Perspective on Pastures Productivity and Emissions

Climate Clever Beef Project

29th November 2011

Australian Government
Department of Agriculture, Fisheries and Forestry

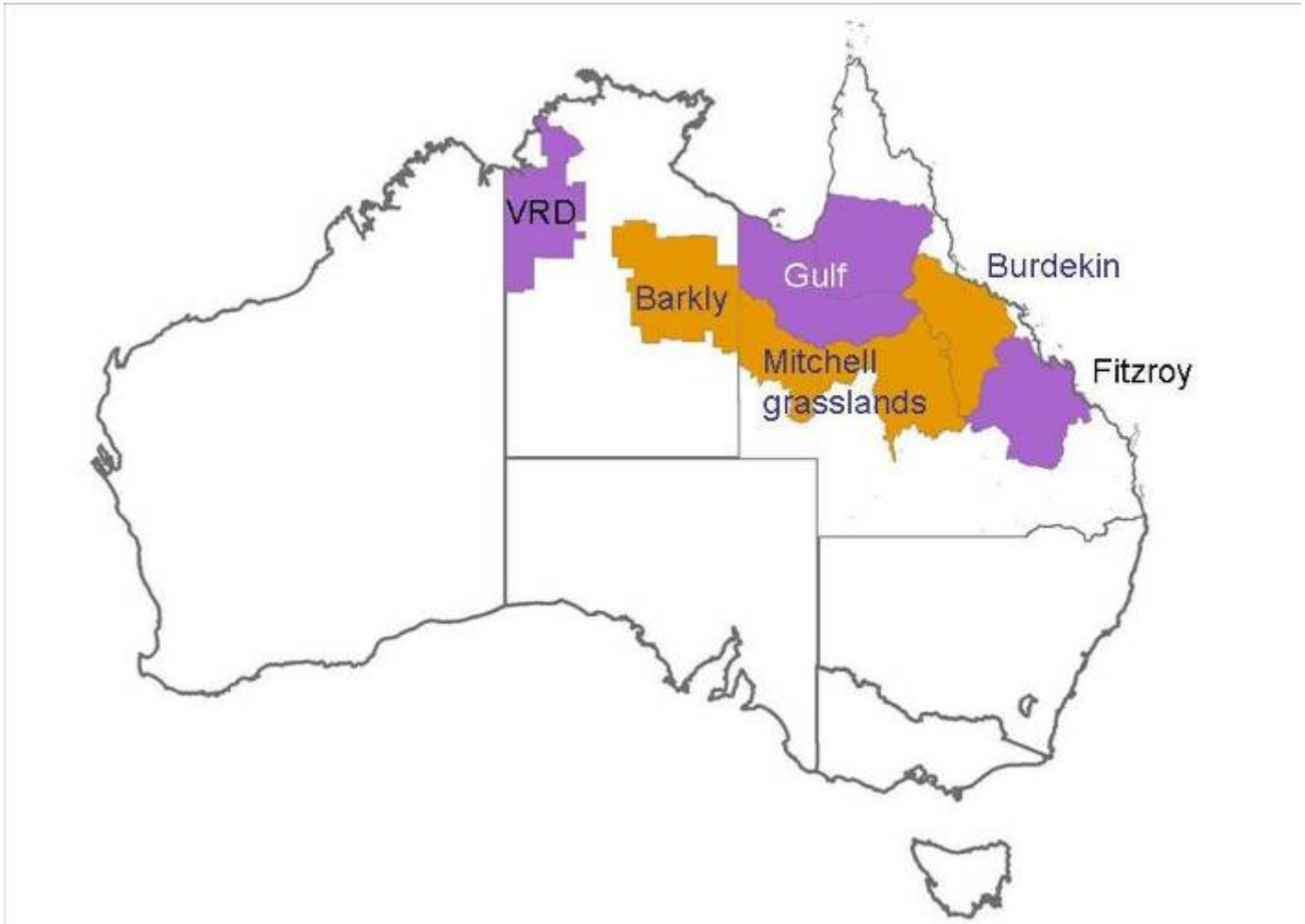
Northern Territory Government

CSIRO

mla

Queensland Government

Location – Climate Clever Beef



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

Climate Clever Beef

