

Sheparton, Victoria
28th July 2014



Lucerne Agronomy

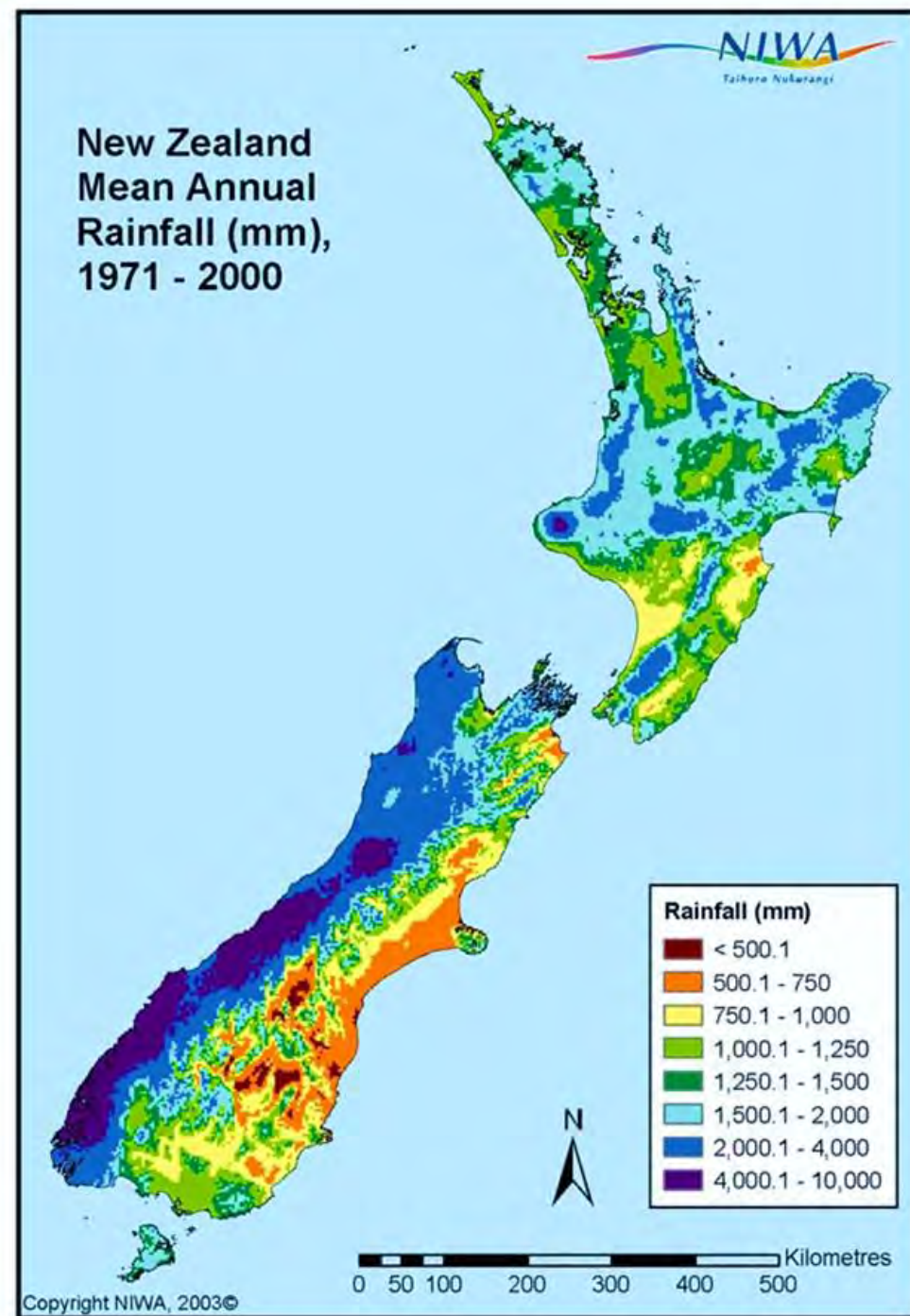
Dr Derrick Moot
Professor of Plant Science

New Zealand's specialist land-based university



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**Strong rainfall gradient
West \Rightarrow East**





Rain fed 300-800 mm

East coast - summer dry

Objectives

- Outline the role of lucerne in New Zealand farming systems
- Describe management to maximise production, quality and persistence
- Quantify perennial ryegrass growth in relation to nitrogen and water
- www.lincoln.ac.nz/dryland

Growth vs. Development

Growth:

is dry matter accumulation as a result of light interception and photosynthesis

Development:

is the 'age' or maturity of the regrowth crop e.g. leaf appearance, flowering

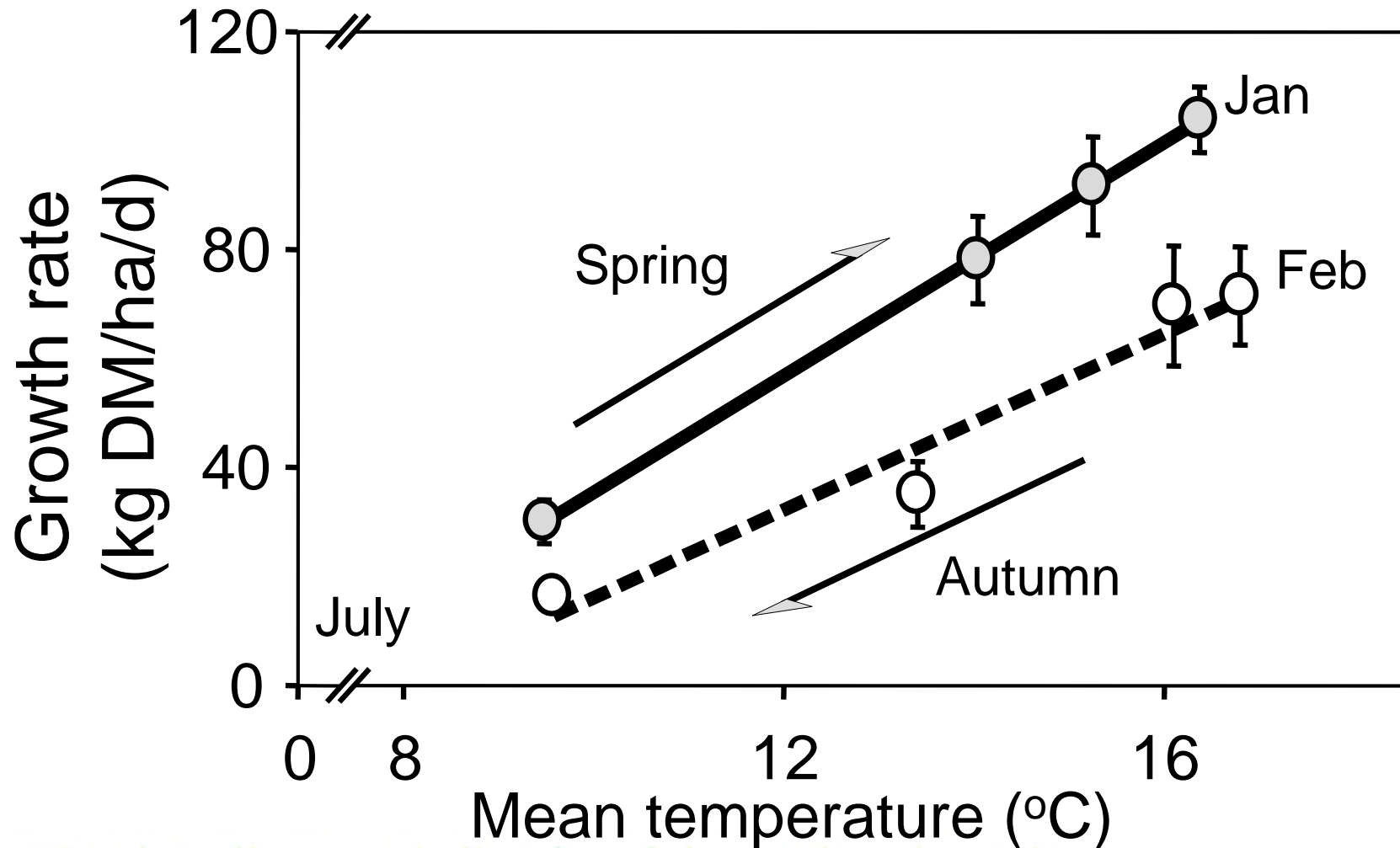
Growth and development are both influenced by environmental signals

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The canopy: the energy capture device



