

PGGW – Kimihia

26 June 2014



**Lincoln  
University**  
*Te Whare Wānaka o Aoraki*  
AOTEAROA • NEW ZEALAND



# **LUCERNE**

## **- agronomy and grazing management**

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New Zealand's specialist land-based university



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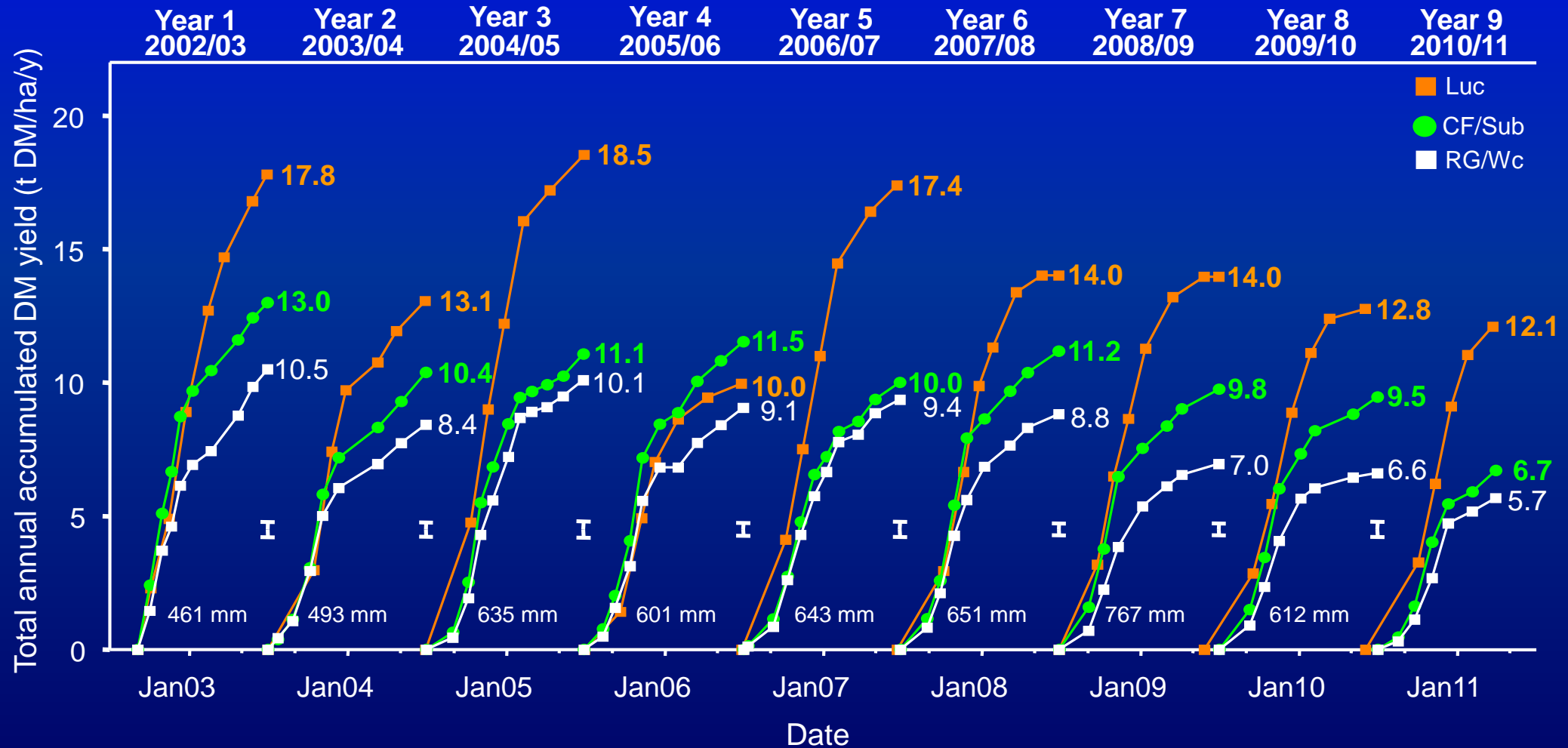
**RG/Wc**  
**Lucerne**  
**CF/Sub**  
**CF/Balansa**  
**CF/Cc**  
**CF/Wc**

**'MaxClover'**



# 'MaxClover' Total DM Yields

(to 30 March 2011)





Spring  
Year 2



Summer  
Year 4

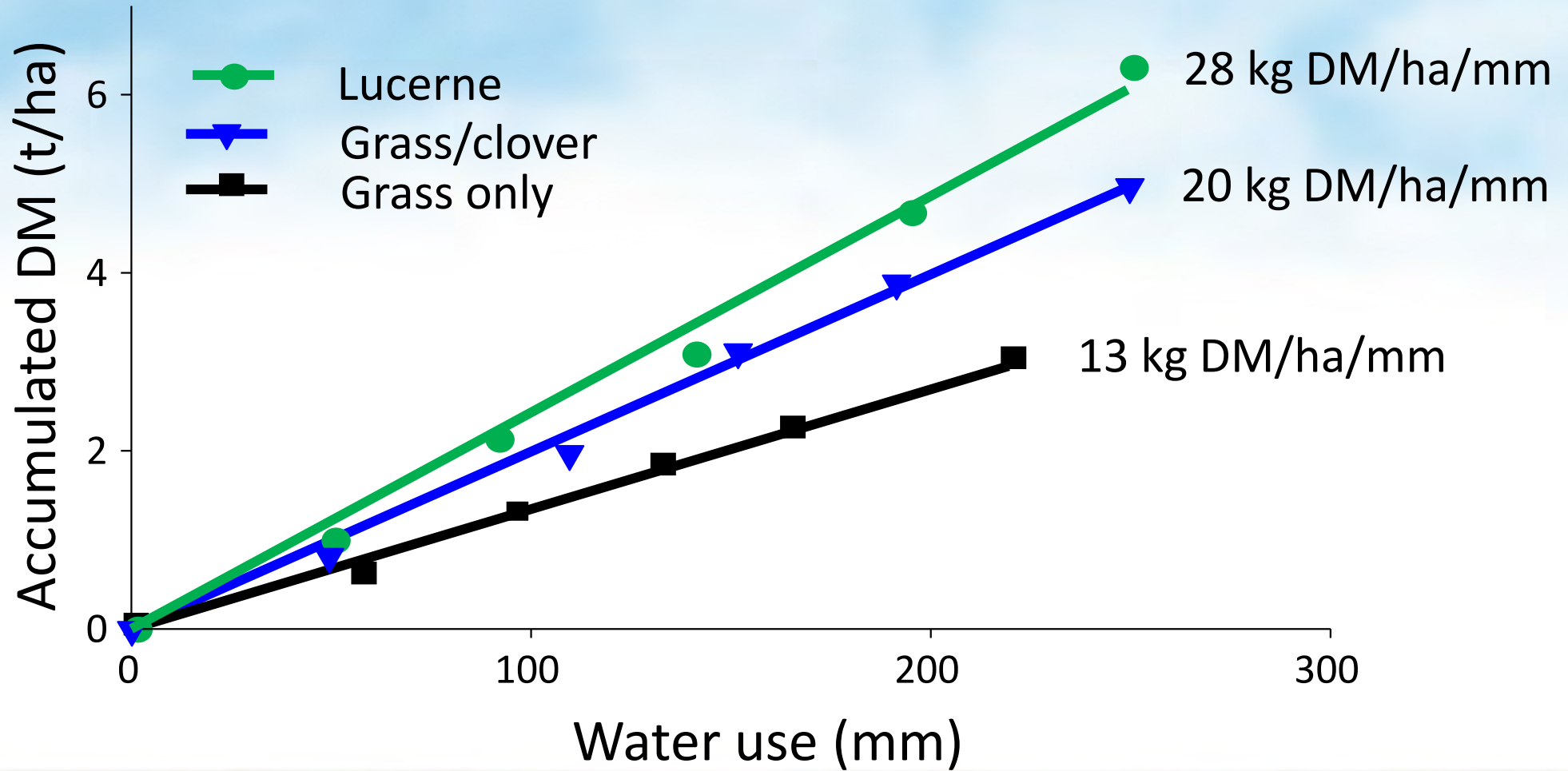


Unsown species <5% in Year 1.. .....>45% in Year 6

# RG/Wc pastures



# Spring WUE



# Nitrogen deficient pasture



1000 kg N/ha



# Ryegrass/clover vs. Lucerne



# Resistance to Pests and Diseases

Cultivar	Dormancy	BGA	PA	SAA	BW	SN	PRR	VW	LD
Grasslands Kaituna	I	R	R	R	R	R	R	-	MR
Grasslands Otaio	I	R	R	R	R	R	R	-	S
Grasslands Torlesse	D	HR	R	R	R	-	R	-	MR
P54Q53	D	MR	MR	MR	HR	HR	HR	-	-
P54V09	D	-	HR	R	HR	HR	HR	HR	-
Runner	D	-	-	-	R	-	S	-	-
Wairau	SD	S	S	S	S	S	S	S	S
WL 325HQ	I	R	R	R	R	MR	R	-	-

BGA = Blue-green aphid

BW = Bacterial Wilt

VW = Verticillium wilt

PA = Pea aphid

SN = Stem nematode

LD = Leaf diseases

SAA = Spotted alfalfa aphid

PRR = Phytophthora root rot

D = Dormant

SD = Semi-dormant

HR = 50%+ resistant

MR = 16-30%

R = Resistant = (31-50%)

