

Hovells Creek Acid Soil Action Grazing Demonstration “Direct drilled lime/pasture grazing trial”

AIMS

- To establish a grazing trial comparing direct drilled limed areas to unlimed areas. This will enable us to establish a pasture program suited to our area.
- Compare pasture and animal production of the limed and unlimed areas using merino wethers.
- Measure livestock production on all paddocks ie. Stocking rate and wool production per hectare.
- Measure lime movement through the soil profile and monitor changes in fertility.
- Measure changes in pasture composition and available feed on offer.

SITE SPECIFICS

- **Location:** Barry and Penny Gay’s, “Willow Glen”, Cowra. The site is located on the Reids Flat Road approximately 64 km south east of Cowra.
- The site consists of 2 paddocks, fertilised with the same rate of phosphorus, with and without lime.
- The demonstration commenced in late December 1999 with the spreading of 2.5T/ha lime on the eastern half of the paddock and the sowing of a new pasture in May 2000. The pasture mix included Holdfast Phalaris, Currie Cocksfoot, Tall Fescue, Sub Clover(Goulburn & Seaton Park) and Strawberry Clover.
- Both paddocks received 80kg/ha Mo Super in April prior to sowing, then 80kg/ha DAP at sowing. 125kg/ha single super was applied to both paddocks in Autumn 2001 and 160kg/ha Pasture Extra in Autumn 2002.
- The site was set stocked with wethers in December 2001.

RESULTS

COMPREHENSIVE SOIL TESTS

0-10cm Soil Layer

- The pH (CaCl_2) of paddocks *prior to liming* was **4.1** (unlimed paddock) and **4.3** (paddock to be limed)
- The pH (CaCl_2) of the limed paddock 3 years post liming is **4.9**
- The Al% (% of CEC) of paddocks *prior to liming* was **24.3** (unlimed paddock) and **17.0** (paddock to be limed)
- The Al% (% of CEC) of the limed paddock 26 months post liming is **3.5**
- The average P (*Colwell*) level of both paddocks prior to sowing was **8ppm**
- The average P (*Colwell*) levels of both paddocks in 2003 are **35ppm**. The dry conditions that have been experienced since the soil testing in 2002, have resulted in quite a jump in the P levels for 2003. This is shown in the phosphorus trends over time illustrated on page 3.

Comprehensive Soil Test Summary 1999 - 2003

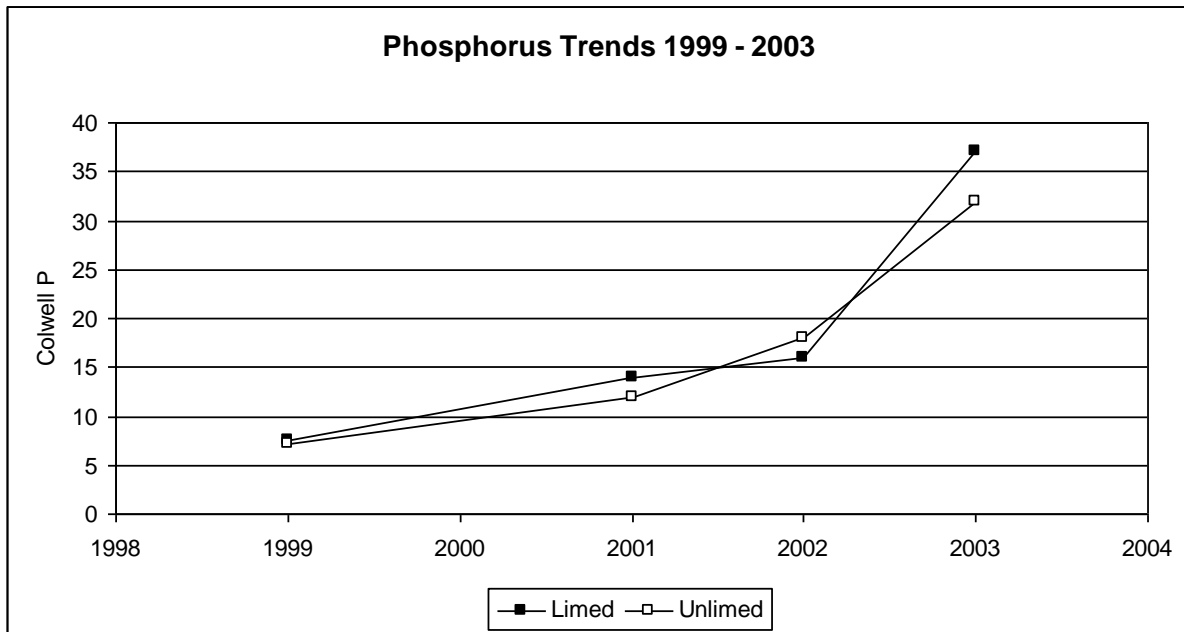
	1999	2001	2002	2003	1999	2001	2002	2003
Paddock	pH	pH	pH	pH	Al	Al	Al	Al
(0-10cm)	CaCl_2	CaCl_2	CaCl_2	CaCl_2	%	%	%	%
Unlimed	4.1	4.2	4.1	4.3	24.3	19.4	24.3	22.0
Lime	4.3	4.7	4.7	4.9	17.0	3.6	5.1	3.5

