

Dryland pastures

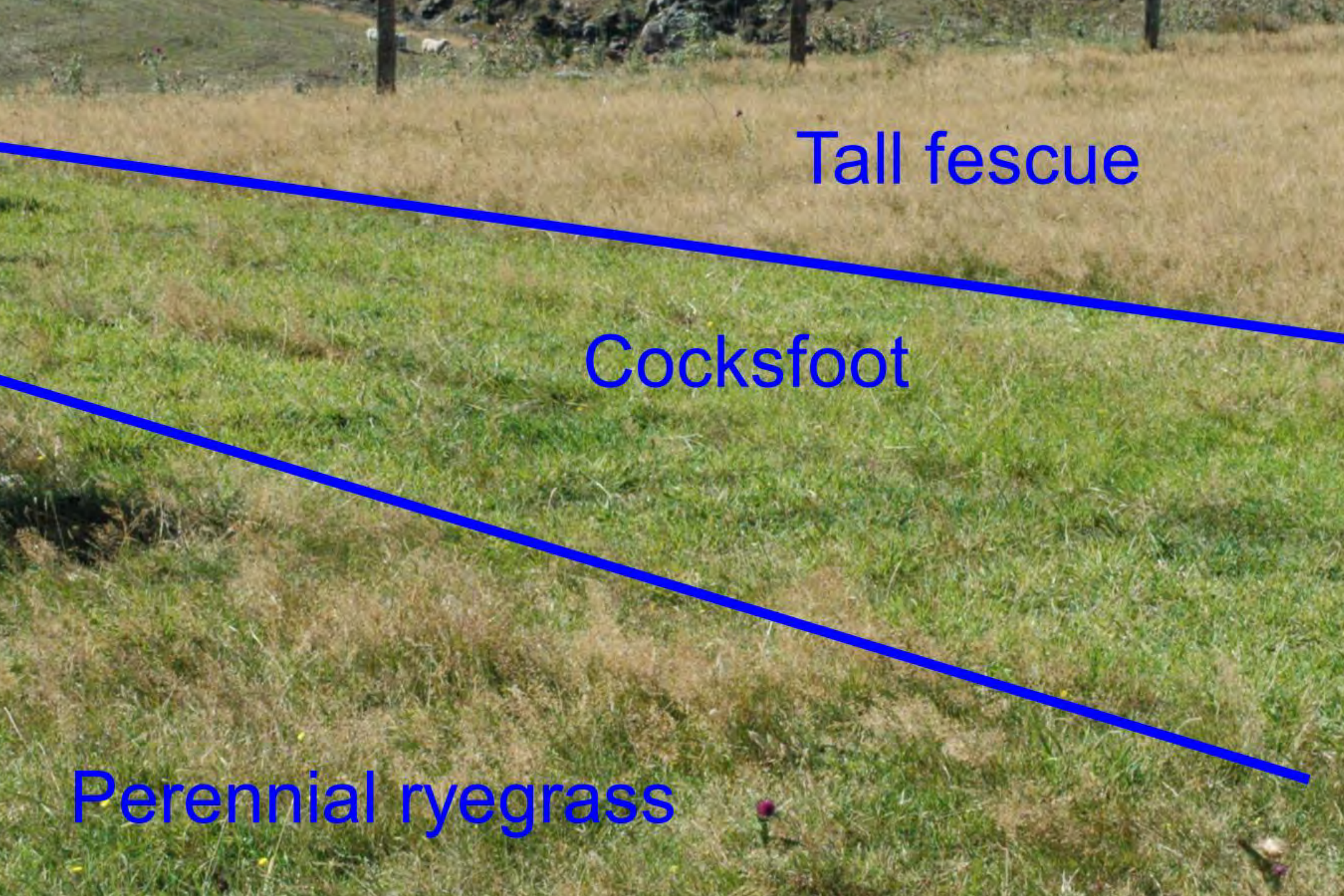
- agronomy and grazing management

Dr Derrick Moot

Professor of Plant Science



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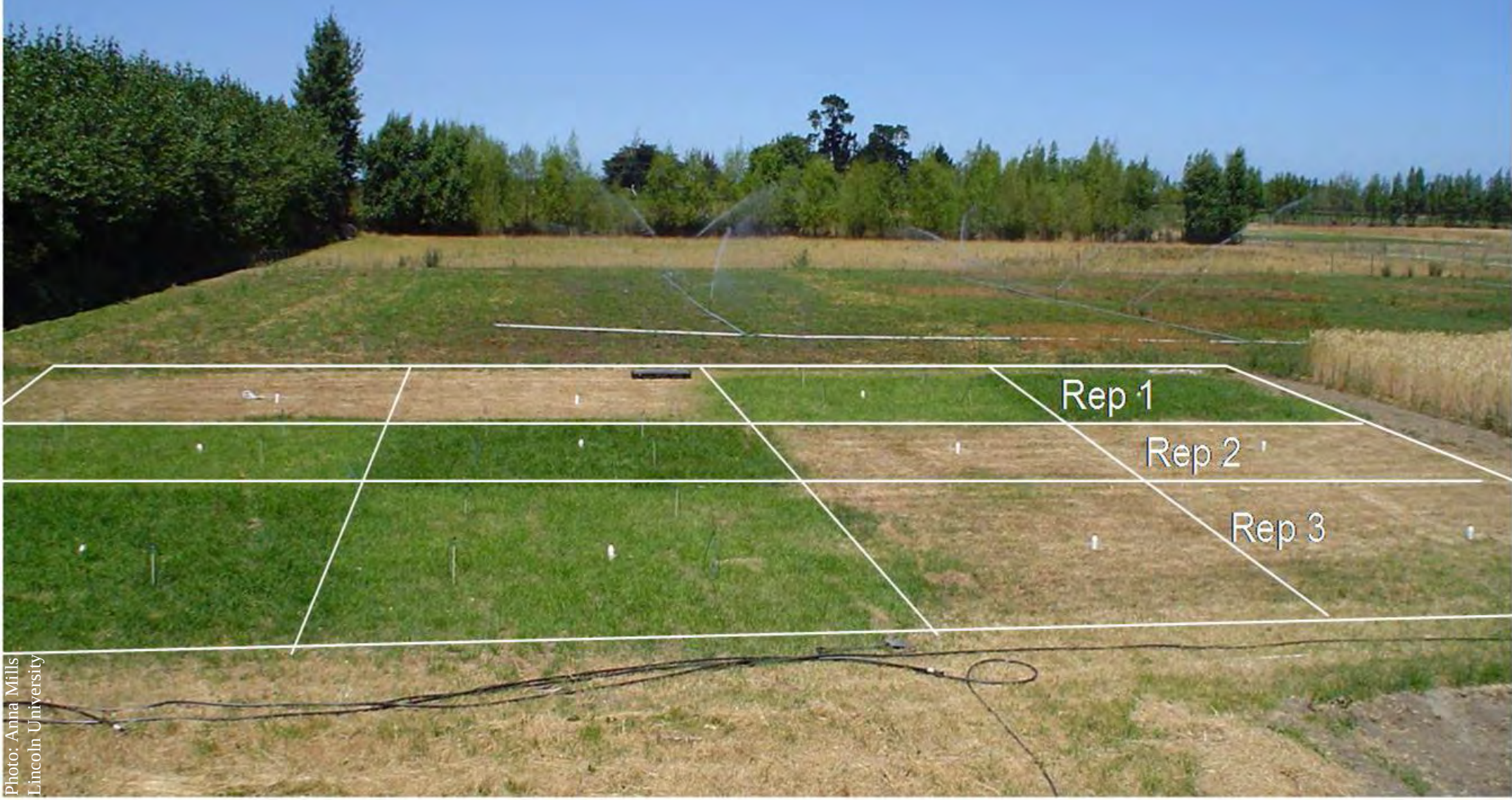


