Carbon and Grazing - finding the balance

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Australian Government
Department of Agriculture, Fisheries and Forestry

Northern Territory Government

CSIRO

mla

Queensland Government

Overview

Carbon cycle

National level emissions

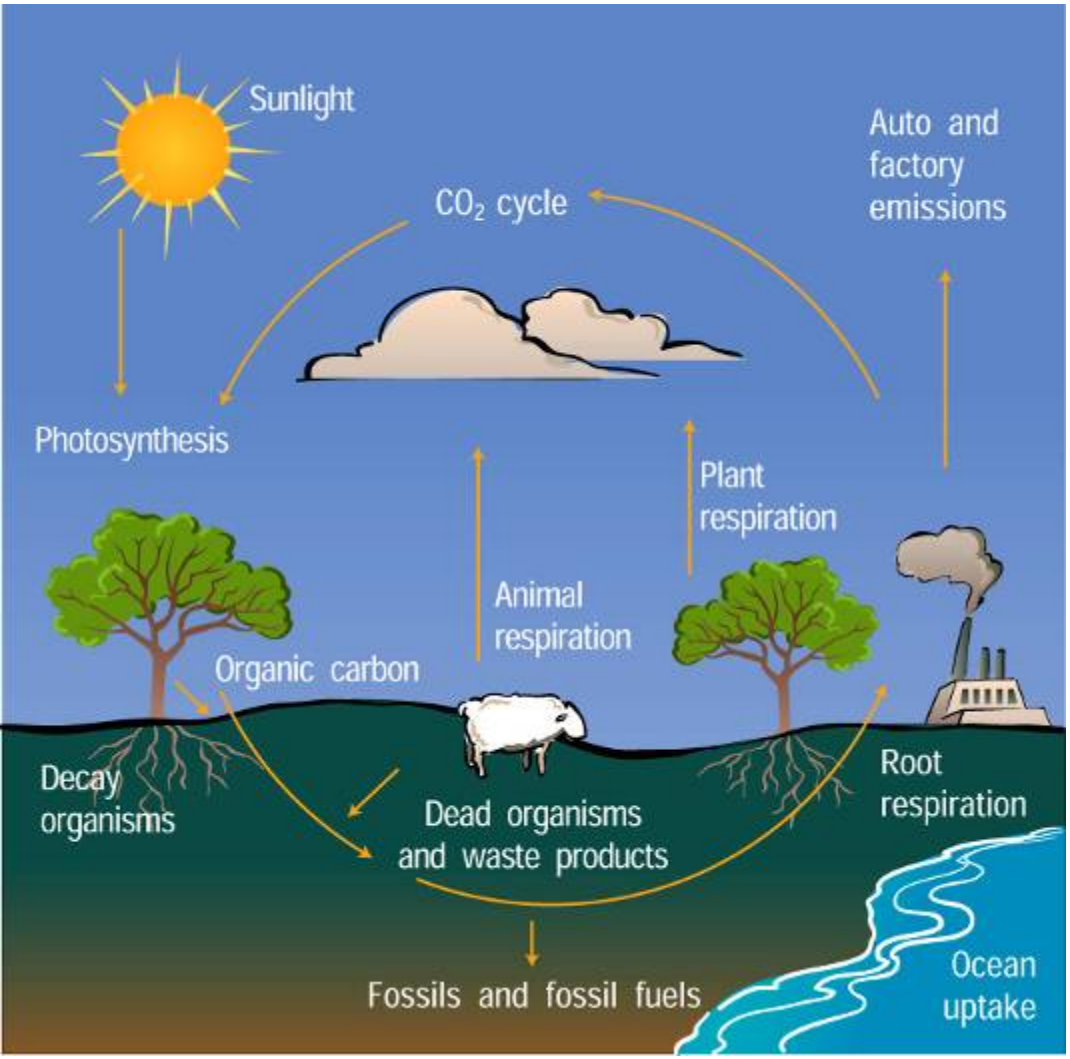
State level

Farm level

- Climate Clever Beef
- Herd (Blanncourt)
- Regrowth (Jimarndy)
- Soil (Nth Gulf, Wambiana, Toorak)

