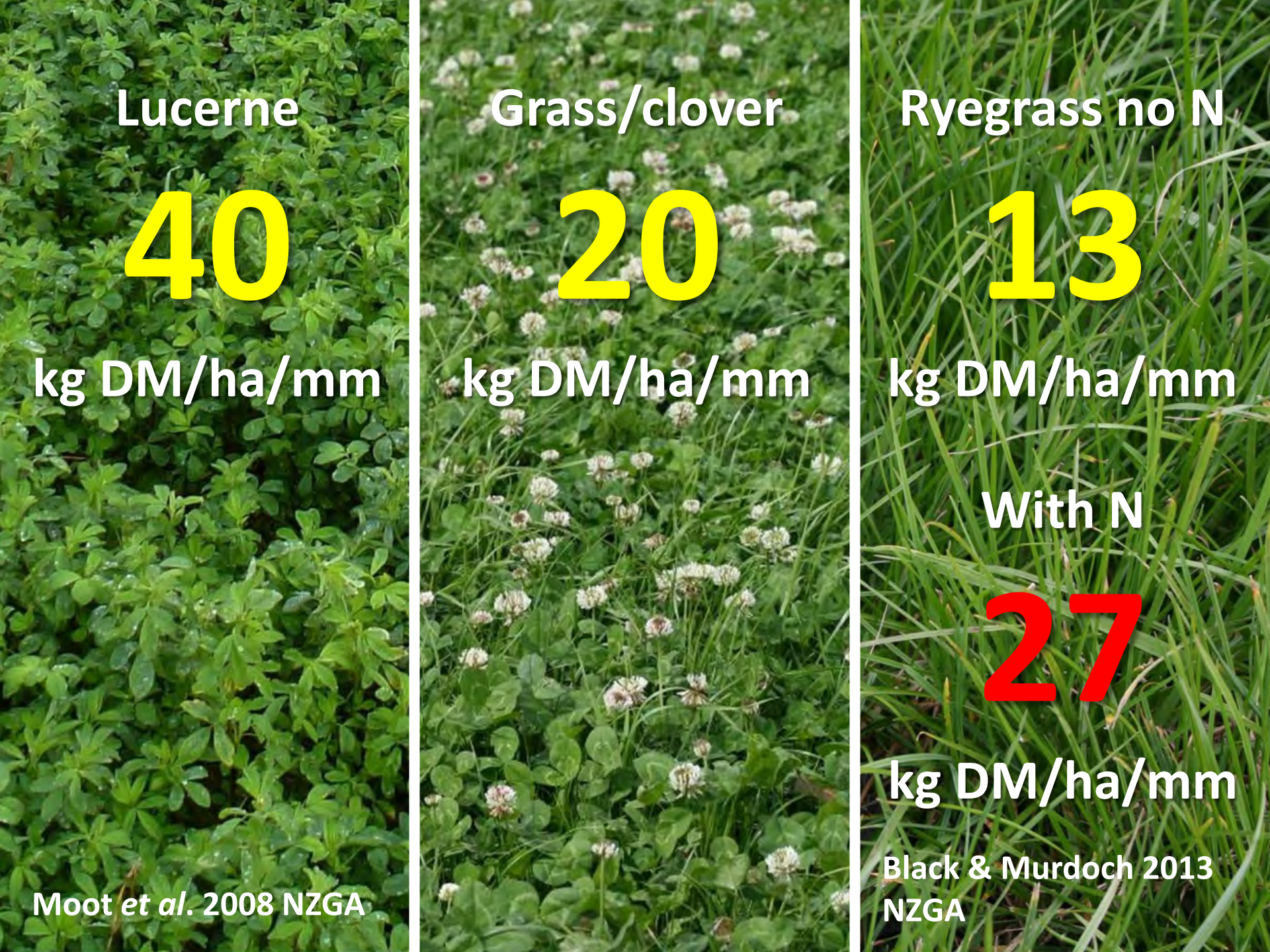
Lincoln University
Te Whare Wānaka o Aoraki
AOTEAROA • NEW ZEALAND

Improving high country and dryland pastures

Dr Alistair Black

New Zealand's specialist land-based university

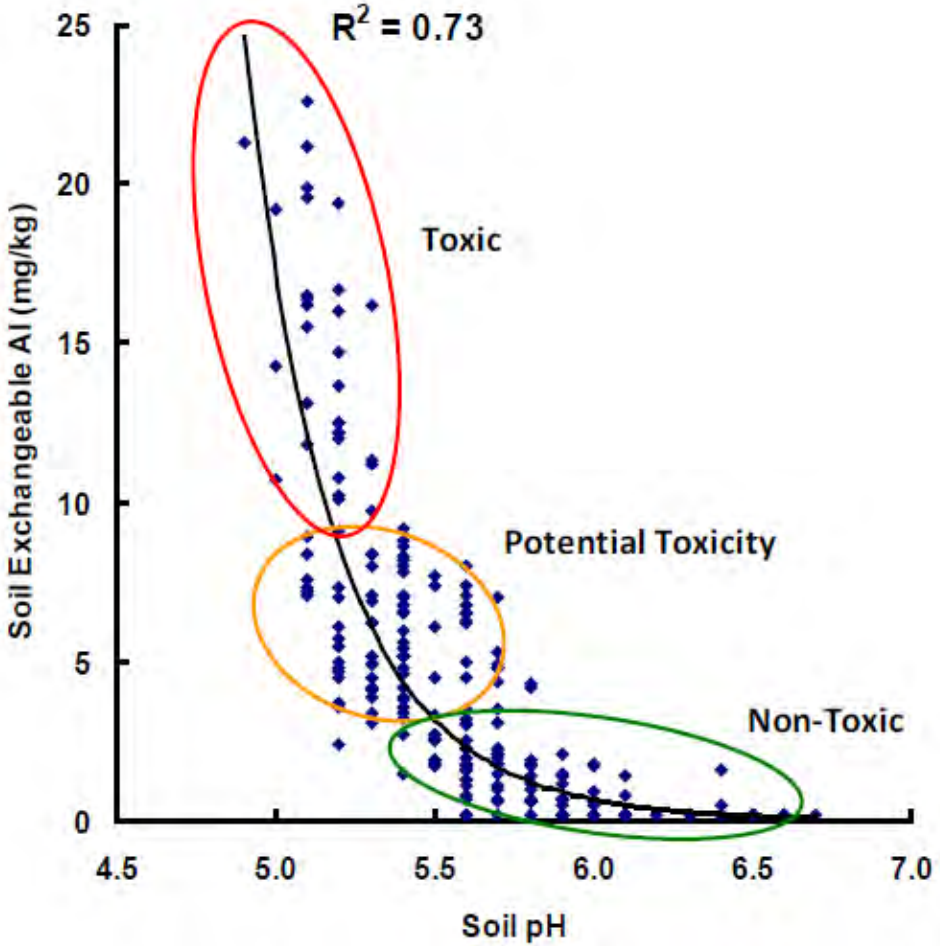

Lucerne
40
kg DM/ha/mm
Moot *et al*. 2008 NZGA
Grass/clover
20
kg DM/ha/mm
Ryegrass no N
13
kg DM/ha/mm
With N
27
kg DM/ha/mm
Black & Murdoch 2013
NZGA

