HEREFORDS
Australia

Productivity Driven Sustainability - Carbon – Where to Start and How to Make Money

Tuesday 14 May 2024
Wodonga

PRECISION PASTURES

Soil Carbon Presentation

Herefords Australia – Sustainability Forum
May 2024

HEREFORDS Australia

PRECISION PASTURES

OUR VISION

Farmers sustainably and profitably
increasing farm production and soil carbon sequestration

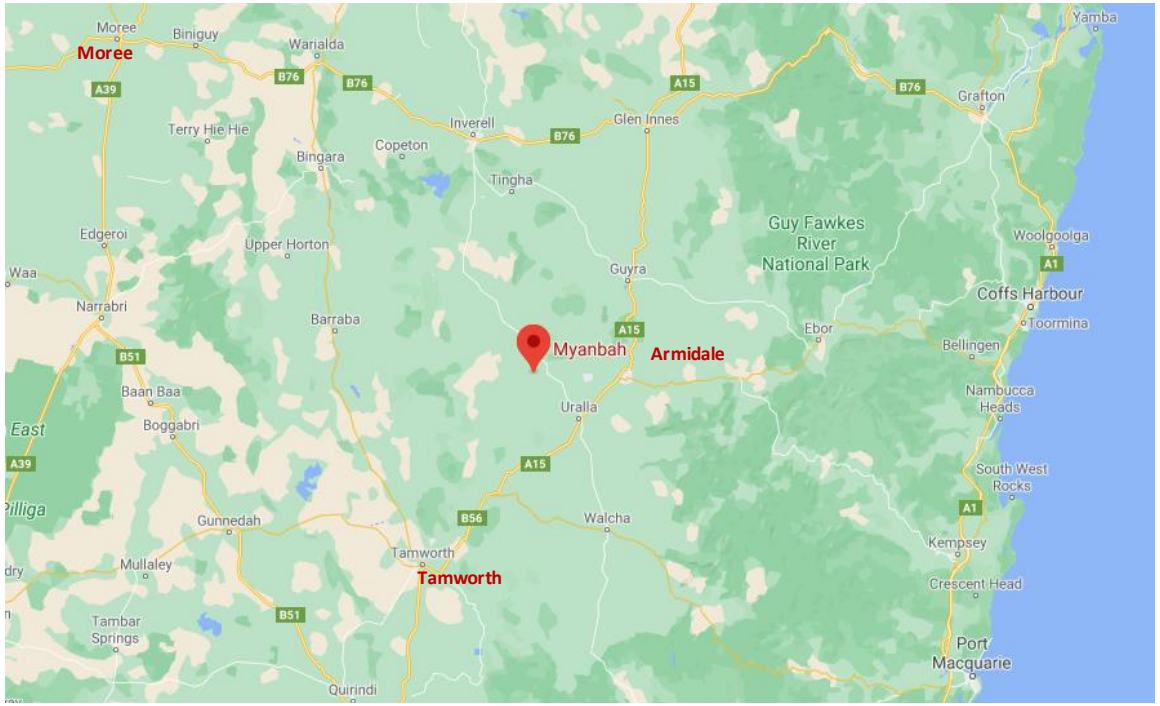
OUR MISSION - WHY WE EXIST

To provide farmers with soil testing services, data and advice to overcome soil health issues and address production constraints to optimise production and maximise soil carbon sequestration, for a fair price

"Myanbah"

- **Uralla, NSW (near Armidale / Tamworth)**
- **3,200 acres**
- **Sheep & cattle**
- **Family of 5**

We wanted to
improve our **pasture**



OUR OWN SOIL CARBON PROJECT

How did we start?

13th June 2019 \ 11 shallow soil samples (0-10cm) \ 4 deep soil samples (0-100cm)

