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**Lincoln
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Te Whare Wānaka o Aoraki

AOTEAROA • NEW ZEALAND



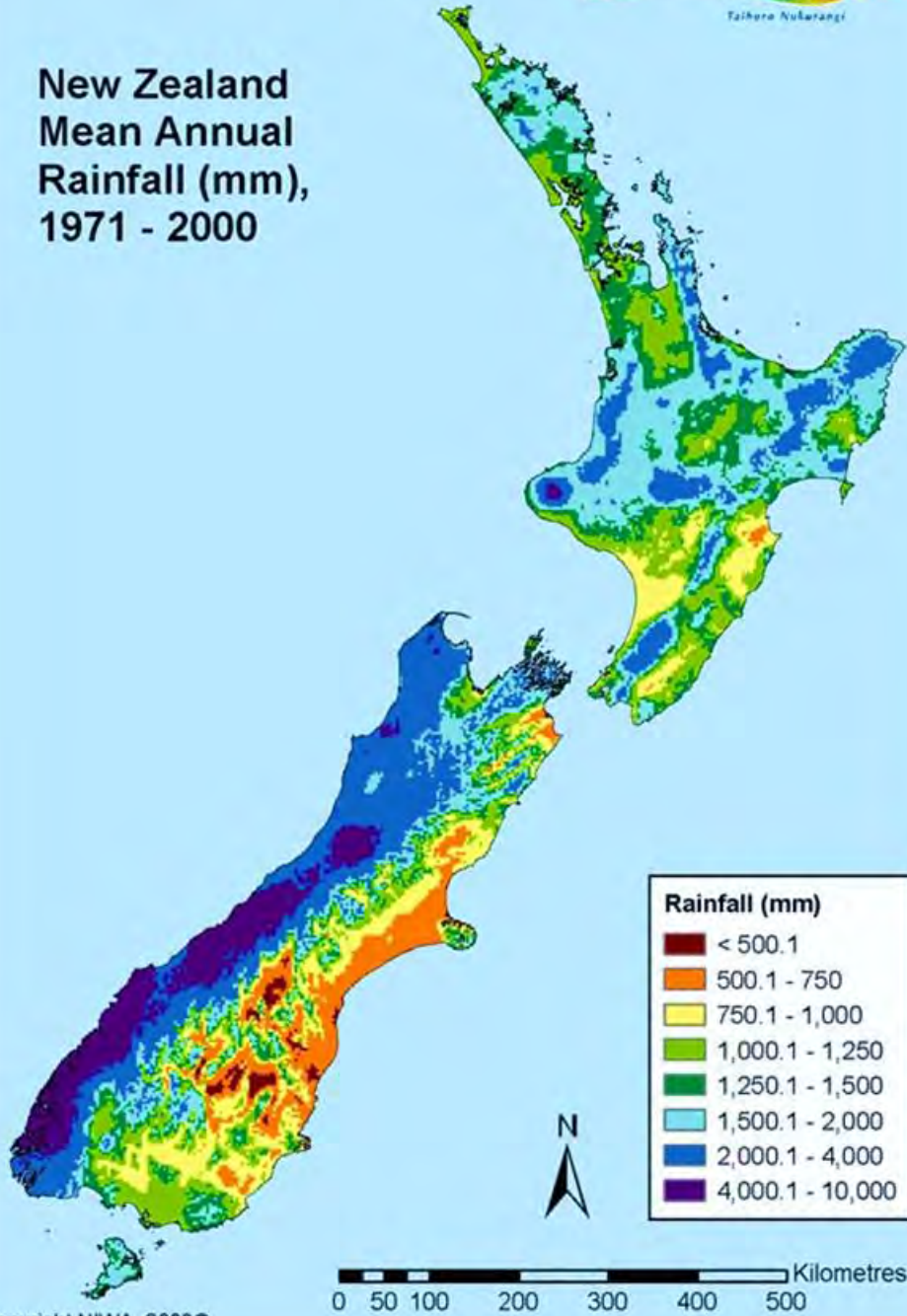
**Howlong, NSW
19th August 2015**

Lucerne Agronomy

**Dr Derrick Moot
Professor of Plant Science**

New Zealand's specialist land-based university

New Zealand
Mean Annual
Rainfall (mm),
1971 - 2000



**Strong rainfall gradient
West ⇒ East**



**Rain fed 300-800 mm
East coast - summer dry**

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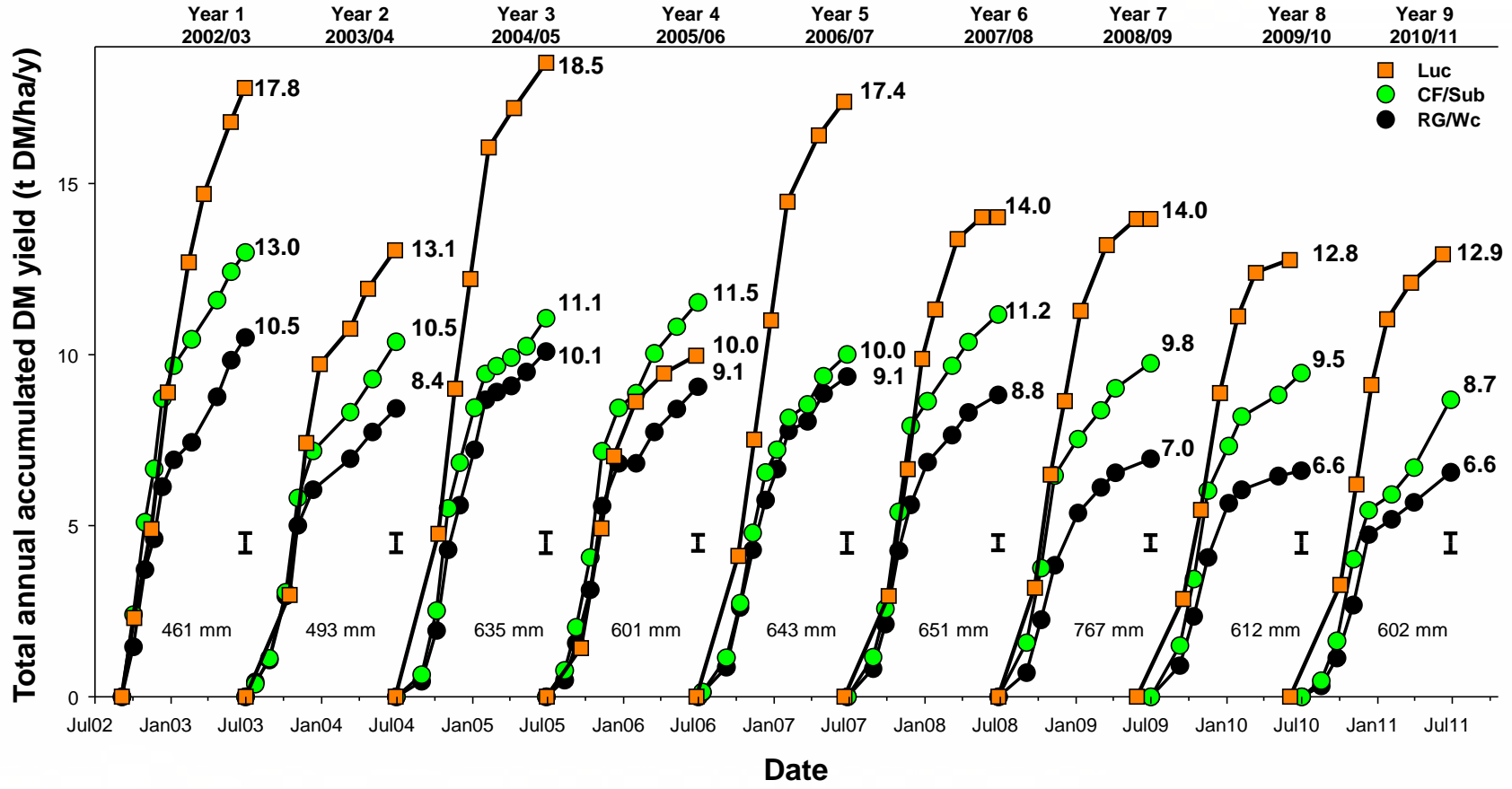
Objectives