Vegetative growth

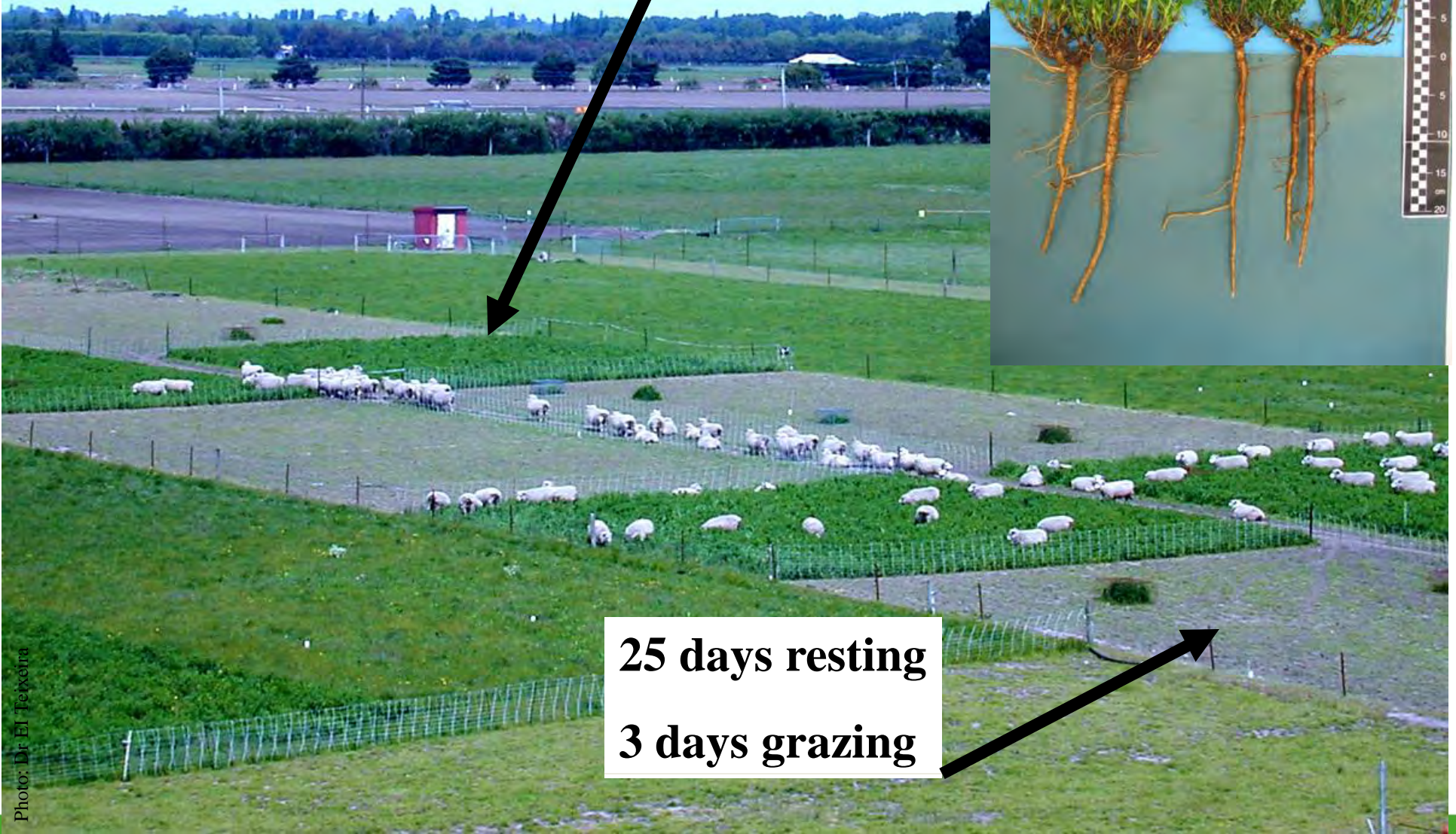


Experiment 2

flexible grazing

38 days resting

4 days grazing



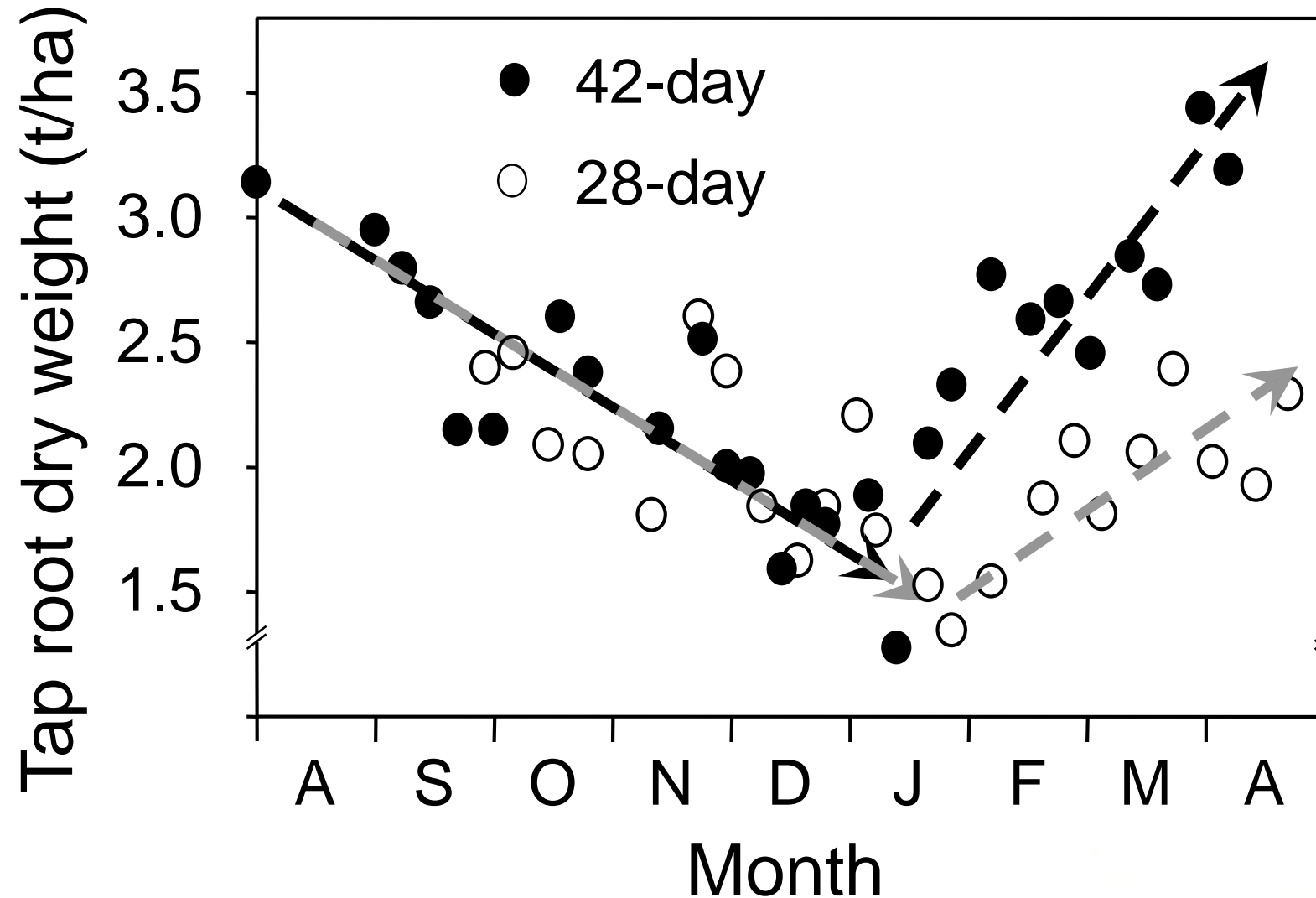
25 days resting

3 days grazing

What's going on down there?



