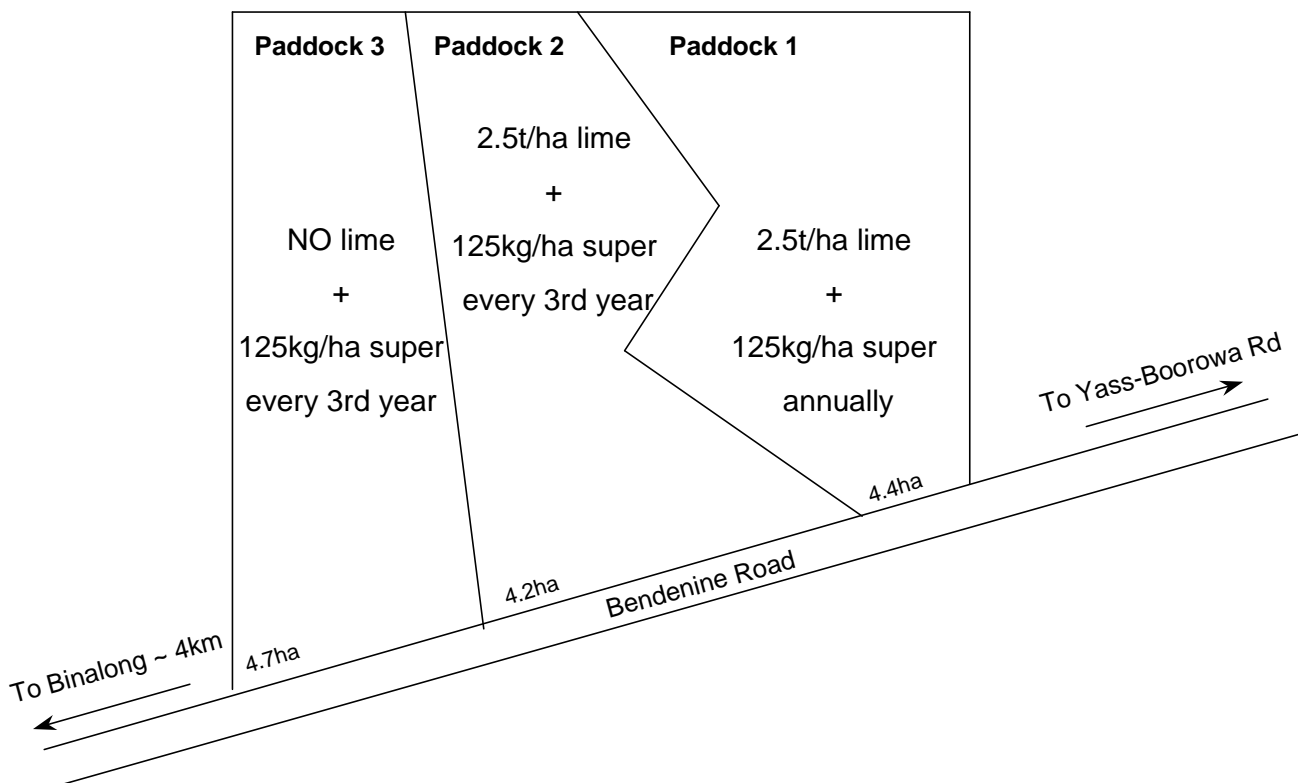


## Binalong Landcare Topdressing Lime/Grazing Demonstration

### SEPTEMBER Update, 2004

#### Binalong Landcare Group ASA Site Layout



#### SITE SPECIFICS

- **Location:** Max and Jan Giles, "Kuriong", Binalong.
- The paddocks are set stocked with Merino wethers. The pasture consists of predominantly native perennial grasses, annual grass, subterranean clover and broadleaf species, which is typical of much of the country in the Landcare Group.

