the incorporation of the composting barn and a 4.2% decrease in total Nitrogen fertiliser was assumed as a result.

What Did We Find

LESLIE HILLS - APPLES

	FACTOR	INCREASE/DECREASE	PERCENTAGE
NITROGEN	Total loss (kg)	Decrease	8.7%
	Loss/ha (kg/ha)	Decrease	10.8%
	N Surplus (kg/ha)	Decrease	5.5%
PHOSPHORUS	Total loss (kg)	Decrease	6.1%
	Loss/ha (kg/ha)	No change	No change
	P Surplus (kg/ha)	Decrease	8.6%

What Did We Find

LESLIE HILLS - APPLES

FACTOR	INCREASE/DECREASE	PERCENTAGE
CO2 (CO2-E TONNES/YR)	Decrease	5.5%
METHANE (CO2-E TONNES/YR)	Decrease	5.8%
N2O (CO2-E TONNES/YR)	Decrease	6.1%
TOTAL GHG EMISSIONS (CO2-E TONNES/YR)	Decrease	3.8%

What Did We Find

CHAMROUSSE - BARLEY

	FACTOR	INCREASE/DECREASE	PERCENTAGE
NITROGEN	Total loss (kg)	Decrease	27%
	Loss/ha (kg/ha)	Decrease	26.3%
	N Surplus (kg/ha)	Decrease	12.9%
PHOSPHORUS	Total loss (kg)	Decrease	13.8%
	Loss/ha (kg/ha)	No change	No change
	P Surplus (kg/ha)	Decrease	13%

What Did We Find

CHAMROUSSE - BARLEY

FACTOR	INCREASE/DECREASE	PERCENTAGE
CO2 (CO2-E TONNES/YR)	Decrease	3.8%
METHANE (CO2-E TONNES/YR)	Decrease	3.3%
N2O (CO2-E TONNES/YR)	Decrease	7.2%
TOTAL GHG EMISSIONS (CO2-E TONNES/YR)	Decrease	1.1%

What Did We Find

EDALE – COMPOSTING BARN

	FACTOR	INCREASE/DECREASE	PERCENTAGE
NITROGEN	Total loss (kg)	Decrease	7.8%
	Loss/ha (kg/ha)	Decrease	6.9%
	N Surplus (kg/ha)	Decrease	13%
PHOSPHORUS	Total loss (kg)	Decrease	4.1%
	Loss/ha (kg/ha)	No change	No change
	P Surplus (kg/ha)	No change	No change

What Did We Find

EDALE – COMPOSTING BARN

FACTOR	INCREASE/DECREASE	PERCENTAGE
CO2 (CO2-E TONNES/YR)	Decrease	0.1%
METHANE (CO2-E TONNES/YR)	Increase	0.8%
N2O (CO2-E TONNES/YR)	Decrease	0.4%
TOTAL GHG EMISSIONS (CO2-E TONNES/YR)	Decrease	4.6%

What Did We Find

CUMULATIVE EFFECTS OF CHANGES

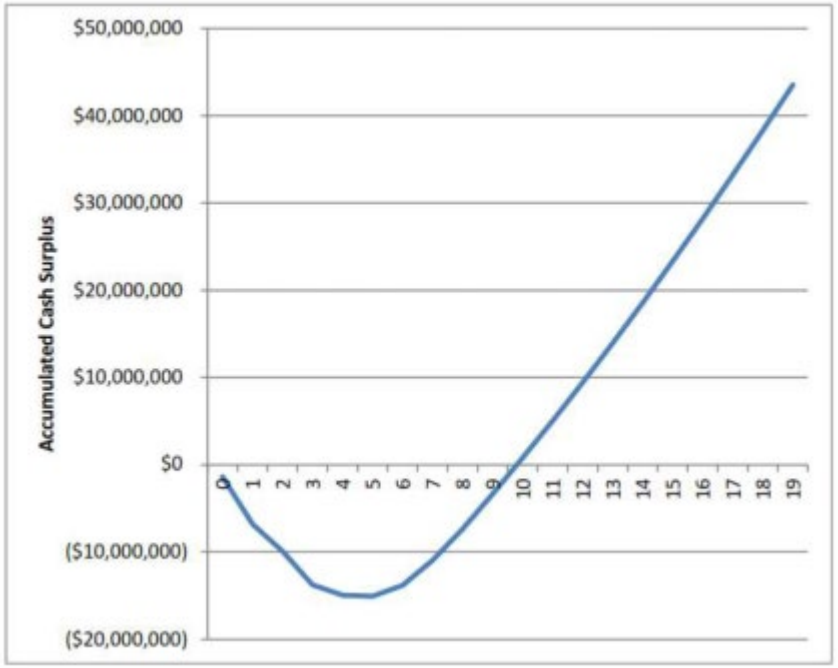
FACTOR	METRIC REDUCTION	PERCENTAGE REDUCTION
NITROGEN	5,969kg/N/yr	13%
PHOSPHORUS	77kg/P/yr	8%
GREENHOUSE GAS EMISSIONS	430 CO2-e tonnes/yr	3.6%

ECONOMIC CONSIDERATIONS

LESLIE HILLS

- Greg Dryden from Fruition Horticulture was contracted to provide a financial analysis of the Apples development.