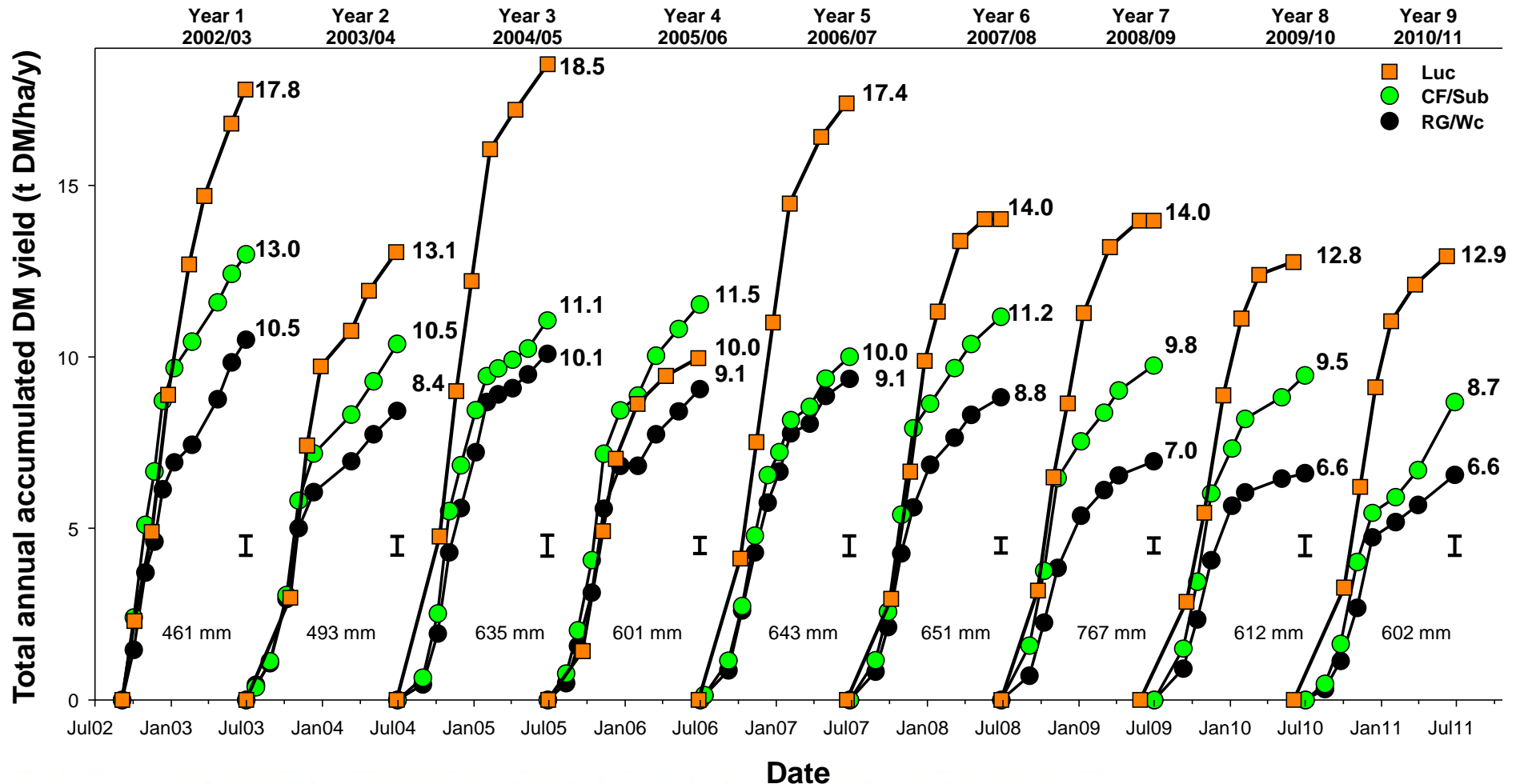
Partitioning to roots

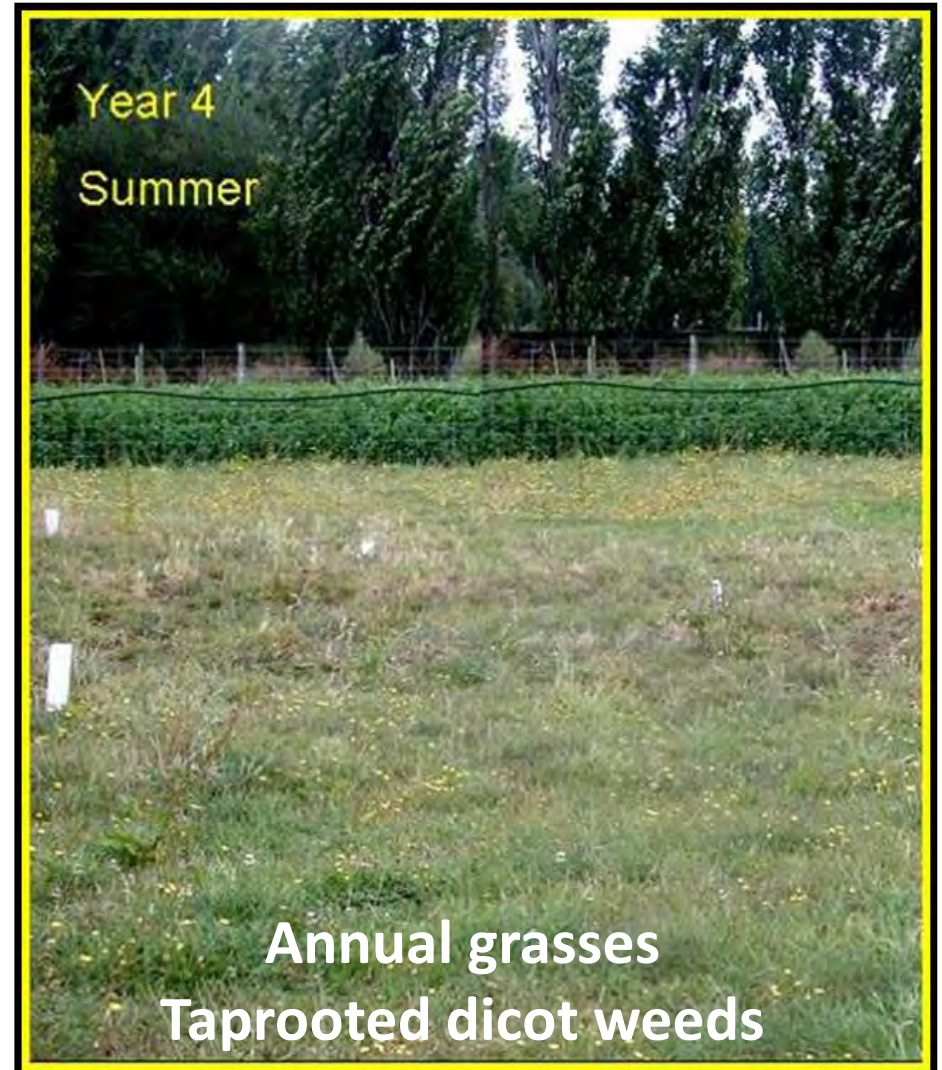
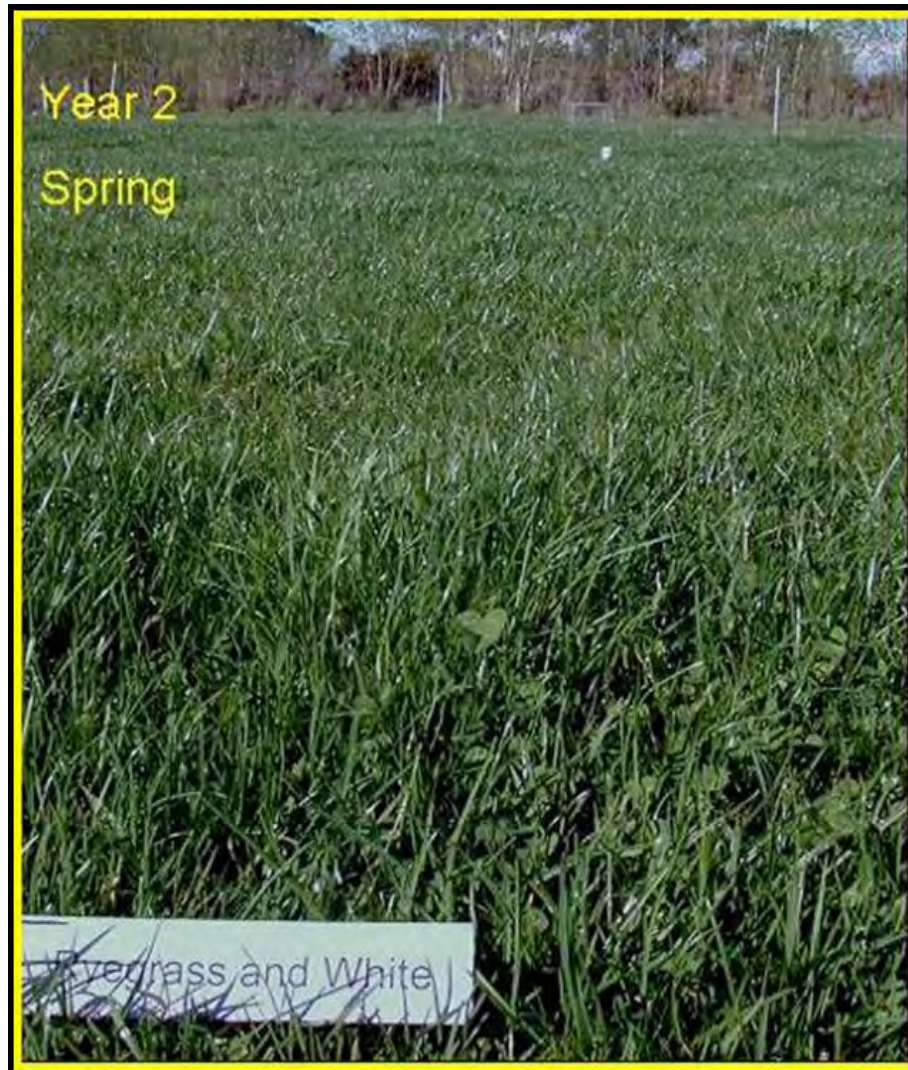