Site Number	Sample 3 110215251 8 Myambah	Sample 4 110215252 6 Myambah	Sample 7 110215255 4 Myambah	Sample 10 110215258 1 Myambah	Sample 13 110215261 10 Myambah	Sample 14 110215262 12 Myambah	Sample 15 110215263 11 Myambah	Sample 16 110215264 13 Myambah	Sample 17 110215265 14 Myambah	Sample 18 110215266 9 Myambah	Sample 19 110215267 15 Myambah	Sample 20 110215268 7 Myambah	Sample 21 110215269 3 Myambah	Sample 22 110215270 2 Myambah	Sample 23 110215271 5 Myambah
Parameter	I3006/3	I3006/4	I3006/7	I3006/10	I3006/13	I3006/14	I3006/15	I3006/16	I3006/17	I3006/18	I3006/19	I3006/20	I3006/21	I3006/22	I3006/23
Colwell Phosphorus (mg/kg P)	93	81	60	38	34	39	69	33	24	59	85	62	38	20	71
Nitrate Nitrogen (mg/kg N)	3.9	8.5	11	5.7	7.5	8.4	4.2	7.9	16	3.0	3.3	3.8	6.3	14	7.0
Ammonium Nitrogen (mg/kg N)	1.4	1.3	1.4	1.0	6.0	2.1	2.5	2.1	34	2.5	1.5	9.5	1.9	8.1	1.6
Sulfur (mg/kg S)	4.6	3.6	4.9	7.9	8.1	4.3	7.9	5.5	5.4	1.4	4.2	1.8	1.8	4.3	2.8
pH (1:5 CaCl)	5.03	4.81	4.84	5.46	5.17	4.97	5.13	5.28	5.79	5.42	4.82	4.81	4.96	5.03	5.17
pH (1:5 water)	5.76	5.55	5.49	6.07	5.79	5.67	5.90	5.95	6.25	6.16	5.58	5.60	5.62	5.75	5.94
Electrical Conductivity (dS/m)	0.029	0.033	0.047	0.023	0.040	0.038	0.027	0.041	0.069	0.027	0.037	0.028	0.034	0.055	0.040
Estimated Organic Matter (% OM)	2.3	2.0	3.1	1.6	3.7	3.0	2.7	3.0	4.8	2.8	2.4	2.1	2.6	2.5	1.4
(cmol+/kg)	1.63	1.21	1.64	1.93	3.73	1.84	2.26	4.88	5.03	2.61	1.15	1.21	2.51	1.85	1.40
Exchangeable Calcium (kg/ha)	822	542	735	867	1673	824	1015	2188	2258	1361	515	542	1129	833	629
(mg/kg)	367	242	328	387	747	368	453	977	1006	563	230	242	504	372	281
(cmol+/kg)	0.59	0.44	0.45	0.42	0.92	0.58	0.92	1.07	1.34	1.07	0.45	0.63	0.86	0.69	0.55
Exchangeable Magnesium (kg/ha)	169	120	123	114	252	157	252	292	364	292	122	172	231	186	151
(mg/kg)	71	53	55	51	112	70	112	130	162	130	54	77	103	83	67
(cmol+/kg)	0.17	0.19	0.21	0.16	0.24	0.19	0.42	0.49	0.47	0.22	0.26	0.16	>0.32	0.22	0.19
Exchangeable Potassium (kg/ha)	151	163	188	144	213	167	366	433	413	192	229	138	>112	191	167
(mg/kg)	67	73	84	64	95	75	163	193	184	86	102	62	>50	85	75
(cmol+/kg)	0.10	0.08	0.07	0.07	0.08	0.08	0.07	0.07	0.08	0.09	0.08	0.08	0.10	0.08	0.08
Exchangeable Sodium (kg/ha)	53	39	35	34	41	42	37	36	40	47	42	40	50	39	40
