Hawkes Bay
18 May 2015

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Lucerne

Grazing management

Dr Derrick Moot
Professor of Plant Science

New Zealand's specialist land-based university

Dry matter yield and botanical composition of the 'MaxClover' grazing experiment at Lincoln University, Canterbury, New Zealand

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MAXCLOVER PHOTO DIARY - 2002/03 to 2010/11

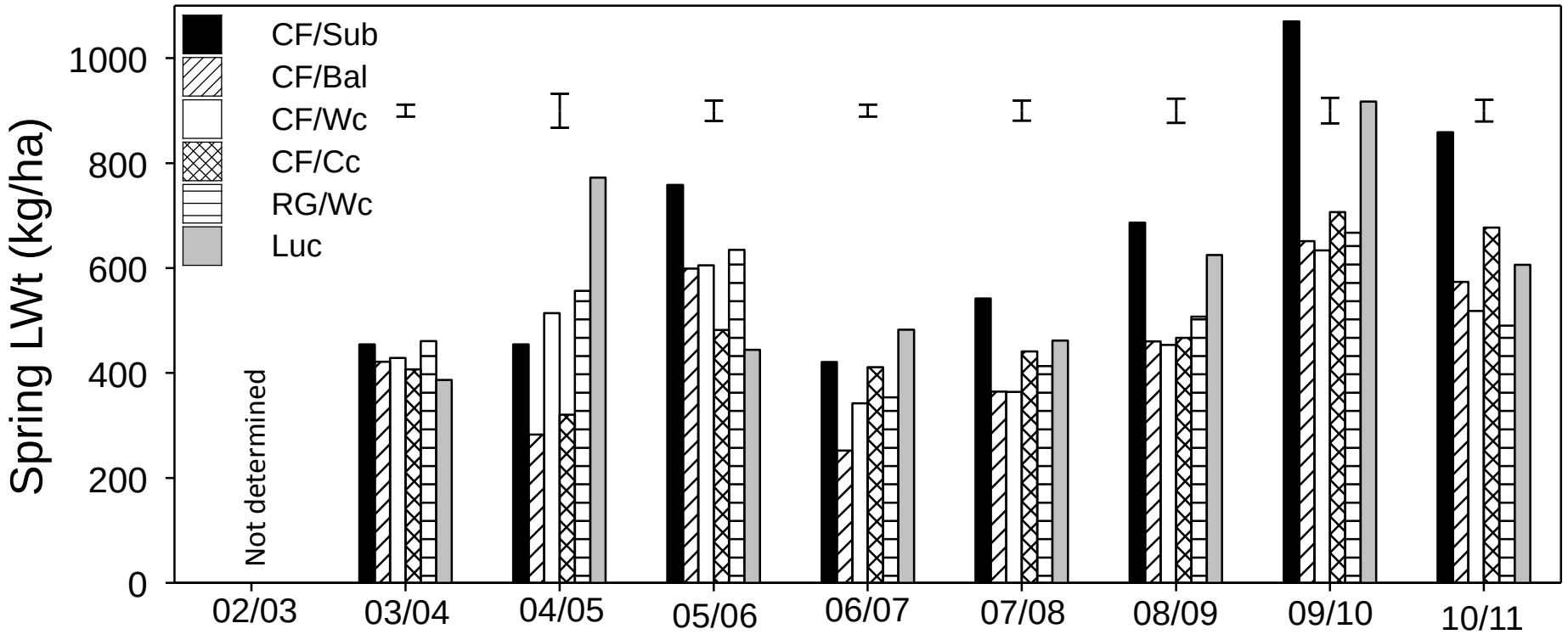
Prepared by: DJ Moot; A Mills; RJ Lucas; KM Pollock; M Smith
Lincoln University Dryland Pastures Research Team

New Zealand's specialist land-based university

Funded by:
beef+lamb new zealand

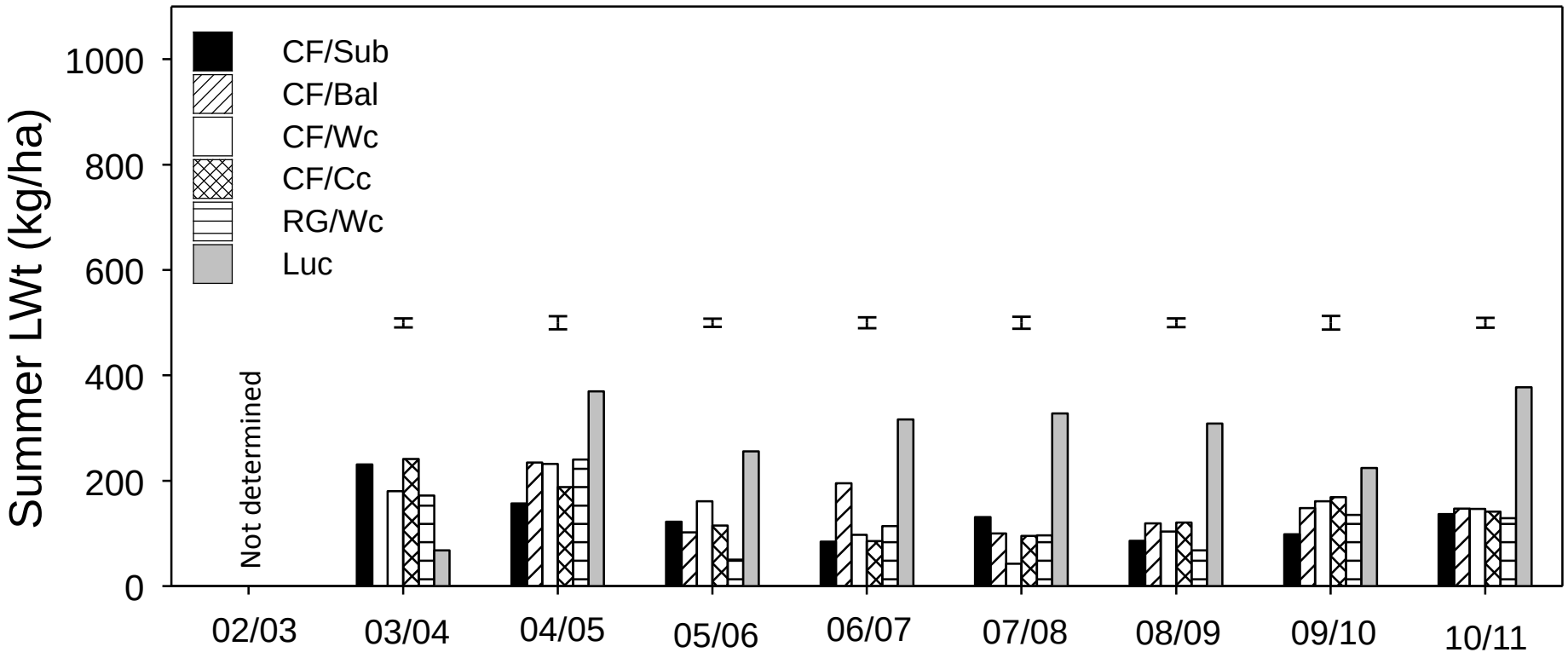
The 'MaxClover' Grazing experiment in paddock H19 at Lincoln University