- **Paddock Treatments:**

<b>Paddock 1</b>	Autumn 98	- lime 2.5 t/ha + 125 kg/ha Mo super (0.05)
	Autumn 99 – 04	- annual application of 125 kg/ha super Mo super applied every 3 <sup>rd</sup> year.
<b>Paddock 2</b>	Autumn 98	- lime 2.5 t/ha + 125 kg/ha Mo super (0.05) spread every 3 <sup>rd</sup> year.
	February 01	- 125 kg/ha Mo super (0.05)
	February 04	- 125 kg/ha Mo super (0.05)
<b>Paddock 3</b>	Autumn 99	-125 kg/ha Mo super (0.05) spread every 3 <sup>rd</sup> year.
	February 01	- 125 kg/ha Mo super (0.05)
	February 04	- 125 kg/ha Mo super (0.05)

- **Stocking Rates:**

Initial stocking rates were:

**Pad 1** 13.2 wethers/ha                      **Pad 2** 11.4 wethers/ha                      **Pad 3** 9.5 wethers/ha

Stocking rates prior to de-stocking in November 2002 were as follows:

**Pad 1** 14.5 wether/ha                      **Pad 2** 11.2 wether/ha                      **Pad 3** 8.5 wethers/ha.

Current Stocking rates as of early September 2004 are as follows:

**Pad 1** 14.1 wether/ha                      **Pad 2** 9 wether/ha                      **Pad 3** 8.9 wethers/ha.

Comments:

Due to drought conditions in November 2002, animals were removed from paddocks on 26<sup>th</sup> November. All sheep were put back onto trial on 30<sup>th</sup> June 2003 (animals off for a total of 7 months).

All sheep removed again on 12<sup>th</sup> Dec 2003. Sheep put back on 19<sup>th</sup> January 2004 (animals off for 1 month).

Sheep were removed from Paddock 2 on 9<sup>th</sup> February 2004 and put back on the trial on 6<sup>th</sup> September 2004 (animals off for 7 months).

Sheep were removed from Paddocks 1 and 3 on 3<sup>rd</sup> March and put back on the trial on the 6<sup>th</sup> September 2004 (animals off for 6 months).

Economics presented for 2003 reflect the de-stocking period. Costs have been calculated as if the sheep were fed a drought maintenance ration while still on the trial. Drought feeding occurred for 6 months.

## RESULTS

### (i) SOIL PHOSPHOROUS (Colwell mg/kg)

	Mar 1998	Dec 1998	Dec 1999	Dec 2000	Dec 2001	Dec 2002	Dec 2003
<b>Paddock 1</b>	12	14	12	13	9	13	13
<b>Paddock 2</b>	9	13	11	10	9	10	11
<b>Paddock 3</b>	11	14	14	7	6	12	10

- Soil phosphorous levels have been holding in Paddock 1 with an annual super application of 125 kg/ha with the exception being the December 2001 readings. This figure seems low – we have done a number of rechecks on this test and the figure was as stated – sampling error maybe the issue!
- Paddocks 2 and 3 receive super every third year. Both paddocks received 125 kg/ha super in Autumn 1998, 2001 and 2004. The soil phosphorous levels in both paddocks show a rise in phosphorous in the year of application and then a gradual decline until the next super application. This is what you would expect, however again perhaps the readings for December 2001 are a little lower than expected!

**(ii) TISSUE PHOSPHOROUS (Whole Shoot % P) Sampled October each year**

	2001	2002	2003
<b>Paddock 1</b>	<b>0.245</b> (Col P 13.9)	<b>0.239</b> (Col P 8)	<b>0.281</b> (Col P 18.5)
<b>Paddock 2</b>	<b>0.192</b> (Col P 12.3)	<b>0.191</b> (Col P 8)	<b>0.19</b> (Col P 14)
<b>Paddock 3</b>	<b>0.205</b> (Col P 11.9)	<b>0.164</b> (Col P 6)	<b>0.19</b> (Col P 12)

- Clover tissue samples taken in October 2001 on Paddock 1 indicated that phosphorous levels in the clover were reading below the adequate level for optimum plant growth (0.28% P) indicating we have not reached our target soil phosphorous level as yet. Tissue tests taken in October 2002 were similar to readings in 2001 for paddocks 1 & 2. In October 2003 paddock 1 indicates the phosphorous levels have reached an optimum for plant growth while paddock 2 is still similar to 2001 and 2002 figures.
- The clover tissue samples taken in Oct 2001 for paddock 3 indicate that the phosphorous levels have remained below the adequate level for optimum plant growth.
- Soil P readings are jumping around but tissue testing is indicating we are definitely building soil P levels in Paddock 1. The tissue testing indicates the soil P level in Paddock 2 may be close to holding or slowly declining while Paddock 3 maybe close to holding. The data highlights the importance of soil testing over a longer term. One years data may well be meaningless.

**(iii) LIME MOVEMENT PROFILE TESTS**

- Complete soil cores taken in Autumn each year to a depth of 20cm are cut into 2.5cm segments down to 10cm depth and then 5cm segments down to the 20cm depth.
- The purpose of this intensive soil testing is to investigate the movement of surface applied lime down through the soil profile over time.

