POST QUAKE FARMING

Integrated Farming and Forestry Case Study

Kulnine, Kekerengu

beef+lamb
new zealand

Ministry for Primary Industries
Manatū Ahu Matua

Environment
Canterbury
Regional Council
Kaunihera Taiao ki Waitaha

Farms affected by 2016's earthquakes are turning the huge challenges of devastation into an opportunity for their business. Using expert advice, analyses and information, farmers are diversifying land use to improve economic, environmental and social outcomes.

This is the second case study of a series which presents information about farms affected by the 2016 Kaikoura Earthquake. The farms have all had analyses carried out by a farm system consultant, a forestry/carbon consultant, and the farmers themselves. All farms have completed a farm environment plan with soil and land use capability mapping.

MEET THE CHAFFEYS

INTEGRATED FARMING AND FORESTRY CASE STUDY:
KULNINE, KEKERENGU

OVERVIEW

Kulnine is owned by Sandy and Anna Chaffey. It is 615ha, of which 462ha is effective.

Trees are very much part of the Kulnine landscape. On the better classes of land, the Chaffeys farm sheep and beef which is a trading/finishing operation.

The earthquake triggered further analysis of the Chaffeys' business, and has put a focus strongly on business diversification, within the property, and externally.

CHAFFEYS' OVERALL GOALS

- To have a financially and environmentally sustainable farming business on Kulnine.

- To leverage off Kulnine Partnership and Kulnine (the land) to grow the business further off-farm, with the overall goal to make farm succession as even and fair as possible.

SPECIFIC GOALS

- Expand the business to include two sustainable farming operations (to support farm succession) within three years.

- Keep the animal production system simple and profitable and within the capability of the land, with negligible environmental impact.

- Operate a sheep and beef unit that is financially, environmentally and socially sustainable, generating as much profit as possible from the farm.

- Diversify business investments and risk.

- Protect and enhance the aesthetic, biodiversity and environmental values of the property for future generations.

CURRENT FARM SYSTEM

- 2,000 – 2,500 winter trade hoggets (22kg carcass weight), bought in March/April at 30kg live weight.
- Buy 900 – 1000 ewes with lambs at foot (130%)
- Ewes sold prime and store at weaning in January
- 2,000 lambs bought in Dec – Jan period and finished
- 180 weaner bulls bought spring and sold autumn 160 – 230 kg live weight
- 120 Hereford weaner bulls purchased autumn for dairy industry
- 350 Yearling Friesian bulls from spring and sold autumn

- 320 Yearling Jersey bulls for dairy industry bought spring and sold as 2-year olds
- 5 -7 ha of kale sown in spring for late summer and early autumn lambs
- 24 ha of winter rape, mid-October spray, summer fallow, sown in January/February and grazed by bulls and lambs
- 5 – 15 ha of Italian ryegrass, of which 5-7ha replaces kale in autumn, and some may be sown in green feed oats
- 13 ha of lucerne
- 14 ha of red clover
- Up to 73 ha in forages.

IDENTIFYING LAND SUITABLE FOR DIFFERENT USES

1.   A paddock scale land resource inventory (LRI) survey was undertaken for Kilnine by Suzie Le Cren from LandVision Ltd. This consisted of mapping the underlying geology, soils, slope, erosion type and severity and vegetation.

2.   The LRI survey was used to derive the land use capability units (LUC) across the property. The LUC classification system is based on the five LRI factors and splits land up into eight different classes. Class I land is the most versatile while class VIII is the least. Generally speaking, for classes I to IV you can get a tractor over, and it is suited to intensive pastoral farming and fodder cropping. Class V land, depending on slope, may be suited to very infrequent cropping as part of the pasture renew programme. Class VI is strong pastoral hill country whilst Class VII land has significant limitations to pastoral use. Class VIII land is not suited to farming or forestry and should be retired.

3.   21% of land on Kulnine is LUC classes III and IV, 12% is class V land, 52% is class VI land and 14% is class VII land.

