

Some thoughts on mitigating livestock emissions, including forestry for carbon credits & clearwood

Tony Rhodes



What we've learnt

Developed farm - average animal and per hectare performance.

612 ha with an effective grazed area of 515 ha

non-pastoral land use comprises:

29 ha *P. radiata*

16 ha *Eucalyptus sp.*

19 ha bush and arboretum

55 ha manuka regeneration

Livestock GHG Emissions - 2009

	Livestock GHG emissions
Whole-Farm emissions from 515 ha (tonnes CO ₂ -e) ¹	1,946
Per Hectare Emissions (tonnes CO ₂ -e per ha)	3.78
Emission intensity (kg CO ₂ -e per kg of meat & fibre ²)	19.4

¹ Calculated using Overseer® ver. 5.4.3.0

² Meat & fibre production is expressed as carcass weight equivalents. All sheep meat and beef production is converted to carcass weight units. Scoured wool weight is converted to carcass weight on a 1:1 basis.

Alternative Livestock Policies - mitigation

	2009	↑ E/lamb flock, R2 bulls	1990
Whole-Farm emissions from 515 ha (tonnes CO ₂ -e) ¹	1,946	2,198	1,803
Per Hectare Emissions (tonnes CO ₂ -e per ha)	3.78	4.27	3.50
Emission intensity (kg CO ₂ -e per kg of meat & fibre ²)	19.4	17.7	21.5

- We can only make small changes to emissions - about +/-10%
- Livestock systems are dynamic

¹ Calculated using Overseer® ver. 5.4.3.0

² Meat & fibre production is expressed as carcass weight equivalents. All sheep meat and beef production is converted to carcass weight units. Scoured wool weight is converted to carcass weight on a 1:1 basis.

Conclusions

More efficient livestock systems:

- produce more livestock GHG emissions - 4.27 vs. 3.78 tonnes/ha
- produce more meat & fibre – 240 vs. 205 kg/ha
- reduce intensity of livestock GHG emissions – 17.7 vs. 19.4 kg/kg m&f
- mean today, the farm has lower intensity of emissions than in 1990 – 19.4 vs. 21.5 kg/kg m&f

Carbon Storage - sequestration

Currently, the farm is accumulating carbon at the rate of about 1,600 tonnes each year

Land use	Hectares	Year of planting	Carbon Sequestration Rate ³ (tonnes CO ² /ha)/yr	Carbon Sequestered (tonnes CO ² /yr)
Pasture	489		-	-
Pine trees	14.8	2001	42	622
Pine trees	10.0	1995	36	360
Pine trees	4.2	1981	29	122
Eucalyptus	16.1	1981	16	258
Mixed tree species	4.3		3	13
Scrub	54.5		3	163
Bush	15.7		3	47
Arboretum	3.0		3	9
Waste/banks	0.7		-	-
Total				1,594

³ A Guide to Look-up Tables for the Emissions Trading Scheme. MAF, March 2009

Emission Credits

Carbon credits can only be claimed for forest plantings after 1989 on non-forest land (land that either was not forest land on 31/12/89 or land that was forest land on 31/12/89 but has subsequently been deforested).

So in this case the Bush and Arboretum, and 1981 plantings of pine and eucalyptus are ineligible for carbon credits under the current Emissions Trading Scheme.

It would be possible to claim credits for carbon accumulation since 1 January 2008 in the *P. radiata* forest.

Eligibility for carbon credits across the manuka regeneration will depend on previous land cover.

