Using carbon initiatives for positive landuse change in Northland

Introduction

This info sheet describes, using the example of a Northland sheep and beef farm, the balance between carbon liabilities and credits and the way in which existing forestry can contribute to future physical and economic resilience. The case study farm is a traditional sheep and beef operation with around 4,100 stock units. The effective grazing area is 478 hectares with a mixture of flats and rolling country. The production base is 630 ewes plus 700 cattle, ranging from heifer calves to two year bulls and beef cows.

Key Messages

- Assessing landuse capability and profitiability can help maximise benefits to the farm business from integrating a carbon management strategy
- Farms with existing post-1989 forestry have valuable risk management options

Total annual greenhouse gas emissions

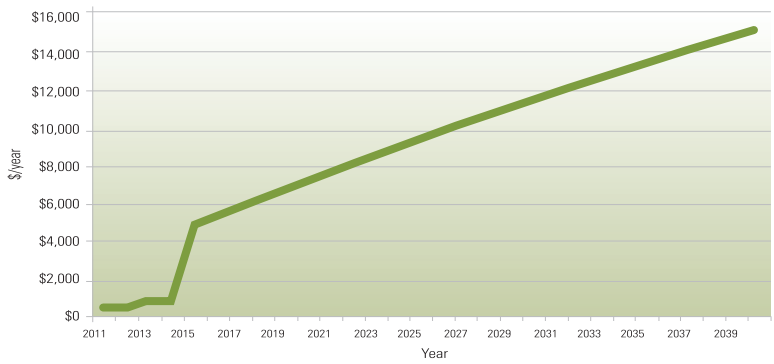
Annual emissions from the case study farm are described in the table below. A New Zealand Unit (NZU), the standard measure used for carbon accounting in the Emissions Trading Scheme (ETS), is equivalent to 1 tonne of carbon dioxide (CO2). Emissions from livestock are calculated from meat production (slaughter records). This farm produces, 22 tonnes of beef from 72 cattle and 56 tonnes sheep meat from 3114 sheep. Note that livestock are the source of 97% of emissions from the case study farm (1,630 of the total 1,675 units). The Carbon Farming Group calculator was used to prepare this table[1].

GREENHOUSE GAS SOURCE (ANNUAL EMISSIONS)		TONNES CO_2 (NZU)
Petrol	2,446 litres	6
Diesel	6,110 litres	16
Electricity	4,500 kWh	1
Nitrogen	3.8 tonnes	21
Cattle	72 head	143
Carcass weight (beef)	22 tonnes	223
Sheep	3,114 head	934
Carcass weight (sheep meat)	56 tonnes	331
	Total	1,675

Impact of ETS on the farm

Agriculture will be included in the ETS from 2015. Initially, farmers' liabilities for livestock emissions will be limited to 10%. These liabilities will increase by 1.3% per year from 2016 onwards. The 2015 liabilities for this farm will be 163 NZUs which equates to about $13 and $1 per head cattle and sheep respectively @ $25/NZU. The total annual cost to the farm from 2010 to 2040 (including energy and fertiliser) is shown on the graph below.

Total annual cost of ETS from 2010 to 2040 @ $25/NZU



1. Based on new regulations for agriculture in the NZ ETS from September 2010. These can be found at http://www.maf.govt.nz/climatechange/agriculture/EmissionsFactors_AgETS.pdf. Note that two calculations are required for sales of livestock to meat processors, number of head killed X emissions factor and carcass weight of livestock X emission factor. Calculator can be found at www.carbonfarming.org.nz

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Carbon credits & greenhouse gas balance

There is little that can be done immediately to reduce livestock emissions significantly without reducing stock numbers (see info sheet 7 for options). Therefore we have assumed emissions will remain constant in the short term, and that carbon credits could be used to offset emissions. Carbon accumulated by trees can be claimed as carbon credits in the case of forests planted after 1989 on land not previously forested (see info sheet 7).

This case study farm is eligible to claim carbon credits from an existing "post-1989" forest. Twenty hectares of radiata pine was planted in 1995 and 166ha of low-quality grazing land was retired for native forest regeneration. This area qualifies for credits from native forest reversion as prevailing grazing management was preventing forest species from covering 30% or more of the land.

We estimate that between 2008 and 2012 the 20ha of pine forest will accumulate 3,814 NZUs (average of 38.4 NZU/ha/yr) and the 166ha of native will accumulate 7,105 NZUs (average of 8.6 NZU/ha/yr)[1]. This equates to an average of 2,183 NZU/yr for the farm.

The greenhouse gas emissions balance is calculated by deducting credits from emission liabilities. With total annual emissions for the farm at 1,630 and annual credits at 2,183, the farm has a surplus of credits.

Because agriculture's liabilities under the ETS will initially be limited, the case study farm will accrue 16,160 surplus credits (NZUs) from carbon accumulation between January 2008 and December 2014. These may be sold or could be retained.

How can credits from a forest be used?

Given that emissions liabilities will initially be charged at the processor level, it will not be possible to directly offset emissions liabilities from livestock with credits from forestry. A farmer will need to sell credits from forestry and use the cash to offset the impact of emissions costs on the farm budget.

Landuse capability and productivity

Land use capability surveying and pasture productivity monitoring of this farm revealed three broad land type categories. This detail was collated from pasture, livestock and profitability monitoring carried out during the three year Meat and Wool monitor farm programme. The table below shows that the flat/easy land produced almost three times what the steep hills did. This low productivity steep land was also subject to gorse spraying every 3 years at a cost of $600/ha. The combination of low productivity and high cost resulted in a negative gross margin on this land type. Land use analysis identified 100ha suitable for establishment of new forest.

LAND TYPE	ANNUAL PRODUCTION (KGDM/HA) (AVERAGE FROM JUNE 2008 TO MAY 2010)
Flat/Easy Land	12,950
Rolling Hills	8,776
Steep Hills	4,947

Proposed new forest and farm productivity

Farmax® was used to assess the impact on the livestock operation of converting 100ha of grazing land to forestry. The table below suggests that average productivity and gross margin would be significantly improved. Reducing grazing land by 20% would improve profitability and would reduce overall production by less than a five percent.

	CURRENT FARM	AFTER 100 HA NEW FOREST
Area	478 ha	378 ha
kg Meat per ha	204	261
kg Wool per ha	25	15
kg Total per ha	229	276
$ Gross Margin per kg product	2.07	2.51
kg Total Farm Production	109,468	104,469
$ Gross Margin per hectare	474	693

Establishing the new forest could be done over several years, funded directly from carbon credit sales so that no extra capital would be required. This new planting will ensure there will be sufficient credits available to address the expected harvest liabilities from the 20ha of existing forest in 2025. Forestry offers an opportunity to reduce emission liabilities (and costs) over the medium term (30 to 50 years) while new GHG mitigation technologies are developed and implemented.

A range of other benefits from forestry can also add value to the farm. These include protecting waterways, reducing soil erosion, providing shade and shelter for livestock, increasing biodiversity, diversifying income from carbon and timber, and improving the amenity of a property.

1. Carbon Stock per hectare for post-1989 forest land (Pinus radiata) for Auckland (Look-up Tables, March 2009, MAF, http://www.maf.govt.nz/sustainable-forestry/ets/guide/lookup-table-guide.pdf).

Further Reading

Carbon Farming Information Report
www.carbonfarming.org.nz
www.maf.govt.nz/climatechange
www.landcare.org.nz/

Information prepared by P.A.Handford and Associates Ltd in conjunction with the Carbon Farming Group