PGGW – Kimihia
26 June 2014

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AOTEAROA • NEW ZEALAND

LUCERNE
- agronomy and grazing management

Dr Derrick Moot

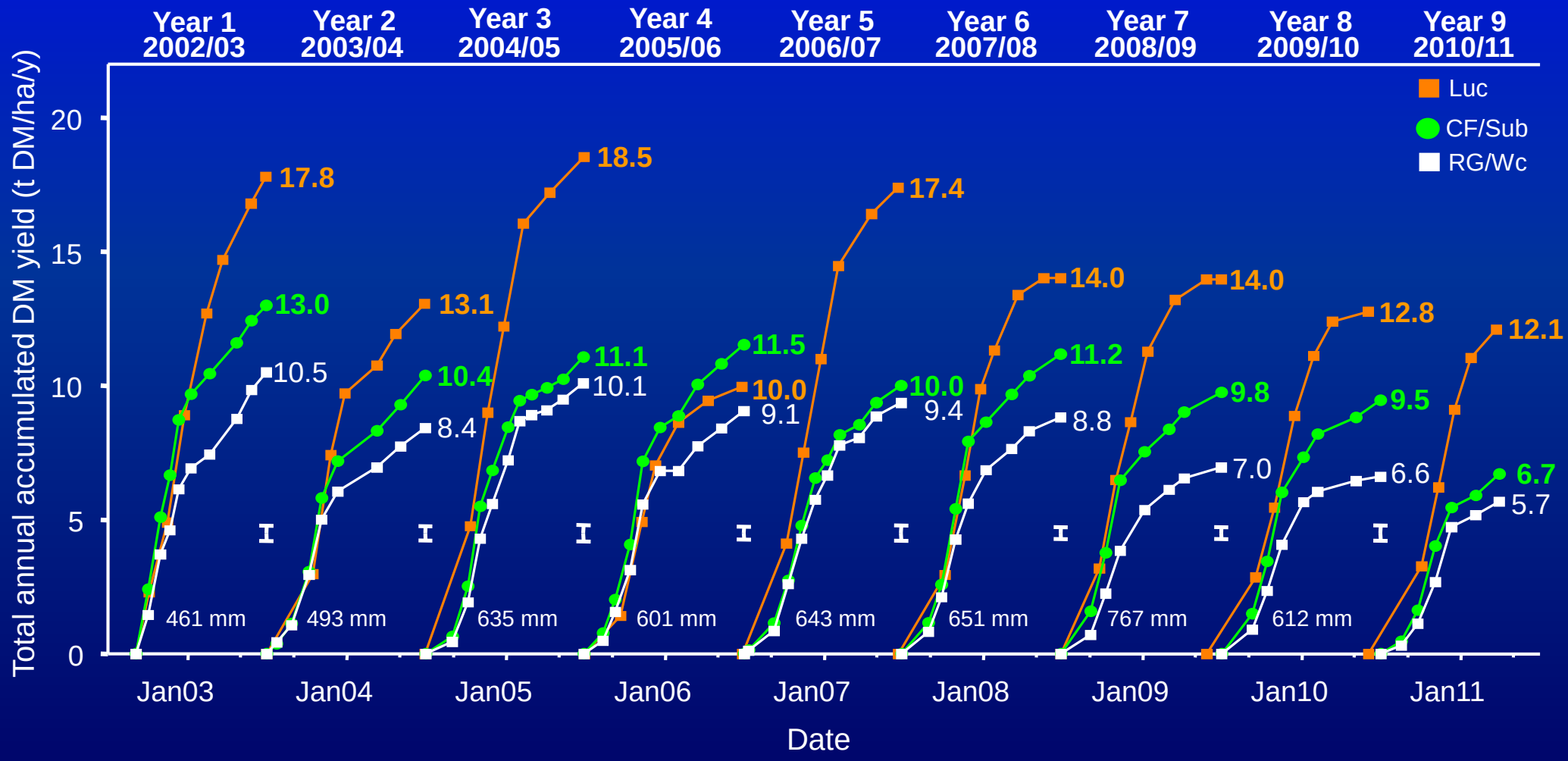
Professor of Plant Science

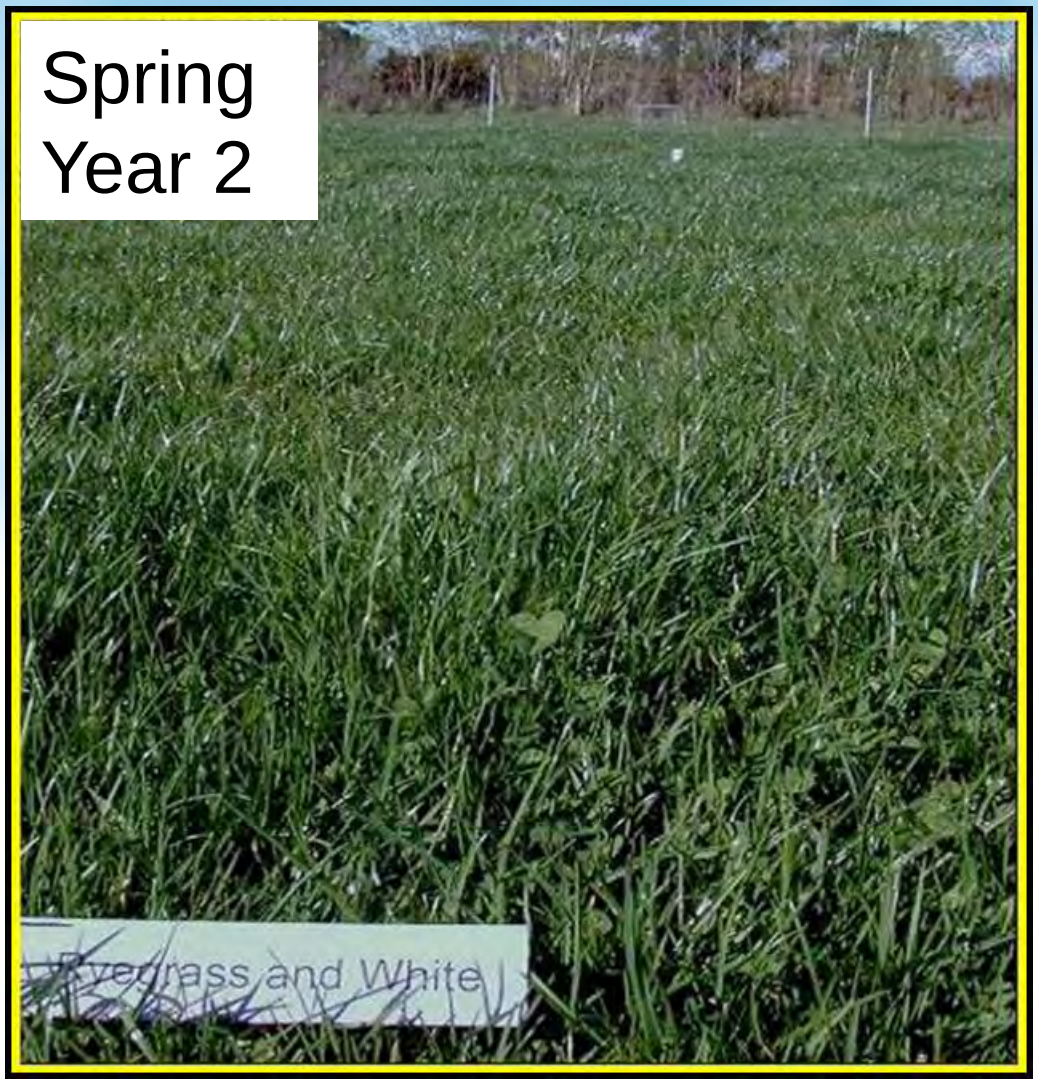
New Zealand's specialist land-based university

‘MaxClover’

‘MaxClover’ Total DM Yields

(to 30 March 2011)

