

**Report to SFF
Grant No. 06/067**

**Pasture and forage options for store lamb
and beef production from South Island hill
and high country.**

2008 Field Day booklet

Prepared by
Dr Derrick Moot
Professor of Plant Science
Lincoln University
New Zealand

November 2008

Lees Valley Farmer Group

FARMER UPDATE DAY

Pasture and forage options for SI hill and high country

20 NOVEMBER 2008

Mt Pember Farm Ltd, Wharfedale Station



Photo: LU FSC



PROGRAMME

- 10.15 am An introduction to Lees Valley
- 10.45 am Comparison of \pm cultivation, two drill types and three rates of lime when sowing permanent pasture into herbicided, undeveloped, depleted grassland – Dick Lucas
- 11.15 am Perennial grass growth \pm nitrogen – Dr Anna Mills and Miss Vonny Fasi
- 11.45 am Legumes and Herbs – Professor Derrick Moot and Mr Dick Lucas
- 12.15 am Annuals and Forages – Dr Warwick Scott
- 12.45 am Pasture Mixtures – Professor Derrick Moot
- 1.15 pm Lucerne Experiments – Professor Derrick Moot
- 1.30 pm Overview – Where to from here?
- N.B. Times may be subject to change depending on the number of visitors.

Lunch to follow at the Mt Pember Farm Ltd office, Wharfedale Station

Lees Valley Farmers' Group

Background:

The Lees Valley Farmers' Group includes farmers, managers and farm staff in and around the Lees Valley area of North Canterbury. We include farmers from the valley who co-ordinate some management of the trial plot. The core applicant group of 20 farmers was formed in January 2005 to discuss agronomic issues related to the intensification of Lees Valley. At this point scientists from Lincoln University were invited to discuss potential ideas for development. Together the group successfully sourced funding from the MAF Sustainable Farming Fund to establish a demonstration site in the Lees Valley. The aim of the group is to provide a research and extension site for public discussion and debate on pasture options for intensifying hill and high country areas lead by agronomists from Lincoln University.

Farmers within the group were surveyed about the issues relevant to them and ranked topics for demonstration on site and at their own properties. Issues most commonly identified were:

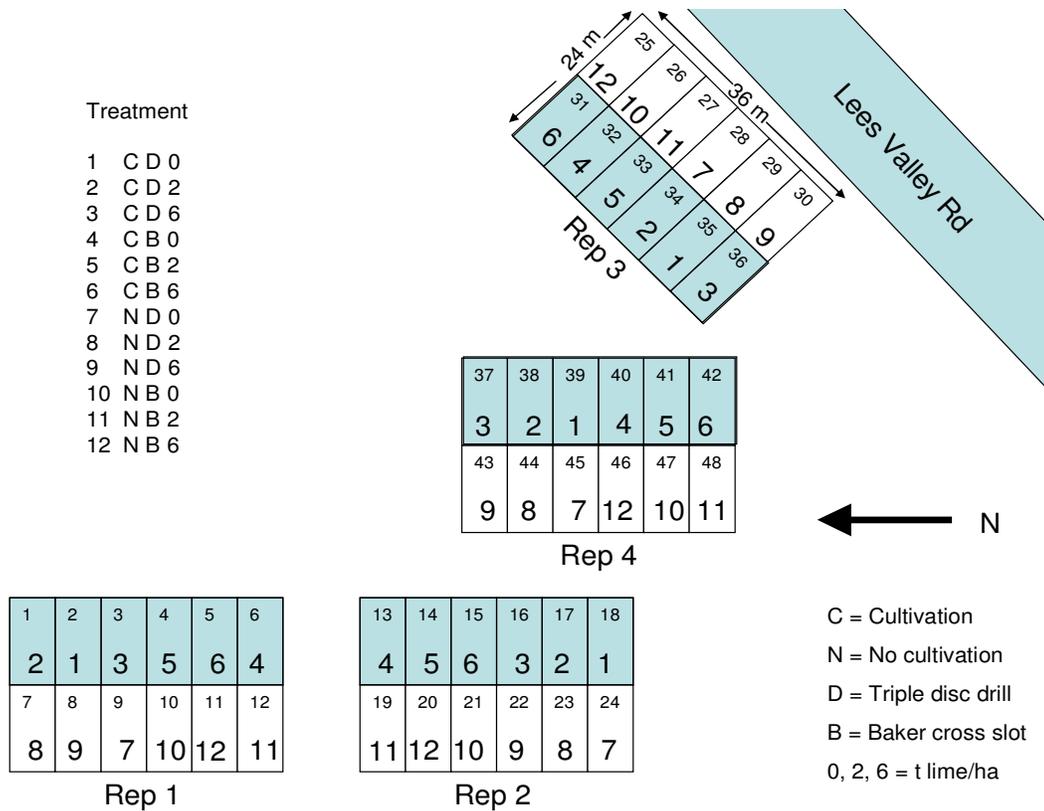
- Pasture species combinations
- Nitrogen on pasture
- Fertilizers and brassicas
- Caucasian clover establishment
- Annual clover establishment and management
- Sowing rates of pastures
- Lucerne grazing management
- Oversowing on steeper hill country

Based on this feedback a series of demonstrations and experiments have been established on a 10 ha site. The aim of the farmers update day is to enable a wider audience to see the range of issues being tackled and provide some data for discussion. The opportunity is for attendees to take messages from this environment to apply to their own on-farm situation. People wishing to be placed on the mailing list to receive updates are invited to complete the attendance sheet record accordingly.

A full time technician is employed to monitor pasture growth and plot management. Senior students from Lincoln University are involved in research projects based around the plots and an army of overseas visitors has been enlisted as volunteer workers to assist with harvests and data collection. A weather station has been installed to allow site specific rainfall, temperature, wind run and radiation data to be collected and this is used to assist in interpreting pasture growth.