Tall fescue

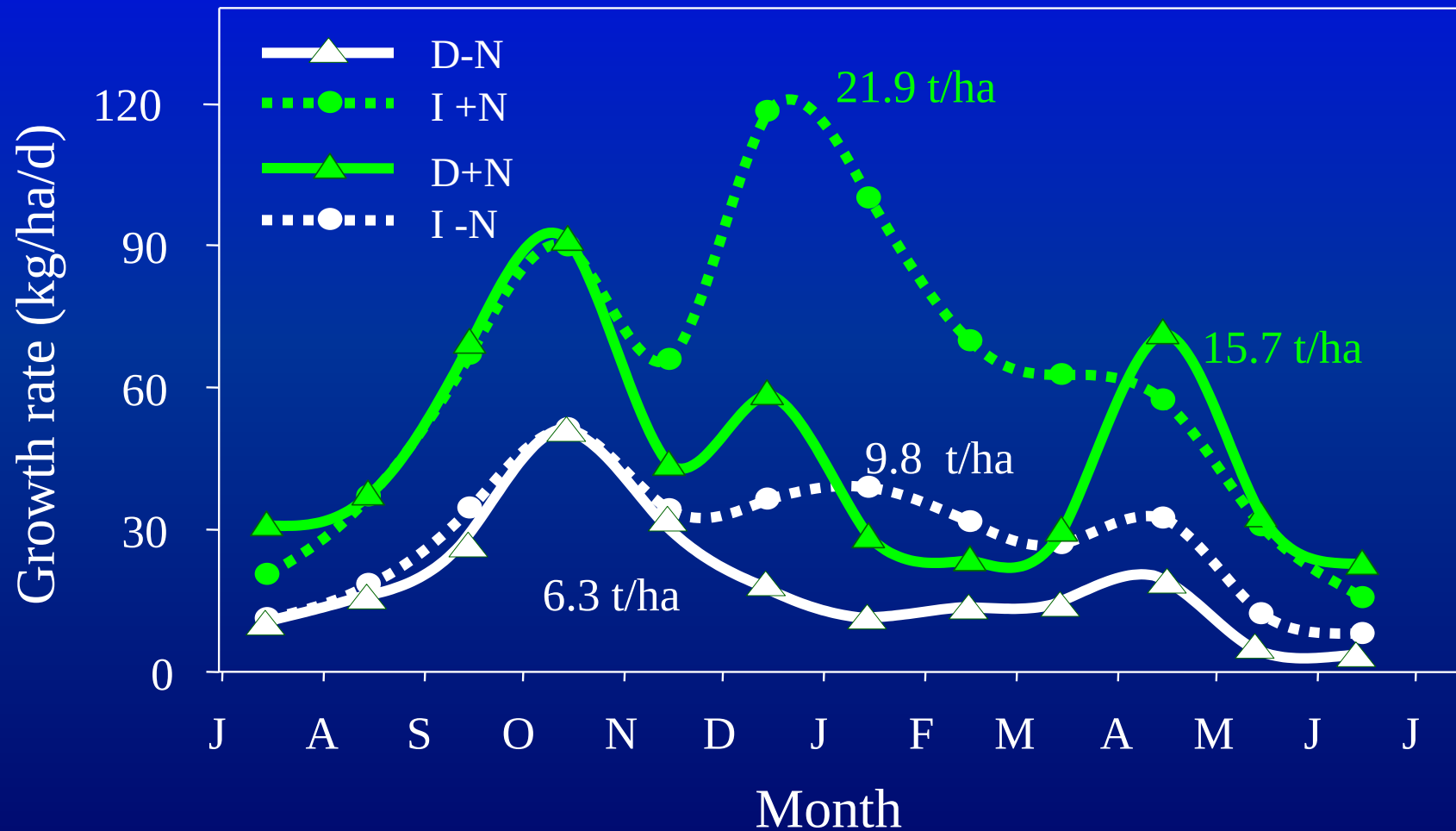
Cocksfoot

Perennial ryegrass

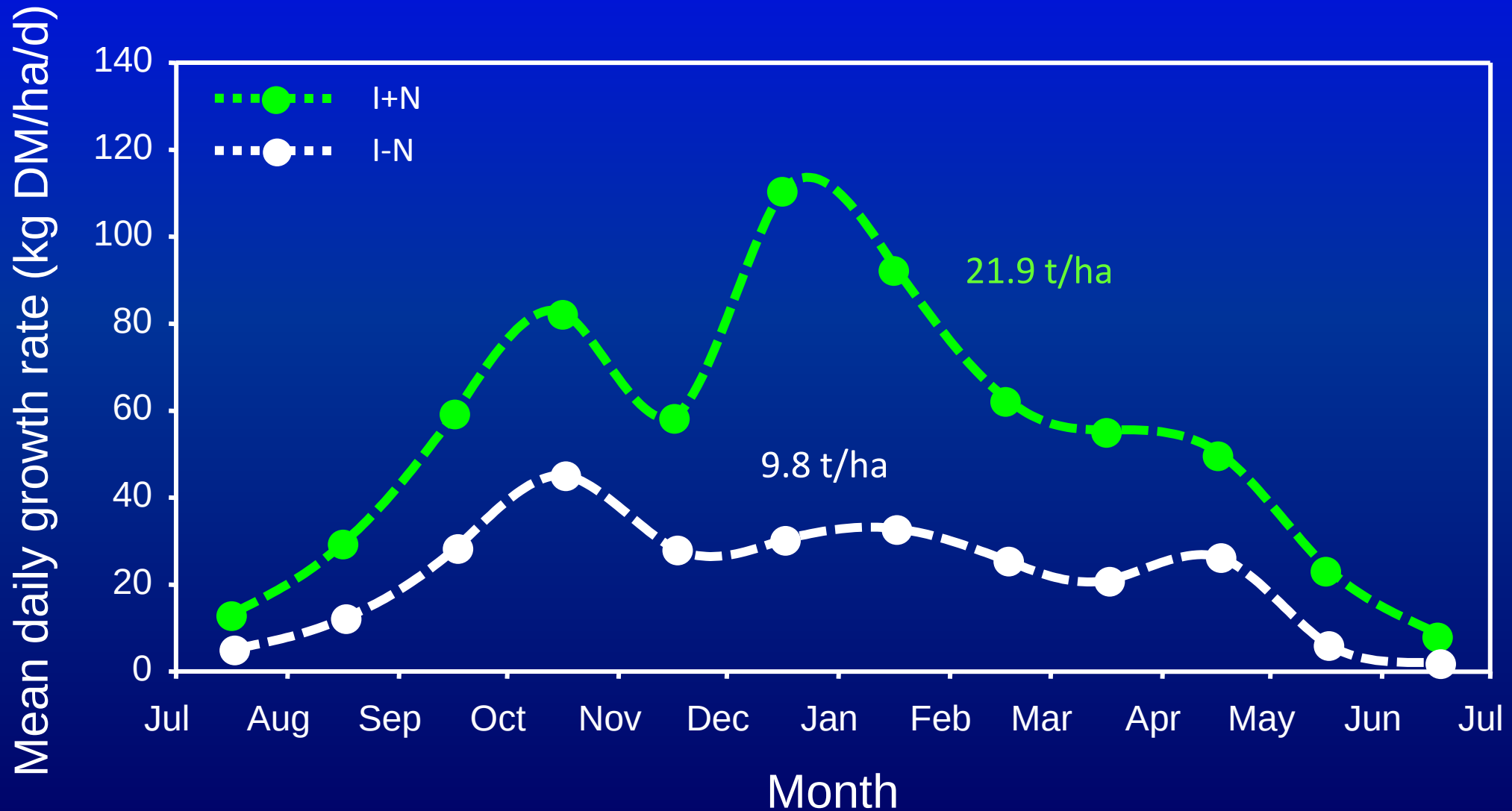
Experiment site



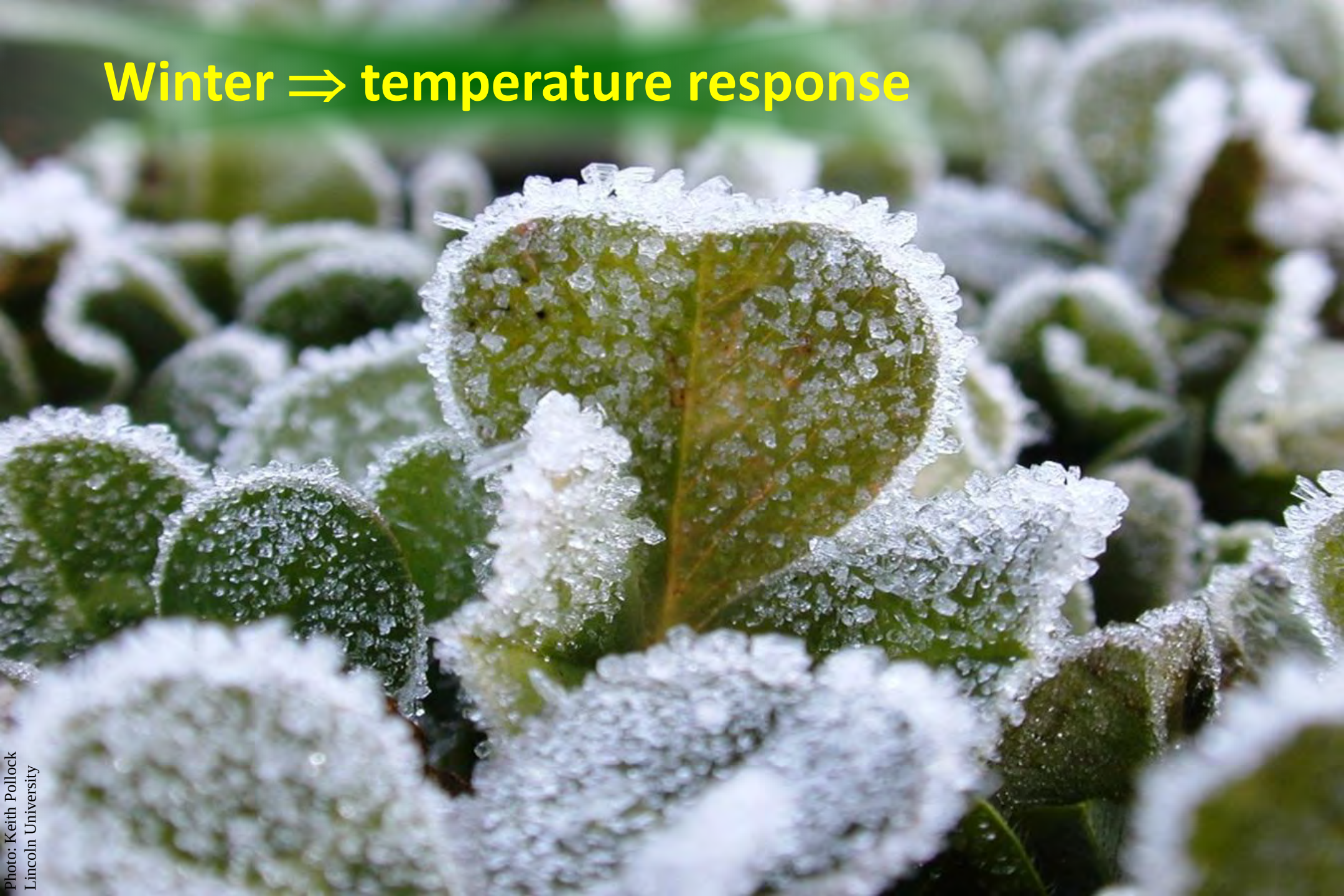
Growth rates (2 year means)