- Outline the role of lucerne in New Zealand farming systems
- Understand how lucerne growth and development affects management
- Describe management to maximise production, quality and persistence

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

Grazing Expt. - 'MaxClover'

MaxClover Total DM yields



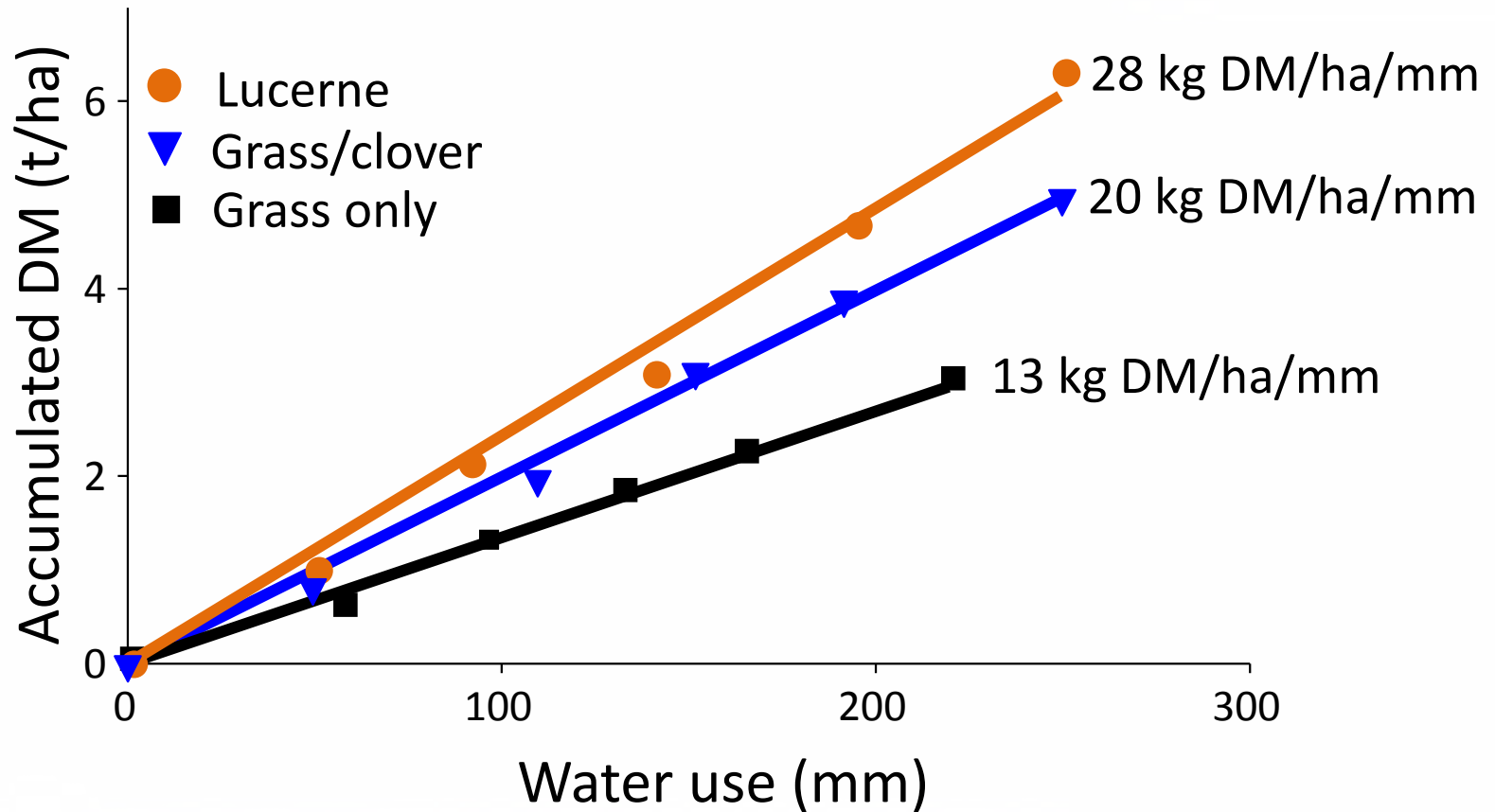


Unsown species <5% in Year 1>45% in Year 6

RG/Wc pastures

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Spring WUE



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

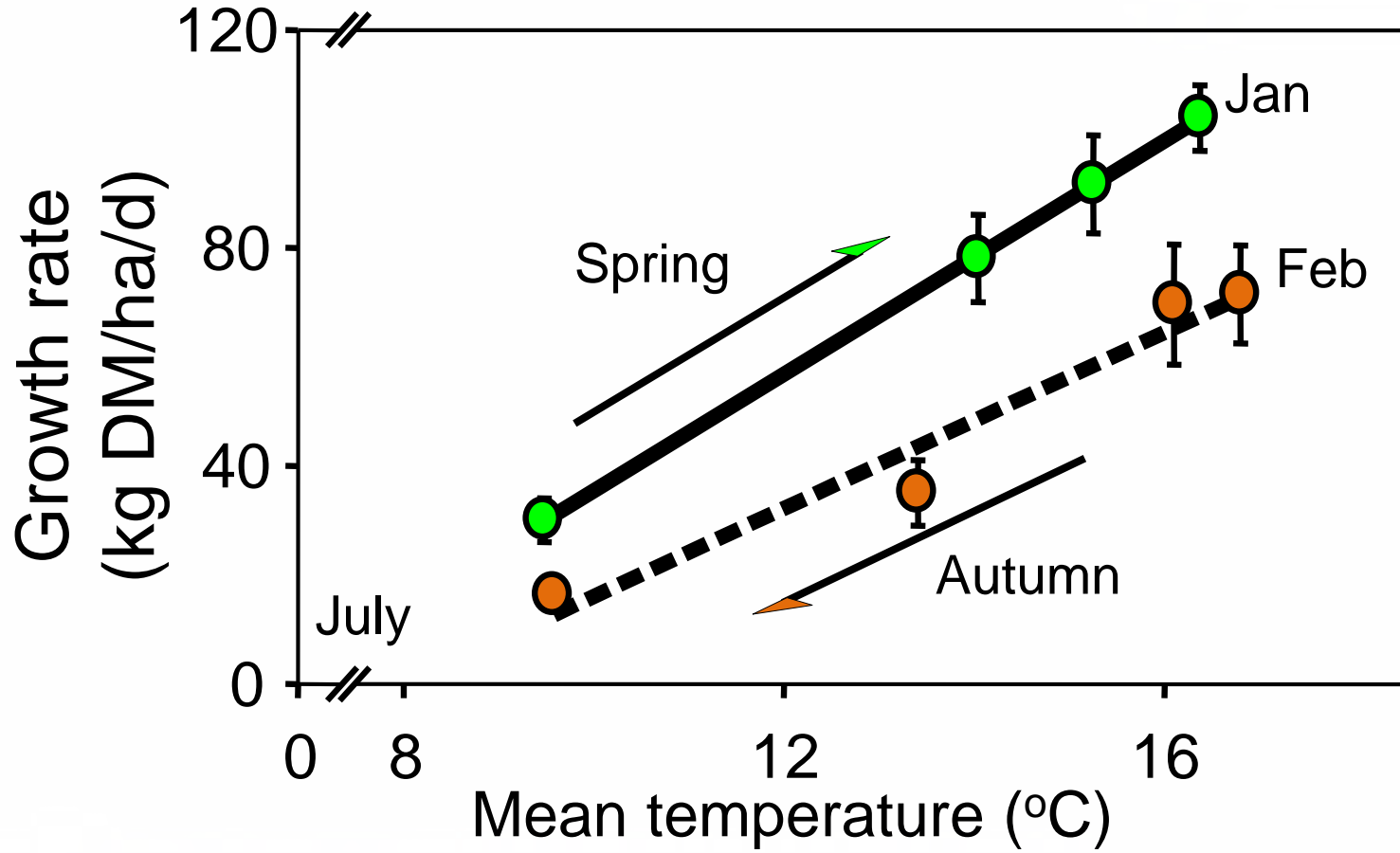
Growth and **development** are both
influenced by environmental signals