The Group has funding to maintain the site until June 2009. At that point MAF will reassess the situation and may provide additional funding if the applicant group and wider audience (you) see benefit in continuing some or all of the monitoring. Given that persistence and production are important attributes of dryland pasture species we are hopeful that the opportunity will present itself to maintain the site beyond the three year commitment period.

Comparison of \pm cultivation, two drill types and three rates of lime when sowing permanent pasture into undeveloped, depleted grassland



Pasture Establishment Options

Comparisons of: Cultivation vs. No cultivation
Cross slot drill vs. triple disc
Rates of lime (0, 2, 6 t/ha)

Initial soil fertility (0-75 mm): pH 5.3, Olsen P 9, Sulphate S 5

All treatments had the same:

- Herbicide in Dec 2006 (Roundup 3 l/ha plus 40 g/ha of 'Granstar' which was ineffective on Hieracium)
- Late Feb/early March 2007 – superphosphate 400 kg/ha broadcast before cultivation
- DAP 350 kg/ha with seed in cross slot but spread before cultivation for triple disc.
- The pasture mix was 'Leura' and 'Woognellup' sub clovers 3.6 kg/ha (each)
'Nomad' white clover 2 kg/ha
'Ella' cocksfoot 1 kg/ha
'Revolution' hybrid perennial ryegrass 10 kg/ha

First Spring: - 2nd October 2007 Results: Total Green DM

Cultivation 660 kg DM/ha vs. 290 kg DM/ha for no cultivation
Cross slot 540 kg DM/ha vs. 410 kg DM/ha for triple disc
6 t lime/ha 560 kg DM/ha vs. 430 kg DM/ha for 0 and 2 t lime/ha

350 plants/m² established in cultivated plots vs. 280 plants/m² in non-cultivated

Seven months after lime application, aluminium levels were 2.1 (0 t lime/ha), 1.7 (2 t lime/ha) and 1.1 me/100g soil (6 t lime/ha). Levels >1 me/100 g soil are considered toxic. Lime applications less than 6 t/ha were insufficient to alleviate Al toxicity for pasture growth and production 6 months after application.

Second Spring: - Plot Scores (0-10) based on % clover ground cover 20 months after establishment on 11 November 2008

	Method		Drill type		Lime Rate		
	Cult	No Cult	Cross	Triple	0 t/ha	2 t/ha	6 t/ha
Reps 1-3 (deep soil)	6.0	6.1	5.9	6.1	4.0	6.4	7.7
Rep 4 (shallow soil)	2.3	1.5	1.5	2.3	2.2	2.2	1.3

Sub clover cultivars

‘Leura’ sub clover regeneration after initial good establishment has been disappointing in other trials in this Lees Valley programme. Here, in this ± cultivation experiment, sub clover has successfully regenerated after setting seed in spring 2007. The 50/50 mixture of the late flowering ‘Leura’ with the earlier flowering ‘Woogenellup’ may be the reason for this success. Apart from flowering time ‘Leura’ also has harder seed than ‘Woogenellup’. The “softer” seed of the ‘Woogenellup’ may also be helpful in the Lees Valley environment.

Check 10 sub plants to identify ‘Woogenellup’ from ‘Leura’. It is relatively easy to pick the difference as ‘Woog’ has no hairs on its runners and ‘Leura’ has hairy runners. Also ‘Woog’ has a red stipule at the base of the leaf stems (petioles).