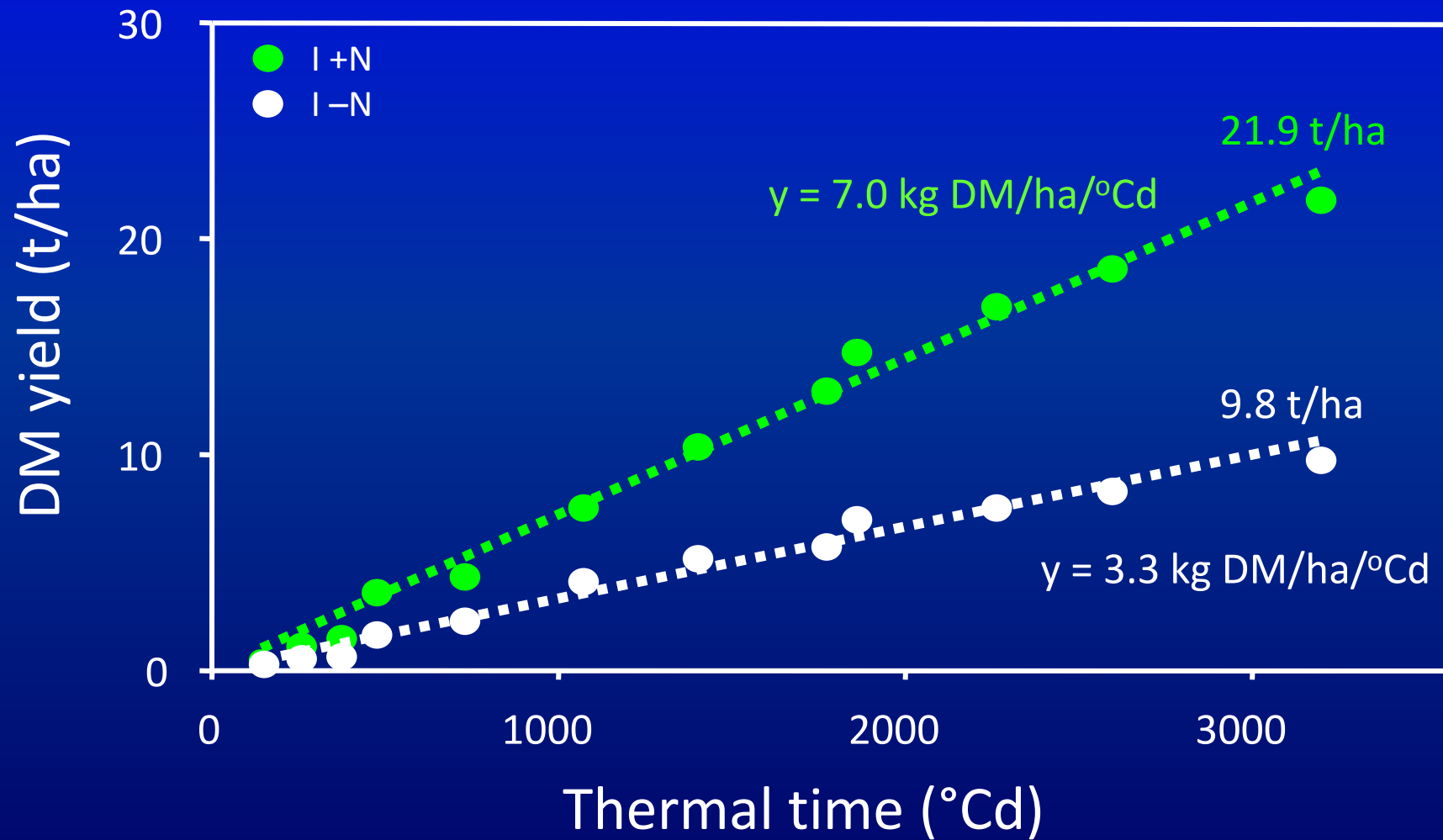
Pasture Growth Rates – 2 yr mean



Winter $\Rightarrow$ temperature response

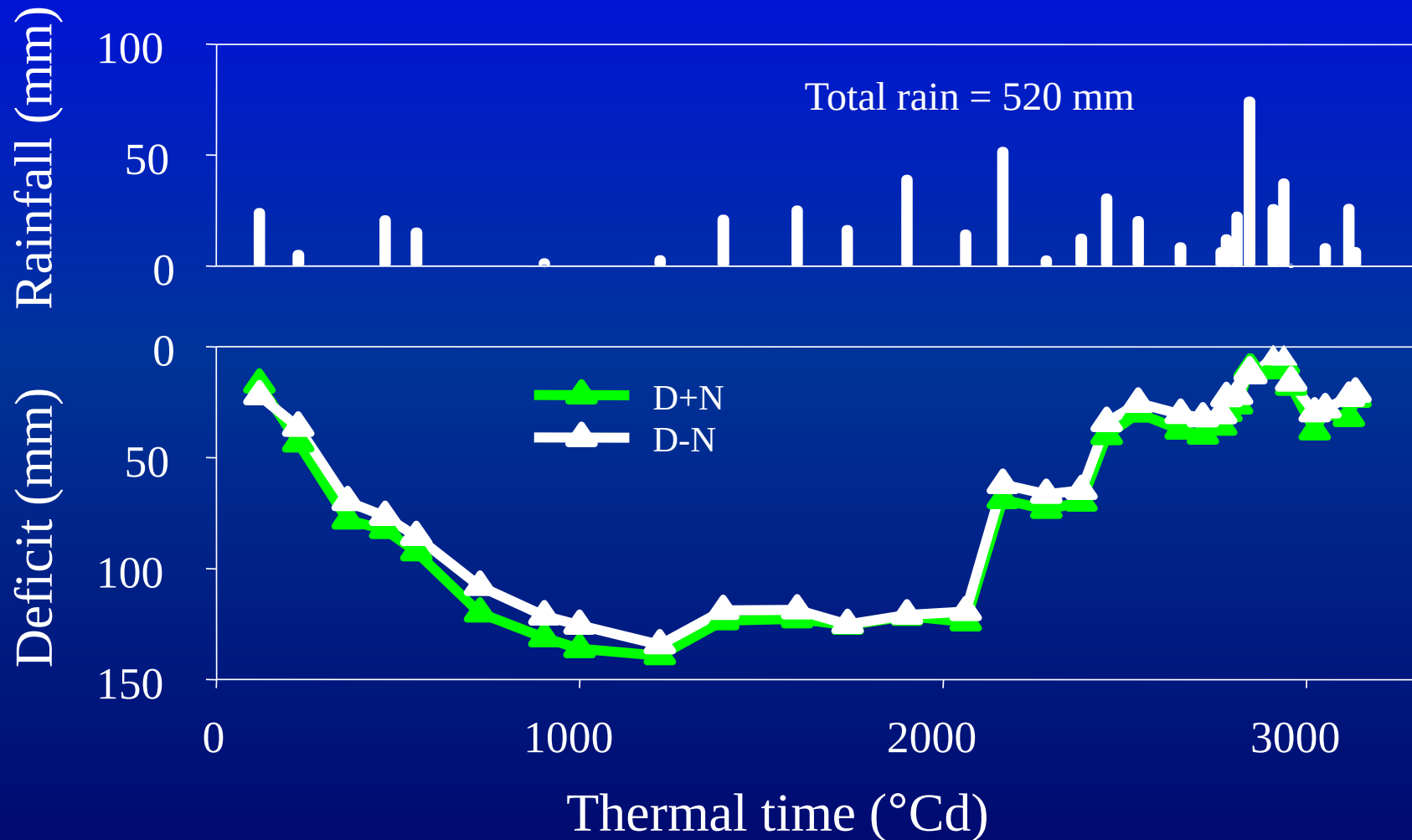


The Nitrogen gap

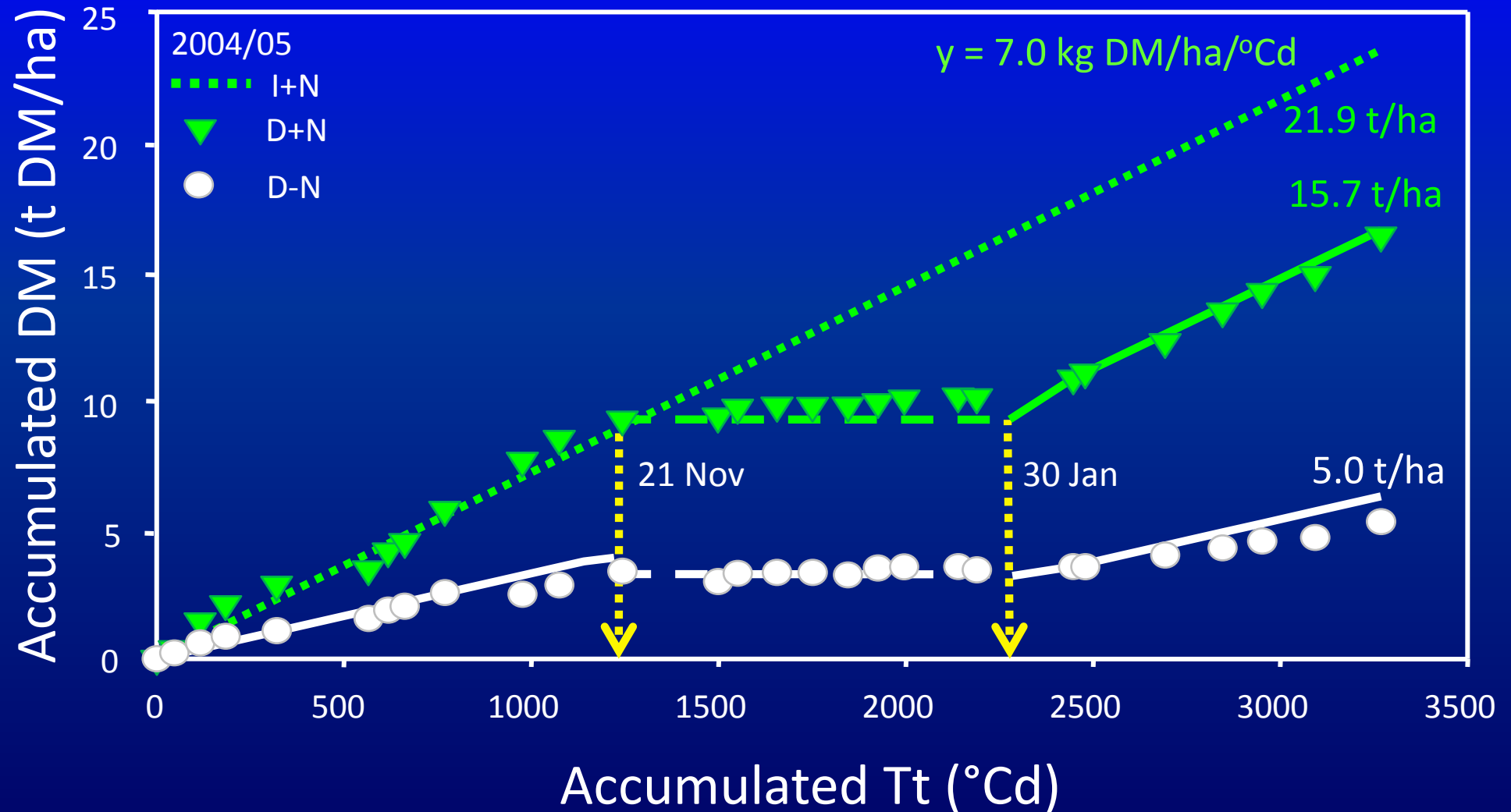