The canopy: the energy capture device



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Vegetative growth

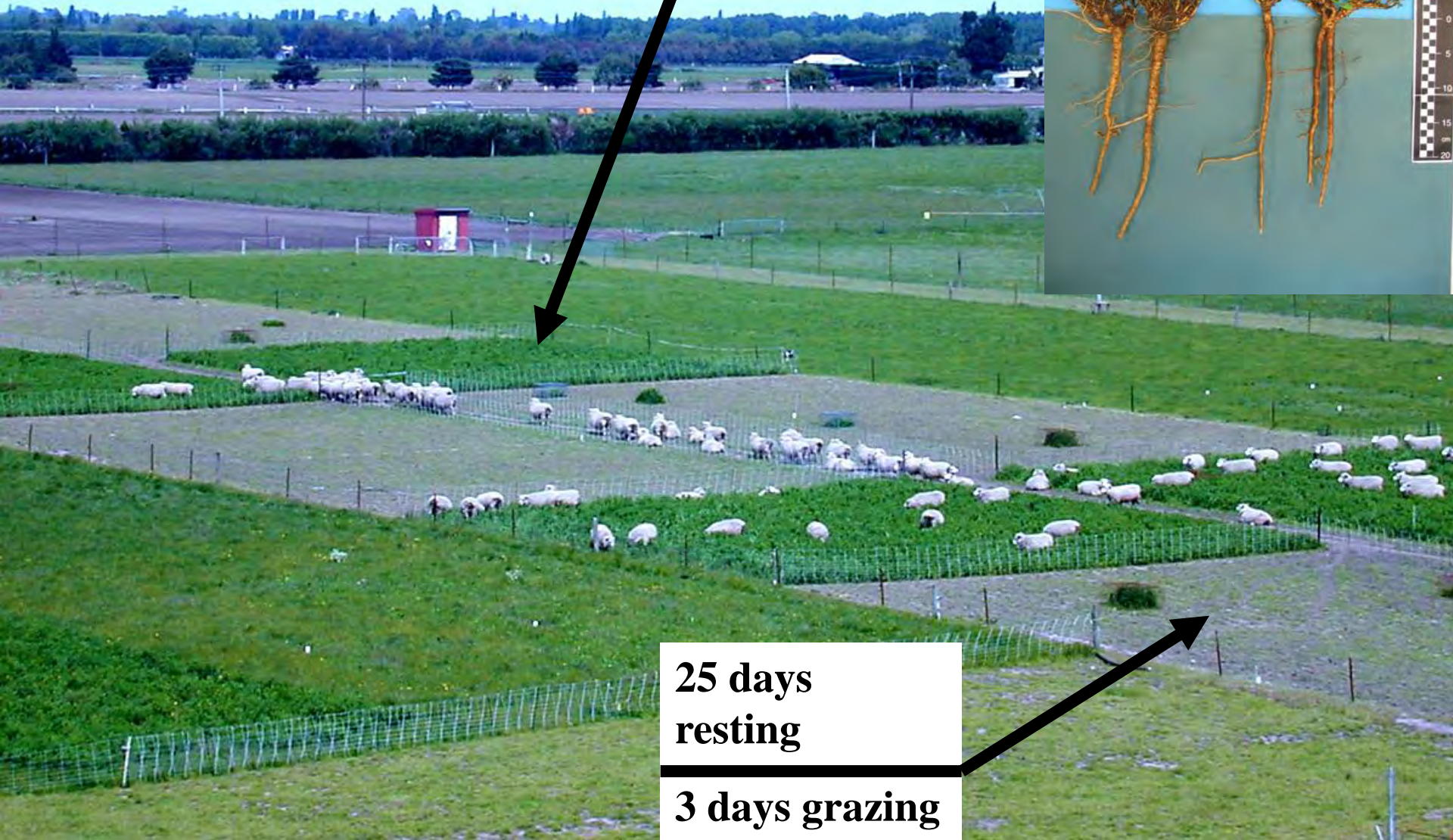


Experiment 2

flexible grazing

38 days
resting

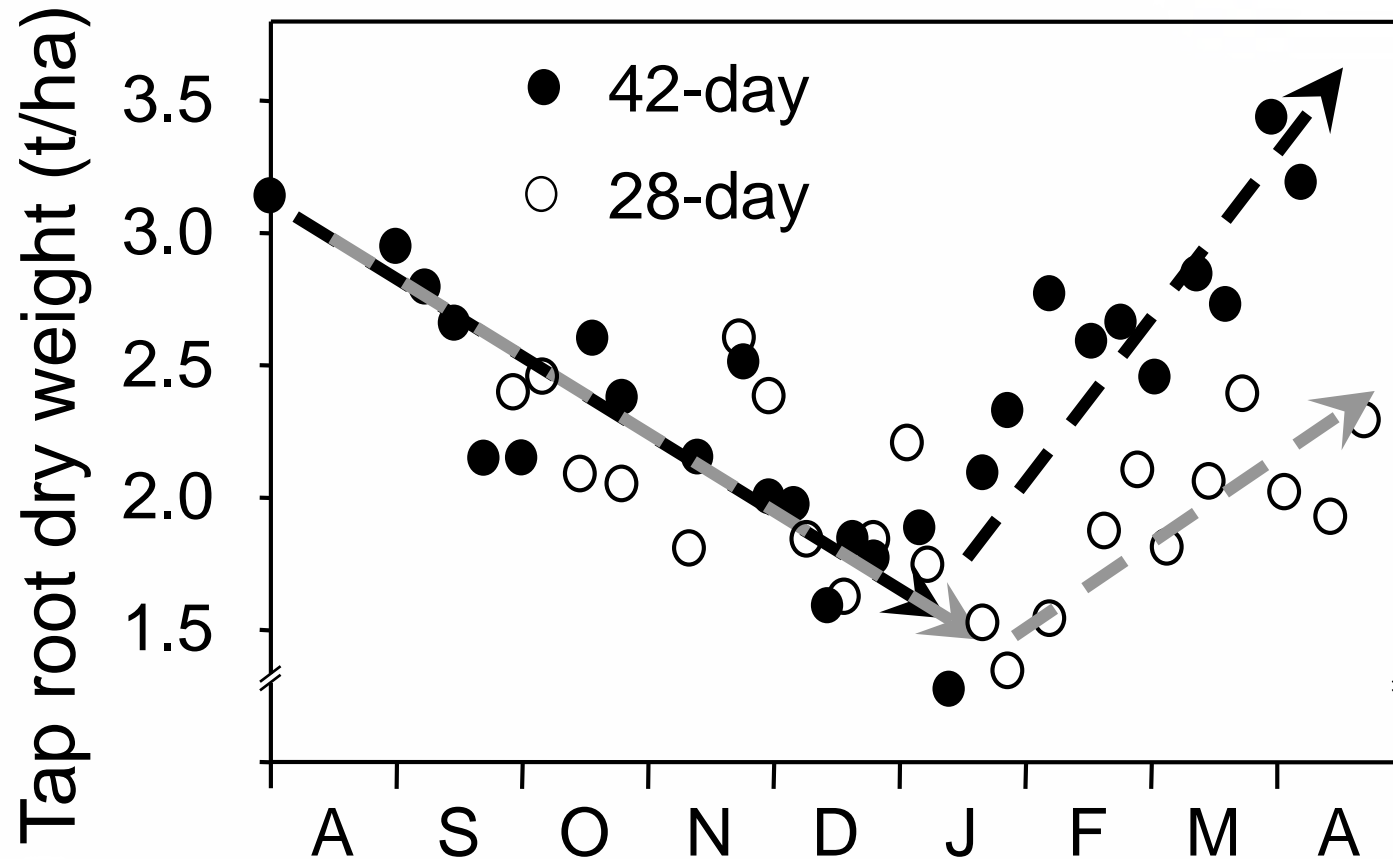
4 days grazing



25 days
resting

3 days grazing

Partitioning to roots



Seasonal grazing management

Spring

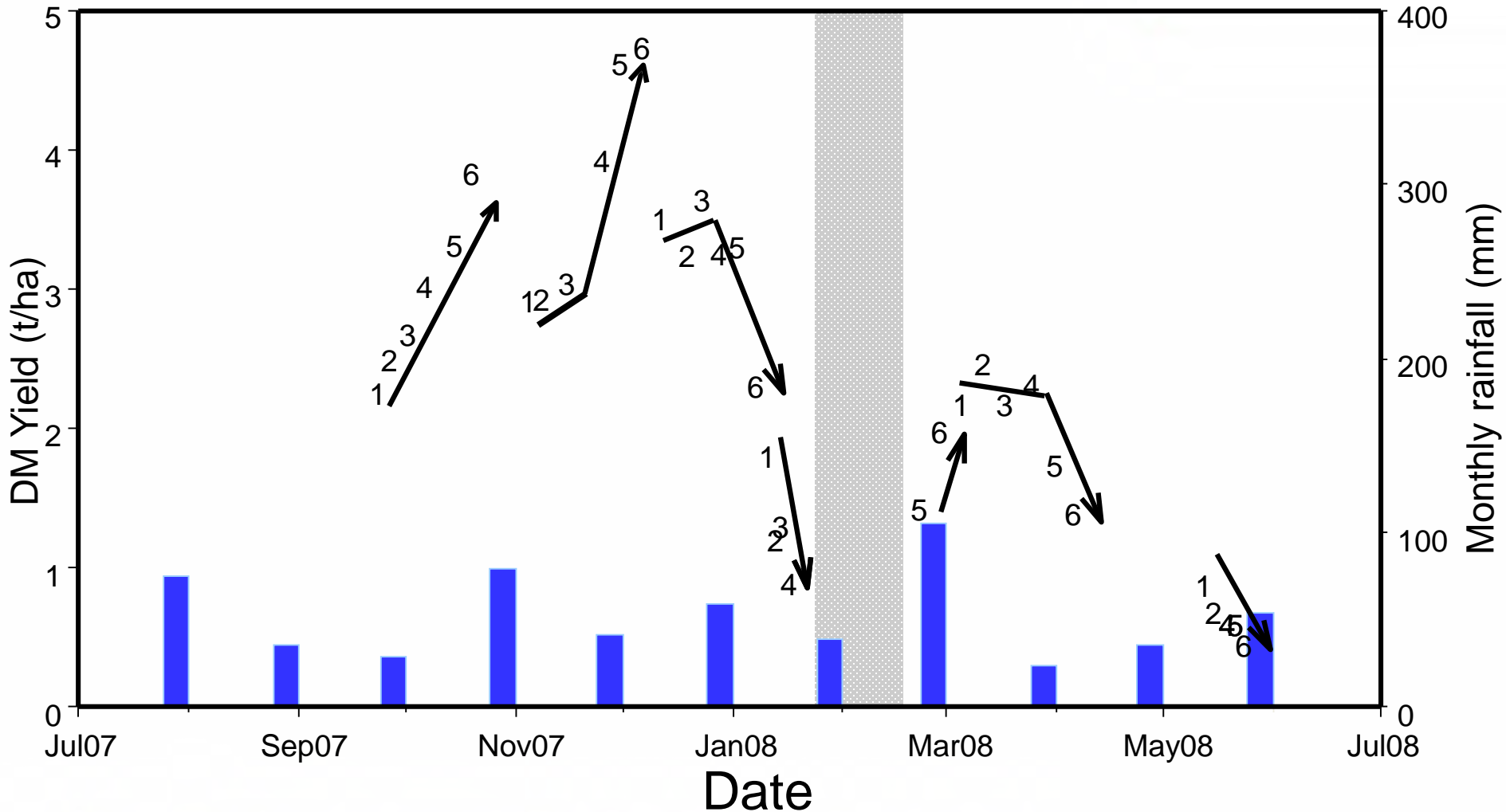
- 1st rotation aided by root reserves to produce high quality vegetative forage.
- can graze before flowers appear (~1500 kg DM/ha) ideally ewes and lambs but

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



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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 NZ

- 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



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Fibre and salt

Maximize reliable spring growth – high priority stock



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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.