(mg/kg)	24	18	15	15	18	19	17	16	18	21	19	18	22	18	18
(cmol+/kg)	0.04	0.08	0.05	<0.01	0.03	0.09	0.04	0.01	<0.01	<0.01	0.07	0.08	0.02	<0.01	0.01
Exchangeable Aluminium (kg/ha)	7	17	10	2	6	18	8	2	1	2	14	13	5	2	3
(mg/kg)	3	7	4	<1	3	8	3	1	<1	<1	6	6	2	<1	1
(cmol+/kg)	0.09	0.11	0.10	0.05	0.11	0.13	0.08	0.07	0.06	0.04	0.12	0.11	0.06	0.07	0.06
Exchangeable Hydrogen (kg/ha)	2	2	2	1	2	3	2	2	1	<1	3	2	1	2	1
(mg/kg)	<1	1	1	<1	1	1	<1	<1	<1	<1	1	1	<1	<1	<1
Effective Cation Exchange Capacity	2.82	2.10	2.52	2.64	5.11	2.95	3.80	6.60	6.99	4.24	2.19	2.26	3.65	2.91	2.30
Calcium (%)	64.9	57.5	65.0	73.3	72.9	63.4	59.6	73.9	72.0	66.2	53.9	52.4	68.9	63.7	60.9
Magnesium (%)	20.7	20.9	17.9	15.8	18.1	19.9	24.3	16.3	19.1	25.3	31.0	39.2	23.3	23.5	24.1
Potassium (%)	6.1	8.9	8.5	6.2	4.8	6.6	11.0	7.5	6.7	5.2	12.5	7.0	2.9	7.5	8.3
Sodium - ESP (%)	3.7	5.6	2.7	2.5	1.6	2.0	1.9	1.1	1.1	2.1	3.9	5.4	2.7	2.6	3.4
Aluminium (%)	1.3	3.9	1.9	0.4	0.6	3.0	1.0	0.2	0.1	0.2	3.2	2.6	0.7	0.3	0.6
Hydrogen	3.3	5.2	4.0	1.8	2.1	4.3	2.2	1.1	0.9	1.0	5.5	4.2	1.7	2.4	2.8
Calcium/Magnesium Ratio	3.1	2.7	3.6	4.6	4.0	3.2	2.4	4.5	3.8	2.6	2.6	1.9	3.0	2.7	2.5
Zinc (mg/kg)	1.0	0.8	1.6	0.9	2.2	1.4	1.4	2.6	0.9	1.1	1.0	0.8	0.8	0.7	0.7
Manganese (mg/kg)	11	13	17	10	16	13	15	26	18	6.5	12	16	26	12	9.8
Iron (mg/kg)	149	139	128	59	195	238	112	127	152	248	145	162	95	77	86
Copper (mg/kg)	0.2	0.2	0.2	<0.1	0.4	0.2	0.2	0.8	0.3	0.3	0.9	0.2	0.2	0.1	0.1
Boron (mg/kg)	0.19	0.14	0.30	<0.1	0.27	0.22	0.22	0.36	0.34	0.24	0.22	0.17	0.17	0.18	0.12
Silicon (mg/kg Si)	22	18	29	21	35	27	30	58	57	31	22	19	25	16	17
Total Carbon (%)	1.34	1.14	1.75	0.90	2.10	1.74	1.57	2.84	2.72	1.60	1.36	1.20	1.61	1.40	0.90
Total Nitrogen (%)	0.11	0.09	0.13	0.07	0.18	0.15	0.13	0.24	0.20	0.10	0.09	0.08	0.09	0.08	0.05
Carbon/Nitrogen Ratio	12.1	13.0	13.3	13.5	11.4	11.6	12.6	11.8	13.8	15.5	15.9	16.0	16.8	16.9	16.7
Basic Texture	Loam	Loam	Loam	Loam	Loam	Loam	Loam	Loam	Loam	Loam	Loam	Loam	Loam	Loam	Loam
Basic Colour	Brownish	Brownish	Brownish	Brownish	Brownish	Brownish	Grey	Brownish	Brownish	Brownish	Brownish	Brownish	Brownish	Brownish	Brownish
Chloride Estimate (equiv. mg/kg)	18	21	30	15	26	24	17	27	44	17	23	18	22	35	26