4.   The LUC Class is further coded according to the land's greatest limitation to use. Subclasses include soil erosion, soil wetness, soil physical properties, and climate.

5.   Each area of land is also assigned a standard classification called an LUC Unit, based on LUC class, use limitation, and underlying geology, soils, slope, erosion, and vegetation. At Kulnine there are 13 different LUC units each with its own strengths and limitations along with conditions of use for long term sustainable land management. LUC units have standardised descriptions, stock carrying capacity, and tree growth indexes. This information can be used for assessing how land management options and estimating production potentials.

6.   Soil information is a component of the LRI survey. In some cases it is useful to present it as a standalone map as soil type boundaries don't necessarily follow LUC boundaries. On Kulnine 15 dominant soil types were identified all with their own inherent strengths, limitations and production opportunities.

7.   Detailed soil information is useful for a range of planning purposes including nutrient management (getting the best use of fertiliser as well as reducing runoff and leaching losses), pasture management, and understanding risk and vulnerability associated with different soils.

HOW HAS LUC HELPED THE CHAFFEYS?

"   *LUC has given us some actual figures of each type of land classification, which helps us make proactive and informed decisions about our land use. It has also reinforced what we knew about the capabilities of our different land classes.*"

FUTURE FOR THE FARM BUSINESS

TREES FOR KULNINE

LUC has been used to assess the land and identify the 'right tree for the right place'.

Class III to VI is suitable for pastoral farming and has not been considered for forestry. A further consideration is eligibility for the ETS. Land with forest species present on 31 December 1989 is not eligible and cannot be used for carbon forestry.

PRE-1990 FOREST

166ha was identified as pre-1990 forest and therefore not eligible for the New Zealand Emissions Trading Scheme (ETS). This means there are no carbon credits for this area, and if deforested, there is a liability if not replanted within four years or offset by planting an equivalent area elsewhere. The deforestation liability on this area is $18,600/ha at $25/NZU.

POST-1989 FOREST

Forest established post-1989 can be registered in the ETS. There are two areas that meet the post-1989 criteria on Kulnine; a 1.25ha area of indigenous, and a 1.65ha area of exotic forestry. If these areas were registered, they would receive carbon credits, and also face liabilities if harvested, or if deforestation occurred from natural causes, e.g. fire or wind-throw (although these rules are expected to change in the upcoming review of the ETS).

The indigenous area would earn around 6.5 NZUs per hectare per year, which is considered too small to offset the costs of being involved with the ETS. The exotic area is in two stands, each less than 1ha, which then makes them ineligible unless the forest area is expanded through further planting.

PLANTING OPTIONS

The final assessment was to identify areas which could potentially be planted in forestry. The areas to target at Kulnine are class VIe (erosion-prone class VI land), and class VII land. Other areas of erosion-prone land and riparian areas were also targeted as these areas were deemed not suitable for pastoral farming.

A total of 67ha meet this criteria. About half of this is cleared kanuka, which meets the One Billion Trees criteria, and also can qualify for the ETS if it was cleared more than four years ago. An additional 34ha is bare land and so meets both the One Billion Trees and ETS criteria if planted and registered.
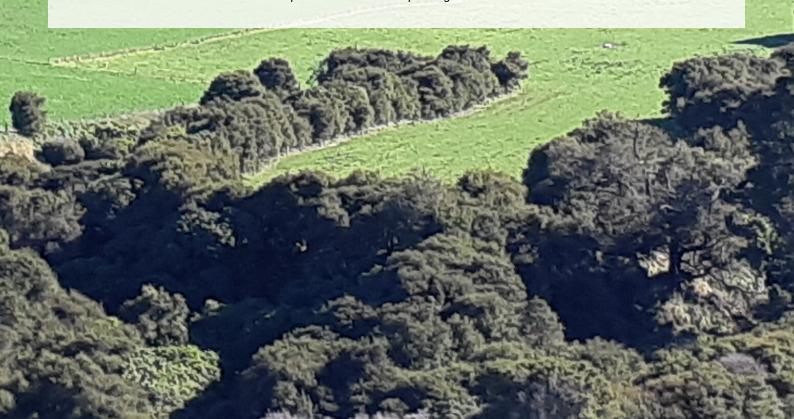
WHY EXPLORE TREES FOR KULNINE?