Total spring LWt production



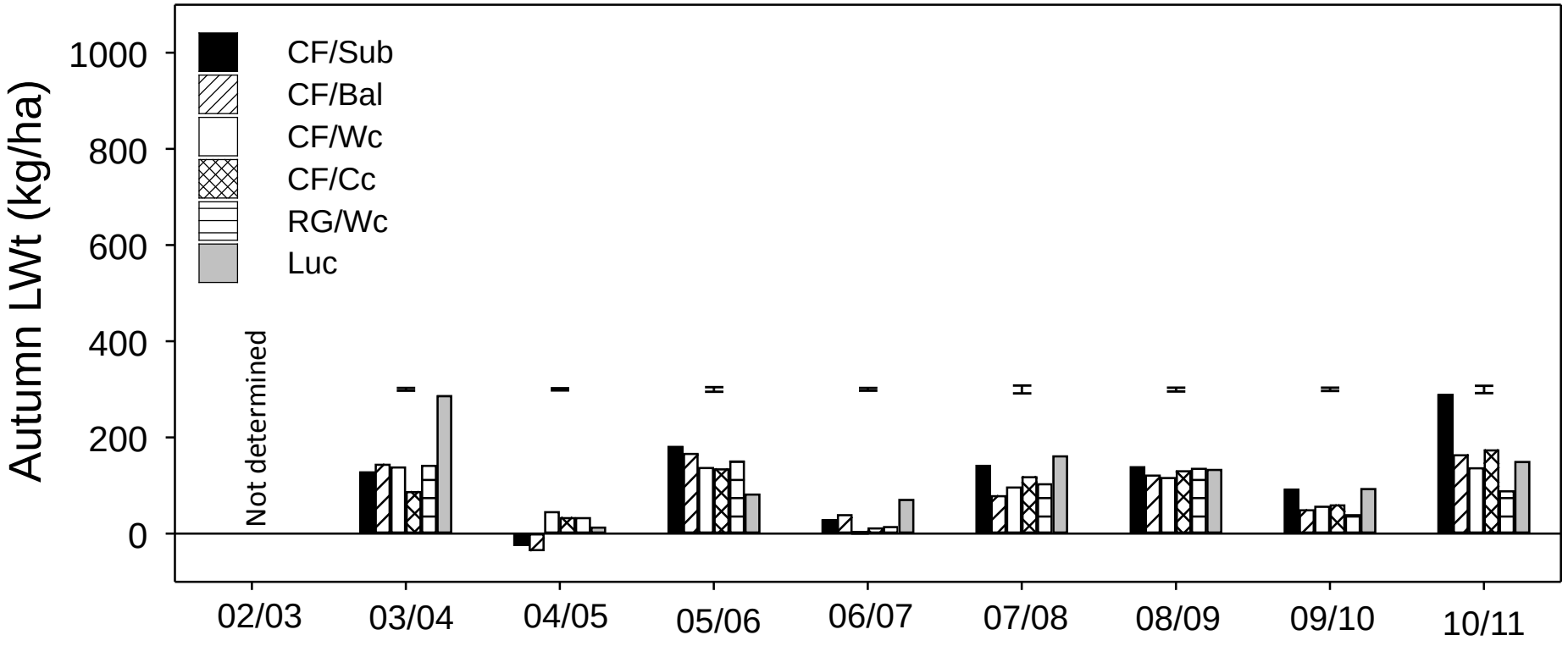
Mills *et al*. 2014b

Total summer LWt production



Mills *et al*. 2014b

Total autumn LWt production

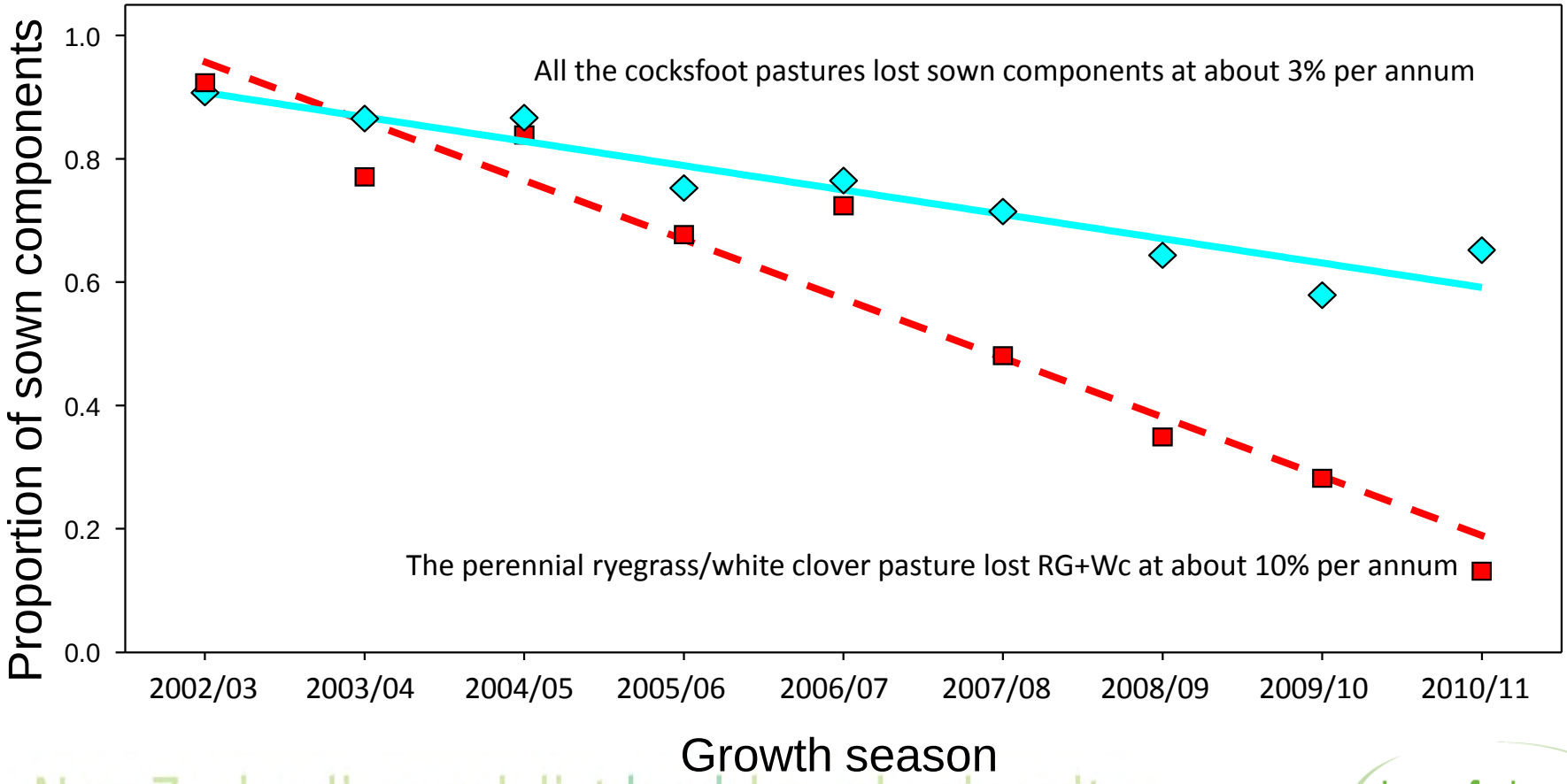


Mills *et al*. 2014b

Yield and composition of six dryland pastures over nine growth seasons

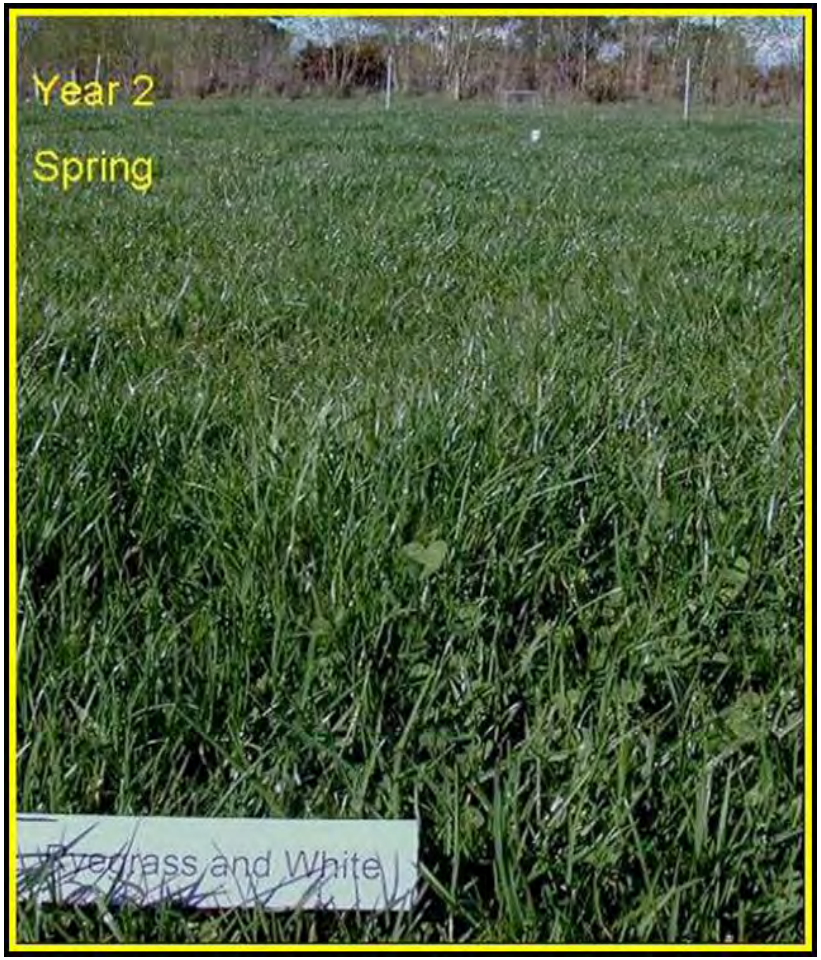
- Lucerne produced more DM than all grass based pastures in most years.
- Its tap-root enabled access to water from lower soil layers but it also used water more efficiently than the grass based pastures - especially in spring.
- CF/Sub clover was the highest yielding grass based pastures in Years 6-9.
- Yields of all pastures declined over time.

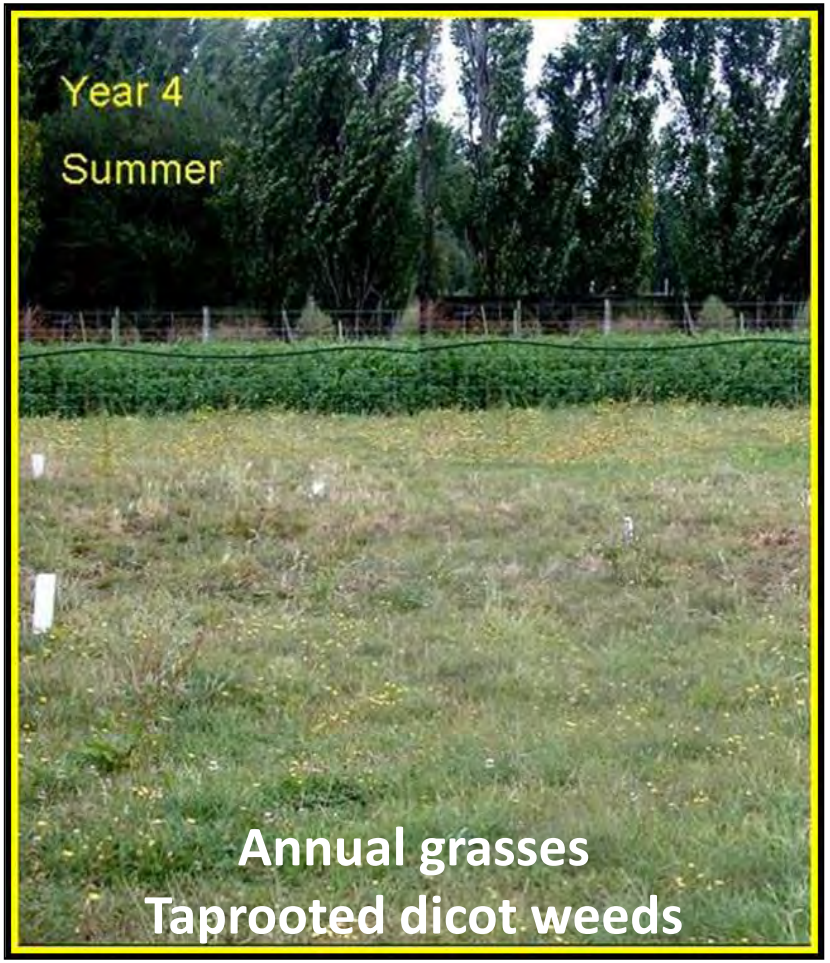
Figure 2. Change in the proportion of originally sown pasture components (grass + clover) over time



Mills *et al.*, 2014a

Weed Invasion

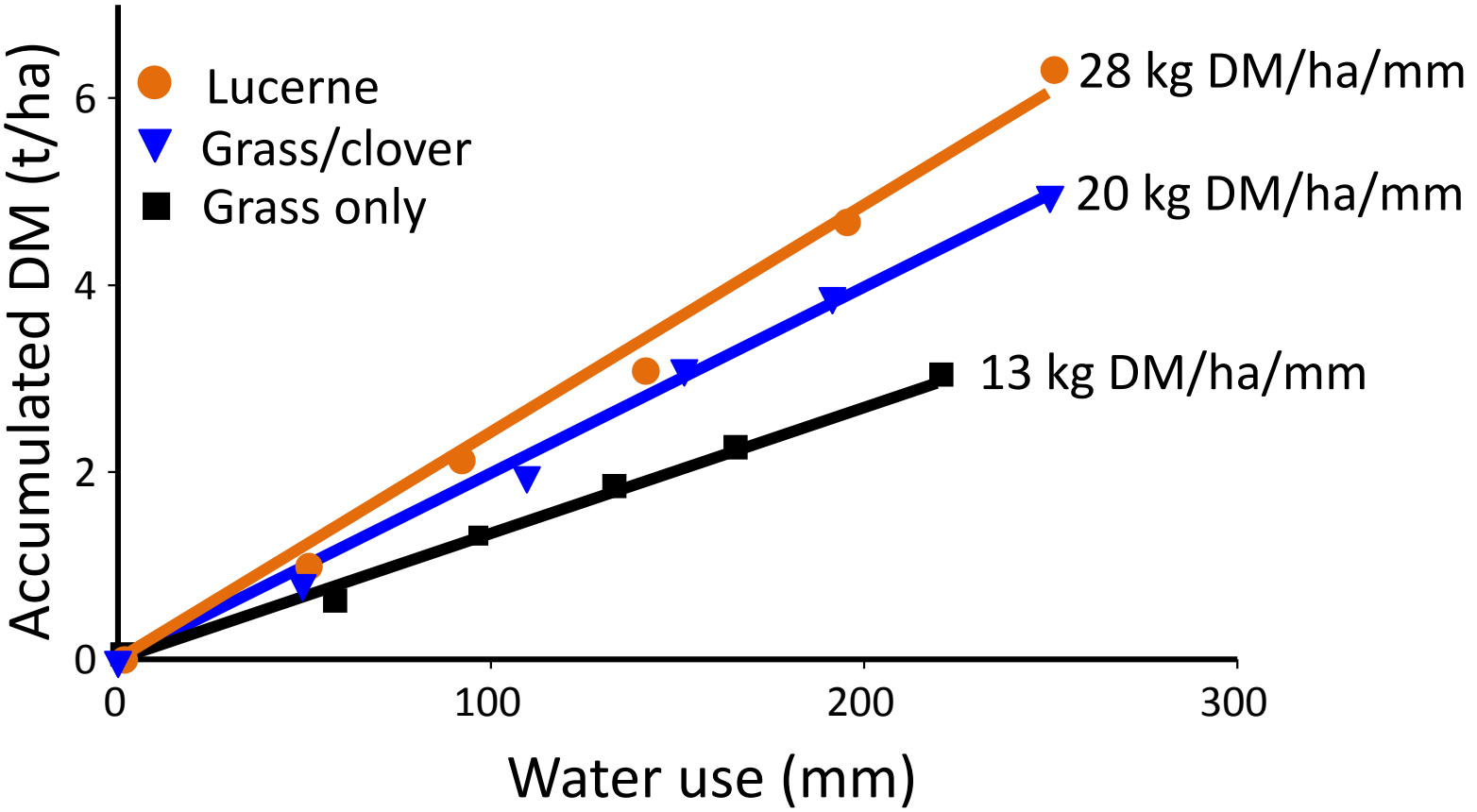




Unsown species <5% in Year 1 …….>45% in Year 6

RG/Wc pastures

Spring WUE



Moot *et al*. 2008

Lucerne Objectives

- Grazing management to maximise production, quality and persistence
- Set stocking
- Current experiments


Over 60,000 ha sown and doubling of lucerne seed sales over 10 years
“35% Rate of return on investment”

Growth:

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

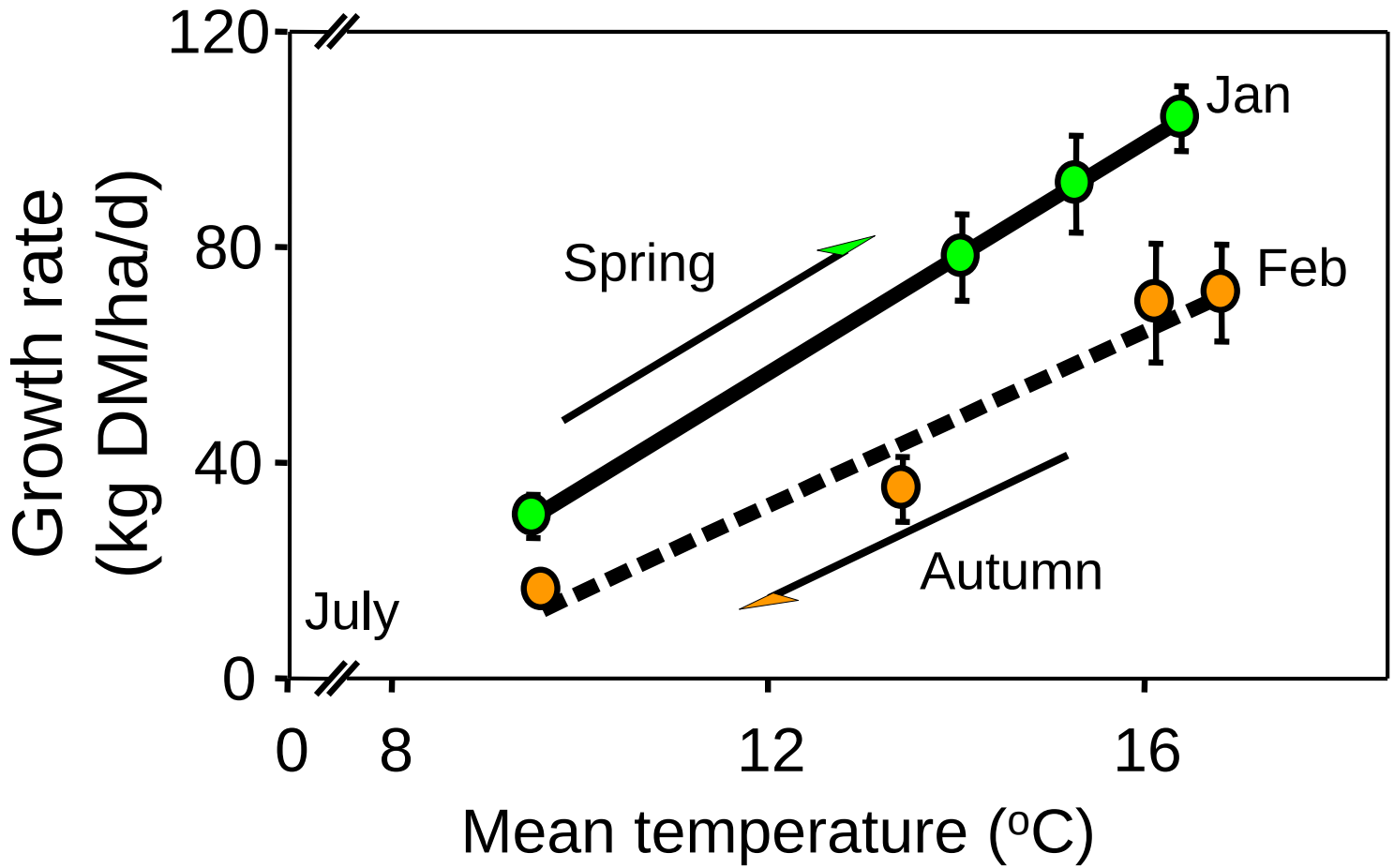
Development:

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

Growth and development are both influenced by environmental signals

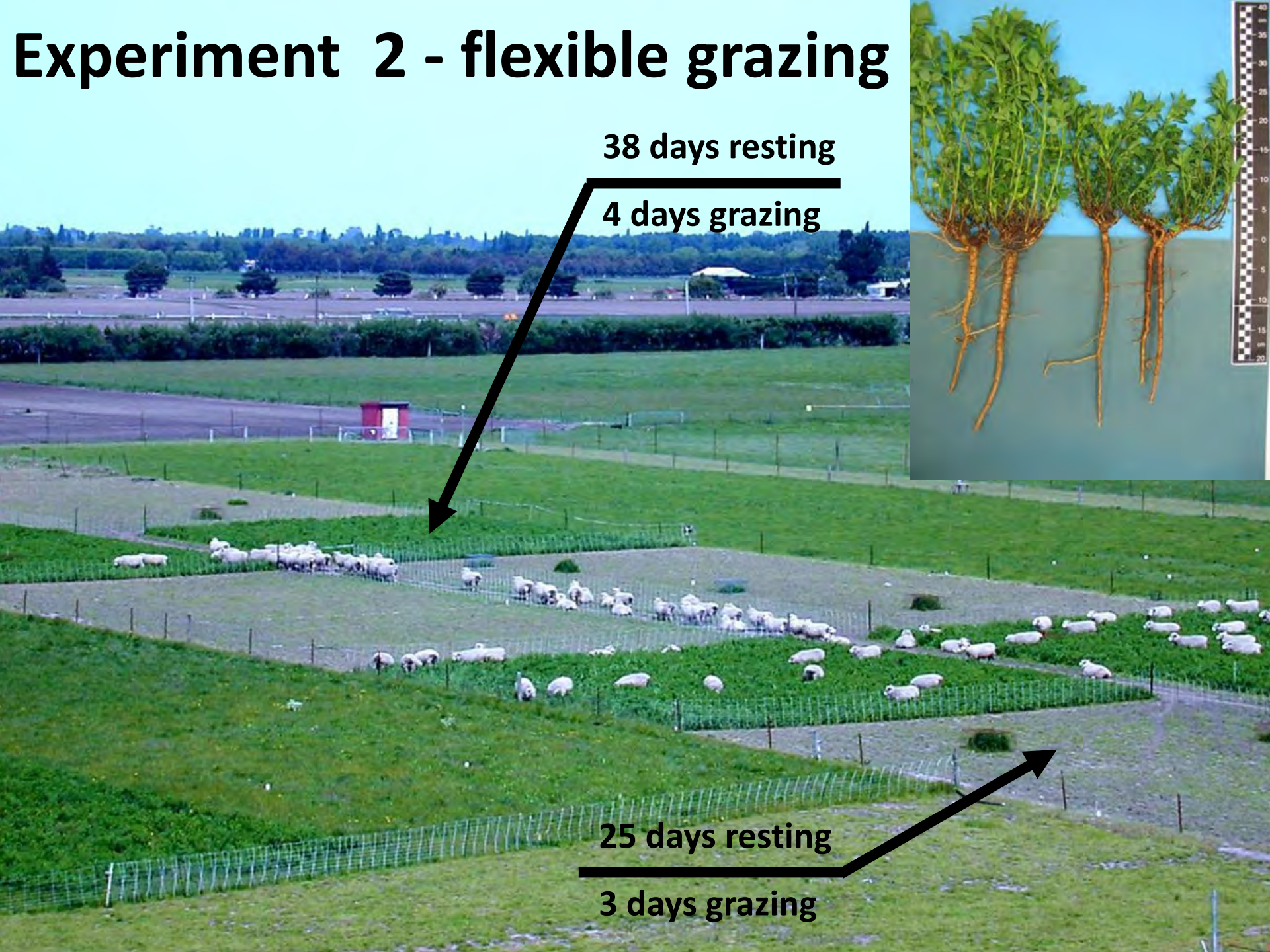
The canopy:
the energy capture device

Vegetative growth



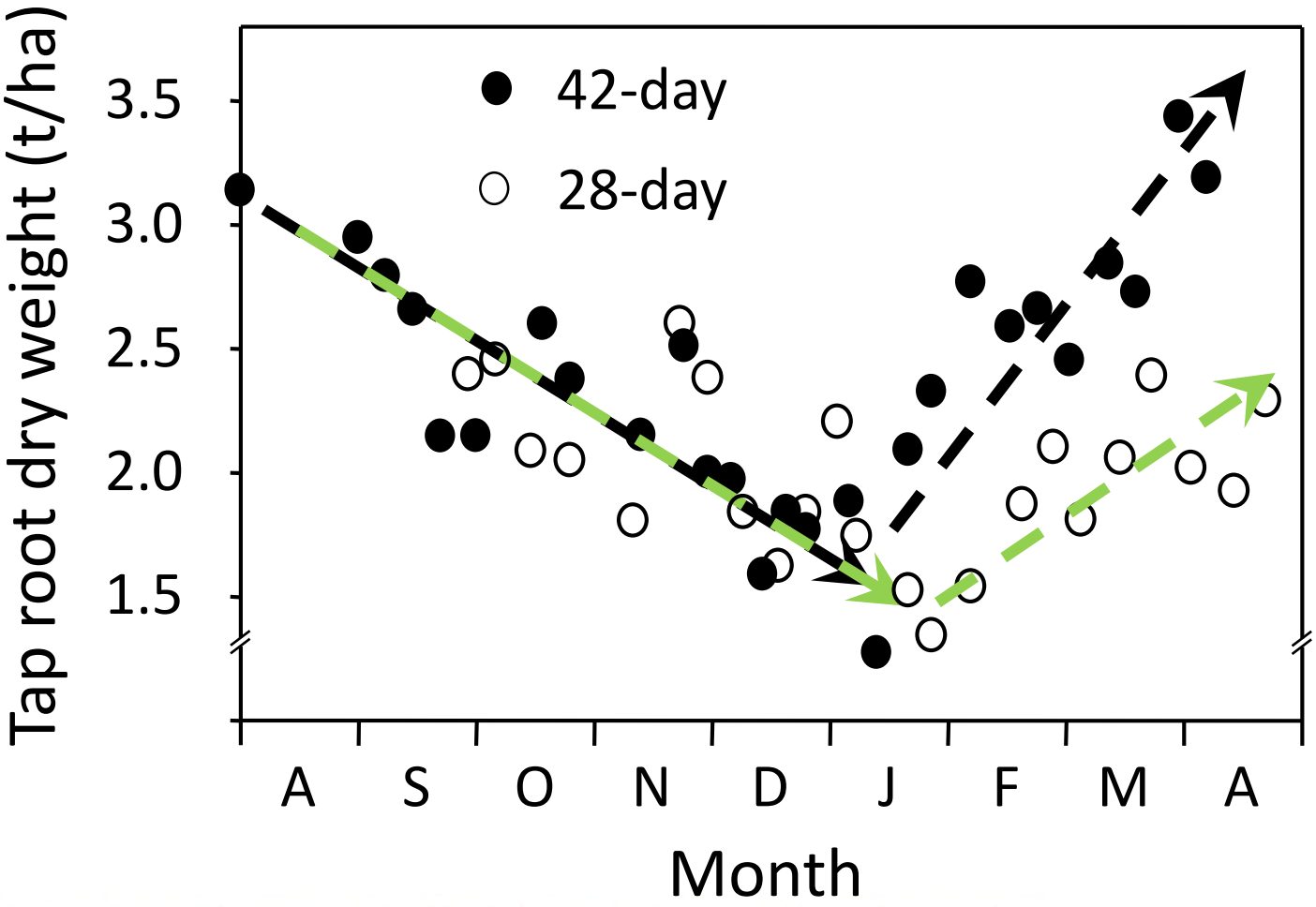
Moot *et al*. 2003

Experiment 2 - flexible grazing



What's going on down there?

Partitioning to roots



Moot *et al*. 2003

Seasonal grazing management

Spring

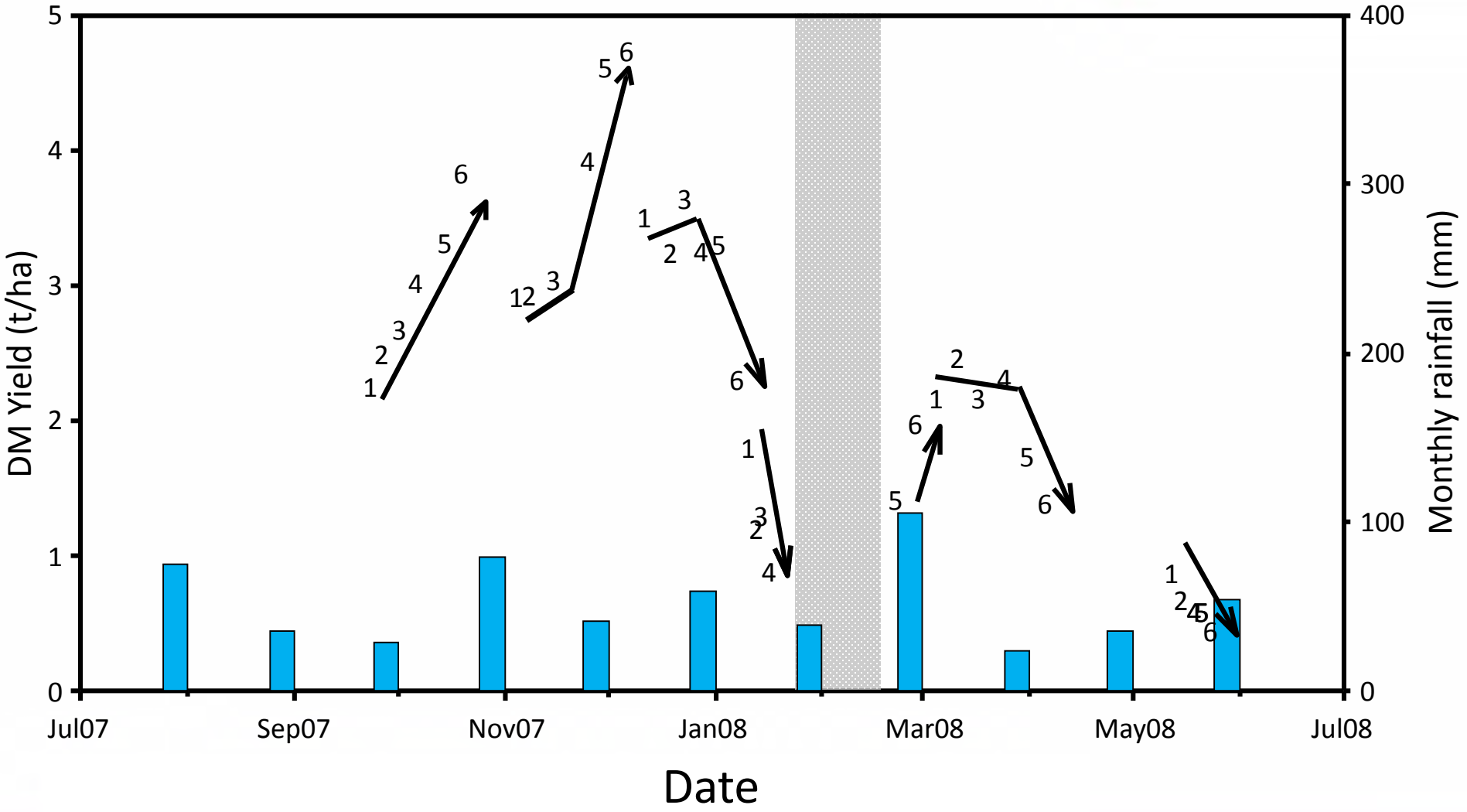
- 1st rotation aided by root reserves to produce high quality vegetative forage.