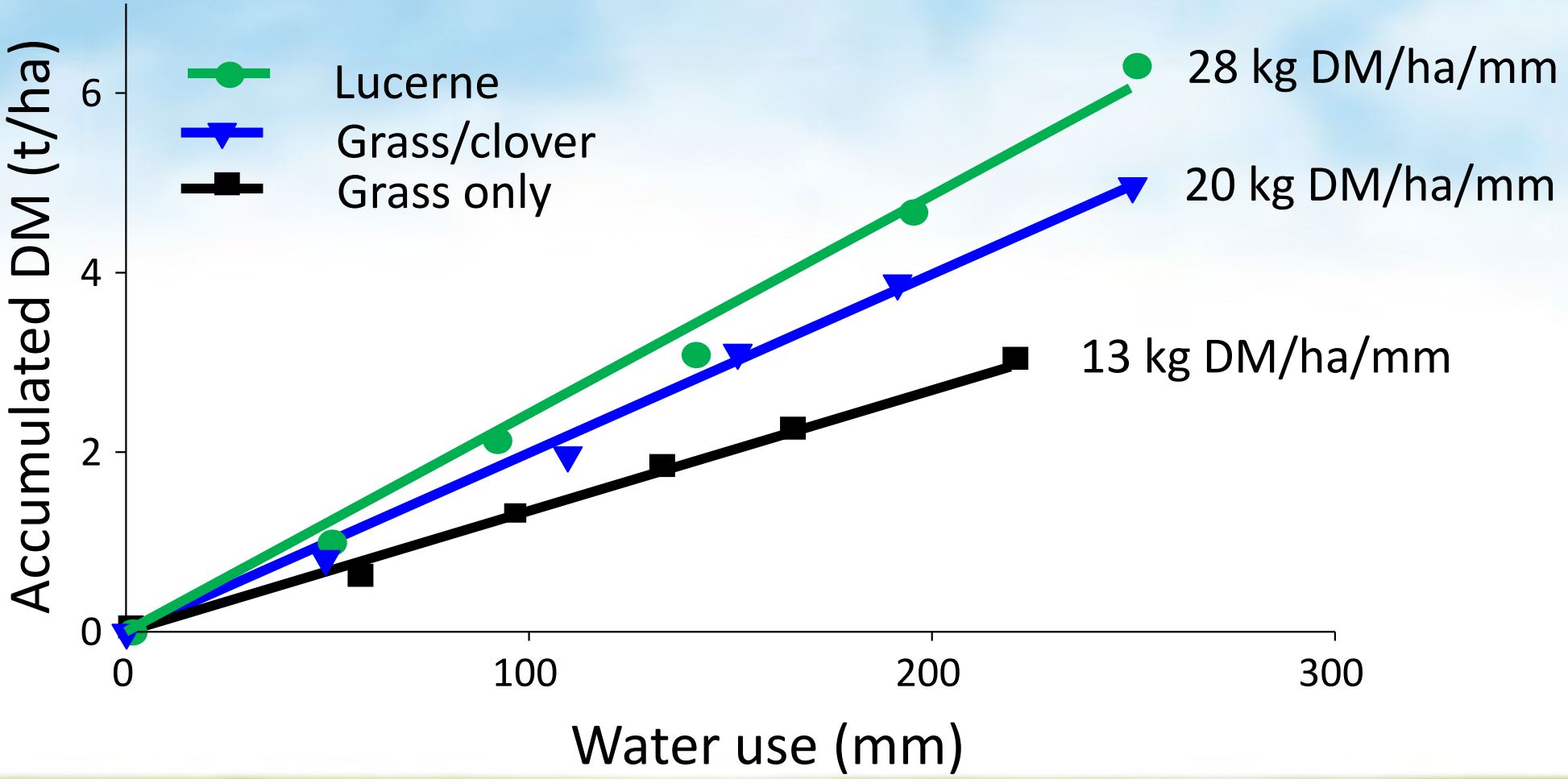




Unsown species <5% in Year 1.. …….>45% in Year 6

RG/Wc pastures

Spring WUE



Moot et al. 2008

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 = Phytopthora root rot

D = Dormant
SD = Semi-dormant

HR = 50%+ resistant
MR = 16-30%

R = Resistant = (31-50%)
S = Susceptible

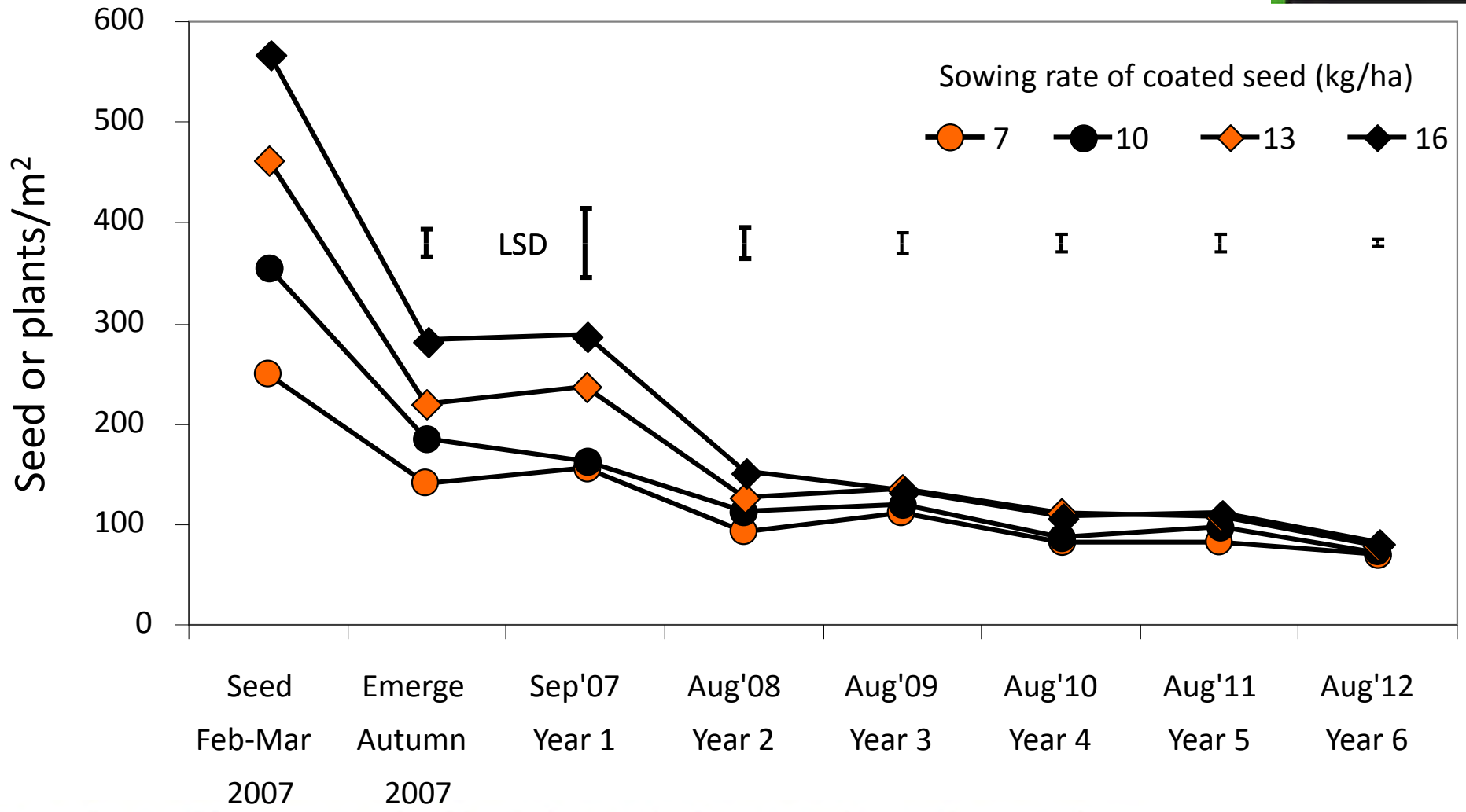
Adapted from: Dunbier & Easton 1982

1. Lucerne establishment

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

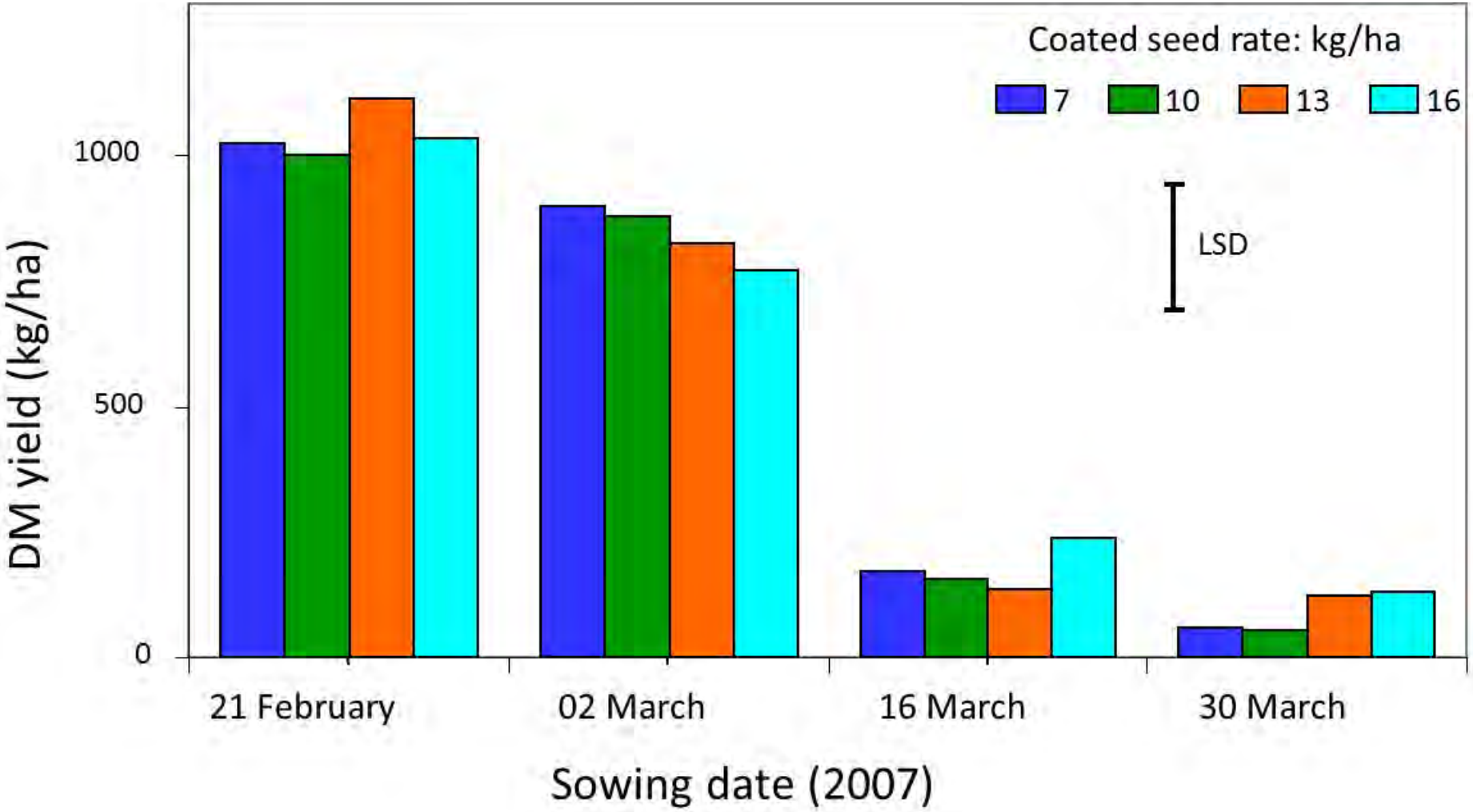
Sowing
- inoculated
- 10-25 mm
- bare or coated 8-10 kg/ha
- spring or autumn (grass grub)
- cultivated or direct drilled
- after fallow?