Summer $\Rightarrow$ moisture response

Soil moisture deficit 2003/04



The Nitrogen gap

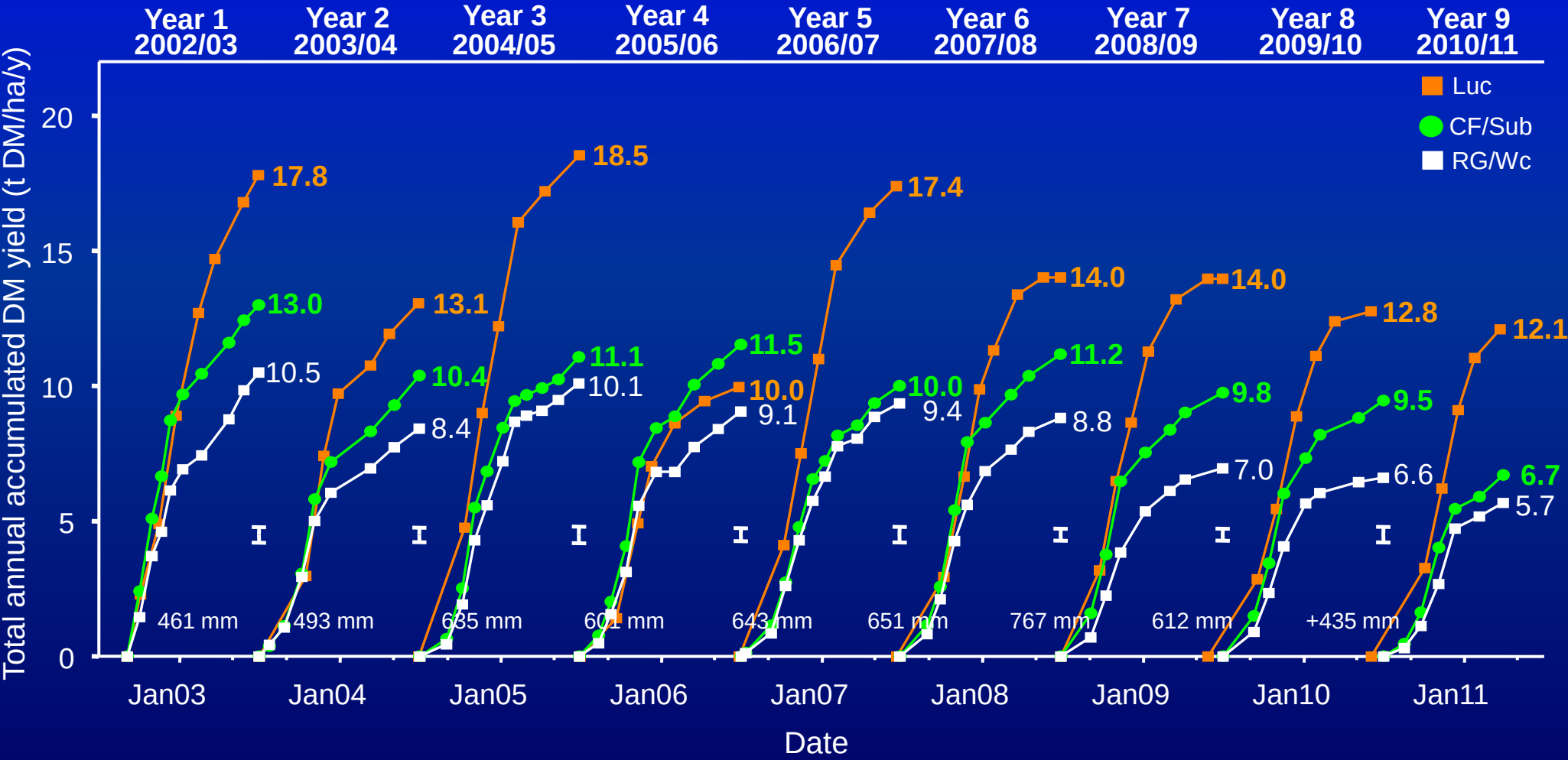


Rg/Wc
Lucerne
CF/Sub
CF/Bal
CF/Cc
CF/Wc

Experiment 4 - 'MaxClover'

'MaxClover' Total DM Yields

(to 30 March 2011)