Another option⁴

Radiata clearwood regime – 450 sph – producing timber and carbon credits

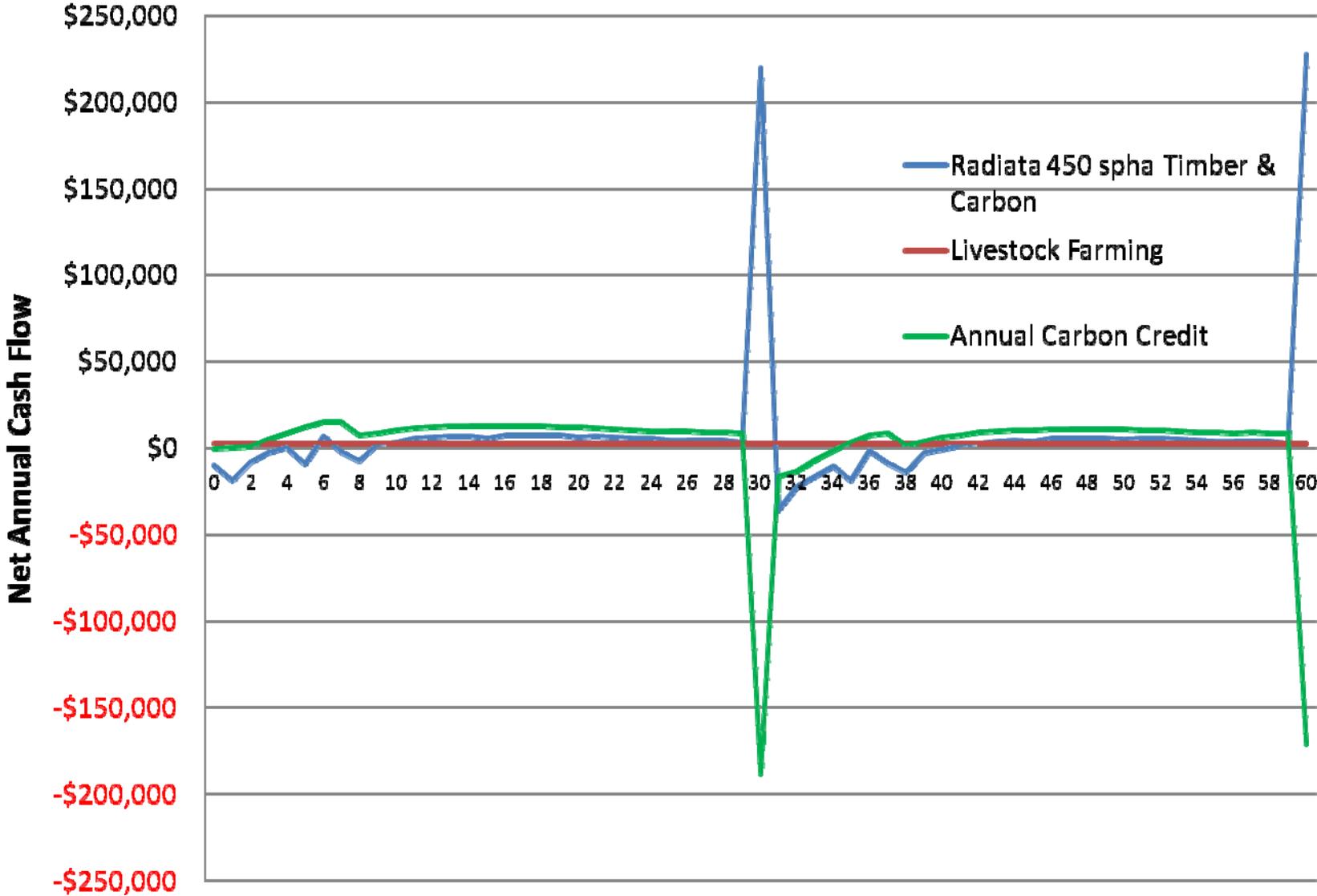
- one of a range of options evaluated
- thought to be a less risky option – both high quality timber and carbon
- Harvested at yr 30 and re-planted
- CO₂-e valued at \$20/tonne

