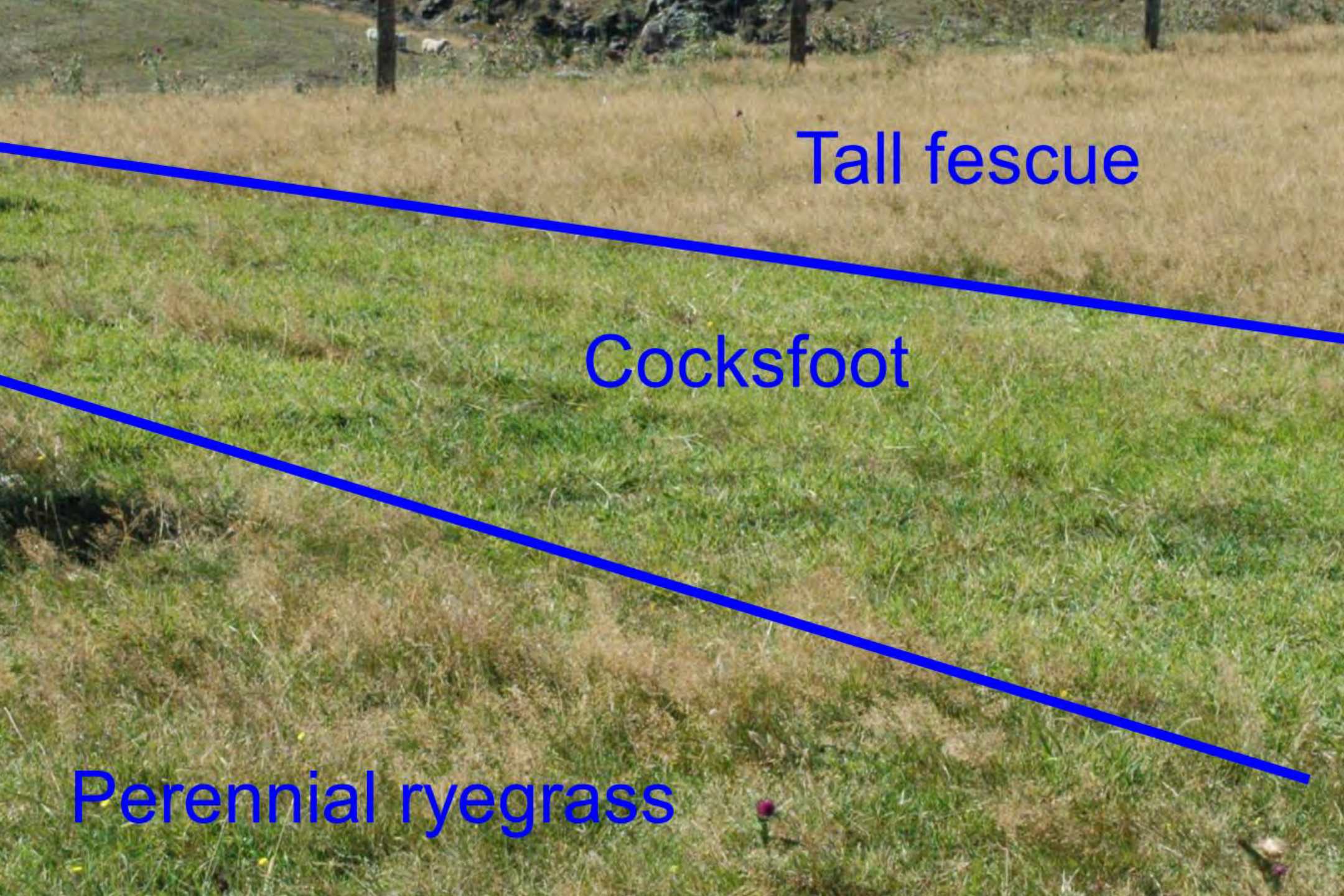
LUCERNE

- agronomy and grazing management

Dr Derrick Moot

Professor of Plant Science

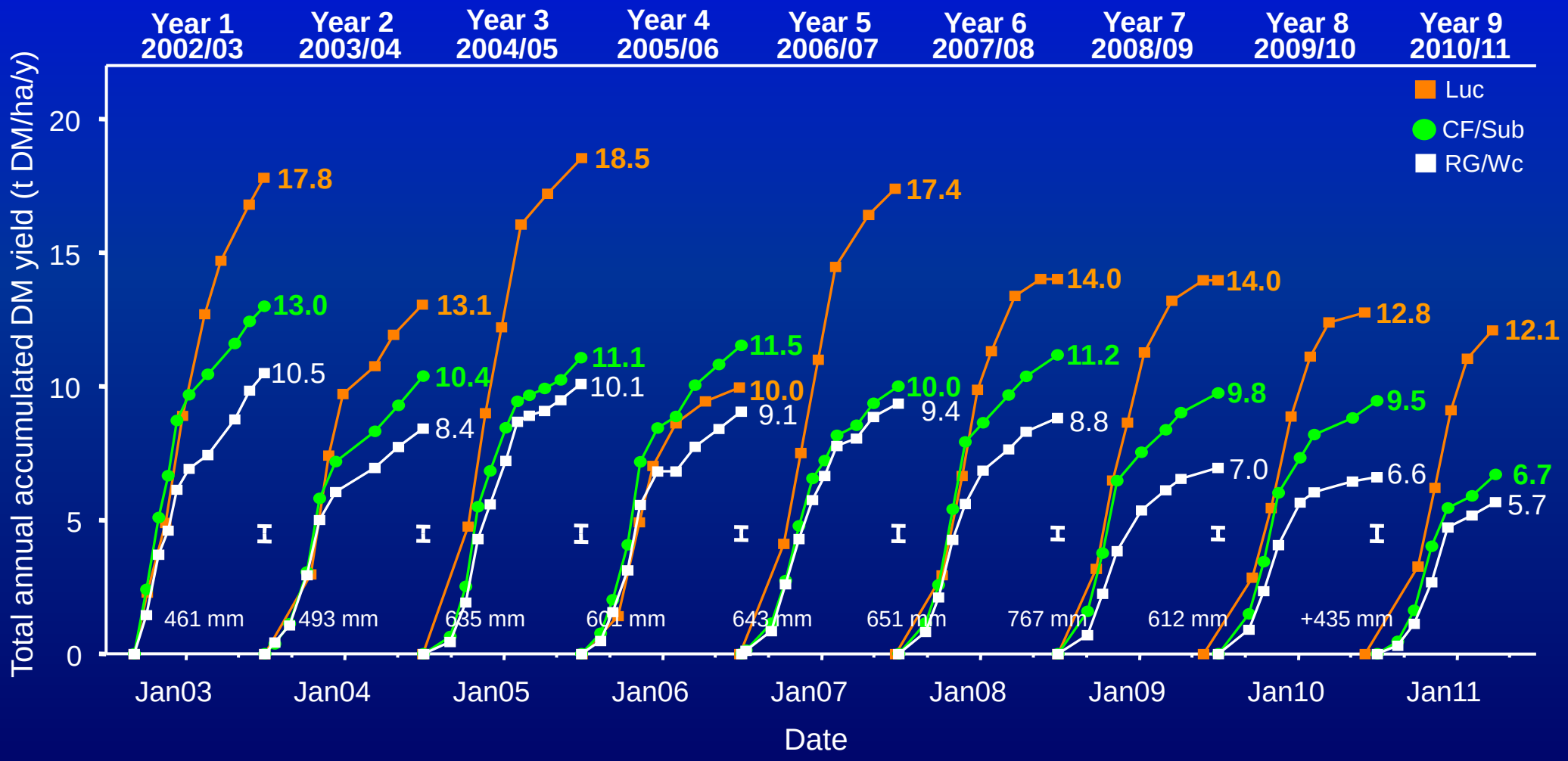

Tall fescue
Cocksfoot
Perennial ryegrass


beef+lamb
new zealand
Rg/Wc
Lucerne
CF/Sub
CF/Balansa
CF/Cc
CF/Wc

‘MaxClover’

‘MaxClover’ Total DM Yields

(to 30 March 2011)