Flower of Denmark subclover

Photo: LU FSC

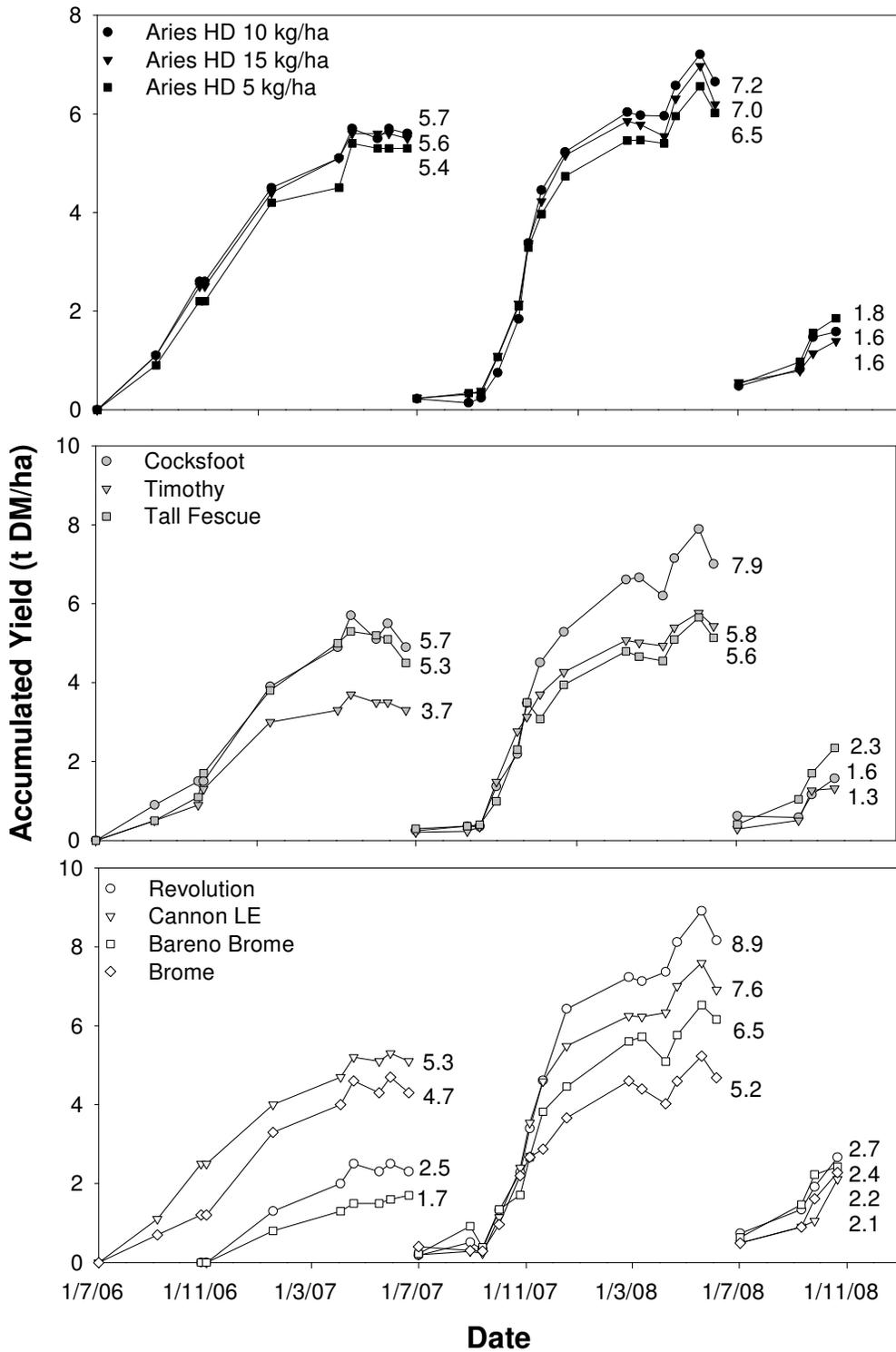
Perennial Grasses

- The site was initially sprayed with Roundup (4l/ha) in April 2005 and again in October. Lime applied at 5 t/ha. Browntop mat broken down by hoof and tooth from April to August 2005. 400 kg/ha superphosphate and 300 kg/ha DAP applied in January 2006 then disced, harrowed and heavy rolled.
- Eight species were sown 13 February 2006. Revolution ryegrass and Bareno brome were sown 1 November 2006
- Plots were grazed April, September and November 2006, January and June 2007 and October 2008. They were topped in December 2006, January and September 2008.
- Year 2 yield included spring N application of 150 kg/ha and ranged from 5.2 to 8.9 kg DM/ha for 'Gala' grazing brome and 'Revolution' respectively. Spring 2007 yield was highest in the 'Revolution' at 5.5 t DM/ha compared with 3 t DM/ha in the tall fescue. Summer production was similar among treatments; while in autumn the yield was 381 (Timothy) compared with 794 kg DM/ha ('Revolution').
- In year 3 yield to October 2008 ranged from 1.3 for Timothy to 2.7 t DM/ha for 'Revolution'. Spring growth slowed by lack of soil moisture.
- Maintenance fertiliser (300 kg/ha superphosphate) and urea (50 kg N/ha) applied September 2008.

Soil Quick Test: pH 6.1, Olsen P 16, Ca 9, Mg 8, K 9, Na 2, S 9 at 8 August 2007
pH 6.2, Olsen P 15, Ca 8, Mg 10, K 13, Na 2, S 6 at 19 May 2008



'Bareno'
brome greening up (foreground) in response to late winter applied N



Nitrogen on Perennial Grasses

- Plots were split in half. One half had 150 kg N/ha applied August 2007.
- Regrowth period was 97 days long.
- DM response ranged from 8.2 to 27.9 kg DM/kg N for ‘Gala’ grazing brome and ‘Revolution’ respectively.
- 50 kg N/ha (Urea) applied to –N plots in March 2008.

Treatment	DM response (kg DM/kg N)	Spring 2007 Growth rate (kg DM/ha/ °Cd)	
		0 kg N/ha	150 kg N/ha
Perennial ryegrass			
‘Aries’ (8 kg/ha)	13.4 _{bcd}	4.2	8.3
‘Aries’ (12 kg/ha)	20.1 _{ab}	3.1	9.1
‘Aries’ (15 kg/ha)	19.4 _{abc}	2.7	8.7
‘Cannon LE’	19.0 _{abc}	3.7	9.4
‘Revolution’	27.9 _a	2.5	10.3
Brome			
‘Bareno’	16.5 _{bcd}	2.3	6.4
‘Gala’	8.2 _d	3.4	6.1
Cocksfoot			
‘Kara’	19.4 _{abc}	3.1	9.0
Tall fescue			
‘Advance’	9.6 _{cd}	3.6	8.0
Timothy			
‘Viking’	15.7 _{bcd}	2.9	7.6
	Mean	8.3 _a	3.2 _b
	SEM		0.17
	Significance	**	***

***=P<0.01, **=P<0.001, treatment means followed by the same letter subscript are similar.



Applying urea

Photo: LU FSC



Timothy response to N application (background)
Note urine patches in the foreground indicating N deficiency.



Photo: LU FSC

Revolution ryegrass response to N application (background)

Legume/Herbs

- Alsike (3.5 kg/ha), white (4 kg/ha), red (5kg/ha), subterranean (10 kg/ha), balansa (3 kg/ha) clovers, chicory (0.6 kg/ha), plantain (1 kg/ha) and lucerne (10 kg/ha) were sown 8 – 13 February 2006. Site preparation same as for perennial grasses.
- Caucasian clover (Cc) was over drilled in chicory and plantain treatments and sown with rape on November 1 2006.
- Plots were grazed September and November 2006, January, June and November 2007, April and October 2008.
- Year 2 production range was 2.7 (chicory and caucasian) to 4.0 (red clover) t DM/ha.
- Maintenance fertiliser (750 kg/ha superphosphate) applied October 2007 and 300 kg/ha superphosphate applied September 2008.