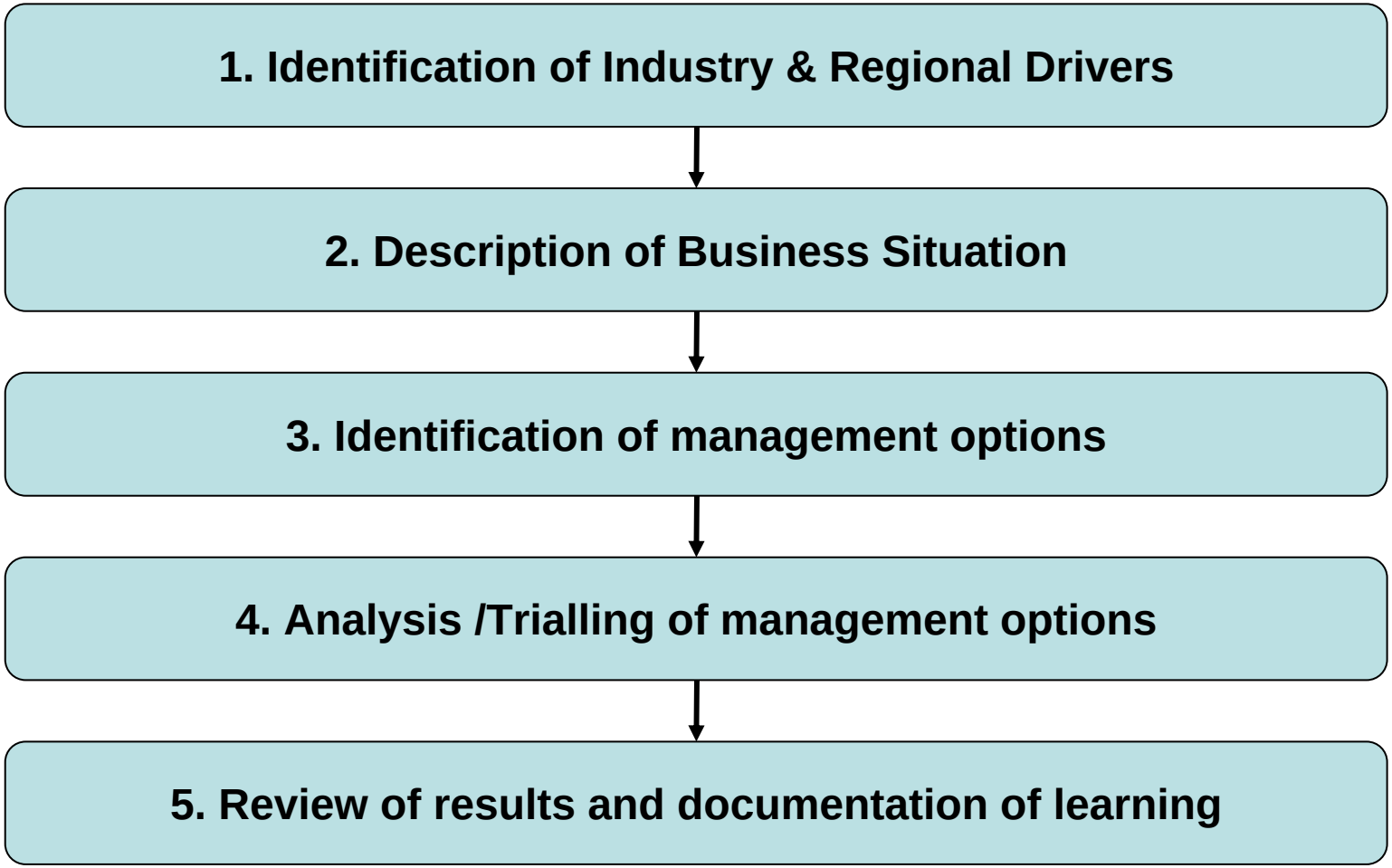
The region, business, identification of options and analysis of options are evaluated in terms of:

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

- Business resilience and adaptability

Framework – Climate Clever Beef

Framework to systematically assess which management options are likely to have the best outcomes for a beef business.