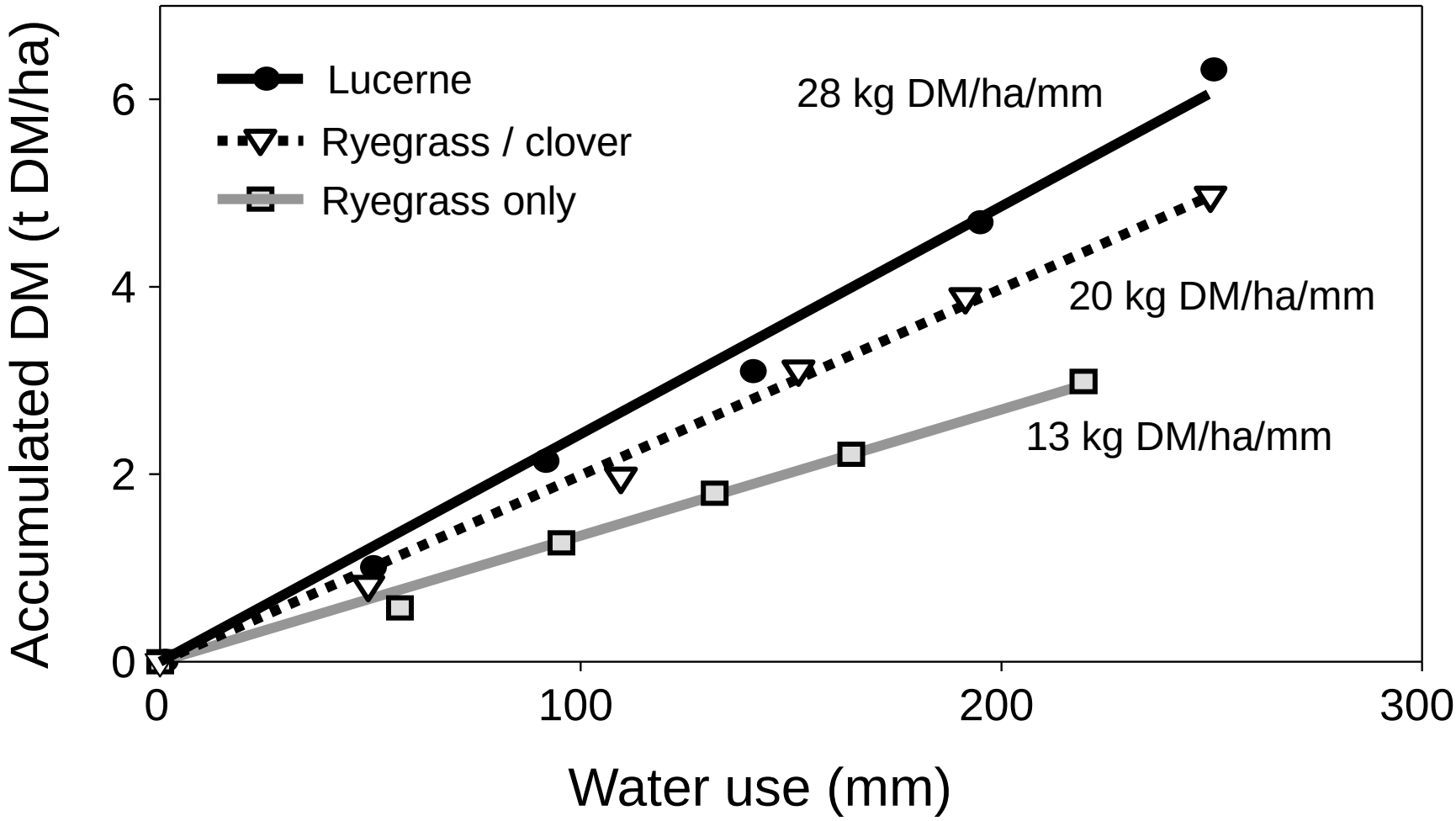
Source: Moot 2012

RG/Wc pastures

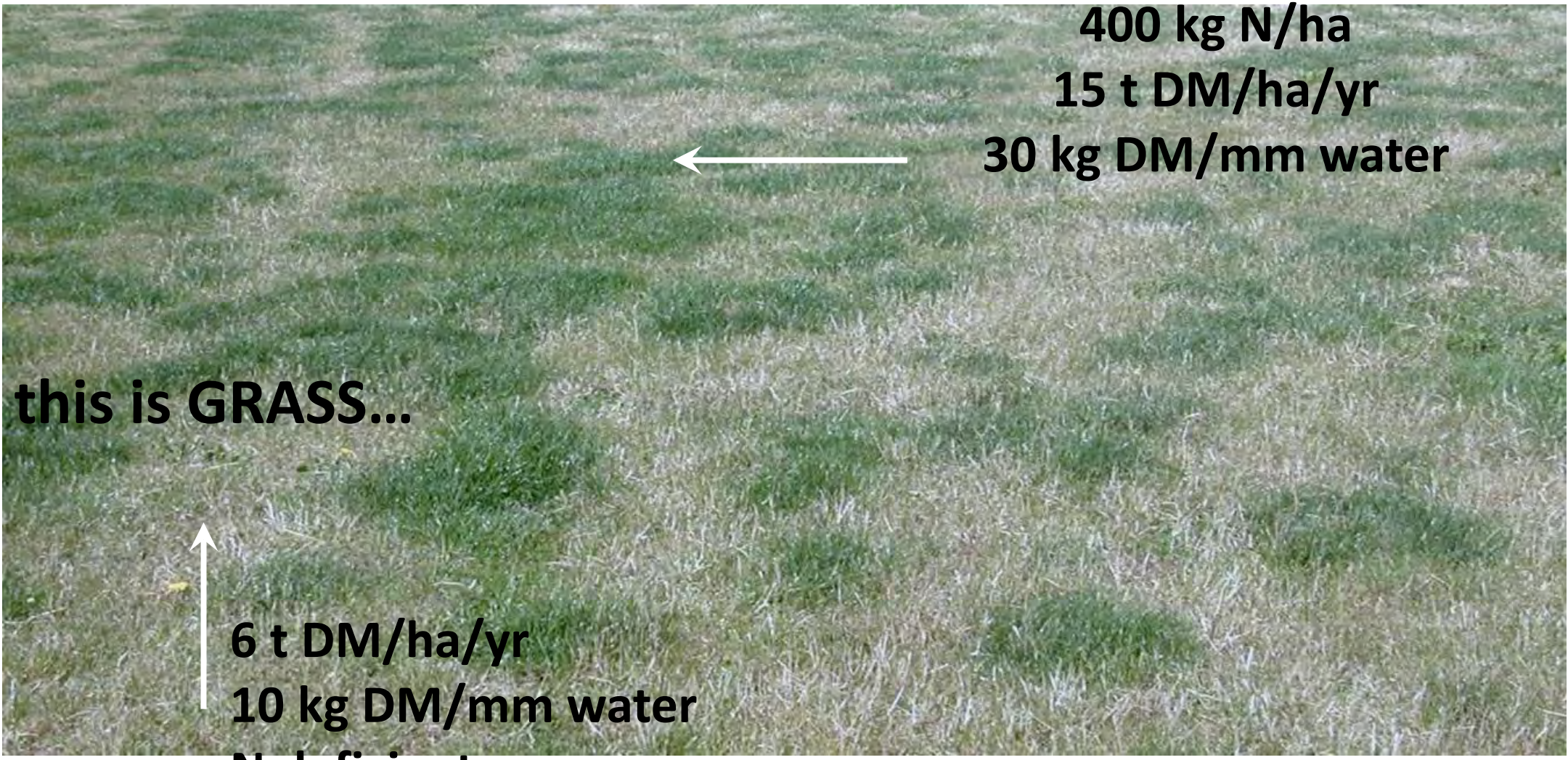
Unsown species <5% in Year 1 …….>45% in Year 6

Lucerne pastures

Spring WUE: legume = (nitrogen)