Carbon cycle

Interdependence



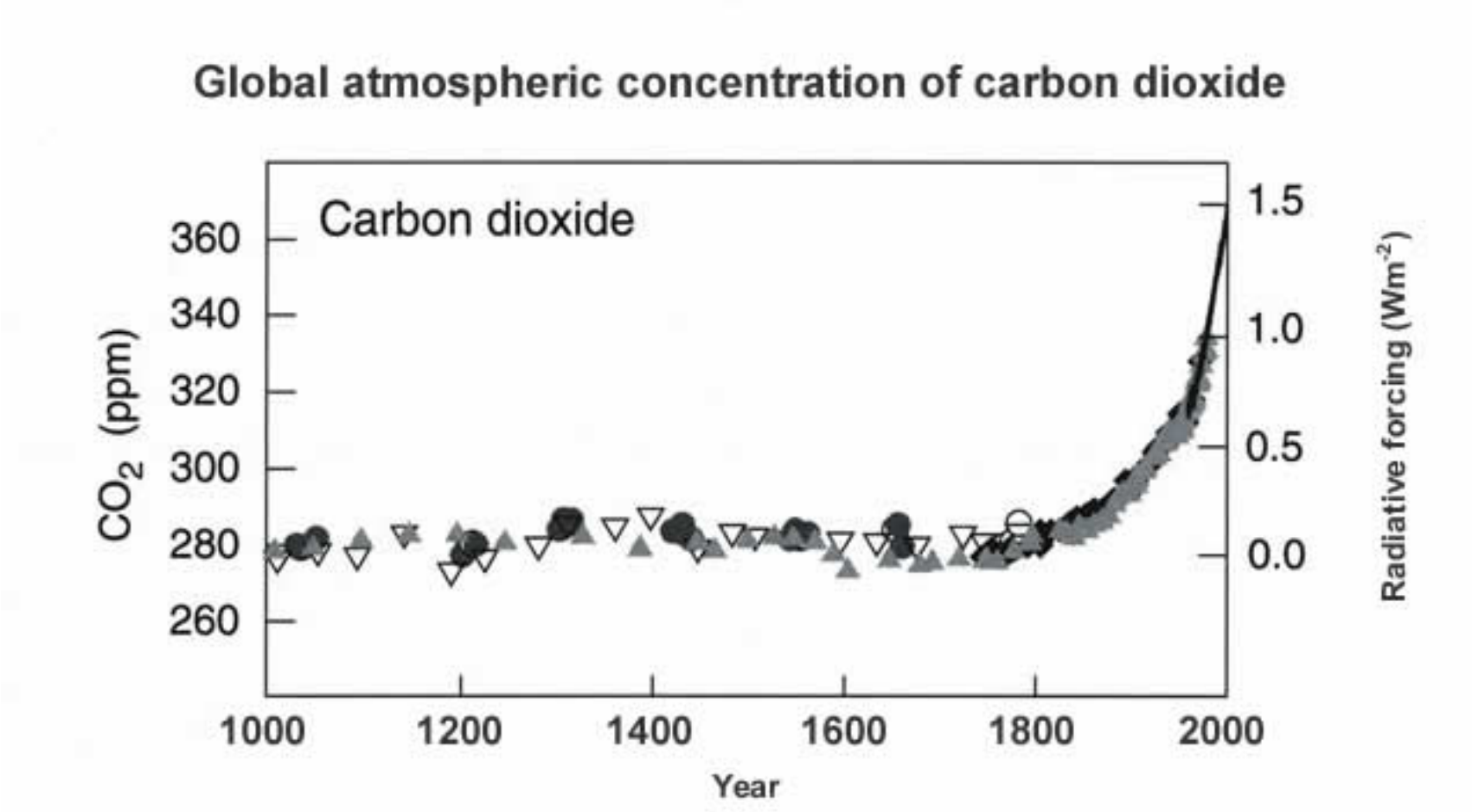
Plants
Animals
Soil carbon
Soil biology
Atmosphere
Water quality
Biodiversity
Land condition

Fossil fuel emissions

