

# Carbon Balance –Integrated Dairy, Sheep and Beef Operation

## Contents



## Introduction

This info sheet describes a balance of carbon liabilities and credits for an integrated dairy, sheep and beef operation. Using a case study, the potential impacts of Emissions Trading Scheme (ETS) are discussed, along with the possible use of forestry to offset on-farm emissions.

## Case study – Integrated livestock operation

This case study operates on three properties comprising of a 178 ha dairy farm with 535 cows, a 40ha dairy run-off and a 362 ha sheep and beef farm. Around 8700 stock units are farmed in total.

### Total annual greenhouse gas emissions

Annual greenhouse gas 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 ETS, is equivalent to 1 tonne of carbon dioxide ($CO_2$). Emissions from livestock are calculated from milk and meat production (slaughter records). This farm produces 210,000kg milk solids, 31 tonnes of beef from 151 cattle and 25 tonnes sheep meat from 1472 sheep. Note that livestock are the source of 88% of emissions from the case study farm (2,428 of the total 2,763 units). The Carbon Farming Group calculator was used to prepare this table[1].

| GREENHOUSE GAS SOURCE (ANNUAL EMISSIONS) | | | TONNES $CO_2$ NZU |
|---|---|---|---|
| Petrol | 2,300 | litres | 5 |
| Diesel | 12,500 | litres | 33 |
| Electricity | 63,848 | kWh | 15 |
| Nitrogen | 45 | tonnes | 258 |
| Milk Solids | 210 | tonnes | 1,289 |
| Cattle | 151 | head | 299 |
| Carcass weight (beef) | 31 | tonnes | 269 |
| Sheep | 1,472 | head | 442 |
| Carcass weight (sheep meat) | 25 | tonnes | 129 |
| | Total | | 2763 |

### Impact of ETS on farm

Agriculture will be included in the Emissions Trading Scheme from 2015. Initially there will be a 90% free allocation of credits which means that farmers will be liable for 10% of their livestock emissions (energy and fertiliser will be paid separately). This amounts to 243 NZUs in 2015 for this farm. Milk and meat processors will pay this on behalf of the farmer. At $25/NZU this will amount to a levy of about 1.5c/kg milk solids, $9 per head for cattle and $1 per head for sheep at slaughter. The free allocation will reduce by 1.3% per year on year from 2016 onwards. This is shown on the graph over the page.

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

Sustainable Farming Fund

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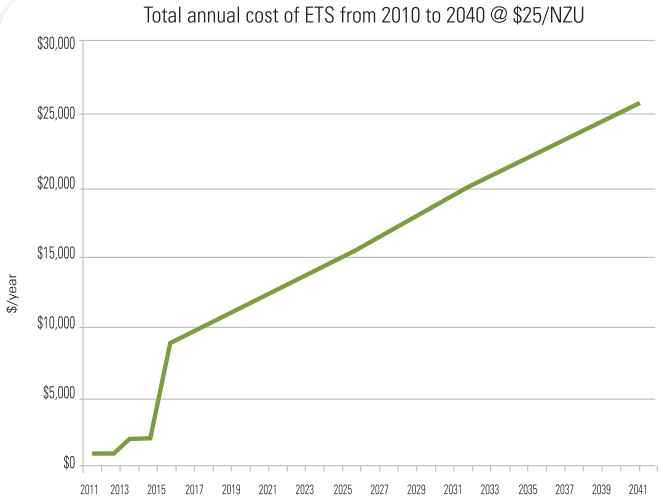


## Carbon price effects

At the moment carbon liabilities will be dealt with at the processor level. Changes in the carbon price will have a direct impact on final costs of any scheme. The market price for carbon is very uncertain and will continuously vary like other commodity prices. However, post-1989 forests provide credits at the farm and national levels. Access to these credits reduces exposure to future increases in carbon price, significantly reducing business risk. This will add carbon to the range of products considered by forest managers (see info sheet 12 for detail).

## Potential forestry credits

There is little that can be done immediately to reduce livestock emissions without reducing stock numbers so we have assumed emissions remain constant in the short term, and therefore carbon credits are required 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 for details).

The rate of carbon accumulation or "sequestration" varies with species, climate, age and management regime. For the case study, we have conservatively estimated that by the year 2040, 400 tons of carbon will be accumulated and stored in a hectare of radiata pine forest. This forest is assumed to be planted and harvested on a continual basis (see mixed age forest, info sheet 12). Total emissions liabilities for the farm from 2015 until 2040 will be 18,224 NZUs. Fourty six hectares of new forestry would be required to offset this amount. The table below shows the total cost of emissions liabilities to the farm, the effect of carbon price and the impact forestry could have on addressing those costs.

| Carbon (NZU price | Total cost to 2040 No forestry | Total cost to 2040 with 46 ha forestry |
|---|---|---|
| $25 | $455,600 | $106,000 |
| $50 | $911,200 | $106,000 |

At $25/NZU the total cost to the farm for emission liabilities to 2040 will be $455,600 or about $18,200 per year, double this if the price rises to $50/NZU. However if 46 ha of new forest is established then the cost of liabilities under the ETS will not exceed the costs of establishment and maintenance which will be considerably less (approximately $106,000 or $4,240 per annum equivalent). The addition of forestry as an offset against emissions could play an important role in reducing the cost of the ETS to the farm by insulating the business from the risk of future increases in the price of carbon.

## Summary

The bulk of agricultural emissions are difficult to mitigate. Forestry, either on or off the farm, 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. Consideration should be given to planting new forests now as several government schemes encourage the development of forestry to reduce the potential impact of future obligations (see info sheet 4).

## Further Reading

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

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