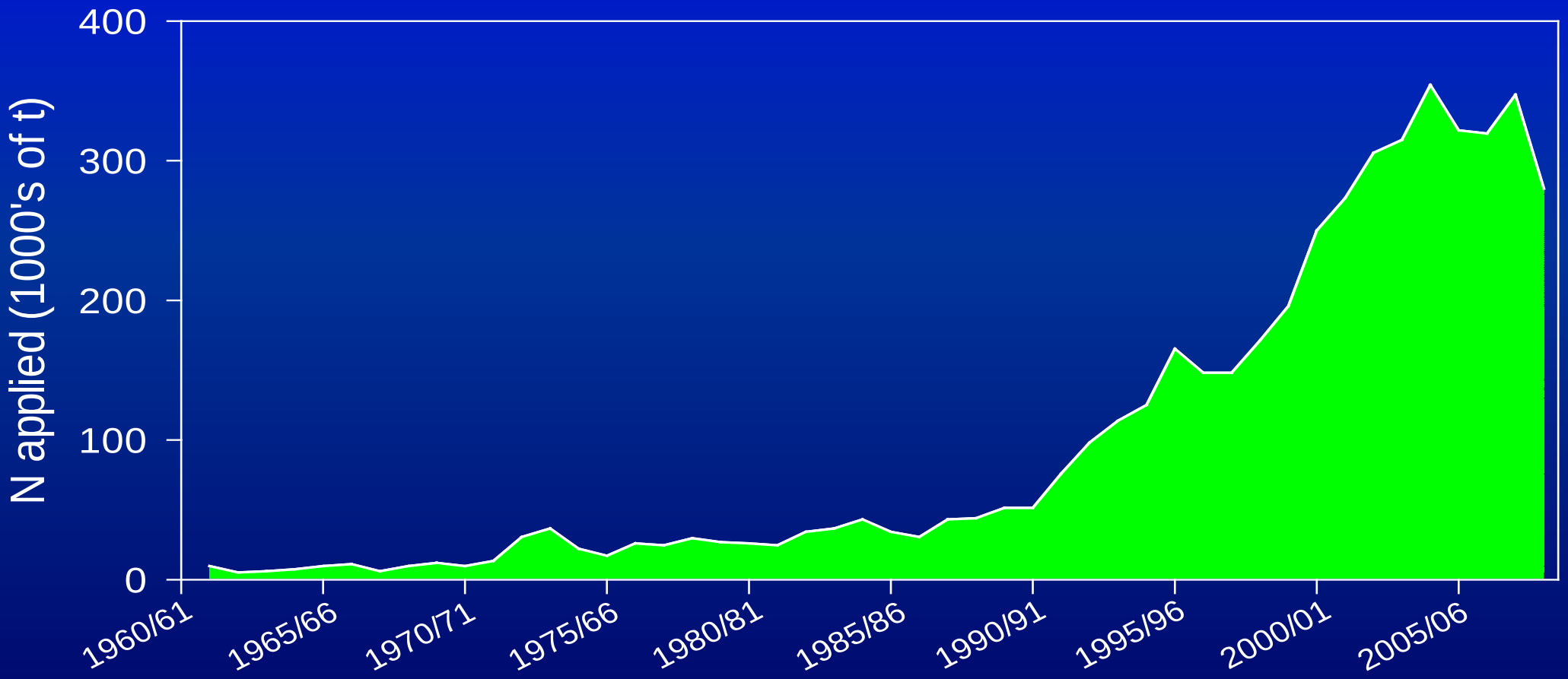
Source: Moot *et al.* 2008


These are urine patches
400 kg N/ha
15 t DM/ha/yr
30 kg DM/mm water
this is GRASS…
6 t DM/ha/yr
10 kg DM/mm water
N deficient grass

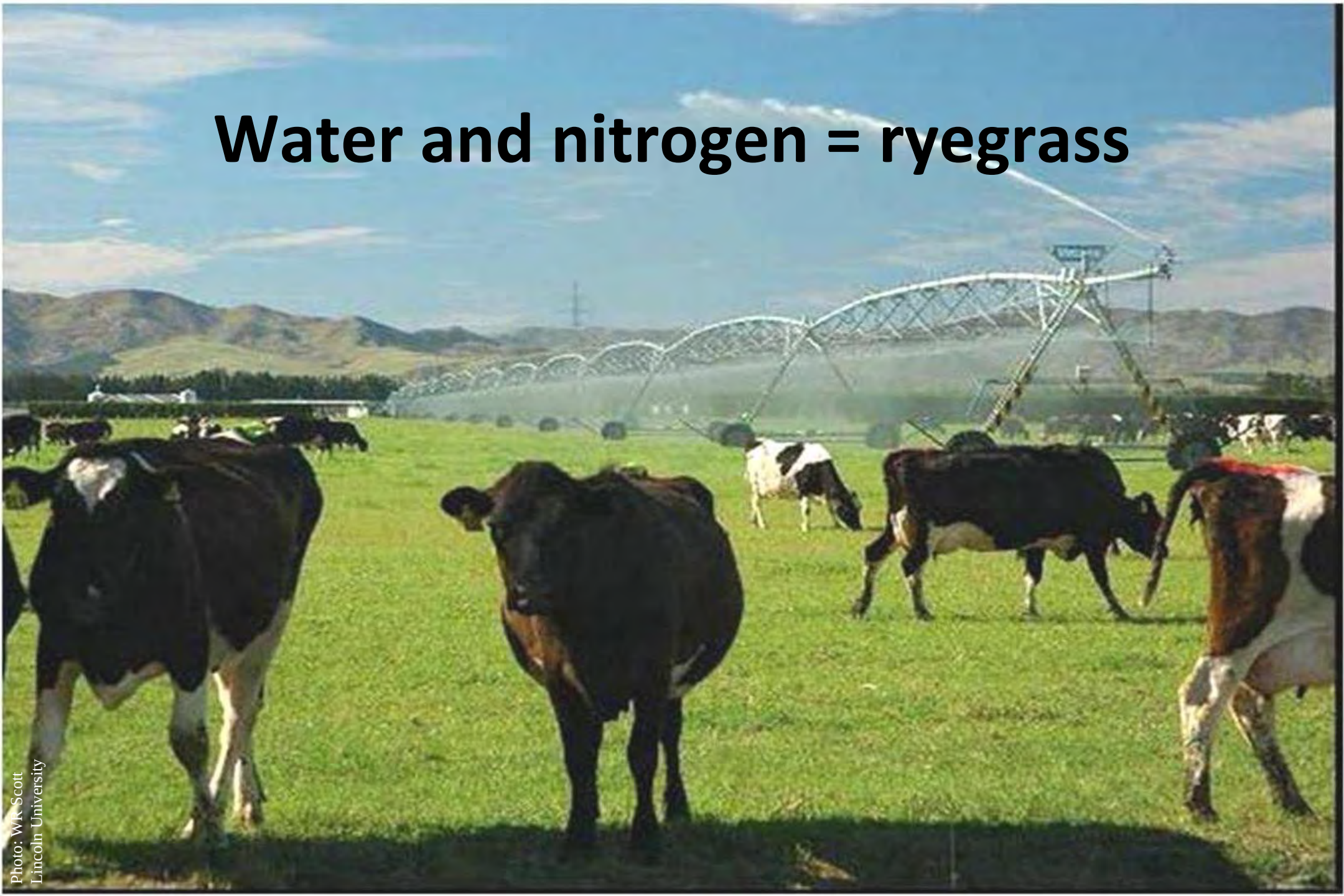
Nitrogen deficient pasture

1000 kg N/ha

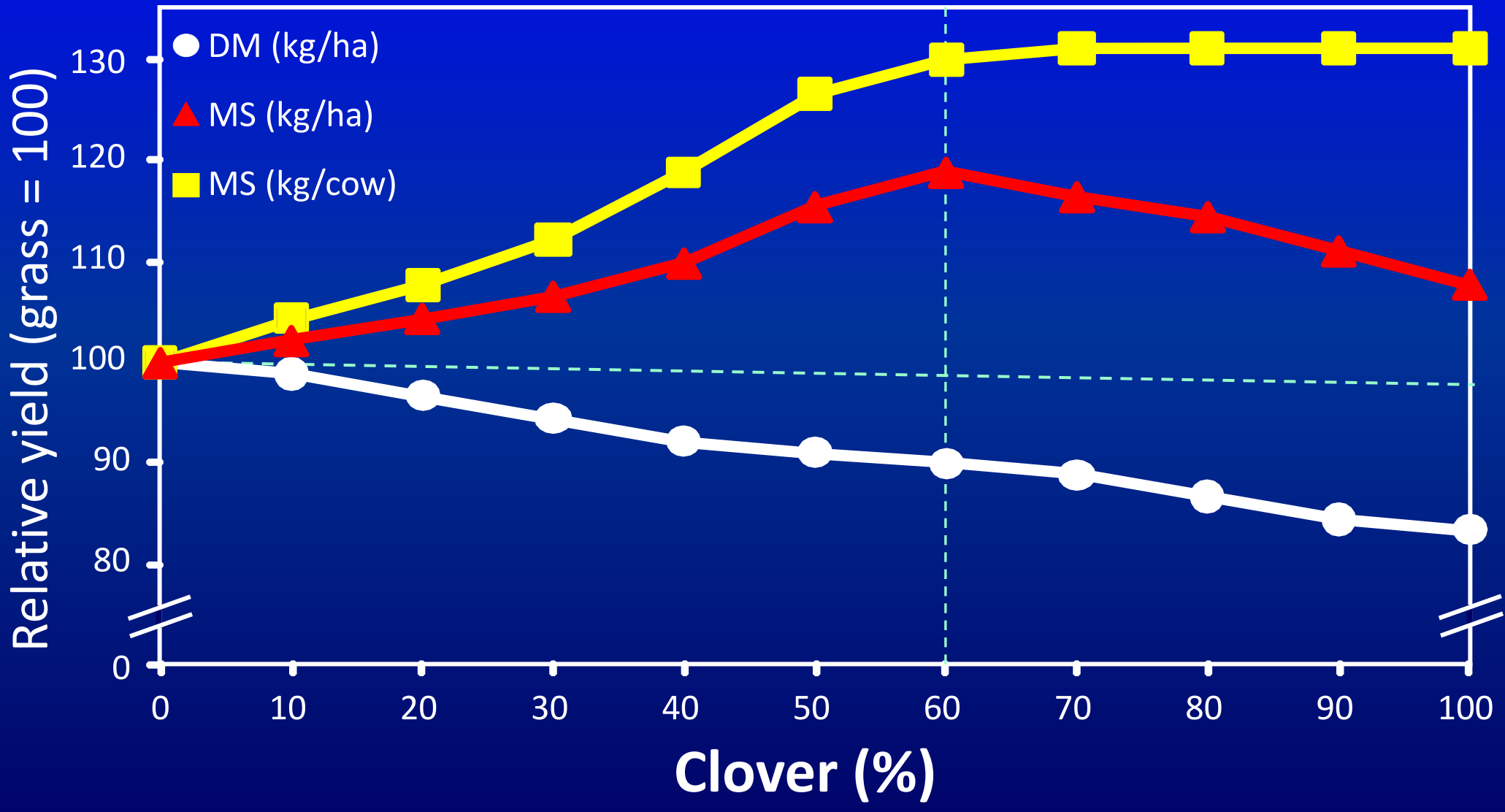
Nitrogen fertiliser use



Source: New Zealand Fertiliser Manufacturers' Research Association


Water and nitrogen = ryegrass
Photo: WR Scott
Lincoln University

Clover content & milksolids production



Source: Cosgrove 2005

Sheep prefer 70% legume, 30% grass

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	LMR	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%