We have some classes of land that are prone to erosion and slumping, and it is also hard to keep regenerating scrub off. We wanted to explore other options for this type of land to see if there was something better to do with it that generates a financial return."

WHAT SPECIES TO PLANT AND WHY?

Table 1 shows economics for the different species options identified for the 67ha of land.

	Manuka/Kanuka	Permanent eucalyptus	Pinus radiata
Area	8ha	36.5ha	19ha
Forest cost year 1 /ha	$2,200	$1,800	$1,400
Forest cost year 2 /ha	$300	$350	$200
Forest cost year 9 /ha	$0	$0	$800
Annual forest cost /ha	$50	$50	$50
ETS cost year 1 /ha	$25	$25	$25
Annual ETS cost /ha	$4	$4	$4
One Billion Trees Grant year 1 /ha	$540	$450	$450
One Billion Trees Grant year 2 /ha	$900	$750	$750
One Billion Trees Grant year 4 /ha	$360	$300	$300
One Billion Trees Grant	Landowner keeps all carbon credits	Landowner keeps all carbon credits	Crown keeps first 6 years of carbon credits
Estimated stumpage income			$22,500/ha (harvest at 28 years)
Carbon income average per year (@$25/NZU)	$161	$420	$110
Annualised average net earnings (EBITR) average/ha/year	$130	$390	$770
Return on capital (IRR), land @ $3,800/ha	2.0%	10.9%	8.3%
Weighted average net earnings (EBITR)/ha/year	$471		
Weighted average return on capital (IRR), land @ $3,800/ha	9.0%		

Table 1: Economics for different forest species considered for planting on Kulnine.

WHY PINE?

Areas that are well suited for harvesting were identified for a timber + carbon regime. These areas were considered good timber forest prospects because of economic and environmental factors related to log recovery.

Radiata pine is the preferred candidate as it provides the highest returns and the lowest establishment risks. It also has well-established markets and industry to support activities. Pinus Radiata is also a highly dependable timber production tree with very few disease issues and excellent growth consistency compared with other species. It has also benefited from many years of plant breeding and refinement which means high-performing cultivars are readily available.

With the likely ETS rule changes, the harvest carbon repayment obligations which currently disadvantage farm-woodlot forestry will no longer be an issue. Therefore, having a timber forest that benefits from carbon income coupled with timber income provides a potential for increased returns and diversification.

WHY EUCALYPT?

There are over seven hundred species of eucalypts, some of which have proven to grow very well in New Zealand. Eucalypts are a good choice for a carbon forest because they have high growth rates (in some cases they can outpace radiata pine in terms of growth rates) and as a hardwood (flowering) tree they have a higher carbon density per cubic metre of wood.

Eucalypts have been modelled as a scenario for areas that are less accessible for harvesting and therefore are better suited for permanent forestry where carbon credits are the only income source. Species of eucalypts such as *E. regnans* and *E. fastigata* are proven to grow fast, store large amounts of carbon, and can live for many hundreds of years.

In the right conditions Eucalypts can act as a companion crop for native forest species and a food source for native birds and bees. Sparse foliage allows light and moisture to reach the canopy floor for native regeneration, while the flowers attract nectar-feeding birds, and insects for insect-feeding birds.

Areas identified for different tree species on Kulnine.

WHY MANUKA/KANUKA?

Manuka/Kanuka were chosen because both species are naturally occurring in the surrounding areas. Manuka also has the benefit of providing a potential, additional income stream through honey. There is also a reasonable industry that has grown around planting manuka so establishment costs are generally less than for other indigenous forest species.

Kanuka, being similar to manuka, also benefits from lower establishment costs. Finally, both species are reasonably robust and easy to establish compared with other indigenous species.