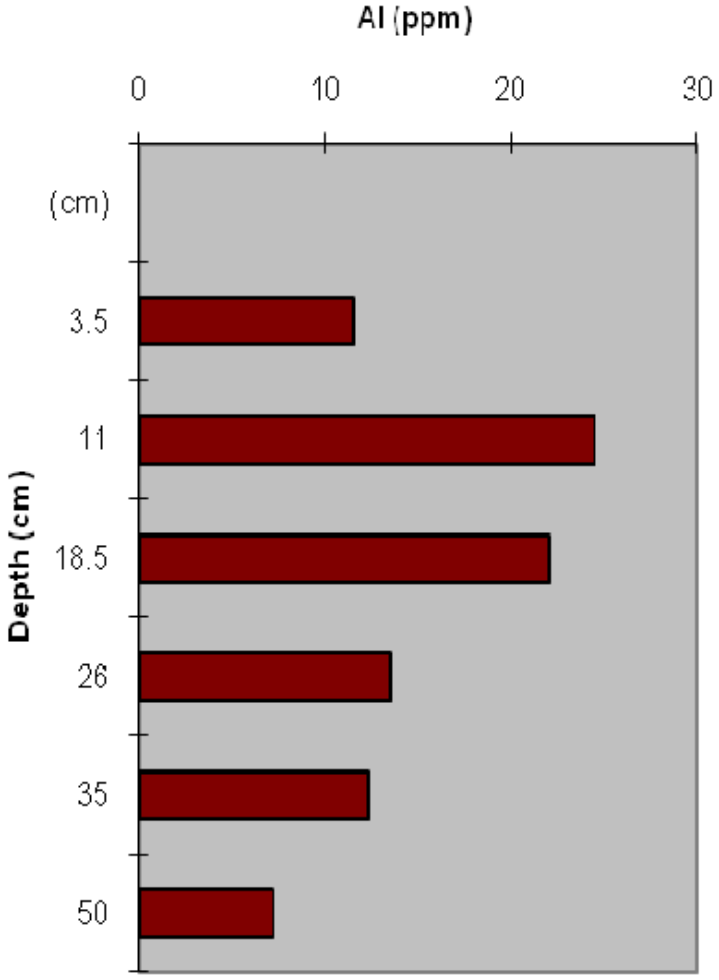
Ewes & twin lambs graze lucerne at Ashley Dene

Bog Roy Station

Photo: 'Bog Roy Station

Soil acidity





(Espie, 2009)

Low pH, high soluble Al

Lime applied to soil surface

Can take years to penetrate into soil profile

Deep lime placement?