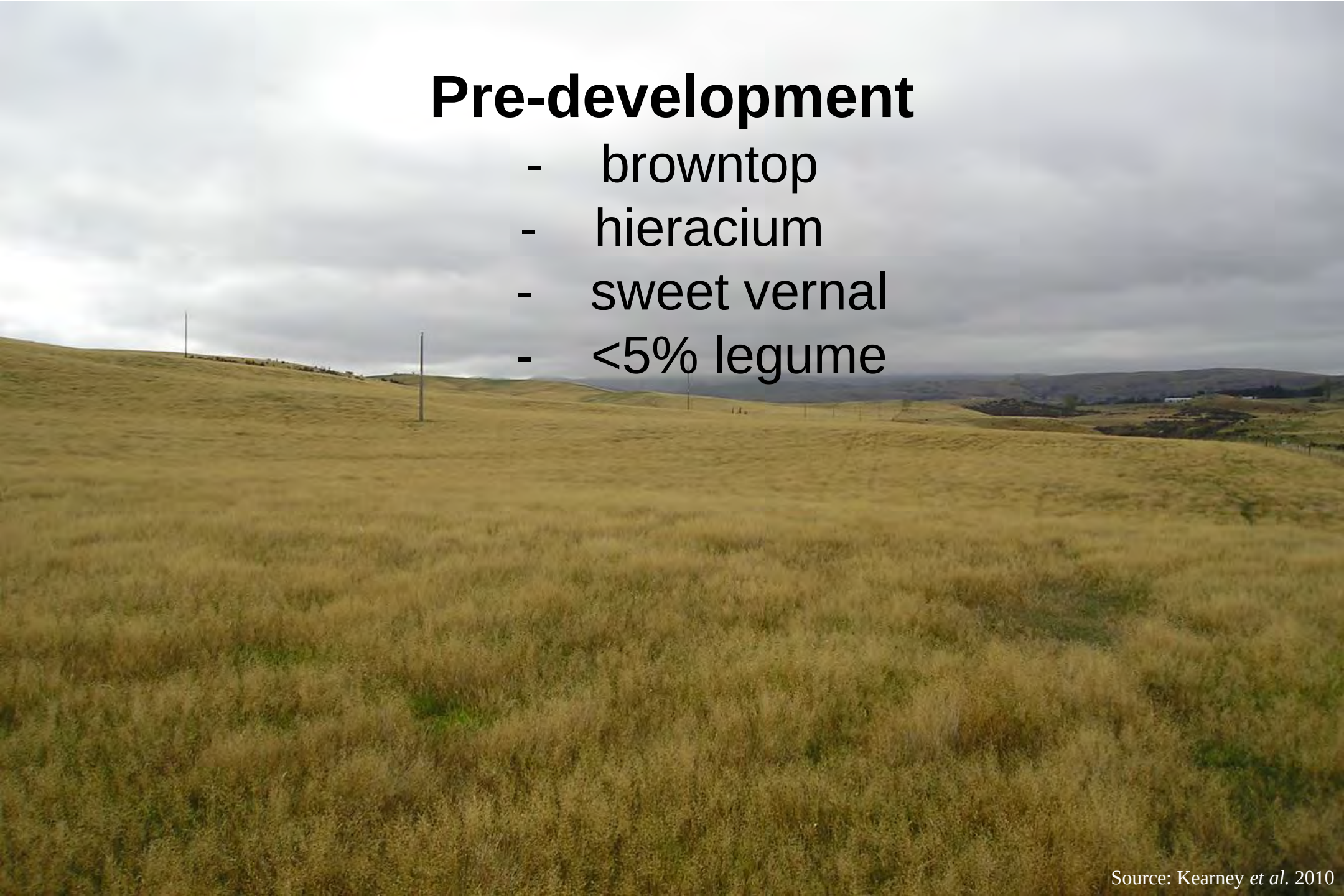
R = Resistant = (31-50%)
S = Susceptible

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?



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 (µg/ml)	Potassium (QTU)	Sulphur (µg/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

Photo: V Fasi
Lincoln University

Lucerne root

~8 months after sowing
> 1.5 m length

Photo: D Hollander
Lincoln University

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

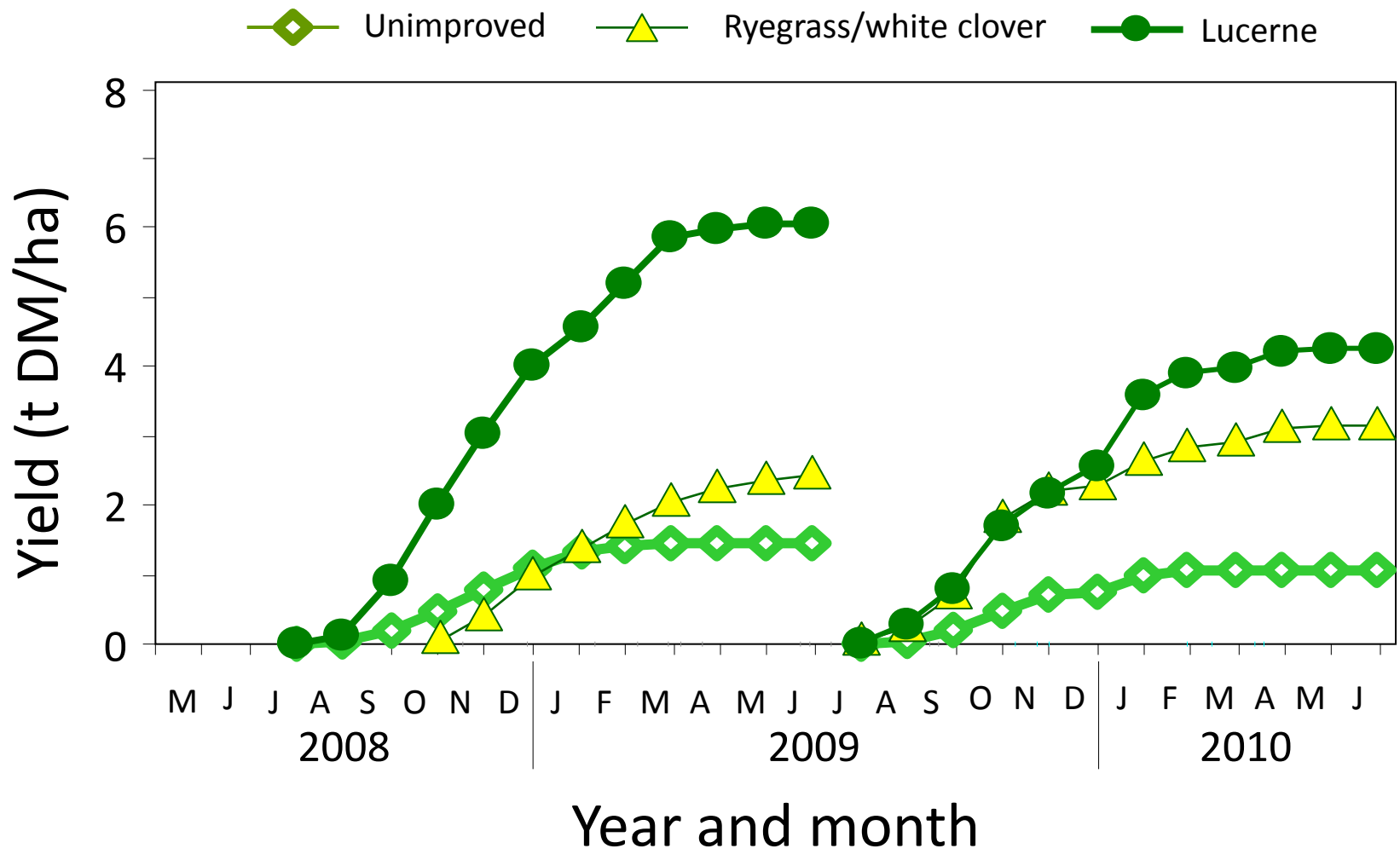
Result from Autumn spray, photo taken 1 November 2010