Livestock (extensive, intensive)
Cropping
Forestry
Horticulture

Business productivity and profit
Communities

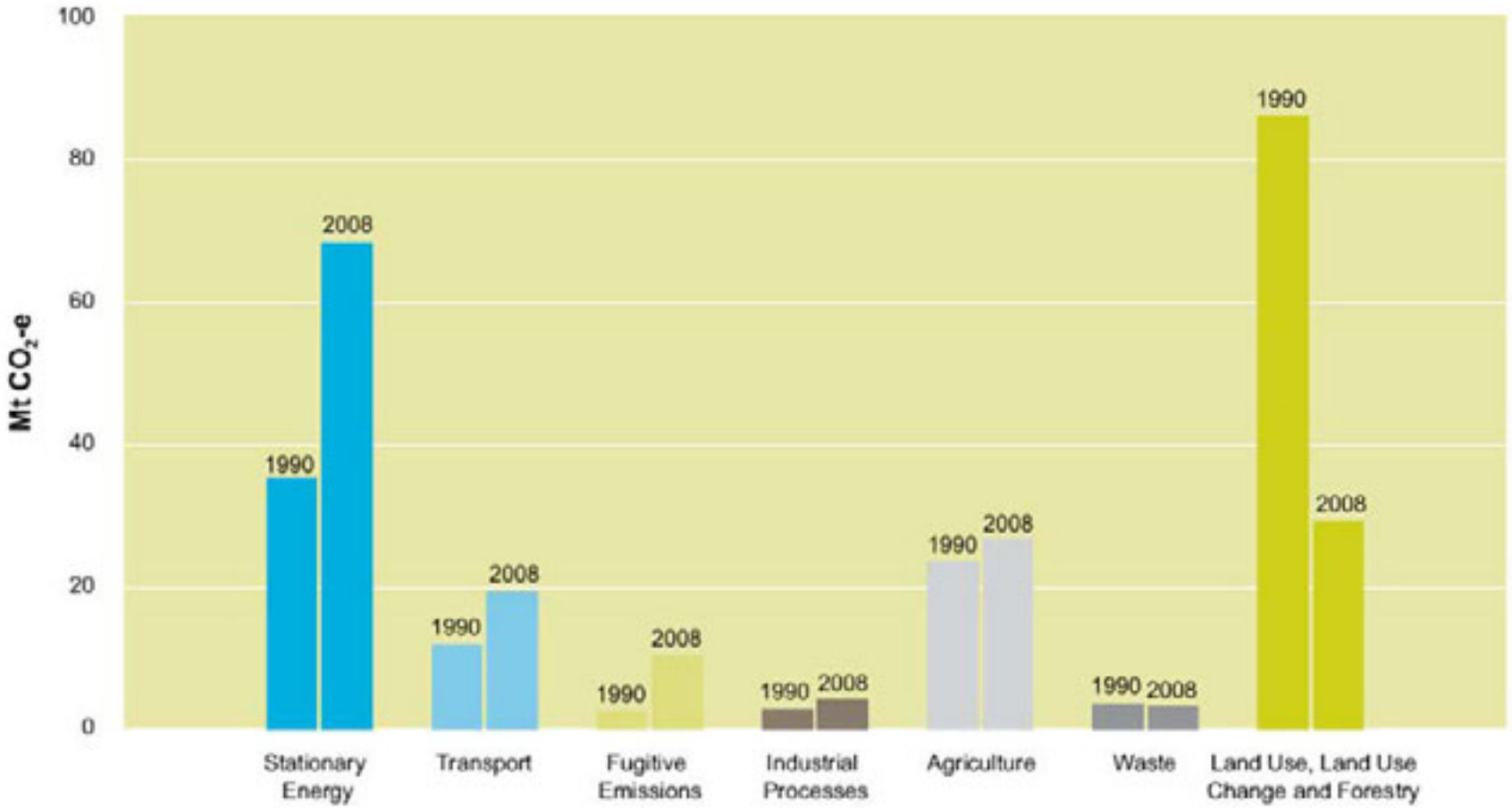
What is the fuss about?