Jimarndy – Herd Modelling

Original herd

- 3800 AEs with 1794 cows mated
- Steers sold at ~2.5 years in July at 530 kg
- Cull heifers sold at 18 months at 300 kg

Management options evaluated

- Selling cull heifers at 380 kg at 2 years
- EU market with prices increased $0.20/kg carcase weight
- EU market with prices increased $0.30/kg carcase weight
- HGP steers with turnoff at 530 kg in May instead of July
- HGP steers with turnoff at 560 kg in July

Jimarndy – Herd Modelling

	Sell cull heifers 1 yr	Sell cull heifers 2 yr	EU prices + 20 cents	EU prices + 30 cents	HGP Steers sold at 530 kg	HGP Steers sold at 560 kg
Total adult equivalents	3,800	3,800	3,800	3,800	3,800	3,800
Total breeders mated	1,794	1,757	1,794	1,794	1,817	1,758
Total breeders mated & kept	1,450	1,402	1,450	1,450	1,469	1,421
Weaners/total cows mated	72.7%	72.7%	72.7%	72.7%	72.7%	72.7%
Total cows and heifers sold	620	598	620	620	628	608
Av. female price	$606	$653	$620	$628	$606	$606

Jimarndy – Herd Modelling

	Sell cull heifers 1 yr	Sell cull heifers 2 yr	EU prices + 20 cents	EU prices + 30 cents	HGP Steers sold at 530 kg	HGP Steers sold at 560 kg
Total steers sold	640	619	640	640	648	627
Steer live weight	530 kg	530 kg	530 kg	530 kg	530 kg	560 kg
Steer sale month	July	July	July	July	May	July
Average steer price	$857	$857	$915	$942	$857	$907
GM/AE after interest	$157.76	$155.08	$168.02	$172.75	$156.34	$162.83

Jimarndy – Emissions Modelling

	Sell cull heifers 1 yr	Sell cull heifers 2 yr	EU prices + 20 cents	EU prices + 30 cents	HGP Steers sold at 530 kg	HGP Steers sold at 560 kg
Liveweight sold (t)	604	602			611	610
Methane (t CO2e)	6,817	6,813			6,720	6,716
Nitrous oxide (t CO2e)	492	492			484	484
Total Livestock Emissions (t CO2e)	7,309	7,305			7,205	7200
Emissions intensity per liveweight sold (t CO2e per t liveweight sold)	12.1	12.1			11.8	11.8
Emissions intensity per ha (t CO2e per ha)	0.38	0.38			0.37	0.37

Using HGPs led to a 2.5% improvement in beef emissions intensity

Avocet – Breedcow modelling

- 32 km South of Emerald
- 4500 ha
- Land types include brigalow and softwood scrub, alluvial brigalow and some lancewood country

Breedcow Analysis

- Comparisons

Scenario 1	Scenario 2	Scenario 3
336 breeders	336 breeders	500 breeders
↓ weight	↑ weight	↓ weight
↓ reproductive performance	↑ reproductive performance	↓ reproductive performance

Avocet – Breedcow modelling

	Scenario 1 Land uncleared, high SR	Scenario 2 Land cleared, low SR (current 2011)	Scenario 3 Land cleared, high SR
Total AE	640	765	948
Total breeders mated	336	336	500
Weaners/total cows mated	74.5%	86.4%	74.5%
Gross margin for herd	$134,074	$176,235	$198,387
GM/AE after interest	$155.08	$173.78	$154.62

Avocet – Breedcow modelling

	Scenario 1 Land uncleared, high SR	Scenario 2 Land cleared, low SR (current 2011)	Scenario 3 Land cleared, high SR
Liveweight sold (t)	95.5	120.6	143.4
Methane (t CO2e)	1,093	1,372	1,627
Nitrous oxide (t CO2e)	74	91	111
Total Livestock Emissions (t CO2e)	1,167	1,464	1,738
Emissions intensity per liveweight sold (t CO2e per t liveweight sold)	12.2	12.1	12.1
Emissions intensity per ha (t CO2e per ha)	0.39	0.33	0.39

Reducing stocking rate led to a 18% reduction in emissions per ha.