PRECISION PASTURES

OUR SOIL TEST RESULTS

- ✗ Major acidity issue (pH 4.81-5.79)
- ✗ Major sulphur deficiency (15/15 samples <8mg/kg S)
- ✗ Minor Phosphorous deficiency (8/15 samples < 34mg/kg P)
- ✗ Minor Potassium deficiency (10/15 samples <100mg/kg K)
- ✗ Major Carbon deficiency (13/15 samples LESS THAN 2% C)

RECOMMENDED SOLUTIONS

✓ Lim ✓ Fert ✓ Compost ✓ Pasture improvement

e

“…these are eligible activities to create ACCUs from a soil carbon project?”

OUR OWN SOIL CARBON PROJECT
What is the Soil Carbon Method?

28%
All projects are soil carbon
(June 2023)

Australian Government
Clean Energy Regulator

In 2013, the Australian Government launched the Clean Energy Regulator to establish methods for creating and trading of carbon offsets known as Australian Carbon Credit Units (ACCUs).

The most recent method is The Estimation of Soil Organic Carbon Sequestration using Measurement and Models Method 2021 (the "Soil Carbon Method").

This new method is used by over **511** projects registered with the CER.

So what?
Why should I do a carbon project on our farm?

- Increase my production — mla
- Top ranked method — (carbon)plan
- High ACCU generation / ha

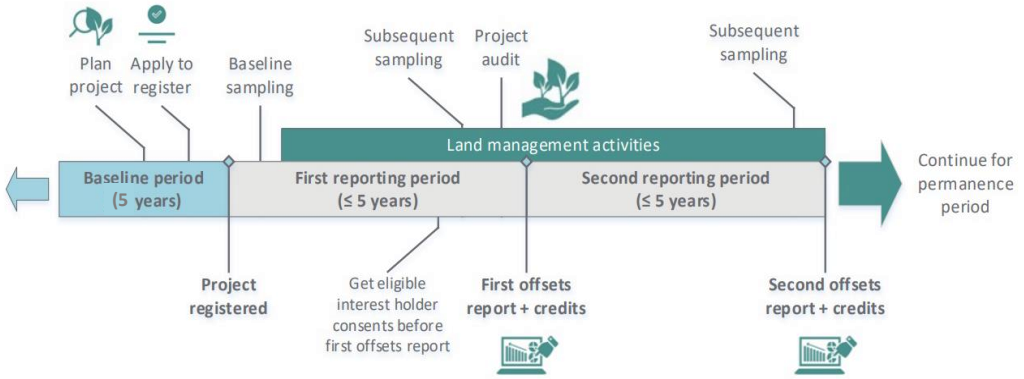
OUR OWN SOIL CARBON PROJECT

How does the CER methodology actually work?

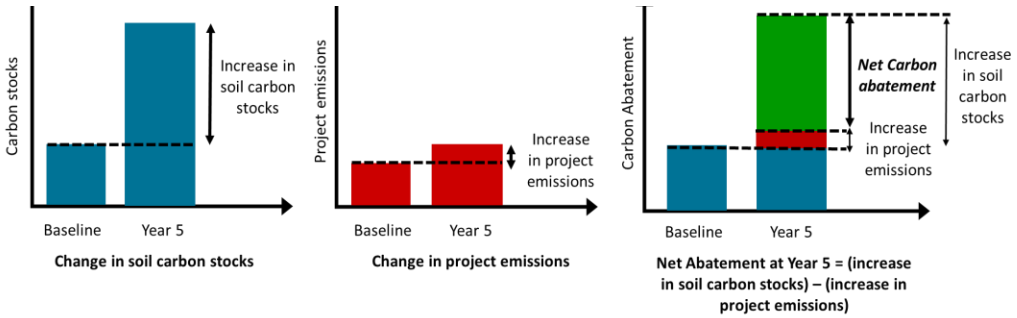
You **must** undertake at least one **eligible activity**;

1. Applying nutrients (synthetic or non-synthetic) ✓
2. Applying lime to remediate acid soils; ✓
3. Applying gypsum to remediate sodic or magnetic soils; ✓
4. Undertaking new irrigation ✗
5. Re-establishing or rejuvenating a pasture by seeding ✓
6. Establishing a pasture where there was no pasture ✓
7. Altering the stocking rate, duration or grazing intensity ✓
8. Retaining stubble after a crop is harvested ✗
9. Converting intensive tillage to reduced or no tillage ✗
10. Modifying landscape to remediate land ✗
11. Using mechanical means to redistribute soil ✗

Project Timeline



Net Abatement



A carbon credit is a bit like a **Promissory Note**

A certified promise to keep 1 ton CO_2 in my soil, by continuing my eligible activity