- 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



Moot & Smith 2011

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

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)

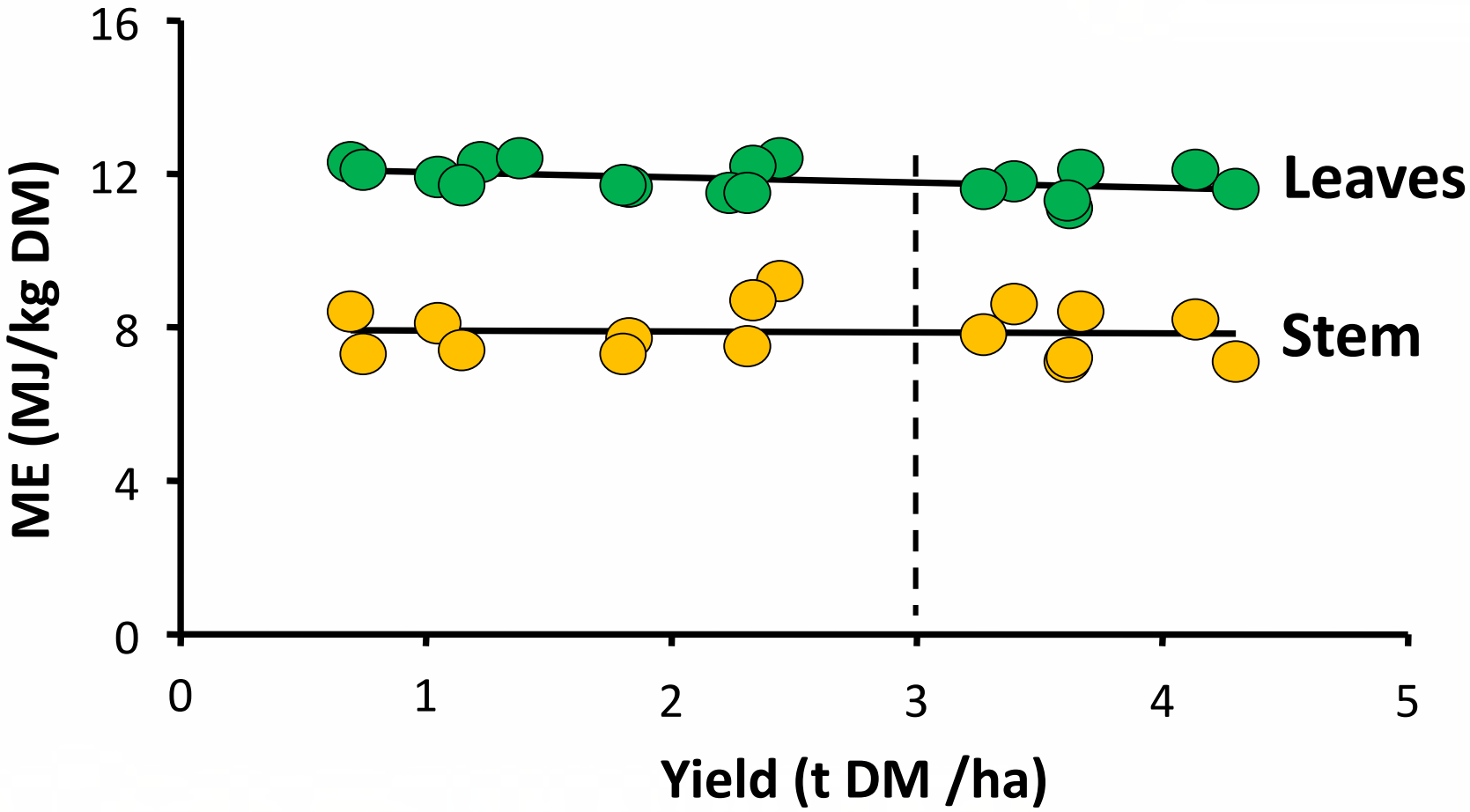
- terminal drought ⇒ graze standing herbage
- allow 50% flowering
- long rotation (42 days) somewhere between Jan and end of May.

⇒ **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

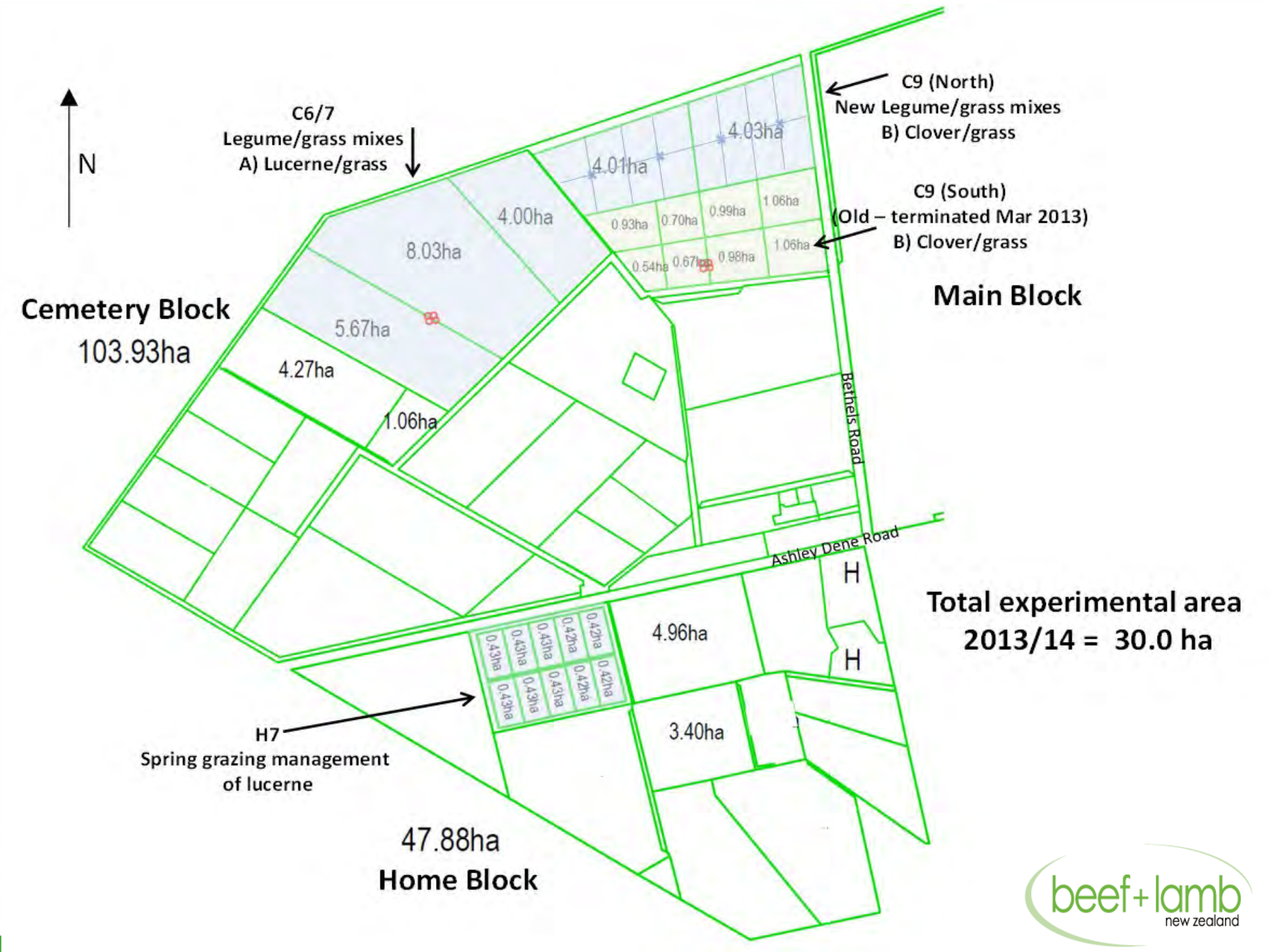


Brown & Moot 2004

Lucerne grazing options

- **Rotational grazing**
- **Set stocking**
- **Grass mixes**

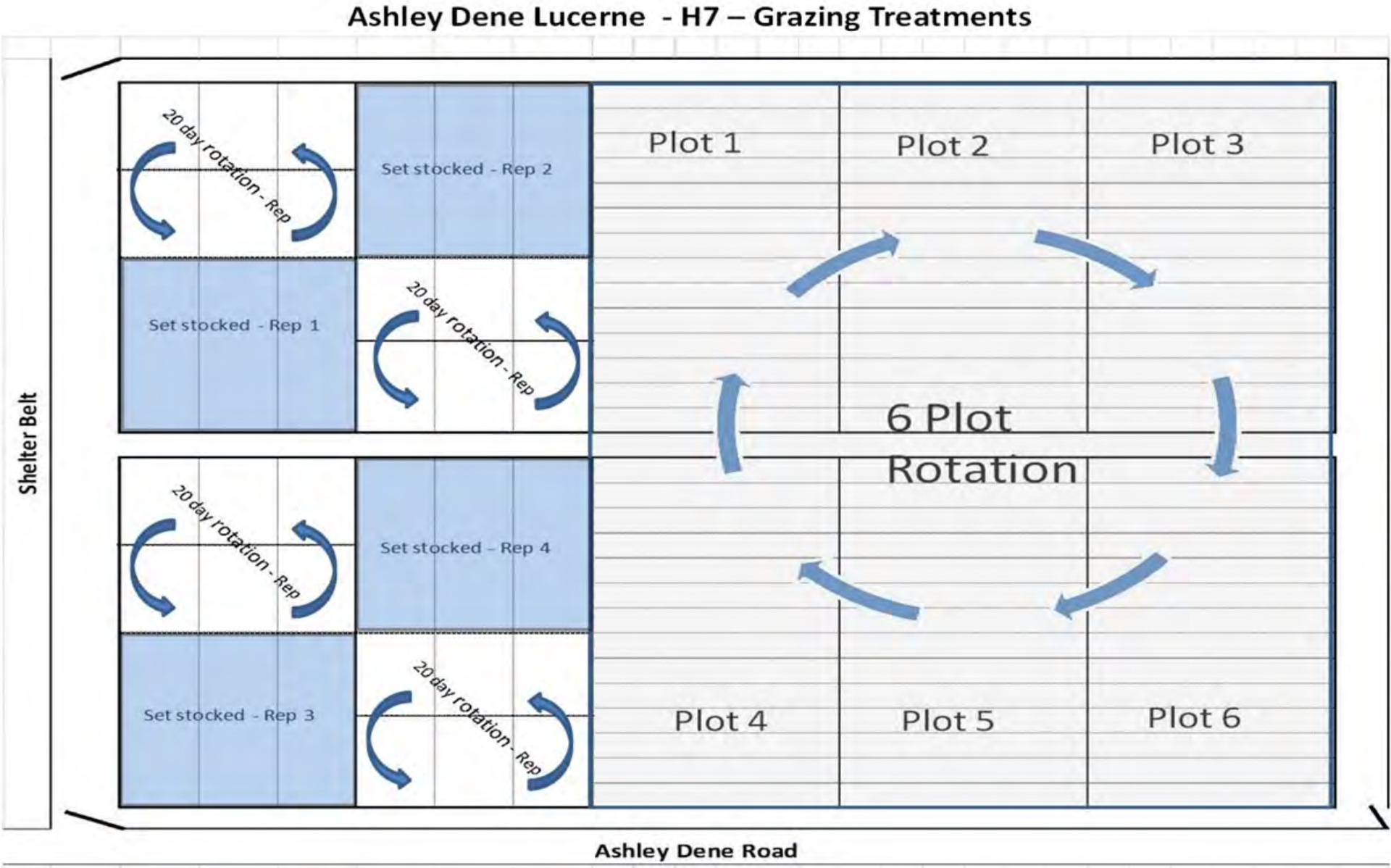
Pastoral 21 BLNZ funded programme


N
C6/7
Legume/grass mixes
A) Lucerne/grass
C9 (North)
New Legume/grass mixes
B) Clover/grass
C9 (South)
(Old – terminated Mar 2013)
B) Clover/grass
Main Block
Cemetery Block
103.93ha
4.03ha
4.01ha
4.00ha
8.03ha
5.67ha
4.27ha
1.06ha
0.93ha
0.70ha
0.99ha
1.06ha
0.54ha
0.67ha
0.98ha
1.06ha
Bethels Road
Ashley Dene Road
H
H
4.96ha
3.40ha
0.43ha
0.42ha
H7
Spring grazing management
of lucerne
47.88ha
Home Block
Total experimental area
2013/14 = 30.0 ha