Source: Kearney *et al.* 2010

Source: Kearney *et al.* 2010

Source: Kearney *et al.* 2010

Pasture growth



Source: Kearney *et al.* 2010

Photo: V Fasi (LU)
Lees Valley

Seasonal grazing management

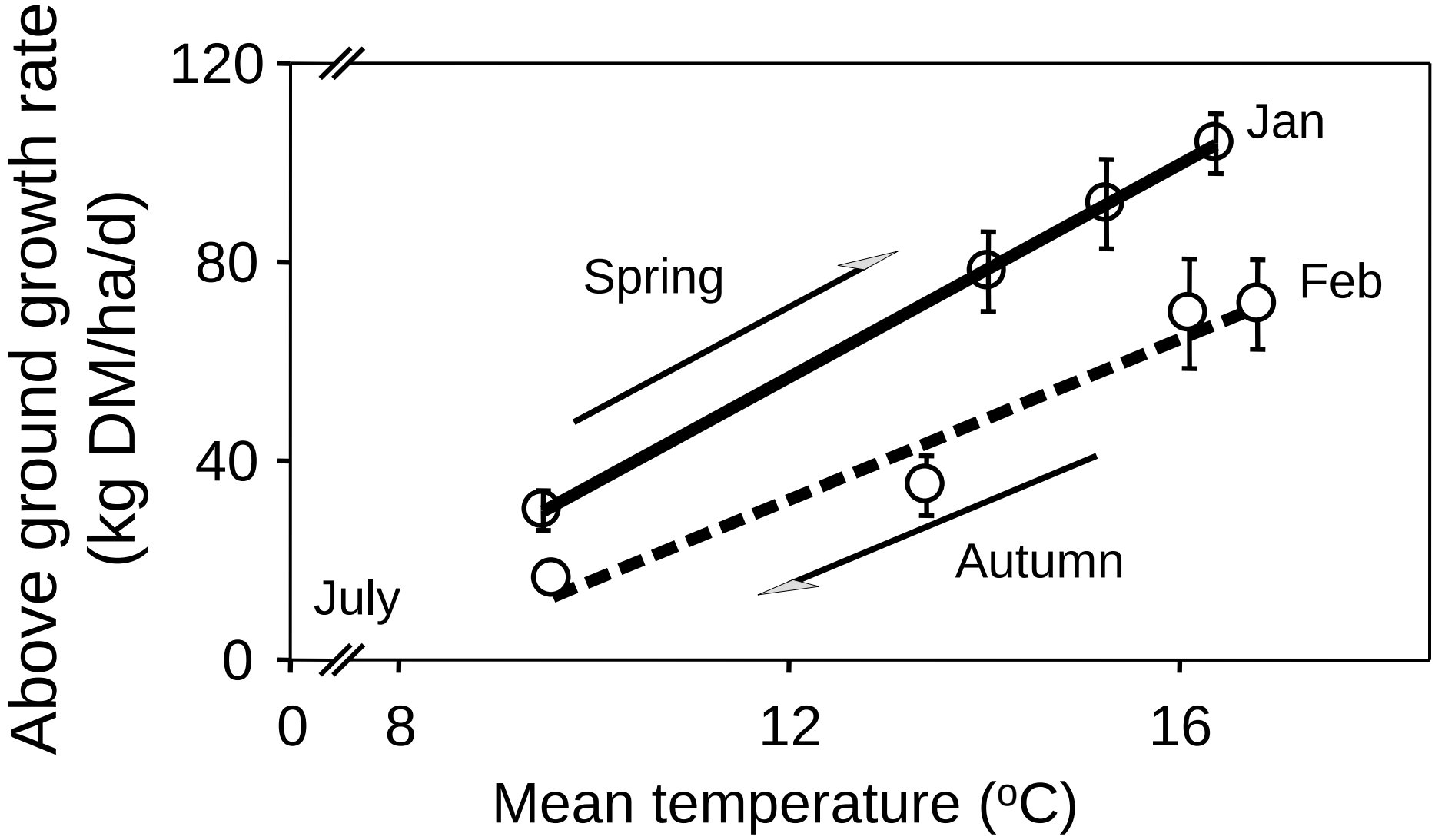
Spring

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

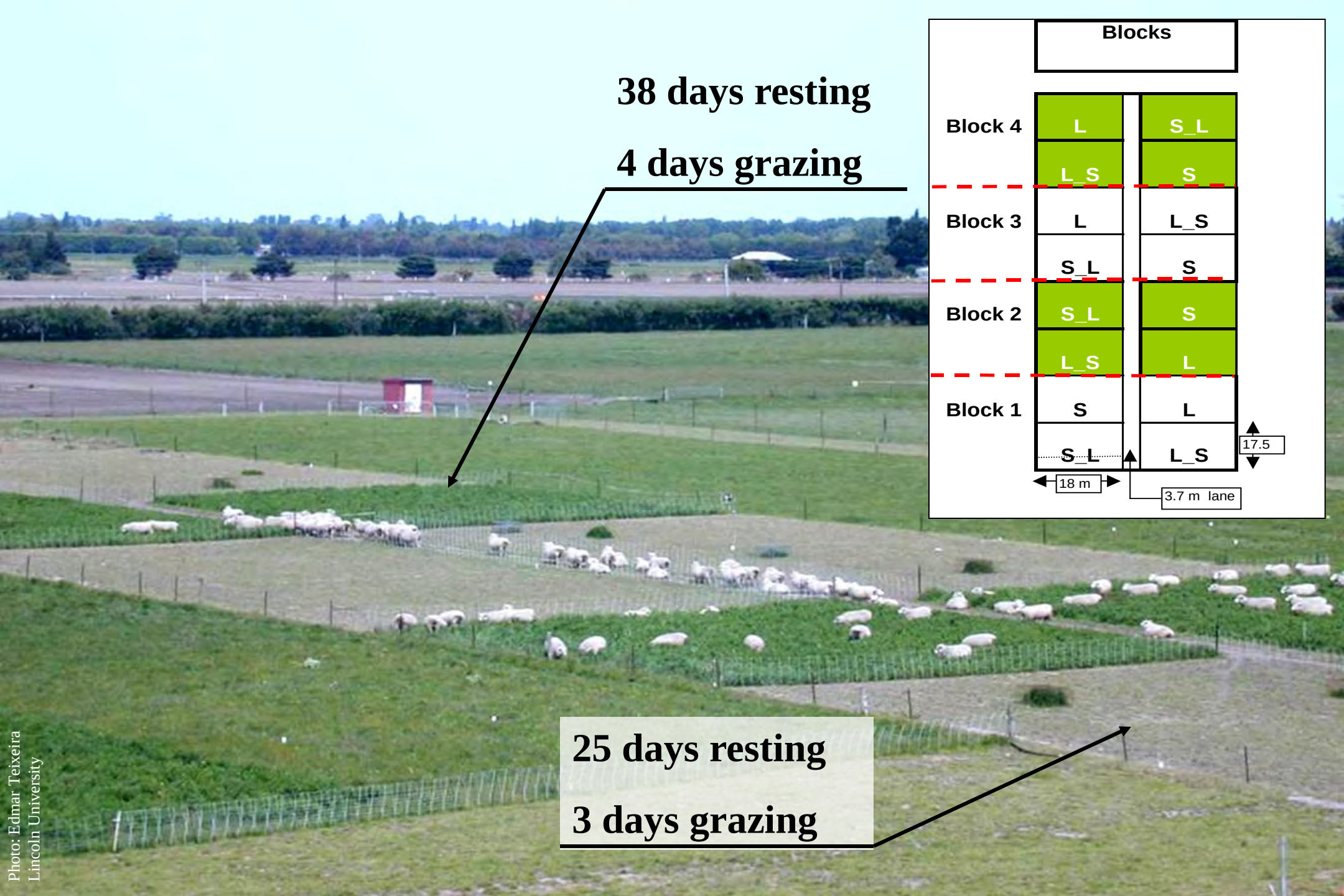
- can graze before flowers appear (~1500 kg DM/ha) ideally ewes and lambs but