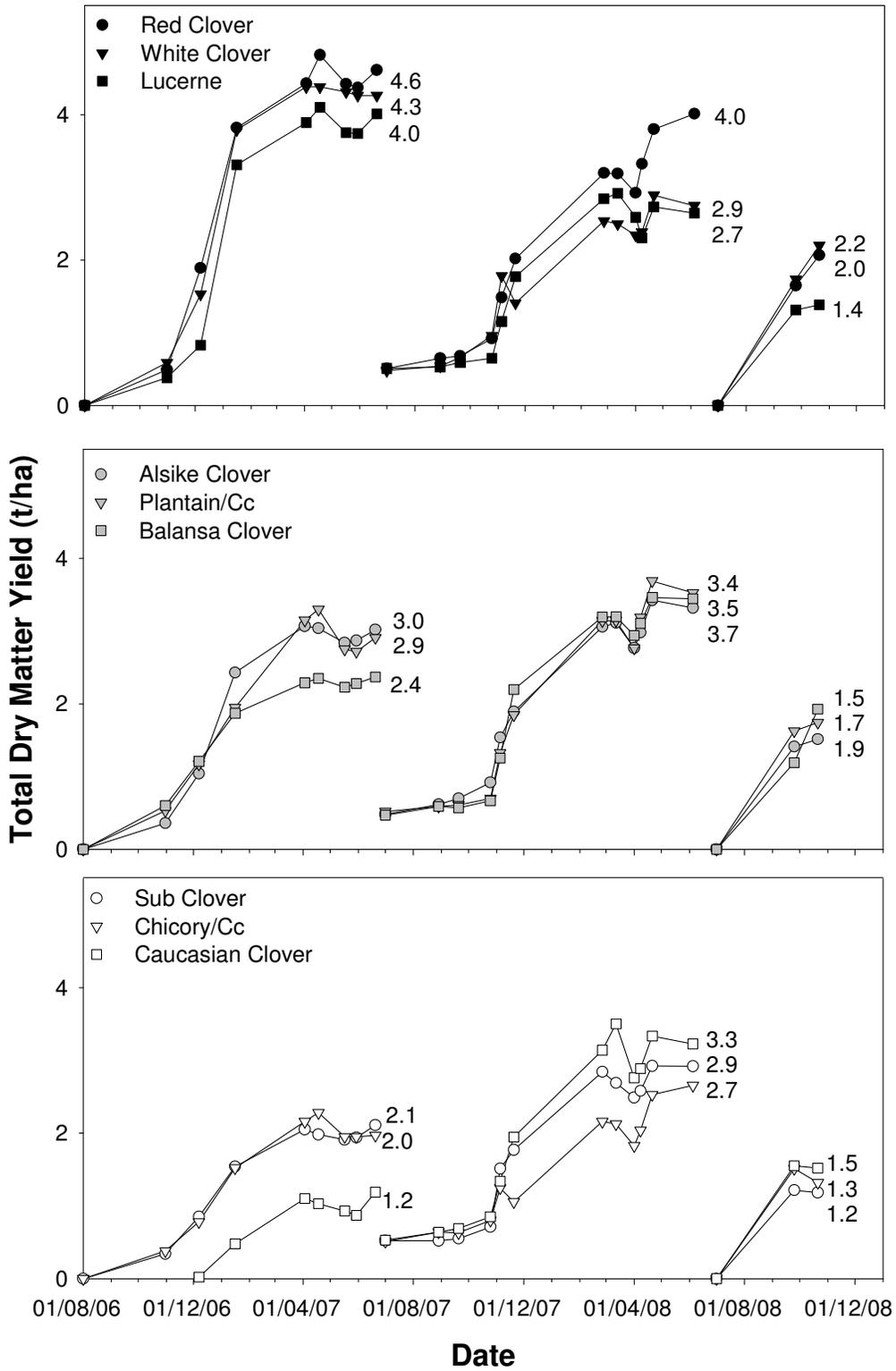
Soil Quick Test: pH 6.0, Olsen P 17, Ca 7, Mg 10, K 11, Na 2, S 8 at 8 August 2007
pH 5.9, Olsen P 19, Ca 7, Mg 12, K 16, Na 2, S 30 at 19 May 2008

New sowing on 28th February 2008

- All legume plots were oversown with a strip (9 x 10 m) of 'Bronsyn' perennial ryegrass (10 kg/ha), 'dg25' cocksfoot (2 kg/ha), subterranean ('Denmark' 10 kg/ha) and strawberry clover ('Lucila' 2 kg/ha).
- Fallow plots sown with subterranean ('Denmark' 10 kg/ha) and strawberry clover ('Lucila' 2 kg/ha).



Chicory, caucasian clover and sorrel



Winter brassicas on dryland stones: a bit of a gamble

(Adapted from Forage Brassica Development Group Workshop Modules)

Dr Warwick Scott

- Without Irrigation, water availability is the main source of yield variation in brassicas
- Brassicas produce about 20 kg DM/ha per mm of water used
- A bony stony soil will store about 70 mm of available water in the 1.0 m root zone. Heavier deeper soils may store up to 140 mm of available water in the zone
- Kale and rape have a more vigorous root system than the root crops such as swedes and turnips

Increasing the odds or reducing the risks

- Choose the heaviest soil available for the earliest sowing
- Fallow the soil to ensure the top 1 m is at Field Capacity at sowing time
- Eliminate barriers to root penetration such as pans, poor aeration or low pH
- Spread sowing times: Kales and Swedes late November to mid December, soft turnips mid December to late January
- With adequate moisture, delaying sowing reduces yield
- The earliest sowings are most likely to run out of water first under dryland conditions
- Once a crop emerges it starts to spend precious water by transpiration crop
- Ensure brassica seedlings are not attacked by springtails, aphids or Nysius Fly
- Be conservative with the use of nitrogen fertiliser: N produces more leaves and leafy crops spend more water.

Salvaging a failed brassica crop

- The hard decision to abandon a failed brassica crop needs to be made early
- The number of salvage alternatives declines rapidly as the season progresses
- A failed swede or kale crop can be resown in soft turnips in January
- An Italian type ryegrass may be sown up to early March depending on location – lower yields, great quality and regrowth
- A cereal greenfeed crop can either be direct drilled into a failed brassica crop or sown alone. This option is possible until early April in most parts of NZ
- Salvage operations must address the reason(s) why the crops failed

Growing brassicas is like fishing: apart from the rainfall luck has little to do with it.