Face paddock of 12.13 ha

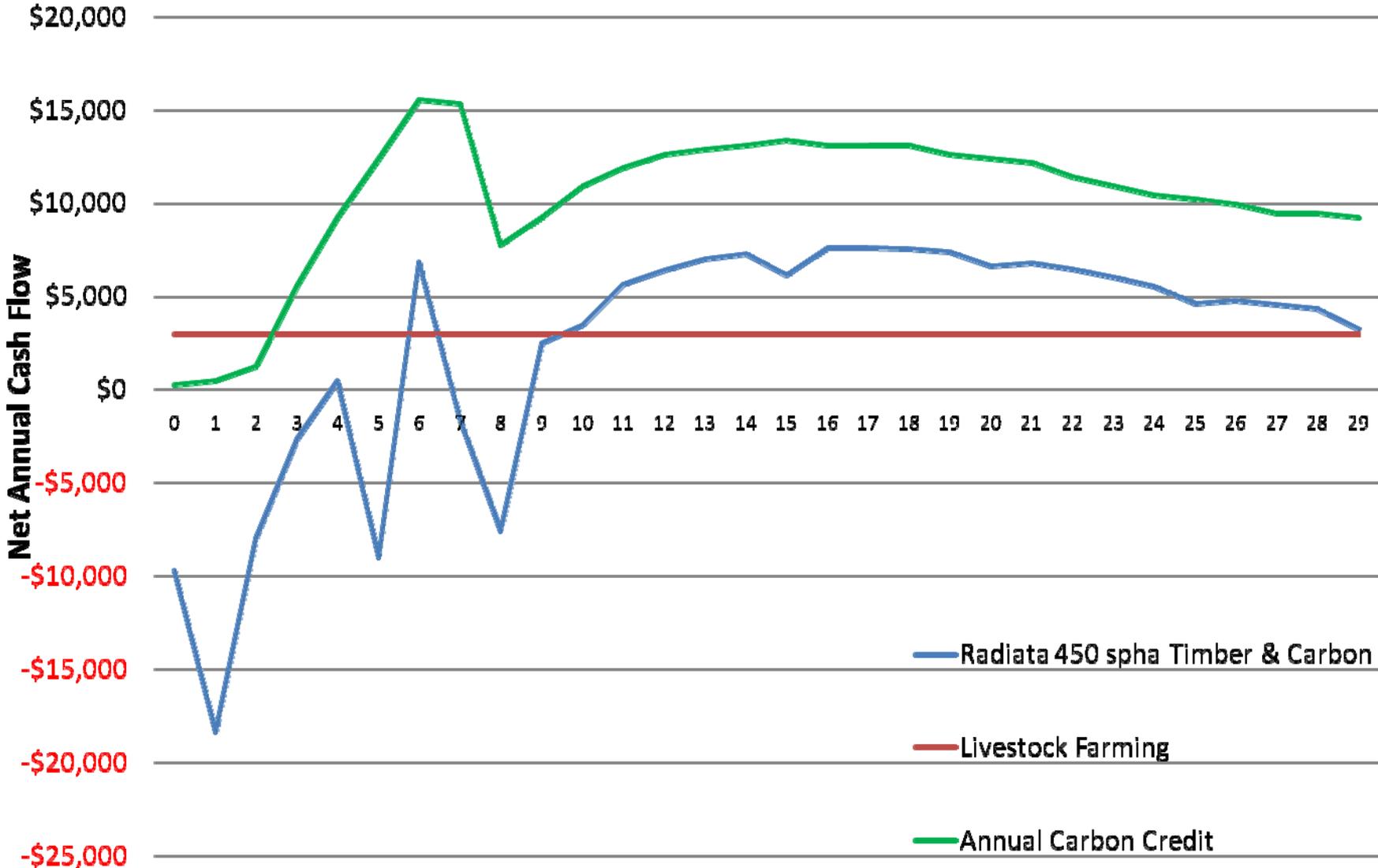
- **drop 91 su**
- **reduce annual fertiliser input \$910**

4 Impact of carbon trading on the economics and environmental benefits of tree planting options - Envirolink study on McRae Trust land, Wairoa, Hawkes Bay. West, G., Poole B., Molony K..