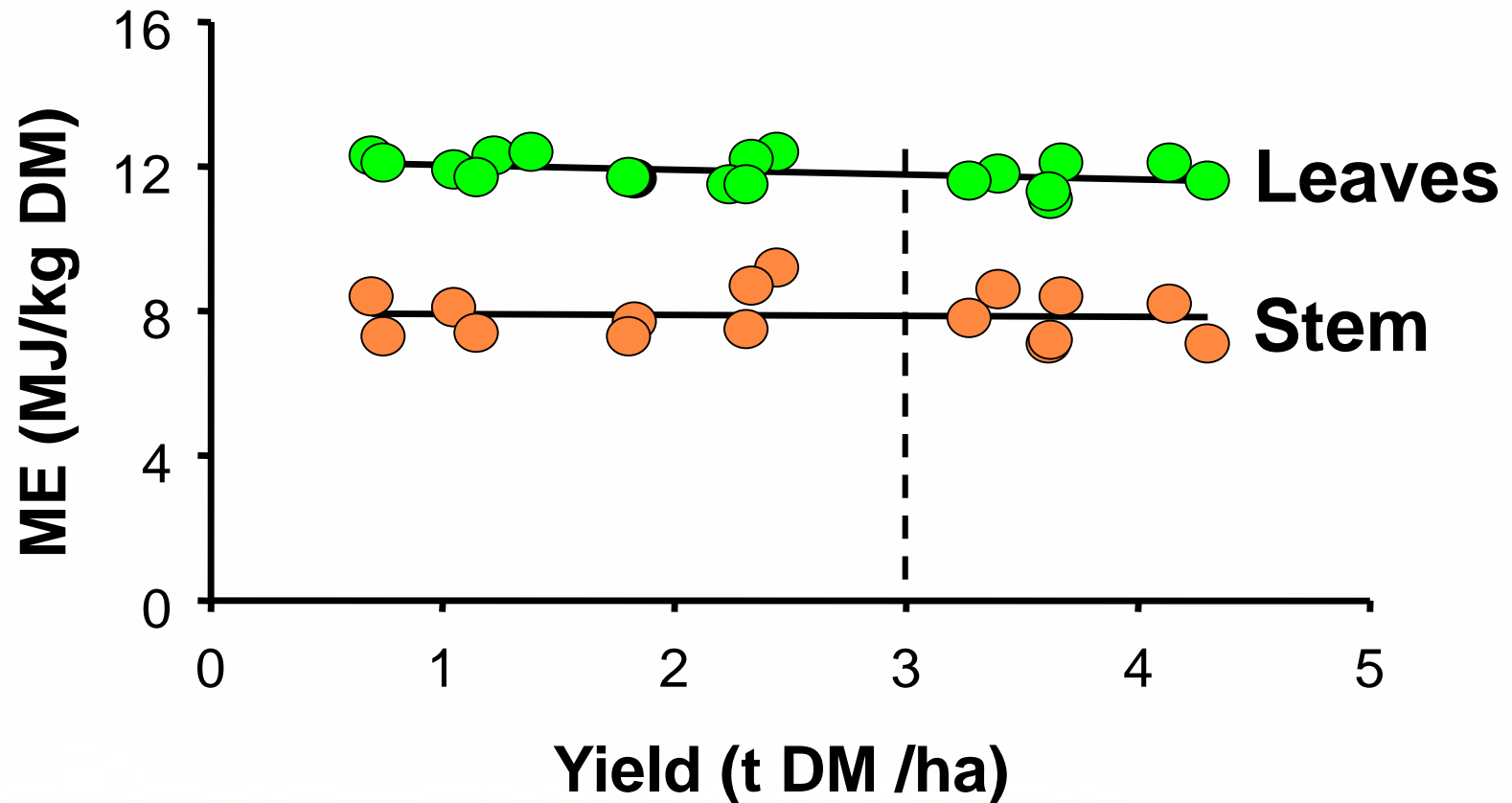
**\Rightarrow build-up root reserves for spring growth
and increase stand persistence**

**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
 - 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

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Drilling seed with fertiliser

Direct drilling = seed + fertiliser



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Sowing rate and date

Established 2007 LU – Templeton silt loam

Coated ‘Grasslands Kaituna’ lucerne.