Source: IPCC 2001

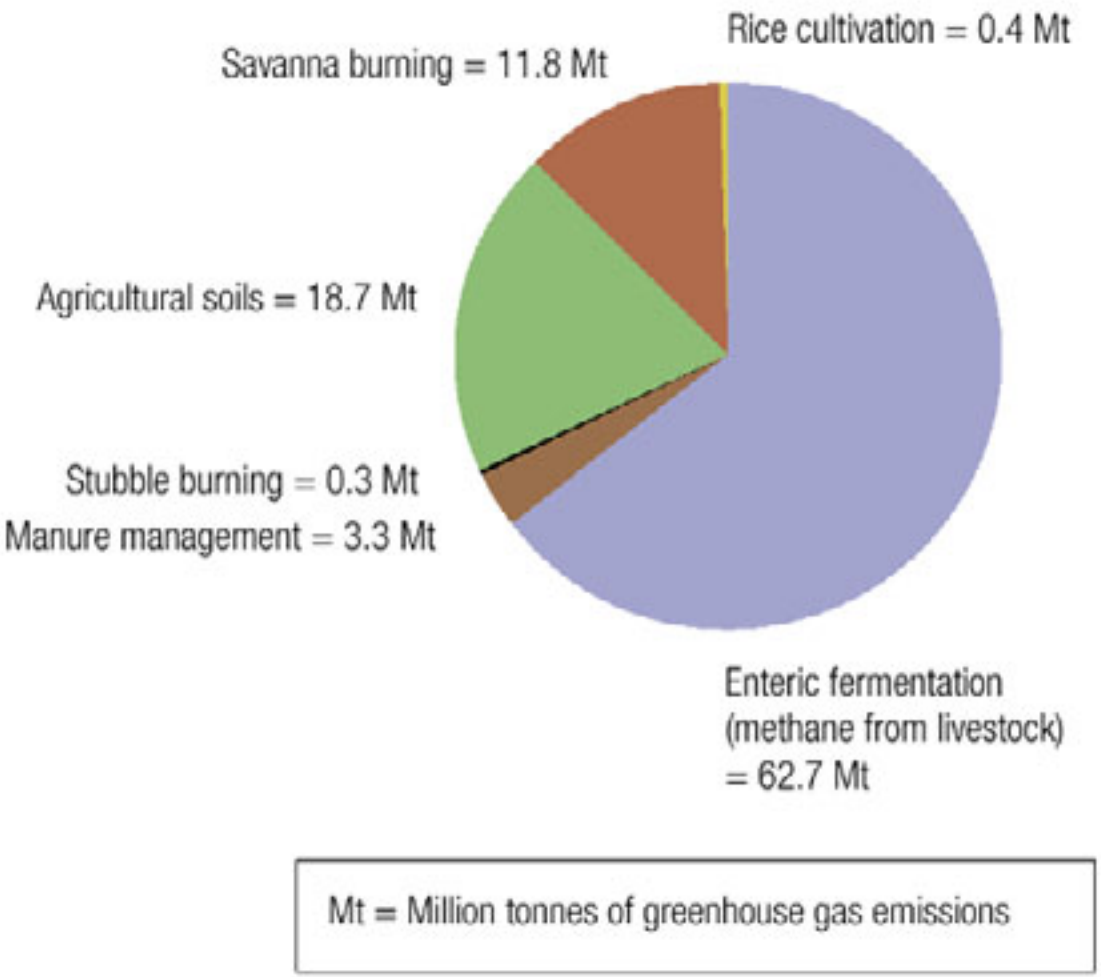
Heading to 450 ppm

Figure 6: Queensland – Emissions by Sector, 2008



Dept of Climate Change 2010

Greenhouse gas emissions from Australian agriculture, 2003



75% Cattle
20% Sheep

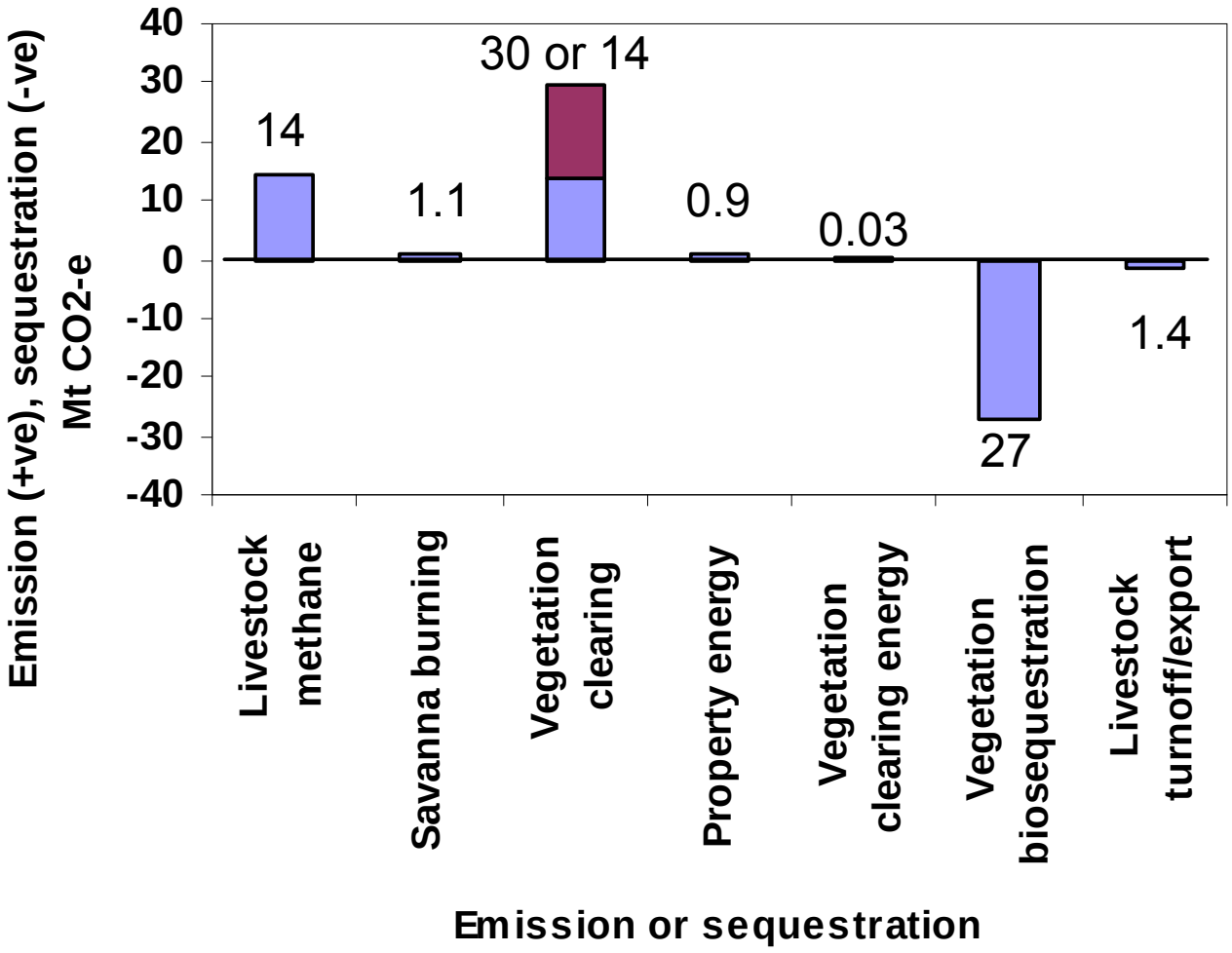
90% Cattle in Qld
80% of land use in Qld

Net carbon position of QLD beef industry

Assessed carbon stocks and greenhouse emissions including:

- Livestock methane (1.5 t CO_2-e per AE per year)