S = Susceptible



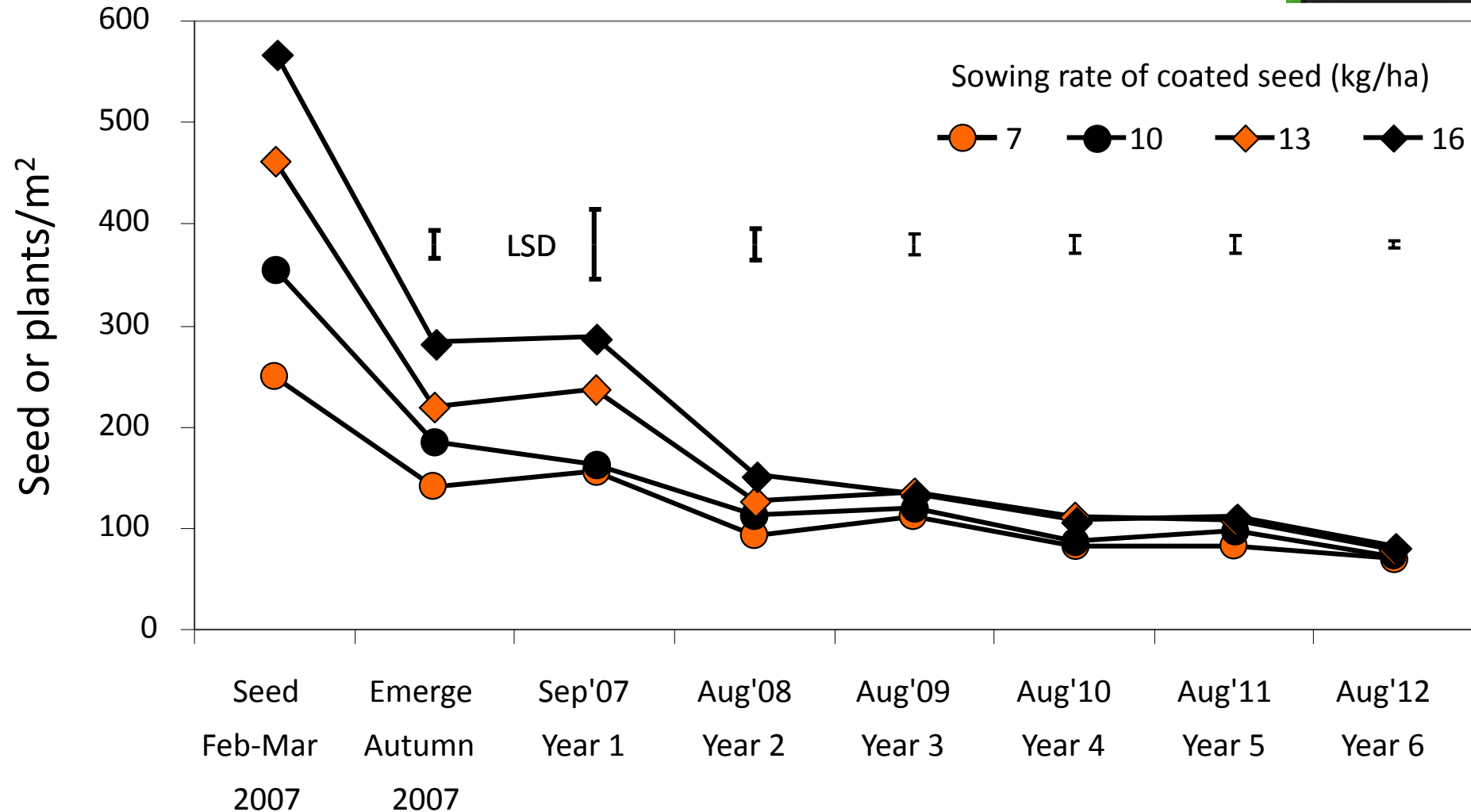
# 1. Lucerne establishment

- Soils**
- deep free draining
  - pH 6.0 – 7.0
  - rg/wc fertility

- Sowing**
- inoculated
  - 10-25 mm
  - bare or coated 8-10 kg/ha
  - spring or autumn (grass grub)
  - cultivated or direct drilled
  - after fallow?

