



Manaaki Whenua
Landcare Research

Supplementary material for Analysis I

Assessing the Nationwide Economic Impacts of Farm-Level Biological GHG Emission Mitigation Options

Prepared for: The Biological Emissions Reference Group (Project No. 18399)

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NZFARM model results for dairy and sheep & beef farm systems considering intensities and rate of mitigation options across regions for Analysis I

Table A1. Area of mitigation options adopted across regions by dairy farms under GHG1 price scenario (\$20.25/tCO2) in 2030, in 1,000 ha

Dairy system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu-Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
2	No mitigation	0	0	0	0.13	6.77	0	38.99	0	0	0	0	44.23	0	0	0	9.59
3	No mitigation	31.96	34.26	0	0	0	0	0	0	88.07	0	0	0	0	220.11	0	0
4	No mitigation	0	0	207.59	0.13	5.11	0	29.14	0	0	46.27	95.74	33.11	0	0	0	7.29
5	No mitigation	0	4.86	86.54	0	0	0	0	0	0	0	0	0	0	31.44	0	0
3	Output approach: 5% reduction	0	0	51.90	0.13	6.77	4.09	38.99	0.13	0	0	0	44.23	13.04	0	35.66	9.59
4	Output approach: 10% reduction	0	0	0	0	0	0	0	0	0	17.38	35.92	0	0	0	0	0
4	Change in supplementary feed: switch 50% of supplementary feed to low protein feed	0	19.56	0	0	0	0	0	0	0	0	0	0	0	125.78	0	0
5	Change in supplementary feed: switch 100% to low protein feed	0	0	0	0	0	0	0	0	0	5.75	12.02	0	0	0	0	0
2	Change in supplementary feed: switch 100% to low protein feed	0	0	0	0.13	6.77	0	38.99	0	0	0	0	44.23	0	0	0	9.59
3	Change in supplementary feed: switch 100% to low protein feed	0	0	0	0	0	0	0	0	0	46.27	95.74	0	0	0	0	0
2	Change in supplementary feed: reduce imported high protein volumes by 50% and reduce stocking rate	0	19.56	0	0	0	0	0	0	0	0	0	0	0	125.78	0	0
3	Once-a-day milking: half a season	0	19.56	0	0.26	8.56	0	48.70	0	0	0	0	55.22	0	125.78	0	12.02
2	Once-a-day milking: entire season	31.96	0	0	0	0	0	0	0	88.07	0	0	0	0	0	0	0
2	Planting forestry: 5% forestry	0	0	0	0	0	6.14	0	0.26	0	0	0	0	19.56	0	53.56	0

Table A2. Area of mitigation options adopted across regions by dairy farms under GHG4 price scenario (\$135/tCO₂) in 2030, in 1,000 ha

Dairy system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu -Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
3	No mitigation	32.0	0	0	0	0	0	0	0	88.0	0	0	0	0	0	0	0
5	No mitigation	0	4.9	0	0	0	0	0	0	0	0	0	0	0	31.4	0	0
2	Output approach: 5% reduction	0	0	0	0.2	6.8	0	38.9	0	0	0	0	44.2	0	0	0	9.6
4	Output approach: 5% reduction	0	0	121.12	0	0	0	0	0	0	23.1	47.9	0	0	0	0	0
5	Output approach: 5% reduction	0	0	0	0	0	0	0	0	0	5.8	12.0	0	0	0	0	0
3	Output approach: 10% reduction	0	0	51.9	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Output approach: 10% reduction	0	0	86.5	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Output approach: 15% reduction	0	0	0	0.2	6.8	0	38.9	0	0	46.2	95.7	44.2	0	0	0	9.6
4	Output approach: 15% reduction	0	0	0	0	0	0	0	0	0	17.3	35.9	0	0	0	0	0
4	Reduction in fertiliser use: no fertiliser use	0	0	0	0.1	5.1	0	29.2	0	0	0	0	33.1	0	0	0	7.2
2	Change in supplementary feed: reduce imported high protein volumes by 50% and reduce stocking rate	0	19.5	0	0	0	0	0	0	0	0	0	0	0	125.8	0	0
3	Change in supplementary feed: reduce imported high protein volumes by 50% and reduce stocking rate	0	19.5	0	0	0	0	0	0	0	0	0	0	0	125.8	0	0
2	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	0	0	0.2	6.8	0	38.9	0	0	0	0	44.2	0	0	0	9.6
3	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	0	0	0.2	8.5	0	48.7	0	0	0	0	55.2	0	0	0	12.0
4	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	19.5	0	0	0	0	0	0	0	23.1	47.9	0	0	125.8	0	0
2	Reduction in cow numbers: 10% reduction	16.0	0	0	0	0	0	0	0	44.0	0	0	0	0	0	0	0
3	Reduction in cow numbers: 15% reduction	0	14.7	0	0	0	0	0	0	0	0	0	0	0	94.3	0	0
3	Reduction in cow numbers: 20% reduction	0	0	0	0	0	4.1	0	0.2	0	0	0	0	13.0	0	35.7	0
5	Reduction in cow numbers: 20% reduction	0	0	86.5	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Once-a-day milking: half a season	0	19.5	0	0	0	0	0	0	0	0	0	0	0	125.8	0	0
2	Once-a-day milking: entire season	16.0	0	0	0	0	0	0	0	44.0	0	0	0	0	0	0	0
2	Planting forestry: 5% forestry	0	0	0	0	0	6.2	0	0.3	0	0	0	0	19.5	0	53.5	0

Table A3. Area of mitigation options adopted across regions by dairy farms under GHG1 price scenario (\$28.73/tCO₂) in 2050, in 1,000 ha