Never lamb on or set stock lucerne

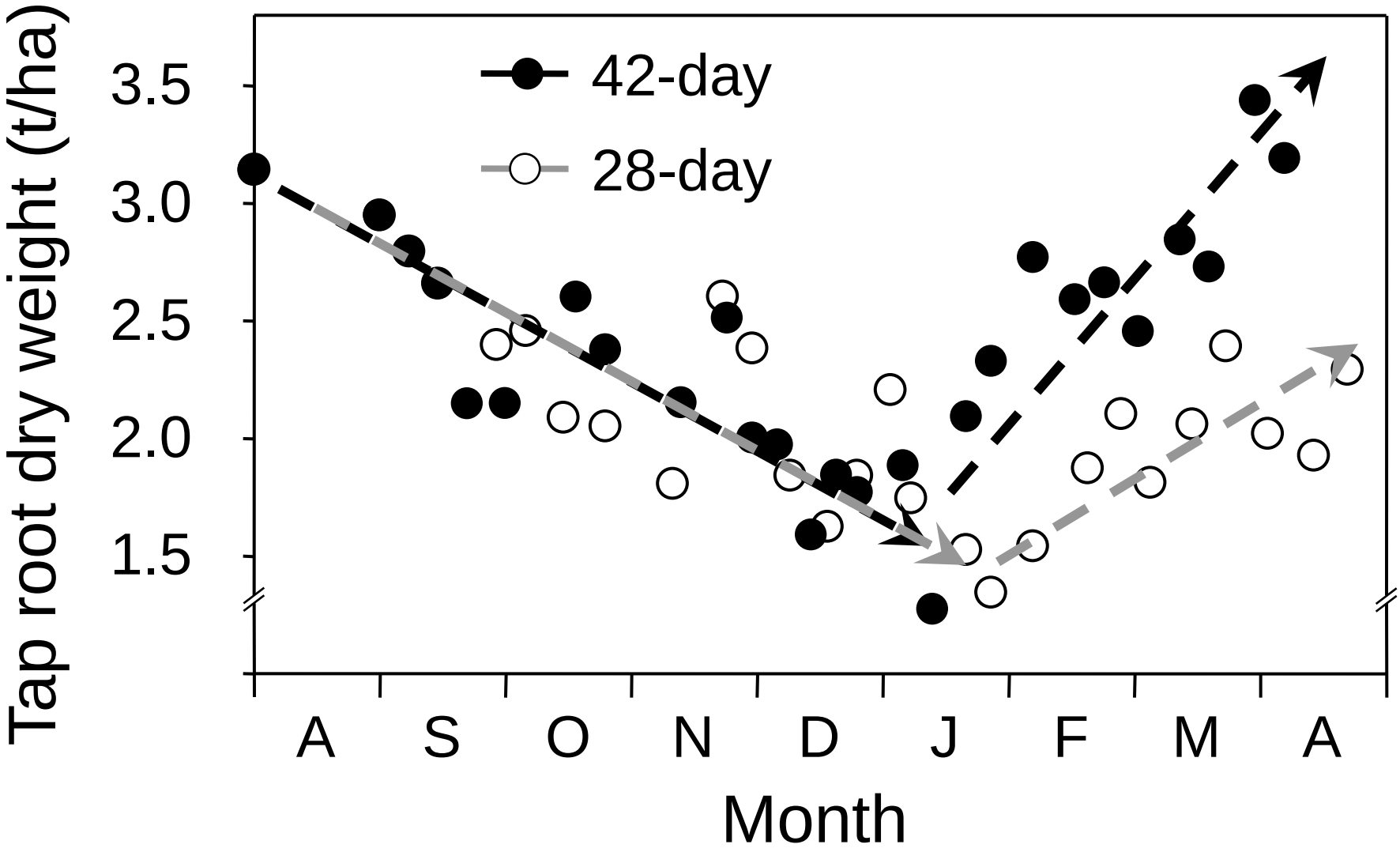
Vegetative growth



Source: Moot *et al*. 2003


38 days resting
4 days grazing
Blocks
Block 4
L
S_L
L_S
S
Block 3
L
L_S
S_L
S
Block 2
S_L
S
L_S
L
Block 1
S
L
S_L
L_S
17.5
18 m
3.7 m lane
25 days resting
3 days grazing
Photo: Edmar Teixeira
Lincoln University

Partitioning to roots



Source: Moot *et al*. 2003

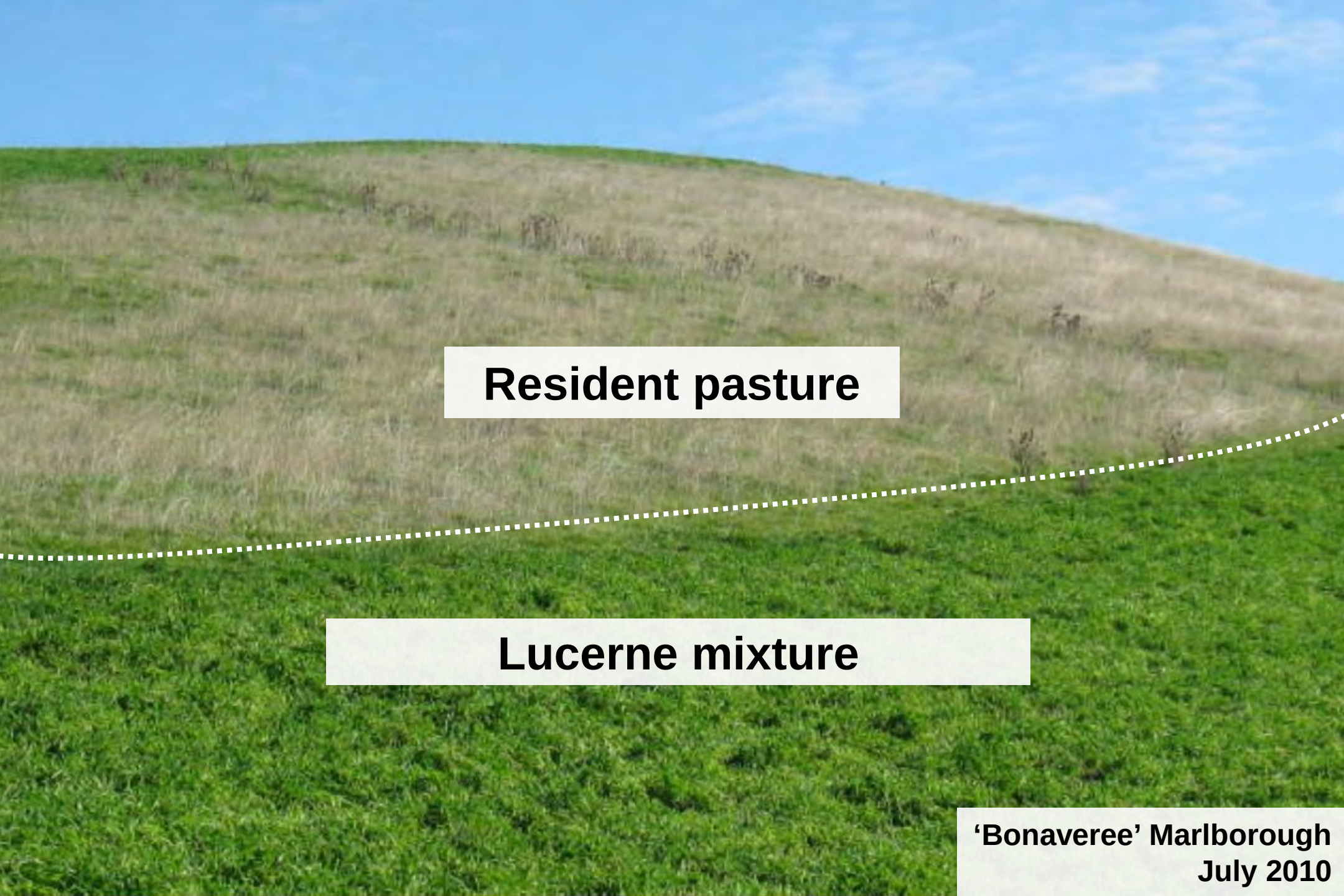

Photo: Edmar Teixeira
Lincoln University
20 15 10 5 0
0 5 10 15 20 25 30 35 40 45

Doug and Fraser Avery “Bonavaree”