Lotus major – Mt Grant Station

Alsike clover – Sawdon Station

Caucasian clover

Lupin

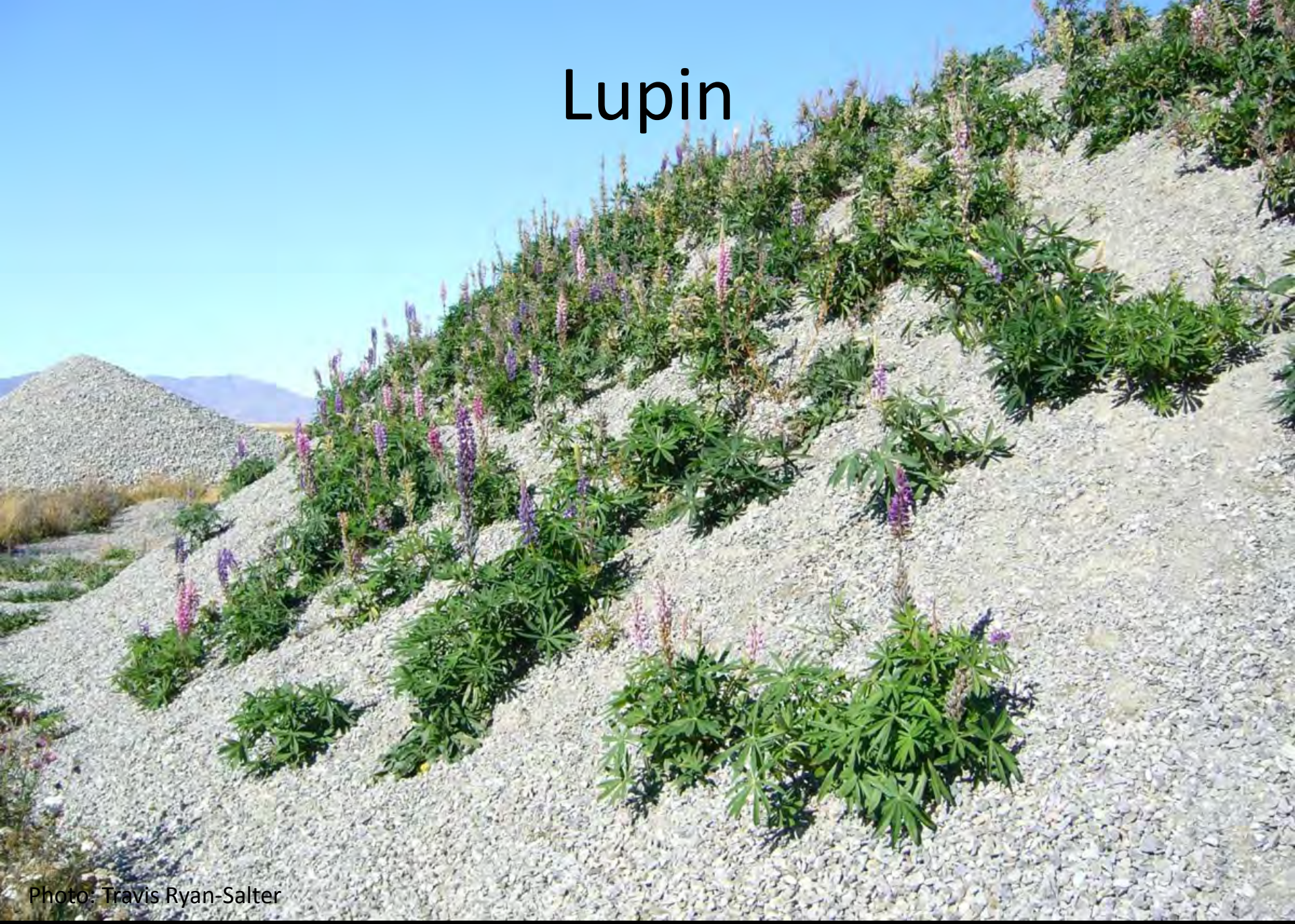


Photo: Travis Ryan-Salter

Mt John, Tekapo

Photo: Kate Wilson

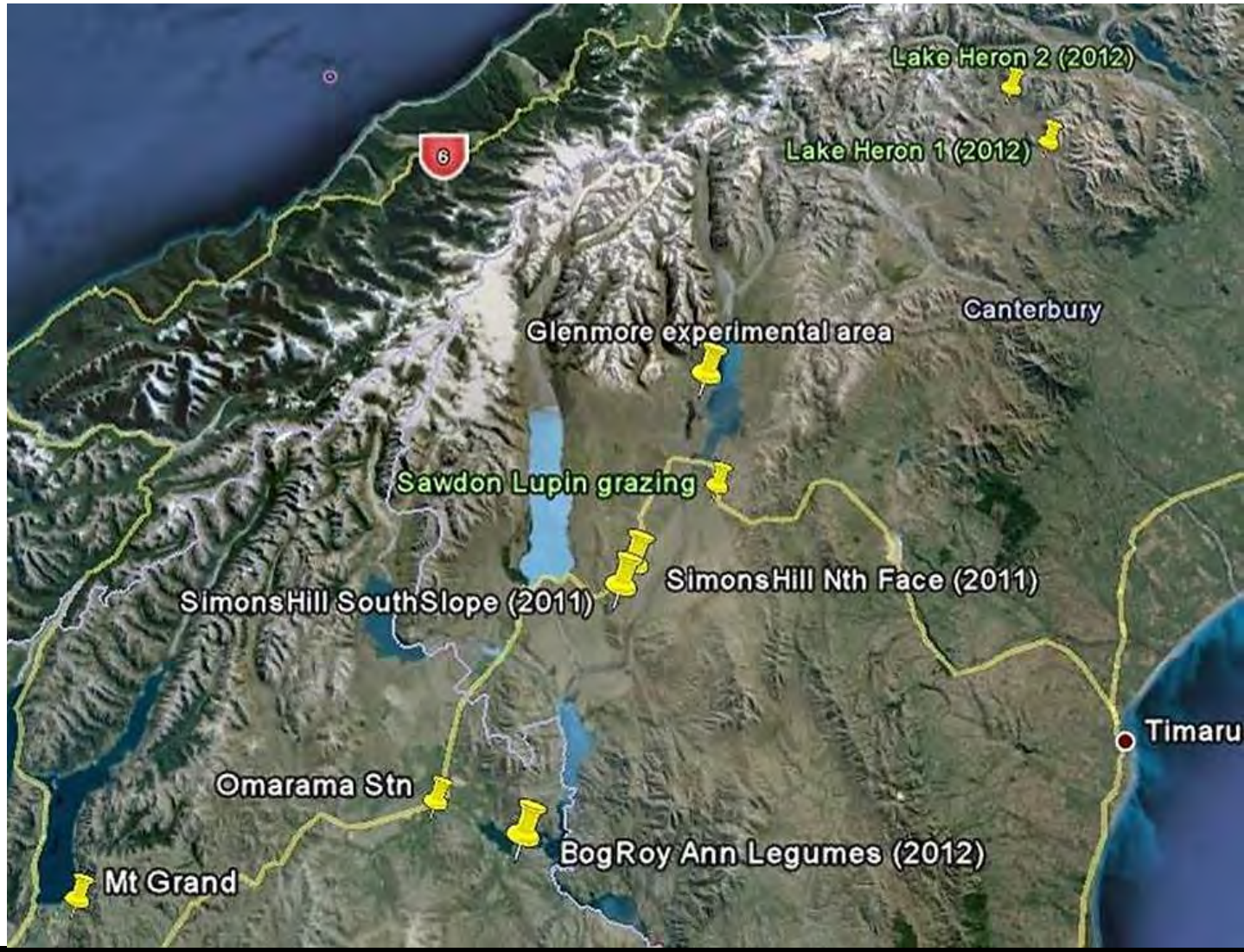
Lupin and Cc persistence

Change in species dominance over 25 years in response to five rates of superphosphate (1 = 0, 2 = 50, 3 = 100, 4 = 250 and 5 = 500 kg/ha/year) and grazing management (H = high stocking rate, M = moderate, L = low, and s = set stocking and m = mob stocking). A = alsike clover, C = chewings fescue, D = cocksfoot, H = hawkweed, K = Caucasian clover, L = Russell lupin, O = tall oat grass, W = white clover, and Z = fescue tussock (adapted from Scott, 2008).

Grazing	Year 2 - 4					Year 5 - 8					Year 9 - 12					Year 13 - 16					Year 17 - 20					Year 21 - 24				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Hs	L	A	A	L	A	H	A	A	H	W	H	L	K	K	C	H	K	K	K	C	H	K	K	K	C	H	K	K	K	C
Hm	L	L	L	L	W	L	L	L	L	D	H	L	L	L	K	L	K	K	L	K	L	K	K	K	K	L	K	K	K	K
Ms	L	L	A	L	A	H	L	L	A	W	H	L	L	K	C	H	L	L	K	C	H	L	L	K	C	H	L	L	K	C
Mm	L	L	L	L	A	H	L	L	L	D	H	L	L	L	D	H	L	L	L	C	H	K	K	K	K	H	O	O	K	C
Ls	L	L	L	L	A	H	L	L	L	D	H	L	L	L	C	H	L	L	L	C	Z	K	K	K	K	Z	O	O	K	C
Lm	L	L	A	L	A	H	L	L	L	L	H	L	L	L	L	Z	L	L	L	C	Z	O	O	O	K	Z	O	O	O	C

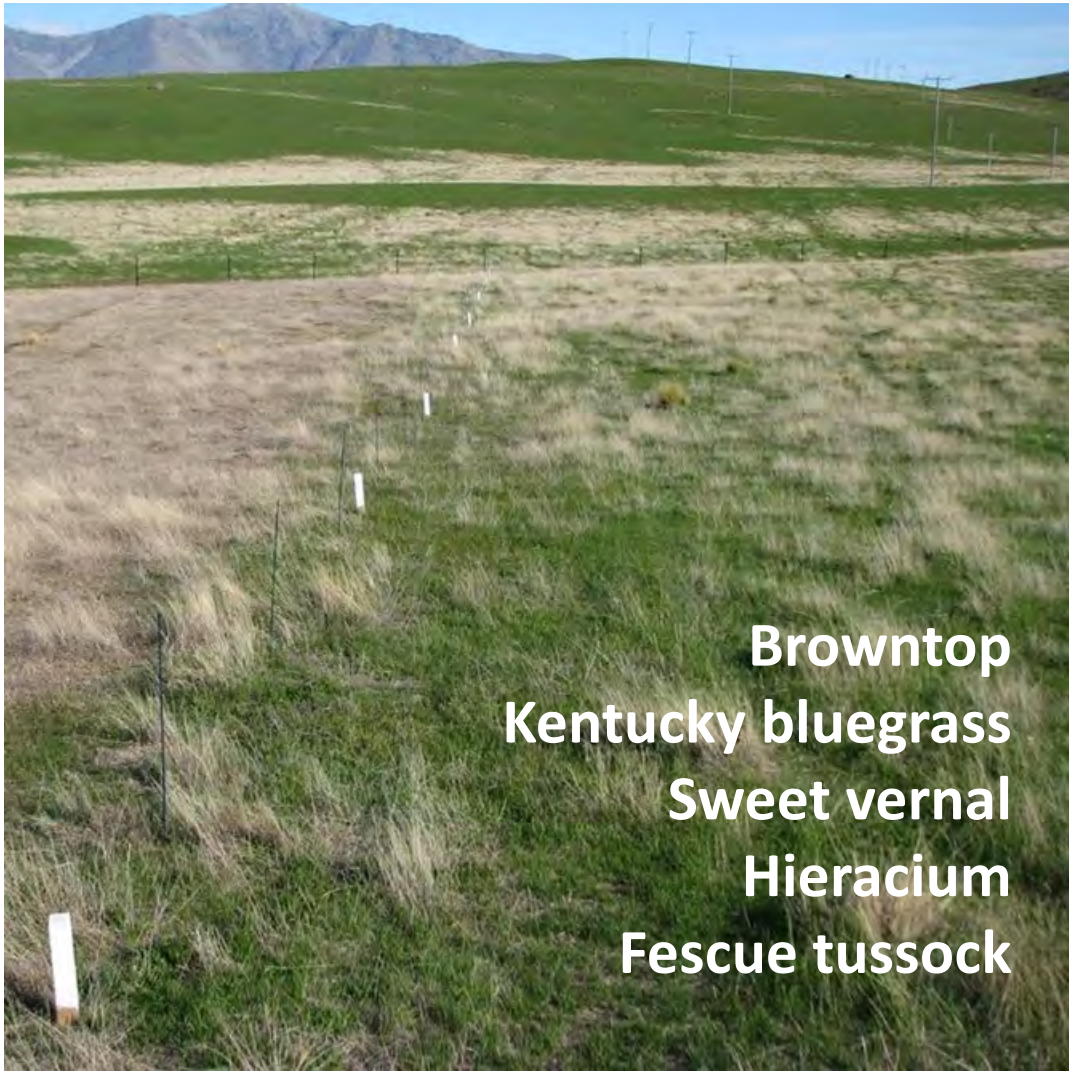
NZ Merino forage projects

- **Lake Heron**
- **Sawdon**
- **Glenmore**
- **Simon's Hill**
- **Bog Roy**
- **Omarama**
- **Mt Grand**