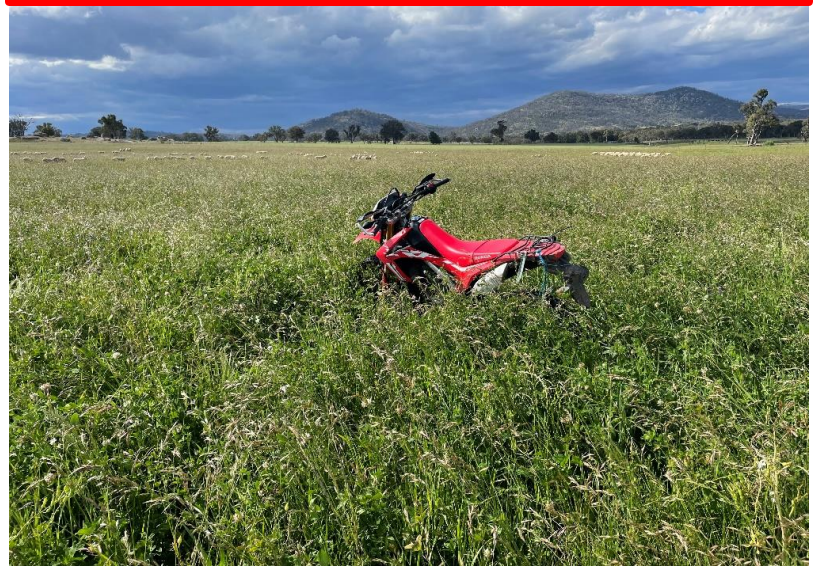
OUR OWN SOIL CARBON PROJECT

We conducted a trial of the agronomy

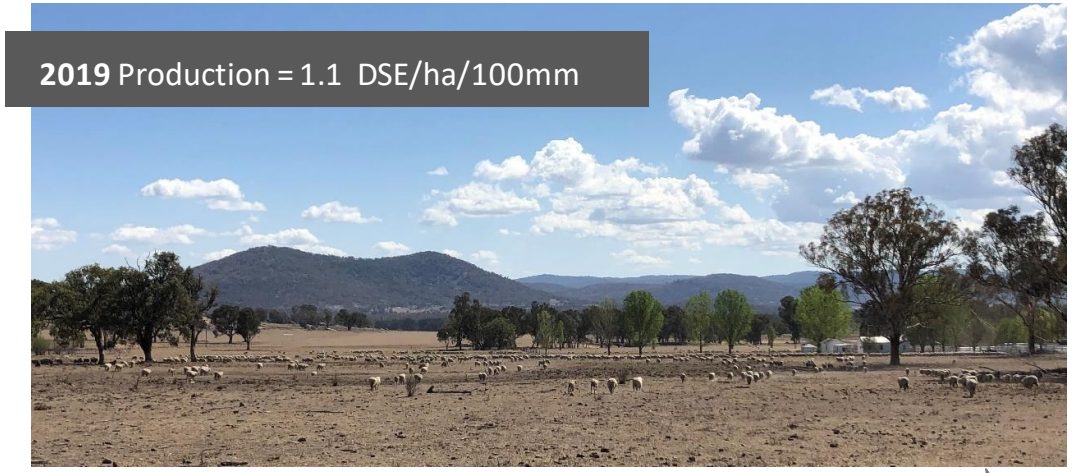
We did a trial, to see if the agronomy and production increase actually worked

Increase in production	= 0.8 DSE
	= 36t CO_2
Increase in soil carbon	= 0.24%
	= 300t CO_2

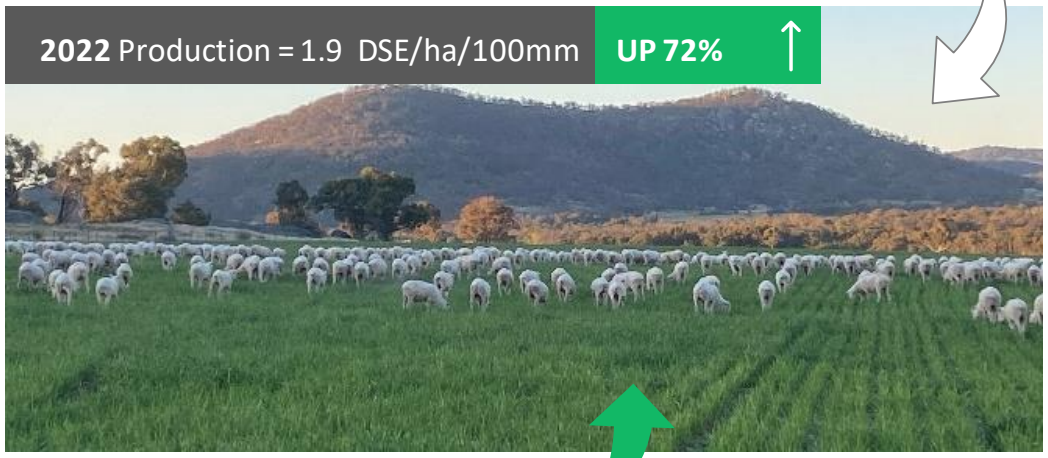
Almost **8.3 times** more CO_2 sequestered than was emitted



2019 Production = 1.1 DSE/ha/100mm



2022 Production = 1.9 DSE/ha/100mm **UP 72%** ↑



In 3 years, we achieved a 0.24% increase in soil carbon (10-50cm depth)
I reckon I could increase by 1% or more in 25 years

OUR OWN SOIL CARBON PROJECT

Then we made several KEY decisions.