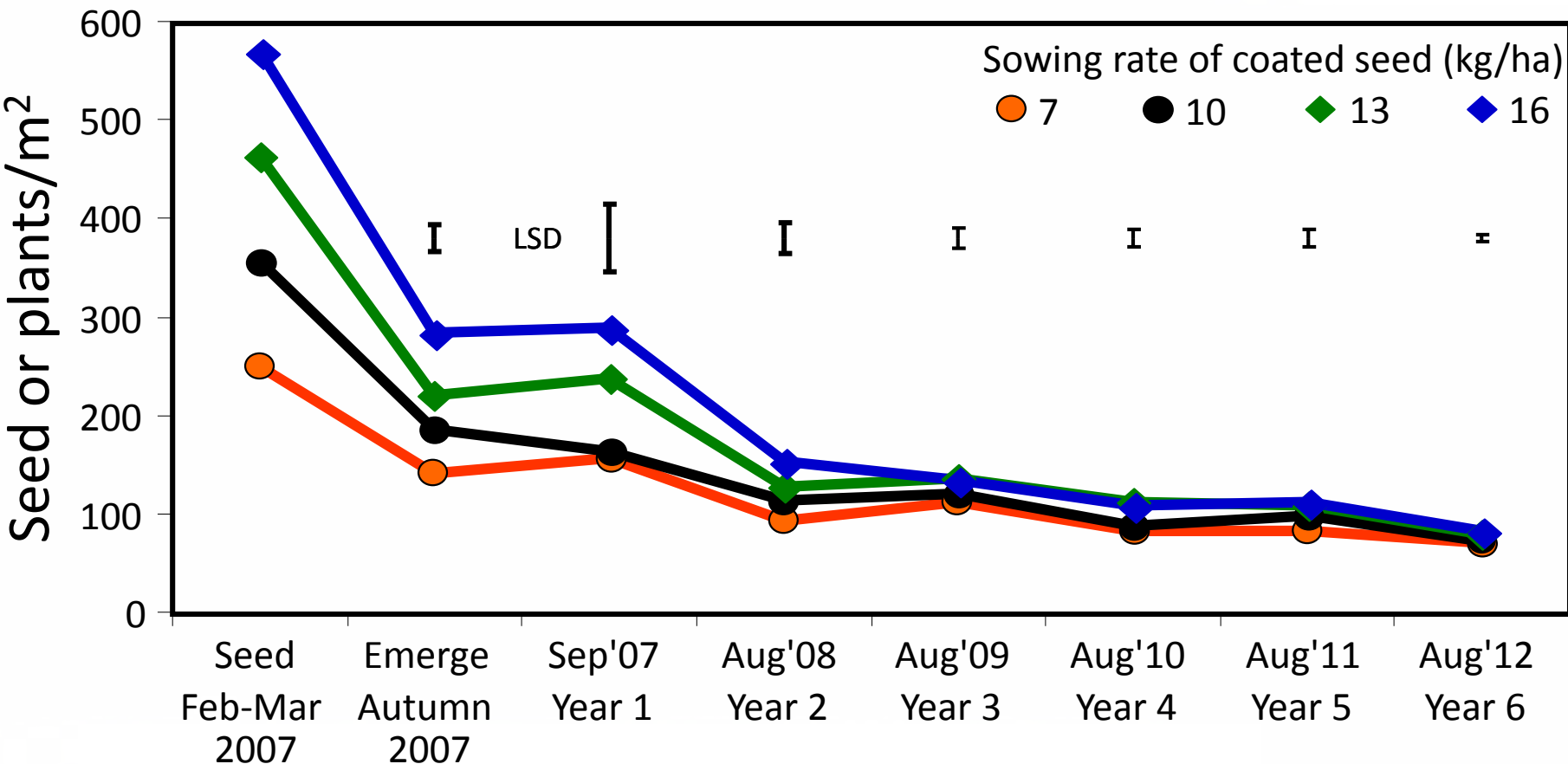
Four sowing dates

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

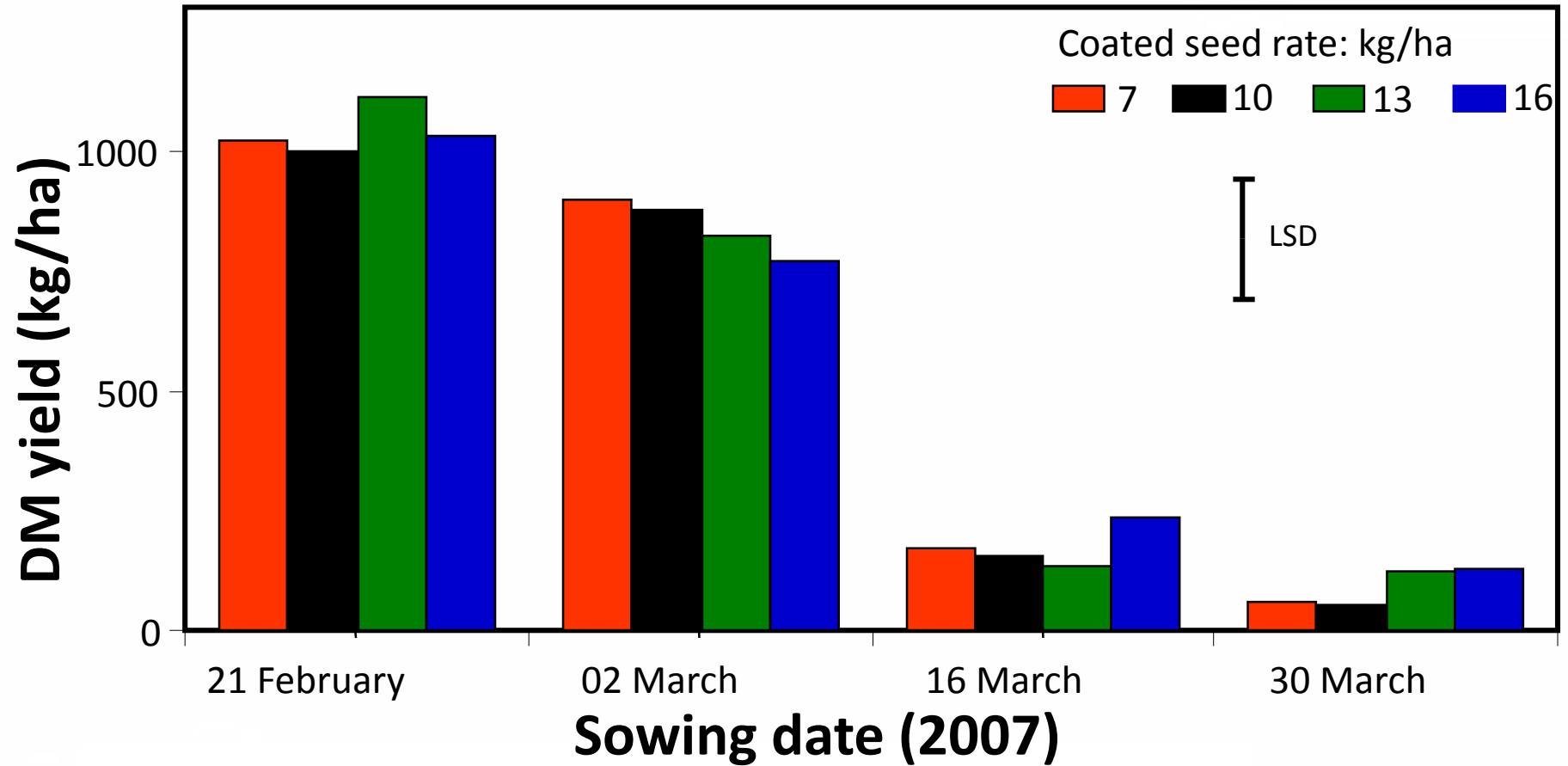
Four sowing rates

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

Sown seed & plant population over time



Seedling lucerne yield to early June



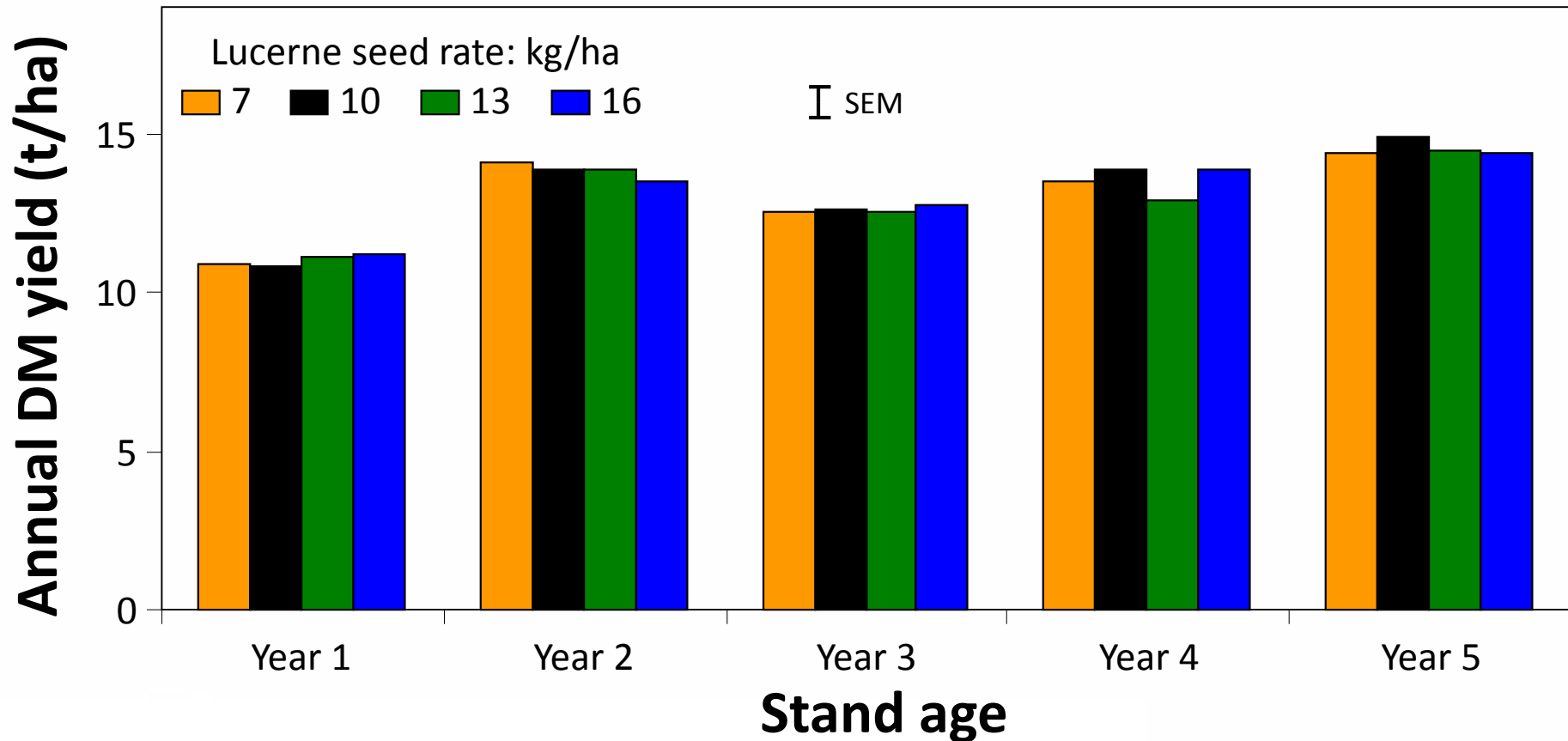
Weeds present @ 09 October 2007 (Year 1)