RG/Wc
Lucerne
CF/Sub
CF/Balansa
CF/Cc
CF/Wc

Grazing Expt. - 'MaxClover'

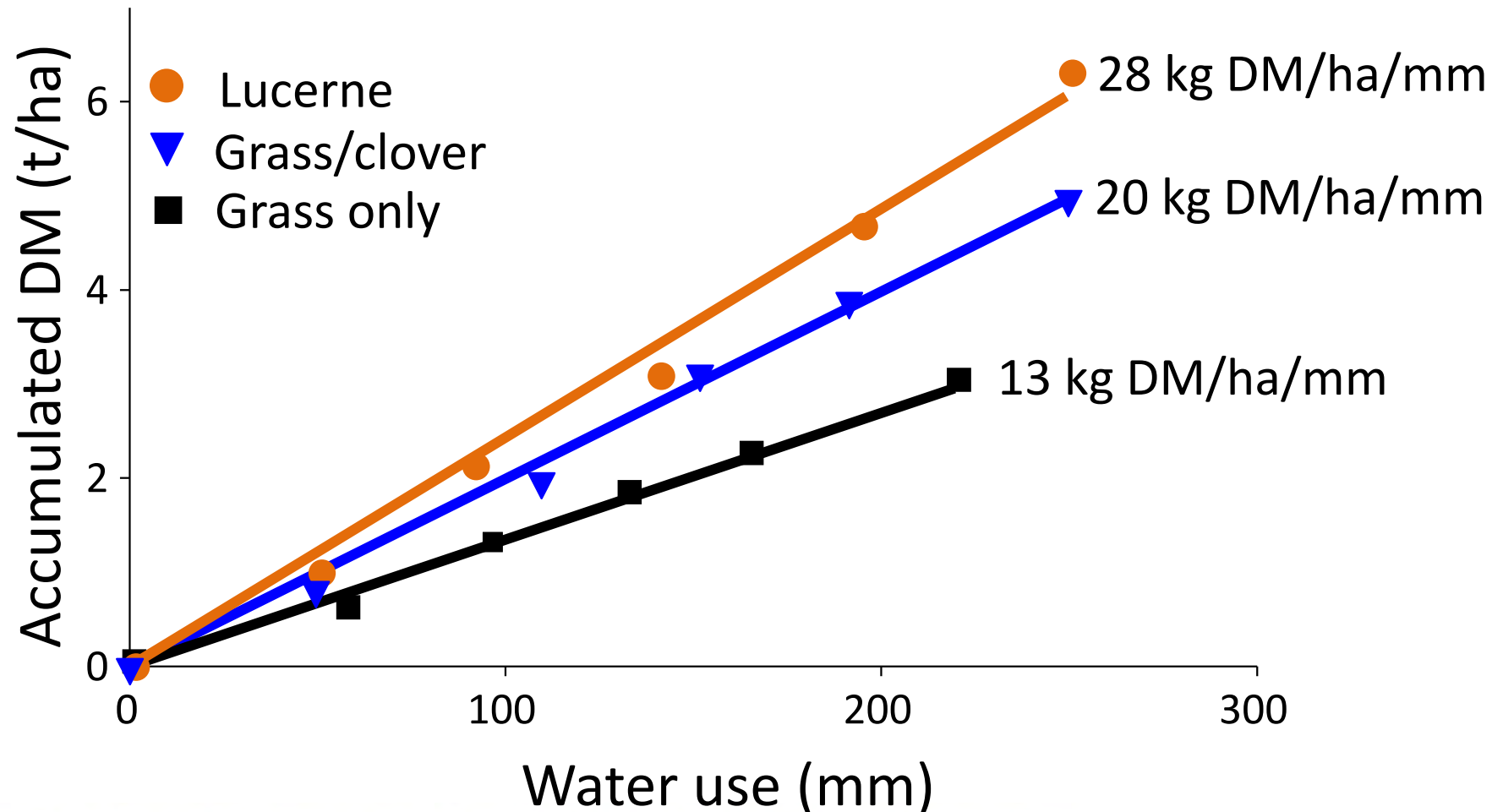
MaxClover Total DM yields





Unsown species <5% in Year 1>45% in Year 6
RG/Wc pastures

Spring WUE



SERVANT LEADER



Extension – solution to every problem

Seasonal grazing management

Spring

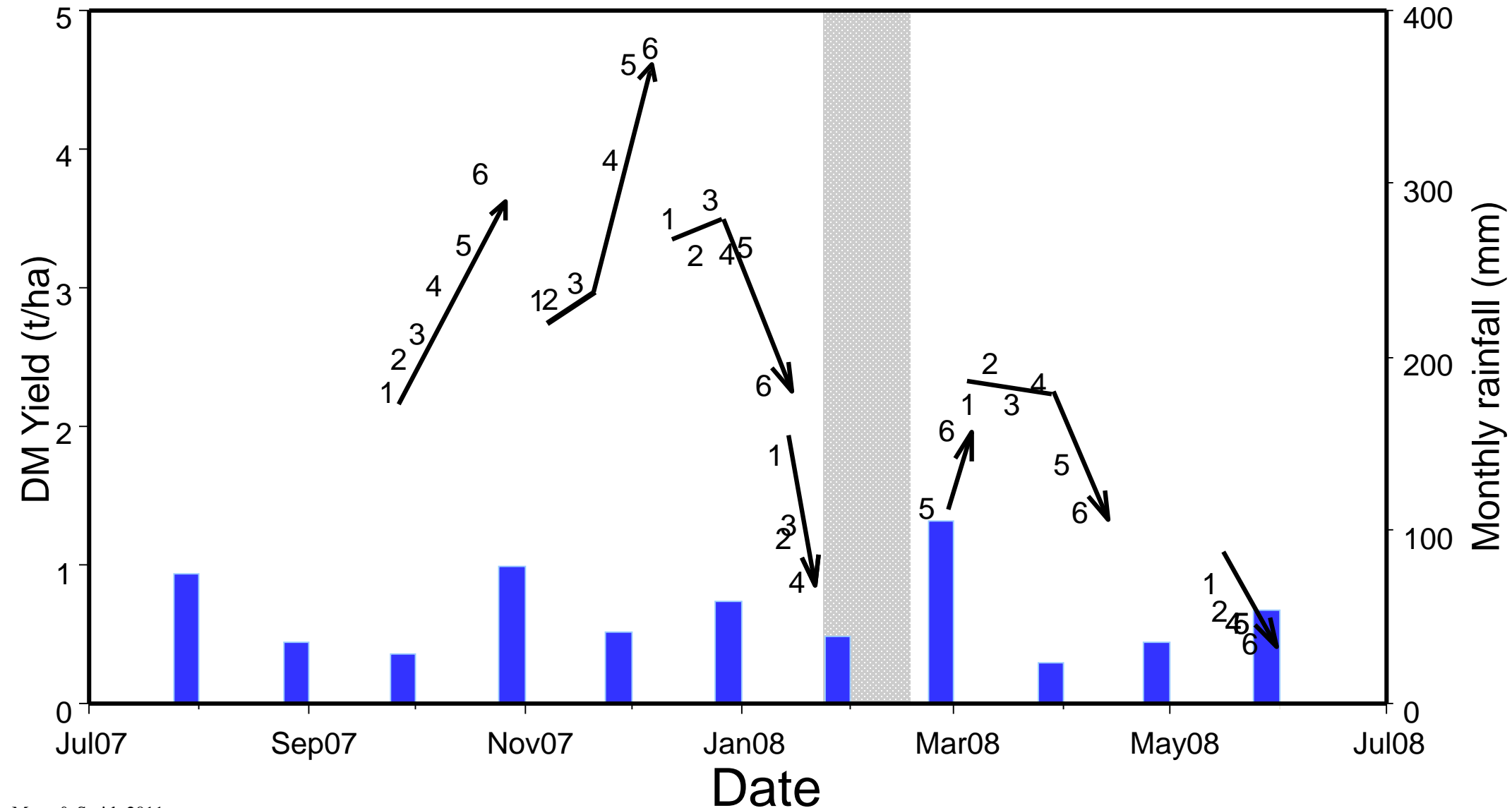
- 1st rotation aided by root reserves to produce high quality vegetative forage.
- can graze before flowers appear (~1500 kg DM/ha) ideally ewes and lambs but