Dairy system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu-Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
2	No mitigation	0	0	0	0.1	5.3	0	30.5	0	0	0	0	34.6	0	0	0	7.5
3	No mitigation	25.0	26.8	0	0	0	0	0	0	68.9	0	0	0	0	172.2	0	0
4	No mitigation	0	0	162.4	0.1	4.0	0	22.8	0	0	36.2	74.9	25.9	0	0	0	5.7
5	No mitigation	0	3.8	67.7	0	0	0	0	0	0	0	0	0	0	24.6	0	0
3	Output approach: 5% reduction	0	0	40.6	0.1	5.3	3.2	30.5	0.1	0	0	0	34.6	10.2	0	27.9	7.5
4	Output approach: 10% reduction	0	0	0	0	0	0	0	0	0	13.6	28.1	0	0	0	0	0
2	Change in supplementary feed: switch 100% to low protein feed	0	0	0	0.1	5.3	0	30.5	0	0	0	0	34.6	0	0	0	7.5
3	Change in supplementary feed: switch 100% to low protein feed	0	0	0	0	0	0	0	0	0	36.2	74.9	0	0	0	0	0
5	Change in supplementary feed: switch 100% to low protein feed	0	0	0	0	0	0	0	0	0	4.5	9.4	0	0	0	0	0
2	Change in supplementary feed: reduce imported high protein volumes by 50% and reduce stocking rate	0	15.3	0	0	0	0	0	0	0	0	0	0	0	98.4	0	0
4	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	15.3	0	0	0	0	0	0	0	0	0	0	0	98.4	0	0
3	Once-a-day milking: half a season	0	15.3	0	0.2	6.7	0	38.1	0	0	0	0	43.2	0	98.4	0	9.4
2	Once-a-day milking: entire season	25.0	0	0	0	0	0	0	0	68.9	0	0	0	0	0	0	0
2	Planting forestry: 5% forestry	0	0	0	0	0	4.8	0	0.2	0	0	0	0	15.3	0	41.9	0

Table A4. Area of mitigation options adopted across regions by dairy farms under GHG4 price scenario (\$191.54/tCO₂) in 2050, in 1,000 ha

Dairy system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu -Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
4	Output approach: 5% reduction	0	0	69.2	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Output approach: 5% reduction	0	0	0	0	0	0	0	0	0	5.8	12.0	0	0	0	0	0
3	Output approach: 15% reduction	0	9.8	0	0	0	0	0	0	0	46.2	95.7	0	0	62.9	0	0
4	Output approach: 15% reduction	0	0	0	0.1	5.1	0	29.2	0	0	0	0	33.1	0	0	0	7.2
3	Output approach: 20% reduction	0	0	0	0	0	0	0	0	0	40.4	83.8	0	0	0	0	0
4	Output approach: 20% reduction	0	0	0	0.2	6.8	0	38.9	0	0	0	0	44.2	0	0	0	9.6
2	Reduction in fertiliser use: no fertiliser use	16.0	0	0	0.2	6.8	0	38.9	0	44.0	0	0	44.2	0	0	0	9.6
2	Change in supplementary feed: reduce imported high protein volumes by 50% and reduce stocking rate	0	19.5	0	0	0	0	0	0	0	0	0	0	0	125.8	0	0
3	Change in supplementary feed: reduce imported high protein volumes by 50% and reduce stocking rate	32.0	9.8	0	0	0	0	0	0	88.0	0	0	0	0	62.9	0	0
2	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	0	0	0.2	6.8	0.0	38.9	0.0	0	0	0	44.2	0	0	0	9.6
3	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	19.5	0	0	0	0	0	0	0	0	0	0	0	125.8	0	0
4	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	19.5	0	0	0	0	0	0	0	0	0	0	0	125.8	0	0
5	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	4.9	0	0	0	0	0	0	0	0	0	0	0	31.4	0	0
4	Reduction in cow numbers: 5% reduction	0	0	51.9	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Reduction in cow numbers: 15% reduction	16.0	0	0	0	0	0	0	0	44.0	0	0	0	0	0	0	0
3	Reduction in cow numbers: 15% reduction	0	14.7	0	0.2	8.5	0	48.7	0	0	0	0	55.2	0	94.3	0	12.0
4	Reduction in cow numbers: 15% reduction	0	0	0	0	0	0	0	0	0	23.1	47.9	0	0	0	0	0
3	Reduction in cow numbers: 20% reduction	0	0	51.9	0	0	4.1	0	0.2	0	0	0	0	13.0	0	35.7	0
4	Reduction in cow numbers: 20% reduction	0	0	86.5	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Reduction in cow numbers: 20% reduction	0	0	86.5	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Planting forestry: 5% forestry	0	0	0	0	0	6.2	0	0.3	0	0	0	0	19.5	0	53.5	0

Table A5. Dairy profits with different mitigation options across regions under GHG1 price scenario (\$20.25/tCO₂) in 2030, in \$ million

Dairy system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu-Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
2	No mitigation	0	0	0	0.30	10.64	0	60.61	0	0	0	0	68.75	0	0	0	15.00
3	No mitigation	43.62	57.68	0	0	0	0	0	0	120.02	0	0	0	0	371.30	0	0
4	No mitigation	0	0	233.29	0.19	6.88	0	39.21	0	0	41.15	85.27	44.47	0	0	0	9.70
5	No mitigation	0	6.29	60.64	0	0	0	0	0	0	0	0	0	0	40.51	0	0
3	Output approach: 5% reduction	0	0	48.07	0.13	4.59	0.40	26.13	0.02	0	0	0	29.64	1.26	0	3.45	6.47
4	Output approach: 10% reduction	0	0	0	0	0	0	0	0	0	5.67	11.74	0	0	0	0	0
4	Change in supplementary feed: switch 50% of supplementary feed to low protein feed	0	5.73	0	0	0	0	0	0	0	0	0	0	0	36.91	0	0
5	Change in supplementary feed: switch 100% to low protein feed	0	0	0	0.16	5.76	0	32.81	0	0	0	0	37.22	0	0	0	8.12
2	Change in supplementary feed: switch 100% to low protein feed	0	0	0	0	0	0	0	0	0	100.02	207.23	0	0	0	0	0
3	Change in supplementary feed: switch 100% to low protein feed	0	0	0	0	0	0	0	0	0	8.23	17.06	0	0	0	0	0
2	Change in supplementary feed: reduce imported high protein volumes by 50% and reduce stocking rate	0	30.98	0	0	0	0	0	0	0	0	0	0	0	199.42	0	0
3	Once-a-day milking: half a season	0	16.24	0	0.39	14.01	0	79.77	0	0	0	0	90.48	0	104.52	0	19.74
2	Once-a-day milking: entire season	26.37	0	0	0	0	0	0	0	72.56	0	0	0	0	0	0	0
2	Planting forestry: 5% forestry	0	0	0	0	0	7.62	0	0.31	0	0	0	0	24.00	0	65.88	0

Table A6. Dairy profits with different mitigation options across regions under GHG4 price scenario (\$135/tCO₂) in 2030, in \$ million