**pH**

- A pH (CaCl<sub>2</sub>) change of > 0.3 pH units from the original pH in 1998, has been used to signify a “lime effect”.
- Over the first 5 year period, if we consider just pH change alone, the lime appears to have moved through the soil profile to a depth of :
  - 10 cm in Paddock 1
  - 20 cm in Paddock 2

The readings for 2004 (year 6) indicate the “lime effect” to these above depths may be diminishing. Both Paddocks 1 and 2 are now showing a lime effect to 7.5 cm.

Note - The variation in pH during this time in Paddock 3 has not exceeded > **0.3 pH units** from the original pH in 1998. Hence the assumption of no change (this validates/strengthens the choice of > 0.3 pH units as the arbitrary figure used to signify a "lime effect")

- The greater "apparent" lime effect in Pdk 2 *could be* due to the loam texture in all segments down to 20cm, compared to the loam texture down to the 10cm layer and clay loam texture from 10-20cm in Paddock 1.

### **Aluminium % (Al %)**

- An effect on aluminium has been viewed in two ways:
  1. Reducing Al% to 5% or less
  2. Substantial reduction in the Al %.
- Aluminium has been reduced to below 5% down to a depth of:
  - 5 cm in Paddock 1
  - 7.5 cm in Paddock 2
- When you look at the % change in Al % in Paddocks 1 and 2 it looks like lime may have had an effect over the first 5 years to a depth of:
  - 10 cm in Paddock 1(2003 data - 83% change in 5-7.5 cm layer; 69% change in 7.5-10 cm layer)
  - 20 cm in Paddock 2(2003 data – 93% change in 5-7.5 cm layer; 67% change in both the 7.5-10 cm and 10-15 cm layer; 56% change in 15-20 cm layer).

The 2004 % change in Al% data suggests that the "lime effect" in Paddocks 1 and 2 has diminished to:

- 7.5 cm in Paddock 1
- 10 cm in Paddock 2

Note: Anything less than 50% change in Al% I have ignored in the above interpretation. (you will find % change in the table following)

### **Summary on Lime Movement**

Over the life of the trial, looking at pH alone indicates a "lime effect" has occurred down to 10 cm in Pdk 1 and 20 cm in Pdk 2. However 6 years following the original lime application the "lime effect" based on soil pH change at these depths appears to be weakening. It is in the 6<sup>th</sup> year that the "lime effect" appears to be diminishing.

If you look at Al % (which impacts on root growth), full amelioration has only occurred down to 5 cm in Pdk 1 and 7.5 cm in Pdk 2. Note however, there does appear to be a reduction in Al% below these depths of considerable quantity (ie: > 50% reduction from the original Al% in 1998) indicating the lime is having some effect lower in the profile, but hasn't fully reduced the Al. Similar to the pH change, in the 6<sup>th</sup> year it appears that the Al% is creeping back up again indicating there is now a diminishing "lime effect".

**pH(CaCl2) Profiles**

Pdk 1							
1998	1999	2000	2001	2002	2003	2004	Depth (cm)
4.4	6.6	5.8	6.0	6.2	6.7	5.3	2.5
4.2	4.6	4.7	5.3	5.1	5.6	4.8	5
4.1	4.4	4.5	4.6	4.6	4.9	4.7	7.5
4.1	4.3	4.5	4.4	4.4	4.8	4.4	10
4.2	4.3	4.4	4.4	4.4	4.4	4.3	15
4.2	4.3	4.5	4.4	4.4	4.5	4.3	20

Pdk 2							
1998	1999	2000	2001	2002	2003	2004	Depth (cm)
4.4	6.3	6.1	5.9	5.9	5.7	5.2	2.5
4.2	4.7	5.2	5.4	5.2	5.0	4.8	5
4.3	4.3	4.9	5.0	5.0	5.5	4.7	7.5
4.4	4.4	4.8	4.7	4.8	4.8	4.6	10
4.4	4.6	4.8	4.9	4.8	5.0	4.5	15
4.6	4.6	4.9	4.8	4.9	5.1	4.6	20