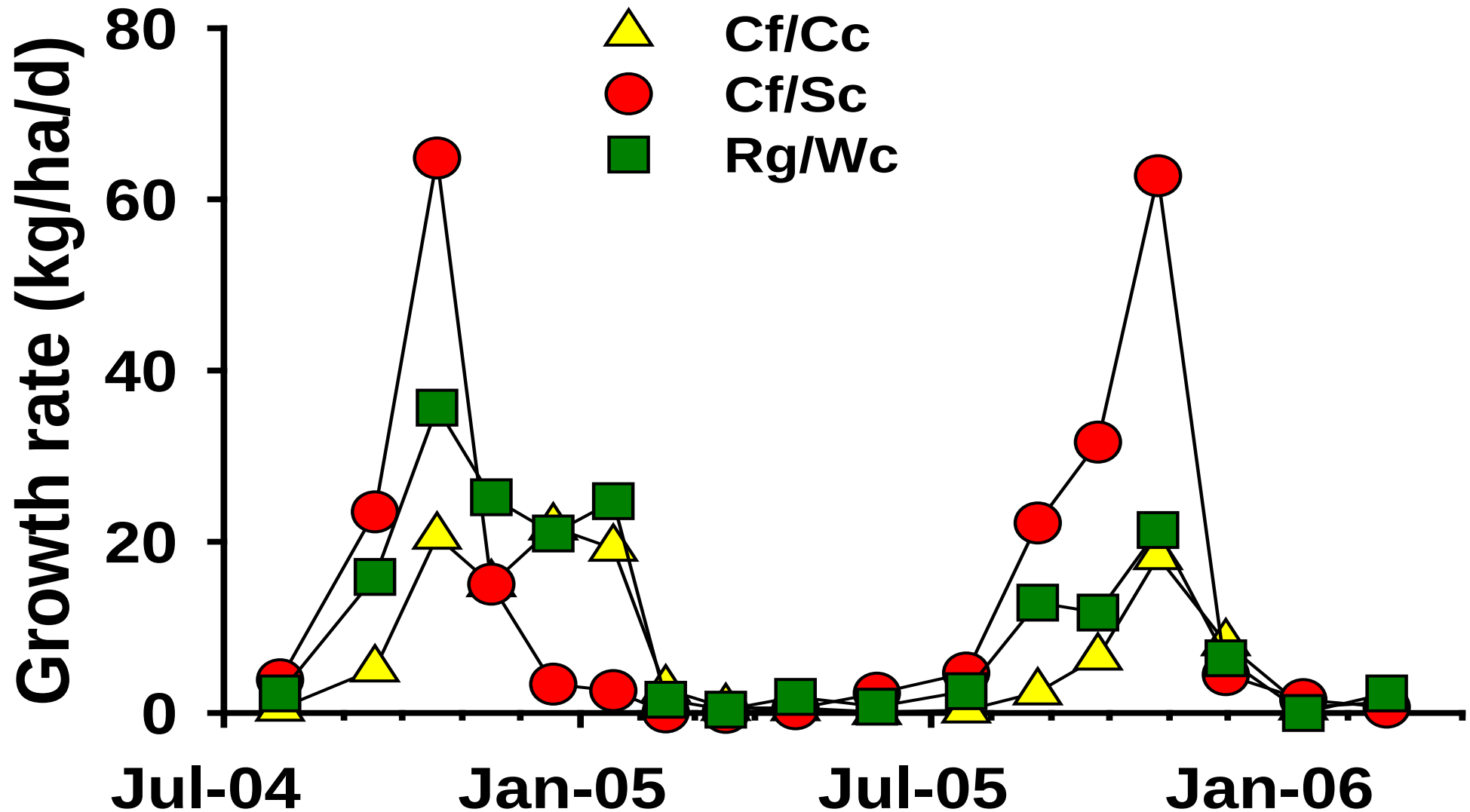
Sub clover



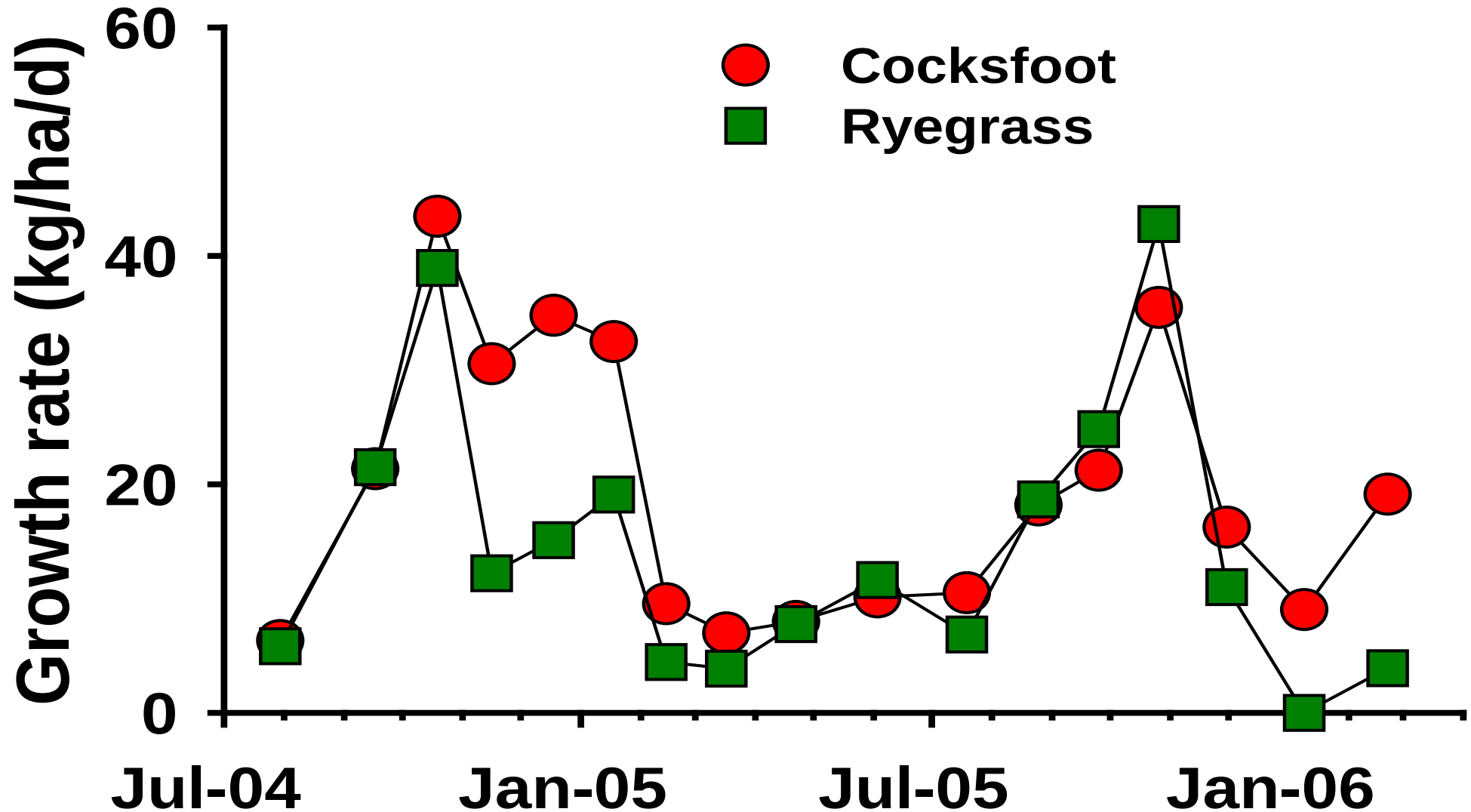
Balansa clover



Seasonal clover growth



Seasonal grass growth



RG/Wc pastures

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

Spring
Year 2



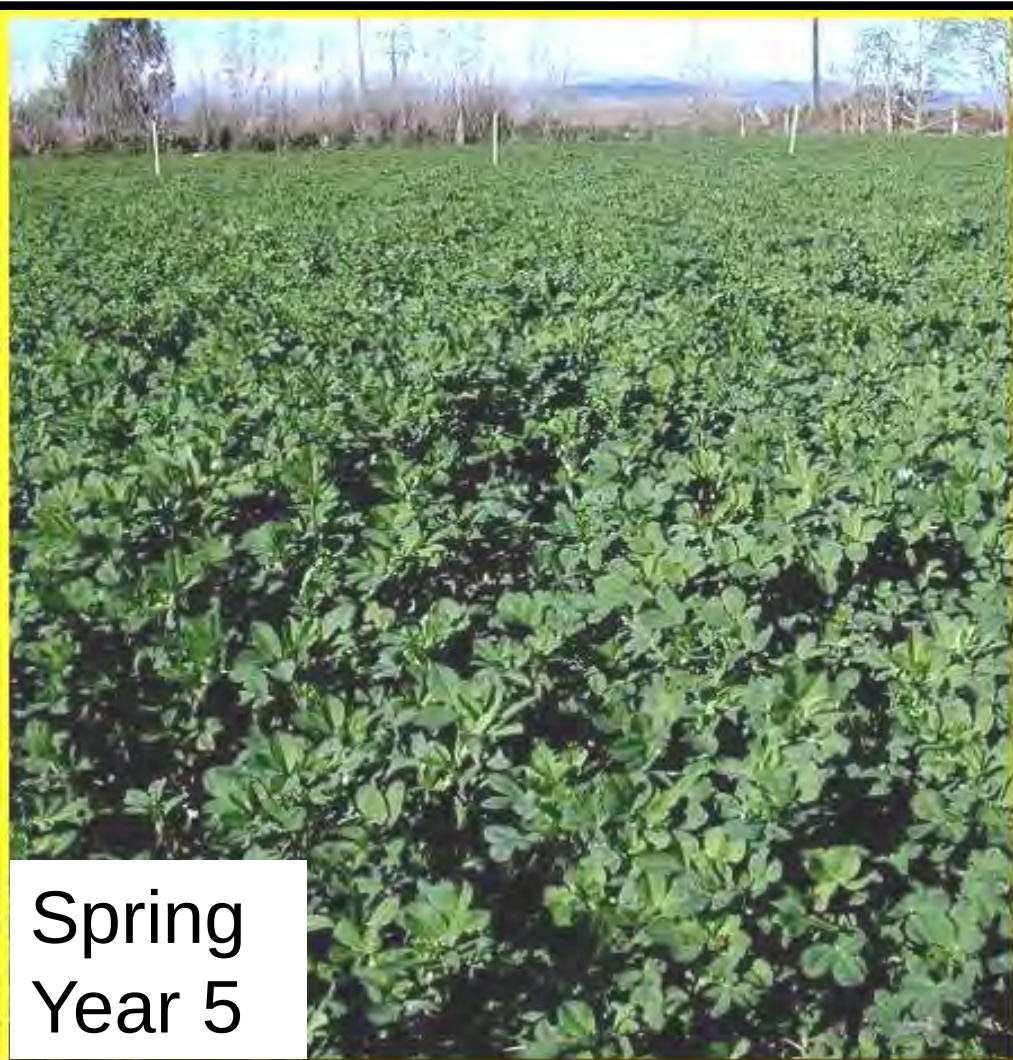
Redgrass and White

Summer
Year 4

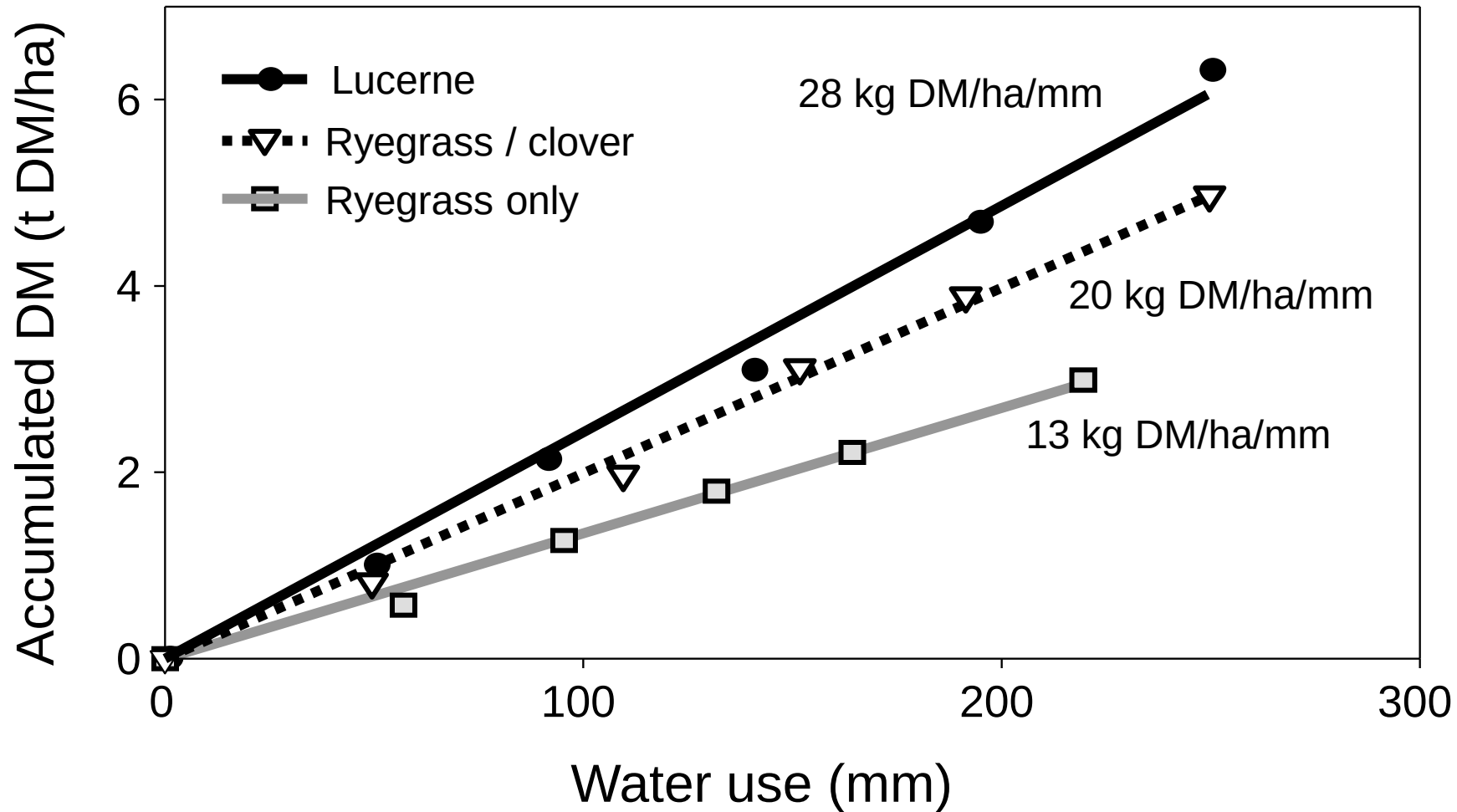


- Annual grasses
- Taprooted dicot weeds

Lucerne pastures



Spring WUE: legume = (nitrogen)