Dairy system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu -Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
3	No mitigation	25.04	0	0	0	0	0	0	0	68.91	0	0	0	0	0	0	0
5	No mitigation	0	1.20	0	0	0	0	0	0	0	0	0	0	0	7.73	0	0
2	Output approach: 5% reduction	0	0	0	0.12	4.25	0	24.22	0	0	0	0	27.47	0	0	0	5.99
4	Output approach: 5% reduction	0	0	74.06	0	0	0	0	0	0	13.17	27.29	0	0	0	0	0
5	Output approach: 5% reduction	0	0	0	0	0	0	0	0	0	2.91	6.04	0	0	0	0	0
3	Output approach: 10% reduction	0	0	2.32	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Output approach: 10% reduction	0	0	37.72	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Output approach: 15% reduction	0	0	0	0.02	0.67	0	3.84	0	0	65.07	134.81	4.36	0	0	0	0.95
4	Output approach: 15% reduction	0	0	0	0	0	0	0	0	0	-4.01	-8.31	0	0	0	0	0
4	Reduction in fertiliser use: no fertiliser use	0	0	0	0.09	3.24	0	18.45	0	0	0	0	20.93	0	0	0	4.57
2	Change in supplementary feed: reduce imported high protein volumes by 50% and reduce stocking rate	0	16.29	0	0	0	0	0	0	0	0	0	0	0	104.85	0	0
3	Change in supplementary feed: reduce imported high protein volumes by 50% and reduce stocking rate	0	16.62	0	0	0	0	0	0	0	0	0	0	0	106.97	0	0
2	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	0	0	0.01	0.41	0	2.34	0	0	0	0	2.65	0	0	0	0.58
3	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	0	0	0.18	6.53	0	37.19	0	0	0	0	42.18	0	0	0	9.20
4	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	-6.56	0	0	0	0	0	0	0	-7.98	-16.53	0	0	-42.20	0	0
2	Reduction in cow numbers: 10% reduction	2.79	0	0	0	0	0	0	0	7.67	0	0	0	0	0	0	0
3	Reduction in cow numbers: 15% reduction	0	12.45	0	0	0	0	0	0	0	0	0	0	0	80.12	0	0
3	Reduction in cow numbers: 20% reduction	0	0	0	0	0	-2.30	0	-0.09	0	0	0	0	-7.26	0	-19.92	0
5	Reduction in cow numbers: 20% reduction	0	0	-24.76	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Once-a-day milking: half a season	0	0.23	0	0	0	0	0	0	0	0	0	0	0	1.50	0	0
2	Once-a-day milking: entire season	1.73	0	0	0	0	0	0	0	4.75	0	0	0	0	0	0	0
2	Planting forestry: 5% forestry	0	0	0	0	0	3.64	0	0.15	0	0	0	0	11.46	0	31.47	0

Table A7. Dairy profits with different mitigation options across regions under under GHG1 price scenario (\$28.73/tCO₂) in 2050, in \$ million

Dairy system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu-Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
2	No mitigation	0	0	0	0.28	10.17	0	57.92	0	0	0	0	65.69	0	0	0	14.33
3	No mitigation	42.25	55.52	0	0	0	0	0	0	116.25	0	0	0	0	357.36	0	0
4	No mitigation	0	0	218.17	0.18	6.60	0	37.56	0	0	38.46	79.68	42.61	0	0	0	9.30
5	No mitigation	0	5.92	54.07	0	0	0	0	0	0	0	0	0	0	38.09	0	0
3	Output approach: 5% reduction	0	0	44.59	0.12	4.29	0.18	24.42	0.01	0	0	0	27.70	0.56	0	1.55	6.04
4	Output approach: 10% reduction	0	0	0	0	0	0	0	0	0	4.94	10.23	0	0	0	0	0
2	Change in supplementary feed: switch 100% to low protein feed	0	0	0	0.15	5.36	0	30.52	0	0	0	0	34.62	0	0	0	7.55
3	Change in supplementary feed: switch 100% to low protein feed	0	0	0	0	0	0	0	0	0	97.14	201.26	0	0	0	0	0
5	Change in supplementary feed: switch 100% to low protein feed	0	0	0	0	0	0	0	0	0	7.84	16.24	0	0	0	0	0
2	Change in supplementary feed: reduce imported high protein volumes by 50% and reduce stocking rate	0	29.89	0	0	0	0	0	0	0	0	0	0	0	192.43	0	0
4	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	4.78	0	0	0	0	0	0	0	0	0	0	0	30.74	0	0
3	Once-a-day milking: half a season	0	15.05	0	0.38	13.43	0	76.47	0	0	0	0	86.74	0	96.90	0	18.92
2	Once-a-day milking: entire season	24.75	0	0	0	0	0	0	0	68.11	0	0	0	0	0	0	0
2	Planting forestry: 5% forestry	0	0	0	0	0	7.33	0	0.30	0	0	0	0	23.08	0	63.33	0

Table A8. Dairy profits with different mitigation options across regions under GHG4 price scenario (\$191.54/tCO₂) in 2050, in \$ million

Dairy system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu -Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
4	Output approach: 5% reduction	0	0	4.10	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Output approach: 5% reduction	0	0	0	0	0	0	0	0	0	0.31	0.65	0	0	0	0	0
3	Output approach: 15% reduction	0	-0.40	0	0	0	0	0	0	0	49.29	102.12	0	0	-2.57	0	0
4	Output approach: 15% reduction	0	0	0	0.05	1.66	0	9.43	0	0	0	0	10.69	0	0	0	2.33
3	Output approach: 20% reduction	0	0	0	-0.03	-1.04	0	-5.92	0	0	0	0	-6.71	0	0	0	-1.46
4	Output approach: 20% reduction	0	0	0	0	0	0	0	0	0	-2.36	-4.89	0	0	0	0	0
2	Reduction in fertiliser use: no fertiliser use	-3.50	0	0	0.06	1.98	0	11.25	0	-9.63	0	0	12.76	0	0	0	2.78
2	Change in supplementary feed: reduce imported high protein volumes by 50% and reduce stocking rate	0	9.05	0	0	0	0	0	0	0	0	0	0	0	58.25	0	0
3	Change in supplementary feed: reduce imported high protein volumes by 50% and reduce stocking rate	16.27	9.20	0	0	0	0	0	0	44.77	0	0	0	0	59.22	0	0
2	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	0	0	-0.06	-2.22	0	-12.64	0	0	0	0	-14.34	0	0	0	-3.13
3	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	-7.39	0	0	0	0	0	0	0	0	0	0	0	-47.54	0	0
4	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	-12.59	0	0	0	0	0	0	0	0	0	0	0	-81.01	0	0
5	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	-1.30	0	0	0	0	0	0	0	0	0	0	0	-8.38	0	0
4	Reduction in cow numbers: 5% reduction	0	0	13.02	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Reduction in cow numbers: 15% reduction	-1.76	0	0	0	0	0	0	0	-4.84	0	0	0	0	0	0	0
3	Reduction in cow numbers: 15% reduction	0	7.44	0	0.10	3.40	0	19.37	0	0	0	0	21.97	0	47.90	0	4.79
4	Reduction in cow numbers: 15% reduction	0	0	0	0	0	0	0	0	0	-16.78	-34.77	0	0	0	0	0
3	Reduction in cow numbers: 20% reduction	0	0	-16.97	0	0	-3.42	0	-0.14	0	0	0	0	-10.76	0	-29.53	0
4	Reduction in cow numbers: 20% reduction	0	0	-68.49	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Reduction in cow numbers: 20% reduction	0	0	-57.69	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Planting forestry: 5% forestry	0	0	0	0	0	1.68	0	0.07	0	0	0	0	5.29	0	14.51	0