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



‘Bonaveree’ Marlborough
July 2010

‘Bonaveree’ Marlborough
July 2010

Maximize reliable spring growth – high priority stock

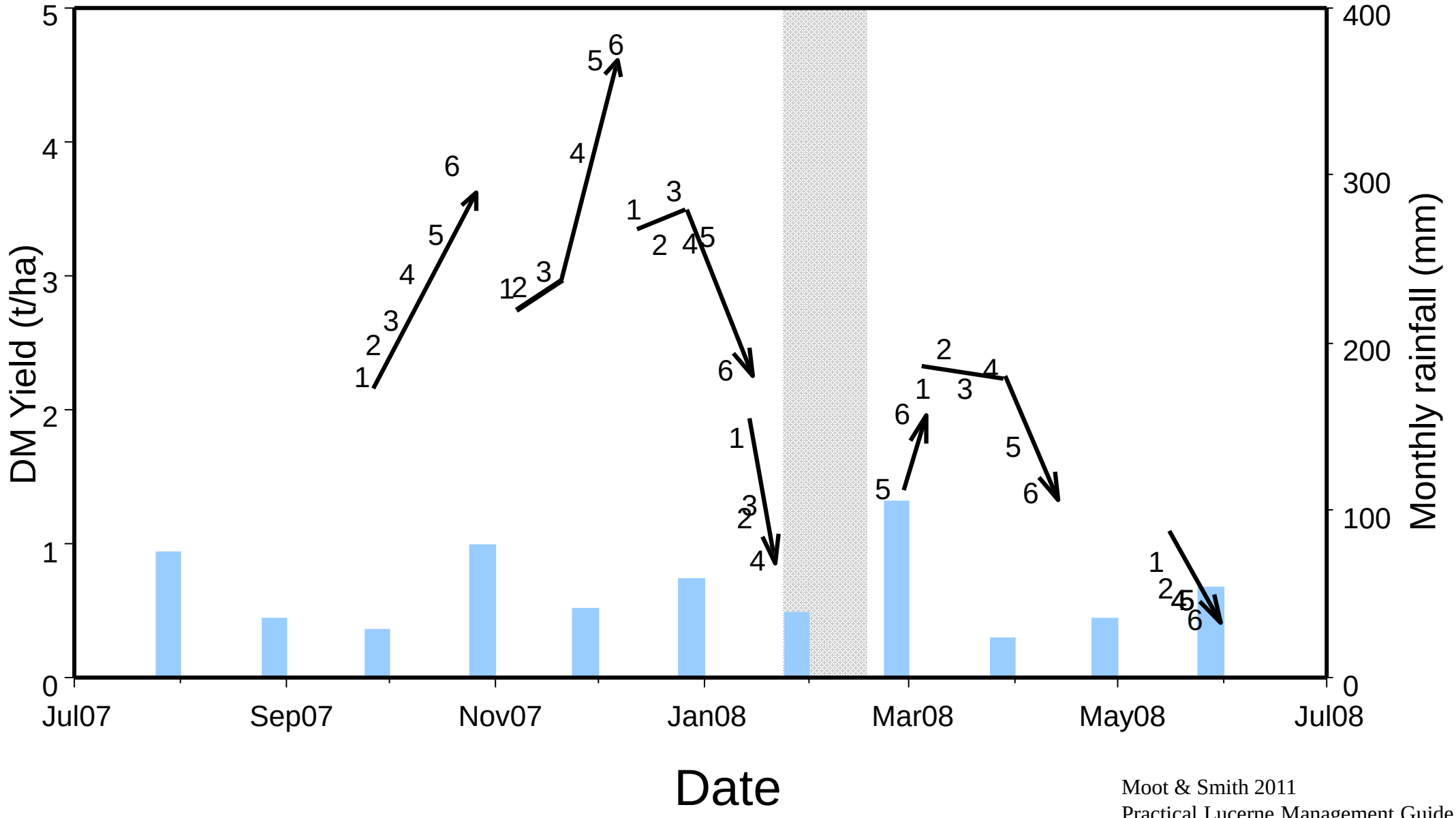
Rotation 1 Pre-graze
Plot 1 (21/9/07)
2.3 t DM/ha
20-25 cm tall

