Strathbogie Tableland Landcare Group

Galls Gap Road, Strathbogie – Soil and Pasture Trial

This trial commenced in 2021 with the aim of trying to determine whether deep cultivation (ripping) would 'open up the soil profile" enabling better application of lime to improve acidity problems; encouraging pasture to establish deeper roots and for the soil to retain more moisture (rather than rain just running off the paddock)

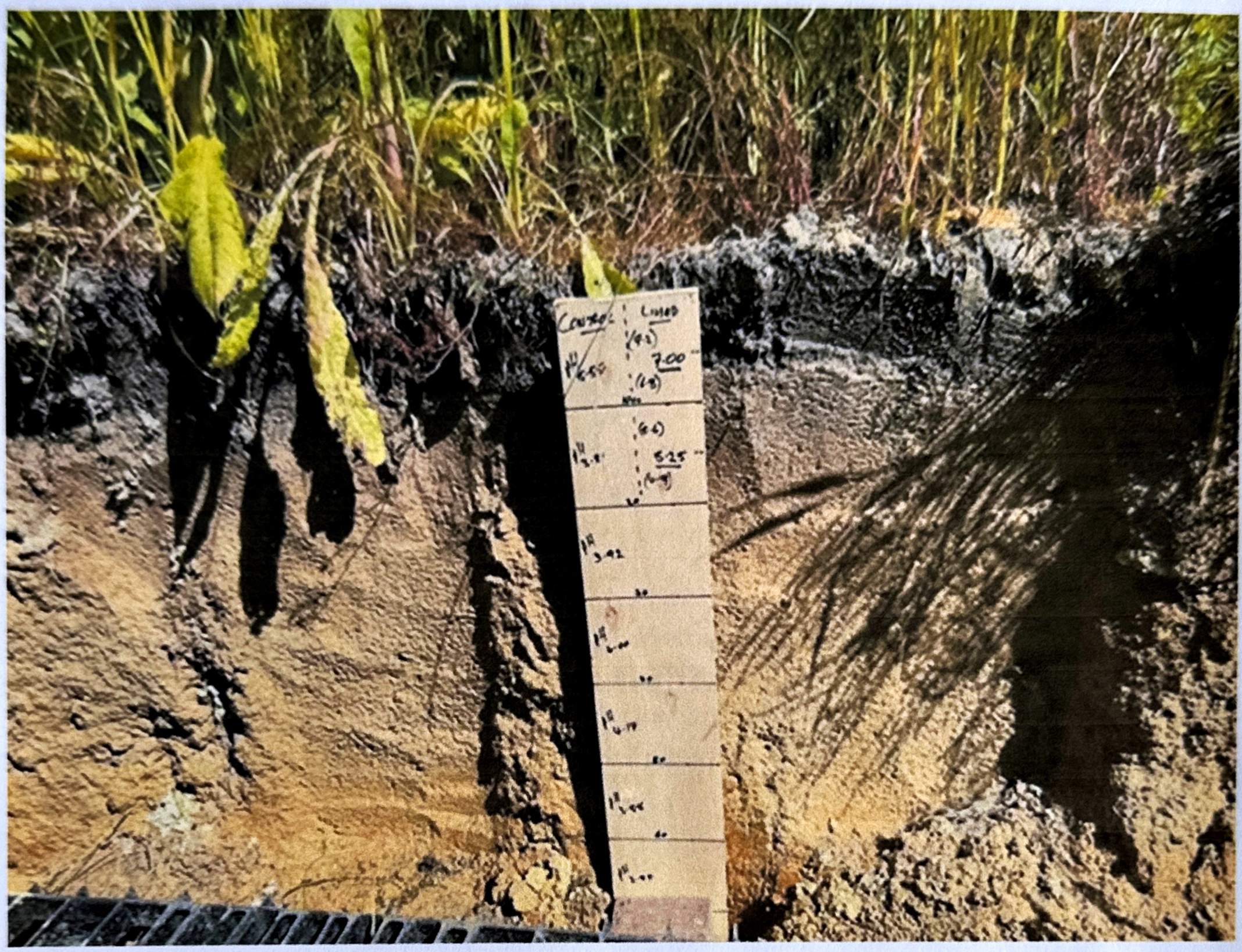
Decisions regarding this trial were made after taking soil tests in 10cm ranges down to 70cms. (ie: 0 – 10cm; 10 – 20cm; 20 – 30cm etc) Soil tests in the top 10cms were showing that liming over 10 years has increased the pH substantially but that below 10cms the lime applications had made very little difference.