Table A9. Greenhouse gas emissions for dairy farms with different mitigation options under GHG1 price scenario (\$20.25/tCO₂) in 2030, in 1,000 tCO₂

Dairy system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu-Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
2	No mitigation	0	0	0	0	0	0	0	0	0	86.3	178.7	0	0	0	0	0
3	No mitigation	0	0	0	0	0	0	0	0	0	340.0	704.5	0	0	0	0	0
4	No mitigation	0	44.4	775.5	0	0	0	0	0	0	0	0	0	0	285.6	0	0
5	No mitigation	0	114.3	0	0	0	0	0	0	0	0	0	0	0	735.7	0	0
3	Output approach: 5% reduction	190.5	0	0	0	0	0	0	0	524.3	0	0	0	0	0	0	0
4	Output approach: 10% reduction	161.9	255.4	0	0	0	0	0.0	0.0	445.4	0	0	0	0	1643.8	0	0
4	Change in supplementary feed: switch 50% of supplementary feed to low protein feed	0	0	410.4	1.0	35.4	25.9	201.7	1.1	0	0	0	228.8	81.6	0	224.0	49.9
5	Change in supplementary feed: switch 100% to low protein feed	0	139.5	0	1.9	68.4	0	389.7	0	0	0	0	442.1	0	897.7	0	96.5
2	Change in supplementary feed: switch 100% to low protein feed	0	0	0	0	0	0	0	0	0	46.4	96.2	0	0	0	0	0
3	Change in supplementary feed: switch 100% to low protein feed	0	0	0	1.3	47.4	0	270.0	0	0	0	0	306.3	0.0	0	0	66.8
2	Change in supplementary feed: reduce imported high protein volumes by 50% and reduce stocking rate	0	0	0	0	0	34.7	0	1.4	0	0	0.0	0	109.3	0	299.9	0
3	Once-a-day milking: half a season	0	0	1782.7	0.9	34.0	0	193.5	0	0	317.7	658.3	219.5	0	0	0	47.9
2	Once-a-day milking: entire season	0	0	0	1.6	55.7	0	317.3	0	0	0	0	359.9	0	0	0	78.5
2	Planting forestry: 5% forestry	0	128.0	0	0	0	0	0	0	0	0	0	0	0	824.2	0	0

Table A10. Greenhouse gas emissions for dairy farms with different mitigation options under GHG4 price scenario (\$135/tCO₂) in 2030, in 1,000 tCO₂

Dairy system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu -Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
3	No mitigation	161.9	0	0	0	0	0	0	0	445.4	0	0	0	0	0	0	0
5	No mitigation	0	44.4	0	0	0	0	0	0	0	0	0	0	0	285.6	0	0
2	Output approach: 5% reduction	0	0	0	1.5	52.7	0	300.4	0	0	0	0	340.7	0	0	0	74.3
4	Output approach: 5% reduction	0	0	1008.3	0	0	0	0	0	0	138.8	287.6	0	0	0	0	0
5	Output approach: 5% reduction	0	0	0	0	0	0	0	0	0	46.0	95.4	0	0	0	0	0
3	Output approach: 10% reduction	0	0	389.9	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Output approach: 10% reduction	0	0	652.2	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Output approach: 15% reduction	0	0	0	0.9	30.6	0	174.1023	0	0	279.0	578.1	197.5	0	0	0	43.1
4	Output approach: 15% reduction	0	0	0	0	0	0	0	0	0	81.4	168.7	0	0	0	0	0
4	Reduction in fertiliser use: no fertiliser use	0	0	0	0.8	29.0	0	165.1	0	0	0	0	187.3	0	0	0	40.9
2	Change in supplementary feed: reduce imported high protein volumes by 50% and reduce stocking rate	0	128.0	0	0	0	0	0	0	0	0	0	0	0	824.2	0	0
3	Change in supplementary feed: reduce imported high protein volumes by 50% and reduce stocking rate	0	142.2	0	0	0	0	0	0	0	0	0	0	0	915.2	0	0
2	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	0	0	1.3	46.5	0	264.9	0	0	0	0	300.4	0	0	0	65.5
3	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	0	0	1.6	55.8	0	317.5	0	0	0	0	360.2	0	0	0	78.6
4	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	106.6	0	0	0	0	0	0	0	163.4	338.5	0	0	686.4	0	0
2	Reduction in cow numbers: 10% reduction	85.6	0	0	0	0	0	0	0	235.5	0	0	0	0	0	0	0
3	Reduction in cow numbers: 15% reduction	0	88.5	0	0	0	0	0	0	0	0	0	0	0	569.7	0	0
3	Reduction in cow numbers: 20% reduction	0	0	0	0	0	19.7	0	0.8	0	0	0	0	61.9	0	169.9	0
5	Reduction in cow numbers: 20% reduction	0	0	582.4	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Once-a-day milking: half a season	0	139.5	0	0	0	0	0	0	0	0	0	0	0	897.7	0	0
2	Once-a-day milking: entire season	93.9	0	0	0	0	0	0	0	258.4	0	0	0	0	0	0	0
2	Planting forestry: 5% forestry	0	0	0	0	0	34.7	0	1.4	0	0	0	0	109.3	0	299.9	0

Table A11. Greenhouse gas emissions for dairy farms with different mitigation options under GHG1 price scenario (\$28.73/tCO₂) in 2050, in 1,000 tCO₂