Autumn application of nitrogen to commercial brassica paddock (Sown November 2007)

- Kale x nitrogen type (C.A.N and urea) x nitrogen rate (0, 50 and 100 kg N/ha)
- 50 kg N/ha applied on 12th of March and 28th of April.

Nitrogen		Wharfedale Kale DM (t DM/ha)		
		Total DM	Leaf DM	Stem DM
Rate (kg/ha)	0	4.67 _b	2.68 _b	1.99
	50	5.76 _a	3.62 _a	2.14
	100	5.57 _a	3.71 _a	1.86
	SEM	0.24	0.12	0.16
Form	CAN	5.36	3.44	1.93
	Urea	5.30	3.24	2.06
	SEM	0.30	0.19	0.11

- The 12th of March application of 50 kg N/ha improved the yield of the kale by 23%, but the further application of another 50 kg N/ha on 28th of April resulted in no further yield increase.

Conclusions:

- The form of N fertiliser (Urea or CAN) had no effect on the yield on 17th of June.
- Autumn application of N must be timed to take advantage of autumn rain but late applications may show a poor response once temperatures reduce growth rates (e.g. May and June).
- Late applications of N may also increase the risk of nitrate poisoning in animals.



Pasture Mixtures – DM yield

- October. Lime applied at 5 t/ha. Browntop mat broken down by hoof and tooth from April to August 2005. 400 kg/ha superphosphate and 300 kg/ha DAP applied in January 2006 then disced, harrowed and heavy rolled.
- Sown on 30 January 2007.
- All plots have a basal clover mixture of ‘Leura’ subterranean clover at 10 kg/ha and ‘Nomad’ white clover at 2 kg/ha.
- Grazed August and November 2007 and April 2008. Topped January, September (excluding Timothy Mixes) 2008.
- Years 1 and 3 are partial years. Year 1 is from sowing to July 2007. Year 3 is from July to October 2008.
- Maintenance fertiliser (750 kg/ha superphosphate) applied October 2007 and 300 kg/ha superphosphate applied September 2008..

Treatment	Yield (t DM/ha)							
	Year 1		Year 2			Year 3		
	Total	Spring	Summer	Autumn	Total	Winter	Spring	Total
Revolution AR1 10kg	0.8	3.0	3.8	4.9	5.6	0.7	1.8	2.5
Cannon HE 10kg	0.6	3.1	3.9	5.4	5.8	0.6	1.8	2.5
Revolution 10kg & Cf (dg25)	0.8	2.5	3.3	4.9	5.3	0.5	1.9	2.4
Revolution AR1 20kg	0.9	3.3	4.2	6.3	6.9	0.8	2.0	2.8
Samson AR1 10kg	0.8	3.2	4.0	5.3	5.9	0.5	1.9	2.2
Advance Tf	0.8	2.9	3.7	5.3	5.4	0.1	1.5	1.8
Ella Cf	0.7	3.0	3.8	5.6	6.1	0.8	1.9	2.4
Bareno brome	0.8	2.7	3.5	5.0	6.4	1.2	3.1	3.3
Agriseeds (dg25) Cf	0.6	2.1	2.9	4.5	5.1	0.7	3.0	3.1
Advance Tf +endophyte	0.7	2.9	3.7	5.4	5.6	0.2	1.7	1.9
Kahu timothy & chic/pltn	0.3	2.7	3.6	3.6	3.6	0.0	1.1	1.7
Kahu timothy & red clover	0.6	2.2	2.3	2.6	2.6	0.0	1.3	1.4
Kahu timothy & plantain	0.5	2.5	3.6	3.6	3.6	0.0	1.1	1.6
Kahu timothy	0.6	2.8	2.9	3.6	3.6	0.0	1.3	1.1
Kahu timothy & chicory	0.3	2.9	3.0	3.7	3.7	0.0	1.4	1.3

RG Soil Quick Test

pH 5.7, Olsen P 12, Ca 5, Mg 7, K 7, Na 2, S 8 (8/8/07)

pH 6.0, Olsen P 12, Ca 7, Mg 8, K 8, Na 3, S 22 (19/5/08)

Dryland Soil Quick Test

pH 5.7, Olsen P 16, Ca 5, Mg 9, K 11, Na <2, S 10 (8/8/07)

pH 5.7, Olsen P 23, Ca 6, Mg 10, K 14, Na 3, S 32 (19/5/08)

Timothy Soil Quick Test

pH 5.8, Olsen P 16, Ca 5, Mg 8, K 9, Na <2, S 11 (8/8/07)

pH 5.9, Olsen P 19, Ca 7, Mg 12, K 16, Na 2, S 30 (19/5/08)



Timothy, chicory and basal legume mixture)



Revolution ryegrass and basal legume mixture

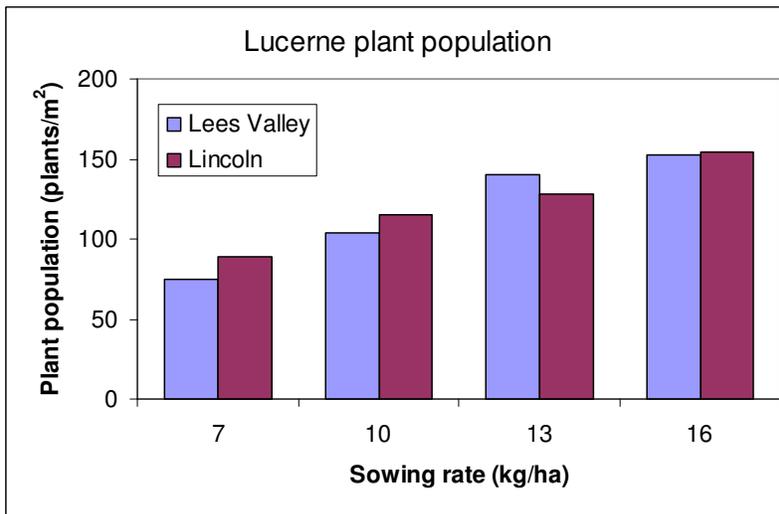
Lucerne

Lees Valley -

- The site was initially sprayed with round up (4l/ha) in April 2005 and again in October. Browntop mat broken down by hoof and tooth from April to August 2005.
- 400 kg/ha superphosphate and 300 kg/ha DAP applied in January 2006 then disced, harrowed and heavy rolled.
- Sown with 20 kg/ha Feast annual ryegrass in February 2006, then grazed May and September 2006
- Glyphosate (540 g/l a.i. at 2 l/ha) applied November 2006.