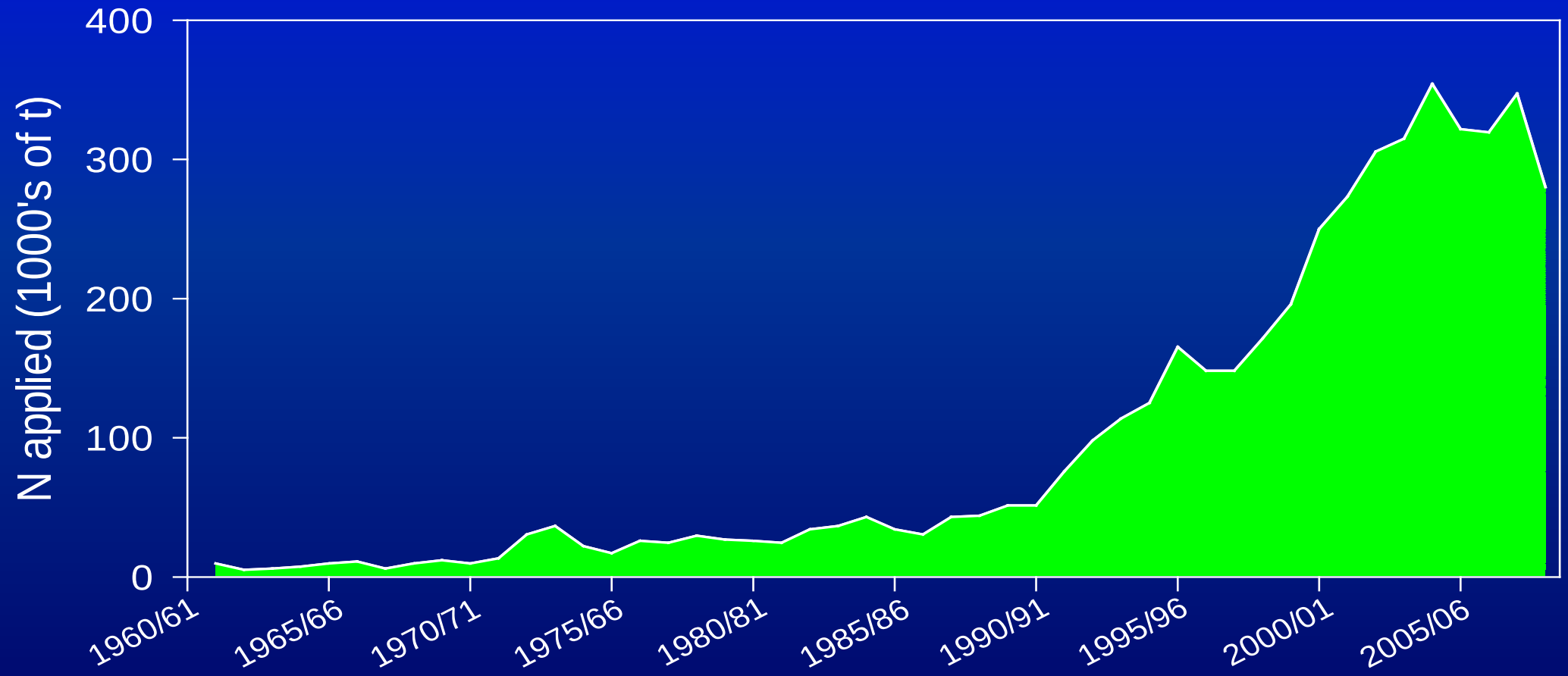


Nitrogen deficient pasture

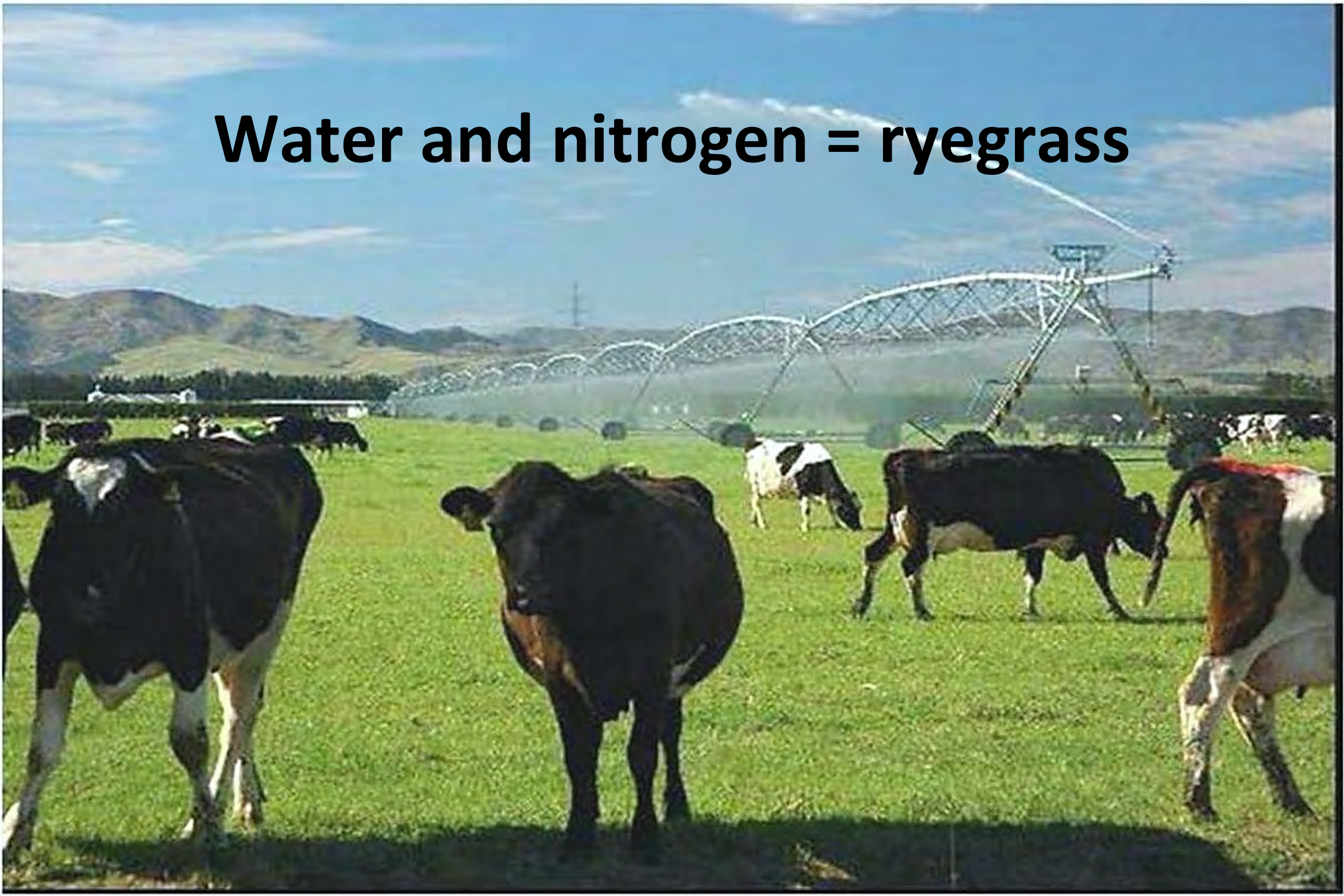


1000 kg N/ha

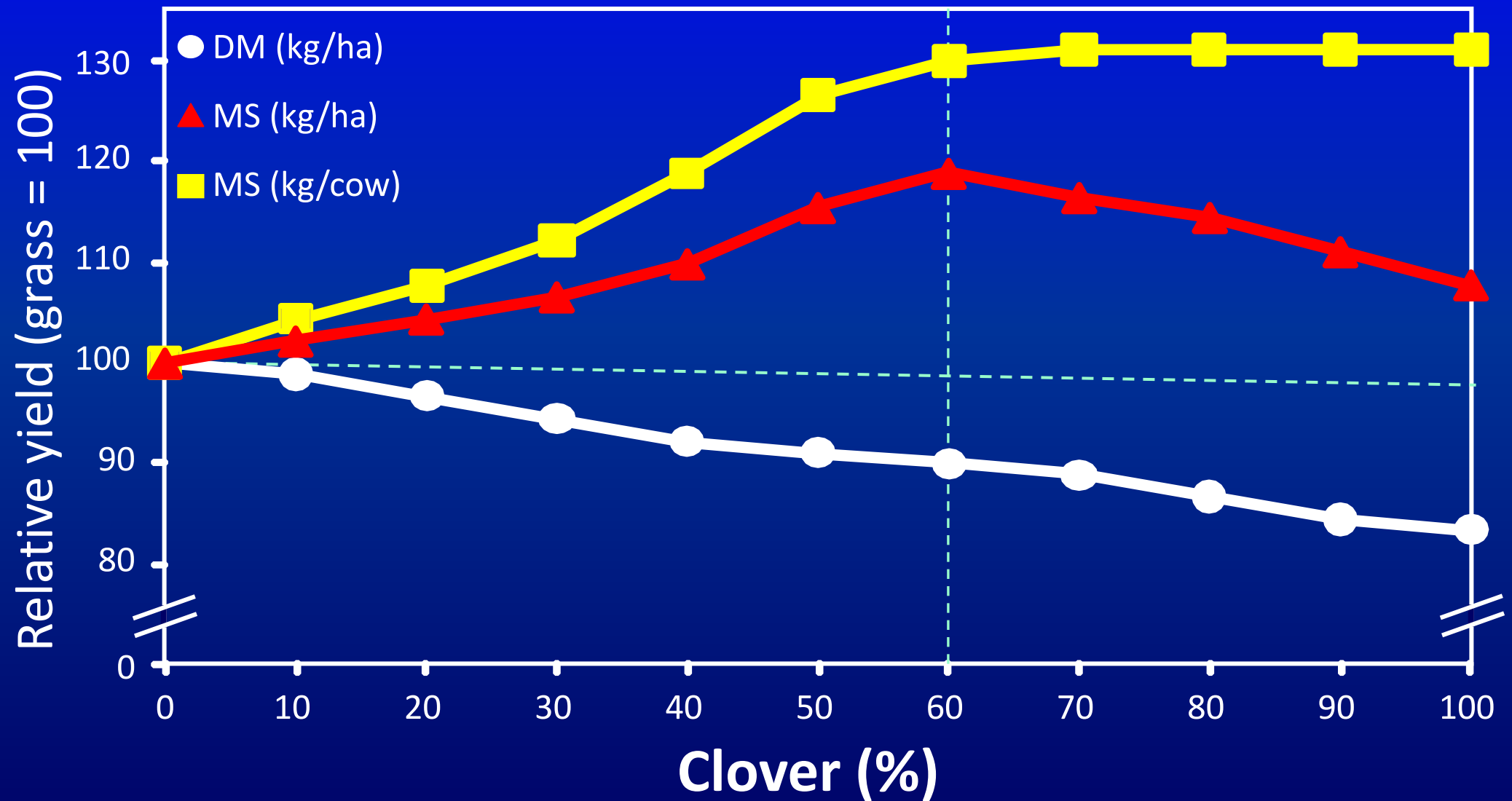
Nitrogen fertiliser use



Water and nitrogen = ryegrass



Clover content & milksolids production