Glenmore Station

- Glacial moraine
- Low pH, high Al
- 630 mm rain

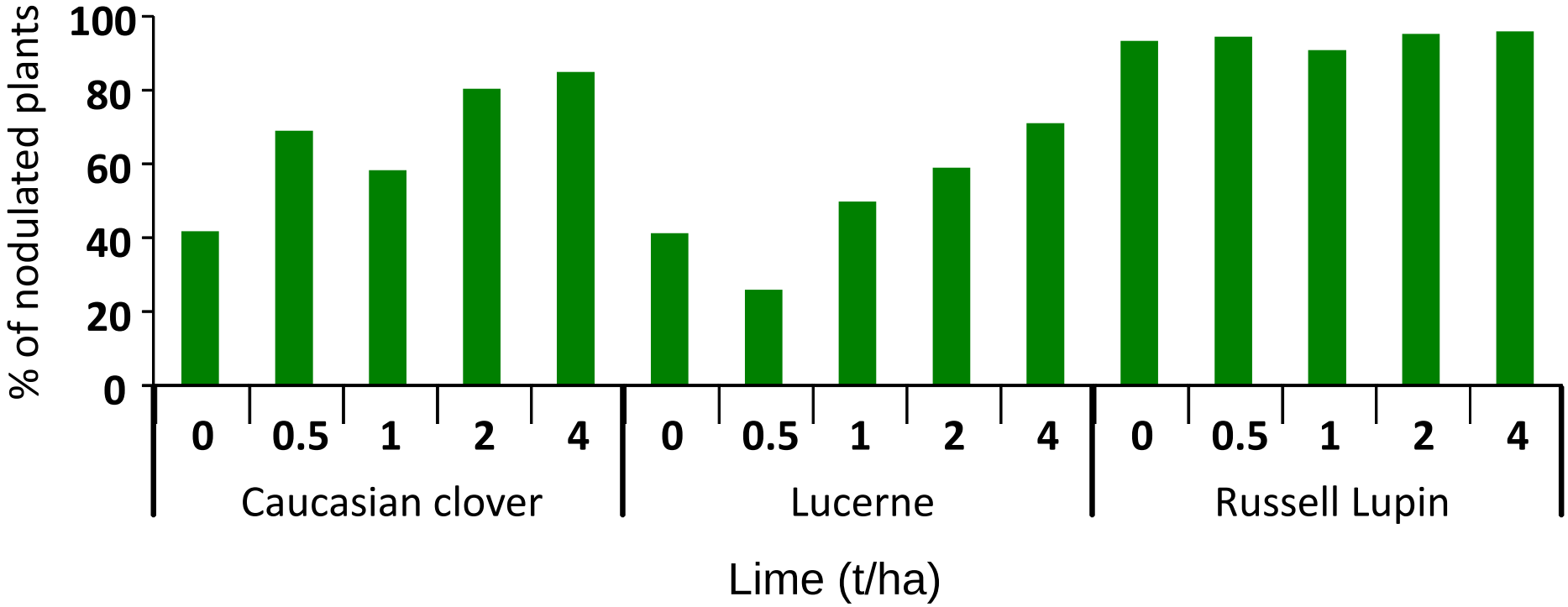


Plot trial – lucerne, lupin, Cc – 0, 0.5, 1, 2 & 4 t lime/ha


10 Dec 2012
Lupin 0 t lime/ha

Lucerne

Response to lime



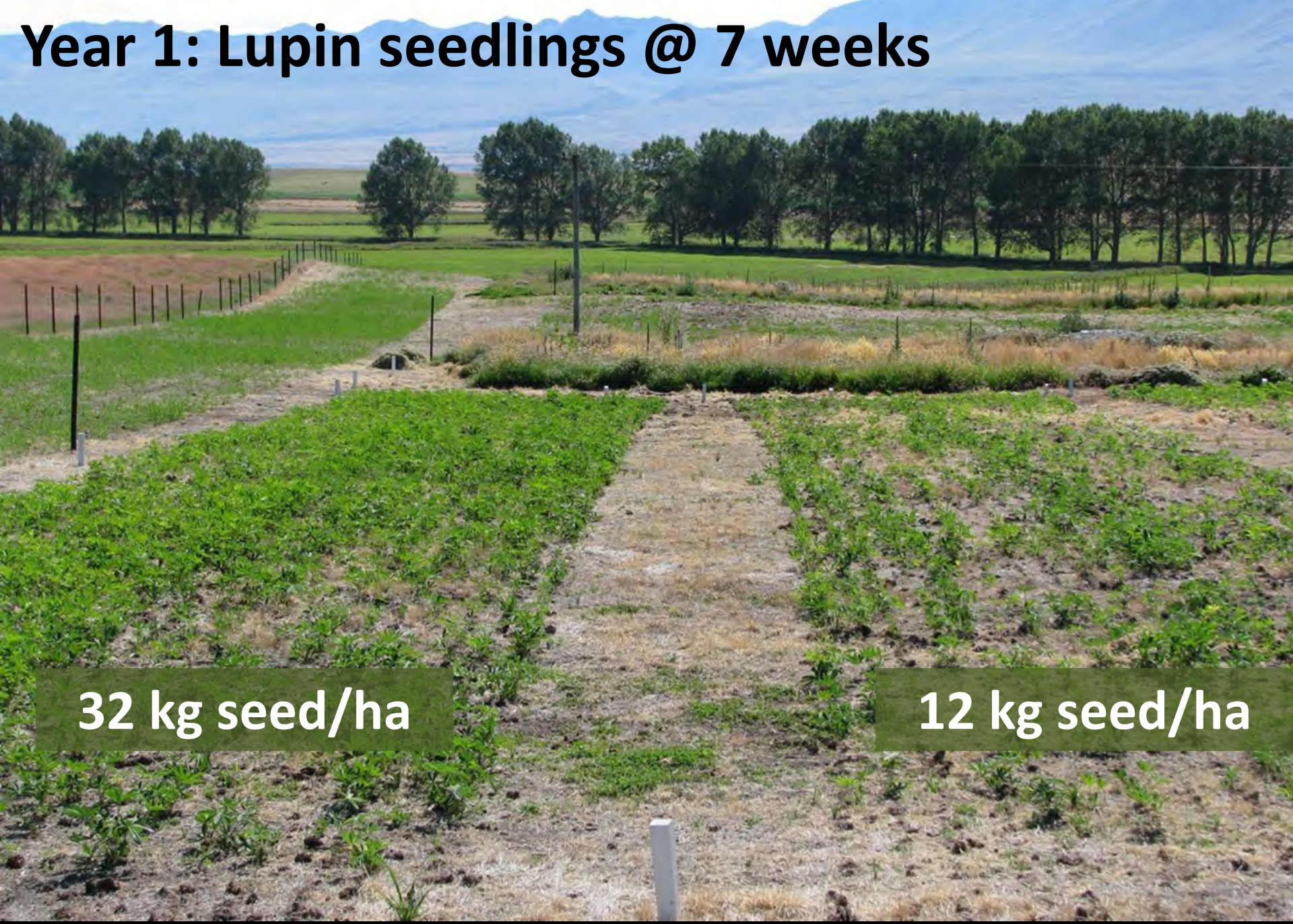
Bradyrhizobium spp. form root nodules on lupin