- Property energy emissions (0.09 t CO_2-e per ha per year)
- Livestock biomass and turn-off
- Forage and litter biomass
- Savanna burning
- Tree biomass (clearing and growth in remnant and regrowth veg.)
- Soil carbon and land condition

Net carbon position of QLD beef industry



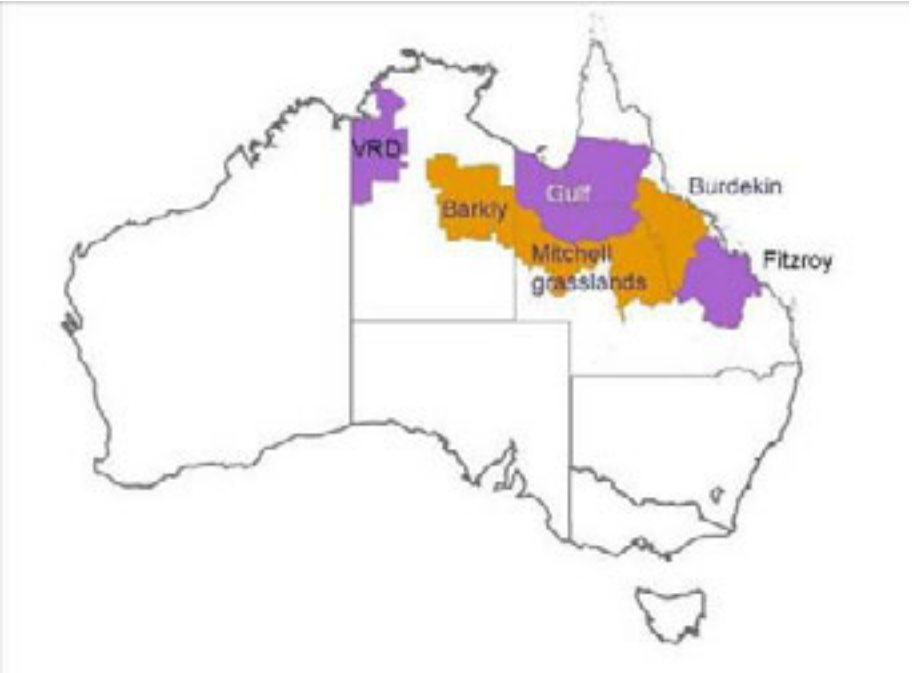
Total emissions 17.4 or 1.2 Mt CO2-e

www.deedi.qld.gov.au
Animals
Beef

Climate Clever Beef

The region, business, identification of options and analysis of options are evaluated in terms of:

