

EMISSIONS TRADING GROUP REPORT TO THE FINANCE AND EXPENDITURE SELECT COMMITTEE

Request

1. On 9 November 2009, the Finance and Expenditure Select Committee requested:

Information on:

- a) How much the agriculture sector's emissions have grown since 1990;
- b) The impact of the full emissions cost on agriculture gross margins by sector;
- c) Comparing the impacts of the existing legislative provisions with the provisions in the Moderated ETS Bill;
- d) Agriculture emissions by source type; and
- e) The ICF International Consultants report.

Response

a) *How much the agriculture sector's emissions have grown since 1990.*

In 2007, the agriculture sector contributed 36.4 million tonnes (mt) carbon dioxide equivalent (CO₂-e) (48.2 per cent) of New Zealand's total greenhouse gas emissions. Emissions in this sector had increased by 3.9 mt CO₂-e (12.1 per cent) from the 1990 level of 32.5 mt CO₂-e. This increase is primarily due to a 1.5 mt CO₂-e (6.9 per cent) increase in methane (CH₄) emissions from the enteric fermentation category and a 2.3 mt CO₂-e (22.4 per cent) increase in nitrous oxide (N₂O) emissions from the agricultural soils category.

b) *The impact of the full emissions cost on agriculture gross margins by sector (2007 work).*

The 2007 MAF report *Projected Impacts of the New Zealand Emissions Trading Scheme at the Farm Level* provided a snapshot of the impacts of the NZ ETS on farms based on the existing legislative provisions.

Table 1 shows the projected impact of the NZ ETS on net profit before tax for a range of farm models and carbon prices based on 2006/07 farm budgets. The figures include methane and nitrous oxide emissions and all on-farm direct energy emissions costs (ie. fuel and electricity) and assume that farmers undertake no mitigation activity or offset their emissions through post 1989 forestry.

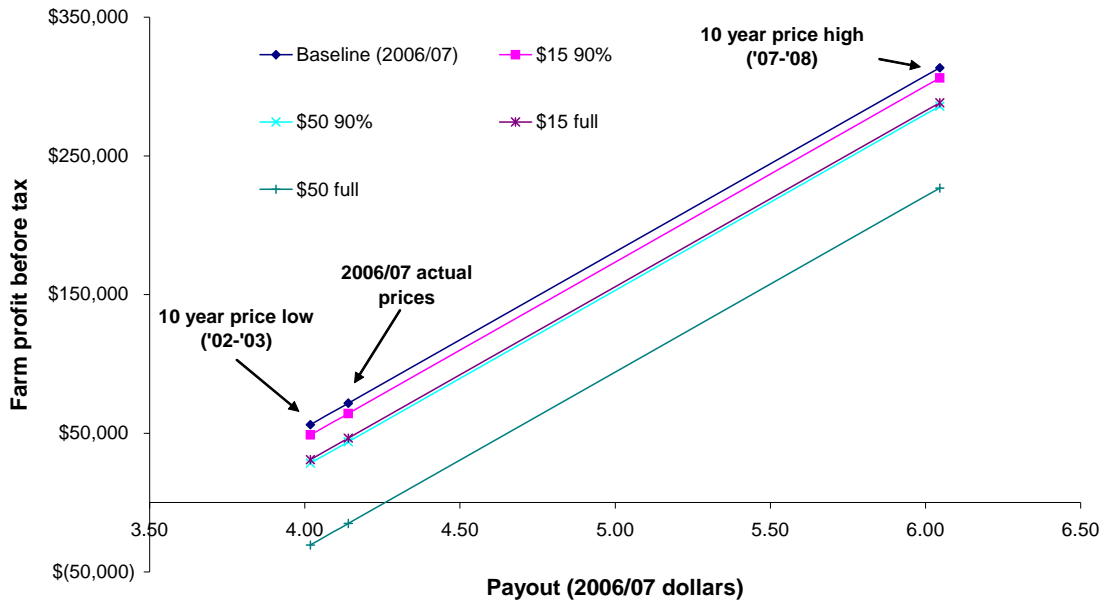
Table 1. Estimated percentage change in profit before tax

Carbon Price>	Allocation of 90% of 2005 emissions			Full Price of Emissions (no allocation)		
	\$15	\$25	\$50	\$15	\$25	\$50
Model						
National Dairy Model (%)	-12.0	-20.4	-40.7	-36.8	-61.6	-123.1
National Sheep and Beef Model (%)	-4.6	-7.9	-15.9	-48.1	-80.3	-160.5
North Island Deer Model (%)	-3.8	-6.6	-13.2	-59.8	-99.9	-199.8
South Island Deer Model (%)	-1.5	-2.6	-5.2	-31.8	-53.1	-107.7

Sensitivity to farm output prices

The report provided an analysis of how changes in farm output prices would affect the farms' profit before tax. High and low price scenarios were developed based on the highest and lowest output prices received (or expected) over the decade of 1997/98 through to 2007/08.

Figure 1. Dairy payout sensitivity



Analysis of the impacts of potential mitigation behaviour

The report also provided an analysis of the potential to mitigate emissions on dairy farms through the use of nitrification inhibitors. This used the following assumptions:

- 100% uptake of inhibitors outside Northland and the West Coast;
- No use of inhibitors in Northland or the West Coast;
- 50% reduction in direct nitrous oxide emissions per kilogram of milksolids for excreta and nitrogen fertiliser; for five months of the year;
- 35% reduction in nitrous oxide emissions through leaching per kilogram of milk solids; for five months of the year.