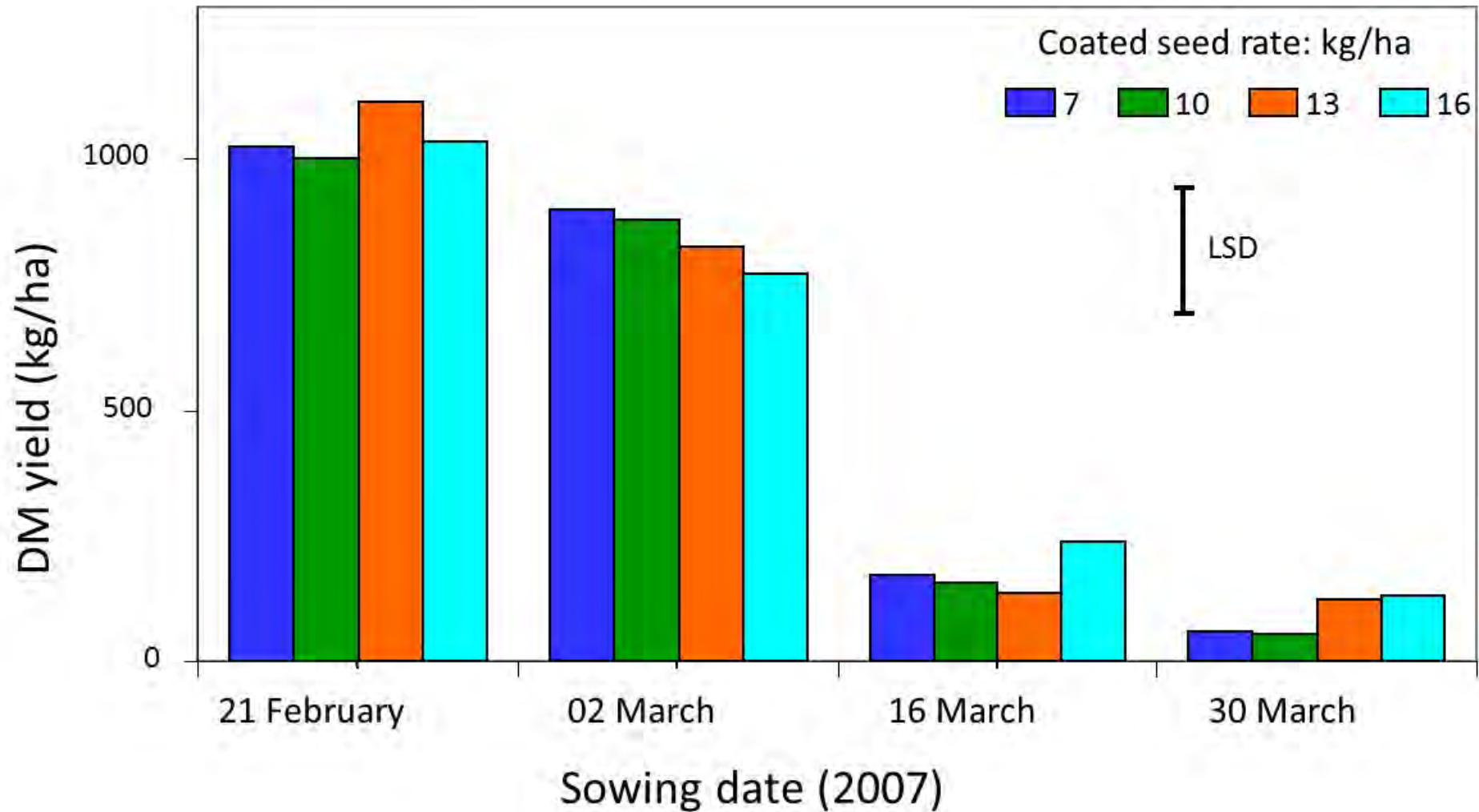


# Sown seed and plant population over time





# Seedling lucerne yield to early June





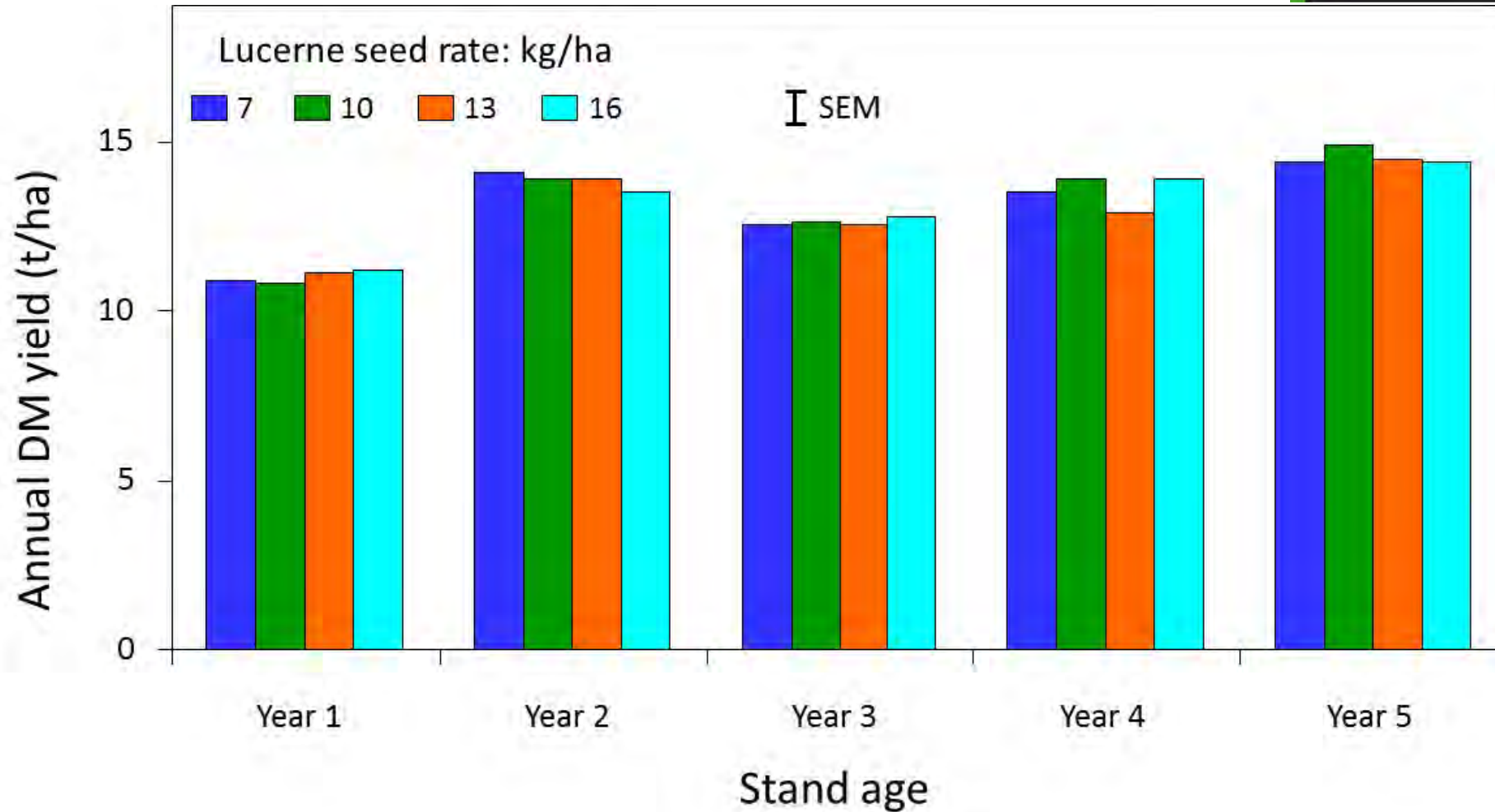
# Weeds present @ 09 October 2007 (Year 1)

Sown 21 Feb 2007

Sown 30 Mar 2007

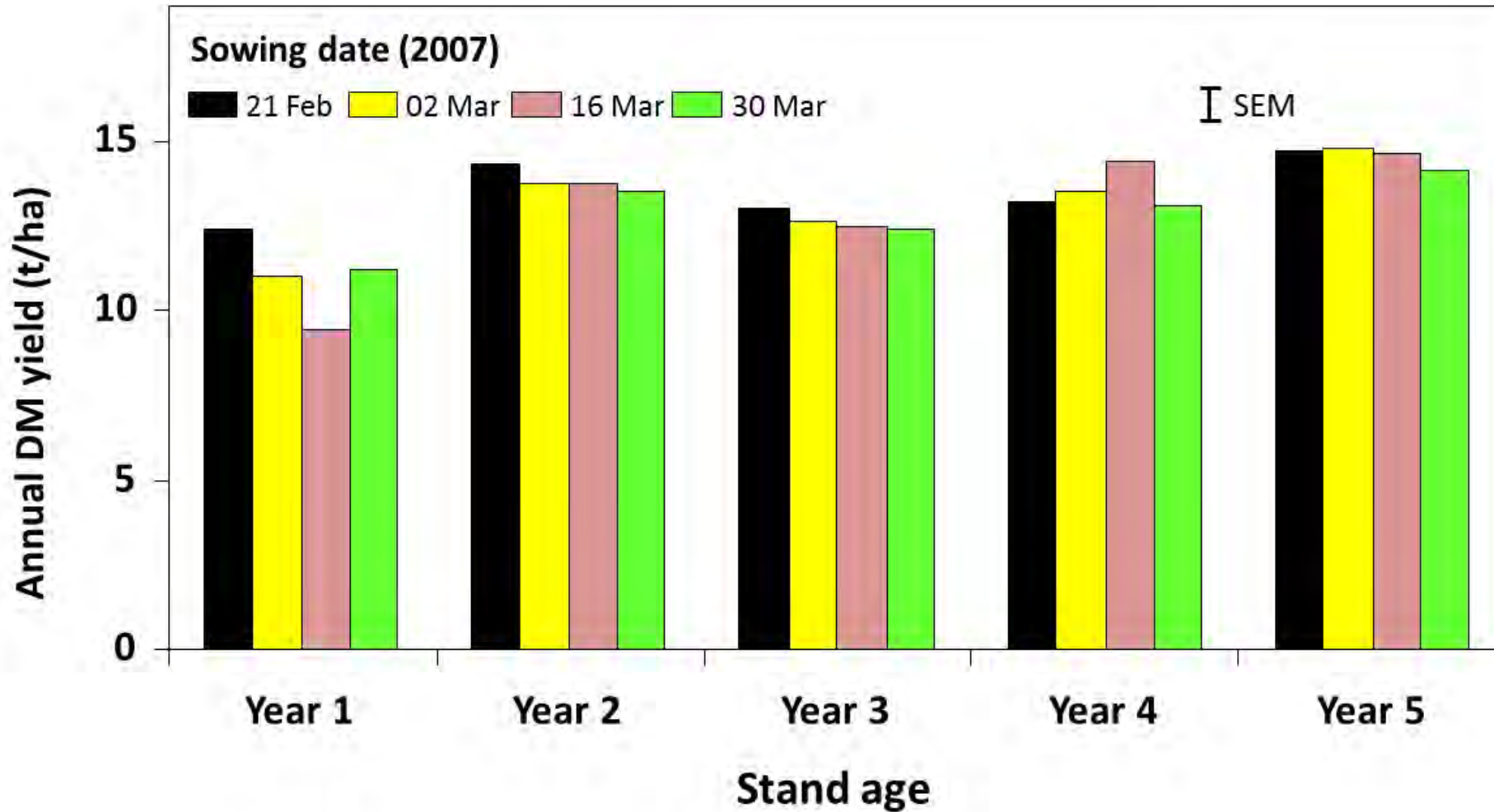


# Annual yield in relation to sowing rate





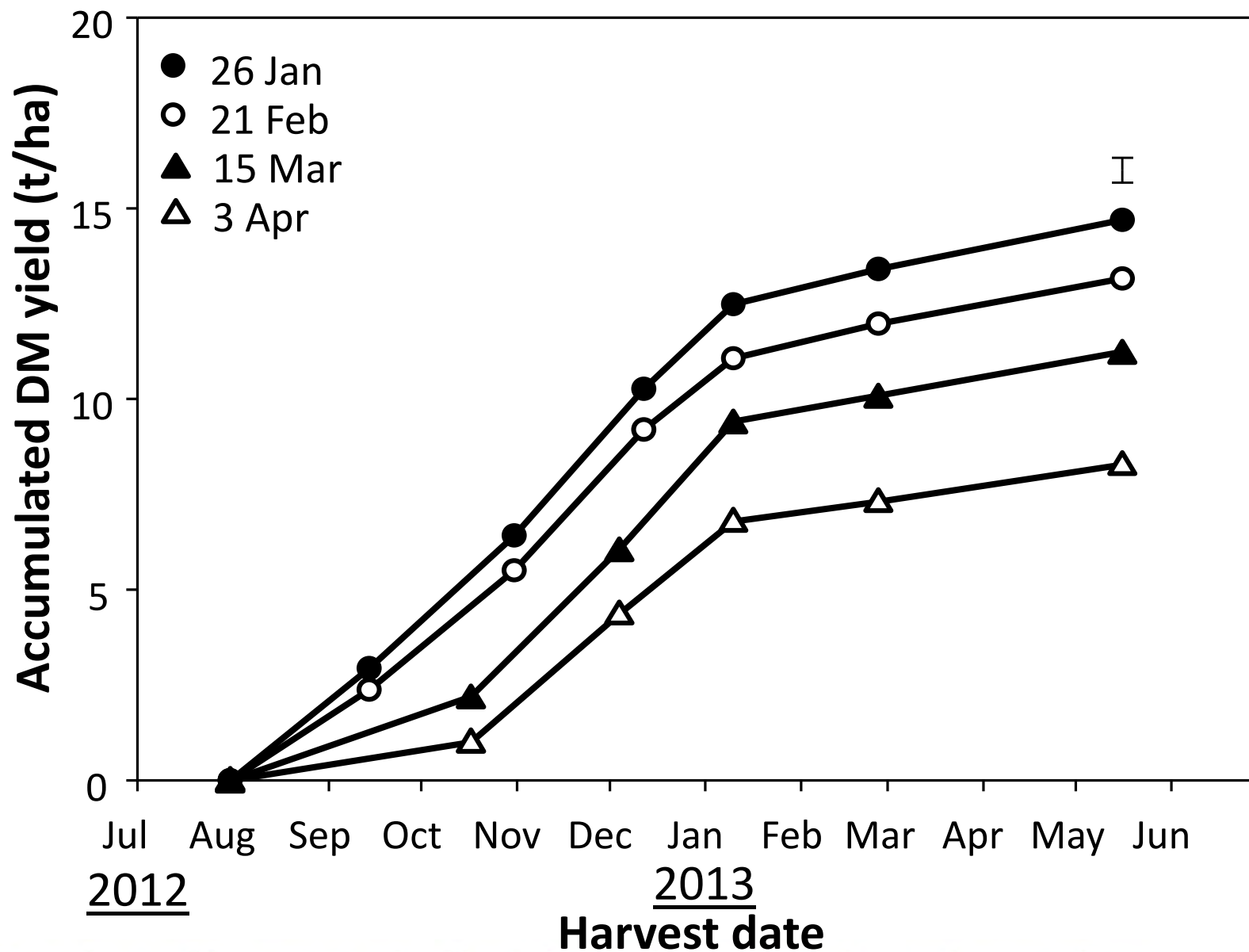
# Annual yield in relation to sowing date