Feb 2014 - Cc

10 Dec 2012 – Lupin sowing rates

Russell and ‘Blue’ lupin
2, 4, 8, 12, 16 and 32 kg/ha

Year 1: Lupin seedlings @ 7 weeks



Year 2: 1 October 2013

Year 2: 1 October 2013

Year 2: 1 October 2013

Year 2: 3 December 2013

Year 2: 3 December 2013

Year 2: 3 December 2013

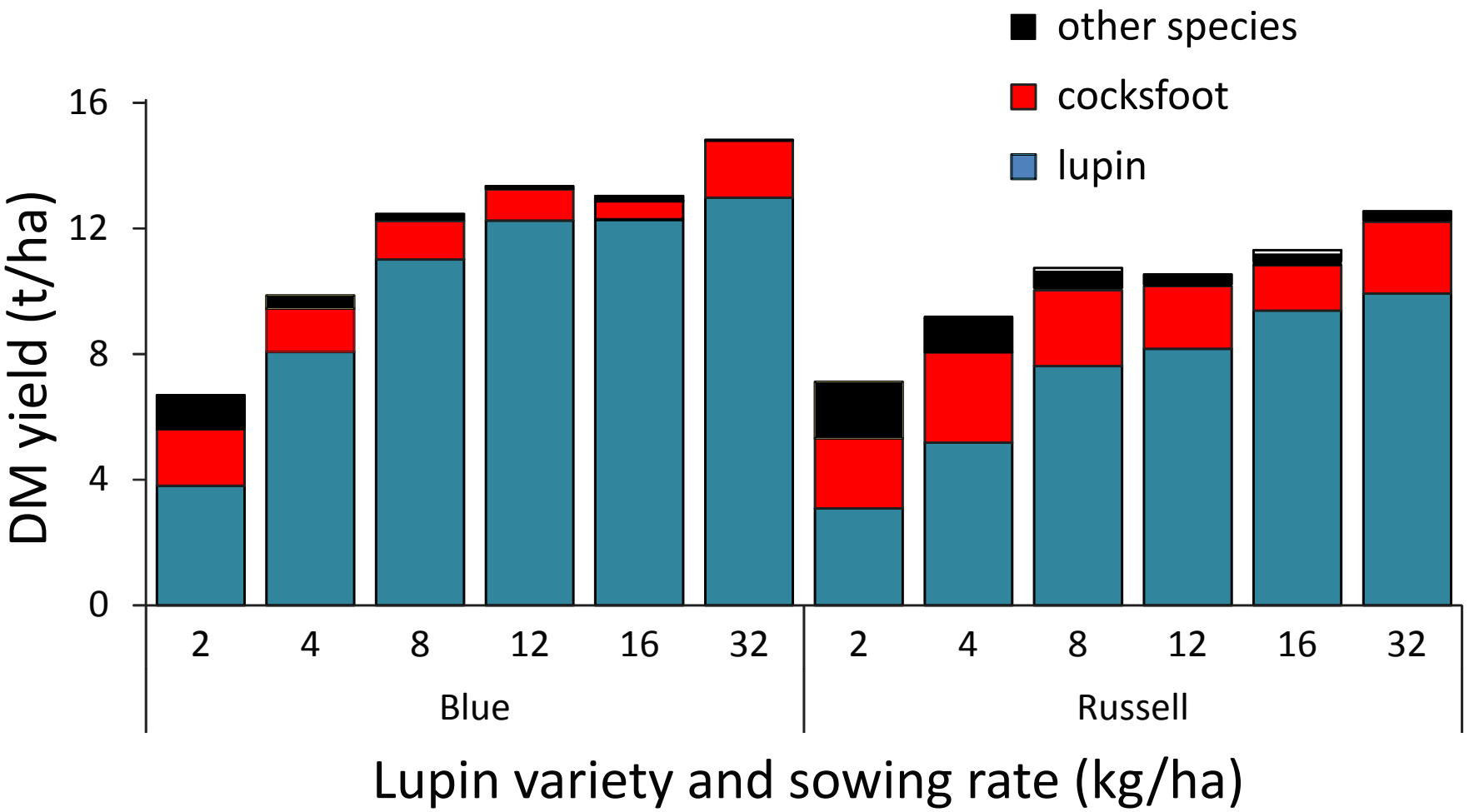
9 December 2013 - 1200 Merino 2-tooths.

Year 2: regrowth to end of March 2014

Year 2: regrowth to end of March 2014

Year 2: regrowth to end of March 2014

DM Yield: Year 2 (Sept-April)



Paddocks of lupin

- Sown December 2013
- After 1 year of ryecorn

Seedlings @ 6 weeks after sowing

Caucasian clover and cocksfoot included in the seed mix

4 months after sowing

4 October 2014 recovery after autumn graze

31 October 2014

Planting lupins – to date

- Autumn + spring herbicide (burn) ryecorn
- Sow in warm soil temperatures after fallow (December)
- Sow at 10 – 20 mm
- Sow at 8 kg/ha with cocksfoot + Cc
- Inoculate ?
- Fert 50 kg/ha S Super/yr
- Graze in year 1 (post- flowering)