Before we could estimate our costs and benefits, we need to make some important decisions…

Registration 	**Options** 1. Do it ourselves? 2. Appoint a project developer?	**Our Decision** We started ourselves (not hard), then appointed a project developer
Fee Structure 	**Options** 1. High ACCU % comm / low cash 2. Low ACCU % comm / high cash	**Our Decision** We wanted low ACCU % commission
Project Ownership (Proponent) 	**Options** 1. Developer is the proponent 2. We are the proponent	**Our Decision** We wanted to be the proponent, the outright owner and decision maker
Sale of ACCUs 	**Options** 1. Forward contract (ERF or other) 2. Inset (off-set our own emissions) 3. Wait – then hold, sell or inset	**Our Decision** We have no intention of selling (yet), we may do a bit of each or get our bank to recognise value on our BS

OUR OWN SOIL CARBON PROJECT

We looked at the financial costs and benefits

Starting with an average Soil Organic Carbon level of 1.17% (0-30cm) and a bulk density ratio of 1.35g/cm^3, we estimated what we could earn if we increased my SOC by 1%…

How to calculate total ACCUs

- Step 1; vol of soil in 1ha = 100m x 100m x 0.3m = 3,000m^3 soil per ha
- Step 2; convert vol to mass = 3,000m^3 x 1.35bd = 4,050t soil per ha
- Step 3; establish SOC increase = 4,050t x 1% = 40.5t SOC per ha
- Step 4; convert SOC to CO_2 = 40.5t x 3.66 = 148.2t CO_2 per ha
- Step 5; convert tCO_2 to ACCU = 148.2t x 1 ACCU = 148.2 ACCU per ha
- Step 6; extrapolate across area = 148 ACCU x 1040ha = 154,159 Total ACCUs

INCOME		
Total Carbon Project Area	1,040 Ha	
Project Term (Permanence Period)	25 years	
	Base Case	High Case
Average SOC % Level	1.17%	
Potential Increase in ave. SOC	1.00%	1.50%
Total ACCUs	154,159	231,239
Price of ACCUs	$ 31.85	$ 50.00
Income per Ha	$ 4,721.13	$ 11,117.25
Gross Income	**$ 4,909,970.52**	**$ 11,561,940.00**
Less CER Discounts (approx. 25%)	$ 1,227,492.63	$ 2,890,485.00
Net Income	**$ 3,682,477.89**	**$ 8,671,455.00**

Now for the project costs, for the full term of the project (30 years)…

Carbon Starter Report	Project Registration	Project Mapping	Baseline Sample Collection	Lab Testing	Annual Monitoring	T1-T5 Audit	T1-T5 Sample Collection	T1-T5 Lab Testing	Commission	Total
Fixed fee; 1 day x $5k	Fixed fee; $30,000	Fixed fee; $4,000	69 total cores @ day rate $3,000 / day (25 cores/day)	$180/core	$2,000/day (once a year)	$9,000/audit (every 5 years)	Same as baseline (every 5 years)	Same as baseline (every 5 years)	8% ACCUs (payable in ACCUs or cash, upon issue to us)	
$ 5,000	**$ 30,000**	**$ 4,000**	**$ 8,280**	**$ 12,420**	**$ 60,000**	**$ 45,000**	**$ 41,400**	**$ 62,100**	**$ 431,645**	**$ 694,845** ($263,200 in cash)

So, for a cash investment of $263k, we could generate around $3-5m worth of ACCUs, in 30 years

While there is NO RUSH, we must understand how soil carbon could work ON YOUR OWN PLACE

What are our options?