Sown seed and plant population over time



Moot et al., 2012

Seedling lucerne yield to early June



Moot et al., 2012

Weeds present @ 09 October 2007 (Year 1)

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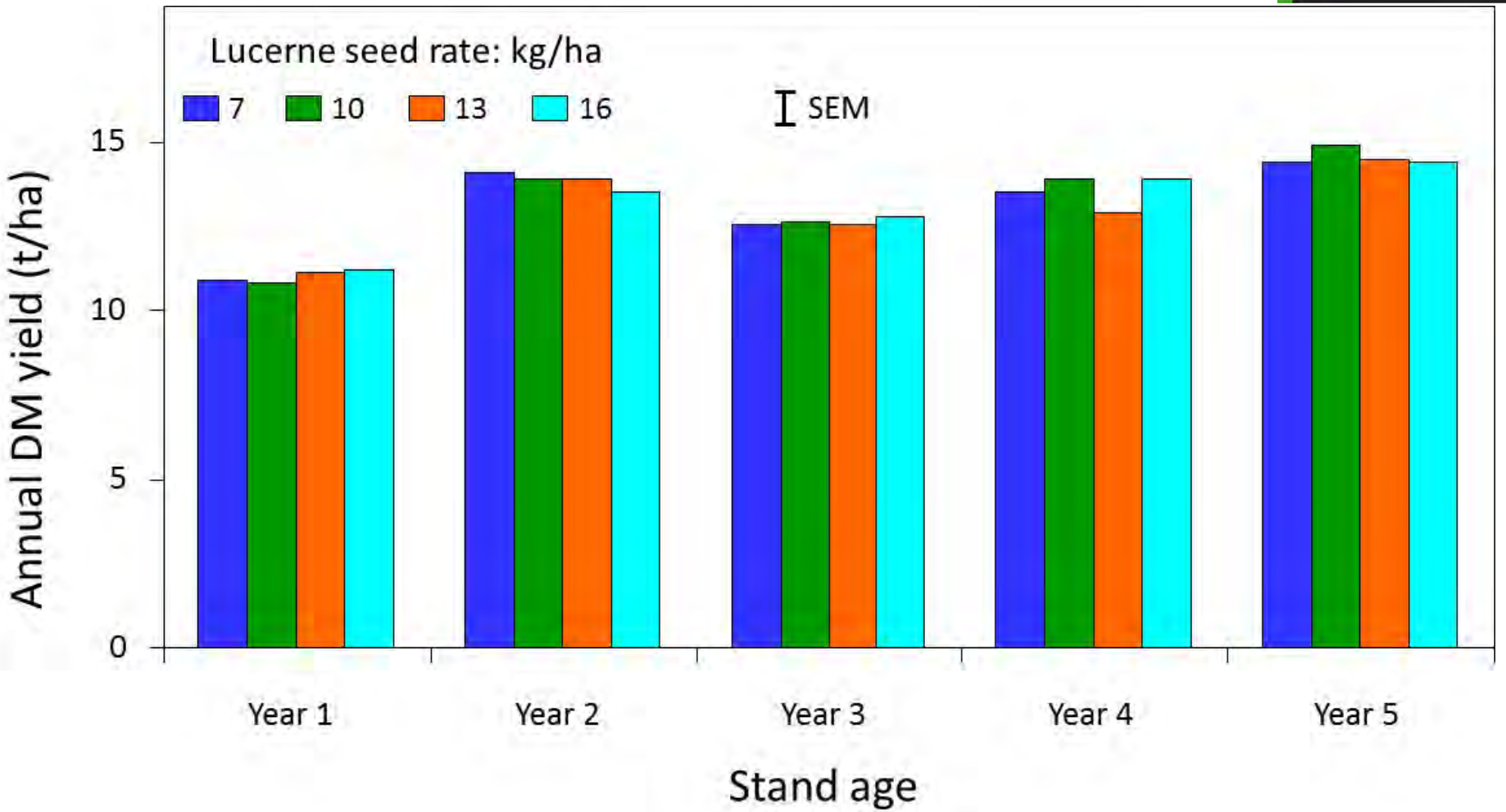
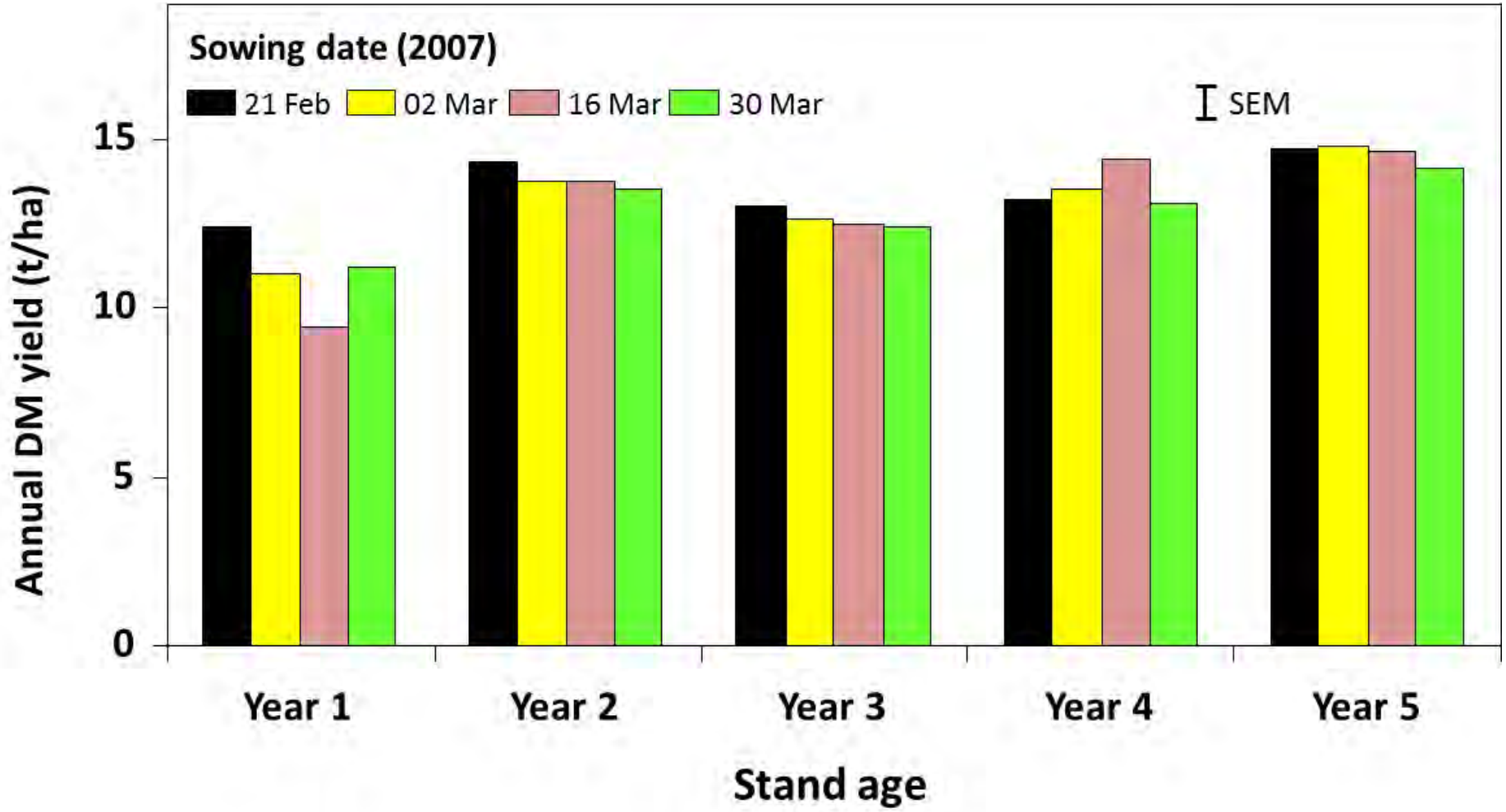
Sown 21 Feb 2007 **Sown 30 Mar 2007**