Our thinking was that if we opened the soil up a bit and then treated the trial plot with a heavy dose of lime we might get more lime into the sub-soil and thereby improve the pH and encourage plants and grasses that would not usually thrive in acidic conditions to grow better with deeper roots.

Soil tests for the Trial Plot prior to commencing the trial:

Macsfield Park	2014	2016	2017	2017	2017	2017	2021 - trial site before works commenced						
	Galls E & W	Galls W	Galls W AD	Galls W AD	Galls W BD	Galls W BD							
	1 - 100	1 - 100	1 - 100	100 - 200	1 - 100	100 - 200	0 - 100	100 - 200	200 - 300	300 - 400	400 - 500	500 - 600	600 - 700
pH (1:5 CaCl2)	4.2	4.5	4.3	4.1	4.6	4.2	5.55	3.81	3.92	4.00	4.17	3.88	3.87
pH (1:5 H2O)	5.2	5.3	5.3	5	5.4	5.1							
EC (1:5 H20) dS/m	0.08	0.08	0.13	0.02	0.08	0.03							
EC (se) (dS/m)	0.6	0.7	1	0.2	0.6	0.4							
EC (se) (dS/m) Cladj	0.6	0.6	0.7	0.1	0.4	0.2							
Chlorine (1:5H2O) mg/kg	52	52	36	6	24	7							
Electrochemical Stability Index	0.02	0.031	0.052	0.015	0.04	0.028							
Organic Carbon (Walkley Black)	3.65	3.45	3.69	1.18	2.46	0.98							
Nitrate Nitrogen(KCl) mg/kg	5	48	124	1	85	14							
Ammonium Nitrogen (KCl) mg/kg	35	19	15	2	11	1							
Phosphorus (Olsen) mg/kg	21.5	24.8	28.9	15.1	16.8	7.2							
Phosphorus Buffer Index (PBI)	65	64	40	48	42	69							
Potassiun (Colwell) mg/kg	293	251	359	62	215	63							
Sulfur (KCl-40) mg/kg	12.7	7.6	9.8	2.1	6.8	3.4							
Exch Ca (BaCl2/NH4Cl) meq/100g	2.07	4.27	5.05	0.66	4.81	0.61							
Exch Mg (BaCl2/NH4Cl) meq/100g	0.74	0.67	0.9	0.13	0.62	0.13							
Exch K (BaCl2/NH4Cl) meq/100g	0.66	0.63	0.94	0.14	0.62	0.14							
Exch Na (BaCl2/NH4Cl) meq/100g	0.16	0.16	0.17	0.02	0.12	0.02							
Aluminium (KCl) cmol+/kg	0.36	0.12	0.08	0.91	0.04	0.92							
Aluminium % Saturation (Group)	9	2.1	1.1	48.9	0.7	50.5							
Magnesium % of CEC Group	18.5	11.5	12.6	7	10.1	7.1							
Sodium % cations	4	2.7	2.4	1.1	2	1.1							
Grass Tetney Risk (Soil)	0.23												
Phosphorus Enviorenmental Risk ir	0.7	0.7	1.7	0.7	0.9	0.3							
Effective Cation Exchange Capacity		5.8	7.1	1.9	6.1	1.8							
Potassium % of CEC					8.7	7.7							
		MAP 120KGS/Ha	MAP 120kgs/Ha				Lime 1T/Ac						
		Lime 1T/Ac	Lime 1T/Ac				Gypsum 1T/Ac						

Photo of the Galls Gap Trial Site Soil Profile and pH measurements in 10cm intervals down to 70cms