Growing point at the top of the plant



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

MaxClover – 38-42 day rotation





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



5th September 2011 – Cave Sth Canterbury



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Stocking rates in New Zealand

- Spring 14 ewes plus twins/ha
- Summer 70 lambs/ha
- Ideally 7-14 days maximum on any one paddock
- Less intensive systems – don't open the canopy



Spring grazing

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



14 ewes + twins/ha

High numbers for 7-10 days





Fibre and salt

Maximize reliable spring growth – high priority stock



Seasonal grazing management

Early autumn (Feb-April)

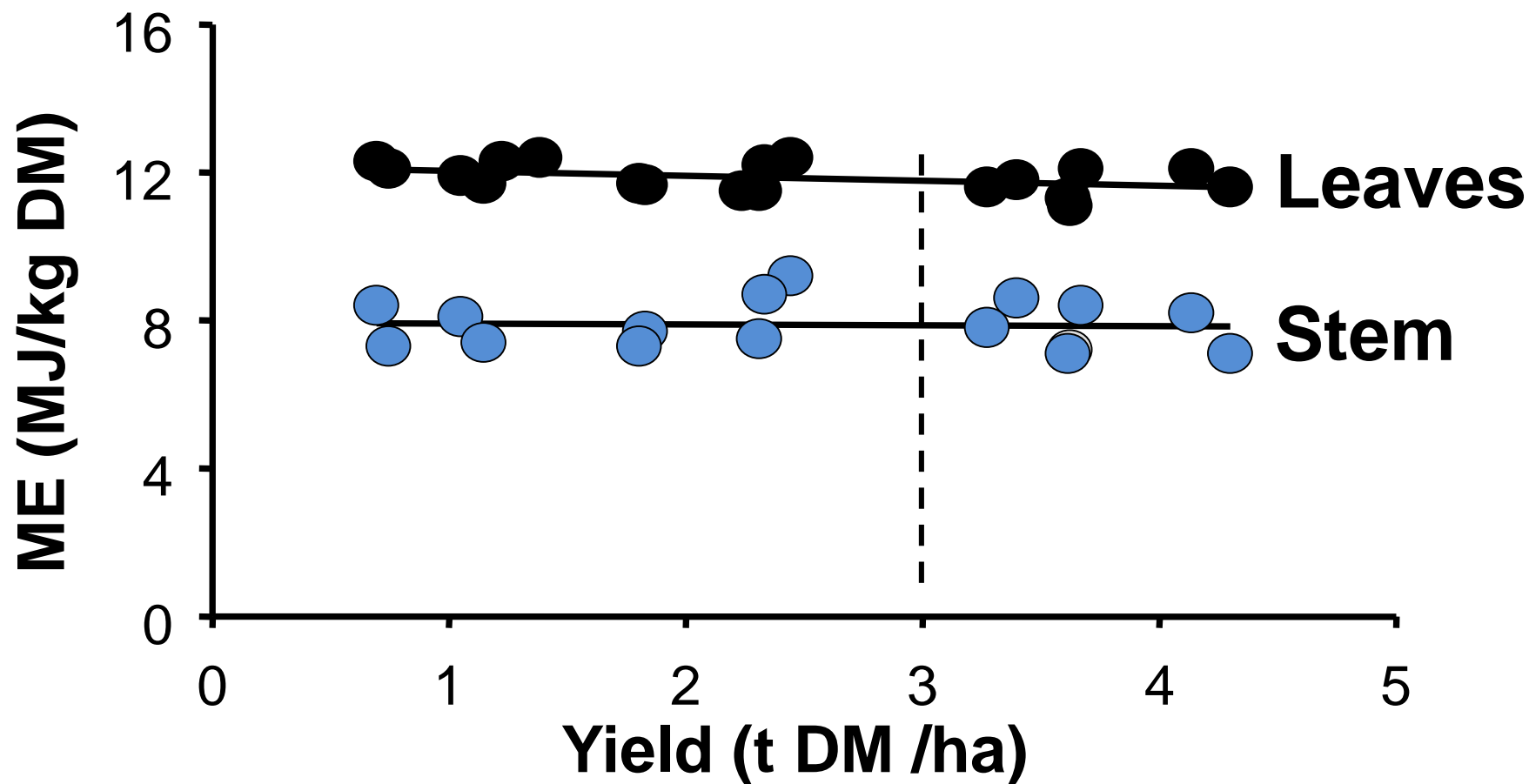
- terminal drought \Rightarrow graze standing herbage
 - allow 50% flowering
 - long rotation (42 days) somewhere between Jan and end of May.
- \Rightarrow build-up root reserves for spring growth and increase stand persistence

Autumn = flowering plants
But don't flush on this!



Rotation 4 Pre-graze
Plot 6 (28/2/08)
2.0 t DM/ha produced in 51 d

Metabolisable energy of lucerne



Animal health

- **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.

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

Establishment

Soils

- deepest free draining soils
- pH_(H₂O) 6.0 (....or 5.2 in CaCl)
- RG/Wc fertility

Sowing

- 8-10 kg/ha
- 10-25 mm
- peat inoculated 8-10 kg/ha
- *spring or autumn*
- cultivated/direct drilled (DAP)

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

Drilling seed with fertiliser
Direct drilling = seed + fertiliser



Sowing rate and date

Established 2007 LU – Templeton silt loam

Coated 'Grasslands Kaituna' lucerne.