Annual yield in relation to sowing rate



Moot et al., 2012

Annual yield in relation to sowing date

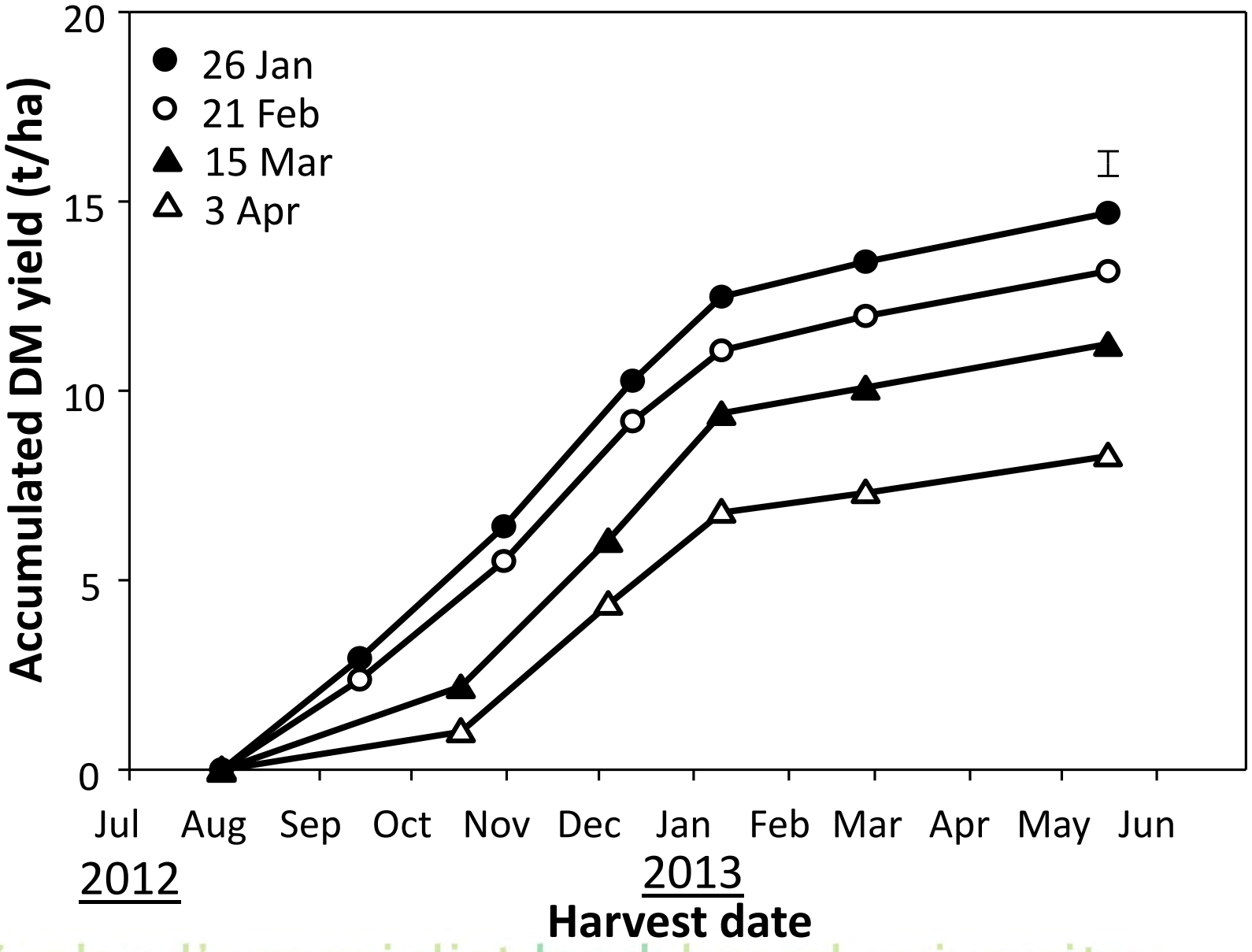


Moot et al., 2012

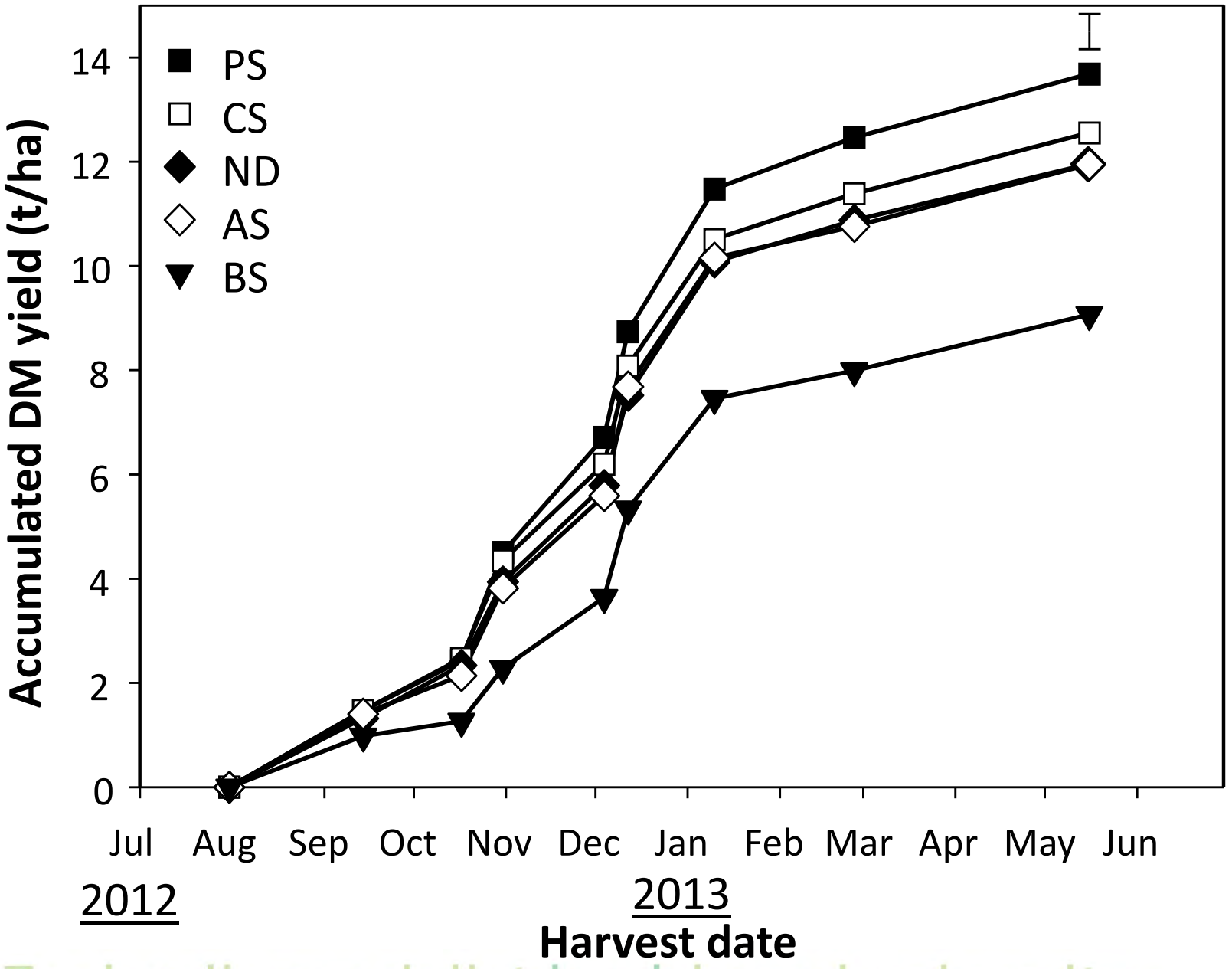
The Experiment

- 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)

Black & Moot 2013



Black & Moot 2013



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Black & Moot 2013

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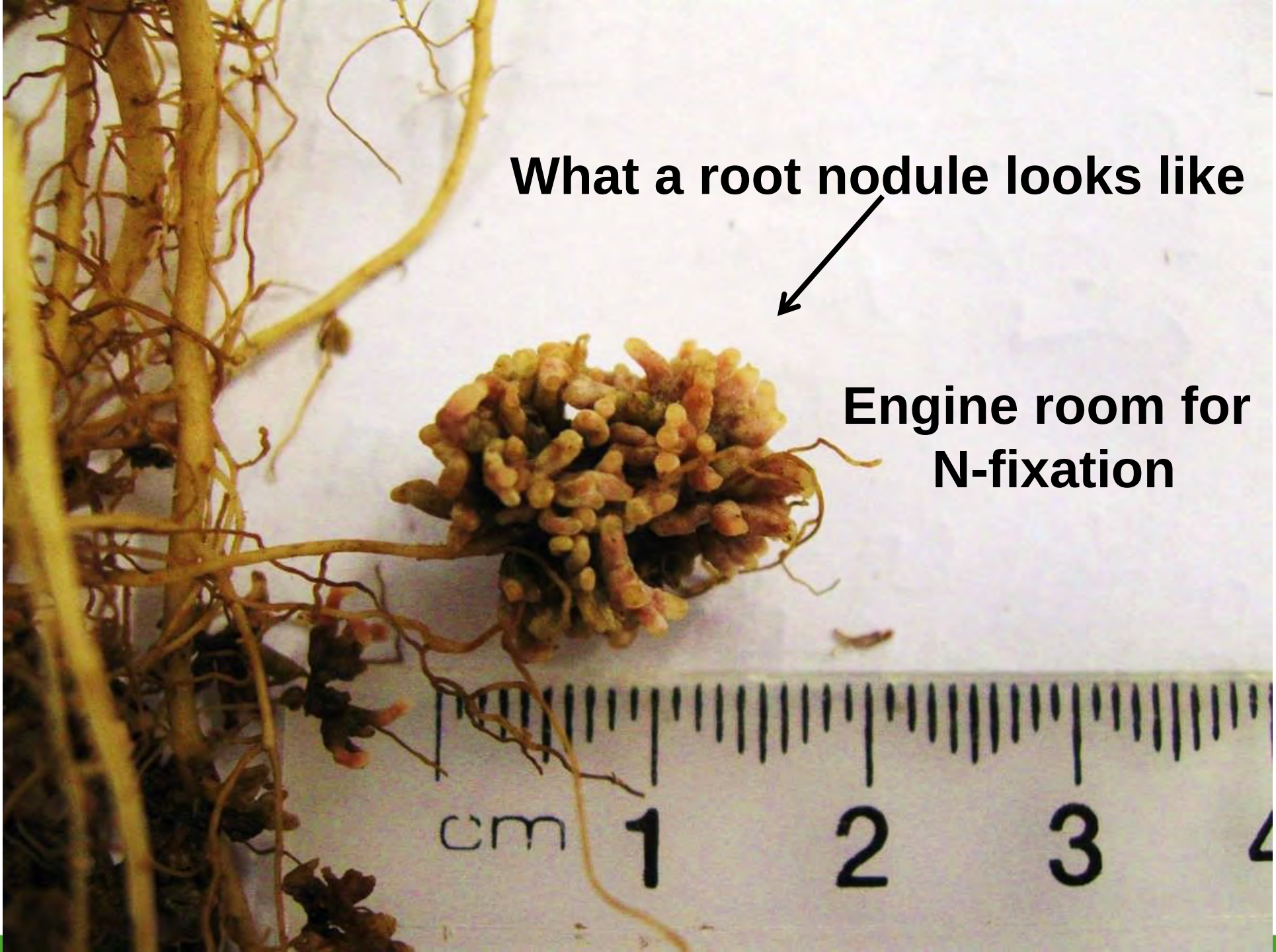