Dairy system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu-Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
2	No mitigation	0	0	0	1.6	55.7	0	317.3	0	0	0	0	359.9	0	0	0	78.5
3	No mitigation	161.9	255.4	0	0	0	0	0	0	445.4	0	0	0	0	1643.8	0	0
4	No mitigation	0	0	1782.7	0.9	34.0	0	193.5	0	0	317.7	658.3	219.5	0	0	0	47.9
5	No mitigation	0	44.4	775.5	0	0	0	0	0	0	0	0	0	0	285.6	0	0
3	Output approach: 5% reduction	0	0	410.4	1.0	35.4	25.9	201.7	1.1	0	0	0	228.8	81.6	0	224.0	49.9
4	Output approach: 10% reduction	0	0	0	0	0	0	0	0	0	86.3	178.7	0	0	0	0	0
2	Change in supplementary feed: switch 100% to low protein feed	0	0	0	1.3	47.4	0	270.0	0	0	0	0	306.3	0	0	0	66.8
3	Change in supplementary feed: switch 100% to low protein feed	0	0	0	0	0	0	0	0	0	340.0	704.5	0	0	0	0	0
5	Change in supplementary feed: switch 100% to low protein feed	0	0	0	0	0	0	0	0	0	46.4	96.2	0	0	0	0	0
2	Change in supplementary feed: reduce imported high protein volumes by 50% and reduce stocking rate	0	128.0	0	0	0	0	0	0	0	0	0	0	0	824.2	0	0
4	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	106.6	0	0	0	0	0	0	0	0	0	0	0	686.4	0	0
3	Once-a-day milking: half a season	0	139.5	0	1.9	68.4	0	389.7	0	0	0	0	442.1	0	897.7	0	96.5
2	Once-a-day milking: entire season	190.5	0	0	0	0	0	0	0	524.3	0	0	0	0	0	0	0
2	Planting forestry: 5% forestry	0	0	0	0	0	34.7	0	1.4	0	0	0	0	109.3	0	299.9	0

Table A12. Greenhouse gas emissions for dairy farms with different mitigation options under GHG4 price scenario (\$191.54/tCO₂) in 2050, in 1,000 tCO₂

Dairy system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu-Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
4	Output approach: 5% reduction	0	0	487.2	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Output approach: 5% reduction	0	0	0	0	0	0	0	0	0	46.0	95.4	0	0	0	0	0
3	Output approach: 15% reduction	0	47.9	0	0	0	0	0	0	0	279.0	578.1	0	0	308.3	0	0
4	Output approach: 15% reduction	0	0	0	0.8	27.0	0	153.7	0	0	0	0	174.4	0	0	0	38.0
3	Output approach: 20% reduction	0	0	0	0.8	29.1	0	165.9	0	0	0	0	188.2	0	0	0	41.1
4	Output approach: 20% reduction	0	0	0	0	0	0	0	0	0	197.5	409.3	0	0	0	0	0
2	Reduction in fertiliser use: no fertiliser use	69.7	0	0	1.1	39.8	0	226.6	0	191.8	0	0	257.1	0	0	0	56.1
2	Change in supplementary feed: reduce imported high protein volumes by 50% and reduce stocking rate	0	128.0	0	0	0	0	0	0	0	0	0	0	0	824.2	0	0
3	Change in supplementary feed: reduce imported high protein volumes by 50% and reduce stocking rate	151.3	86.9	0	0	0	0	0	0	416.2	0	0	0	0	559.2	0	0
2	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	0	0	1.3	46.5	0	264.9	0	0	0	0	300.4	0	0	0	65.5
3	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	133.7	0	0	0	0	0	0	0	0	0	0	0	860.8	0	0
4	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	106.6	0	0	0	0	0	0	0	0	0	0	0	686.4	0	0
5	Change in supplementary feed: remove all imported high protein volumes and reduce stocking rate	0	38.9	0	0	0	0	0	0	0	0	0	0	0	250.4	0	0
4	Reduction in cow numbers: 5% reduction	0	0	509.5	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Reduction in cow numbers: 15% reduction	79.8	0	0	0	0	0	0	0	219.6423	0	0	0	0	0	0	0
3	Reduction in cow numbers: 15% reduction	0	88.5	0	1.5	53.0	0	302.1	0	0	0	0	342.6	0	569.7	0	74.8
4	Reduction in cow numbers: 15% reduction	0	0	0	0	0	0	0	0	0	136.1	282.0	0	0	0	0	0
3	Reduction in cow numbers: 20% reduction	0	0	290.8	0	0	19.7	0	0.8	0	0	0	0	61.9	0	169.9	0
4	Reduction in cow numbers: 20% reduction	0	0	532.8	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Reduction in cow numbers: 20% reduction	0	0	582.4	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Planting forestry: 5% forestry	0	0	0	0	0	34.7	0	1.4	0	0	0	0	109.3	0	299.9	0

Table A13. Area of mitigation options adopted across regions by sheep & beef farms under GHG1 price scenario (\$20.25/tCO₂) in 2030, in 1,000 ha

Sheep & beef system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu-Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
Hill	Replace breeding cows with surplus dairy animals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	198.0	193.0	0.0	0.0	0.0	0.0	0.0
Hill	Reduction in stocking rate – maintain production/area farmed	11.9	68.8	0.0	327.5	934.6	0.0	248.4	0.0	41.3	0.0	0.0	98.6	0.0	491.1	0.0	79.8
Hill	Reduction in stocking rate – maintain production/area farmed	0.0	2.0	0.0	3.1	6.0	0.0	3.9	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0	1.7
Hill	Plant trees on marginal land and maintain production	0.0	0.0	1281.6	0.0	0.0	78.3	0.0	1.2	0.0	530.9	0.0	0.0	19.2	0.0	0.5	0.0
Intensive	Plant trees on marginal land and maintain production	129.1	41.2	0.0	30.5	168.7	0.0	200	0.0	318.4	0.0	0.0	57.8	0.0	174.1	0.0	77.4
Hill	Plant trees on marginal land and maintain production	0.0	0.0	60.9	0.0	0.0	10.9	0.0	0.8	0.0	260.0	43.0	0.0	16.3	0.0	0.8	0.0
Intensive	No mitigation	0.0	0.0	476.9	0.0	0.0	62.9	0.0	0.5	0.0	125.8	82.0	0.0	22.2	0.0	26.6	0.0
Intensive	No mitigation	0.0	0.0	176.4	0.0	0.0	23.3	0.0	0.2	0.0	0.0	0.0	0.0	8.2	0.0	9.8	0.0
Intensive	No mitigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	358.1	233.3	0.0	0.0	0.0	0.0	0.0