1. Sell via forward abatement contract
   - Fixed price, amount & delivery date, or variable
   - Manage finance, price & delivery risk

2. Sell on spot market
   - Statutory obligation under the safeguard mechanism
   - Voluntary obligation under own commitment
   - Trade on the Australian Carbon Exchange (available in late 2024)

3. Inset or offsetting
   - Insetting – acquiring ACCUs within own supply chain
   - Offsetting – acquiring ACCUs outside own supply chain

Why do it?
Who pays?

4. Do nothing / hold
   - Certified Australian financial instrument, on my ANREU account, on my balance sheet
   - Tax deferred (until sale)
   - Use them as equity, while saving them for a future need

WHERE TO START?

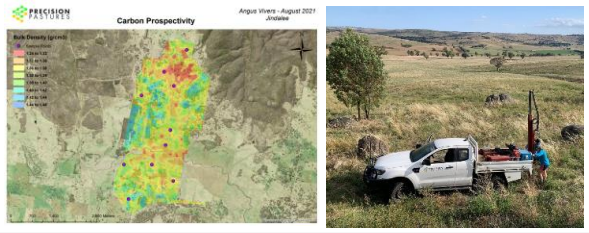
Order your Carbon Starter Report now…

Then we joined Precision Pastures and helped create the Carbon Starter Report… a place to begin **your** soil carbon project.

Carbon Starter Report – Part A

$2,000 per farm

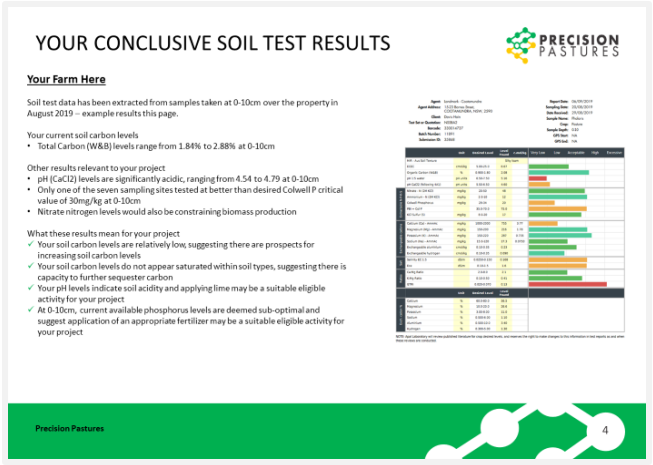
- ✓ Create cadastral boundary map
- ✓ Carbon prospectivity map
- ✓ NDVI, bulk density & gamma
- ✓ Recommend soil sample points

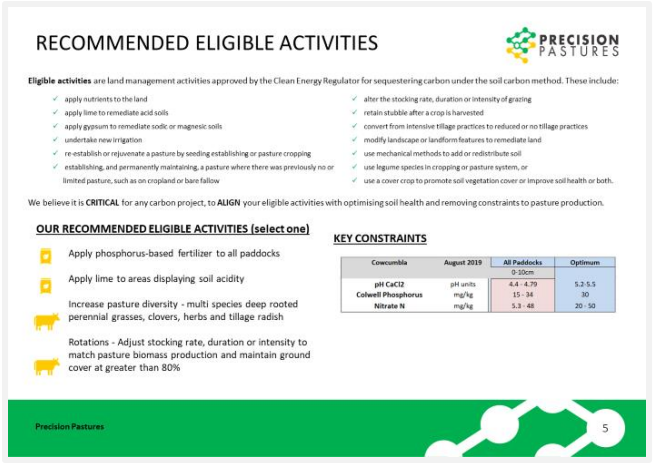


Carbon Starter Report – Part B

$3,000 per farm (+ travel costs)

- ✓ Conduct comprehensive soil tests
- ✓ Identify soil issues and constraints i.e. pH, toxicity, deficiency
- ✓ Recommend eligible activities
- ✓ Cost benefit analysis
- ✓ Explain your options and next steps