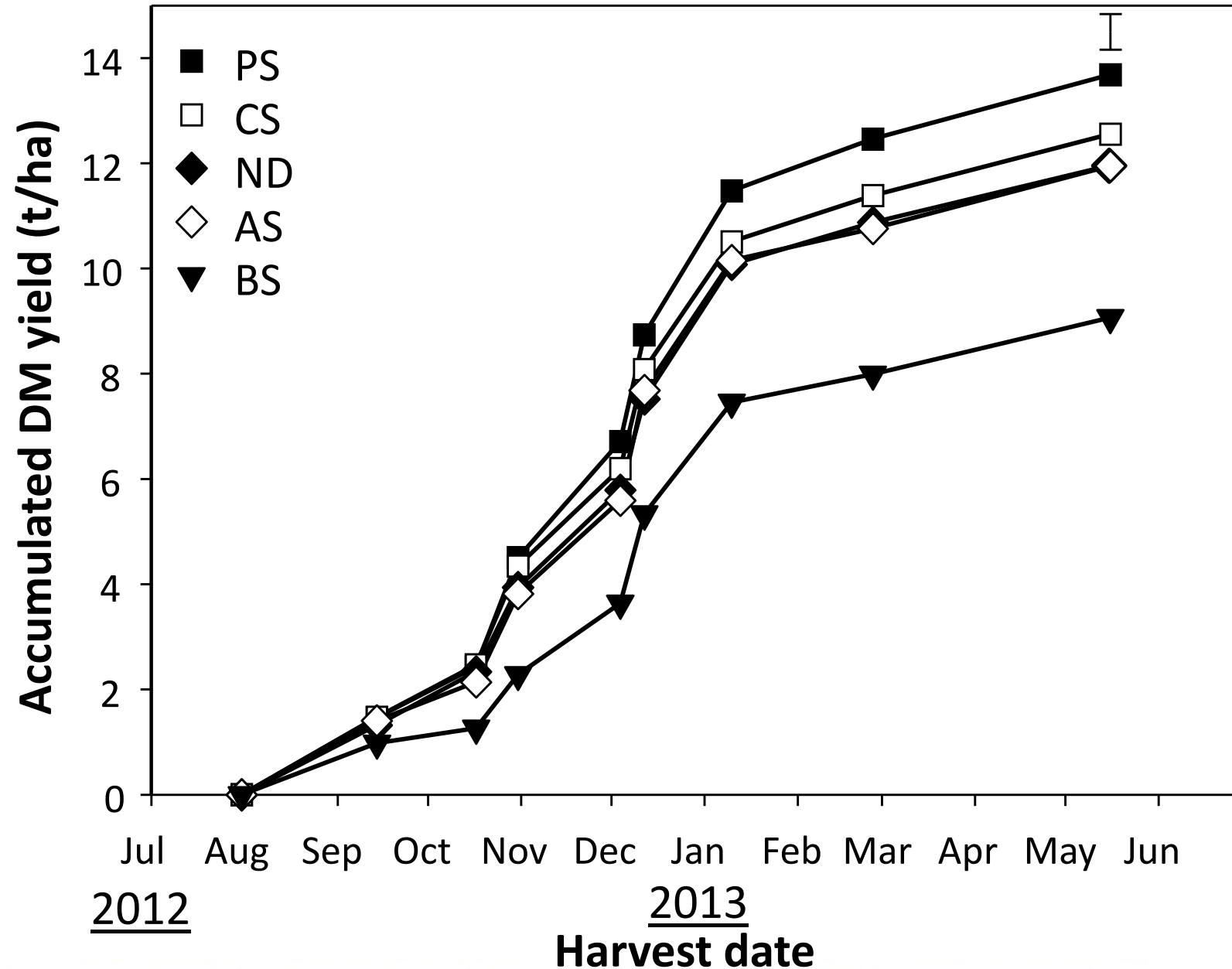


# The Experiment

- At Lincoln University
- Dryland, variable silt loam soil
- No history of lucerne
- Split plot design with 3 replicates
- 4 sowing dates
- 4 seed inoculant technologies used
- Bare seed control also used (no rhizobia)









No inoculant (bare seed)