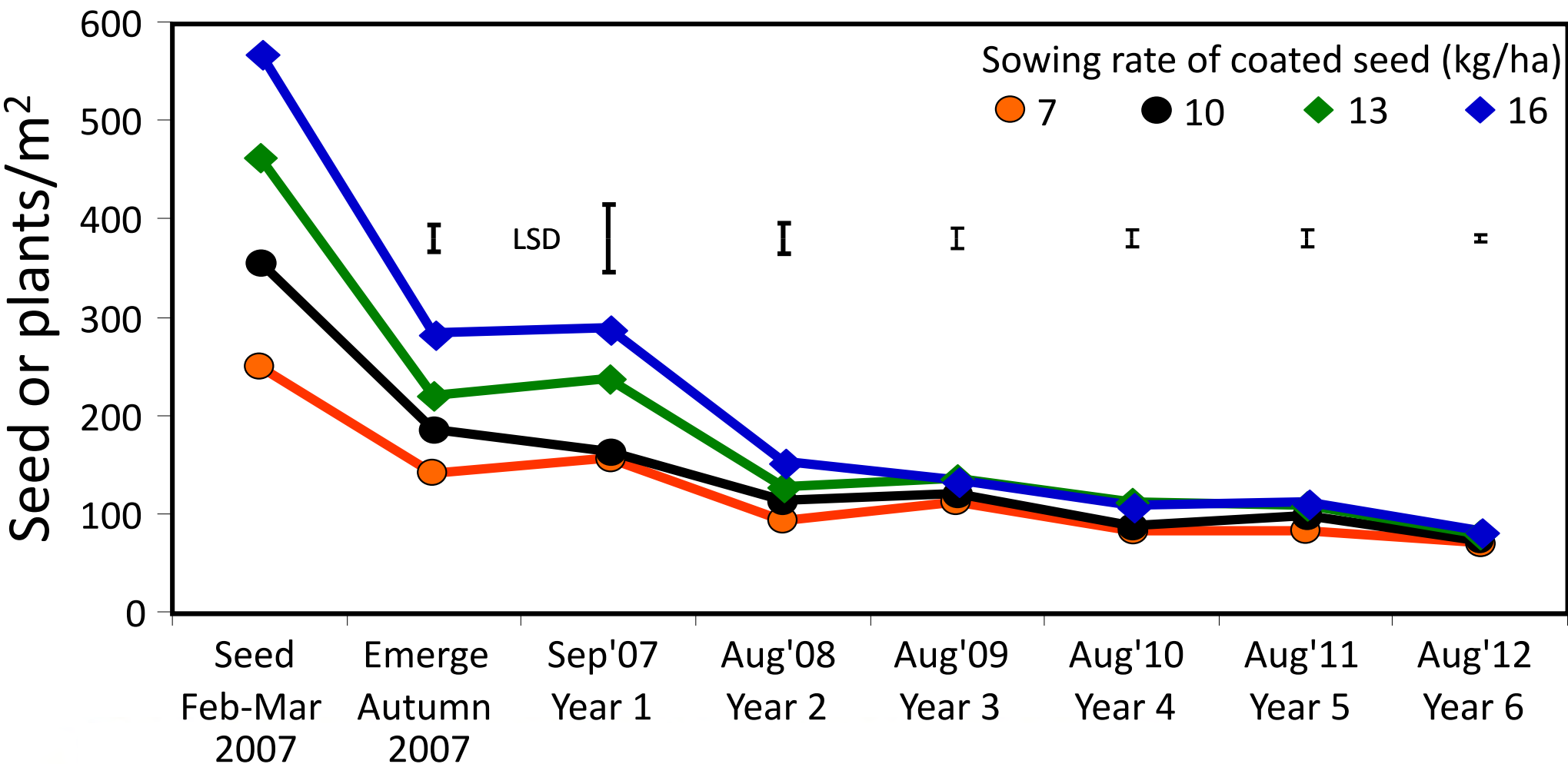
Four sowing dates

- **21 February,**
- **2 March,**
- **16 March and**
- **30 March**

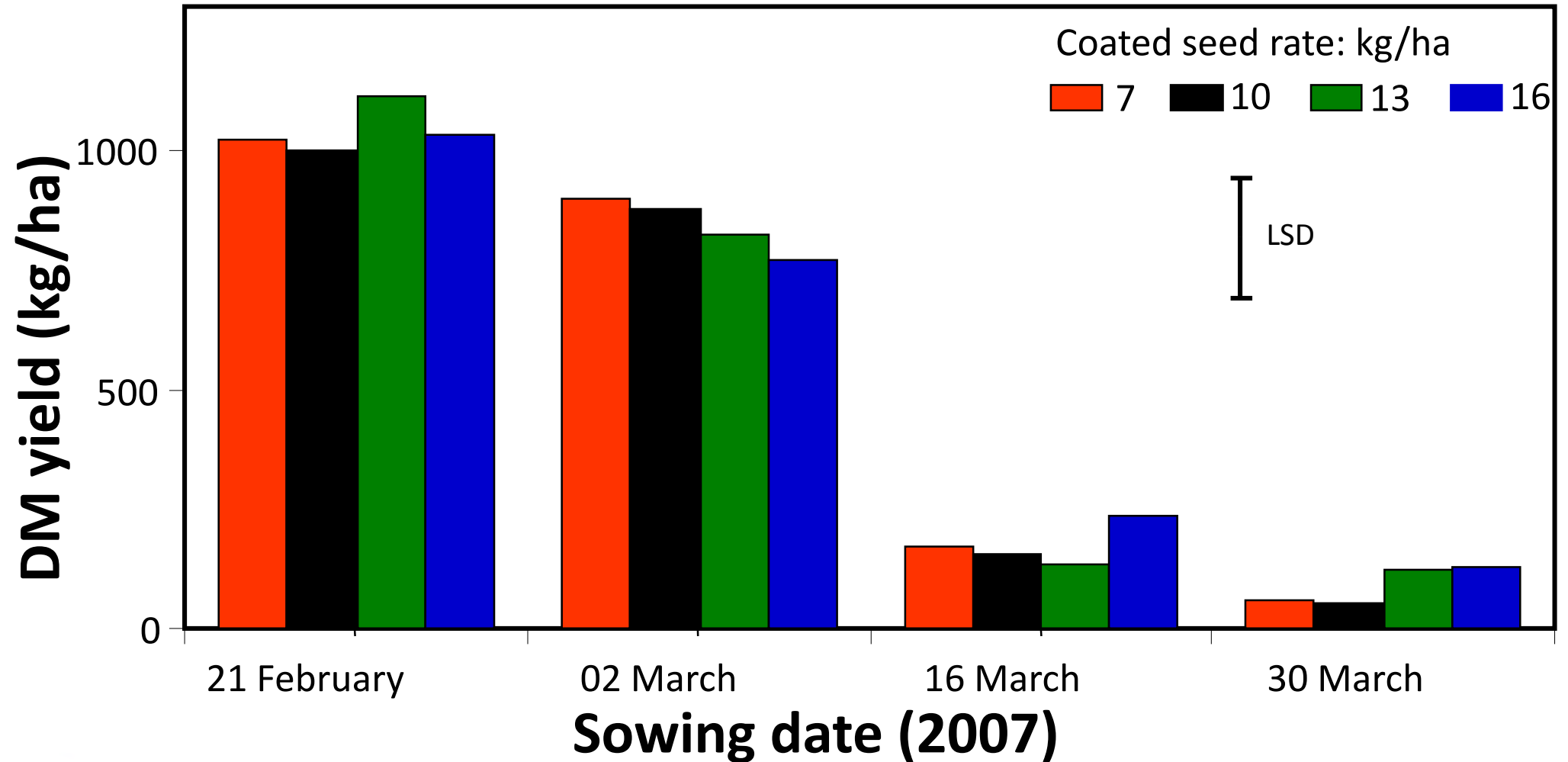
Four sowing rates

- **Equivalent to bare seed @ 7, 10, 13 and 16 kg/ha**

Sown seed & plant population over time



Seedling lucerne yield to early June



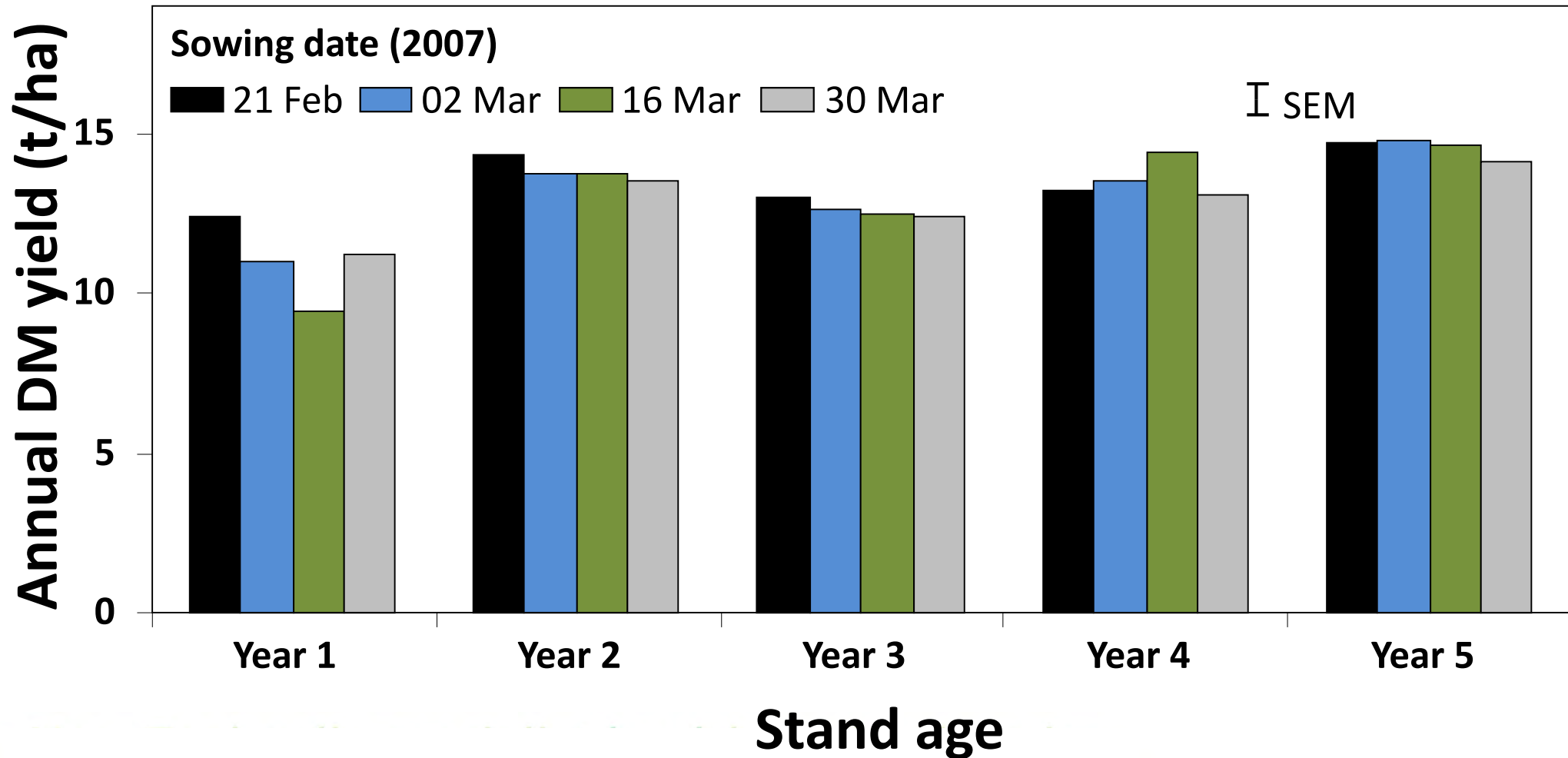
Weeds present @ 09 October 2007 (Year 1)