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Black & Moot 2013

Pre-development

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

Source: Kearney *et al.* 2010

Source: Kearney *et al.* 2010

Lime and Fertiliser Application

Lime 3-5 ton/ha

Fertiliser 250-500kg/ha

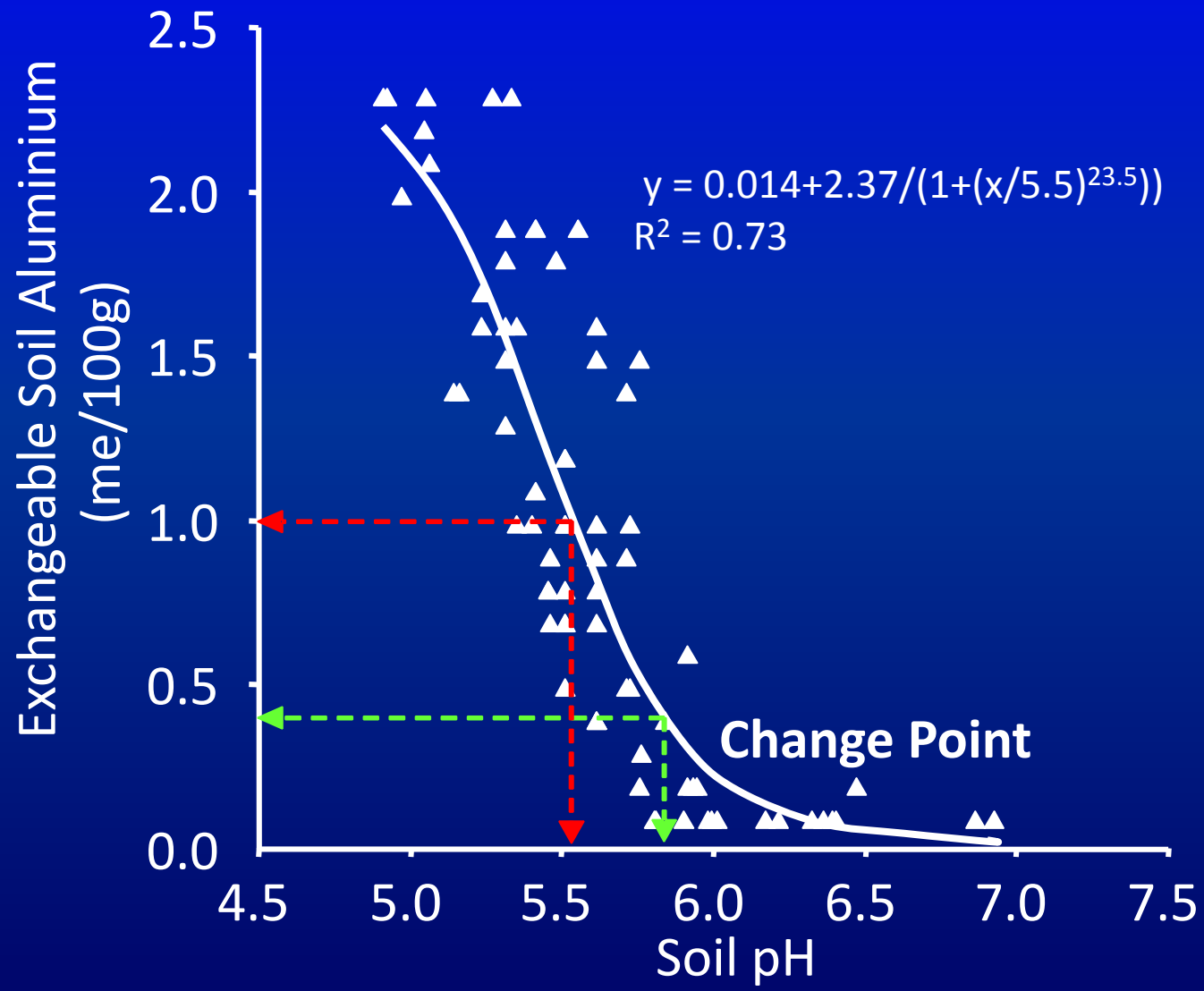
Source: Kearney *et al.* 2010

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)
Pre-Development (2008)					
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
Post-Development (2010)					
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