Inoculated with peat

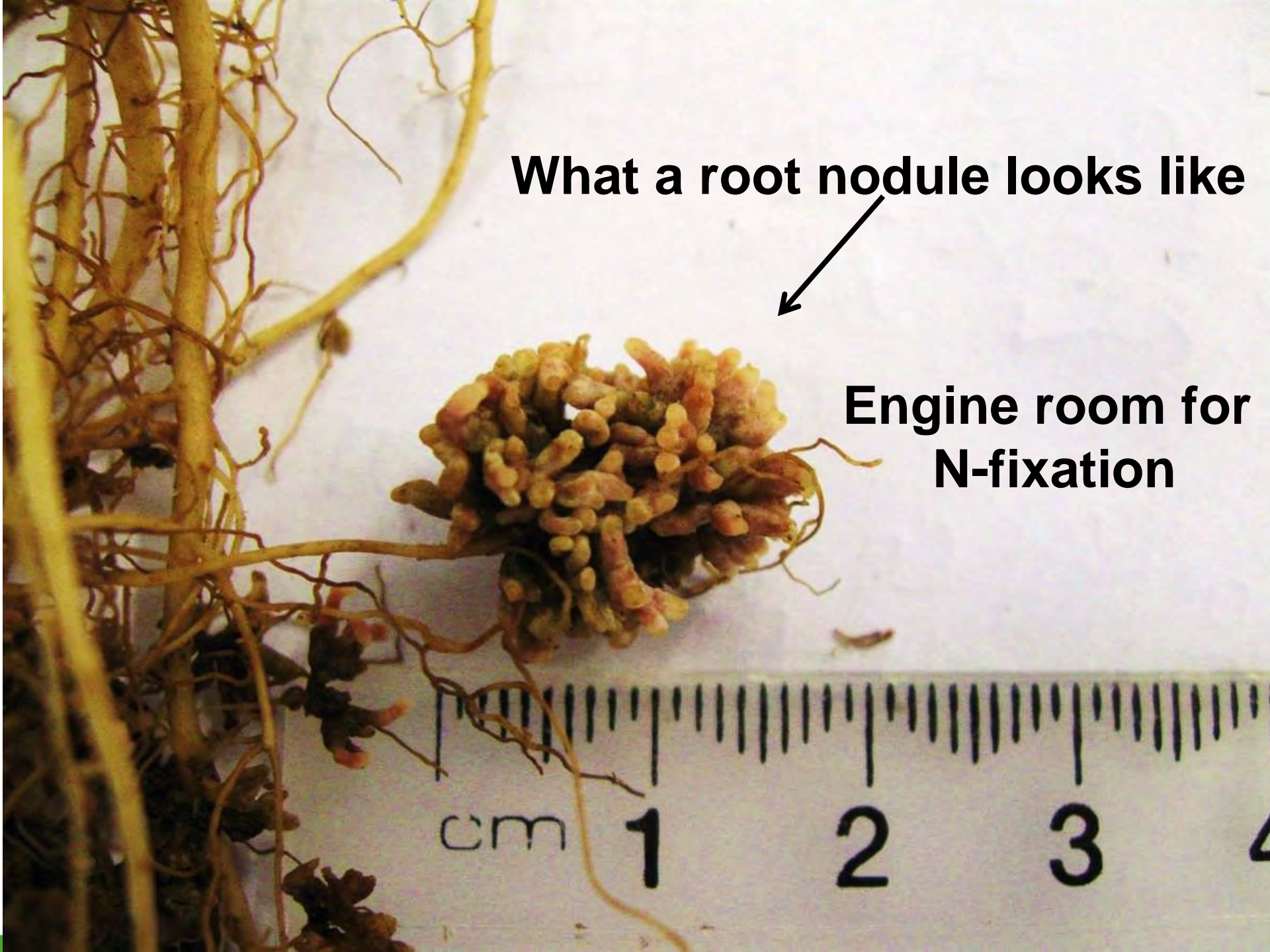




**What a root nodule looks like**



**Engine room for  
N-fixation**





# Pre-development

- browntop
- hieracium
- sweet vernal
- <5% legume





**Low palatability**  
**Low production**  
**Low legume**



# Lime and Fertiliser Application

Lime 3-5 ton/ha

Fertiliser 250-500kg/ha



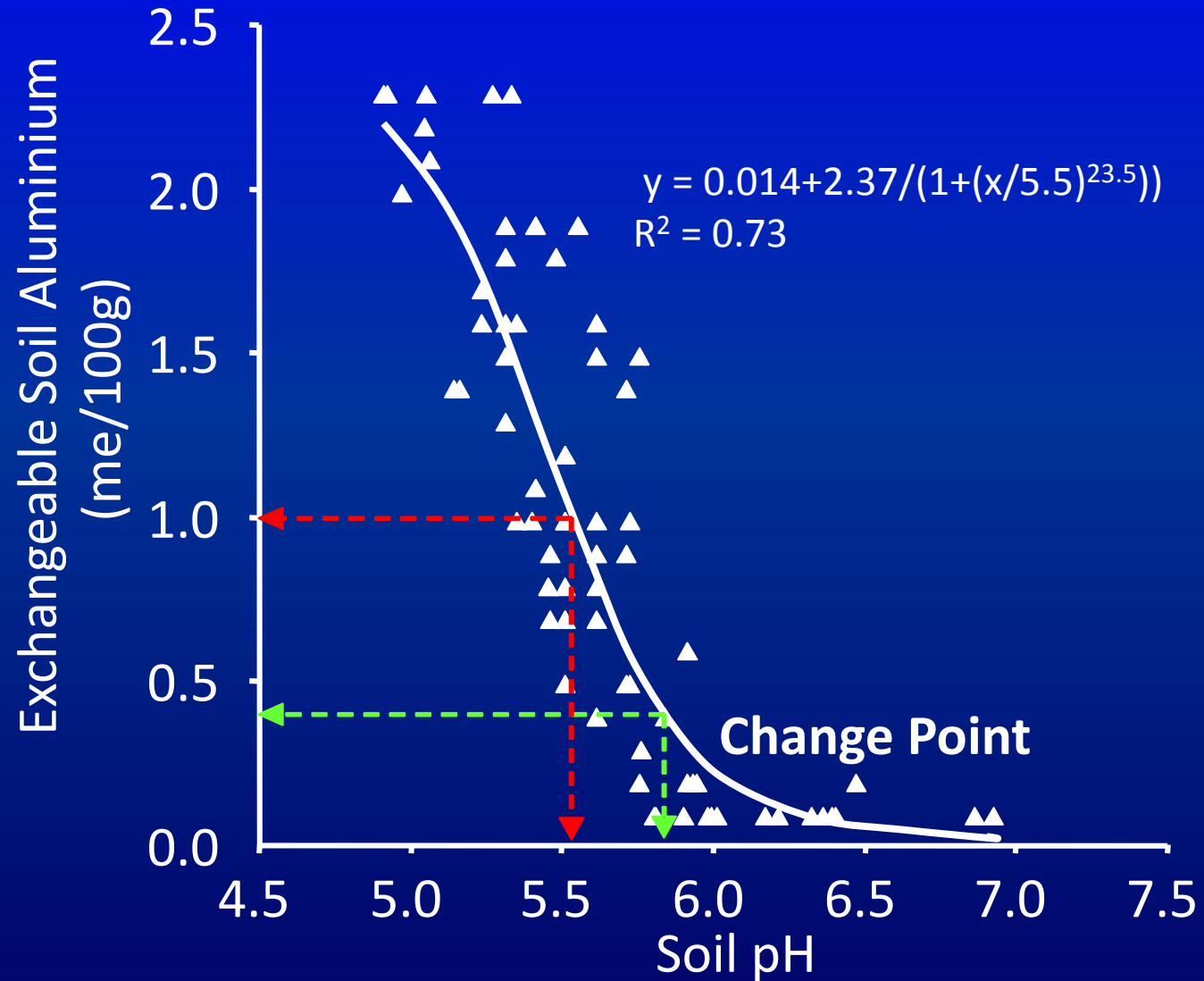
Typical 0.15 m soil test results for pre (2008) and post (2010) fertiliser applications from three Central Otago farms.



	pH	Olsen P (ug/ml)	Potassium (QTU)	Sulphur (ug/g)	Aluminium (mg/kg)
<b>Pre-Development (2008)</b>					
Hills Creek	5.2	10	5	14	2.6
Huntleigh	5.2	10	5	1	6.3
Styx	5.2	13	13	3	5.7
<b>Post-Development (2010)</b>					
Hills Creek	5.8	19	9	31	0.9
Huntleigh	6.0	18	4	25	1.5
Styx	6.1	29	13	23	1.1