Trial Site treatment:

	Plan of Soil Trial demonstration site at Strathbogie						
		Row 1	Row 2	Row 3	Row 4	Row 5	
		18m	18m	18m	18m	18m	
Bay 1	18m						Sow Perennial pasture seed mix
Bay 2	18m						Lime and then pasture seed mix
Bay 3	18m						Poultry manure then pasture seed mix
Bay 4	18m						Legume crop - then pasture seed mix
Bay 5	18m						Legume crop with lime - then pasture seed mix
		Deep Ripped only	Deep ripped and lightly cultivated	No Deep ripping	Deep Ripped only	Deep ripped and lightly cultivated	

Trial Site Summary:

For the purposes of this summary, we will not go into all the detail of the various sowing options on this trial site - although we are more than happy to explain what we did and why we did it.

We deep ripped most of the site in June 2021, leaving a 'control' area in the middle of the site unripped. Ripping depth was 40cm to 45cm.

In Bay 2 (see map) we then 'sowed' pellatised lime (Calcipril) at the rate of 5 tonnes/Ha thru a seeder so that instead of just spreading it on the surface, we got it onto the soil to a depth of 5 – 8cm.

Bay 1 was our 'control' so no extra treatment to that Bay. Bays 3, 4 & 5 each had different treatment.

The total site was then sown with Barenbrug Advanced AT Phalaris at 6kgs/Ha and SF Punter Chicory at 2.5kgs/Ha in August 2021.

The site was lightly grazed with sheep on several occasions and the pasture was allowed to go to seed in Spring 2021 and again in 2022 – thereby giving the plants maximum chance to establish and thrive.

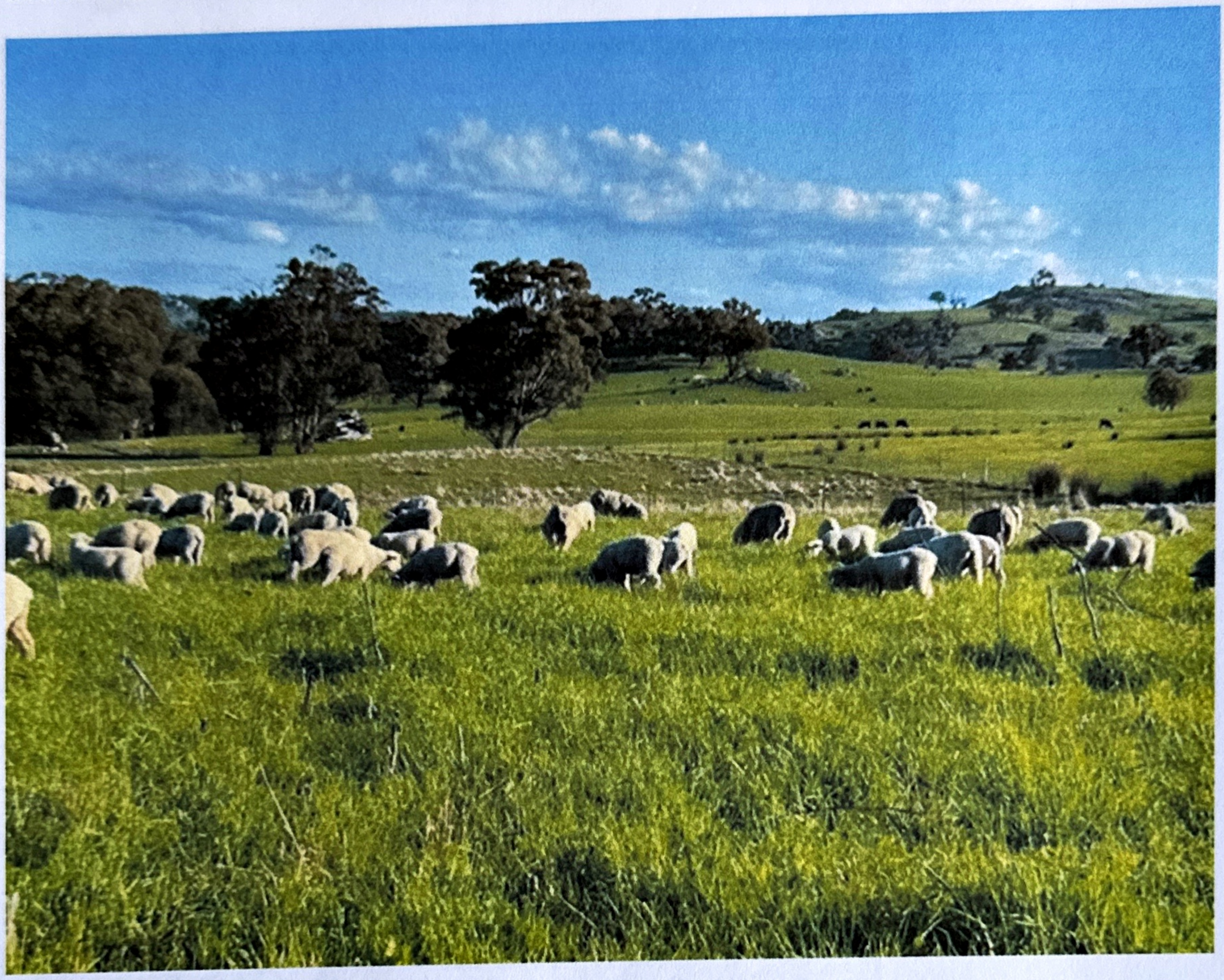
Analysis in the Spring of 2021 showed that we had achieved a reasonable germination of both Phalaris and Chicory – although there was no noticeable difference between the plant growth across the various bays of the trial site. This was surprising as Bay 2 had received a very significant treatment of lime (5 tonne/Ha) that the other bays had not – and we had expected that we would see some difference.