Objective

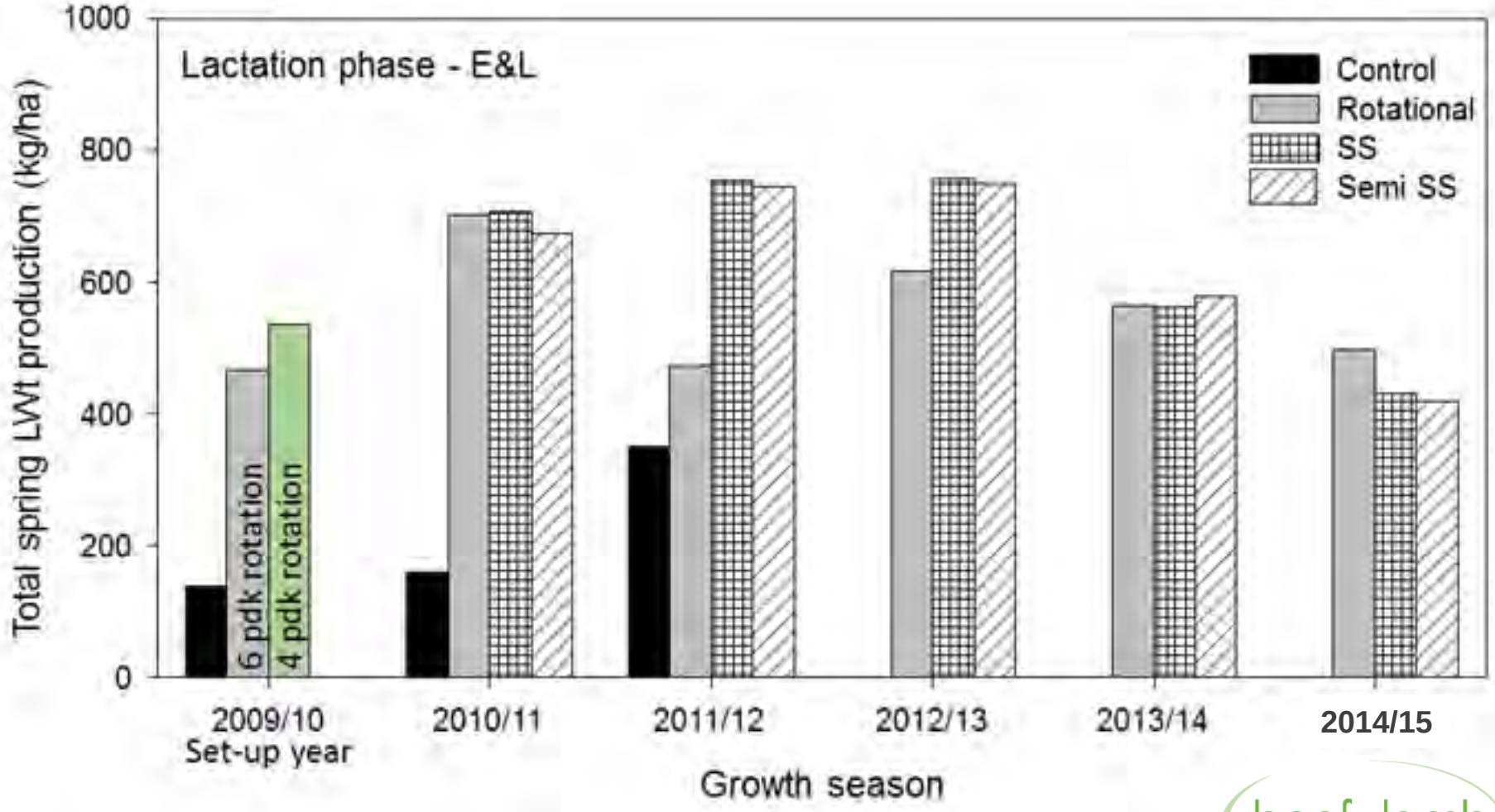
- Evaluate three spring grazing management strategies for lucerne monocultures
  - Rotational grazing (6 paddock system)
  - Set stocked (SS) until weaning
  - Semi set stocked (SSS) until weaning (10 day shifts)

- After weaning SS and SSS lambs mobbed up and moved to an 8 paddock rotational grazing system (**RECOVERY PHASE**)

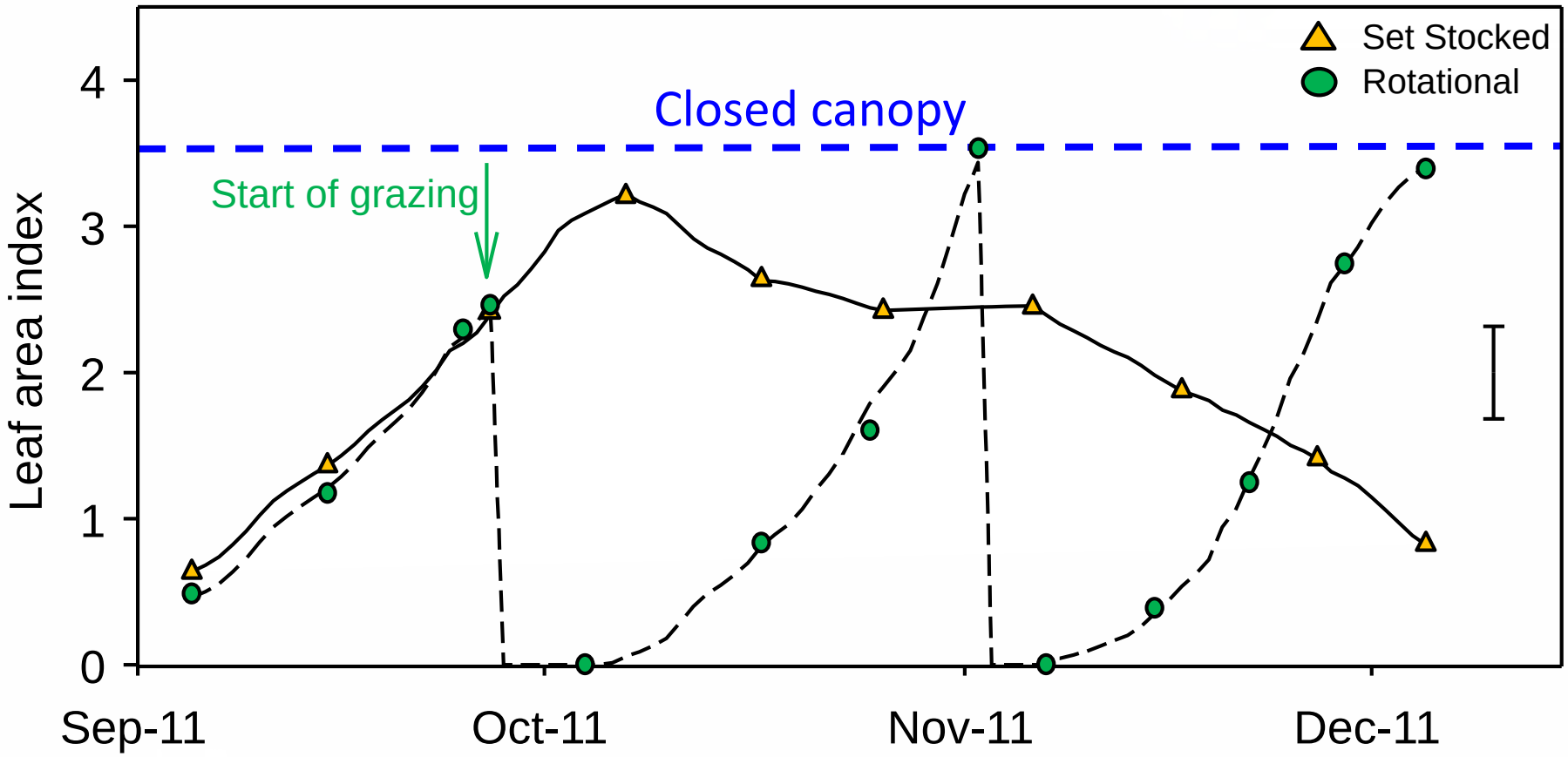

Ashley Dene Lucerne - H7 – Grazing Treatments
Shelter Belt
20 day rotation - Rep
Set stocked - Rep 2
Set stocked - Rep 1
20 day rotation - Rep
Plot 1
Plot 2
Plot 3
6 Plot Rotation
20 day rotation - Rep
Set stocked - Rep 4
Set stocked - Rep 3
20 day rotation - Rep
Plot 4
Plot 5
Plot 6
Ashley Dene Road

Project 3 –
Spring grazing management of lucerne

Total LWt produced - Lactation



Crop canopy



RULES FOR SET STOCKING LUCERNE

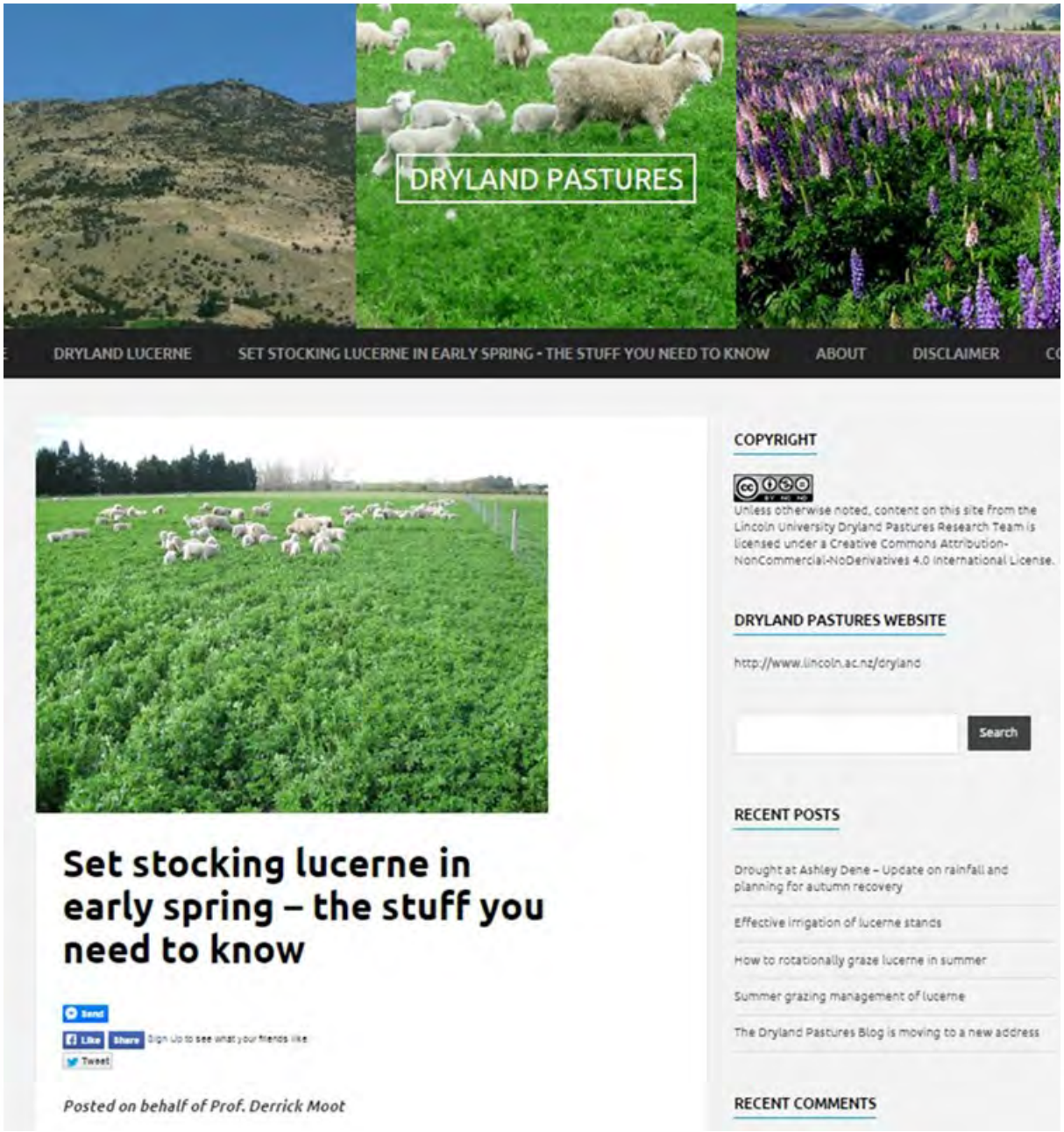
1. Manage lucerne pure swards first.
2. Choose paddocks to lamb on **early in autumn** – shelter, older, early clean-up graze and winter herbicide application.
3. Lucerne grass mixes – grass transition.
4. Early and late for condensed lambing (1 cycle).
5. **Drift onto lucerne ~14 d prior to lambing.**
6. Lucerne 15-20 cm tall and keep it there.
7. **Stock at about half the rotational grazing rate**

https://blogs.lincoln.ac.nz/dryland/2014/10/31/set-stocking-lucerne-in-early-spring-the-stuff-you-need-to-know/

RULES FOR SET STOCKING cont'd.