# Soil pH & exchangeable Aluminium



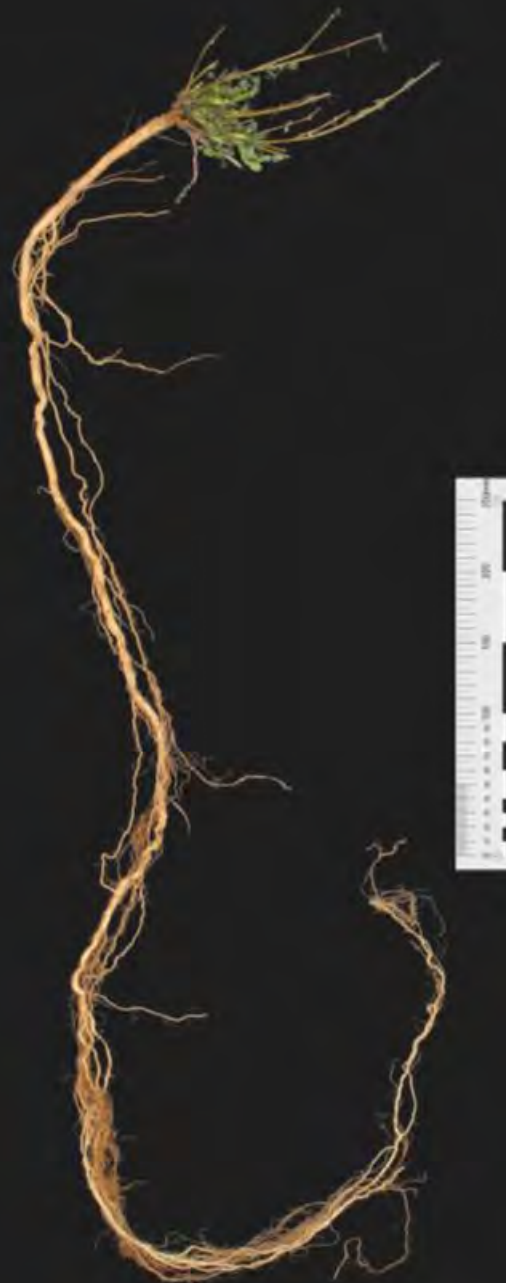






# Lucerne root

~8 months after sowing  
> 1.5 m length





# Autumn Spraying

- Timing is Critical
- Most important tool
- Glyphosate, granstar, penetrant

## Key Results

- Conserve soil moisture
- Kill mass root systems





**2<sup>nd</sup> Spray – Spring**  
Glyphosate, insecticide, penetrant

Result from Autumn spray, photo taken 1 November 2010



Drilling seed with fertiliser  
Direct drilling = seed + fertiliser



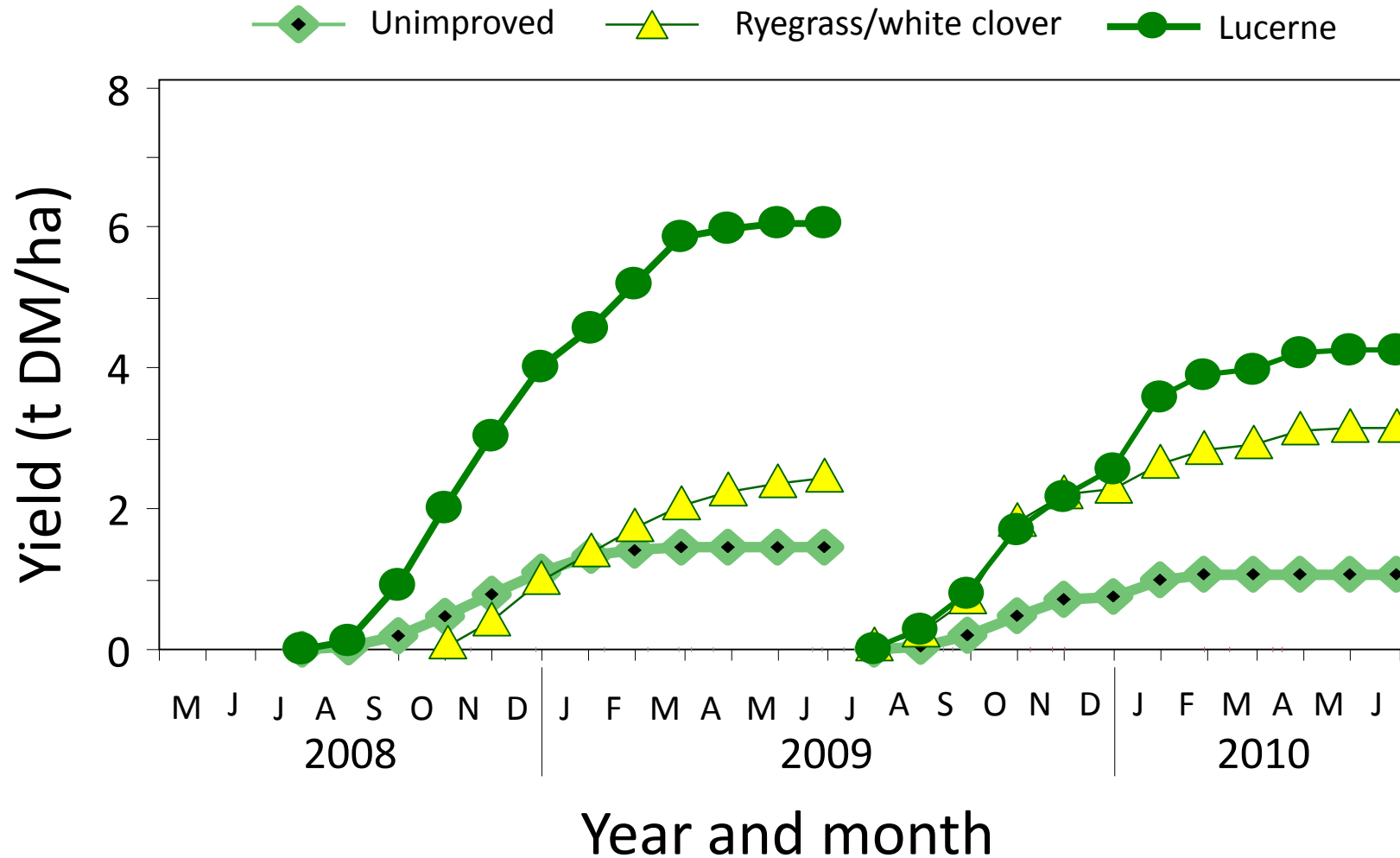


Sown 21/11/2007  
Photo taken 1/11/2010  
Styx Station





# Pasture growth











# Seasonal grazing management

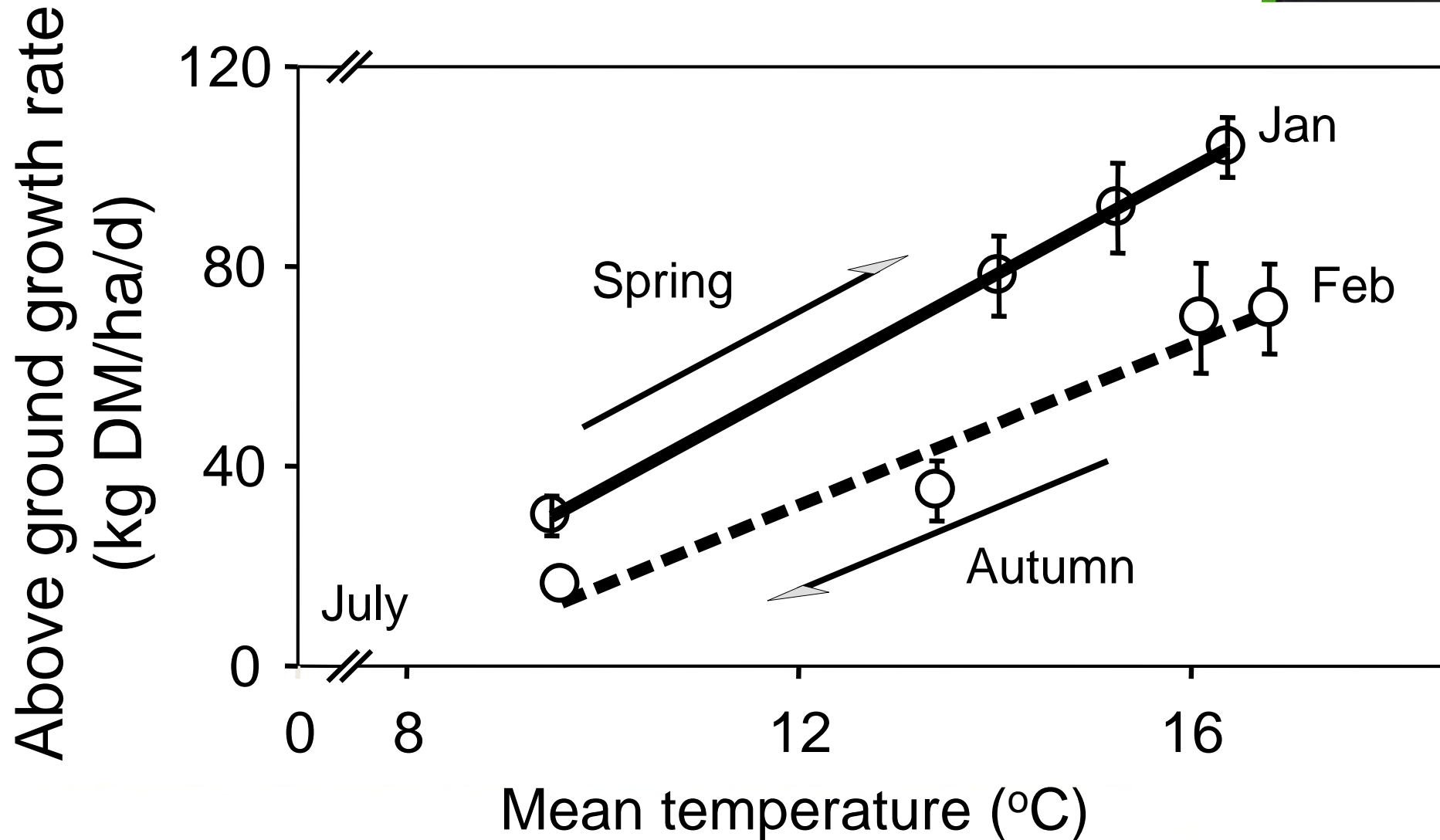
## *Spring*

- 1<sup>st</sup> rotation aided by root reserves to produce high quality vegetative forage.
- can graze before flowers appear (~1500 kg DM/ha) ideally ewes and lambs but

**Never lamb on or set stock lucerne**



# Vegetative growth





# Grazing Experiment

38 days resting

4 days grazing



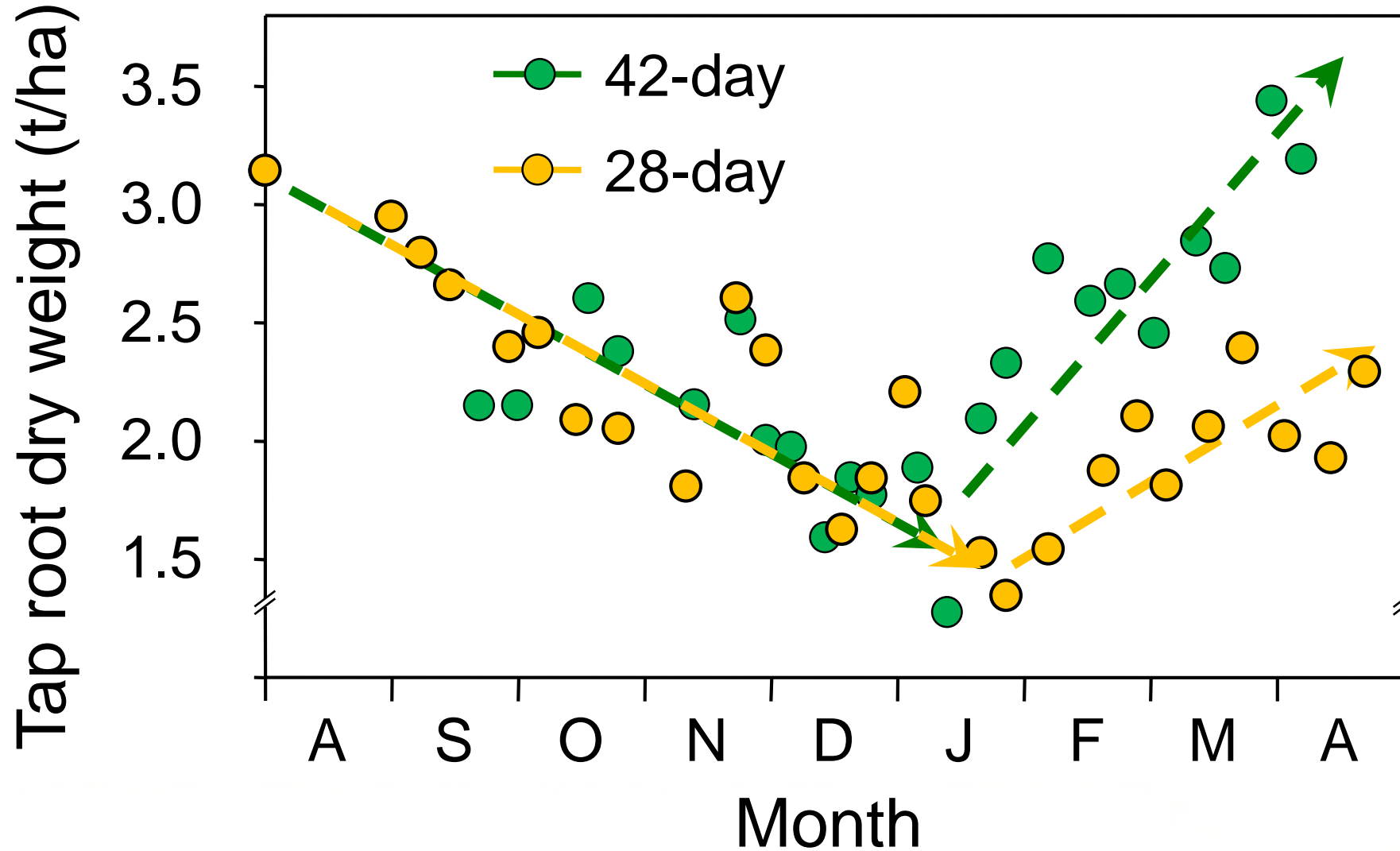
25 days resting

3 days grazing





# Partitioning to roots





# Doug and Fraser Avery "Bonavaree"



Where to plant



# Seasonal grazing management

## Spring/summer (Nov-Jan)

- Priority is stock production (lamb/beef/deer)
- graze 6-8 weeks solely on lucerne
- 5-6 paddock rotation stocked with one class of stock (7-10 days on)
- allowance 2.5-4 kg DM/hd/d – increase later in season