Table A14. Area of mitigation options adopted across regions by sheep & beef farms under GHG4 price scenario (\$135/tCO2) in 2030, in 1,000 ha

Sheep & beef system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu-Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
Hill	Replace breeding cows with surplus dairy animals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	198.0	193.0	0.0	0.0	0.0	0.0	0.0
Hill	Reduction in stocking rate – maintain production/area farmed	0.0	0.0	0.0	327.5	934.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hill	30% Planting forestry – maintain production	11.9	68.8	1281.6	0.0	0.0	78.3	248.4	1.2	41.3	0.0	0.0	98.6	19.2	491.1	0.5	79.8
Hill	Plant trees on marginal land and maintain production	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	530.9	0.0	0.0	0.0	0.0	0.0	0.0
Intensive	Plant trees on marginal land and maintain production	129.1	41.2	0.0	30.5	168.7	0.0	200.0	0.0	318.4	0.0	0.0	57.8	0.0	174.1	0.0	77.4
Hill	30% Planting forestry – maintain production	0.0	2.0	0.0	3.1	6.0	0.0	3.9	0.0	0.0	260.0	43.0	0.0	0.0	2.6	0.0	1.7
Hill	Plant trees on marginal land and maintain production	0.0	0.0	60.9	0.0	0.0	10.9	0.0	0.8	0.0	0.0	0.0	0.0	16.3	0.0	0.8	0.0
Intensive	Plant trees on marginal land and maintain production	0.0	0.0	476.9	0.0	0.0	62.9	0.0	0.5	0.0	125.8	82.0	0.0	22.2	0.0	26.6	0.0
Intensive	Plant trees on marginal land and maintain production	0.0	0.0	176.4	0.0	0.0	23.3	0.0	0.2	0.0	0.0	0.0	0.0	8.2	0.0	9.8	0.0
Intensive	Plant trees on marginal land and maintain production	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	358.1	233.3	0.0	0.0	0.0	0.0	0.0

Table A15. Area of mitigation options adopted across regions by sheep & beef farms under GHG1 price scenario (\$28.73/tCO2) in 2050, in 1,000 ha

Sheep & beef system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu-Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
Hill	Replace breeding cows with surplus dairy animals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	179.9	171.6	0.0	0.0	0.0	0.0	0.0
Hill	Reduction in stocking rate – maintain production/area farmed	10.8	52.7	0.0	266.2	829.2	0.0	229.1	0.0	35.9	0.0	0.0	81.8	0.0	436.5	0.0	71.2
Hill	Plant trees on marginal land and maintain production	0.0	0.0	1146.4	0.0	0.0	76.6	0.0	1.0	0.0	514.5	0.0	0.0	15.4	0.0	0.5	0.0
Intensive	Plant trees on marginal land and maintain production	117.4	31.6	0.0	24.8	149.7	0.0	184.5	0.0	277.1	0.0	0.0	47.9	0.0	154.8	0.0	69.1
Hill	Reduction in stocking rate – maintain production/area farmed	0.0	1.5	0.0	2.5	5.4	0.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	1.5
Hill	Plant trees on marginal land and maintain production	0.0	0.0	54.5	0.0	0.0	10.7	0.0	0.6	0.0	247.7	38.2	0.0	13.0	0.0	0.8	0.0
Intensive	No Mitigation	0.0	0.0	426.6	0.0	0.0	61.5	0.0	0.4	0.0	119.8	72.9	0.0	17.8	0.0	26.4	0.0
Intensive	No Mitigation	0.0	0.0	157.8	0.0	0.0	22.7	0.0	0.2	0.0	0.0	0.0	0.0	6.6	0.0	9.8	0.0
Intensive	No Mitigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	341.1	207.4	0.0	0.0	0.0	0.0	0.0

Table A16. Area of mitigation options adopted across regions by sheep & beef farms under GHG4 price scenario (\$191.54/tCO2) in 2050, in 1,000 ha

Sheep & beef system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu-Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
Hill	Replace breeding cows with surplus dairy animals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	179.9	171.6	0.0	0.0	0.0	0.0	0.0
Hill	30% Planting forestry – maintain production	10.8	52.7	1146.4	266.2	829.2	76.6	229.1	1.0	35.9	514.5	0.0	81.8	15.4	436.5	0.5	71.2
Intensive	Plant trees on marginal land and maintain production	117.4	31.6	0.0	24.8	149.7	0.0	184.5	0.0	277.1	0.0	0.0	47.9	0.0	154.8	0.0	69.1
Hill	30% Planting forestry – maintain production	0.0	1.5	54.5	2.5	5.4	10.7	3.6	0.6	0.0	247.7	38.2	0.0	13.0	2.3	0.8	1.5
Intensive	Plant trees on marginal land and maintain production	0.0	0.0	426.6	0.0	0.0	61.5	0.0	0.4	0.0	119.8	72.9	0.0	17.8	0.0	26.4	0.0
Intensive	Plant trees on marginal land and maintain production	0.0	0.0	157.8	0.0	0.0	22.7	0.0	0.2	0.0	0.0	0.0	0.0	6.6	0.0	9.8	0.0
Intensive	Plant trees on marginal land and maintain production	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	341.1	207.4	0.0	0.0	0.0	0.0	0.0

Table A17. Sheep & beef profits with different mitigation options across regions under GHG1 price scenario (\$20.25/tCO₂) in 2030, in \$ million

Sheep & beef system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu-Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
Hill	Replace breeding cows with surplus dairy animals	0	0	0	0	0	0	0	0	0	107.69	104.92	0	0	0	0	0
Hill	Reduction in stocking rate – maintain production/area farmed	3.47	20.08	0	109.66	312.96	0	69.78	0	12.05	0	0	27.71	0	143.34	0	22.41
Hill	Plant trees on marginal land and maintain production	0	0	123.56	0	0	7.55	0	0.12	0	103.10	0	0	1.85	0	0.04	0
Intensive	Plant trees on marginal land and maintain production	40.69	12.98	0	11.60	64.22	0	64.55	0	100.38	0	0	18.65	0	54.90	0	24.99
Hill	Reduction in stocking rate – maintain production/area farmed	0.00	0.42	0	0.72	1.40	0	0.90	0	0	0	0	0.00	0	0.55	0	0.40
Hill	Plant trees on marginal land and maintain production	0	0	2.14	0	0	0.38	0	0.03	0	8.51	1.41	0	0.57	0	0.03	0
Intensive	No mitigation	0	0.00	152.61	0.00	0.00	20.12	0.00	0.17	0.00	32.33	21.06	0.00	7.11	0	8.50	0
Intensive	No mitigation	0	0	0.00	0	0	0.00	0	0.00	0	227.31	148.09	0	0	0	0	0
Intensive	No mitigation	0	0	115.14	0	0	15.18	0	0.12	0	0.00	0.00	0	5.37	0	6.410948	0