- Productivity
- Profitability
- Land condition
- Greenhouse gas emissions
- Climate change risk



- Business resilience and adaptability

Climate Clever Beef website
http://www.dpi.qld.gov.au/27_20060

- Part of MLA's Northern Grazing Systems Initiative
- DAFF Australian Farming Futures funding

Gulf case study – Business situation

- Purchased property with stock 15 years ago.
- Ran ‘as-is’ for 3 years, low weaning rates and poor land condition.
- Then undertook considerable effort to improve the business including:
  - Reducing stocking rates
  - Wet season spelling
  - Pasture improvement
  - Supplementation
  - Feeding of young cattle to meet weight-for-age targets

Gulf case study – Business situation

Analysed current situation and situation 15 years ago.

- Business financial analysis
- Herd structure and productivity

Profitability

- Gross margin has increased – 165% (BreedcowDynama)
- There is room for improvement compared to regional benchmarks (ProfitProbe) primarily due to high feed costs to reach weight-for-age specifications of younger cattle and reduced time to first calving.

Productivity

- Weaning rate improved from <50% to 70%, death rates reduced significantly
- Cow numbers reduced by about one third, however same number of calves
- Weight gains improved from 50-60 kg/hd/yr to 130-150 kg/hd/yr
- Beef sold increased 180%

Gulf case study – Business situation

Land Condition
- 85% C-condition 15 years ago
- 85% A/B-condition currently

√

Greenhouse gas emissions
- 300 kg CO_2e/ha/yr 15 years ago
- 250 kg CO_2e/ha/yr currently
- 17% improvement

√

Greenhouse gas emissions efficiency
- 25.1 kg CO_2e/kg beef 15 years ago
- 11.7 kg CO_2e/kg beef currently
- 53% improvement

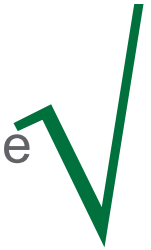
- Energy use was 2% of total emissions
- Pasture biomass increased by 85 kg CO_2e/ha/yr with improved land condition

- 9 businesses in CQ 17 ± 5 kg CO_2e/kg beef, 610 ± 280 kg CO_2e/ha/yr

Gulf case study – Business situation

Climate change risk

- Good. Due to good land condition and feeding regimes (can be extended in poor seasons).



Business resilience and adaptability

- Fair. Due to some profitability indicators of concern.
- Conflict between cost of feeding strategy to improve productivity and reduce greenhouse gas emissions and impact on profitability

Future actions and analysis

- Heifer management to reduce feeding costs.
- Explore less costly feeding options and target only specific mobs.
- Explore alternative marketing strategies for different mobs of cattle.

Jimarndy regrowth management

Approximately 36% of Jimarndy is regrowth

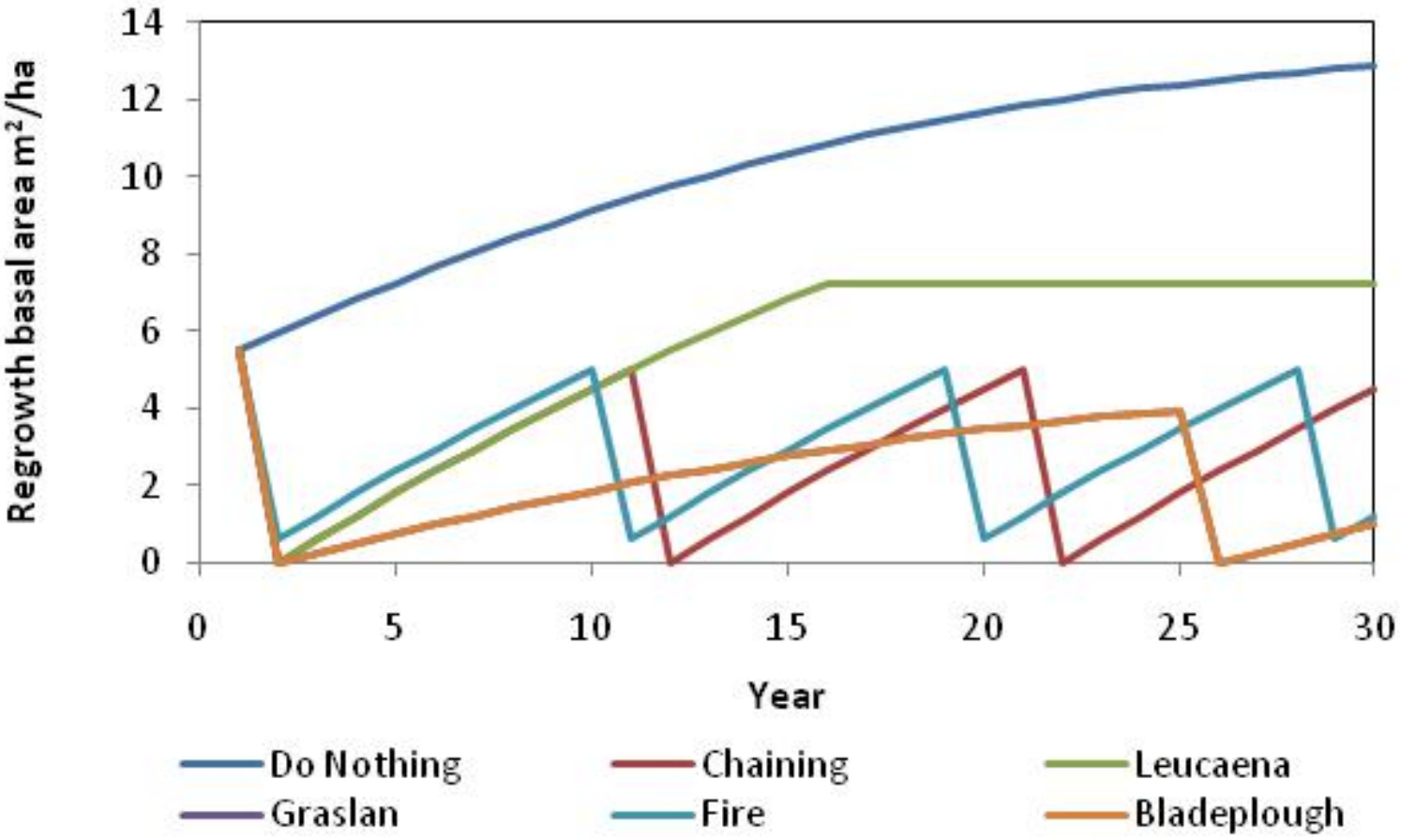
An area of 1000ha of 10 year old regrowth was used for scenario testing.