Sawdon Station

July 2012

Winter survival

Lupin recovered after winter – 2 t DM/ha

Nov 2012

Nov 2012

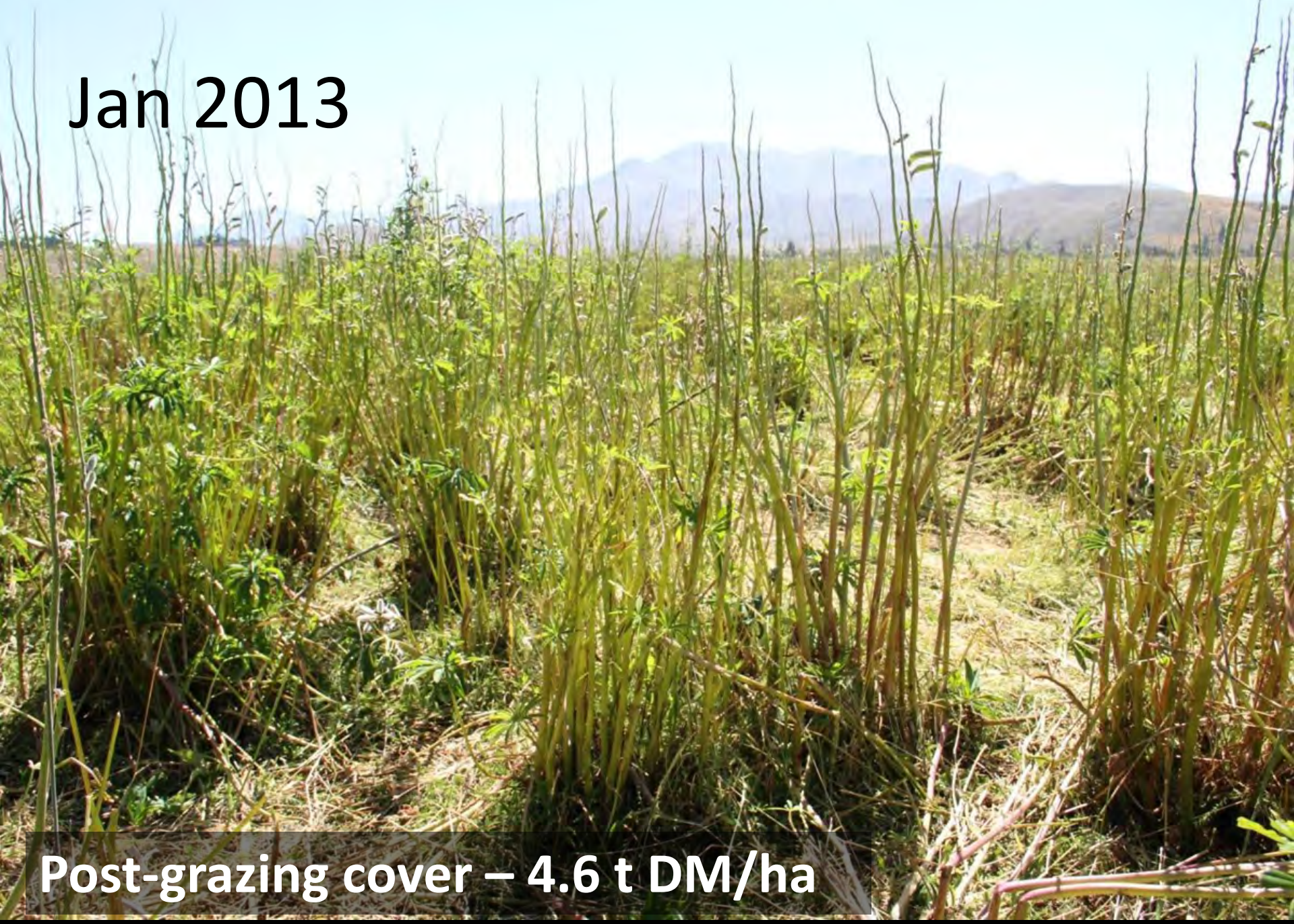
Cover during lambing – 6.1 t DM/ha


Dec 2012

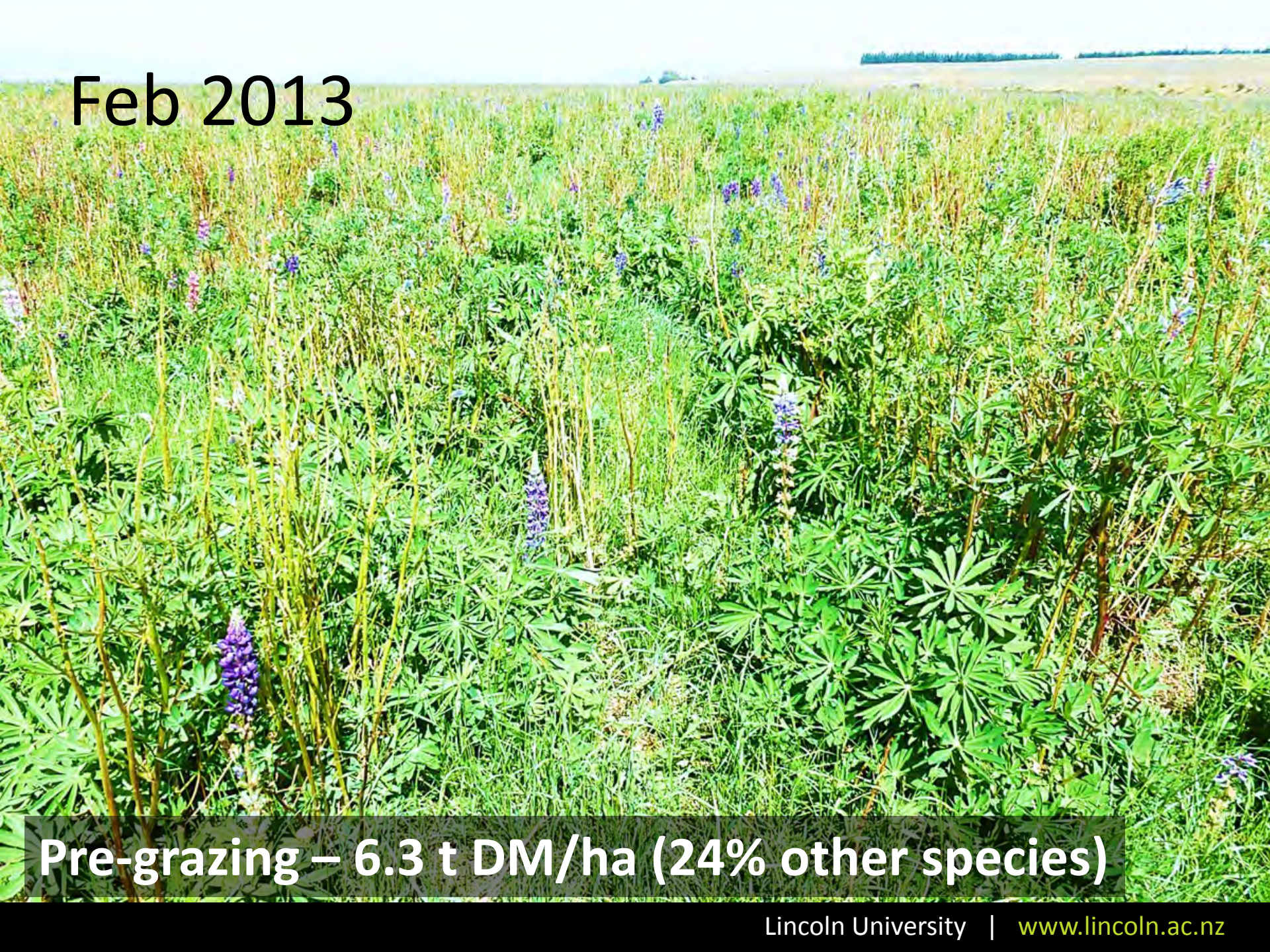

Dec 2012
Sheep ate the flowers first – 6.6 t DM/ha


Dec 2012
Deep taproot = summer survival
Root nodules = nitrogen fixation


Jan 2013
Pre-grazing cover – 7.6 t DM/ha

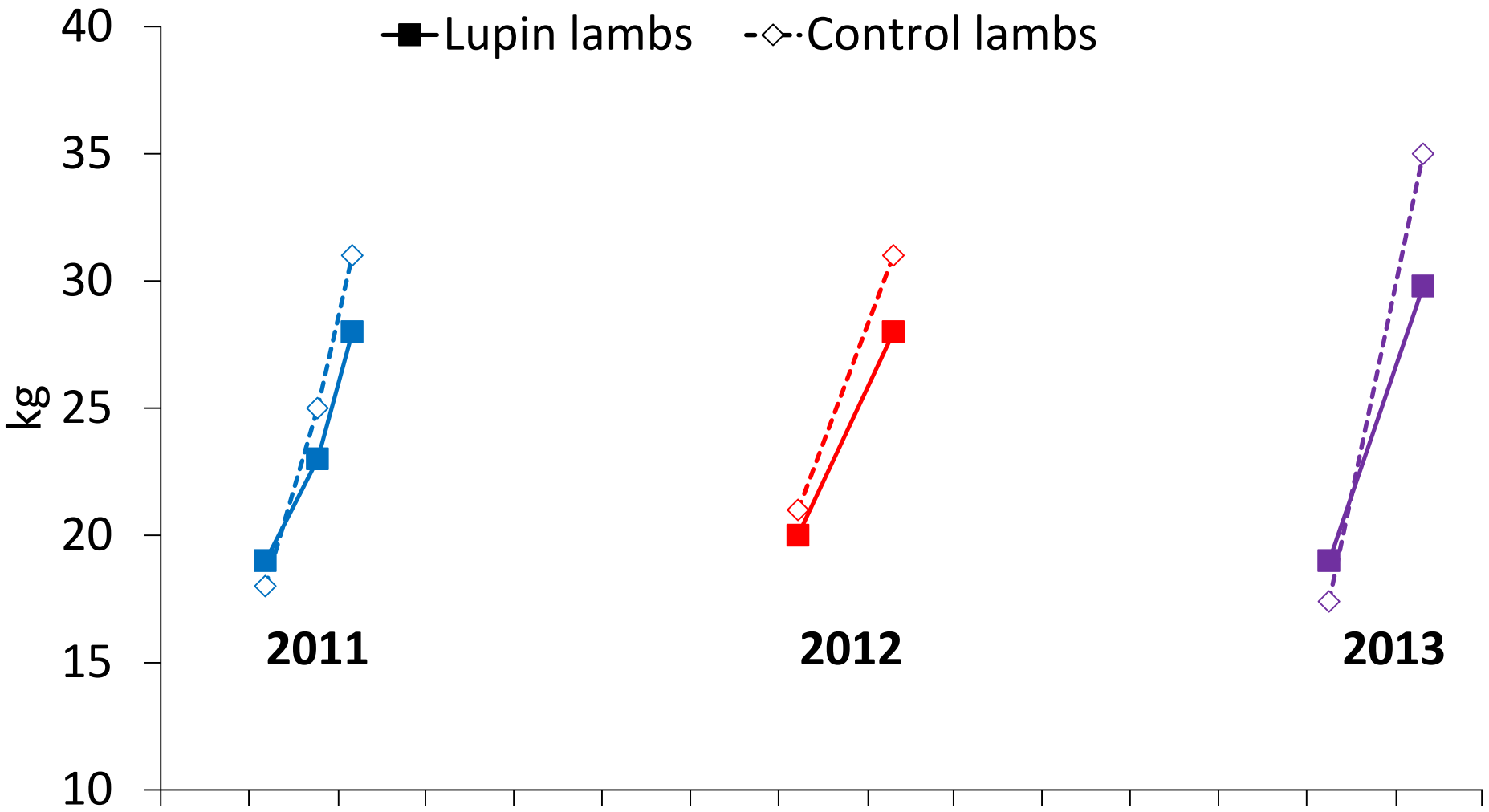

Jan 2013
Post-grazing cover – 4.6 t DM/ha

New leaves regrow from basal shoots


Feb 2013
Pre-grazing – 6.3 t DM/ha (24% other species)