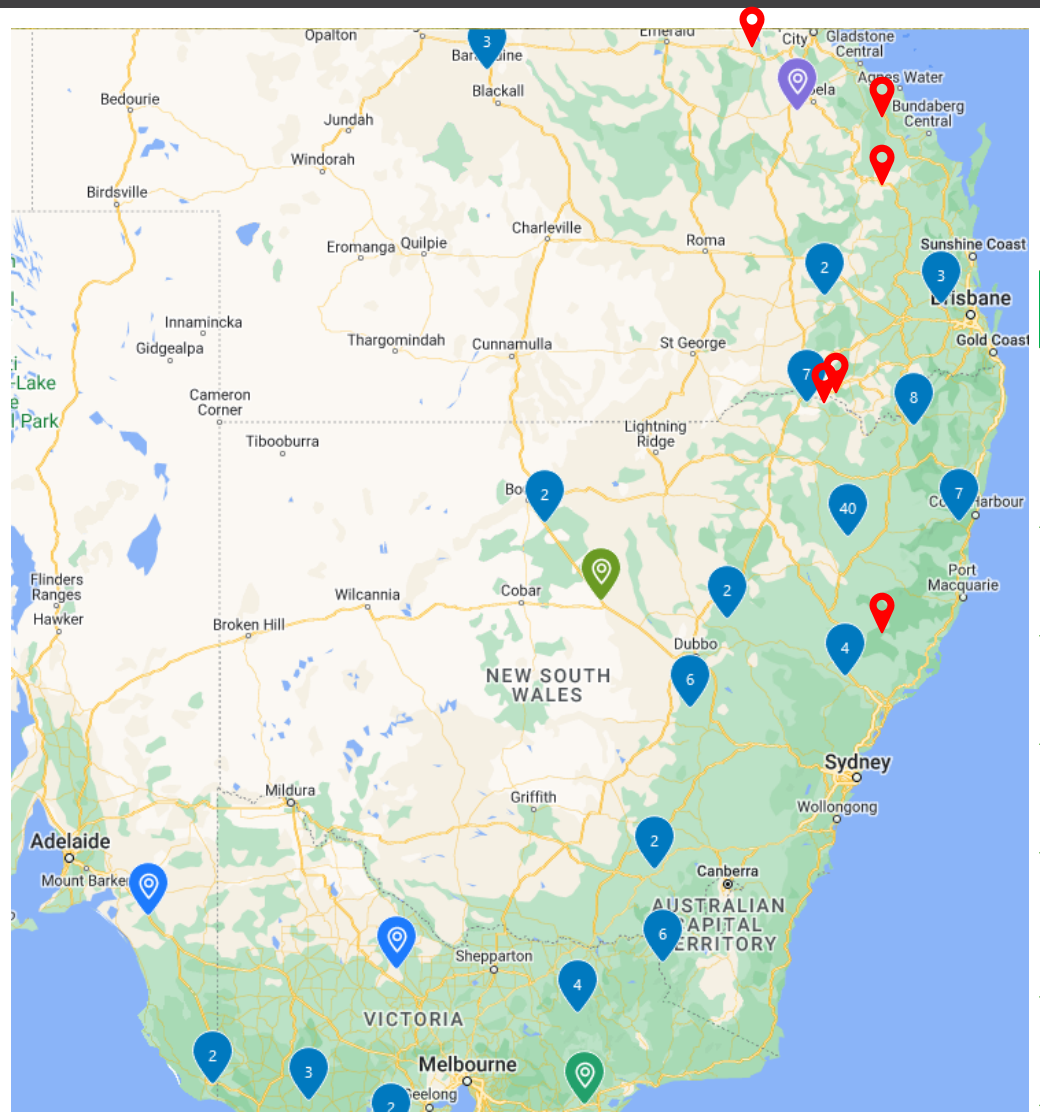




The CSR is fast (3-4 weeks), cheap ($5k + travel), obligation free and will give you all you need to know

WHERE DOES IT WORK?

Anywhere cattle can thrive!



We have projects at varying stages from Cent West Qld, throughout NSW and VIC and into SE South Australia.

Though it's early days, six projects have been issued ACCUs

Location	Project Name	ACCU's	Implied Value *
Goondiwindi QLD	Turpentine Carbon Project	66,050	$2,311,750
Rockhampton Qld	Moora Plains Carbon Project	85,262	$2,984,170
Mt Tom Qld	Fysh Carbon Project	3,559	$124,565
Dungog NSW	McLachlan Carbon Project	2,110	$73,850
North Burnett QLD	Bonnie Doone Carbon Project	94,666	$3,313,310
Yelarbon Qld	Smith Carbon Project	1,362	$47,670

Source: Soil Carbon Industry Group, www.scig.org.au (March 2024)

** The current trading price is approx. $35/ACCUs*

Thank you!

Come to our site and begin your Carbon Starter Report

www.precisionpastures.com.au