Jimarndy regrowth management

Approximately 36% of Jimarndy is regrowth

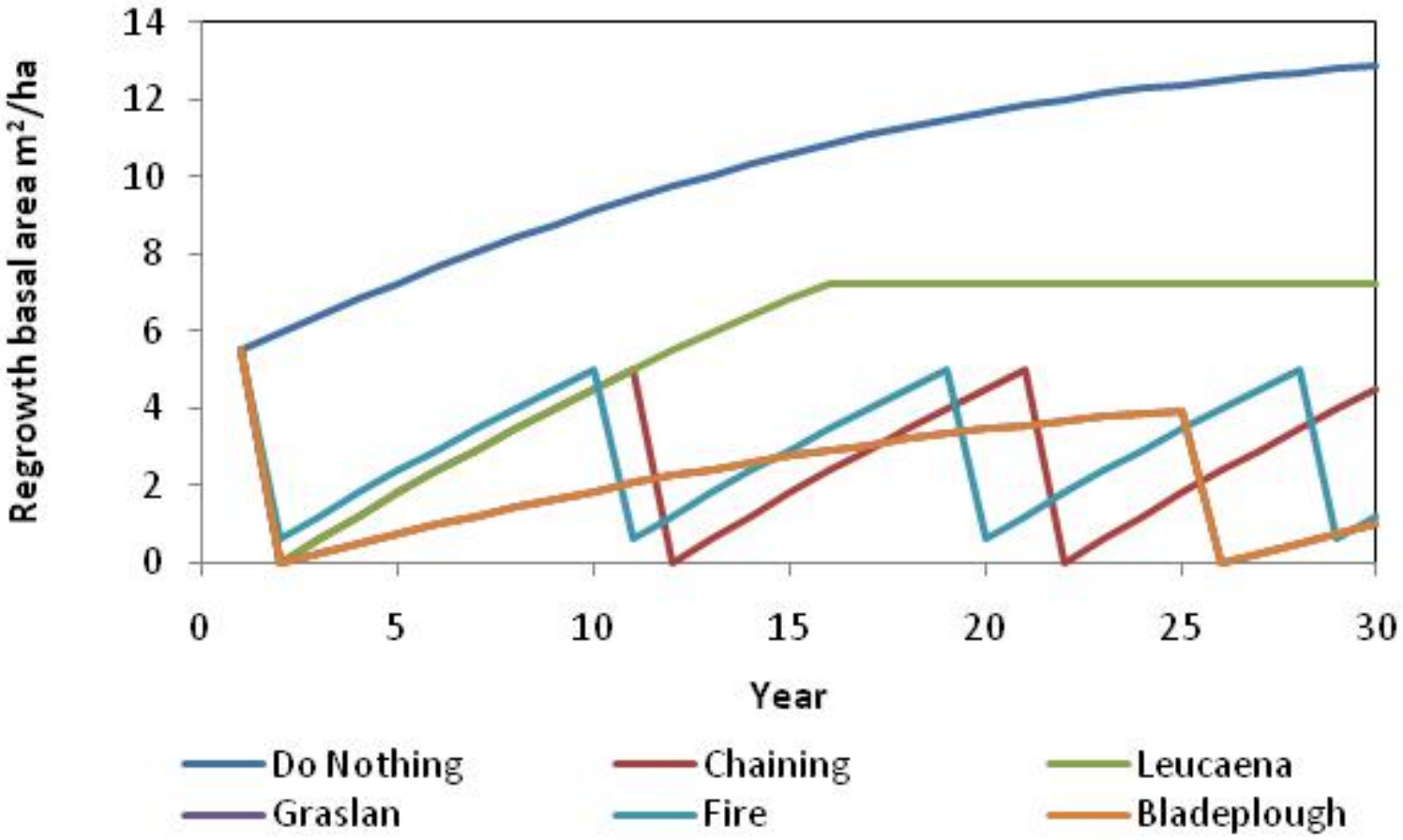
An area of 1000ha of 10 year old regrowth was used for scenario testing.

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).