Soil Quick Test pH 5.7, Olsen P 12, Ca 4, Mg 8, K 11, Na <2, S 8 at 8 August 2007

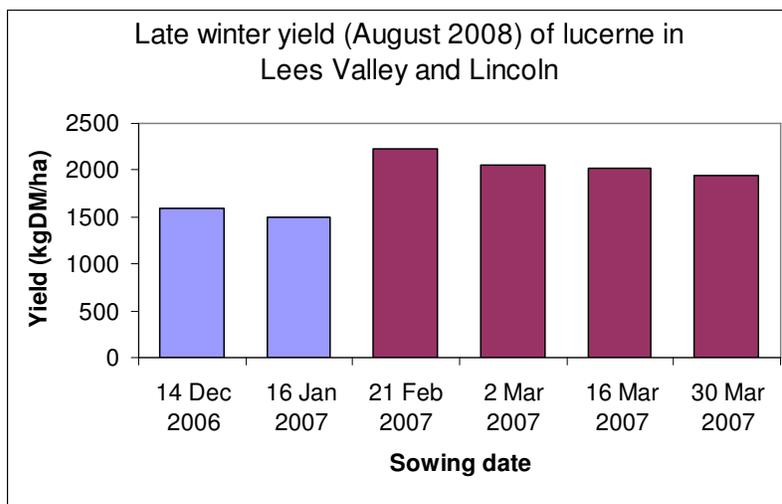
Plant population at 1.5 years after sowing were still strongly affected by initial sowing rates.



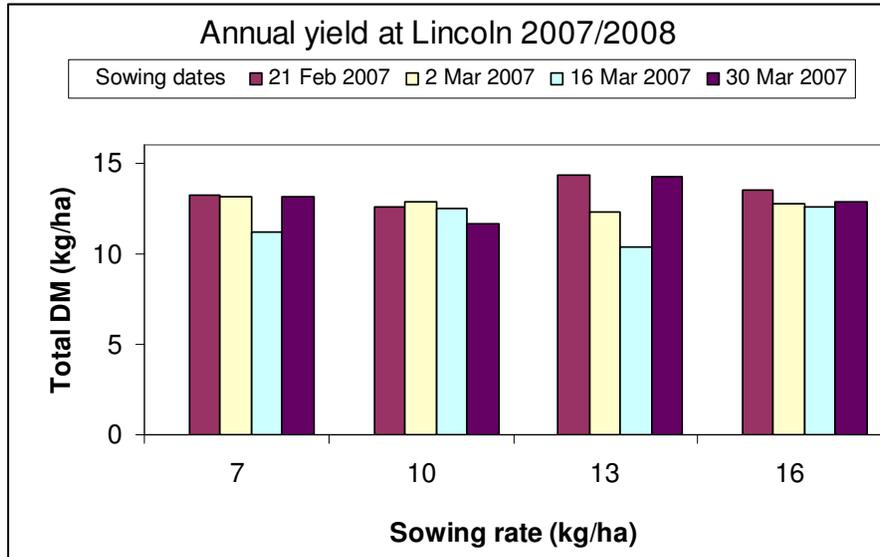
Lincoln –

- A replicate experiment was sown at Lincoln on a Templeton soil. No fertiliser was applied, the site was cultivated, rolled and drilled.
- Sowing rate had no effect on yield at Lees Valley or Lincoln.
- The mean yield for late winter was 1545 and 2064 kg DM/ha for Lees Valley and Lincoln respectively.

Sowing date had no effect at Lees Valley; however at Lincoln sowing in February had a higher 2008 late winter yield compared with the other sowing dates.

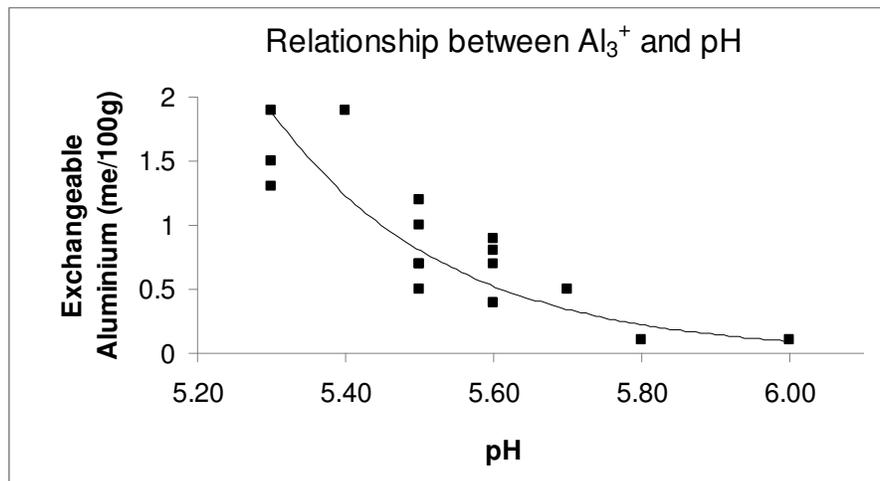


The annual yield for the first full year of growth at Lincoln was 12.7 t/ha, but despite some variation between sowing dates and rates there was no overall significant effects of treatments.