8. SS for 4-5 weeks – **then rotate**.
9. SS lambs use the taller feed as shelter.
10. Stocking rate to keep closed canopy!
11. Canopy gets taller over 4-5 weeks not shorter.
12. **Once canopy reduces begin rotational grazing**.
13. Open canopy = twitch, yarrow, dandelions.
14. Paddocks need autumn (6 wks) recharge.

https://blogs.lincoln.ac.nz/dryland/2014/10/31/set-stocking-lucerne-in-early-spring-the-stuff-you-need-to-know/



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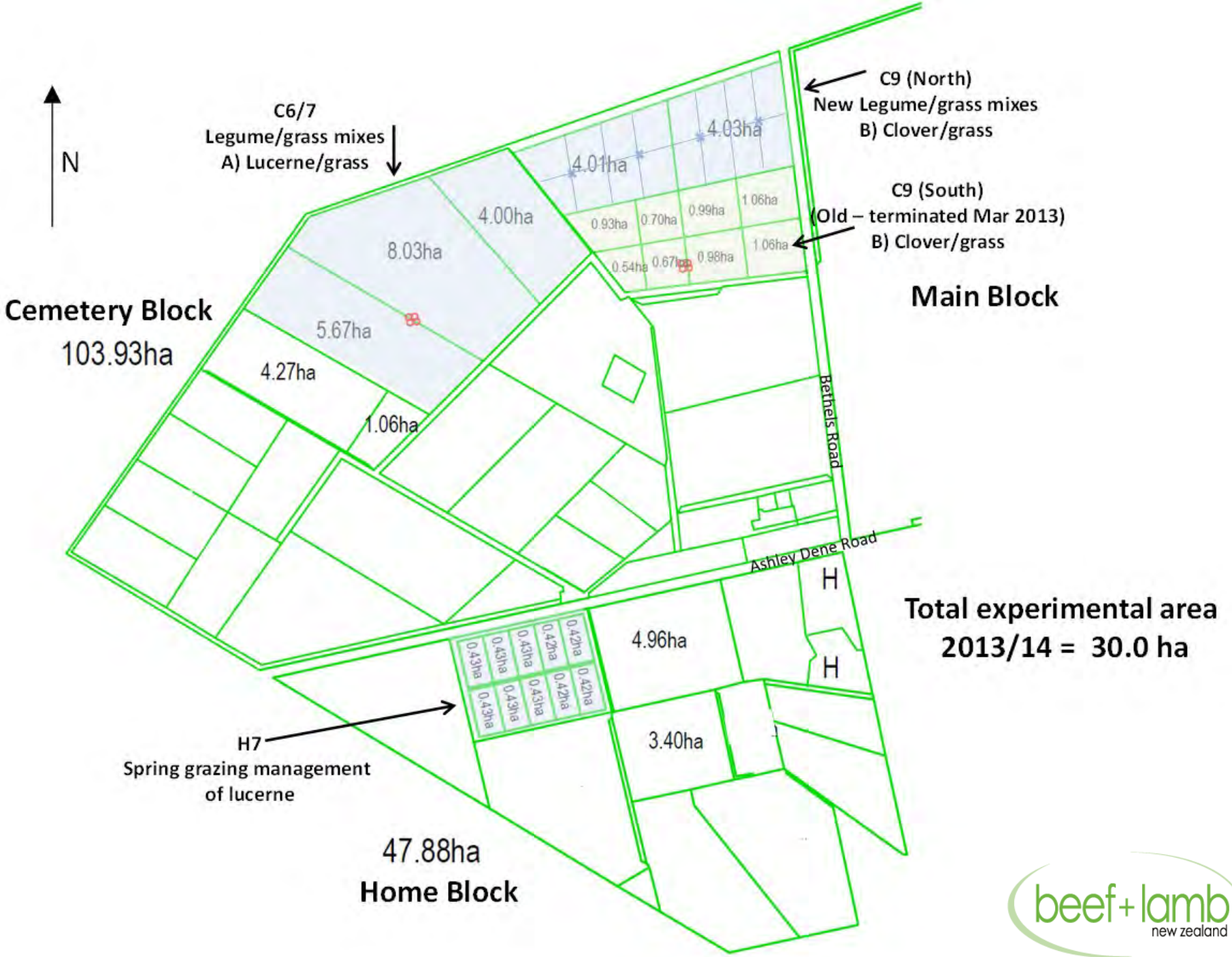
The Blog: https://blogs.lincoln.ac.nz/dryland/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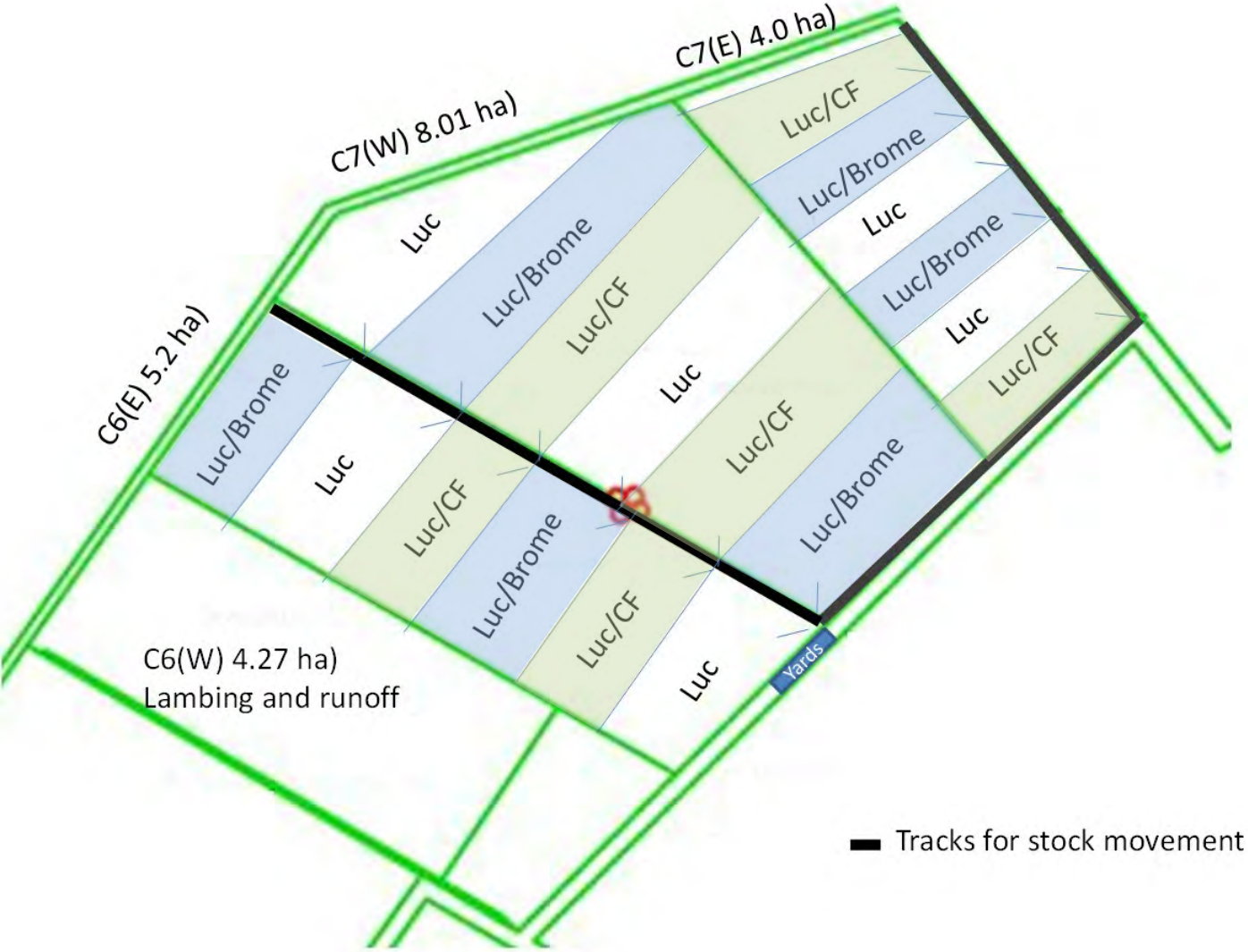
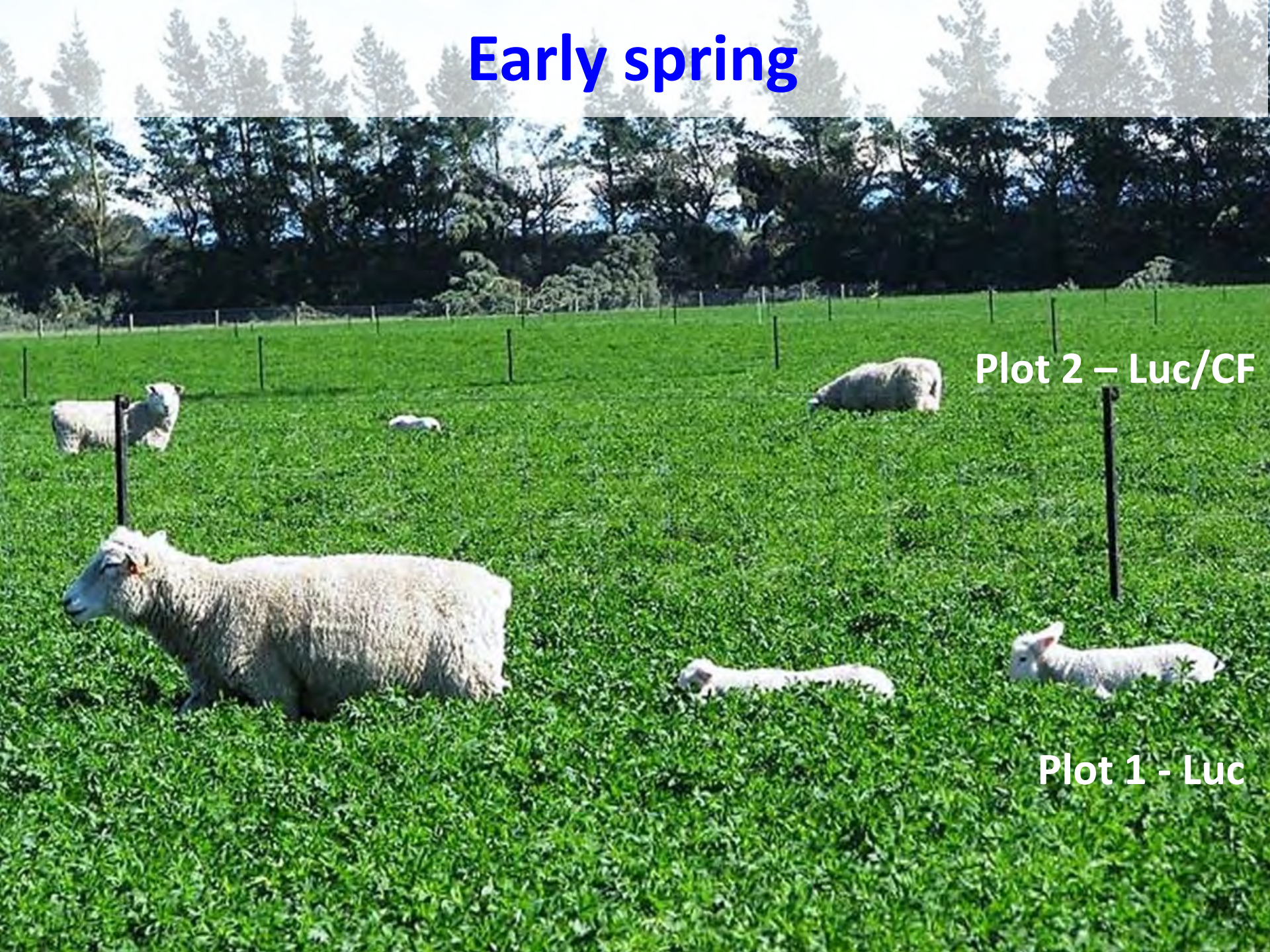
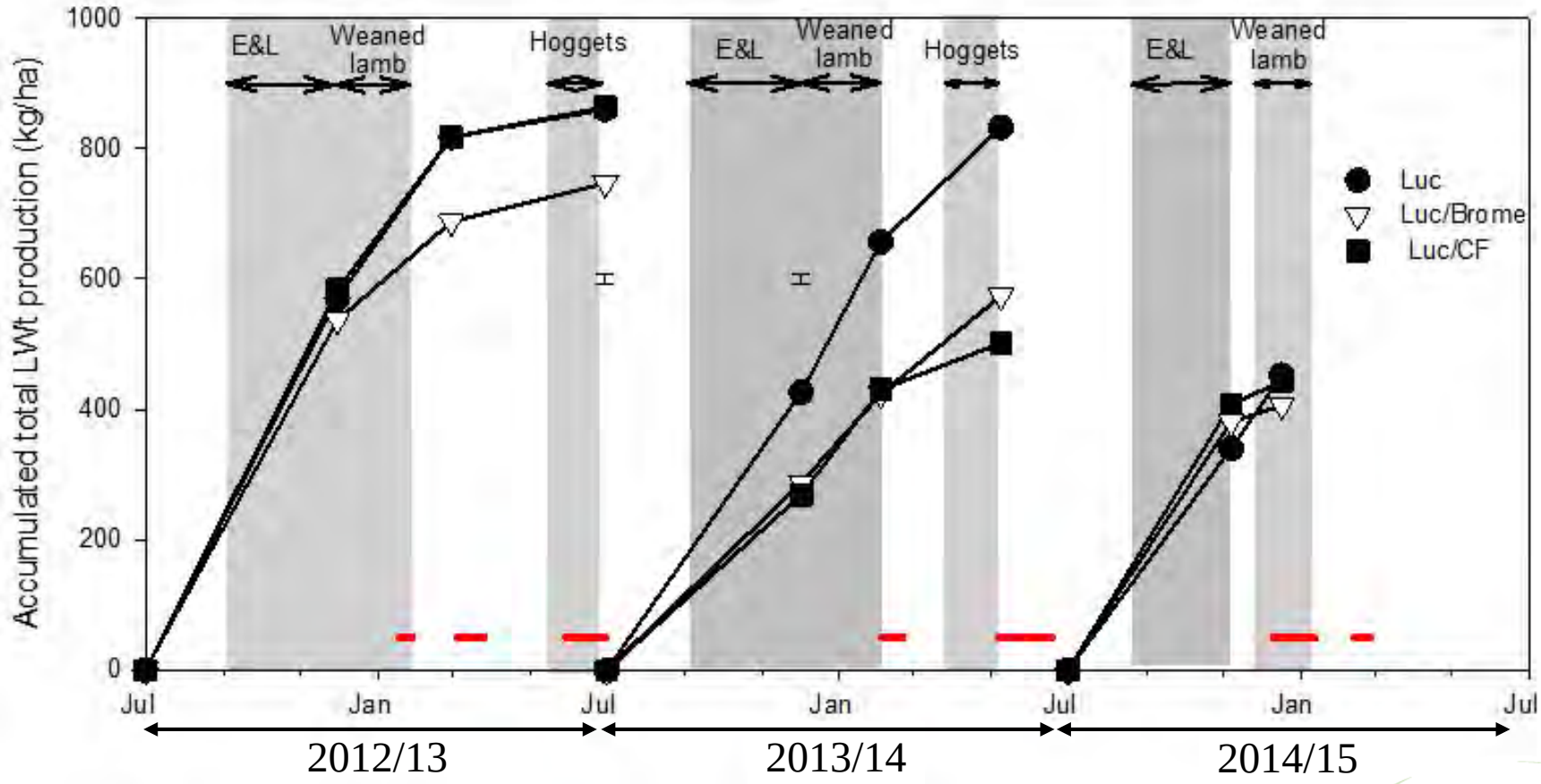
Lucerne/grass mixes