Soil Tests after Lime Treatment

Macsfield Park	2021 - trial site before works commenced							2022 - tests after lime treatment							
								Control		Control		Limed but not ripped				Limed and ripped			
testing depth	0 - 100	100 - 200	200 - 300	300 - 400	400 - 500	500 - 600	600 - 700	0 - 100		100 - 200		0 - 100		100 - 200		0 - 100		100 - 200	
pH (1:5 CaCl2)	5.55	3.81	3.92	4.00	4.17	3.88	3.87	5.84		4.85		7.00		5.25		6.55		5.10	
								0 - 50	50 - 100	100 - 150	150 - 200	0 - 50	50 - 100	100 - 150	150 - 200	0 - 50	50 - 100	100 - 150	150 - 200
								6.37	5.3	5	4.7	7.2	6.8	5.6	4.9	7.2	5.9	5.4	4.8
												Lime Calcipril 2T/Ac							

Observations in Spring 2023:

Both Phalaris and Chicory are growing well – Phalaris doing better in mid September 2023 but as the weather has warmed, the Chicory is now growing better.



The real test will be in January, February and March 2024, with the predicted hot dry Summer, when we will see whether this recently established pasture can produce reasonable feed for livestock. The Summer of 2022/23 was not a real test as we had significant rain thru late Spring and Summer so soil moisture was not a problem.

Conclusions from this trial:

1. Trying to move the pH – particularly of the sub-soil is very difficult and too expensive in a normal farming application. Most farms could not justify liming at over $3,500 per Ha !!

2. The deep ripping in the lighter soils on the Strathbogie Tableland was a waste of time and diesel (at least for our trial). In the 4 months following our liming of this site we had over 300mls of rain and we expected that with the ripped soil we would see some amount of lime "wash down" into the sub-soil. Our subsequent soil tests show that that did not occur.

3. But we do have a reasonable pasture as a result of our trial and, as already stated, this coming summer will be a real test of the success.....

4. We have measured Chicory roots down to 35cms into a sub-soil with a pH range of 3.9 to 4.0 so finding plants and grasses that grow happily in acidic soils will be a far more economic proposition than spending dollars trying to make a significant difference to the pH of your soil.