FARM SYSTEM CHANGES

The proposed 67ha of planting is a combination of non-farmed riparian areas, and farmed areas. There is about 33ha which is currently grazed. Using Farmax, a range of alternative farm system scenarios were analysed to consider the impact of afforestation of this area on the farm business with respect to the feed supply and financial performance of the business.

The scenarios assessed included:
1. Running fewer cattle (28 fewer Friesian bulls traded, and 60 fewer dairy bulls wintered)
2. Fewer jersey bulls (55 fewer)
3. Spring and autumn nitrogen added (24 tonnes urea)
4. Jersey bulls grazed off (105 from 1 March to 31 July at $15/head/week)
5. Reduced sheep numbers (250 fewer trade hoggets, 125 fewer ewes with lambs at foot and 250 fewer summer trade lambs).

Table 2 below shows the economic implications of the different options.

	Current	Less cattle	Less jersey bulls	Nitrogen	Graze-off jersey bulls	Less sheep
Area (ha)	462	429	429	429	429	429
EBITR	$388,021	$362,787	$354,960	$364,503	$353,501	$351,570
EBITR/ha	$840	$846	$827	$850	$824	$820
Capital released	$37,607	$70,565	$0	$0		$29,750
Opportunity cost	$21,473	$26,005	$23,518	$34,520	$33,476	
Opportunity cost by $/ha retired (33ha)	$650	$788	$713	$1046	$1014	

Table 2: economic analysis of different farm system changes for land proposed for afforestation on Kulnine.

Note: Value of capital released assumes an interest rate of 10% which is included in the opportunity cost.

Where the opportunity cost of a particular scenario modelled is less than the EBITR/ha of a forestry option, then there is good economic reason to invest in forestry. In this instance establishing forestry (Pines for production and carbon - $770/ha EBITR) makes economic sense if the livestock system is altered to reflect the "Fewer Cattle" ($650/ha EBITR) and "Nitrogen" ($713/ha EBITR) scenarios modelled using Farmax.

When comparing this financial performance with the B+LNZ Economic Service data, it should be noted that it is performing very well, compared to averages of EBITR/ha for South Island High Country at $52/ha, South Island Hill Country at $158/ha and South Island Finishing Breeding at $406/ha.

When compared to these, the weighted average of the forestry options outperforms the average sheep and beef farm. The values and goals of individuals, as well as options to improve farm performance, need to be taken into consideration.

Importantly, these B+LNZ Economic Service statistics indicate there is likely to be significant opportunity for improved livestock profitability through better farm performance, as well as opportunities to raise overall farm business profitability through one or more of the forestry options outlined in this case study.

KEY POINTS

- Forestry can provide returns on marginal land that is comparable or better than pastoral use.

- There are a range of options for forestry and there are good grants available to help with the cost of land use change.

  Understanding your natural resource base is key. Detailed Land Use Capability mapping can be very beneficial with this and allows you to follow an objective process:
  - Assess your resources
  - Review your livestock systems and policies and their financial performance
  - Get good carbon and forestry advice to assess options

- When retiring land from pastoral grazing, it is important to consider:

  - What's important to you?
  - Change in livestock number
  - Changes to your management and time
  - Impact on staff and other labour
  - Impact on your operating expenses
  - How much capital will be released with different options (if any)
  - Cashflow impact from policy changes
  - Appropriate forestry species for the appropriate goals, objectives, and landscape.

ADVICE TO OTHER FARMERS

This has been a very rewarding exercise; it has enabled us to make an informed decision on what is the best use for our different classes of land. If other farmers are interested in running their classes of land differently than they do now, they should look to use some professional help so they can then make a decision that is best for them using good data, robust mapping information, and sound advice.

It is important to look at different options for forestry, carbon and farming and consider different sensitivities around price as they can look quite different in different years. The different forestry/carbon and farming (although actual) options that were looked at had budgeted or forcasted prices, in a couple of years the results from this analysis could be very different.

It is also worth considering other reasons for changing land use, such as aesthetics".

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