Aluminium Toxicity

- Previous studies (Edmeades *et al.* 1983) found a 50% reduction in DM yield of pastures when Aluminium levels were >1 me/100 g of soil.
- Exchangeable aluminium rarely occurs when the soil pH is greater than 5.5 (Wheeler and O'Connor 1998).
- Aluminium toxicity is more likely to occur in the subsoil than top soil (Edmeades *et al.* 1983). Therefore need to lift the pH at depth.



New trials

Annuals block: herbicide (Roundup 2l/ha and 540 g/l pulse) applied twice (November 2007 and February 2008 prior to sowing on 28th February).

1) Lucerne x lime type (Ag and Quick) and lime rate

The lucerne sowing rate by date experiment produced poor yields. Two 1 metre deep holes were dug on existing lucerne plots and showed signs of horizontal root growth which suggest aluminium toxicity. In an attempt to correct aluminium toxicity a new lucerne x lime trial has been established.

- Lucerne x lime type (Ag and Quick) and lime rate (0, 2, 4, and 8 t/ha)
- Lime applied March, lucerne still to be sown.



Horizontal root growth of lucerne

New trials –cont'd

2) New Dryland Mixtures 2008

		Sow rate (kg/ha)
Grasses	Flecha tall fescue (Max P)	17
	Bareno Brome	40
	Agriseeds cocksfoot (dg25)	7
Basal	White clover 'Nomad'	2
	Sub clover 'Denmark'	10

3) Perennial grass x annual legumes

Cocksfoot emergence is slower than perennial ryegrass hence cocksfoot plots had 'Hokonui' oats in basal treatment to protect clover seedlings against the frost.

		Sow rate (kg/ha)
Grasses	Bronsyn perennial ryegrass	12
	Agriseeds cocksfoot (dg25)	5
Annual clovers	Arrowleaf 'Arrotas'	6
	Persian 'Mihi'	2
	Sub 'Denmark'	10
	Sub 'Leura'	10
	Sub 'Woogenellup'	10
	Red clover 'Pawera'	10
	Strawberry 'Lucila'	8
Basal	White clover 'Nomad'	2
	Oats 'Hokonui'	20

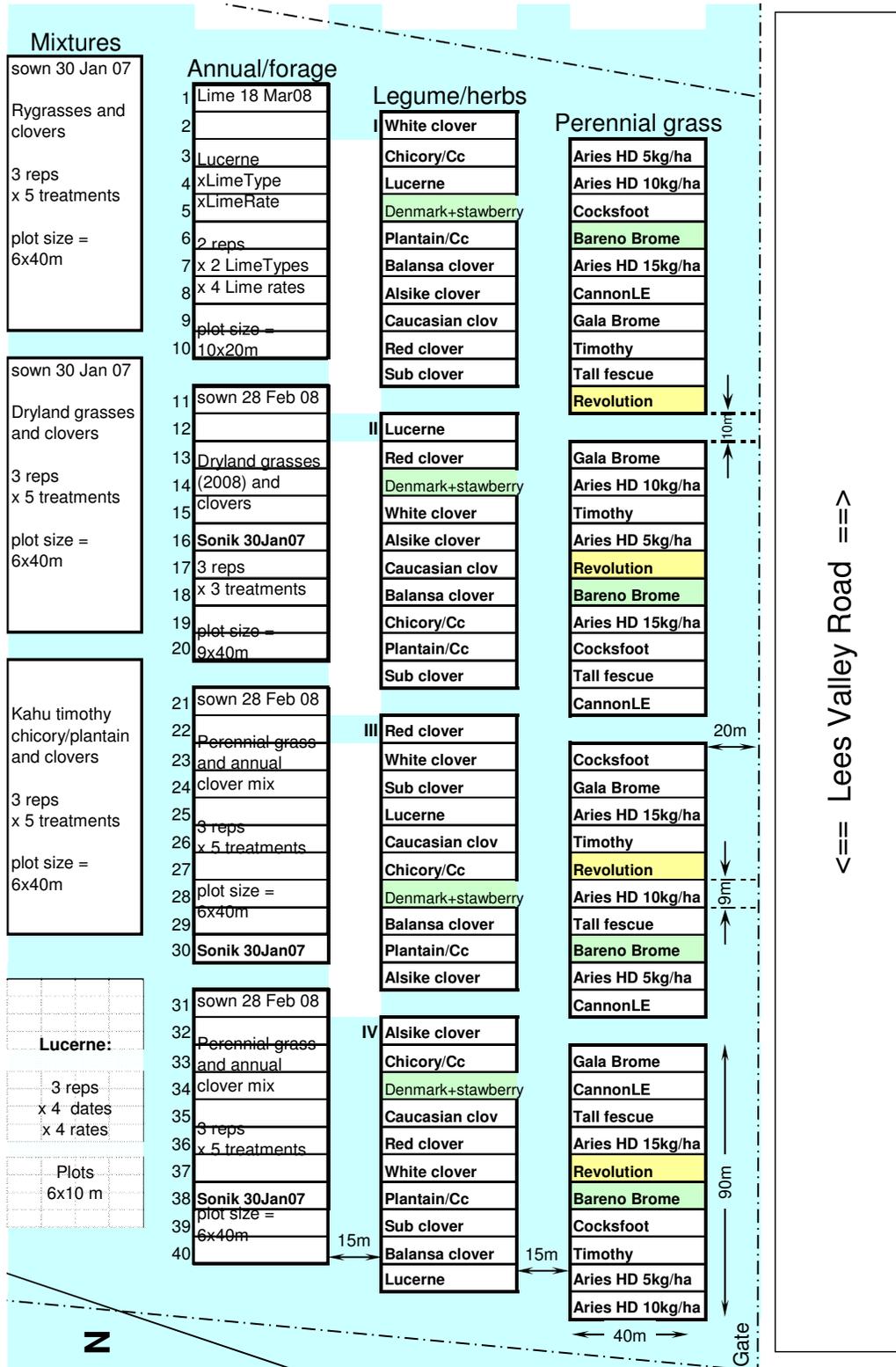
Lees Valley (LV) weather summary

Data are summarized below and compared with data from Darfield and the ECAN rain records from near Island Hill across the valley (due North from trial site, on the Ashley River).