**Resident pasture**

**Lucerne mixture**

**'Bonavaree' Marlborough  
July 2010**





**July 2010**



**Spring = animals**



**Maximize reliable spring growth – high priority stock**





Rotation 1 Pre-graze  
Plot 1 (21/9/07)  
**2.3 t DM/ha**  
**20-25 cm tall**



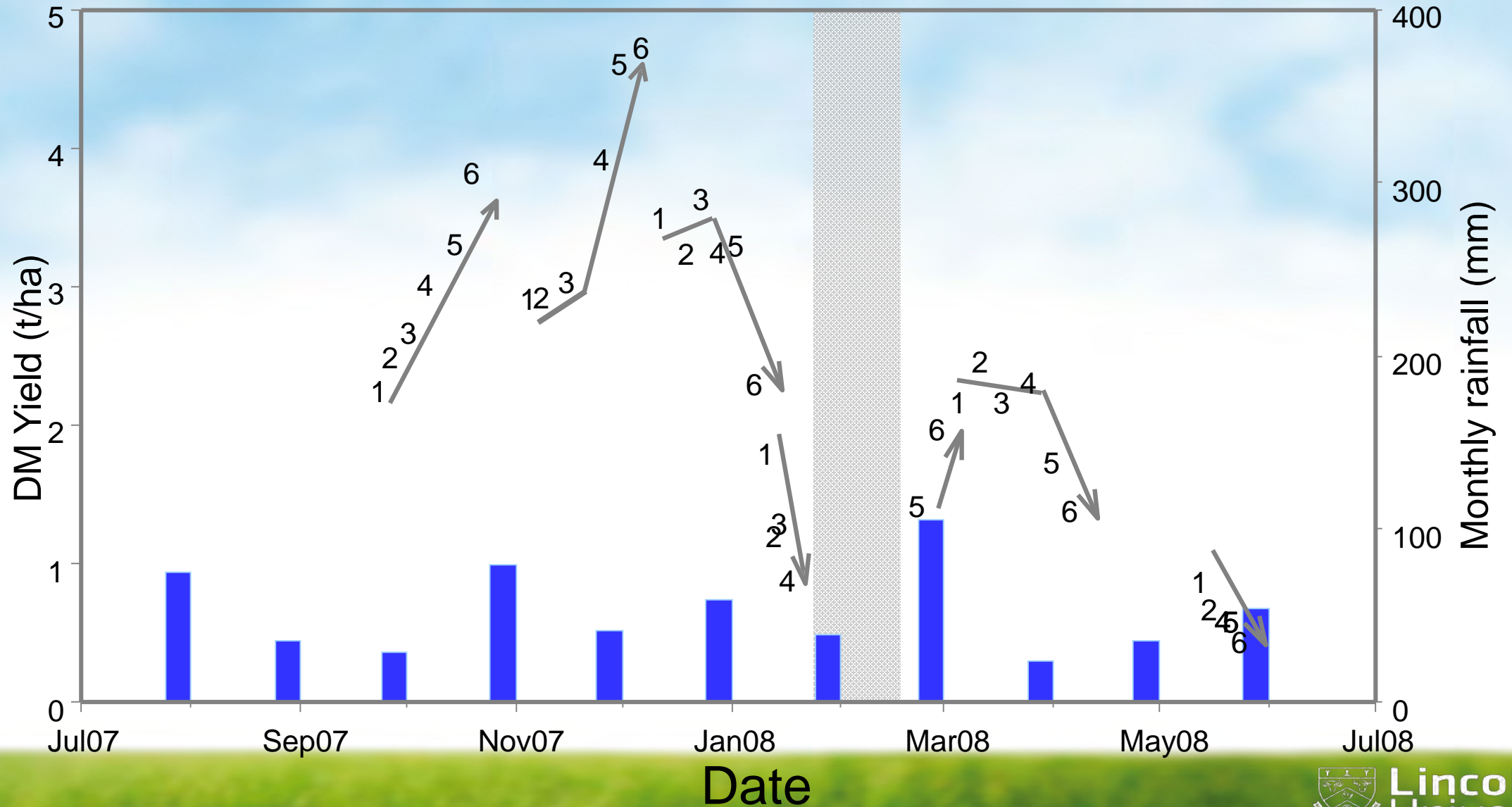
Rotation 2 Pre-graze  
Plot 1 (2/11/07, 38 d)  
**2.9 t DM/ha**  
**35-40 cm tall**