Photo: M Smith
Lincoln University

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

Photo: M Smith
Lincoln University

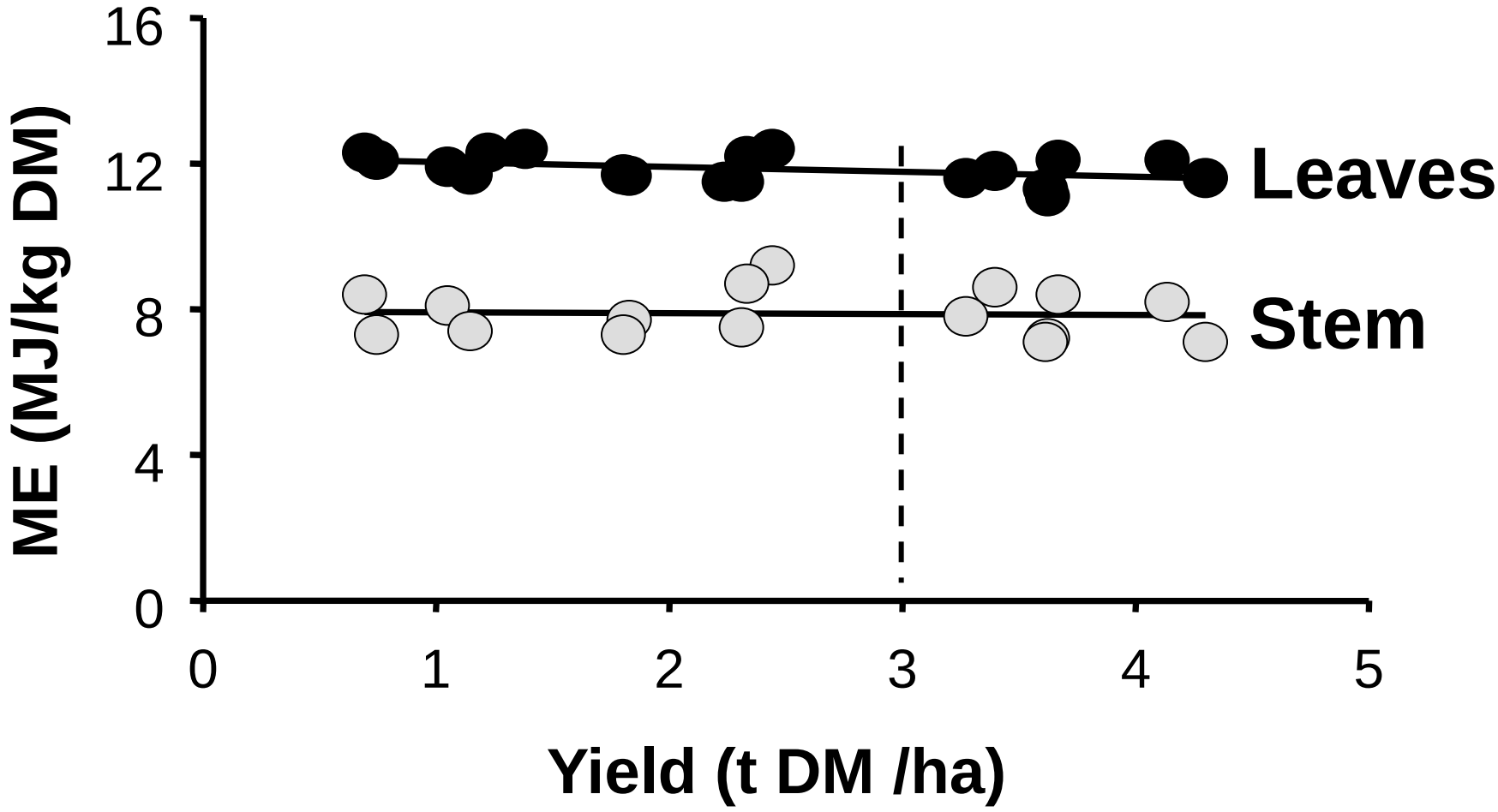
Grazing Rotations at Lincoln University



Moot & Smith 2011
Practical Lucerne Management Guide

5th September 2011 – Cave Sth Canterbury

Metabolisable energy of lucerne



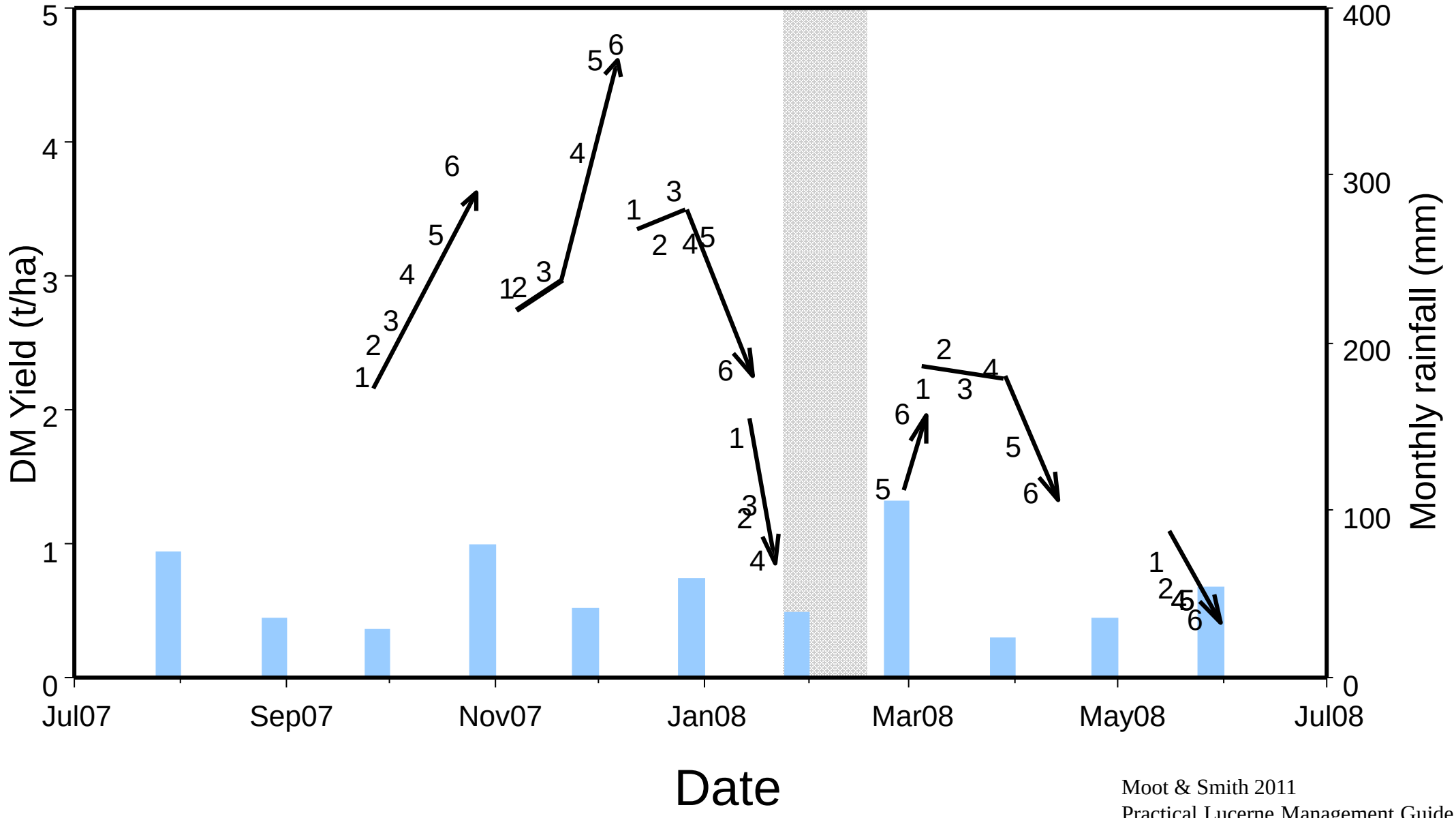
Source: Brown & Moot 2004

Photo: Bonaveree

Photo: Bonaveree

Photo: DJ Moot
Lincoln University

Grazing Rotations at Lincoln University



Moot & Smith 2011
Practical Lucerne Management Guide

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%**

Photo: M Smith
Lincoln University

Creating a net of opportunity

Any autumn rain grows high quality feed

Photo: Bonaveree

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:** 10 in 1 vaccine
- **Cobalt:** vitamin B12 injection
- **Worm haven:** Camping on small area – river edge?
- **Leaf spot in autumn:** avoid flushing on older lucerne
  - new regrowth or tops only are O.K.

Forest conversion 100 000 ha

Photo: Bonaveree

Photo: Bonaveree

Photo: Bonaveree

Ewe hoggets grown on lucerne 54 kg ave

Photo: Bonaveree

Corriedale 2th flushed on wilting lucerne

Photo: Bonaveree


Lucerne (is not grass!!!)
- flushing at Bonaveree
04.03.2009

Photo: DJ Moot
Lincoln University

4. 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 = 40kg/ha/t DM removed + P and S from super


Photo: DJ Moot
Lincoln University

5. Weed Control

Bad weeds = grasses and tap rooted flat weeds

Never set stock in spring

$\Rightarrow$ stand open for summer annual invasion control:
herbicide before July 1

K super if conserving (soil K > 6)


‘Bonaveree’ Marlborough
July 2010
Waterlogged
Photo: Bonaveree

Photo: Bonaveree

Photo: Bonaveree

Close up of a prairie grass and lucerne mixture

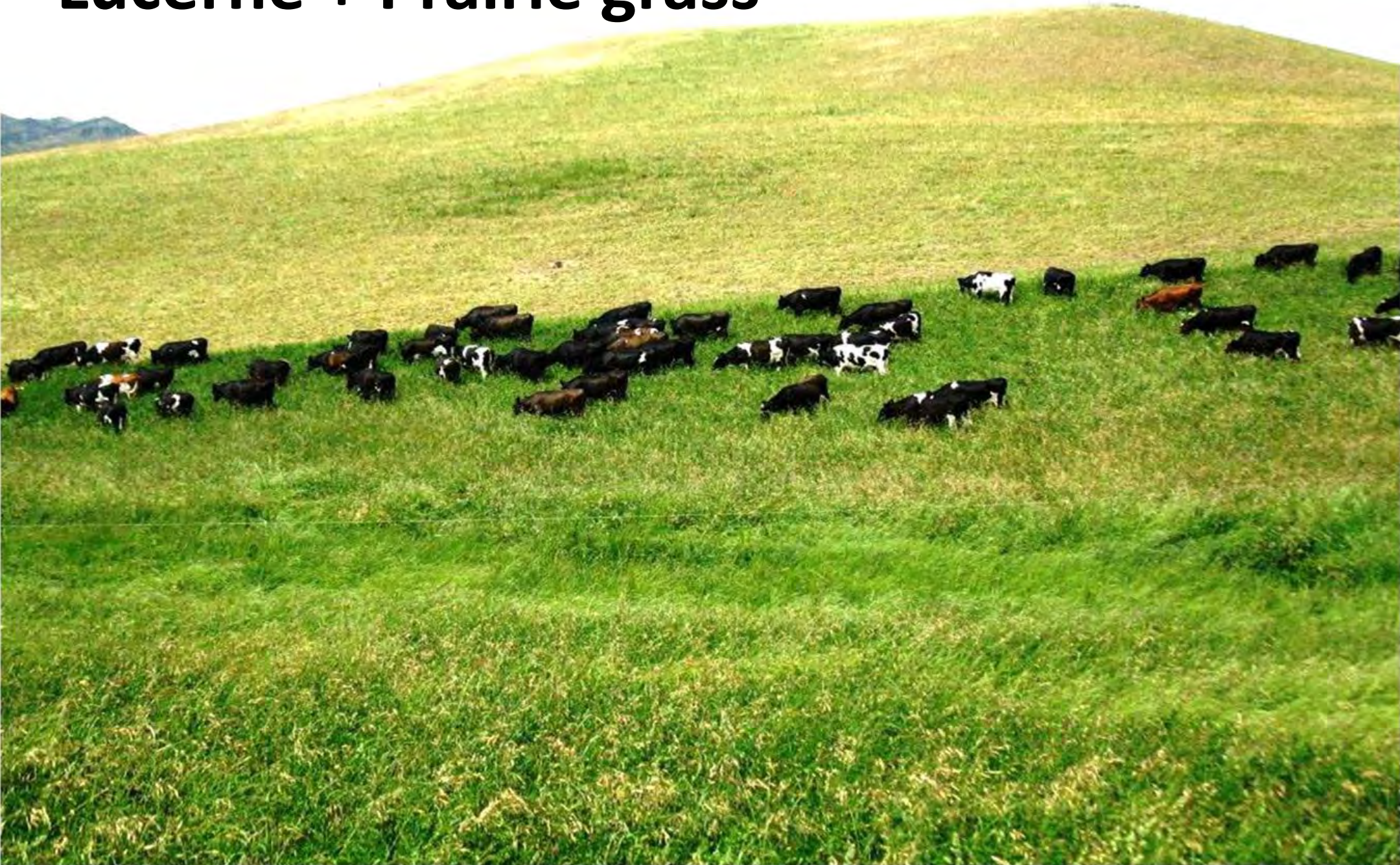
‘Bonaveree’ Marlborough
July 2010

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

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

Lucerne + cocksfoot – Haka Valley

Lucerne + Prairie grass



6. Conservation (high protein)

- Hay – first cut in spring is heaviest
- Crimper/conditioner
  - need rapid moisture loss from stems
- Leaves are the nutritious part
  - bale with dew in evening
- Silage – wilted/chopped
  - inoculant/pasture added to help fermentation

Continuous conservation without prolonged autumn flowering will decrease stand persistence

Only conserve a true surplus

Diverse drought-proofed landscape

SI Farmer of the Year 2010

Conclusions

- Aim to transform dryland farms to be economically, environmentally and socially resilient
- Require regionally specific technical solutions and ongoing extension
- Nitrogen from legumes is the key to improve pastoral water use efficiency
- Lucerne has a key role to play in dryland pastoral farming for deer, beef, and sheep

Acknowledgements

- Beef & Lamb NZ Ltd/ Pastoral21
- Lincoln University
- MAF Sustainable Farming Fund

References

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Lucerne: agronomy and grazing management

Professor Moot gave this presentation at:

The NZ Deer Farmers Association field day

held at

Hawarden, North Canterbury

On:

23 Oct 2011