Pdk 3							
1998	1999	2000	2001	2002	2003	2004	Depth (cm)
4.4	4.4	4.4	4.4	4.7	4.6	4.3	2.5
4.1	4.1	4.2	4.1	4.2	4.2	4.1	5
4.1	4.1	4.2	4.2	4.1	4.1	4.0	7.5
4.1	4.0	4.2	4.1	4.1	4.1	4.1	10
4.2	4.0	4.3	4.1	4.2	4.2	4.1	15
4.3	4.3	4.4	4.2	4.4	4.3	4.3	20

**Aluminium(% of CEC)**

Pdk 1								% change in Al from 98					
1998	1999	2000	2001	2002	2003	2004	Depth (cm)	to 99	to 00	to 01	to 02	to 03	to 04
6.6	0.0	0.6	0.0	1.3	0.9	0.9	2.5	100%	91%	100%	81%	87%	87%
31.6	7.6	12.8	0.0	1.9	1.1	4.0	5	76%	60%	100%	94%	97%	87%
36.5	25.6	19.0	13.6	13.9	6.1	8.5	7.5	30%	48%	63%	62%	83%	77%
35.5	26.9	22.0	23.7	21.1	11.0	20.0	10	24%	38%	33%	41%	69%	44%
33.1	32.1	25.9	23.6	25.5	22.3	29.6	15	3%	22%	29%	23%	33%	11%
27.3	26.5	25.1	26.9	26.5	22.8	28.7	20	3%	8%	1%	3%	16%	5%

Pdk 2								% change in Al from 98					
1998	1999	2000	2001	2002	2003	2004	Depth (cm)	to 99	to 00	to 01	to 02	to 03	to 04
7.1	0.0	0.5	0.0	1.0	1.2	1.3	2.5	100%	93%	100%	86%	83%	82%
18.7	2.3	2.7	0.0	1.2	2.6	1.7	5	88%	85%	100%	94%	86%	91%
16.9	13.2	7.2	2.5	2.4	1.1	4.0	7.5	22%	58%	85%	86%	93%	76%
18.8	17.3	10.1	6.2	5.2	6.1	8.3	10	8%	46%	67%	72%	67%	56%
15.0	3.9	9.2	4.5	8.3	4.9	12.6	15	74%	39%	70%	45%	67%	16%
8.3	6.2	6.4	5.8	6.0	3.7	9.1	20	26%	24%	30%	28%	56%	10%

Pdk 3							
1998	1999	2000	2001	2002	2003	2004	Depth (cm)
7.0	5.0	13.3	5.5	3.4	3.8	6.9	2.5
26.5	23.7	26.5	28.8	21.8	23.2	31.7	5
36.5	45.8	37.0	30.1	35.0	37.2	52.4	7.5
38.1	43.1	42.1	47.5	39.1	41.4	53.1	10
35.3	41.5	38.5	35.9	34.5	47.8	57.9	15
22.3	28.6	31.6	40.9	22.3	41.7	26.9	20

~ Lime

~ Lime effect

~ Reduced Al% to < 5%

~ "Possible Lime Effect"  
(>50% change since initial 1998 Al% reading)

## PASTURE GROWTH RATES

- Pasture dry matter assessments are carried out monthly to allow the calculation of pasture growth rate (measured in kg Dry Matter/ha/day) for the month. Following are the pasture growth rates for the period April to October 1999 - 2003.