MAF developed two scenarios: one where farmers use the inhibitor to increase milk production; and another where farms use the inhibitor to eliminate use of nitrogenous fertilisers and nitrogen-based supplements holding production constant. The results are shown below for varying carbon prices:

Table 2. National Dairy Farm - Change in profit before tax with nitrification inhibitors

		Baseline (06/07)	Free allocation 90% of 2005 emissions			Full price of emissions		
Carbon price \$/t			\$15	\$25	\$50	\$15	\$25	\$50
1. No inhibitors	Farm profit before tax	71690	63095	57060	42482	45282	27550	-16550
	Percentage change		-12.0%	-20.4%	-40.7%	-36.8%	-61.6%	-123.1%
2. Inhibitor + no increase in output	Farm profit before tax		89792	84530	71895	73532	57446	17728
	Percentage change		25.3%	17.9%	0.3%	2.6%	-19.9%	-75.3%
3. Inhibitor + 10% output increase	Farm profit before tax		93245	87408	73341	75071	57135	12796
	Percentage change		30.1%	21.9%	2.3%	4.7%	-20.3%	-82.2%

c) Comparing the impacts of the existing legislative provisions with the provisions in the Moderated ETS Bill.

To compare the farm level impacts of the existing legislation (status quo) with the provisions in the Bill, MAF used the Overseer nutrient management model to estimate average agricultural GHG emissions from a range of Model Farms for the 2005, 2006 and 2007 production years, averaged these results, and projected them forward based on projected sector growth. This provides an estimate of costs as though the point of obligation were at farm level. A processor level obligation would be expected to reduce the degree of variation in cost across different farm types. Essentially the figures compare an estimated future cost with recent profitability figures.

Table 3 below provides the estimated impact of the NZ ETS in the first year of entry on selected MAF Model Farms as a dollar impact and as a percentage of the farms' average 2005-2007 net farm profit before tax. For example, under the status quo, the ETS would cost the Hawkes Bay/Wairarapa Hill Country farm \$7,063 in the first year of agriculture's entry (2013). This represents about 11 per cent of this farm's average 2005-2007 net farm profit before tax.

The method of allocation is very important in determining the distributional impacts of the scheme. Different distributional impacts within sectors and across sectors could be achieved in a number of different ways. Under the status quo scenario, allocation is assumed to be provided pro rata based on the farms' 2005 emissions, but the exact method of allocation under the status quo was to be determined under the allocation plan. Under the Moderated ETS Bill scenario, the allocation baseline is assumed to be recent, rather than historic.

All figures are for methane and nitrous oxide only. They do not include on-farm direct energy emissions costs (ie. fuel and electricity). Also, both scenarios assume that farmers undertake no mitigation activity or offset their emissions through post 1989 forestry.

Table 3. Farm level impacts in the first year (\$25/tonne) – selected model farms

Scenario \$25/tonne CO ₂ -e	Hawkes Bay / Wairarapa hill country S&B	Canterbury / Marlborough hill country S&B	Canterbury / Marlborough breeding- finishing S&B	Waikato / Bay of Plenty Dairy
a. Status Quo	\$7,063	\$2,210 ¹	\$3,106	\$7,115
Net profit before tax	-11.0%	-3.7%	-6.0%	-9.2%
b. Moderated ETS Bill	\$5,828	\$6,249	\$3,382	\$2,833
Net profit before tax	-9.0%	-10.5%	-6.5%	-3.7%

f) Agriculture emissions by type (methane, nitrous oxide and carbon dioxide)

Methane and nitrous oxide

In 2007, CH₄ emissions from enteric fermentation were 64.0 per cent (23,326.4 Gg CO₂-e) of agricultural emissions and 30.9 per cent of New Zealand's total emissions. Nitrous oxide emissions from the agricultural soils category were 33.8 per cent (12,298.1 Gg CO₂-e) of agricultural emissions and 16.3 per cent of total emissions.

Carbon dioxide from energy use

In 2008, the agriculture sector produced approximately 1.8 million tonnes of carbon dioxide emissions. Table 4 shows these emissions by fuel type and subsector.

Table 4: Carbon dioxide from energy use in Agriculture, 2008

Industry	Fuel type									Total
	Electricity	Petrol	Diesel	Fuel oil	LPG	Aviation fuel	Natural gas	Coal	Wood	
Tonnes CO₂e/year										
Horticulture and fruit growing	78,453	33,756	112,049	171	1,565	2,519	2,282	18,429	0	249,224
Sheep, beef cattle, and grain farming	262,155	118,489	278,242	3,393	2,393	1,237	0	4,714	0	670,622
Dairy cattle farming	533,589	74,583	166,001	2,371	1,041	44	4	622	0	778,255
Poultry, deer, and other livestock farming	46,728	13,098	38,633	110	4,660	114	6	715	0	104,065
Total	920,926	239,925	594,925	6,044	9,659	3,914	2,292	24,480	0	1,802,165

Produced using data from: Statistics New Zealand, *Energy Use Survey: Primary industries 2008*.

e) The ICF International Consultants report

The 2008 ICF International Consultants report and supporting analysis has been circulated to the Committee.

¹ The reason that the status quo shows a relatively low level of impact compared with the Bill is that this farm's emissions were relatively high in 2005, providing a relatively high level of assistance under a pro rata approach. Also, sheep and beef sector emissions are assumed to decrease by -0.05% from 2005 to 2013.