Management options considered include:

- Do nothing; allow regrowth to continue to regrow
- Chaining; chain the regrowth periodically
- Leucaena; clear regrowth and establishment leucaena
- Graslan; clear regrowth using graslan herbicide (slows subsequent regrowth)
- Fire; periodically burn regrowth
- Bladeplough; clear regrowth using bladepoughing (slows subsequent regrowth).

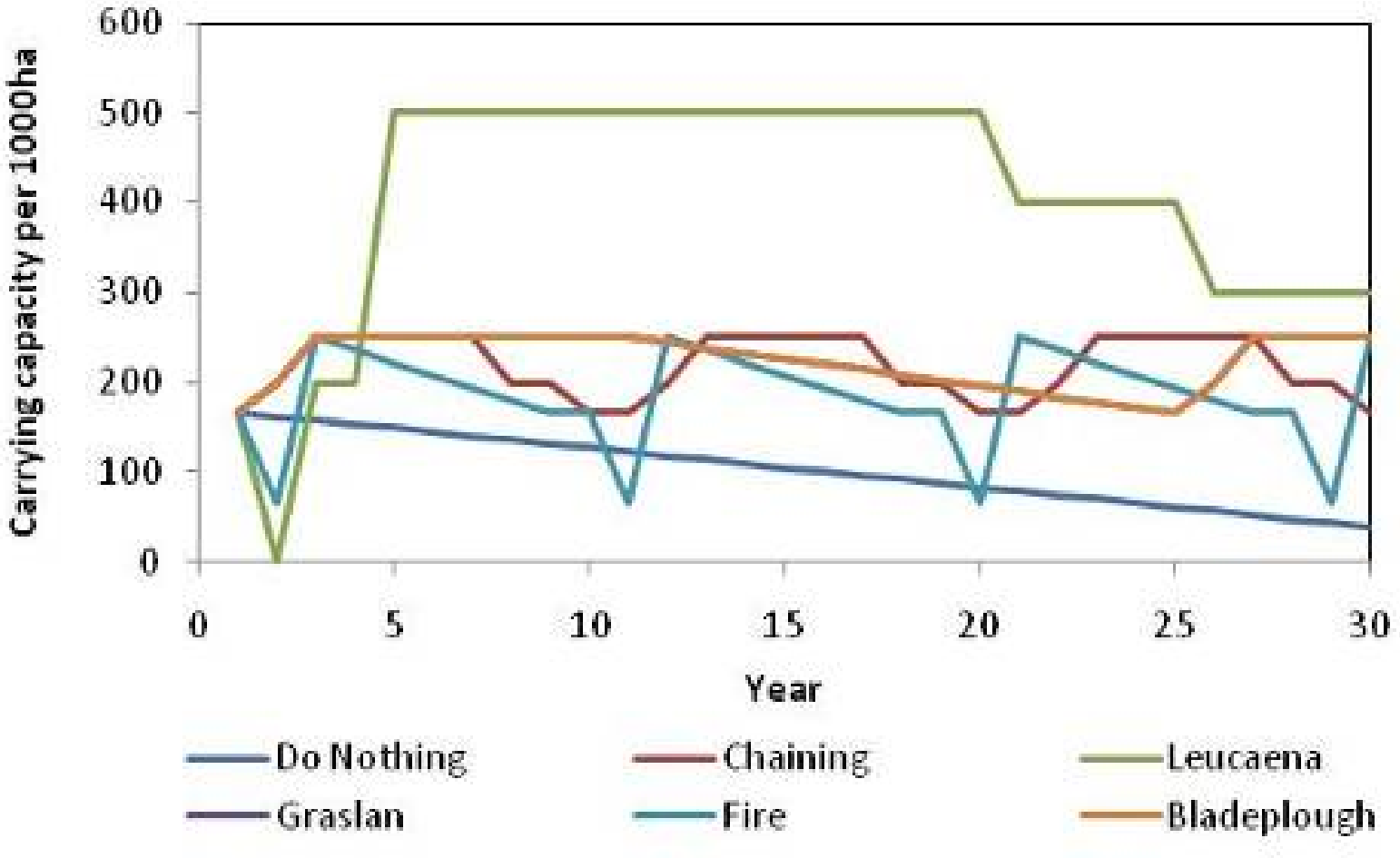
Jimarndy regrowth management

Regrowth basal area for regrowth management options.
Used to calculate carbon in the regrowth.
(Bladeplough and Graslan the same)



Jimarndy regrowth management

Livestock carrying capacity (AEs) for six regrowth management options. (Bladeplough and Graslan the same)



Jimarndy regrowth management

Net present value of regrowth management options

	Livestock income only	Livestock and regrowth sequestration income ($10/t)	Livestock and regrowth sequestration income ($10/t), minus methane emissions
	Compare		
Do Nothing	$ 274,664	$ 652,015	$ 625,605
Chaining	$ 391,549		
Leucaena	$ 383,785	$ 338,069	$ 253,717
Graslan	$ 338,413	$ 12,089	-$ 37,418
Fire	$ 325,363		
Bladeplough	$ 338,413		

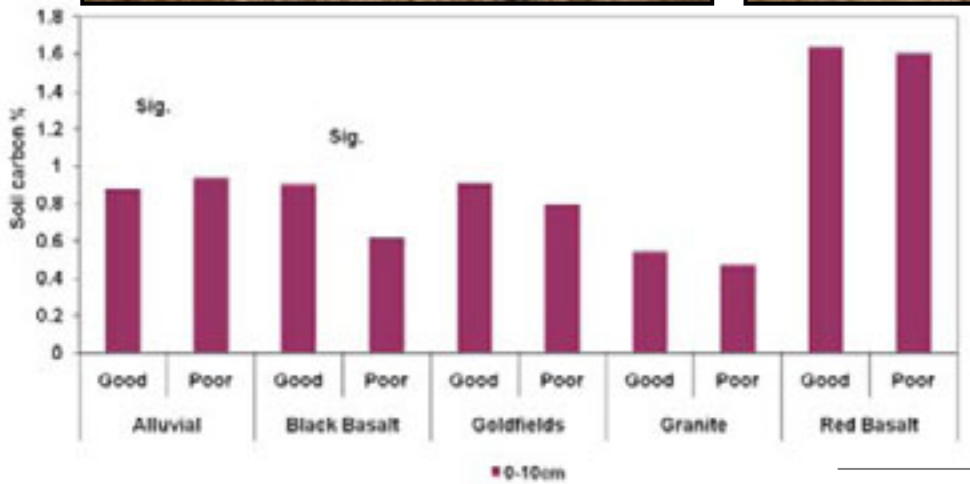
Costs $/ha

bladeplough	150
Chaining	60
Fire	30
Leucaena - plant	608
Leucaena - maintenance	66
Graslan	150

Soil carbon with good and poor land condition

- Northern Gulf and northern Burdekin region in far north Qld
- Five paired sites