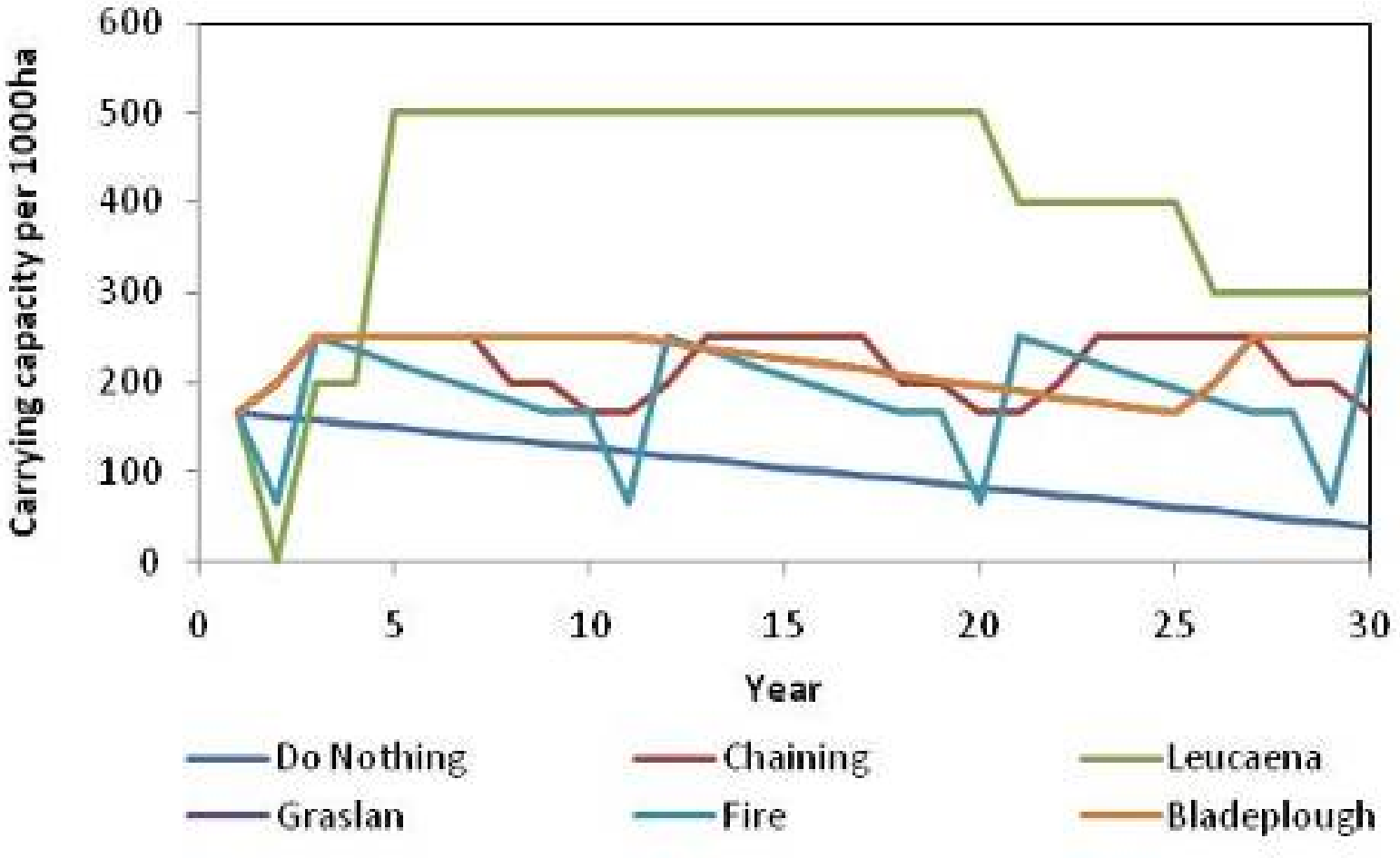
Jimarndy regrowth management

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	$ 156,352	$ 108,524
Leucaena	$ 383,785	$ 338,069	$ 253,717
Graslan	$ 338,413	$ 12,089	-$ 37,418
Fire	$ 325,363	$ 60,854	$ 20,359
Bladeplough	$ 338,413	$12,089	-$ 37,418