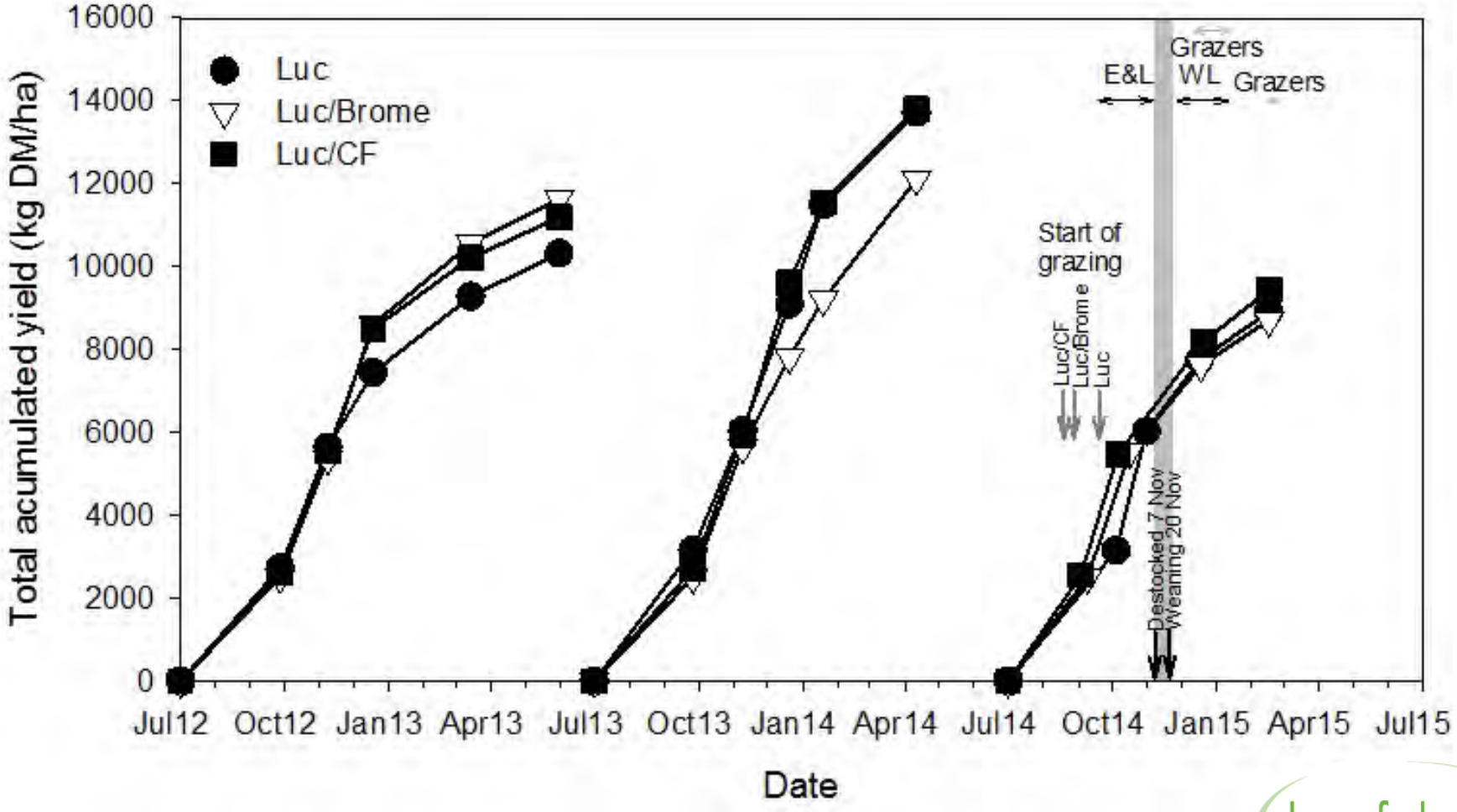
Early spring



Total Accumulated LWt production



DM Yield


Total acumulated yield (kg DM/ha)
16000
14000
12000
10000
8000
6000
4000
2000
0
Luc
Luc/Brome
Luc/CF
Grazers
E&L
WL
Grazers
Start of grazing
Luc/CF
Luc/Brome
Luc
Destocked 7 Nov
Weaning 20 Nov
Jul12
Oct12
Jan13
Apr13
Jul13
Oct13
Jan14
Apr14
Jul14
Oct14
Jan15
Apr15
Jul15
Date


Plot 2
Luc/CF
24 Oct 2012
60
cm
55
50
45
40
35
30
25


Plot 10
Luc/CF
17 Oct 2012

Lucerne/cocksfoot mix – Sept 2013

Plot 3
Luc/Brome
24 Oct 2012


Plot 11
Luc/Brome
17 Oct 2012

Plot 7
Luc/Brome
11 Oct 2013

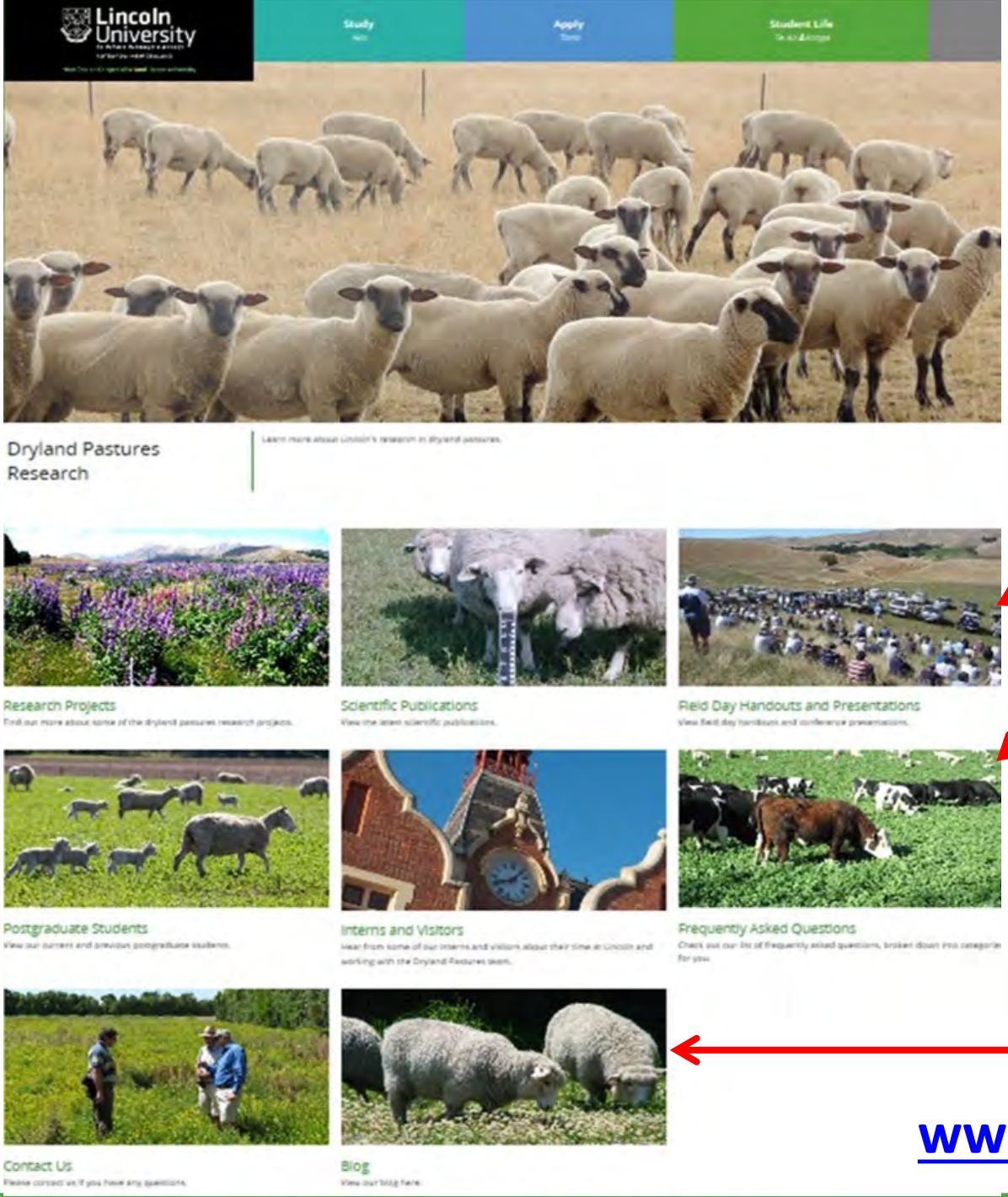

Plot 17
Luc/Brome
14 Nov 2013


3 Feb 2014


3 Feb 2014
Luc/CF


3 Feb 2014
Luc/Brome


3 Feb 2014
Luc



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The website…

Info on:

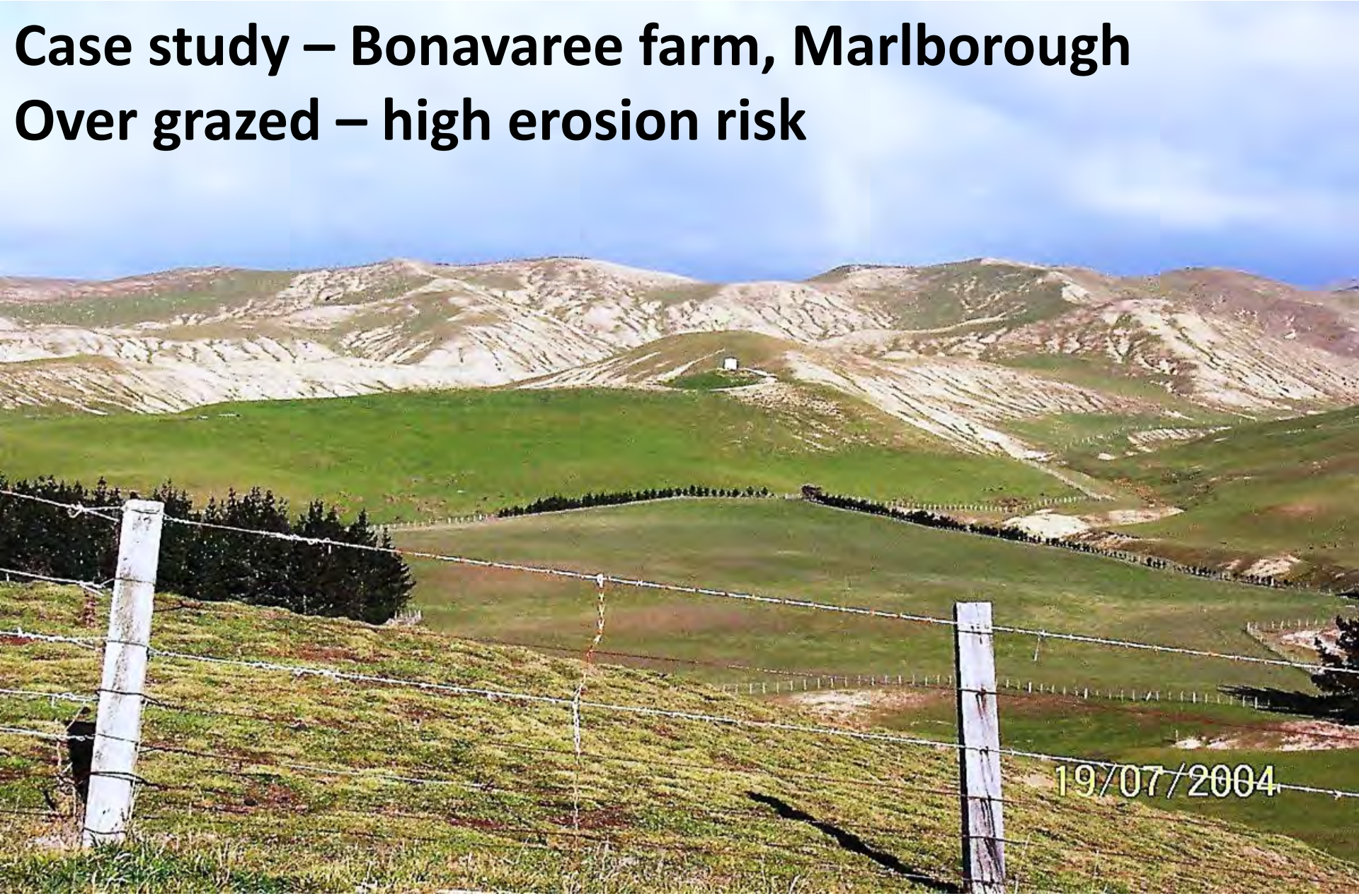
- Current projects
- Field day presentations
- Scientific publications
- FAQs
- Postgraduate study
- Direct link to Blog (text & video posts)

www.lincoln.ac.nz/dryland

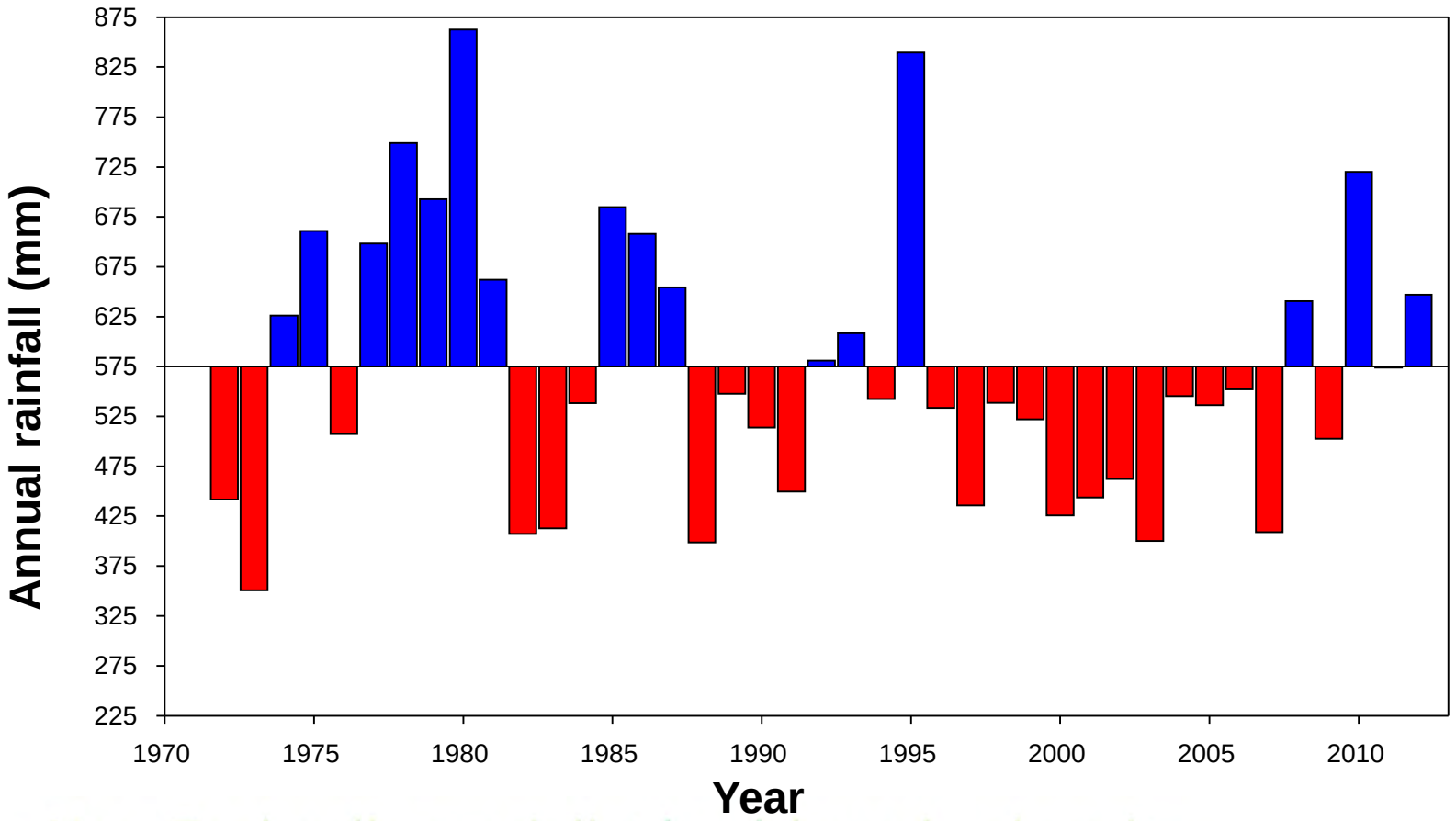
Conclusions

- 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

Case study – Bonavaree farm, Marlborough
Over grazed – high erosion risk



Annual rainfall at ‘Bonavaree’



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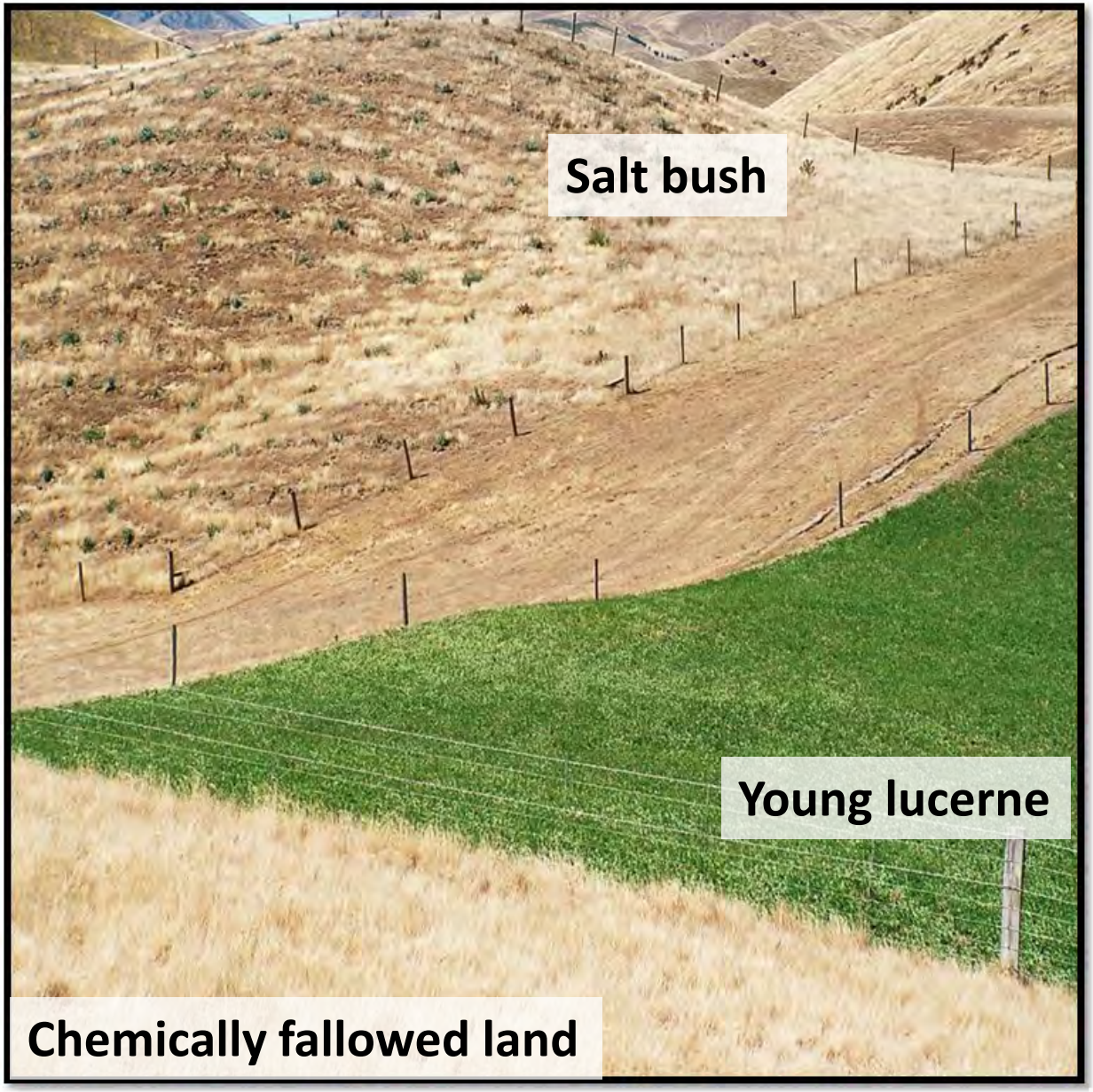

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Landscape farming

‘Bonavaree’ production change over 10 years

	2002	2012	Change
Land area (ha)	1100	1800	↑ 64%
Sheep numbers	3724	4158	↑ 12%
Lambing (%)	117	145	↑ 24%
Lamb weights (kg)	13.3	19	↑ 43%
Lamb sold (kg)	38324	74460	↑ 94%
Wool (kg)	18317	20869	↑ 14%
Sheep:cattle	70:30	50:50	
Gross trading profit (ha)	$317	$792	↑ 149%

References & Links

Lincoln University Dryland Pastures Website: http://www.Lincoln.ac.nz/dryland

Lincoln University Dryland Pastures Blog: https://blogs.lincoln.ac.nz/dryland/

The MaxClover Photo Diary: http://www.lincoln.ac.nz/conversation/drylandpastures/MaxClover Photo Diary (18 MB; PDF)

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