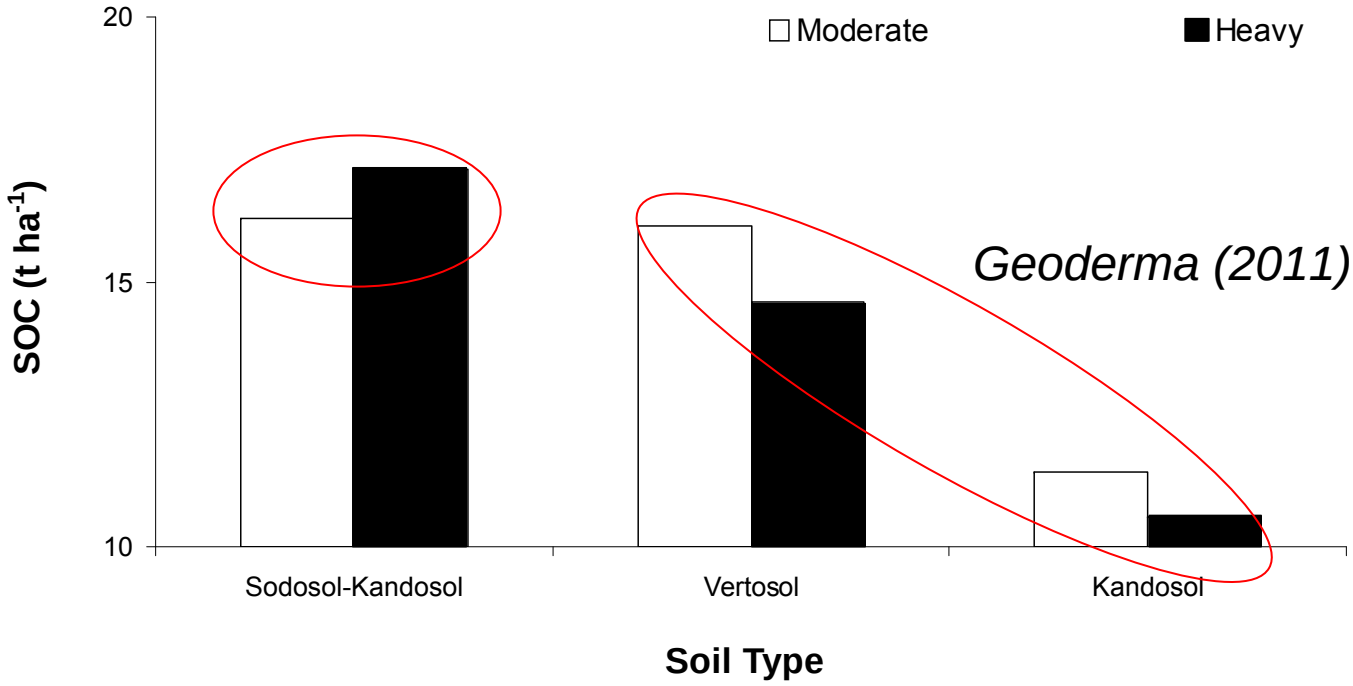
Georgetown Granite land type



No significant difference across land types

Some small differences within a land type but direction not consistent

Wambiana Stock Management Trial



Geoderma (2011) 167-168, 261-273

Soil type x grazing pressure interacted to influence SOC stock to 30cm depth

SOC stock lower in Vertosol & Kandosol soils under Heavy Grazing

SOC stock higher in Sodosol-Kandosol soil under Heavy Grazing

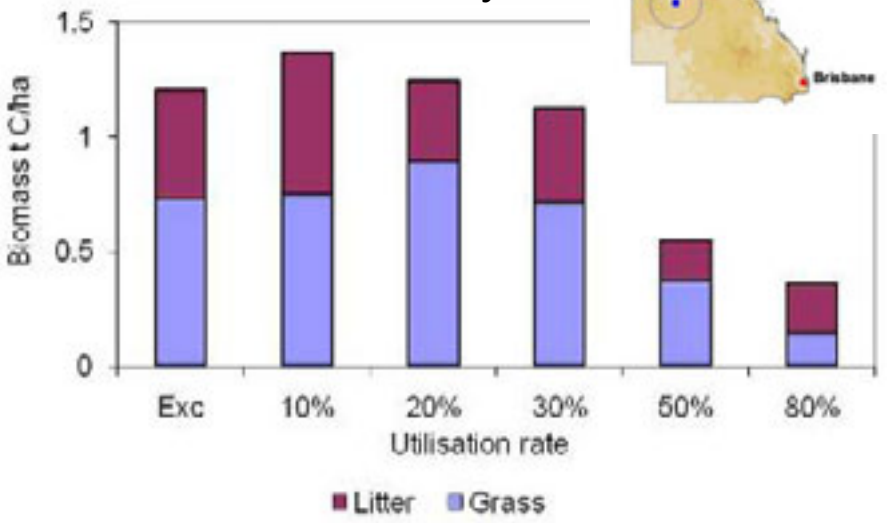
The different response to management of different land types means that caution is required with soil carbon sequestration

Toorak grazing trial

- Mitchell Grass country
- Grazing sheep
- 5 pasture utilisation treatments and exclosure
- Trial ran for 26 years 1984-2010

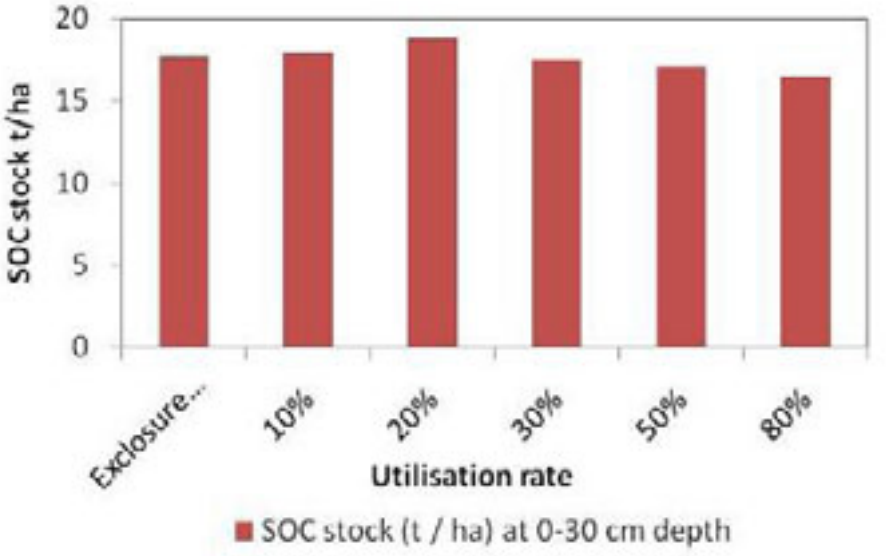
- Preliminary soil analysis indicates No significant difference

Pasture and litter yield



Soil carbon

~0.5% C 0-10cm



Carbon Farming Initiative

- Methodology and scheme development still underway

- Regrowth retention
- Land rehabilitation
- Herd efficiency

- What will it cost to participate?
- What are the risks?
- How will it compliment beef businesses????

Take home messages

- Beef industry does have significant GHG emissions
- On-farm GHG emissions can be calculated
- Soil carbon changes are slow, hard to predict and hard to measure
- There are often on-farm opportunities to reduce emissions and maintain or improve profitability
- Carbon Farming may provide some profitable opportunities, but scheme details are still being developed for extensive beef.