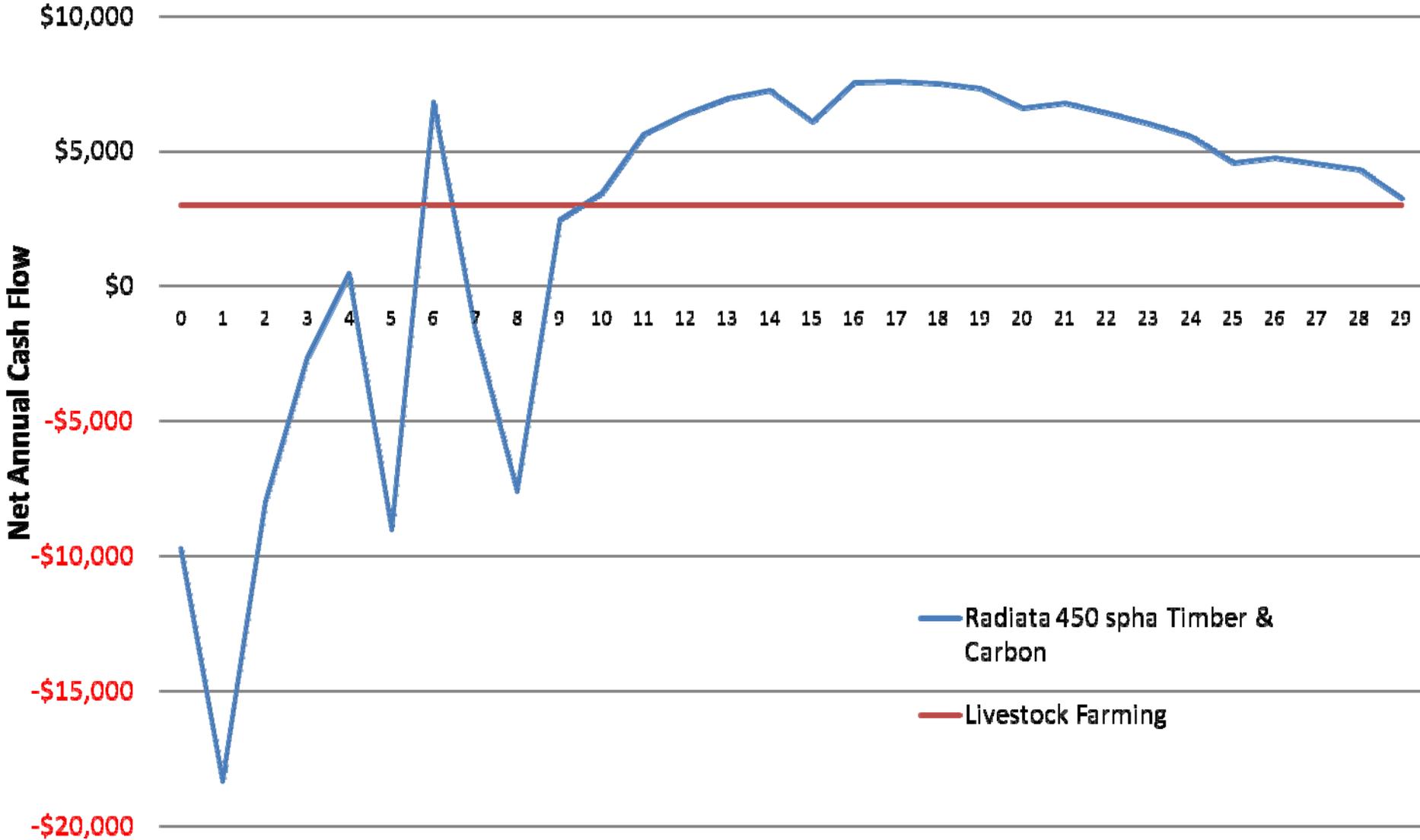
FACE BLOCK (12.13 ha) - LAND USE OPTIONS