Plot: 31  
Date: 2/11/07  
Pre-graze





# Experiment 3 (MaxClover)



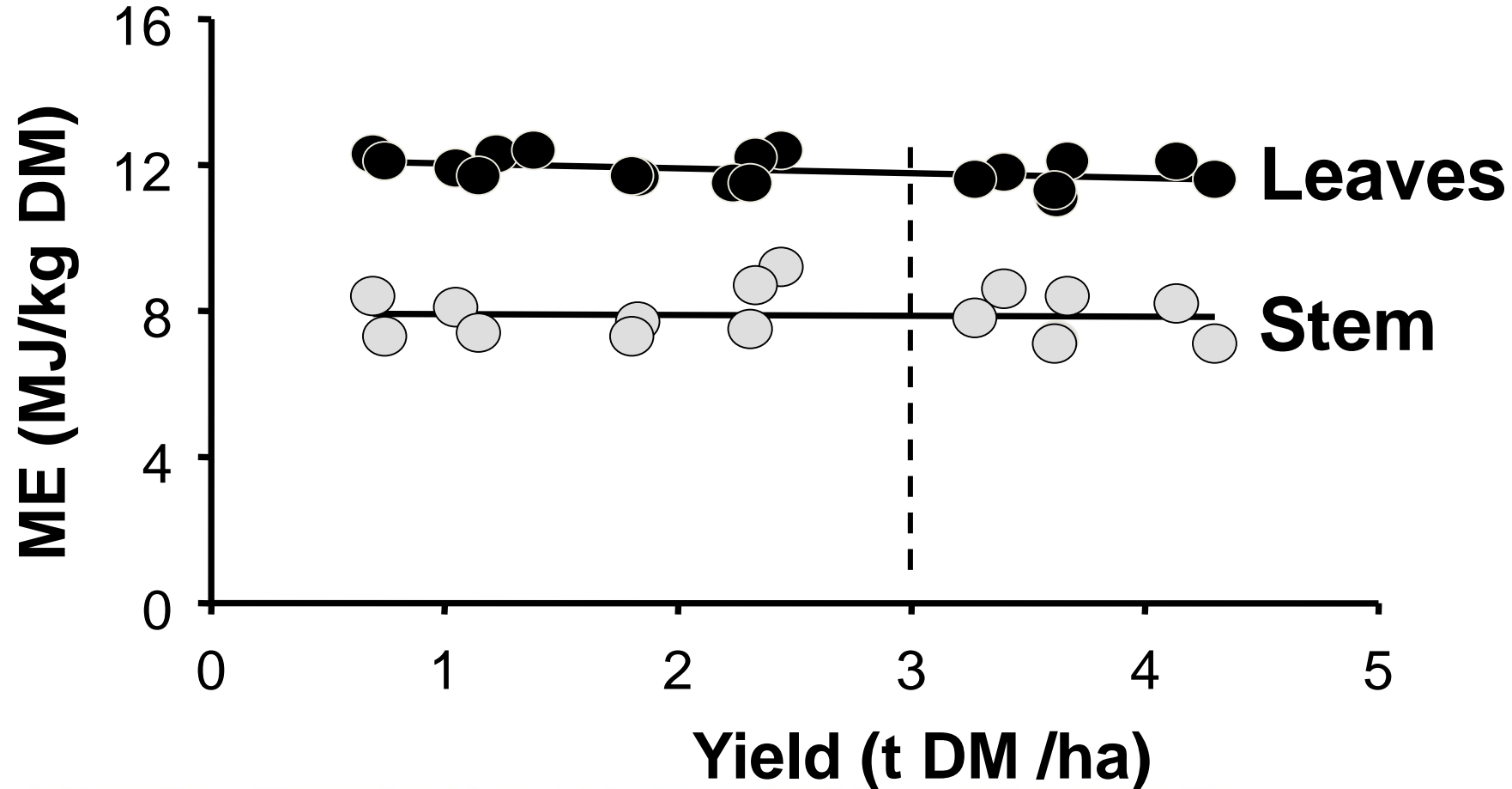




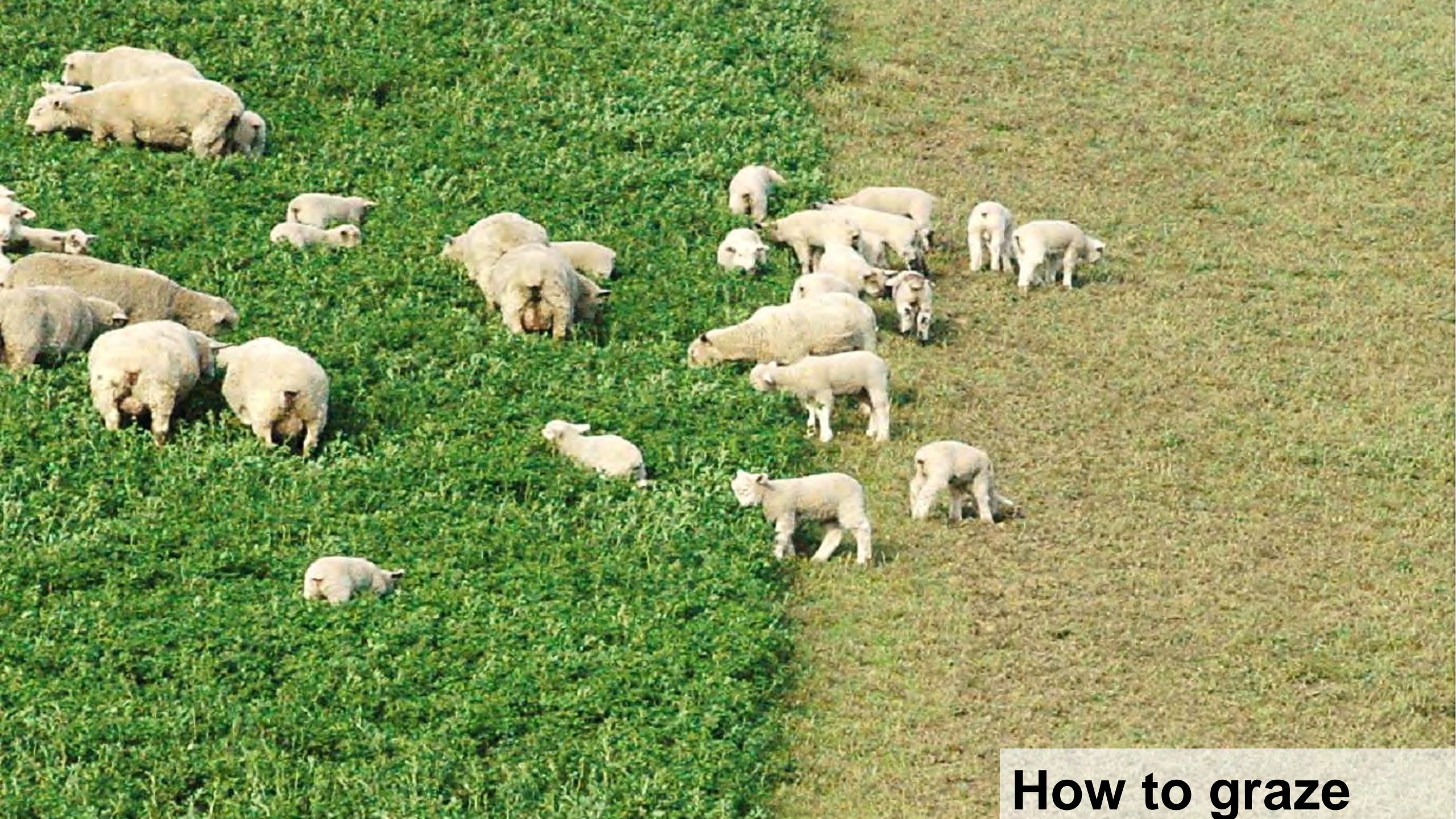
5<sup>th</sup> September 2011 – Cave Sth Canterbury



# Metabolisable energy of lucerne







**How to graze**







# Autumn = flowering plants



Rotation 4 Pre-graze  
Plot 6 (28/2/08) **2.0 t DM/ha produced in 51 d**  
Post-graze (4/3/08) **0.6 t DM/ha**  
UTILISATION = **70%**



# Creating a net of opportunity



**Any autumn rain grows high quality feed**





# Seasonal grazing management

*Late autumn/winter (May-July)*

- hard grazing once growth stops (frost)  
⇒ decrease aphid population
- spray for weeds 10-14 days after winter graze
  - grazing/spraying early July
  - nodes developing at low temperatures



# 3. Animal health

- **Redgut:** problem on high quality feeds – fibre
- **Bloat:** cattle more than sheep – capsules
- **Na def. (0.03%):** salt licks/fence-line weeds/pasture
- Require 0.11% Na - sheep/beef/dairy (13%)



# 3. Animal health (cont'd)

- **Clostridial bacteria:** vaccinate
- **Cobalt:** vitamin B12 injection
- **Worm haven:** Camping on small area – river edge?
- **Avoid flushing if:** leaf spots or flowering lucerne
  - new regrowth or tops only are O.K.



**Which animals?**











**What else to feed**



**Ewe hoggets grown on lucerne 54 kg ave**







**Corriedale 2th flushed on wilting lucerne**





**Lucerne (is not grass!!!)**

- flushing at Bonavaree

**04.03.2009**







A close-up photograph of a lush green prairie grass and lucerne mixture. The image shows a dense field of various green plants, including long-bladed grasses and broad-leaved lucerne plants. The plants are vibrant green and appear to be in full growth. A semi-transparent white banner is overlaid at the top of the image, containing the text 'Close up of a prairie grass and lucerne mixture'.

# Close up of a prairie grass and lucerne mixture

**'Bonavaree' Marlborough**  
July 2010



'Tama' annual ryegrass overdrilled into runout lucerne (12 yrs)





'Tama' annual ryegrass overdrilled into runout lucerne (12 yrs)  
- Close up -





# Lucerne + cocksfoot





# Lucerne + Prairie grass







## Lambing onto Omaka Barley – North Face

Posted on August 27, 2012 by Cath Goulter

Omaka Barley is a great crop to use at Bonavaree. Barley is used here because it really fits in well with the Avery's system. The Omaka variety has been bred locally, and is very suitable for reliable dry matter production in a Marlborough dryland environment.

It is a multipurpose crop at Bonavaree, in that it is used as a green feed crop, and as a break crop. The Omaka is grazed multiple times from March till the end of August. Dry matter production is usually between 6–8 T/ha, and is grazed by both cattle and sheep.

Omaka Barley is also used regularly at Bonavaree for the purpose of breaking weed/pest cycles, and increasing base soil fertility in preparation for sowing lucerne, or a Bonavaree mix. Barley is used as the 2<sup>nd</sup> break crop in a multi stage lucerne renovation system that has been working very well. The 1st break crop used is an Annual Ryegrass that is grazed by multiple bearing ewes at lambing, and prime bull beef production. We will be following the progress of this renovation system through, with regular updates.

Some paddocks are used to grow Omaka Barley for two consecutive years, but because of the Avery's wider interest in establishing paddocks with Lucerne, barley is normally used as a 2nd break crop in the renovation process.



### Recent Posts

- † Lambing onto Omaka Barley – North Face
- † Lambing onto Lucerne – Jaffries Front Flat (August)
- † Bonavaree Dryland Blog
- † Welcome to dryland pastures blog

### Recent Comments

- Cath Goulter on † Bonavaree Dryland Blog
- Gavin snow Loxton on † Bonavaree Dryland Blog
- † Barbara Stuart on † Bonavaree Dryland Blog

### Archives

- † August 2012

### Categories

- † Dryland Lucerne
- † Uncategorized

### Meta

- † Log in
- † Entries [RSS](#)
- † Comments [RSS](#)

## The Blog.....

- On-farm activity diary
- Slide shows, photos and video
- Ability for farmers to comment/question/query
- Farmers and researchers can respond



# Acknowledgements



New Zealand's specialist land-based university



Ministry of Agriculture and Forestry  
Te Manatū Ahuwhenua, Ngāherehere



# References

- Black, D.B.S. and Moot, D.J. 2013. [Autumn establishment of lucerne \(\*Medicago sativa\* L.\) inoculated with four different carriers of \*Ensifer meliloti\* at four sowing dates](#). Proceedings of the New Zealand Grassland Association 75: 137-144.
- Brown, H. E. and Moot, D. J. 2004. Quality and quantity of chicory, lucerne and red clover production under irrigation. *Proceedings of the New Zealand Grassland Association*, **66**, 257-264.
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- Kearney, J. K., Moot, D. J. and Pollock, K. M. 2010. [Dryland lucerne production in Central Otago](#). *Proceedings of the New Zealand Grassland Association*, **72**, 121-126.
- Moir, J. and Moot D.J. 2010. [Soil pH, exchangeable aluminium and lucerne yield responses to lime in a South Island high country soil](#). Proceedings of the New Zealand Grassland Association 72: 191-196.
- Moot, D. J. 2012. An overview of dryland legume research in New Zealand. *Crop and Pasture Science*, **63**, 726–733.
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- Moot, D. J., Pollock, K. M. and Lewis, B. 2012. [Plant population, yield and water use of lucerne sown in autumn at four sowing rates](#). *Proceedings of the New Zealand Grassland Association*, **74**, 97-102.
- Moot, D. J. and Smith, M. 2011. Practical Lucerne Management Guide. 9 pp. <http://www.lincoln.ac.nz/Documents/Dryland-Pasture-Research/presentations/Lucerne-management-guide-Col.pdf>.