### Pasture Growth Rates (kg Dry Matter/ha/day)

Elevation 540 m	Pdk	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>2004</b>	<b>1</b>	-	-	-	-	-	-	-	-	-			
	<b>2</b>	-	-	-	-	-	-	-	-	-			
	<b>3</b>	-	-	-	-	-	-	-	-	-			
<b>Rainfall (mm)</b>		<b>21</b>	<b>14</b>	<b>0</b>	<b>4</b>	<b>16</b>	<b>78</b>	<b>42</b>	<b>51</b>				
<b>2003</b>	<b>1</b>	-	-	-	-	-	-	8	8	12	50	-	-
	<b>2</b>	-	-	-	-	-	-	1	7	10	17	-	-
	<b>3</b>	-	-	-	-	-	-	2	4	9	17	-	-
<b>Rainfall (mm)</b>		<b>4</b>	<b>64</b>	<b>47</b>	<b>25</b>	<b>11</b>	<b>86</b>	<b>65</b>	<b>97</b>	<b>62</b>	<b>91</b>	<b>44</b>	<b>87</b>
<b>2002</b>	<b>1</b>	-	-	-	1	14	15	9	15	15	-	-	-
	<b>2</b>	-	-	-	-2	12	12	9	11	10	-	-	-
	<b>3</b>	-	-	-	-2	8	12	9	8	7	-	-	-
<b>Rainfall (mm)</b>		<b>11</b>	<b>166</b>	<b>44</b>	<b>30</b>	<b>79</b>	<b>39</b>	<b>44</b>	<b>24</b>	<b>71</b>	<b>4</b>	<b>18</b>	<b>4</b>
<b>2001</b>	<b>1</b>	-	-	-	14	9	10	13	9	29	-	-	-
	<b>2</b>	-	-	-	8	7	9	8	7	20	33	-	-
	<b>3</b>	-	-	-	4	7	6	7	6	18	27	-	-
<b>Rainfall (mm)</b>		<b>10</b>	<b>58</b>	<b>131</b>	<b>44</b>	<b>5</b>	<b>106</b>	<b>28</b>	<b>119</b>	<b>77</b>	<b>67</b>	<b>53</b>	<b>29</b>
<b>2000</b>	<b>1</b>	-	-	-	26	13	13	16	18	33	51	62	-
	<b>2</b>	-	-	-	18	9	7	11	12	20	23	44	-
	<b>3</b>	-	-	-	15	9	8	10	9	17	21	39	-
<b>Rainfall (mm)</b>		<b>24</b>	<b>0</b>	<b>9</b>	<b>41</b>	<b>75</b>	<b>65</b>	<b>36</b>	<b>119</b>	<b>70</b>	<b>82</b>	<b>62</b>	<b>60</b>
<b>1999</b>	<b>1</b>	-	-	-	26	11	14	12	21	38	55	-	-
	<b>2</b>	-	-	-	22	11	8	10	14	26	30	-	-
	<b>3</b>	-	-	-	18	9	9	9	12	23	23	-	-
<b>Rainfall (mm)</b>		<b>118</b>	<b>8</b>	<b>98</b>	<b>57</b>	<b>58</b>	<b>42</b>	<b>28</b>	<b>58</b>	<b>26</b>	<b>151</b>	<b>43</b>	<b>107</b>
<b>1998 Rainfall (mm)</b>		<b>25</b>	<b>31</b>	<b>5</b>	<b>65</b>	<b>42</b>	<b>162</b>	<b>113</b>	<b>112</b>	<b>67</b>	<b>77</b>	<b>58</b>	<b>2</b>

- No growth rates have been calculated for Oct 02 – Sept 04 due to drought conditions

## WOOL DETAILS

Year	Paddock	Micron ( $\mu\text{m}$ )	Strength (N/ktex)	Yield (%)	Length (mm)
<b>1999</b>	1	21.5	43	74.7	108
	2	21.3	47	73.7	105
	3	20.7	42	73.7	106
<b>2000</b>	1	19.2	32	70.9	99
	2	18.6	33	70.1	95
	3	18.4	39	67.5	100
<b>2001</b>	1	20.8	44	67.6	95-100
	2	20.4	38	64.9	95-100
	3	20.3	46	66.6	95-100
<b>2002</b>	1	19.5	27	67.0	96
	2	19.5	27	64.4	97
	3	19.5	39	65.9	100
<b>2003</b>	1	21.7	-	69.8	-
	2	19.8	-	71.9	-
	3	20.3	-	69.5	-

Note: Sheep ages changed between 1999 and 2000.

# ECONOMIC ANALYSIS

## AVERAGES FOR THE PERIOD - JANUARY 1999 TO JANUARY 2004

	<b>Paddock 1</b>	<b>Paddock 2</b>	<b>Paddock 3</b>
Stocking rate / ha	14.4	11.2	8.8
Total Clean Wool kg/ha	59.9	43.4	34.8
Total Wool Income \$/ha	507.79	394.60	327.92
Total Cost \$/ha	351.78	288.68	217.54
Profit \$/ha	156.01	105.93	110.38
Difference to Paddock 3	45.63	-4.46	0
Cost of Production c/kg	5.91	6.68	6.33
Fleece Fibre Diameter	20.5	19.9	19.8
Fleece Yield % age	70.0	69.0	68.6
Fleece Length mm			
Strength N/Ktex			
Clean Wool kg/hd	4.18	3.87	3.94