May 2013
Pre-grazing cover – 4.9 t DM/ha

Lamb growth (Dec – Feb)



Wool production

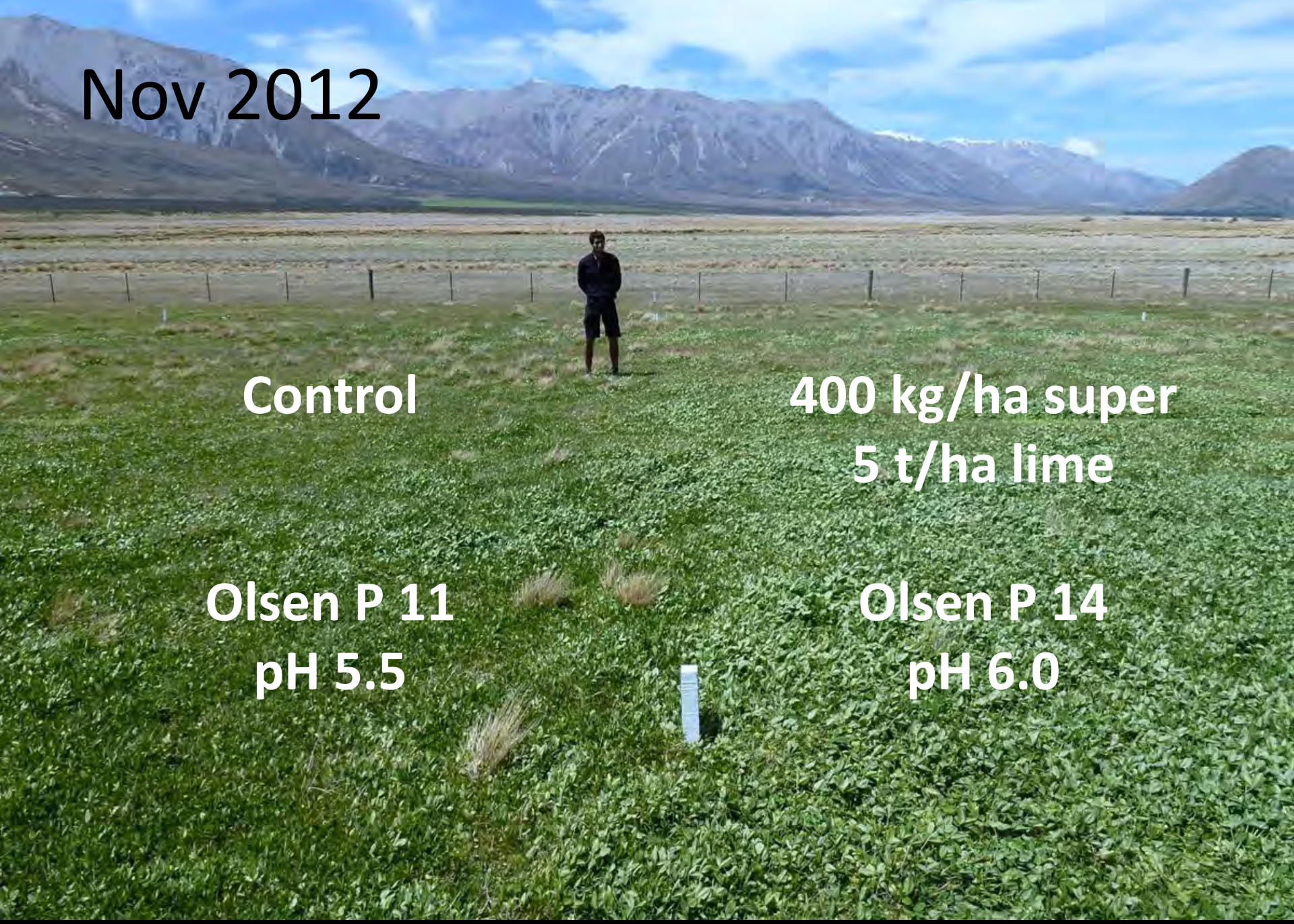
	Lupin	Control
Fleece weight (kg)	4.64	4.92
Staple length (mm)	79	80
Mean micron (µm)	18.6	18.5

Lupin nutritive value

	ME value	Crude protein
Lupin leaf	11.2	20.0%
Lupin stem	10.7	19.5%
Other species	10.5	16.0%


Lake Heron Station
Dec 2011
Caucasian clover – 10+ years old
680 m a.s.l.
pH 5.5, Olsen P 5