- What we found from Greg's work:
  - Significant saving in relation to land costs, given the property is already owned.
  - Total capital costs of $12,751,474 to get the system up and running ($510,058per/ha)
  - Development costs make up 51% of this capital outlay.
  - Accumulated Cash Surplus does not reach a positive figure until Year 10 which coincides with yield production maximizing in a similar timeframe.
  - Peak casual FTEs of 69 during harvest highlights a potential risk given the challenges New Zealand faces with employment.
  - Mature EBITDA = $176,000/ha



ECONOMIC CONSIDERATIONS

CHAMROUSSE

- Basic Gross Margin calculated to assess profitability of Barley inclusion.
- Relatively straight forward in comparison to other two case study farms as not a “transformational” shift from BAU.
- Removed an allowance for cultivation costs due to the operation being self sufficient and reduced fertilizer inputs to encourage residual N uptake following winter crop.
- Favorable outcome with GM = **$1,968/ha**

Crop:	Barley	Product: Grain Harvest			
Gross margin/hec	$ 1,968				
Location:	Canterbury				
Sowing date	20-Aug-23				
Harvest date:	1-Feb-24				
Days in crop:	165				
DIRECT INCOME - per hectare:					
Notes		Yield/ha	UOM	price/unit	total
Grain @ $400/tonne		8	tonne	$ 400.00	$ 3,200
				Total Income:	**$ 3,200**
VARIABLE COSTS - per hectare:					
Process	Detail	Quantity	UOM	cost/unit	total
Soil test	150 mm sample per paddock	1	each	$ 60	$ 60
Initial Spray	Contractor	1	hectare	$ 26	$ 26
	Chemical - glyphosate	3	litres	$ 15	$ 45
Seed	Barley seed	120	kg/ha	$ 1.50	$ 180
Weed & Pest	Herbicide - post plant	1	Appln	$ 40	$ 40
	Application	1	Pass	$ 26	$ 26
Irrigation		1		$ 390	$ 390
Cartage		1		$ 40	$ 40
Other costs	Harvest	1	hectare	$ 390	$ 390
*Interest cost**	on expenditure	$ 4.10	Months	8.5%	$ 35
				Total Expenditure:	**$ 1,232**
				Crop Gross Margin:	**$ 1,968**

ECONOMIC CONSIDERATIONS

EDALE

- Capital expenditure required to construct a composting barn capable of housing 510 cows at an allowance of 7.5m2 per cow = **$2,283,270.**
- Farm Working Expenses anticipated to rise by approximately 3.2%.
- Woodchip requirements assumes a depth of 750mm in the barn.
- Plant & Equipment includes an allowance for the purchase of a mixer wagon, tractor for tilling, tractor for towing the mixer wagon, deep ripper attachment for compost management and a muck spreader.

CAPITAL ITEM	COST (EXCL GST)
BARN CONSTRUCTION	$1,560,600.00
SITEWORKS AND CONCRETE	$423,300.00
WOODCHIP	$73,950.00
PLANT & EQUIPMENT	$225,420.00
TOTAL CAPITAL COST EXPECTED:	***$2,283,270.00***

CHALLENGES

FARMER FEEDBACK

- With any relatively novel concept, the challenges are often the easiest to identify as so many of the opportunities hinge on the individual's ability to execute the idea and reliance on volatile markets is common.
- Primary challenge as already highlighted was the capital costs to get the concepts underway, particularly for the composting barn and Apple development scenarios.
- Change in skillsets/labour required to efficiently manage the new system.
- Climate/natural resource restriction i.e sowing time for Barley, hail for Apples.
- Higher debt loading that may be passed onto the next generation to manage.
- Over capitalizing i.e housing required for peak FTEs during Apple harvest. A farm only needs so many houses…..

OPPURTUNITIES

FARMER FEEDBACK

- Potential benefits of incorporating the composting barn structure spanned matters relating to:
  - Improvements in animal welfare stemming from winter management of cow condition.
  - Potential reductions made in relation to the property's environmental footprint.
  - Potential milk yield increases resulting from greater flexibility in managing cow nutrition.
  - Housed structures were also raised as a potential solution for methane reduction given the ease in administering feed additives but also improving feed utilization.

- Potential benefits of incorporating Barley as a catch crop:
  - Relatively cost-effective method for achieving what seemed like substantial gains in Nitrogen loss prevention.
  - Flexibility to either carry through for grain or utilize as a whole crop silage.

- Potential benefits of Apple development:
  - Diversify income streams.
  - Increase cashflow at different stages of the year.
  - Attracting and expanding grower knowledge into the district.

- General observations:
  - Greater flexibility for business succession.
  - Growth in new labour opportunities for local communities.


Q&A