Costs $/ha

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

Clarke Creek district

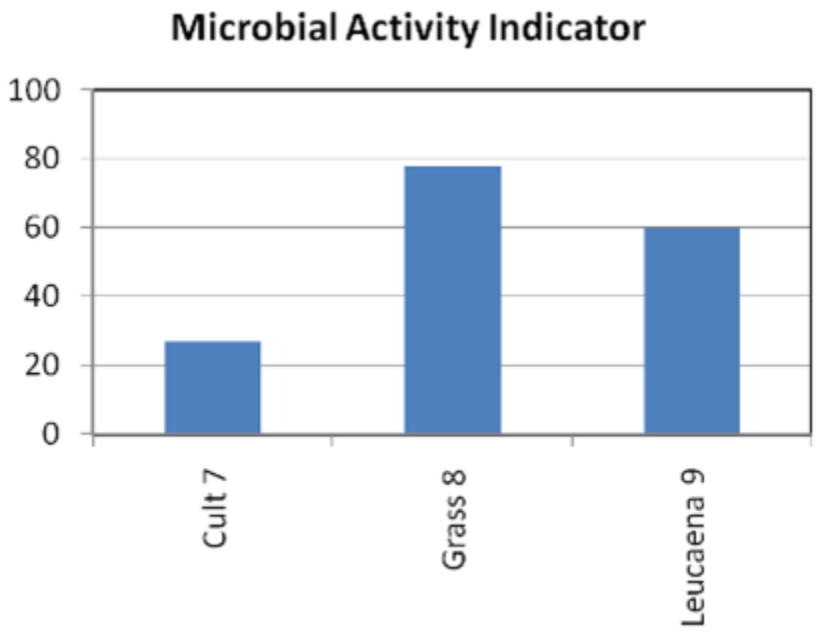
- Formed a landholder group of 7 businesses
- Primary interest is in understanding the impact of their grazing management and land condition on soil health and soil carbon

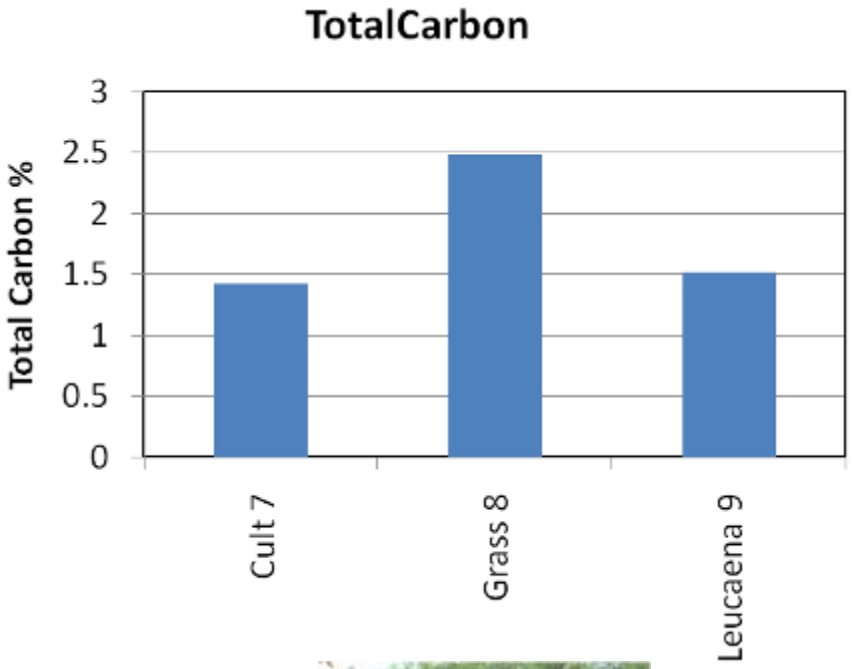
- Assessed 19 management options across seven properties
- Assessed pasture and land condition and sampled surface soil 0-10cm

- Soil analysed for:
  - Microbial activity
  - Microbial types and abundance
  - Soil carbon, particulate carbon
  - Some nutrients