**TOPDRESSING LIME/SUPER GRAZING TRIAL RESULTS  
BINALONG 2003**

<b>INCOME</b>			
	<b>Paddock 1</b>	<b>Paddock 2</b>	<b>Paddock 3</b>
<b>Fleece production</b>			
Area, ha	4.4	4.2	4.7
Stock Number	62	45	40
Stocking rate/ha	14.1	10.7	8.5
Total clean wool, kg/ha	60	44.3	36
Whole clip			
Wool price, clean c/kg	797	835	821
<b>WOOL INCOME</b>	<b>\$478.20</b>	<b>\$369.91</b>	<b>\$295.56</b>

<b>COSTS</b>			
	<b>/ha</b>	<b>/ha</b>	<b>/ha</b>
Variable Costs \$6.00/hd	84.60	64.20	51.00
Fertiliser (\$280/t – super + spread)	35.00	0.00	0.00
Lime (see note)	21.60	21.60	0.00
Feeding (per ha)	289.05	260.30	161.00
Wool selling			
- wool tax           2.00%	9.56	7.40	5.91
- brokerage costs   4.50%	21.09	16.31	13.03
Interest on extra livestock (7%) (Stock valued at \$40/Hd)	15.68	6.16	0.00
Overhead costs	100.00	100.00	100.00
<b>TOTAL COST PER HA</b>	<b>\$576.58</b>	<b>\$475.97</b>	<b>\$330.94</b>

<b>PROFIT</b>			
Profit per ha	-98.38	-106.06	-35.38
Cost of production	9.61	10.74	9.19
Cents/kg clean			
\$/ha difference to paddock 3	-63.00	-70.68	0.00

**Note: The results for 2003 included 6 months where the animals were grazing the trial paddocks, and 6 months of drought feeding.**

### **Economic Analysis Notes**

Fertiliser: Paddock 2 & 3 receive 125kg super/ha every third year, 1/3 of the cost is allocated each year.

1999: \$202/t spread
2000: \$215/t spread
2001: \$255/t spread
2002: \$270/t spread
2003: \$280/t spread

Lime: The cost of lime (\$135/ha) is being spread over 10 years. Each year a capital repayment of 10% is made plus the interest costs at an interest rate of 10%.

Livestock Interest: The interest (10%) of running the extra livestock above paddock 3 has been included.

1999: allowed value of \$25/hd
2000: allowed value of \$30/hd

Interest rate now 8%	2001: allowed value of \$35/hd
Interest rate now 8%	2002: allowed value of \$40/hd
Interest rate now 8%	2002: allowed value of \$40/hd

Overhead Costs: This figure is representative of the local costs, based on local benchmarking data.

### **POINTS FOR DISCUSSION FOR 2003**

- Even though fleece micron was quite variable across the treatments, wool price did not differ that widely, thus resulting in a reasonably fair comparison of production due to the paddock treatments.
- Due to the extended period of feeding occurring across all paddocks a substantial financial loss was incurred. Paddock 2 incurred the greatest loss due to these wethers receiving the highest level of drought feeding. It also has the cost of a lime application added to the equation.
- Over the latter part of the life of the trial, paddock 2 has not been performing well at the designated stocking rates. At the start of the trial it was anticipated that paddock 2 could carry a higher stocking rate than paddock 3 due to its application of lime (both paddocks receive 125kg/ha super every 3<sup>rd</sup> year). The stocking rate in paddock 2 has declined from 11.4 in 1999 to 10.7 in 2003. The paddock still appears to not be supporting the latter stocking rate. Relative to the other treatments, pasture growth rates have been lower, animal body weights lower, wool data indicating lower wool cut per hectare, reduced strength and finer micron. Such a trend **may** indicate that the lime effect has diminished after 6 years. Once sheep are returned to the trial, paddock 2 will be set at a similar stocking rate to paddock 3.
- The average profit/ha over the 5 years of economic data being collected (1999-2003) is as follows:  
Paddock 1 - \$156/ha; Paddock 2 - \$106/ha and Paddock 3 - \$110/ha.  
Compared to paddock 3 (regarded as district practice – 125kg/ha super applied every 3<sup>rd</sup> year), paddock 1 is \$46/ha better off and paddock 2 is worse off by \$5/ha.

## **SUMMARY**

The trial will continue for at least another two years to fully assess the impact of lime over time but it is safe to say that if lime was to give a major production advantage it should have been obvious by now. There has been a change in soil pH in the lime paddocks but the major production improvement has come from the yearly super application. There appears to be some advantage from lime but of a much lower magnitude. The effect of the lime application applied 6 years ago appears to be now diminishing. Remember this trial is on a native perennial grass/annual legume/grass based pasture.

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