Source: Kearney *et al.* 2010

Soil pH & exchangeable Aluminium



Moir & Moot, 2010

Lucerne root

~8 months after sowing

> 1.5 m length

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Autumn Spraying

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

Key Results

- Conserve soil moisture
- Kill mass root systems

Source: Kearney *et al.* 2010

2nd Spray – Spring

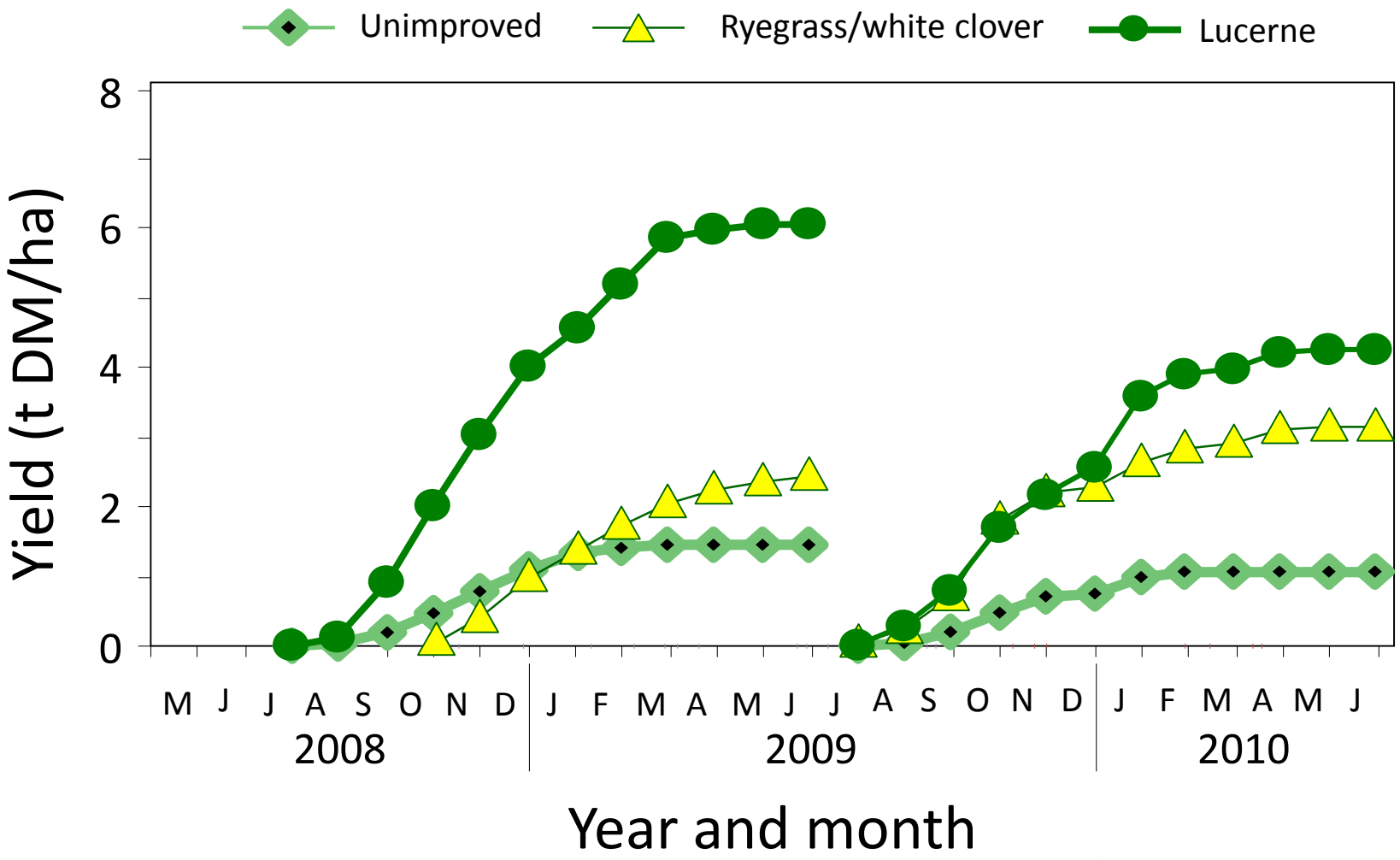
Glyphosate, insecticide, penetrant

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



Source: Kearney *et al.* 2010

Seasonal grazing management

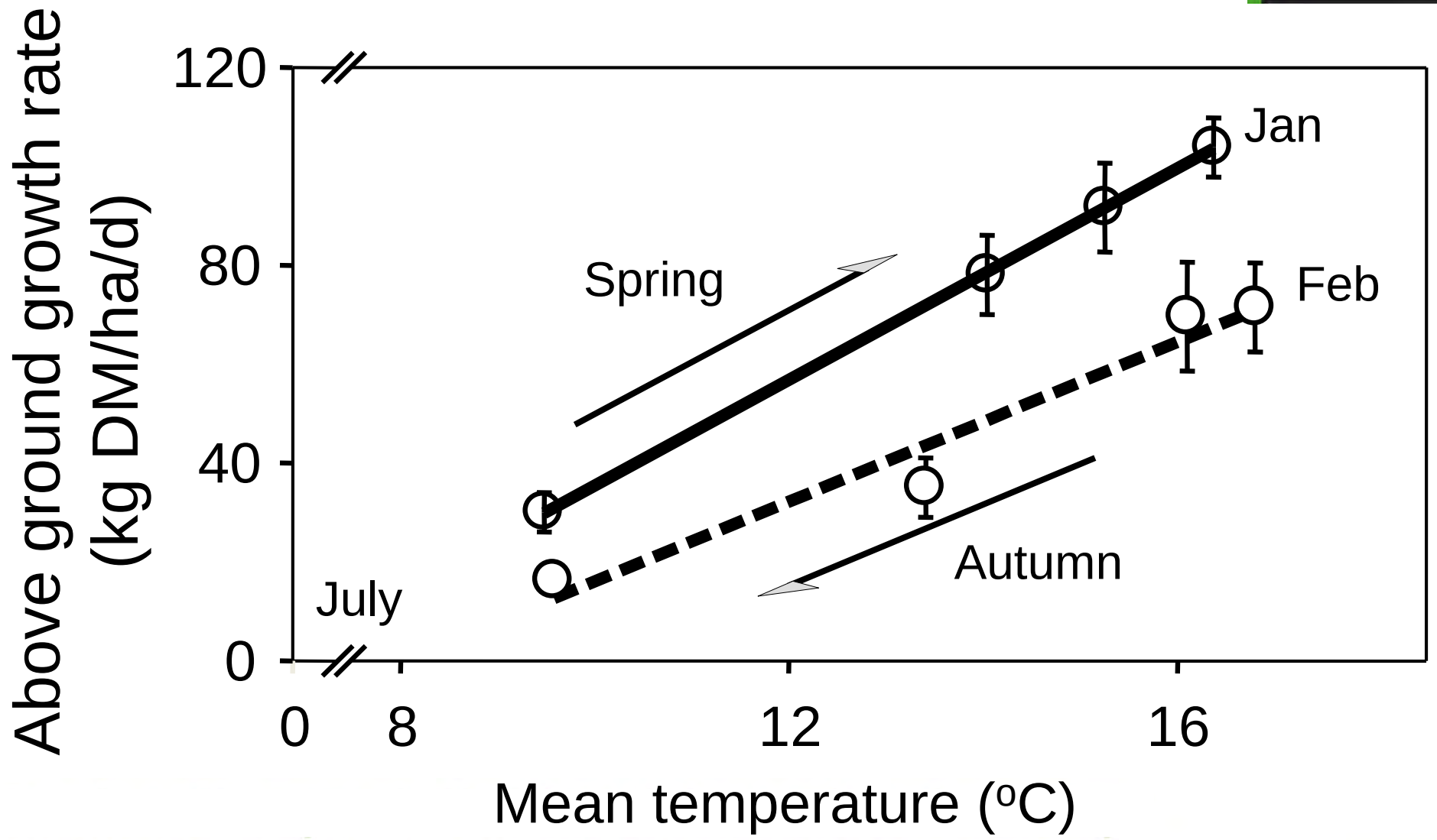
Spring

- 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

Never lamb on or set stock lucerne

Vegetative growth



Source: Moot *et al*. 2003

Grazing Experiment

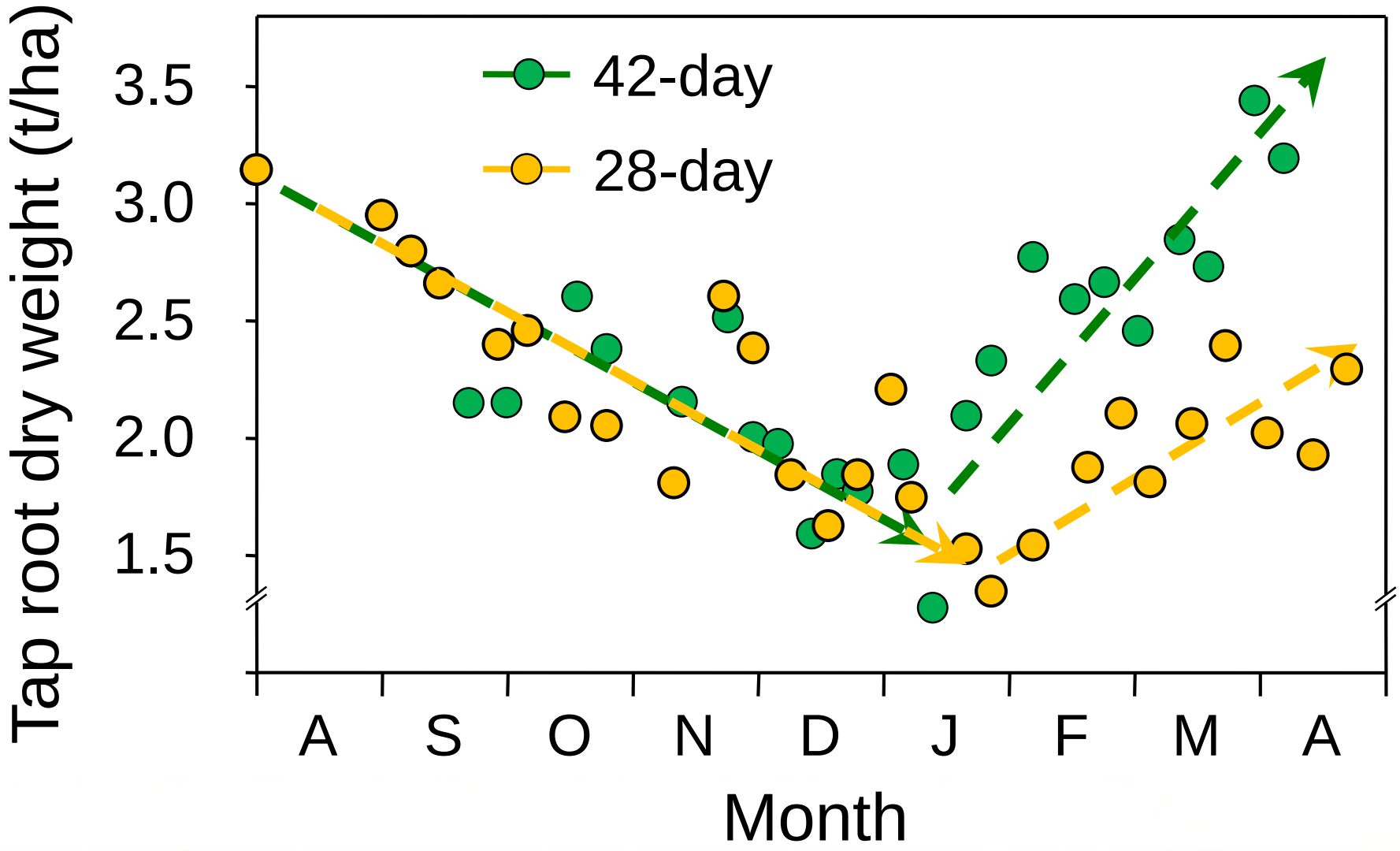
38 days resting

4 days grazing

25 days resting

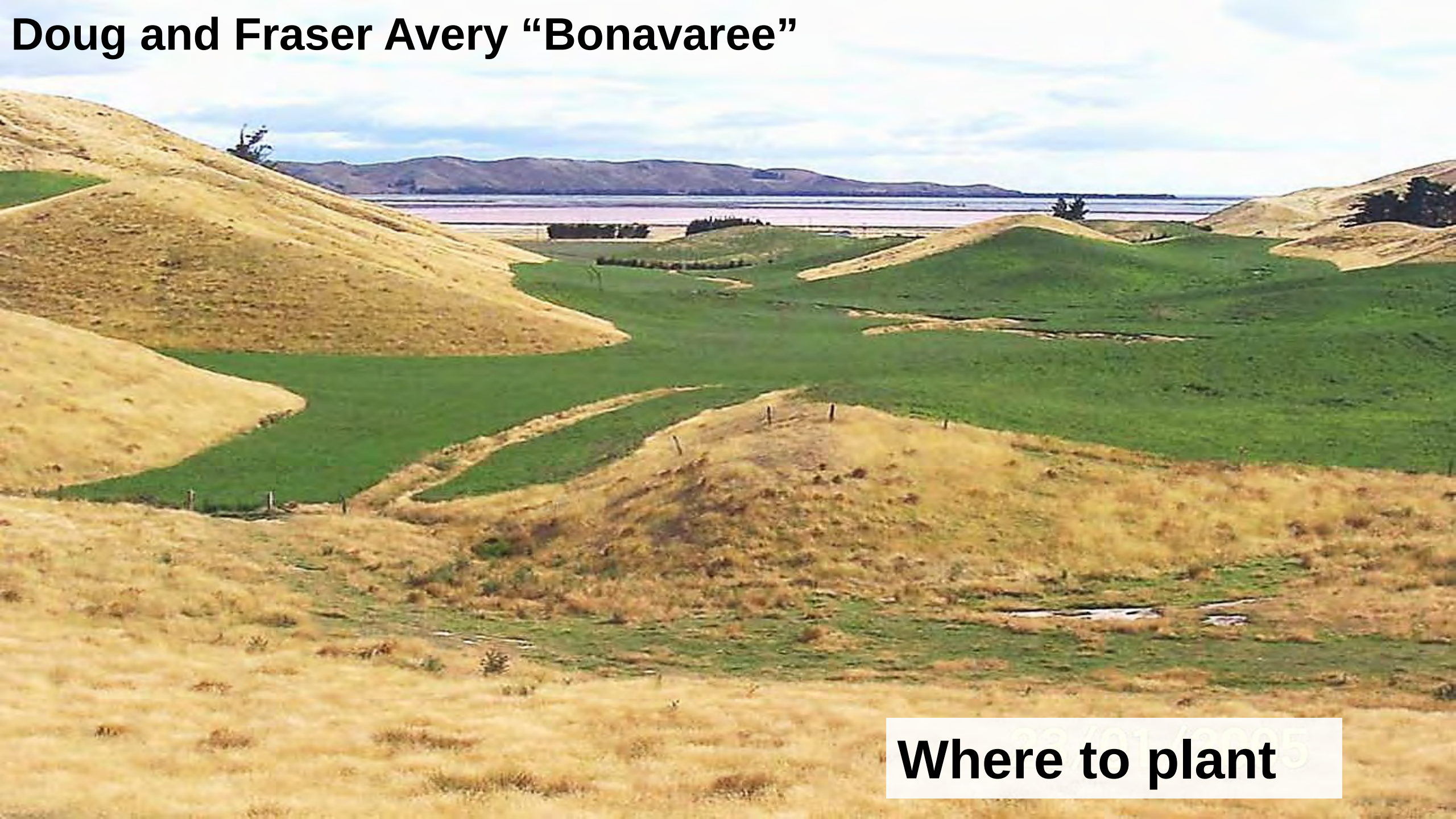
3 days grazing

Partitioning to roots



Source: Moot *et al*. 2003

Doug and Fraser Avery “Bonavaree”