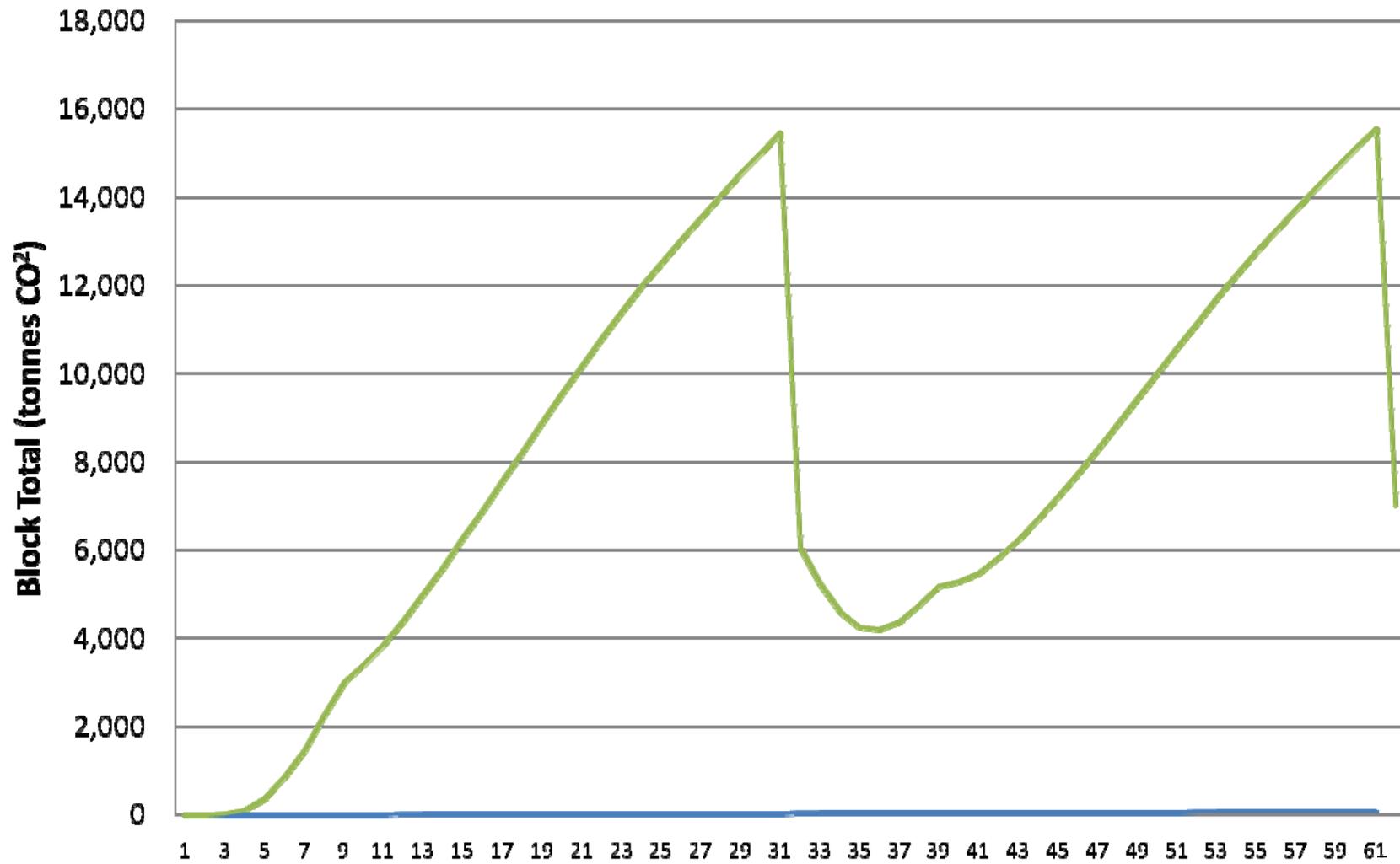
FACE BLOCK (12.13 ha) - LAND USE OPTIONS



FACE BLOCK (12.13 ha) - LAND USE OPTIONS



FACE BLOCK (12.13 ha) - Carbon Sequestered



Key Points

- Mitigation options for livestock GHG emissions are small – about +/- 10%
- Compared to 1990, on McRae Trust, emissions intensity has already been reduced by 10% (kg CO₂-e/kg M&F)
- Integrated timber and carbon farming is an option that helps with up-front forestry costs, but need to be careful about assumptions
- If you wanted to be “carbon neutral” for livestock GHG emissions, you would need to plant about 104 ha in *P. Radiata* over a 30 year period

Significant risks

- assumptions about carbon sequestration rates
- long-term price for carbon and variation when selling and buying back
- fit between site index and timber quality
- long term price for clearwood timber
- sustainability of sheep and beef farming on class V11e4 land