Month	Air temp. (°C)		Soil temp. (°C)		Rainfall (mm)		
	Lees	Darfield	Lees	Lees	Lees(ECAN)	Darfield	
Nov07	11.8	13.4	13.7	23.2	35.5	25.8	
Dec07	14.7	16	16.6	28.0	55.0	69	
Jan08	17.0	18.3	19.7	18.8	37.0	14.2	
Feb08	15.2	16.9	17.9	98.0	167.0	125.2	
Mar08	13.5	16.1	14.7	21.4	25.5	16.8	
Apr08	9.8	12.6	11.4	25.6	46.5	46.2	
May08	2.8	7.9	6.3	17.2	26.5	29.4	
Jun08	3.4	7.8	4.4	83.0	133.5	87	
Jul08	3.2	6.6	3.6	128.5	206.0	148.4	
Aug08	3.8	6.8	5.0	80.8	130.0	126.4	
Sep08	8.6	11.1	8.6	46.3	75.0	54.8	
Oct08	9.5	12.1	11.3	30.6	50.0	24.4	
Means /Totals	9.4	12.1	11.1	601.4	987.5	767.6	

Coloured cells indicate data estimated from ECAN rainfall data.

Darfield data are courtesy of NIWA and ECAN rainfall data are from Environment Canterbury. Rainfall updates from the ECAN network are available by phone or their web page @ <http://www.ecan.govt.nz/Our+Environment/Water/Rainfall/>



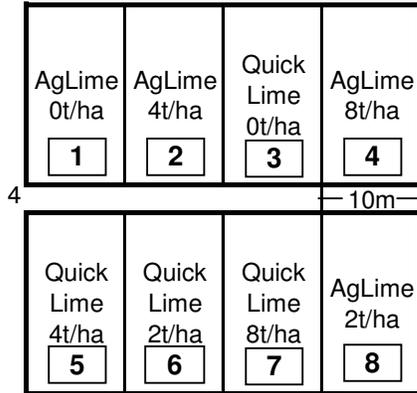
Plot layout for pasture mixes Lees Valley, Feb 08

Experiment	Rep	Plot#	Trt#	Grass/forbs	
Dryland mix (2008)	1	1	1	Flecha Tall Fescue (maxP)	
	1	2	3	Bareno brome	
	1	3	2	dg25 cocksfoot	
Basal =					
Denmark sub and Nomad wc	2	4	3	Bareno brome	
	2	5	1	Flecha Tall Fescue (maxP)	
Existing Sonik short rotation ryegrass plot					
	2	6	2	dg25 cocksfoot	
	3	7	2	dg25 cocksfoot	
plot size = 9 x 40 m	3	8	3	Bareno brome	
	3	9	1	Flecha Tall Fescue (maxP)	
Existing Ryegrass clover headland					
	Rep	plot#	Grs#	Leg#	
Perennial grass + annual legs	1	1	1	1 Arrowleaf	
	1	2	1	5 Woogenlup sub	
	1	3	1	3 Denmark sub	
	Basal =	1	4	1	6 Pawera red
	Nomad wc oats	1	5	1	4 Leura sub
		1	6	1	2 Persian
New headland (9x40m) Bareno brome					
with main plot	1	7	2	2 Persian	
1= Bronsyn AR1 ryegrass	1	8	2	6 Pawera red	
2= dg25 fine leaf cocksfoot	1	9	2	1 Arrowleaf	
	1	10	2	5 Woogenlup sub	
	1	11	2	3 Denmark sub	
plot size = 6 x 40 m	1	12	2	4 Leura sub	
Existing Sonik short rotation ryegrass plot					
Existing Ryegrass clover headland					
	2	13	2	5 Woogenlup sub	
	2	14	2	4 Leura sub	
	2	15	2	3 Denmark sub	
	2	16	2	1 Arrowleaf	
	2	17	2	6 Pawera red	
	2	18	2	2 Persian	
New headland (9x40m) Bareno brome					
	2	19	1	1 Arrowleaf	
	2	20	1	6 Pawera red	
	2	21	1	3 Denmark sub	
Existing Sonik short rotation ryegrass plot					
	2	22	1	5 Woogenlup sub	
	2	23	1	2 Persian	
	2	24	1	4 Leura sub	
Existing Ryegrass clover headland					

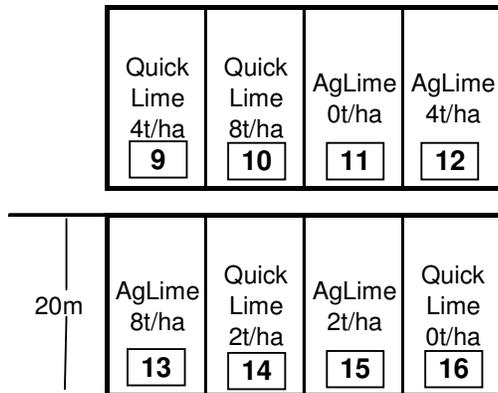
Lucerne xLimeType xLimeRate (2008)

Plot Size = 10 x 20 m
with 3 m headlands
between ends of plots.
And a 4 m strip between
reps

Rep 1



Rep 2



DryLand Mixes (2008)





A 'better soil at the trial site showing a relatively deep top layer overlying stones interspersed with water holding layers of finer soil.



Photo: LU FSC

Triple disc drilling of new grass/legume mixtures, February 2008.



Photo: LU FSC

Chicory