Sown 21 Feb 2007

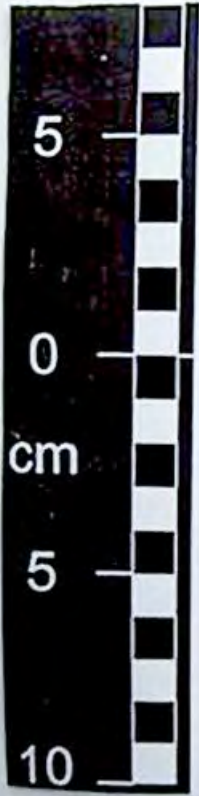
Sown 30 Mar 2007



Annual yield in relation to sowing rate



Sown: February October



Sampled: June

Taproot mass

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

Lucerne grazing options

- Rotational grazing
 - Set stocking
 - Grass mixes

Pastoral 21 BLNZ funded programme

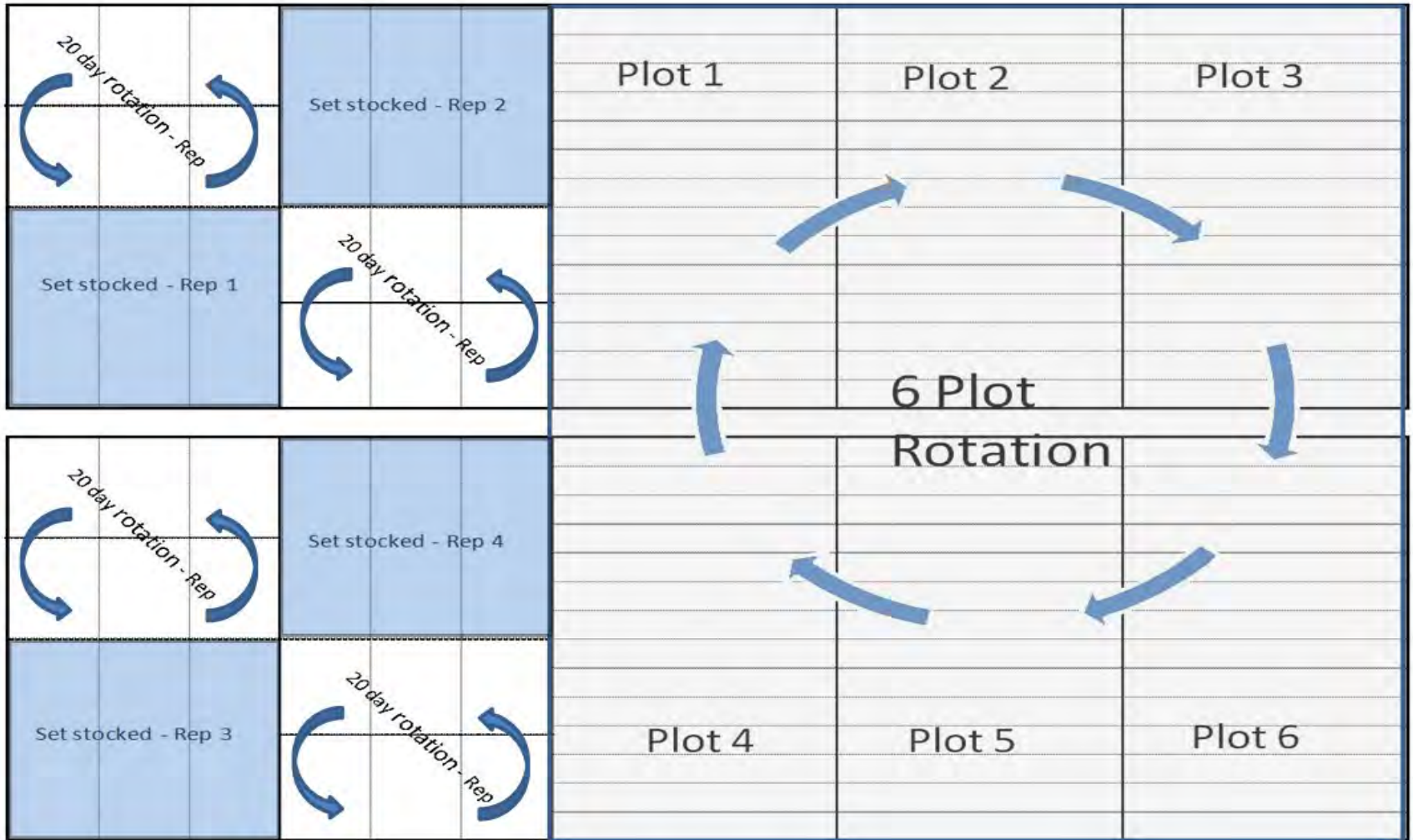


Objective

- Evaluate three spring grazing management strategies for lucerne monocultures
 - Rotational grazing (6 paddock system)
 - Set stocked (SS) until weaning
 - Semi set stocked (SSS) until weaning (10 day shifts)
- After weaning SS and SSS lambs mobbed up and moved to an 8 paddock rotational grazing system (RECOVERY PHASE)