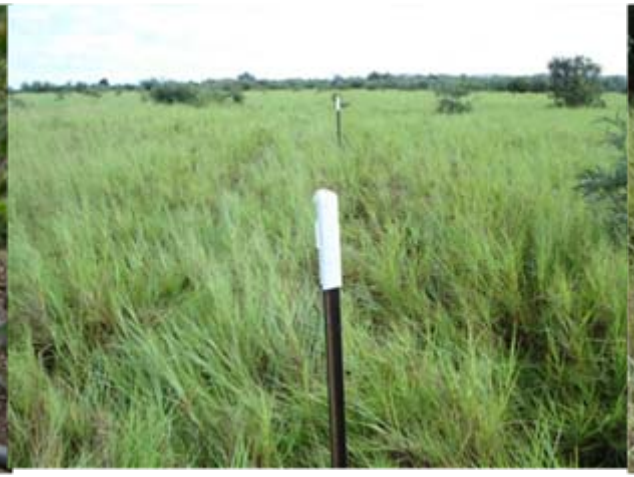
Soil Health and Management

Comparison between Cultivation (grain sorghum), Grass with regrowth, Leucaena (previously cultivated). P low.





Soil Health and Management

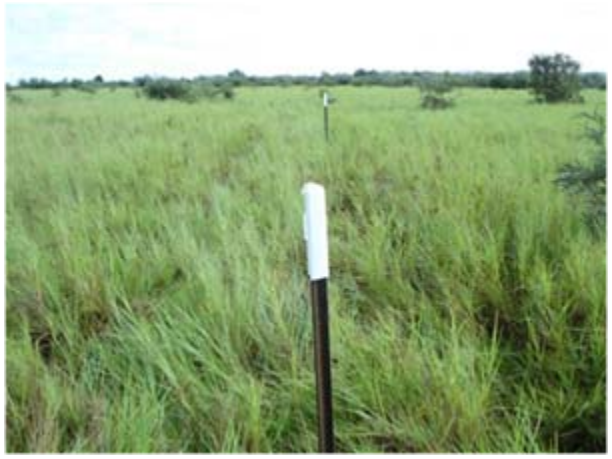

	Nature strip	Stickrake	Regrowth
Pasture biomass kg/ha	39	7,034	3,566
Total Carbon %	4.01 ± 0.29	4.24 ± 0.89	2.81 ± 0.13
Microbial Activity*	79.6	89.2	88.6