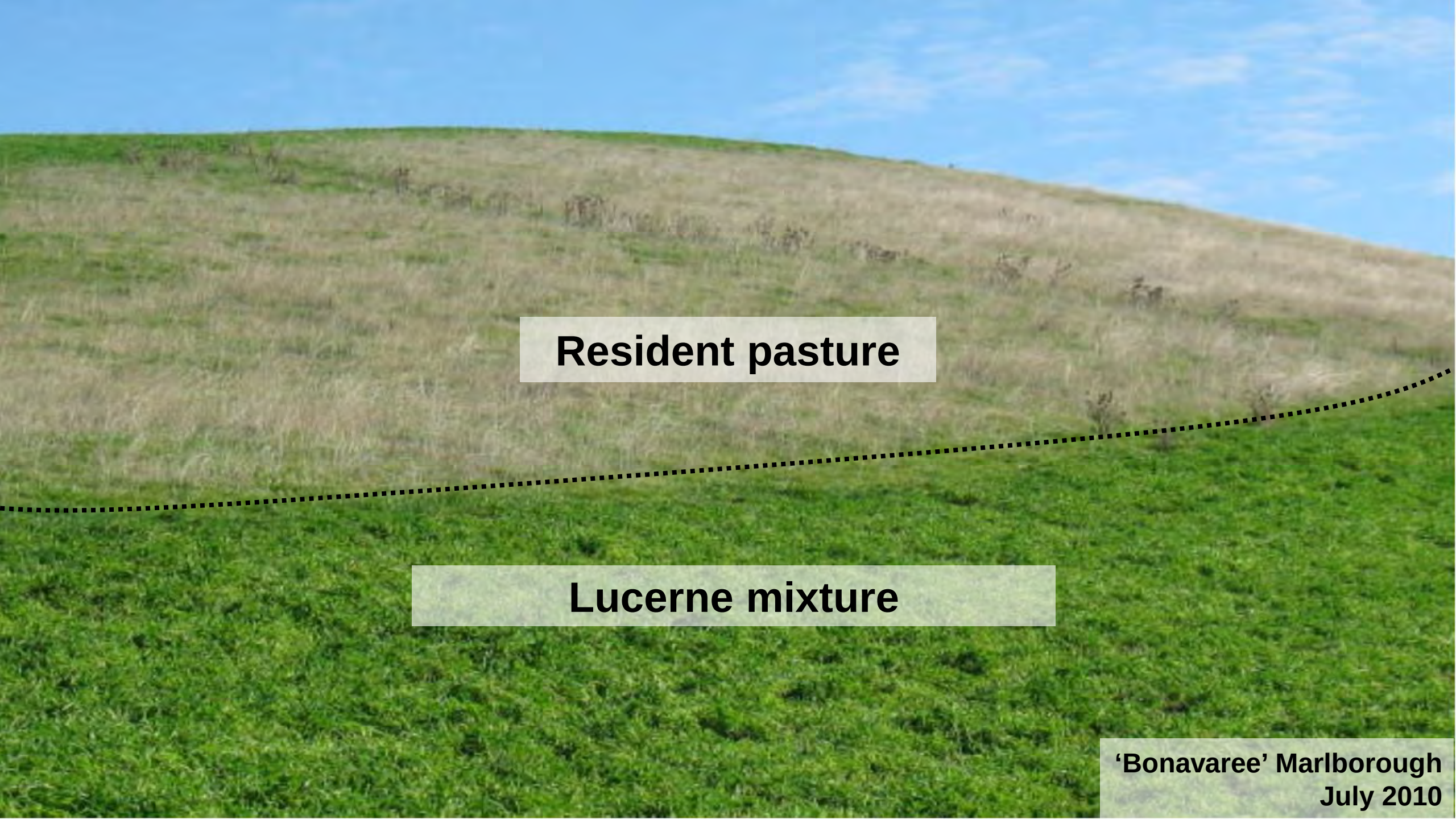


Where to plant

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

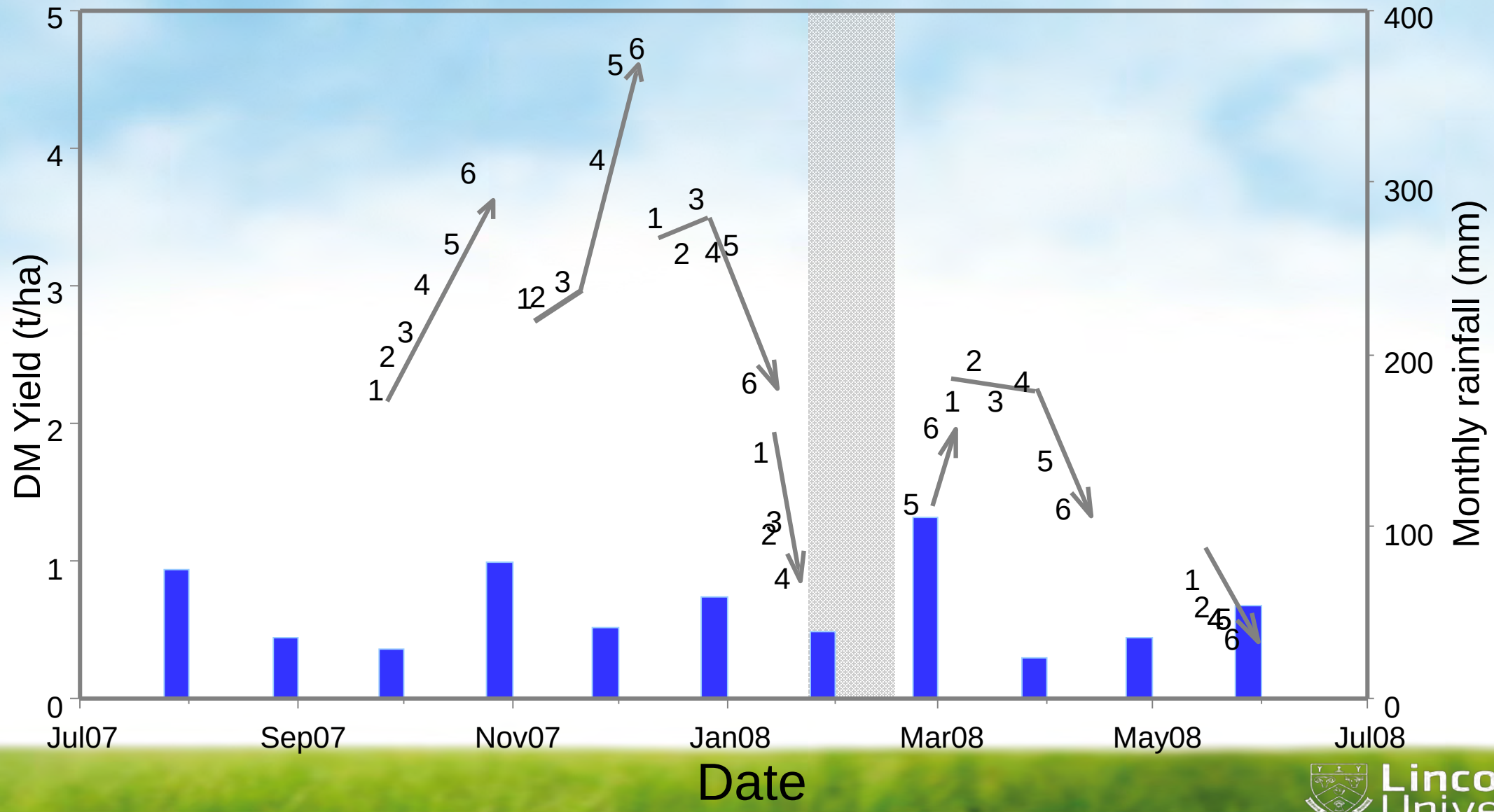
Spring = animals

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

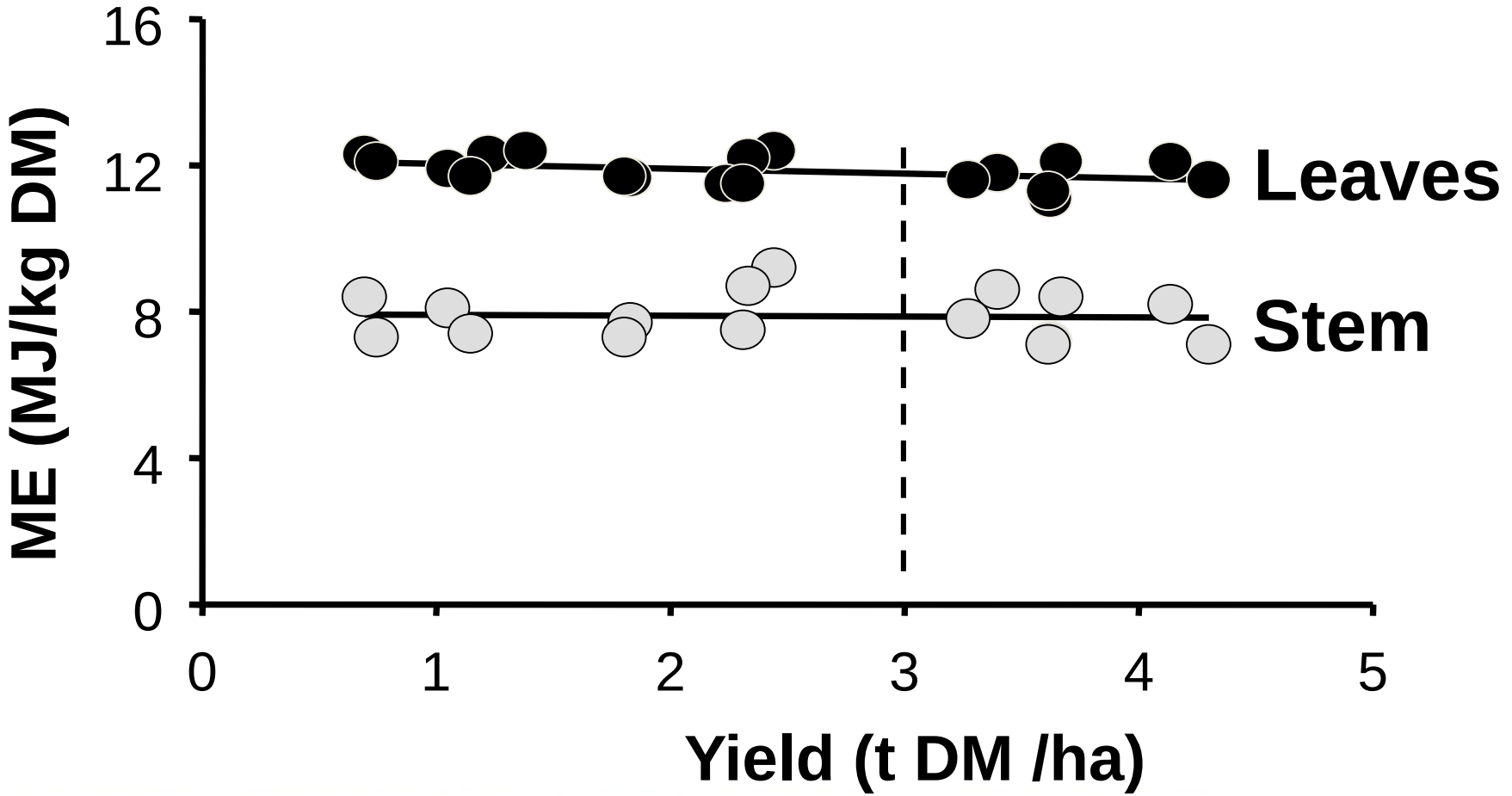
Experiment 3 (MaxClover)