	1999	2001	2002	2003
Paddock	P Colwell	P Colwell	P Colwell	P Colwell
(0-10cm)	ppm	ppm	ppm	ppm
Unlimed	7	12	18	32
Lime	8	14	16	37

Limed

10-20cm Soil Layer

- The pH (CaCl_2) of the limed paddock has increased from **4.6** pre liming to **5.0**, 3 years post liming.
- The Al% (% of CEC) the limed paddock has reduced from **11** pre liming to **3**, 3 years post liming.
- The above results indicate that the effect of the lime has moved into the 10-20cm soil layer.



LIME MOVEMENT PROFILE TESTS

- Complete soil cores taken each year to a depth of 20cm are cut in 2.5cm segments down to 10cm depth and then 5cm segments down to the 20cm depth. These soil samples were taken in June 1999 – before lime was applied in late December 1999. Then again in February 2001, February 2002 and March 2003.
- The purpose of this intensive soil testing is to investigate the movement of surface applied lime down through the soil profile over time.
- A pH (CaCl₂) change of **>0.3 pH units** from the original pH in 1999, has been used to signify a “lime impact”. Ameliorating aluminium (ie: reducing Al% to ≤ 5%) is also viewed to determine the effect of lime
- Over the 3 year period since lime application (actually 39 months), the lime appears to have moved through the soil profile to a depth of 7.5 cm when considering pH change alone. However when Al% is also considered, the amelioration of Al% to 5% has only occurred to a depth of 2.5cm. However, the lime has reduced Aluminium by at least 50% (a substantial reduction) in all soil layers down to the 10 -15 cm layer, when comparing the 2003 levels to the original levels in 1999. This suggests that amelioration is beginning to occur in these lower depths. . The following tables show soil pH (CaCl₂) and Al (%of CEC) readings in each year down to 20cm for both paddocks.

Soil pH (CaCl₂) profiles of limed and unlimed paddocks

Lime				
1999	2001	2002	2003	Depth (cm)
4.3	5.1	5.0	5.1	2.5
4.0	4.4	4.3	4.5	5
4.1	4.3	4.3	4.5	7.5
4.2	4.4	4.5	4.5	10
4.5	4.8	4.6	4.6	15
4.7	4.9	4.7	5.0	20

Unlimed				
1999	2001	2002	2003	Depth (cm)
4.6	4.6	4.3	4.9	2.5
4.1	4.3	4.1	4.1	5
4.1	4.2	4.1	4.1	7.5
4.1	4.3	4.2	4.2	10
4.2	4.4	4.3	4.3	15
4.6	4.5	4.5	4.5	20

Soil AI% (% of CEC) profiles of limed and unlimed paddocks

Lime				
1999	2001	2002	2003	Depth (cm)
13.0	0.5	1.1	1.6	2.5
36.3	11.8	16.0	11.1	5
31.7	18.8	20.9	8.9	7.5
20.7	25.0	11.1	11.1	10
12.8	7.2	7.6	6.1	15
5.2	4.3	11.1	4.0	20

Unlimed				
1999	2001	2002	2003	Depth (cm)
4.8	4.3	6.7	2.2	2.5
25.6	21.9	32.1	28.1	5
32.0	30.4	37.6	37.3	7.5
33.2	28.1	31.4	35.6	10
22.7	16.1	23.4	22.9	15
13.8	11.9	10.1	14.6	20

