



## ADAPTING TO A CHANGING CLIMATE: CASE STUDY 16

# HIGH COUNTRY FARMING

## Climate change, tenure review, and private energy generation

### REDCLIFFS STATION

- Total of 1960 hectares total located in the Upper Rakaia Gorge, mid-Canterbury.
- Land contour includes 200 hectares of flat-rolling country and 1660 hectares of hill country.
- In March 2009 there were 3200 merino ewes, 1800 hoggets, 60 rams, 400 cross bred ewes, 170 Angus cross MA cows, 50 rising two-year heifers, three bulls and 180 rising one-year beef cattle.
- Twenty four hectares is in mixed brassica; swede, turnip and rape.

### THE CLIMATE

- Annual average rainfall at the homestead is 887mm with temperature extremes of between  $-10^{\circ}\text{C}$  and  $40^{\circ}\text{C}$ .
- The prevailing wind is westerly, resulting in high evapotranspiration rates.
- The property is subject to 2–4 snowfalls per year at the homestead of between 100–200mm.

### THE FAMILY

- Willy and Sarah Ensor.



*A harsh and increasingly variable climate coupled with tenure review forced Willy and Sarah Ensor to critically assess their farming system and implement significant changes to ensure long-term sustainability.*

### WHAT IS TENURE REVIEW?

Tenure review of a pastoral lease is a voluntary negotiation between the Crown and the lessee, under the Crown Pastoral Land Act 1998. The process results in the transfer of some land with significant values (biodiversity, landscape, recreation, historic, public access etc) to the Crown, administered by the Department of Conservation as public conservation land, and the freeholding of some land capable of productive use to the lessee.

### A FUNDAMENTAL CHANGE

Tenure review recently reduced the effective area of the farm from 9790.9 hectares to 1960 hectares. The majority of the land retired was steep, undeveloped tussock grassland that carried a wether mob of 2000.

In addition to the downsize, the long-term collection of rainfall data (see Figure 1) helped Willy and Sarah identify increasing variability in annual rainfall with larger extreme events occurring more frequently than when they established the farm in 1983.

“Tenure review, coupled with this variability has required a fundamental change to our business,” says Willy. “Status quo was not feasible as we relied heavily on our wether flock which was run exclusively on the land removed through tenure review process.”



*Tenure review, an increasing number of “peak” climatic events and a variation of annual rainfall of up to 70 percent forced Redcliffs to make significant changes to farming practice.*

## RESPONDING TO A CLIMATE CHANGE THREAT

Key to this has been the need to produce an equivalent amount of feed from a significantly smaller land area and the development of a system that aids in reducing the risks posed by increasing rainfall variability.

## KEY ADAPTATION STRATEGIES

### SHARED KNOWLEDGE

Willy and Sarah joined a group of merino farmers who share knowledge and analyse their farming performance against a set of established key performance indicators.

This helps the couple track production gains and losses and has been particularly important in helping quantify the value of changes prompted by climate variability, commodity prices and the tenure review process.

“Redcliffs is now performing far better,” says Willie, “largely achieved by improving the quality of our sheep and wool, fining up our clip, and detailed analysis and adaptation of our farming system according to our climate and end markets.”

Also critical to the lift in performance has been the shift in proportion of wool-to-meat based income. Previously, approximately 70 percent of total farm income was derived from wool however in the 2008/09 financial year this shifted to around 40 percent.

### REMOVAL OF A STOCK CLASS FROM THE SYSTEM

The land removed through tenure review was predominantly less developed hill and high country, run exclusively with about 2000 merino wethers in the summer. The less developed front hill country which remains part of Redcliffs Station was used as winter grazing for wethers.

To build flexibility into the farming system, wethers as a stock class have been phased out of the system entirely. Coupled with development of the high/mid altitude country still retained as part of Redcliffs, this provides high quality summer feed for ewes post-weaning, cows and calves.

It also offers an excellent balance to the irrigated country and has helped to maintain production through particularly dry periods.

To counter the loss in production and profitability caused by removing the wether flock, Willy has increased ewe numbers by 1300 and cows by 60.

### IRRIGATION

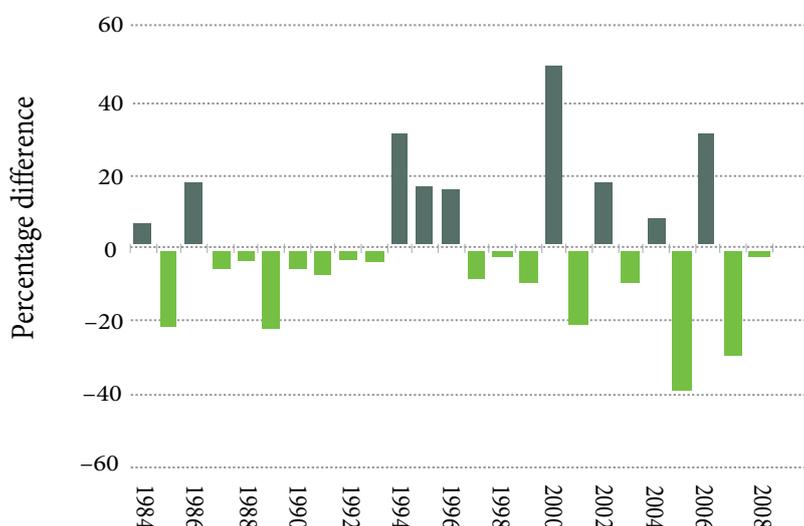
“Tenure review would not have been feasible without irrigation,” says Willie.