Sheep prefer 70% legume, 30% grass

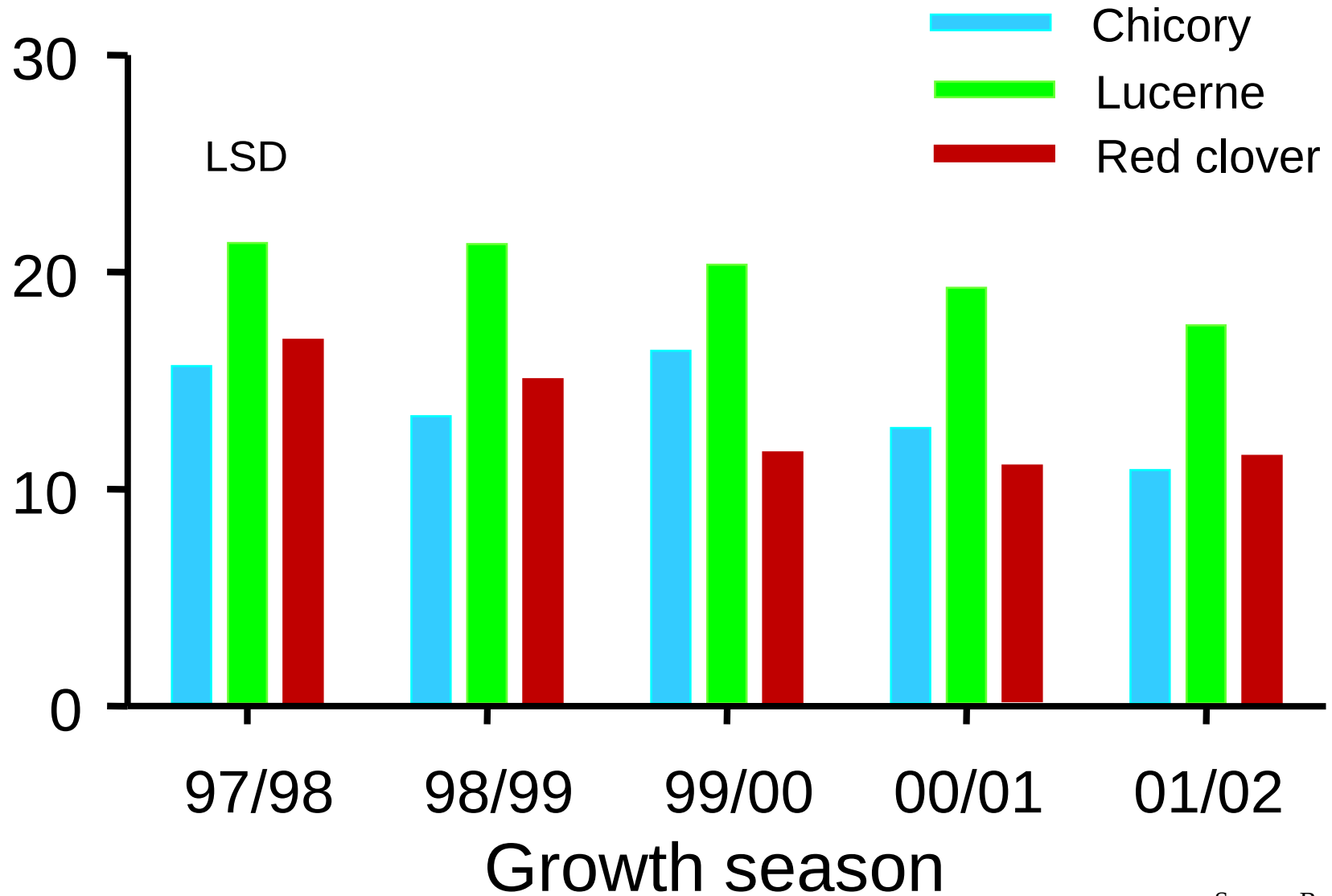
Daily lamb live weight gains in summer/autumn when intake was maximised in experiments using ryegrass & white clover pastures as the control. Source: P. Kemp, Adapted from Kemp *et al.* 2010