Moot & Smith 2011
Practical Lucerne Management Guide

5th September 2011 – Cave Sth Canterbury

Metabolisable energy of lucerne



Source: Brown & Moot 2004

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)
  $\Rightarrow$ 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

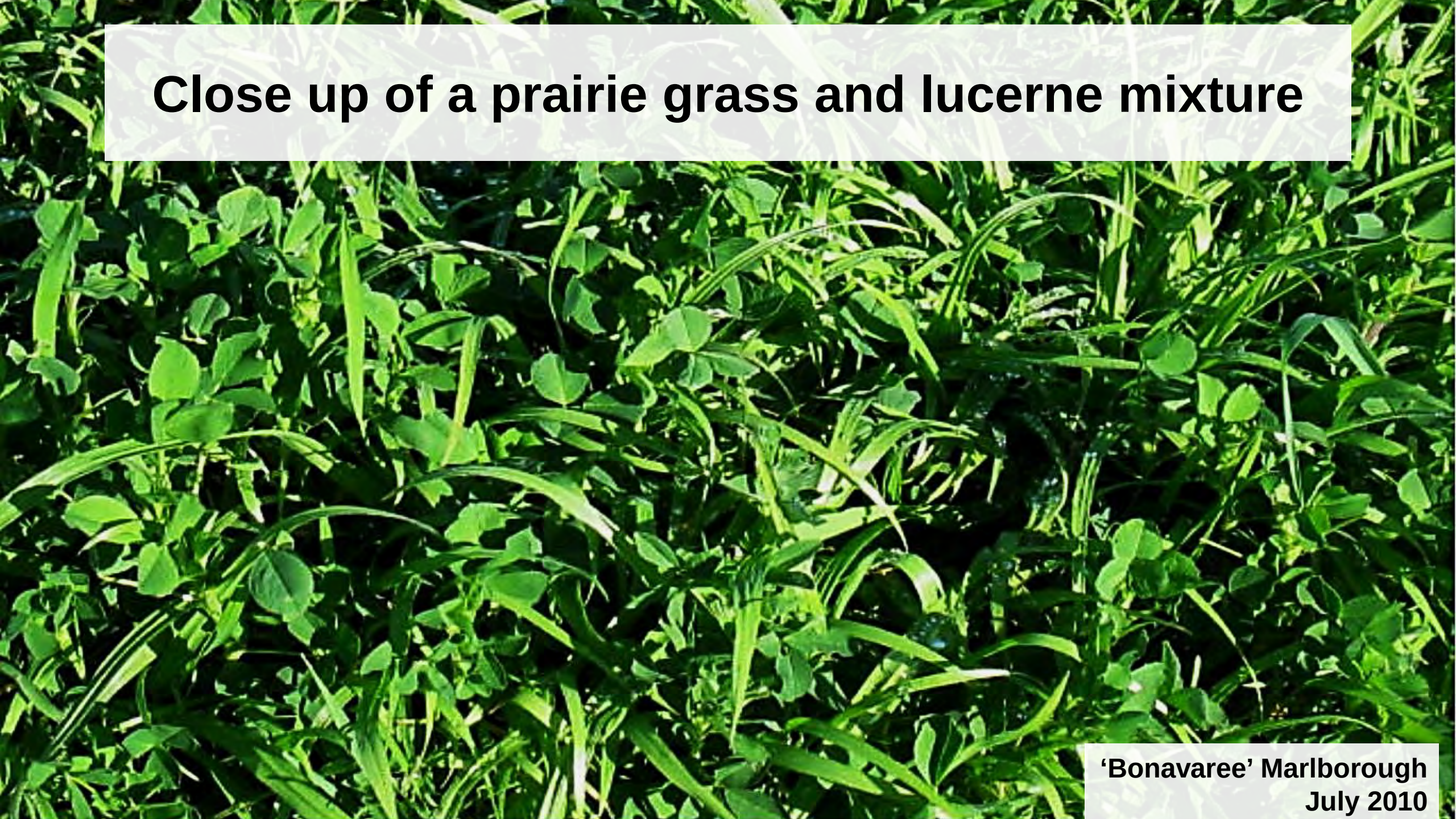
Ewe hoggets grown on lucerne 54 kg ave

Corriedale 2th flushed on wilting lucerne

Lucerne (is not grass!!!)

- flushing at Bonavaree

Close up of a prairie grass and lucerne mixture



‘Bonavaree’ Marlborough
July 2010

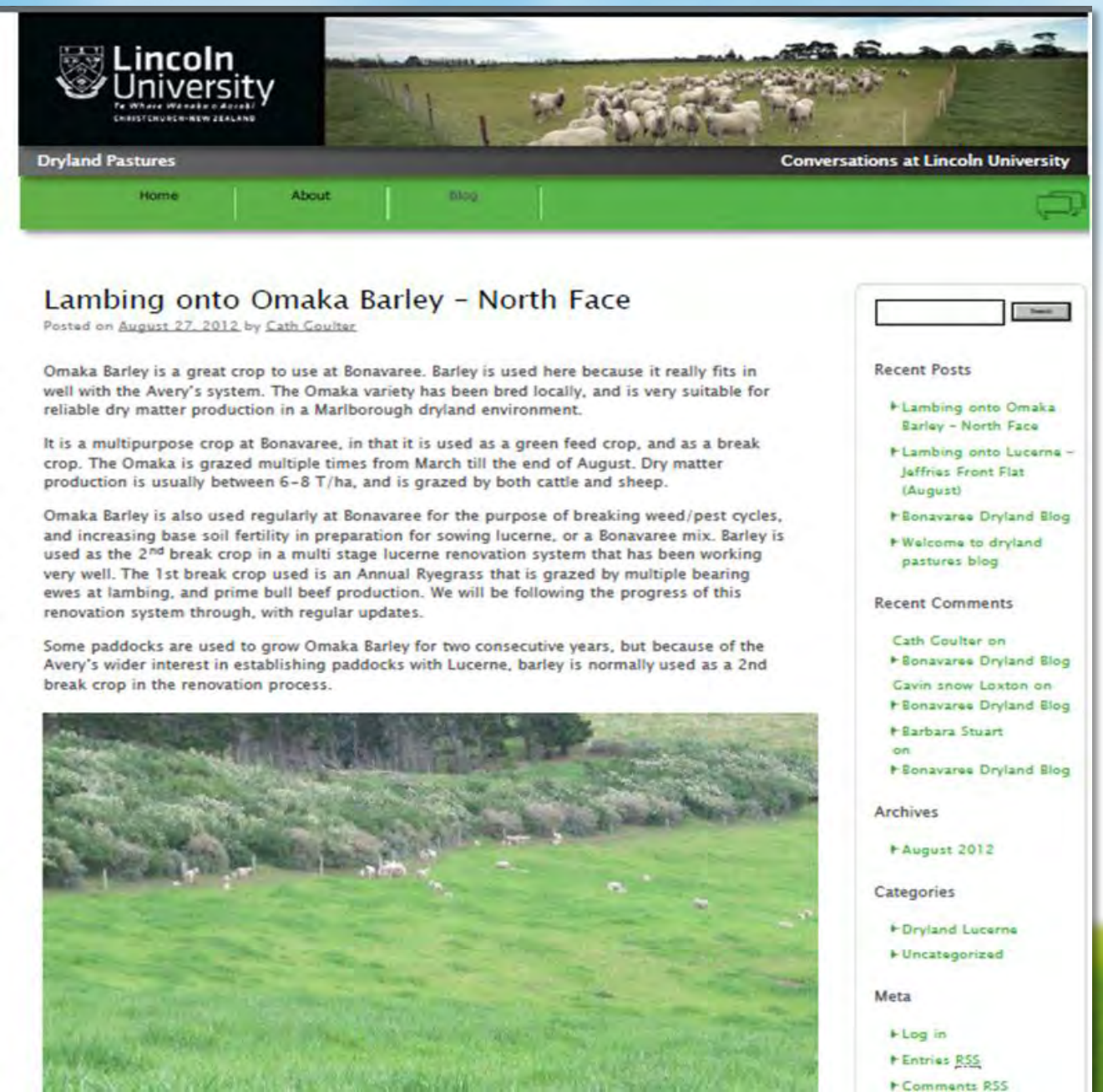

‘Tama’ annual ryegrass overdrilled into runout lucerne (12 yrs)

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

Lucerne + cocksfoot

Lucerne + Prairie grass

www.lincoln.ac.nz/conversation/drylandpastures



The Blog……

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

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beef+lamb new zealand

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Te Manatū Ahuwhenua, Ngāherehere

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