Sown 21 Feb 2007

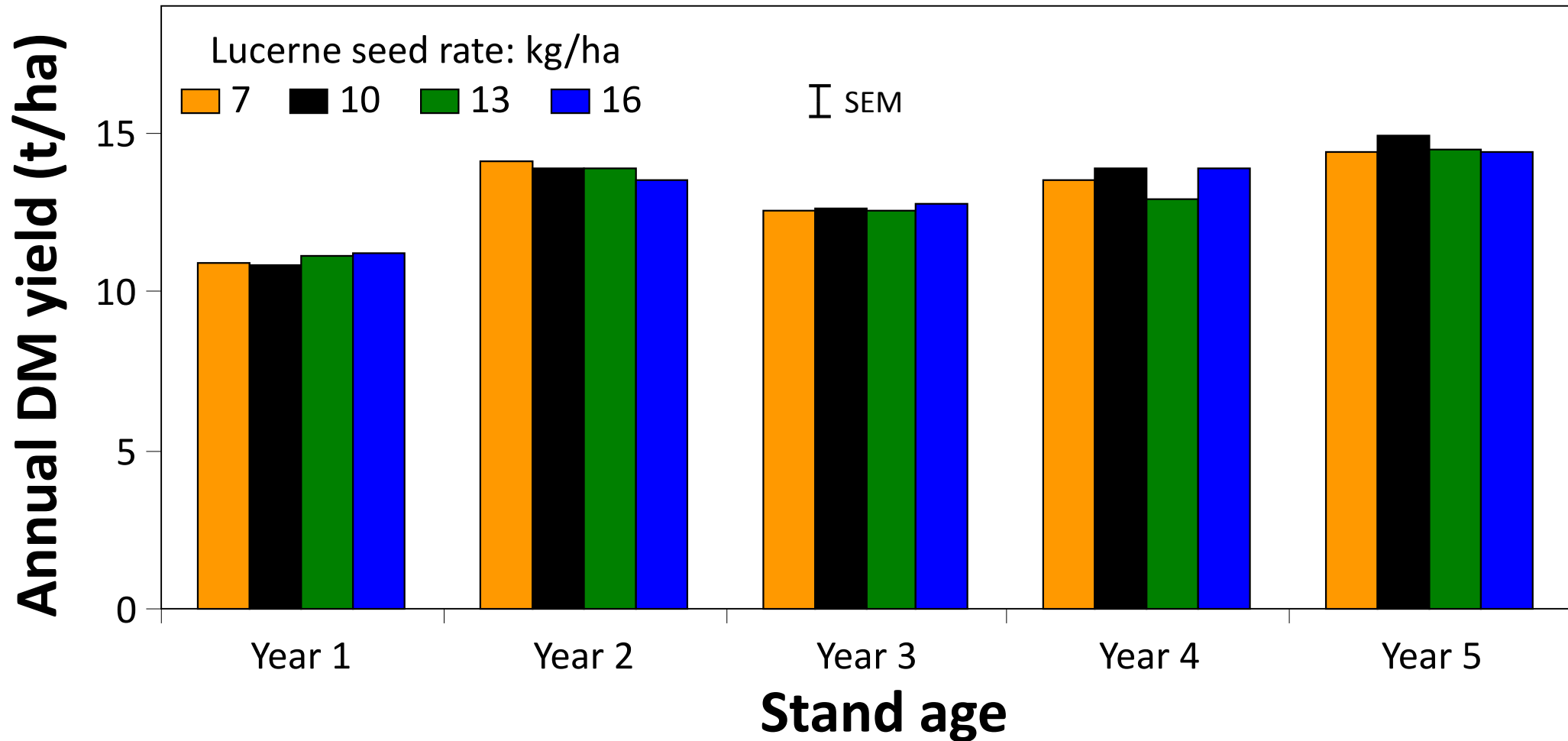
Sown 30 Mar 2007



Annual yield in relation to sowing date



Annual yield in relation to sowing rate



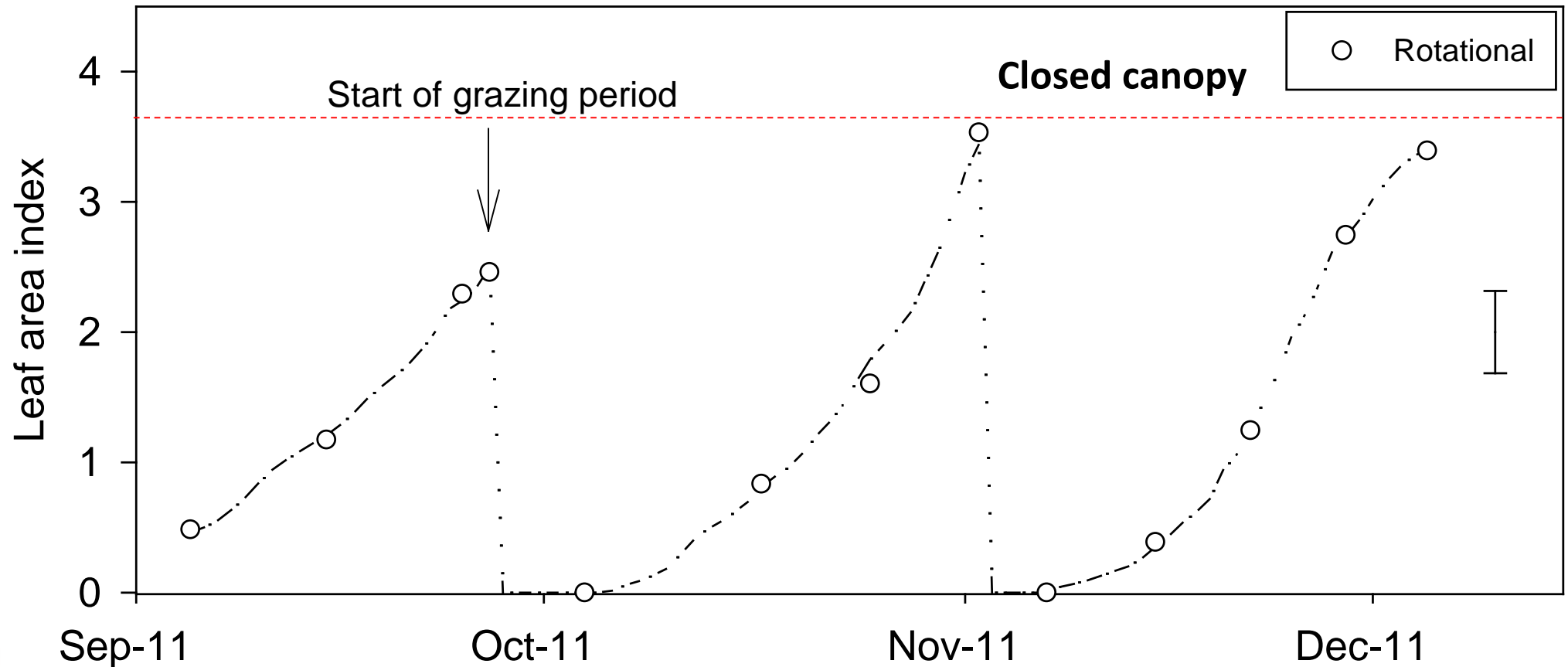
Irrigation

- Before sowing to encourage root growth
- When the canopy is closed to reduce soil evaporation and weed growth
- Large amounts (50 mm) infrequently rather than small (15 mm) amounts frequently
- Fallow – dry soil vs wet soil