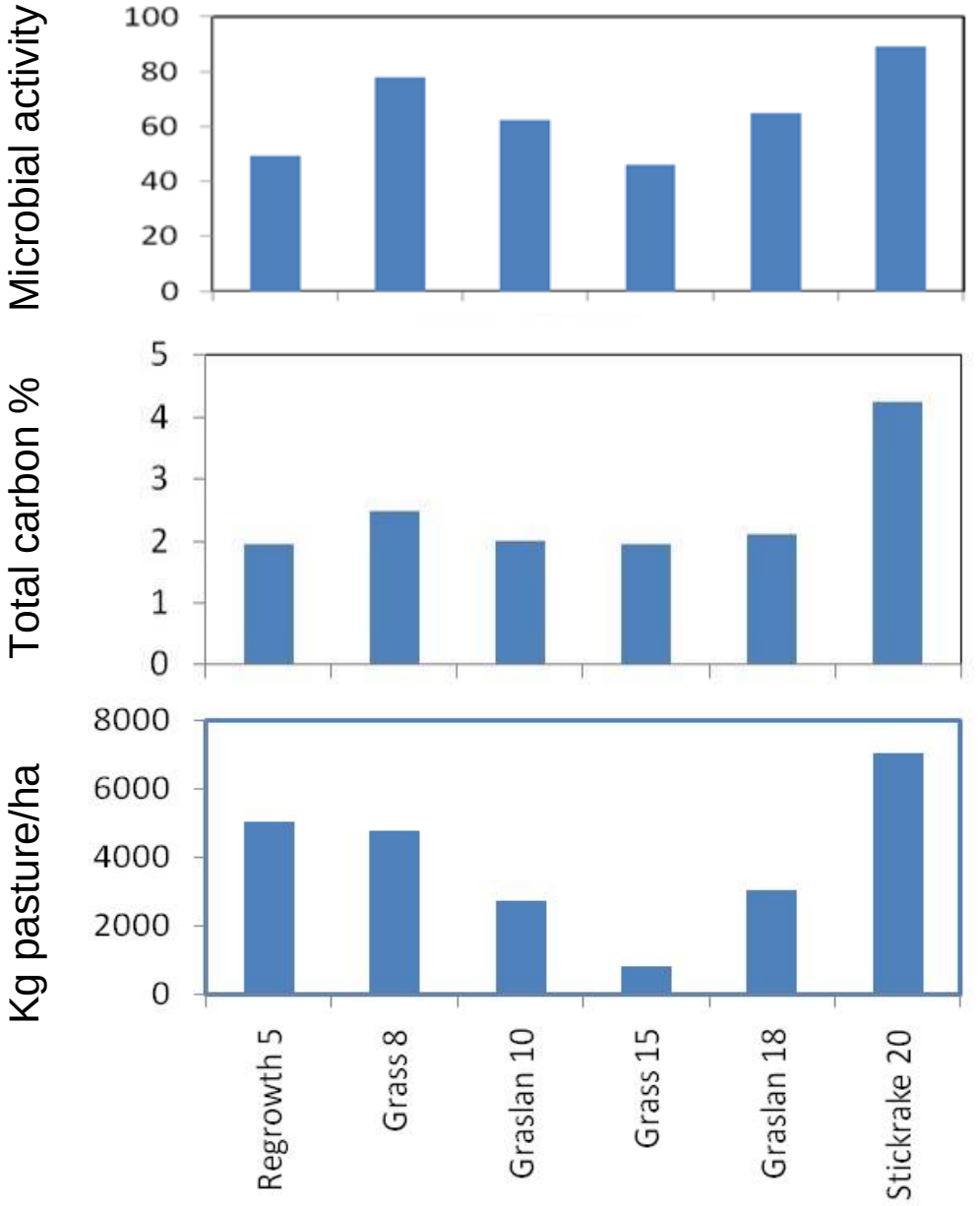
Unexpectedly low, being reassessed

Soil Health and Management

Comparison between cleared brigalow pasture sites.

Pattern with pasture yield.

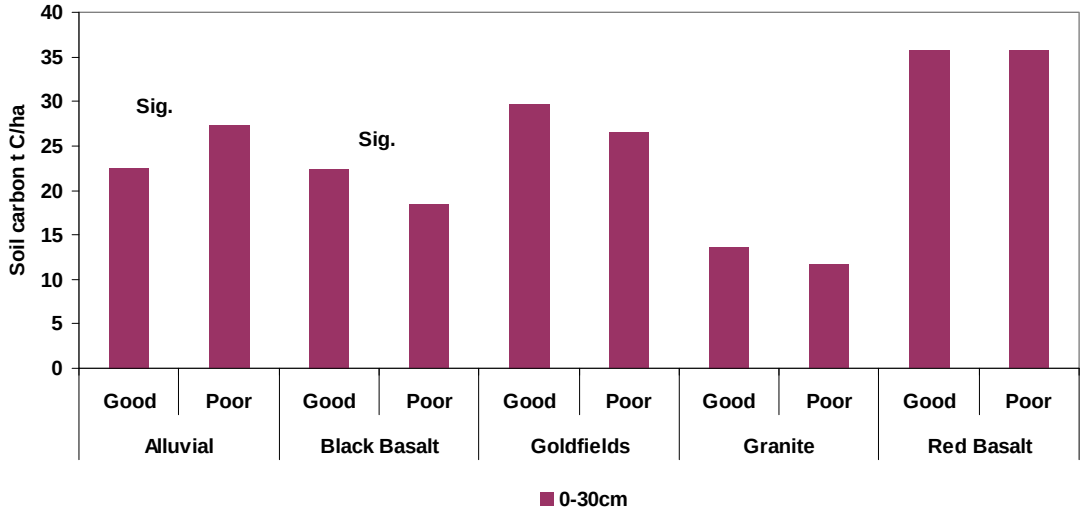




Soil carbon with good and poor land condition

- 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

(LSD 5% 3.4 for 0-30 cm).

Phosphorous

- Marginal <8 mg/kg
- Selection / Rotational Grazing
- Could be a liveweight gain effect over the wet season
- Dung samples
- Blood sampling (young growing stock)