Feb 2012
0, 100, 200 & 400 kg/ha of super
0 and 5 t/ha of lime


Nov 2012
Control
400 kg/ha super
5 t/ha lime
Olsen P 11
pH 5.5
Olsen P 14
pH 6.0

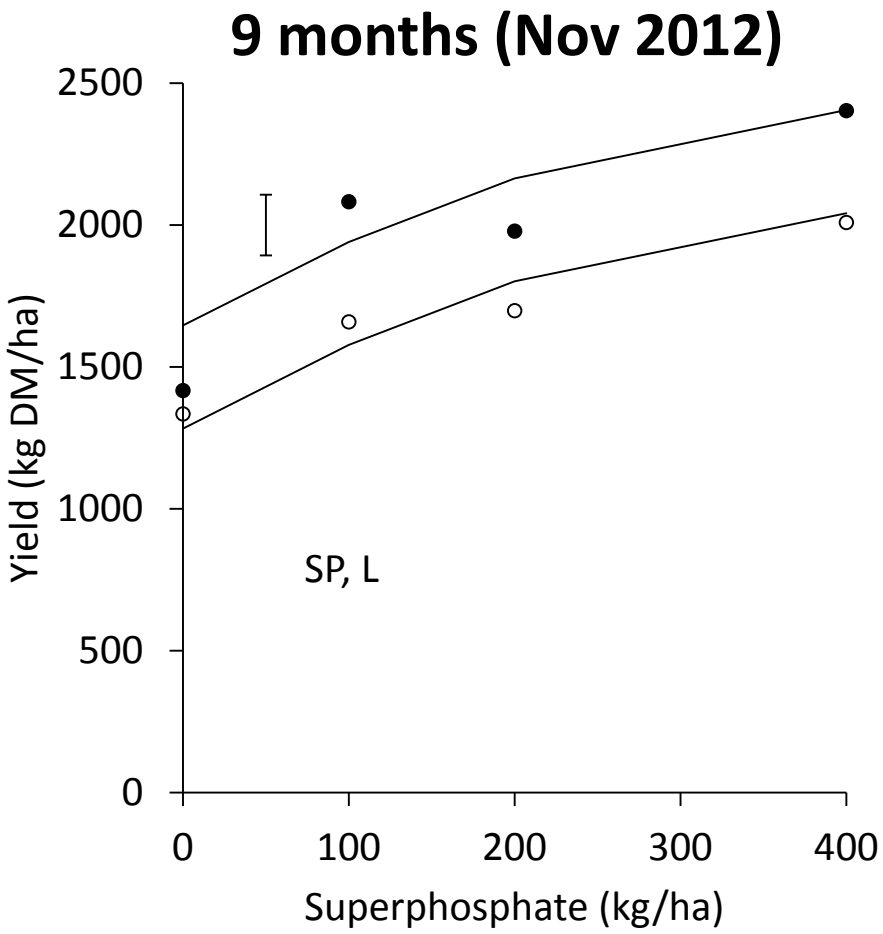
Feb 2013

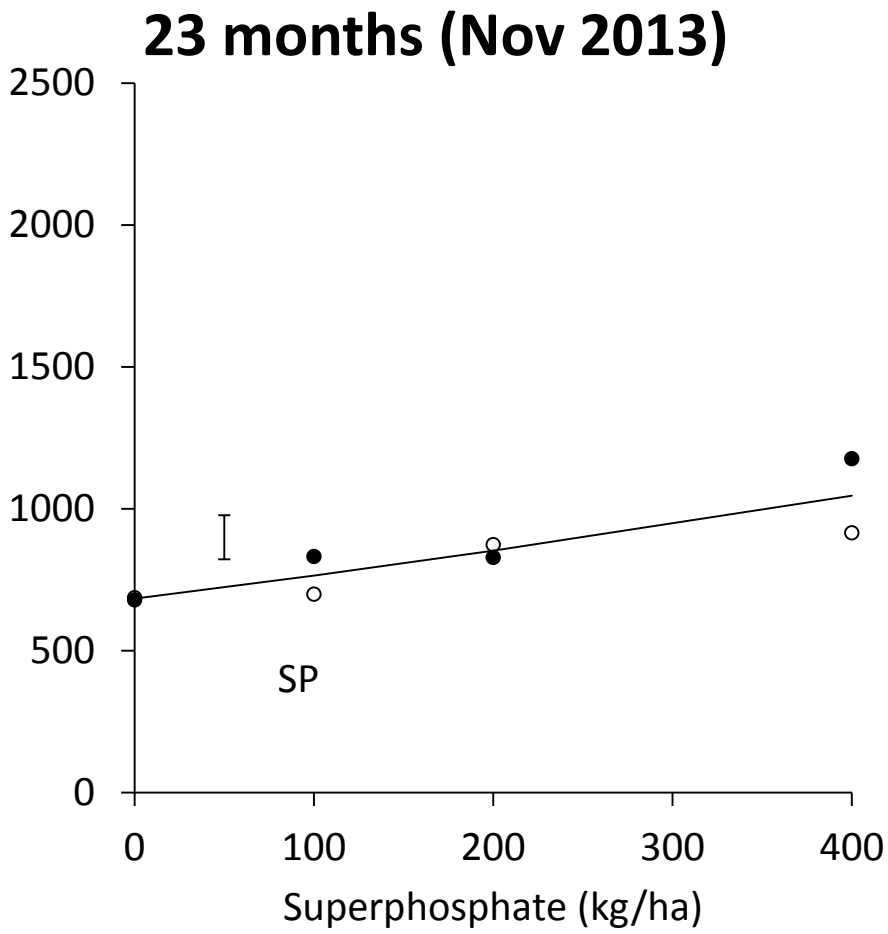

Nov 2013

Jan 2014

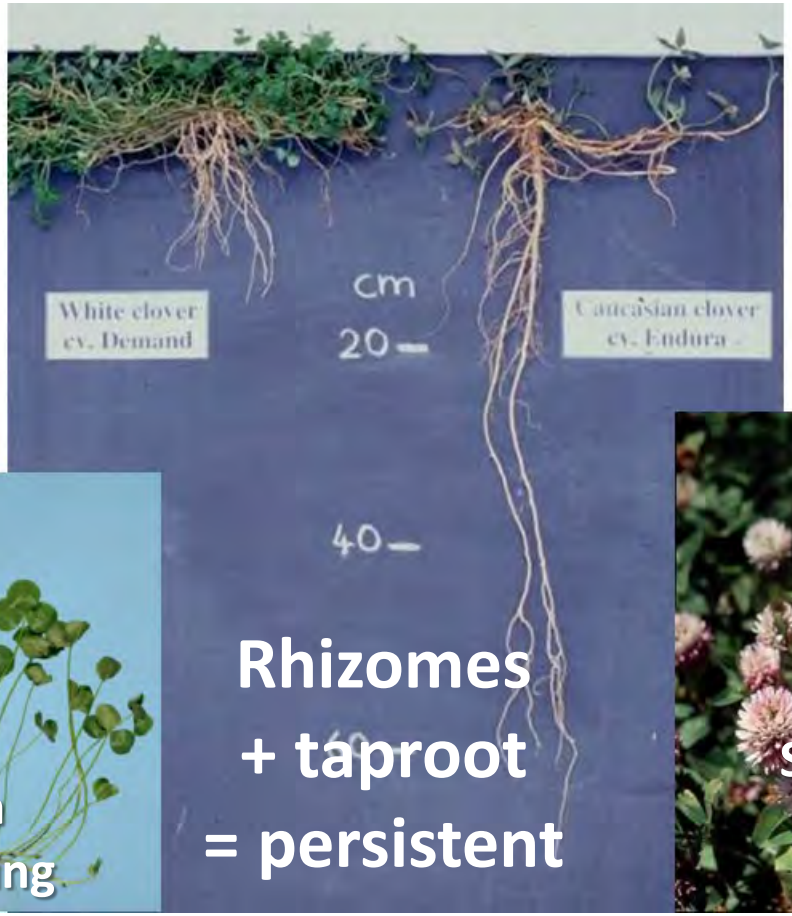
Mar 2014

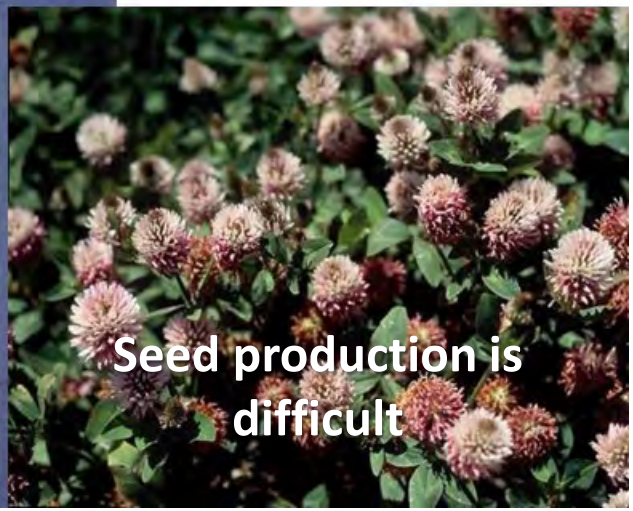
Caucasian clover yield





Caucasian – what we know?






Bog Roy Station

Bog Roy Station
Annual clover trial
Oct 2012

Indigenous annual clovers


Striated clover


‘Mt Barker’ sub clover


‘Rosabrook’ sub clover


Omarama Station
Balansa clover trial
Jan 2012

Oct 2012


Balansa clover


Root nodules on balansa clover


Mt Grand Station
Balansa hay paddock
Jan 2012


Balansa regeneration

Balansa hay loaded with seed

Roll it down the hill


Spread salt over the hay and sheep bury the seed

New look website

Handouts & presentations

Direct link to Blog

www.lincoln.ac.nz/dryland

Early autumn rains give perfect conditions for Sub clover

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Posted on behalf of Dick Lucas

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Acknowledgments

- The farmers – for daring to try
- Denis Fastier – keeping academics grounded
- NZMerino – for funding

Mt Benger, North Canterbury