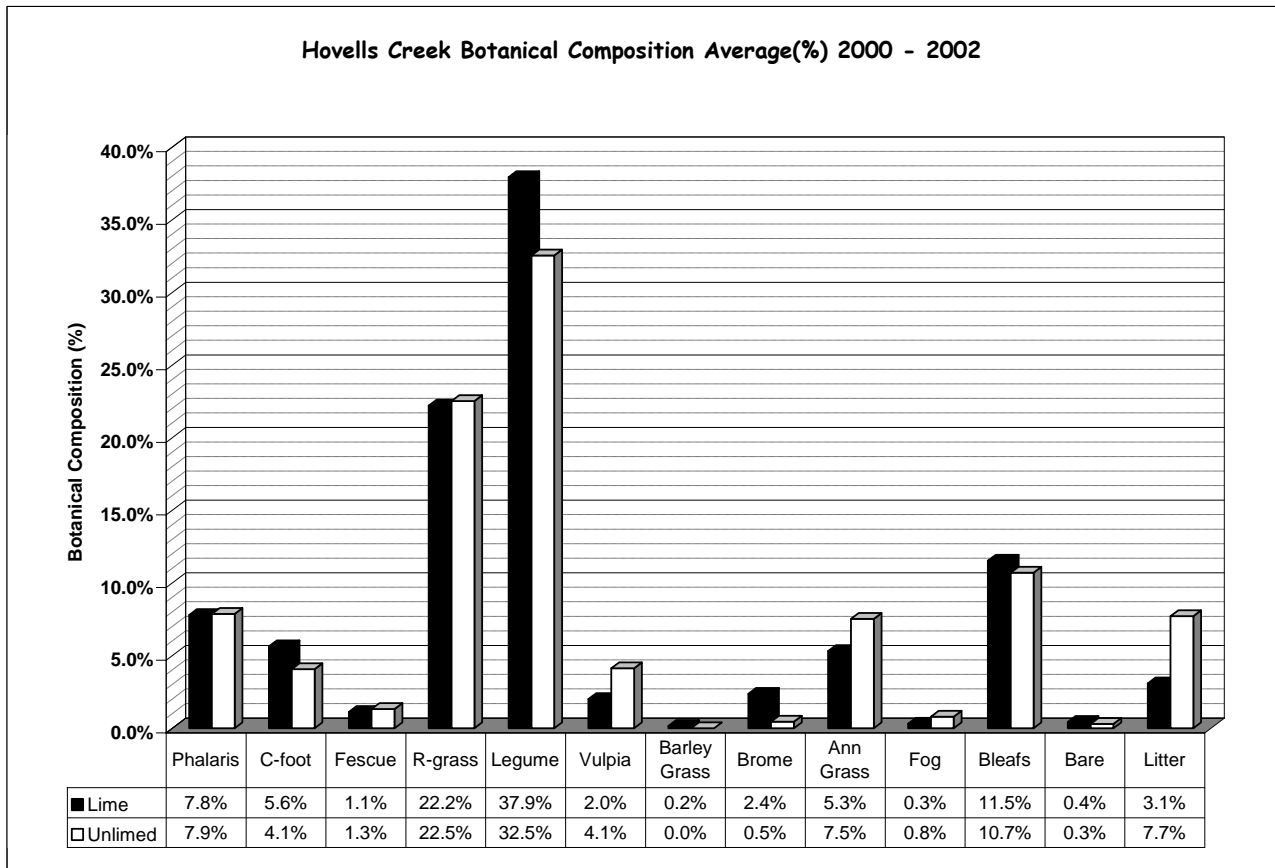
Lime **"Lime effect"** **"Possible Lime effect"**

Note: 1999 samples were taken in June prior to liming in late December 1999.