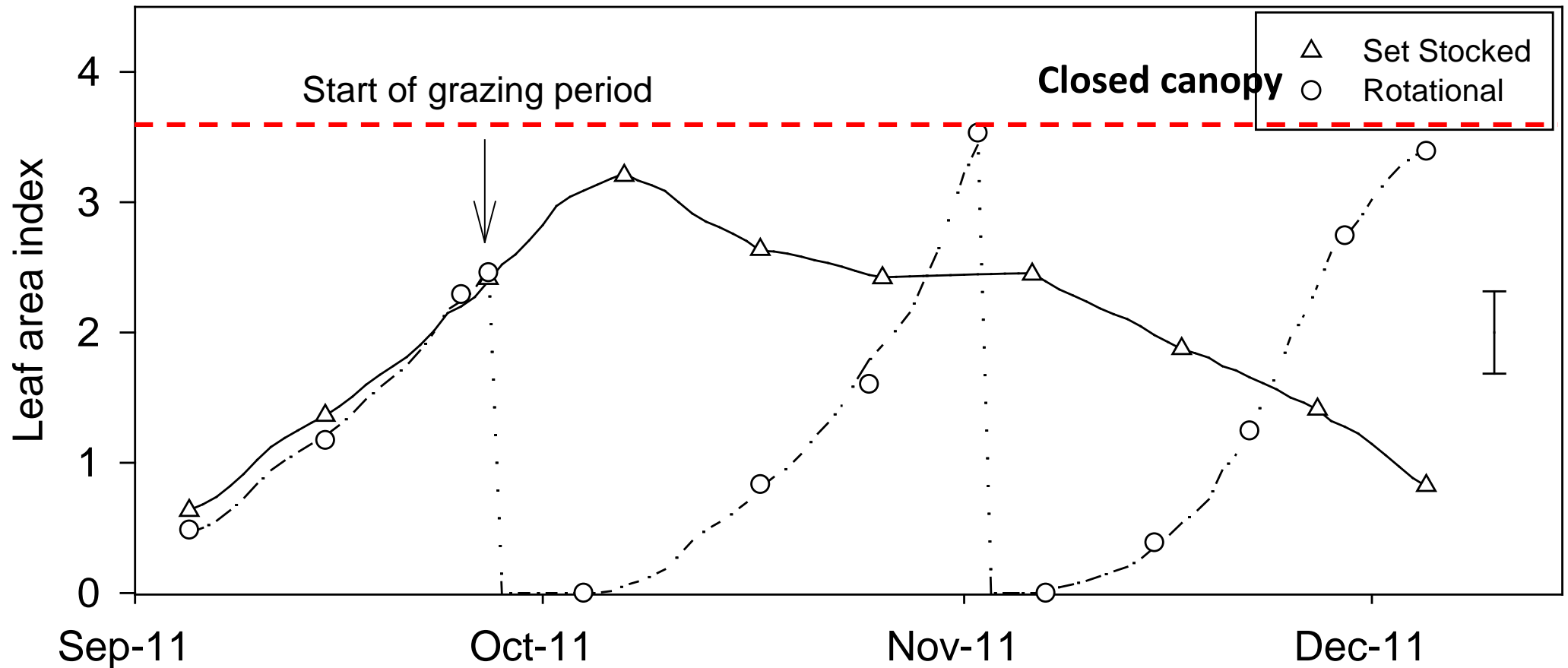


Lambs set stocked

Crop canopy



Crop canopy



Water Use

Grazing treatment	Transpiration	E_s	Total WU
Set stocked	297 _a	77 _b	374
Semi-set stocked	282 _a	76 _b	358
Rotational	231 _b	128 _a	359
P	<0.05	<0.05	ns
SEM	10.6	8.0	





Fertilizer

- Higher requirement from cutting than grazing
 - 2% K = 20 kg/ha/t DM removed
- 50% K super = 80 kg/ha/t DM removed

Or

- KCL = 40 kg/ha/t DM removed + P and S from super

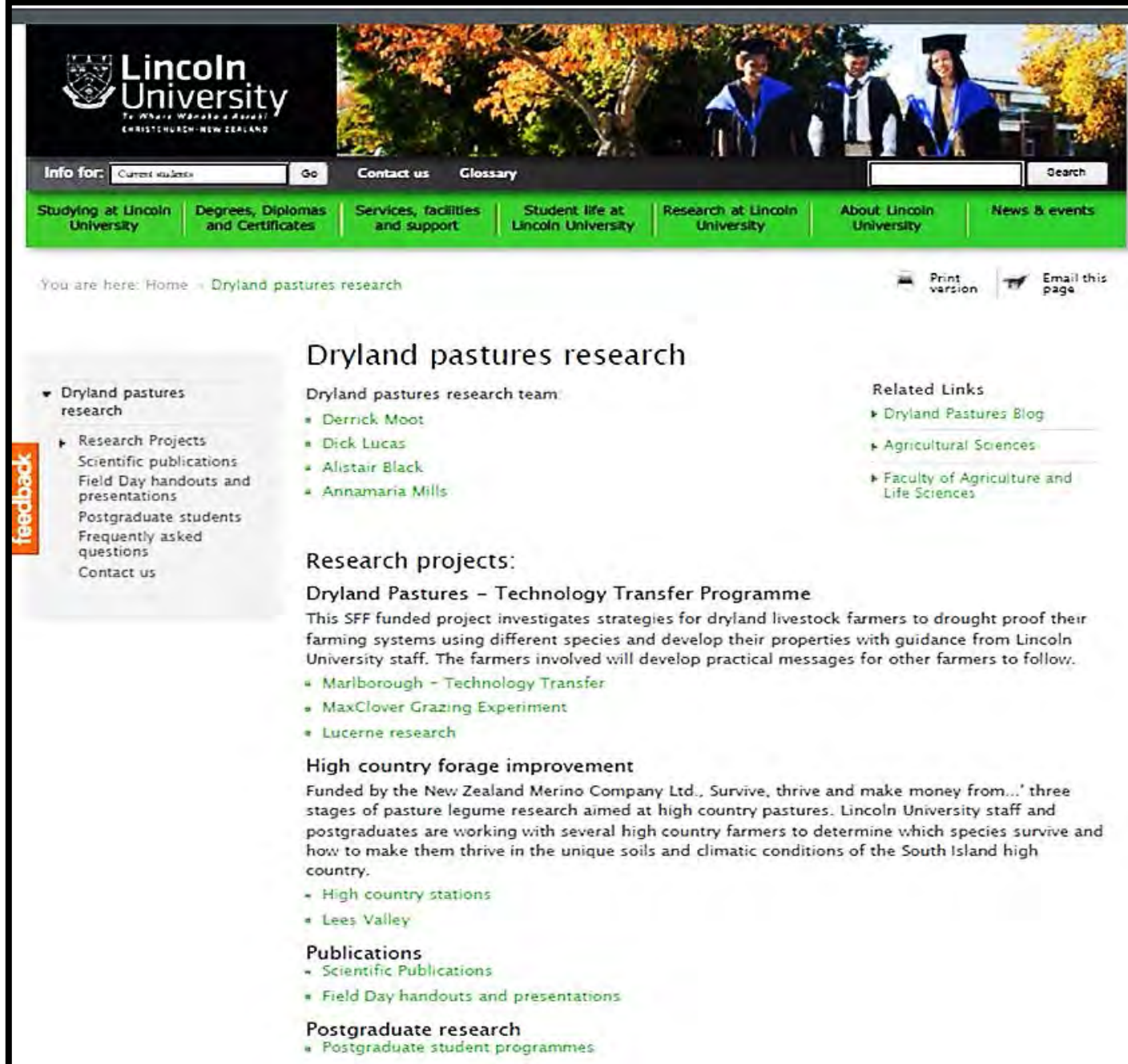


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The website...

Info on:

- Current projects
- Field day presentations
- Scientific publications
- FAQs
- Postgraduate study



The screenshot shows the Lincoln University website. The header features the university's logo and a banner image of graduates. Navigation links include 'Info for: Current students', 'Contact us', 'Glossary', and a search bar. A green navigation bar lists various university sections. The main content area is titled 'Dryland pastures research' and includes a sidebar with a 'feedback' button, a list of links for research projects and publications, and a 'Related Links' section. The main text describes the 'Dryland Pastures – Technology Transfer Programme' and 'High country forage improvement' projects, both funded by the New Zealand Merino Company Ltd.

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Dryland pastures research

Dryland pastures research team:

- [Derrick Moot](#)
- [Dick Lucas](#)
- [Alistair Black](#)
- [Annamaria Mills](#)

Research projects:

Dryland Pastures – Technology Transfer Programme

This SFF funded project investigates strategies for dryland livestock farmers to drought proof their farming systems using different species and develop their properties with guidance from Lincoln University staff. The farmers involved will develop practical messages for other farmers to follow.

- [Marlborough – Technology Transfer](#)
- [MaxClover Grazing Experiment](#)
- [Lucerne research](#)

High country forage improvement

Funded by the New Zealand Merino Company Ltd., 'Survive, thrive and make money from...' three stages of pasture legume research aimed at high country pastures. Lincoln University staff and postgraduates are working with several high country farmers to determine which species survive and how to make them thrive in the unique soils and climatic conditions of the South Island high country.

- [High country stations](#)
- [Lees Valley](#)

Publications

- [Scientific Publications](#)
- [Field Day handouts and presentations](#)

Postgraduate research

- [Postgraduate student programmes](#)

Related Links

- [Dryland Pastures Blog](#)
- [Agricultural Sciences](#)
- [Faculty of Agriculture and Life Sciences](#)

feedback

- ▼ **Dryland pastures research**
- ▶ **Research Projects**
- Scientific publications
- Field Day handouts and presentations
- Postgraduate students
- Frequently asked questions
- Contact us

www.lincoln.ac.nz/dryland

Conclusions

- Lucerne growth rate is seasonal based on storage and remobilization of reserves
- Lucerne can be grazed or cut and carried based on yield – not time of flowering
- Replace nutrients removed through cut and carry (K)
- Minimize soil evaporation by timing of irrigation

References



Website: www.lincoln.ac.nz/dryland

Dryland pastures blog: <http://www.lincoln.ac.nz/conversation/drylandpastures/>

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