Table A18. Sheep & beef profits with different mitigation options across regions under GHG4 price scenario (\$135/tCO₂) in 2030, in \$ million

Sheep & beef system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu-Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
Hill	Replace breeding cows with surplus dairy animals	0	0	0	0	0	0	0	0	0	62.92	61.30	0	0	0	0	0
Hill	Reduction in stocking rate – maintain production/area farmed	0	0	0	43.10	123.00	0	0	0	0	0	0	0	0	0	0	0
Hill	30% Planting forestry – maintain production	0.90	5.22	-43.13	0	0	-2.64	17.82	-0.04	3.14	0	0	7.08	-0.65	37.28	-0.02	5.72
Hill	Plant trees on marginal land and maintain production	0	0	0	0	0	0	0	0	0	-8.43	0	0	0	0	0	0
Intensive	Plant trees on marginal land and maintain production	-23	-7	0	1.36	7.51	0	-22.49	0	-56.72	0	0	-6.50	0	-31.02	0	-8.70
Hill	30% Planting forestry – maintain production	0	0	0	0	0	0	0	0	0	-2	0	0	0	0	0	0
Hill	Plant trees on marginal land and maintain production	0	0	-0.20	0	0	-0.04	0	0	0	0	0	0	-0.05	0	0.0	0
Intensive	Plant trees on marginal land and maintain production	0	0	-4.37	0	0	-0.58	0	0	0	-11.96	-7.79	0	-0.20	0	-0.2	0
Intensive	Plant trees on marginal land and maintain production	0	0	34.96	0	0	4.61	0	0.04	0	0	0	0	1.63	0	1.9	0
Intensive	Plant trees on marginal land and maintain production	0	0	0	0	0	0	0	0	0	60.1	39.1	0	0	0	0	0

Table A19. Sheep & beef profits with different mitigation options across regions under under GHG1 price scenario (\$28.73/tCO₂) in 2050, in \$ million

Sheep & beef system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu-Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
Hill	Replace breeding cows with surplus dairy animals	0	0	0	0	0	0	0	0	0	94.82	90.42	0	0	0	0	0
Hill	Reduction in stocking rate – maintain production/area farmed	2.98	14.54	0	85.14	265.21	0	60.80	0	9.92	0	0	21.70	0	120.43	0	18.89
Hill	Plant trees on marginal land and maintain production	0	0	98.89	0	0	6.61	0	0.085	0	91.93	0	0	1.33	0	0.04	0
Intensive	Plant trees on marginal land and maintain production	32.74	8.80	0	8.82	53.26	0	53.61	0	77.25	0	0	13.92	0	43.16	0	20.08
Hill	Reduction in stocking rate – maintain production/area farmed	0.00	0.30	0	0.55	1.17	0	0.78	0	0	0	0	0	0	0.45	0	0.33
Hill	Plant trees on marginal land and maintain production	0	0	1.76	0	0	0.34	0	0.02	0	7.35	1.13	0	0.42	0	0.03	0
Intensive	No Mitigation	0	0	125.56	0	0	18.10	0	0.12	0	27.45	16.70	0	5.23	0	7.77	0
Intensive	No Mitigation	0	0	97.57	0	0	14.06	0	0.10	0	0	0	0	4.07	0	6.03	0
Intensive	No Mitigation	0	0	0	0	0	0	0	0	0	204.42	124.31	0	0	0	0	0

Table A20: Sheep & beef profits with different mitigation options across regions under GHG4 price scenario (\$191.54/tCO₂) in 2050, in \$ million

Sheep & beef system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu-Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
Hill	Replace breeding cows with surplus dairy animals	0	0	0	0	0	0	0	0	0	37.12	35.40	0	0	0	0	0
Hill	30% Planting forestry – maintain production	0.15	0.74	-93.35	14.44	44.97	-6.24	2.66	-0.08	0.51	-48.14	0	0.95	-1.25	6.16	-0.04	0.83
Intensive	Plant trees on marginal land and maintain production	-49.47	-13.29	0	-3.00	-18.13	0	-60.30	0	-116.72	0	0	-15.65	0	-65.20	0	-22.58
Hill	30% Planting forestry – maintain production	0	-0.04	-0.94	0.01	0.01	-0.18	0.01	-0.01	0	-5.44	-0.84	0	-0.23	-0.06	-0.01	0.01
Intensive	Plant trees on marginal land and maintain production	0	0	-69.6	0	0	-10.03	0	-0.07	0	-31.42	-19.11	0	-2.90	0	-4.30	0
Intensive	Plant trees on marginal land and maintain production	0	0	-1.3	0	0	-0.18	0	0.00	0	0	0	0	-0.05	0	-0.08	0
Intensive	Plant trees on marginal land and maintain production	0	0	0	0	0	0	0	0	0	-15.41	-9.37	0	0.00	0	0	0

Table A21. Greenhouse gas emissions for sheep & beef farms with different mitigation options under GHG1 price scenario (\$20.25/tCO₂) in 2030, in 1,000 tCO₂