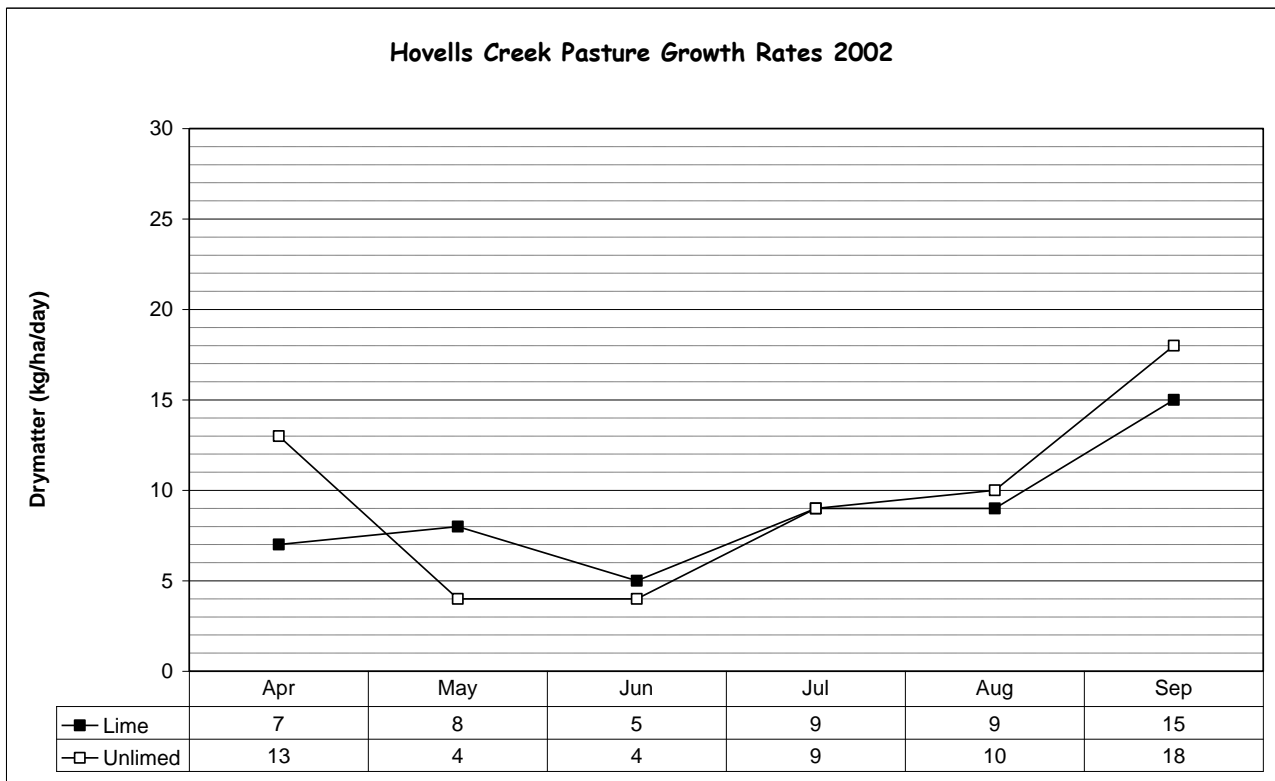
PASTURE COMPOSITION AND GROWTH RATES

- Pasture composition is being measured annually via the endpoint method. Average results for 2000 - 2002 are shown in the graph below. Whilst the differences between treatments are relatively minor, initial trends show slightly higher proportions of legume and brome on the limed paddock than the unlimed paddock. The proportion of vulpia was less on the limed paddock than the unlimed paddock. These trends, although very preliminary and small in nature, are consistent with findings with the long-term research work conducted at the MASTER site near Wagga Wagga. The higher proportion of annual grasses in the unlimed paddock than the limed paddock comprises primarily of toadrush. (excludes vulpia, barley grass and brome)
- Pasture dry matter assessments have been carried out monthly to allow the calculation of pasture growth rates (measured in kilograms of dry matter/ha/day) for the month. Results for April 2002 – September 2002 are shown in the graph below.

Botanical Composition of Limed and Unlimed Paddocks



Pasture Growth Rates (kg dry matter/ha/day)



STOCKING RATES AND WOOL PRODUCTION

- The site was stocked with young merino wethers in December 2001. The stocking rates are the same for both paddocks at 8.75 animals /ha.
- Animals have been managed to ensure that the average body weight of both paddocks remains similar. The aim of doing this is to keep wool characteristics similar between paddocks allowing economic performance for each paddock to be determined.
- Mid-side samples and fleece weights were collected at shearing in October 2002. Both the limed and unlimed paddocks produced an average fleece weight of 6.0 kg/head. (Lime = 6.02 kg/hd; Unlimed = 5.97 kg/hd). A slightly higher micron was achieved on the limed paddock, however all other characteristics were relatively similar. An economic analysis of production will be generated. Wool quality data is shown in the table below.

Wool Quality Characteristics

	Fibre Diameter	Yield	Staple Length	Staple Strength
Paddock	(micron)	(% schlum)	(mm)	(Nkt)
Lime	18.5	74.9	100	31
Unlimed	18.3	75.0	99	31