Ashley Dene Lucerne - H7 – Grazing Treatments

Shelter Belt



Ashley Dene Road

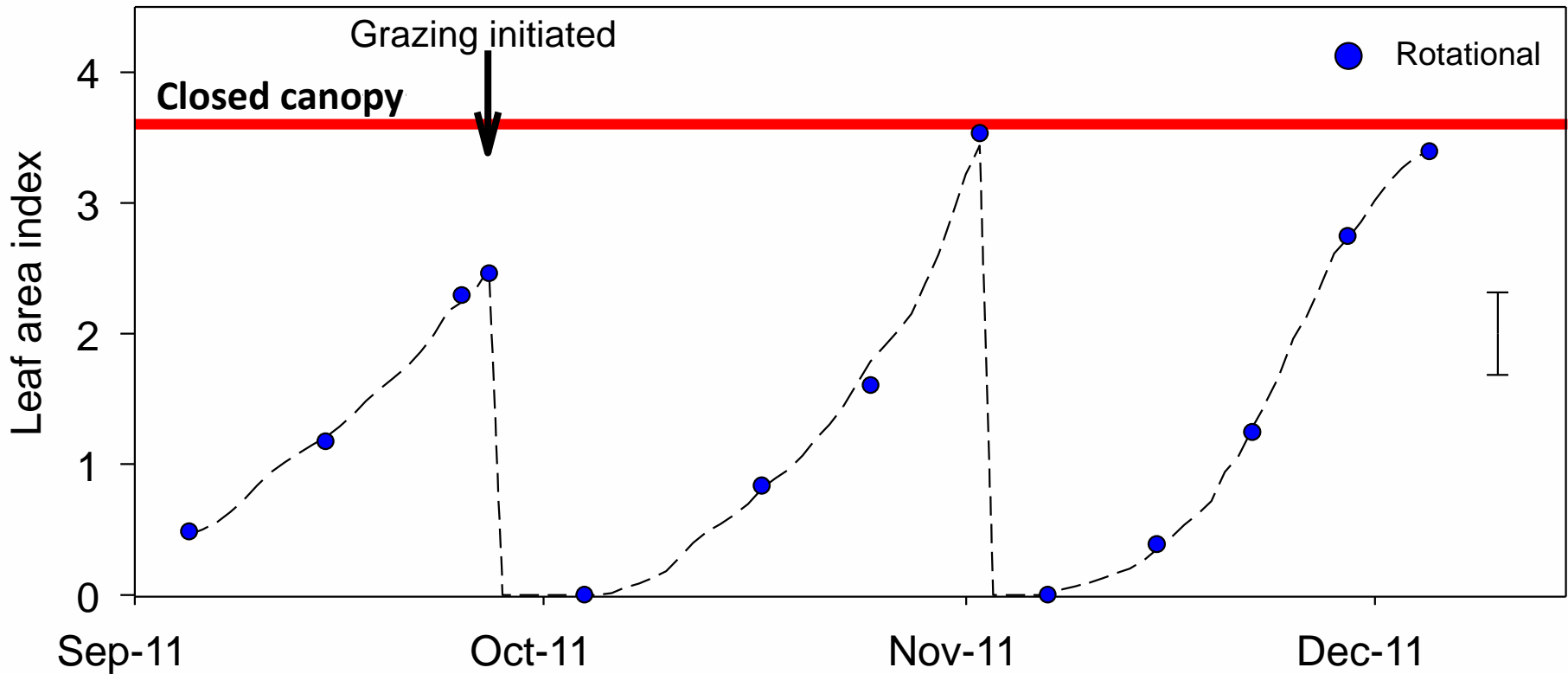
Project 3 – Spring grazing management of lucerne



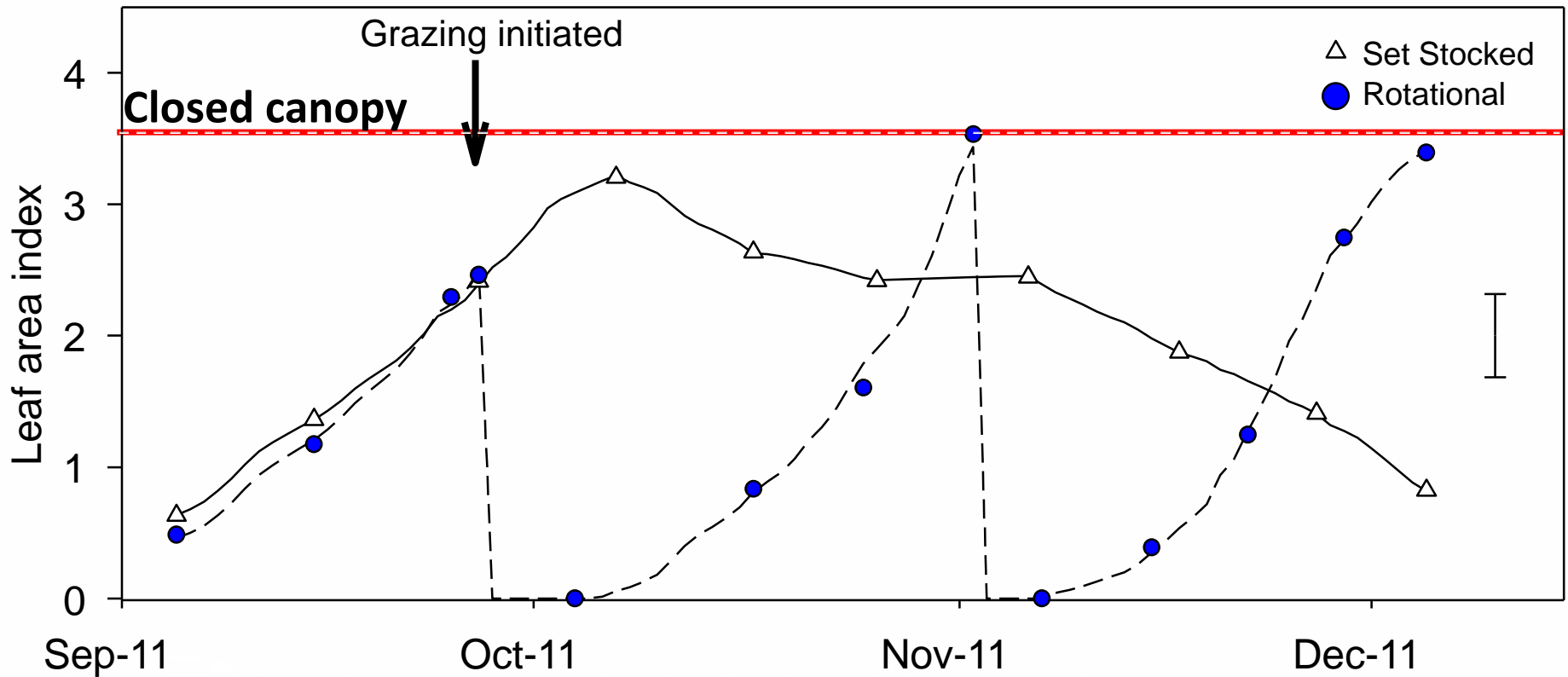
23/9/2010



Crop canopy



Crop canopy



Spring 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	



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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



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
- Minimize soil evaporation by timing of irrigation
- Replace nutrients removed through cut and carry (K)

Websites

Dryland Pastures Website: <http://www.lincoln.ac.nz/dryland>

Dryland Pastures Blog: <https://blogs.lincoln.ac.nz/dryland/>

References

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