Sheep & beef system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu-Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
Hill	Replace breeding cows with surplus dairy animals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	390.1	380.1	0.0	0.0	0.0	0.0	0.0
Hill	Reduction in stocking rate – maintain production/area farmed	22.4	129.6	0.0	580.0	1655.4	0.0	455.5	0.0	77.8	0.0	0.0	180.9	0.0	925.4	0.0	146.3
Hill	Plant trees on marginal land and maintain production	0.0	0.0	1532.8	0.0	0.0	93.7	0.0	1.5	0.0	972.0	0.0	0.0	23.0	0.0	0.6	0.0
Intensive	Plant trees on marginal land and maintain production	555.0	177.0	0.0	89.3	494.2	0.0	758.5	0.0	1369	0.0	0.0	219.1	0.0	748.8	0.0	293.6
Hill	Reduction in stocking rate – maintain production/area farmed	0.0	3.5	0.0	5.0	9.6	0.0	6.1	0.0	0.0	0.0	0.0	0.0	0.0	4.6	0.0	2.7
Hill	Plant trees on marginal land and maintain production	0.0	0.0	20.4	0.0	0.0	3.7	0.0	0.3	0.0	93.4	15.4	0.0	5.4	0.0	0.3	0.0
Intensive	No mitigation	0.0	0.0	1442.6	0.0	0.0	190.2	0.0	1.6	0.0	413.2	269.2	0.0	67.2	0.0	80.3	0.0
Intensive	No mitigation	0.0	0.0	715.1	0.0	0.0	94.3	0.0	0.8	0.0	0.0	0.0	0.0	33.3	0.0	39.8	0.0
Intensive	No mitigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1498.8	976.5	0.0	0.0	0.0	0.0	0.0

Table A22. Greenhouse gas emissions for sheep and beef farms with different mitigation options under GHG4 price scenario (\$135/tCO₂) in 2030, in 1,000 tCO₂

Sheep & beef system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu-Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
Hill	Replace breeding cows with surplus dairy animals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	390.1	380.1	0.0	0.0	0.0	0.0	0.0
Hill	Reduction in stocking rate – maintain production/area farmed	0.0	0.0	0.0	580.0	1655.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hill	30% Planting forestry – maintain production	13.0	75.2	1082.9	0.0	0.0	66.2	264.2	1.0	45.1	0.0	0.0	104.9	16.2	536.7	0.4	84.9
Hill	Plant trees on marginal land and maintain production	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	972.0	0.0	0.0	0.0	0.0	0.0	0.0
Intensive	Plant trees on marginal land and maintain production	555.0	177.0	0.0	89.3	494.2	0.0	758.5	0.0	1369.0	0.0	0.0	219.1	0.0	748.8	0.0	293.6
Hill	30% Planting forestry – maintain production	0.0	2.0	0.0	2.9	5.6	0.0	3.5	0.0	0.0	66.0	10.9	0.0	0.0	2.6	0.0	1.6
Hill	Plant trees on marginal land and maintain production	0.0	0.0	20.4	0.0	0.0	3.7	0.0	0.3	0.0	0.0	0.0	0.0	5.4	0.0	0.3	0.0
Intensive	Plant trees on marginal land and maintain production	0.0	0.0	1298.4	0.0	0.0	171.2	0.0	1.4	0.0	371.9	242.3	0.0	60.5	0.0	72.3	0.0
Intensive	Plant trees on marginal land and maintain production	0.0	0.0	643.6	0.0	0.0	84.9	0.0	0.7	0.0	0.0	0.0	0.0	30.0	0.0	35.8	0.0
Intensive	Plant trees on marginal land and maintain production	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1348.9	878.8	0.0	0.0	0.0	0.0	0.0

Table A23. Greenhouse gas emissions for sheep & beef farms with different mitigation options under GHG1 price scenario (\$28.73/tCO₂) in 2050, in 1,000 tCO₂

Sheep & beef system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu-Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
Hill	Replace breeding cows with surplus dairy animals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	354.4	338.0	0.0	0.0	0.0	0.0	0.0
Hill	Reduction in stocking rate – maintain production/area farmed	20.4	99.3	0.0	471.5	1468.7	0.0	420.2	0.0	67.7	0.0	0.0	150.0	0.0	822.5	0.0	130.5
Hill	Plant trees on marginal land and maintain production	0.0	0.0	1371.0	0.0	0.0	91.6	0.0	1.2	0.0	941.9	0.0	0.0	18.4	0.0	0.5	0.0
Intensive	Plant trees on marginal land and maintain production	505.0	135.7	0.0	72.6	438.5	0.0	699.7	0.0	1191.4	0.0	0.0	181.6	0.0	665.6	0.0	262.0
Hill	Reduction in stocking rate – maintain production/area farmed	0.0	2.7	0.0	4.0	8.5	0.0	5.6	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	2.4
Hill	Plant trees on marginal land and maintain production	0.0	0.0	18.2	0.0	0.0	3.6	0.0	0.2	0.0	89.0	13.7	0.0	4.3	0.0	0.3	0.0
Intensive	No Mitigation	0.0	0.0	1290.4	0.0	0.0	186.0	0.0	1.3	0.0	393.7	239.4	0.0	53.8	0.0	79.8	0.0
Intensive	No Mitigation	0.0	0.0	639.6	0.0	0.0	92.2	0.0	0.6	0.0	0.0	0.0	0.0	26.7	0.0	39.6	0.0
Intensive	No Mitigation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1427.8	868.2	0.0	0.0	0.0	0.0	0.0

Table A24. Greenhouse gas emissions for sheep & beef farms with different mitigation options under GHG4 price scenario (\$191.54/tCO₂) in 2050, in 1,000 tCO₂

Sheep & beef system	Mitigation options	Auckland	Bay of Plenty	Canterbury	Gisborne	Hawke's Bay	Marlborough	Manawatu-Wanganui	Nelson	Northland	Otago	Southland	Taranaki	Tasman	Waikato	West Coast	Wellington
Hill	Replace breeding cows with surplus dairy animals	0	0	0	0	0	0	0	0	0	354.4	338.0	0	0	0	0	0
Hill	30% Planting forestry – maintain production	11.8	57.6	968.7	273.5	851.8	64.7	243.7	0.8	39.3	665.5	0	87.0	13.0	477.1	0.4	75.7
Intensive	Plant trees on marginal land and maintain production	505.0	135.7	0.0	72.6	438.5	0.0	699.7	0	1191.4	0	0	181.6	0	665.6	0	262.0
Hill	30% Planting forestry – maintain production	0	1.5	12.9	2.3	4.9	2.5	3.3	0.1	0	62.9	9.7	0	3.1	2.3	0.2	1.4
Intensive	Plant trees on marginal land and maintain production	0	0	1161.4	0	0	167.4	0	1.1	0	354.3	215.4	0	48.4	0.0	71.8	0
Intensive	Plant trees on marginal land and maintain production	0	0	575.7	0	0	0	0	0	0	0	0	0	24.0	0.0	35.6	0
Intensive	Plant trees on marginal land and maintain production	0	0	0	0	0	0	0	0	0	1285.0	781.4	0	0	0	0	0