In 2002, Willy established an 87 hectare K-line irrigation system and in doing so, was able to make significant changes to the farming and stocking policies. The resulting increase in productivity enabled the tenure review process to occur despite the station weathering both the driest and wettest years in Willie’s time there.

The K-line is gravity fed requiring no pump or generator and minimal maintenance. The water take has been built into the tailrace of the mini hydro-electric power plant, further adding to the efficiency of the system. However, while the system is “pump free” which equates to a major cost saving, the costs of irrigation are still significant when labour, maintenance and the running of the quad bike (required to move the L-line system daily) are taken into account.

The system has the capacity to irrigate another 30 hectares. However, this would require installing a pump which Willy deems “self defeating, as it would complicate what has been specifically designed to be a very simple and effective system.”

FIGURE 1: PERCENT DIFFERENCE TO 24 YEAR AVERAGE ANNUAL RAINFALL AT REDCLIFFS HOMESTEAD 1984–2008



## FOR MORE INFORMATION

- Review information on New Zealand’s climate through the National Climate Database [www.cliflo.niwa.co.nz](http://www.cliflo.niwa.co.nz)
- Read about electricity generation on-farm including micro hydro-generation from the Energy Efficiency and Conservation Authority at [www.energywise.govt.nz](http://www.energywise.govt.nz)
- For more information on designing effective and efficient irrigation systems visit the MAF website [www.maf.govt.nz](http://www.maf.govt.nz)
- For information about tenure review visit [www.linz.govt.nz](http://www.linz.govt.nz)

### **BENEFITS OF THE IRRIGATION SYSTEM**

The installation of irrigation, combined with the establishment of higher quality pastures, has resulted in a production increase of approximately 826 500 kg dry matter per year.

This very nearly balances the approximately 876 000 kg dry matter per year removed through tenure review, as not all of the dry matter was utilised in the old extensive grazing system.

The introduction of irrigation into the system has removed the commitment to selling store lambs at weaning which can be a highly volatile and economically challenging proposition, particularly in dry years. Instead, all lambs produced are either kept on as replacements, or killed as prime lambs or forward stores.

Willy says, “as the east coast becomes drier, growers committed to selling store lambs at weaning will become even more vulnerable to price volatility, as they will be relying only on those farms with irrigation to purchase their stock.”

### **MINI HYDRO-ELECTRIC GENERATION**

A mini hydro-electric power system, installed in 1984, produces 10kw of energy which more than meets the everyday requirements of the farm. This is backed up with a diesel generator for peak times such as shearing or when the stream feeding the system is in major flood.

Isolated farming areas regularly experience power cuts and after major storm events, high country stations are often the last to have power restored. “In the last big snow, no one had power or phone for weeks but we were sitting pretty,” says Sarah.

Climate change projections show an increase in the frequency of significant weather events but the mini hydro system ensures that Willy and Sarah will have a reliable and consistent supply of power, further building the resilience of their farm.

It costs around \$8–9000 per year to run, including maintenance and



Mini hydro-electric scheme water intake.

## **Key points**

- 1** Tenure review, an increasing number of “peak” climatic events and a variation of annual rainfall of up to 70 percent forced Redcliffs to make significant changes to farming practice.
- 2** The incorporation of a mini hydro-electric power station has insulated Redcliffs from increasing power prices and provided security of supply in the face of extreme weather events.
- 3** K-line irrigation, gravity fed using the natural fall of the property has resulted in a highly productive use of water, already being harvested by passage through the mini hydro plant.
- 4** Critical to the ongoing sustainability of the business has been the rationalisation of both stocking policies and pasture development.
- 5** Detailed analysis of farm performance is benchmarked against other merino farmers to provide a guide for improvements.
- 6** Improved economic performance is allowing the farm to remain viable and facilitating a change to more productive and profitable stock classes.

depreciation. Willy estimates that if they were purchasing power from the main grid, they would be using in the region of \$6000 power per year, however as power prices increase this inequity is likely to reverse.

“Commercially, our next step will be to identify opportunities to either more effectively use what we are currently producing, or produce more for a specific purpose,” says Willy.

### **THIS IS ONE IN A SERIES OF CASE STUDIES CALLED ADAPTING TO A CHANGING CLIMATE**

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