Forage	g/day	Range (No. expts)
Ryegrasses/ white clover	154	56 – 226 (10)
Herb/legume	246	246 – 247 (2)
Chicory	254	192 – 290 (3)
Plantain	214	207 – 222 (2)
Red clover	298	292 – 305 (2)
White clover	259	226 – 282 (3)
Lucerne	230	210 – 243 (3)
Birdsfoot trefoil	258	258 (1)
Leaf turnips	245	245 (1)
Mean	251	

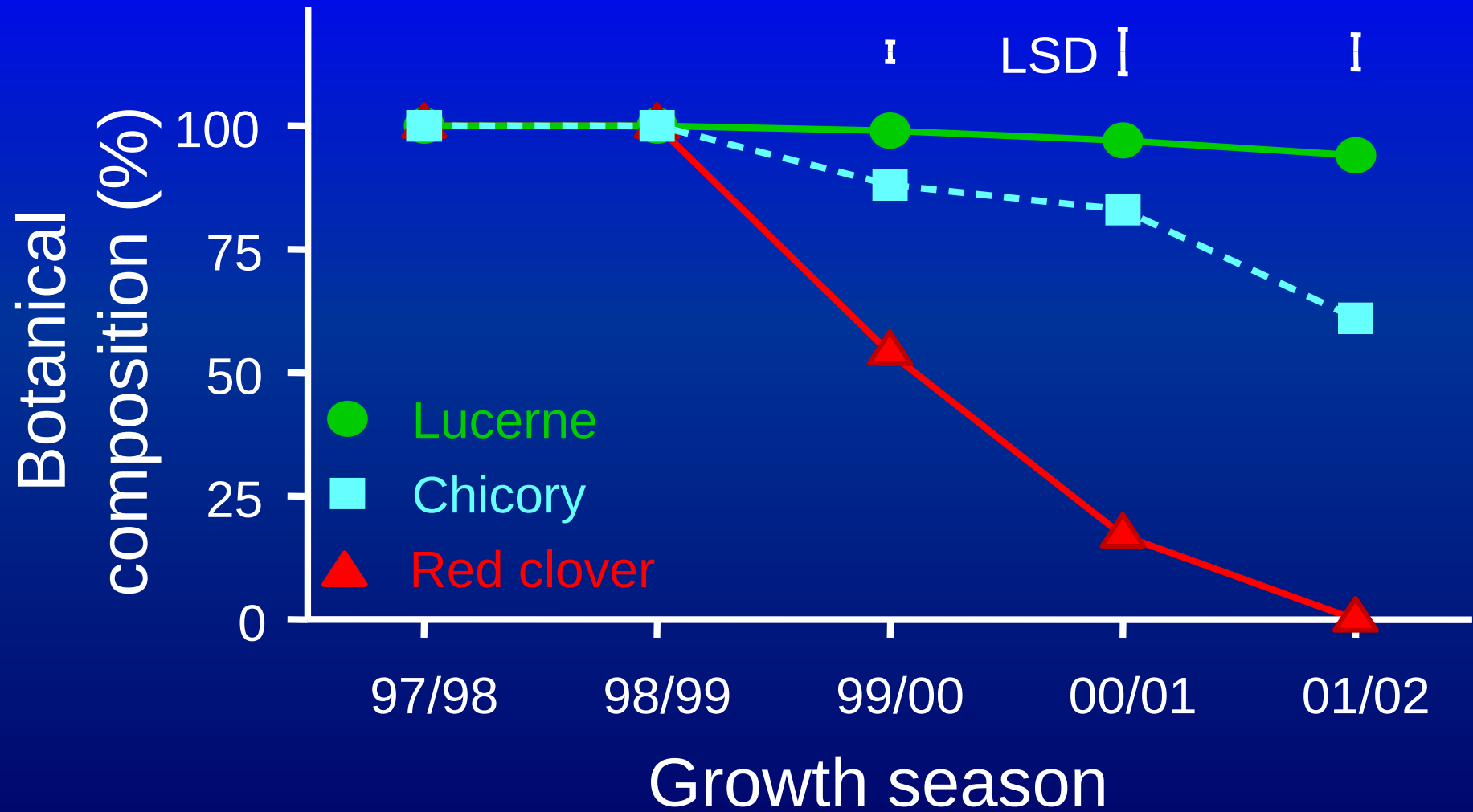
- 
- 65 – 437mm
 - grazed in common,
6-7 times per year
 - 7-10 day measurement interval
 - 6 years



Annual yields - dryland



Persistence



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 = Phytophthora root rot

D = Dormant

SD = Semi-dormant

HR = 50%+ resistant

MR = 16-30%

R = Resistant = (31-50%)

S = Susceptible

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

Lime and Fertiliser Application

Lime 3-5 ton/ha

Fertiliser 250-500kg/ha



Autumn Spraying

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

Key Results

- Conserve soil moisture
- Kill mass root systems

2nd Spray – Spring
Glyphosate, insecticide, penetrant

Result from Autumn spray, photo taken 1 November 2010

Drilling seed with fertiliser
Direct drilling = seed + fertiliser



Lucerne root

~8 months after sowing
> 1.5 m length

Photo: David Hollander
Lincoln University



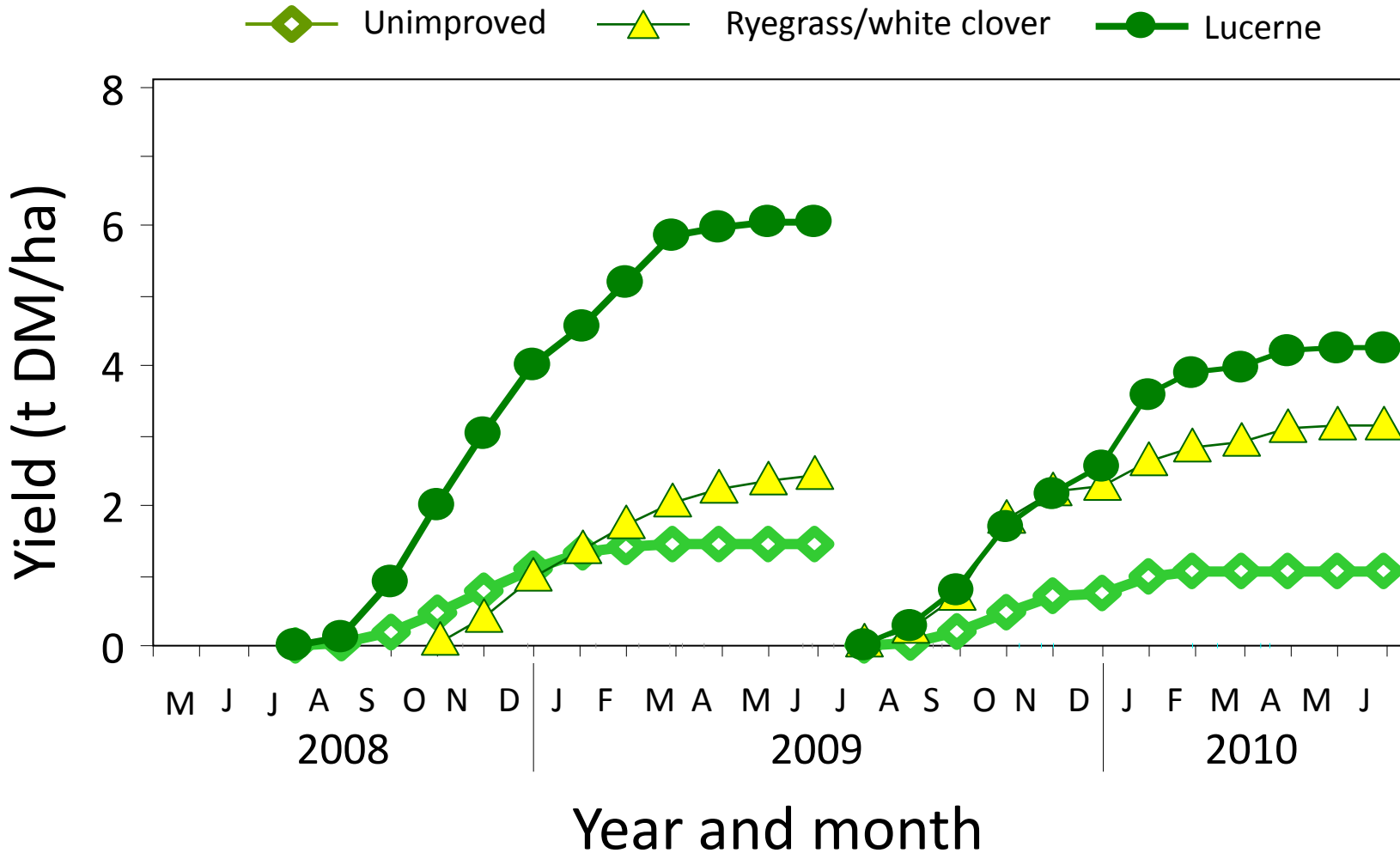
Sown 21/11/2007

Photo taken 1/11/2010

Styx Station



Pasture growth







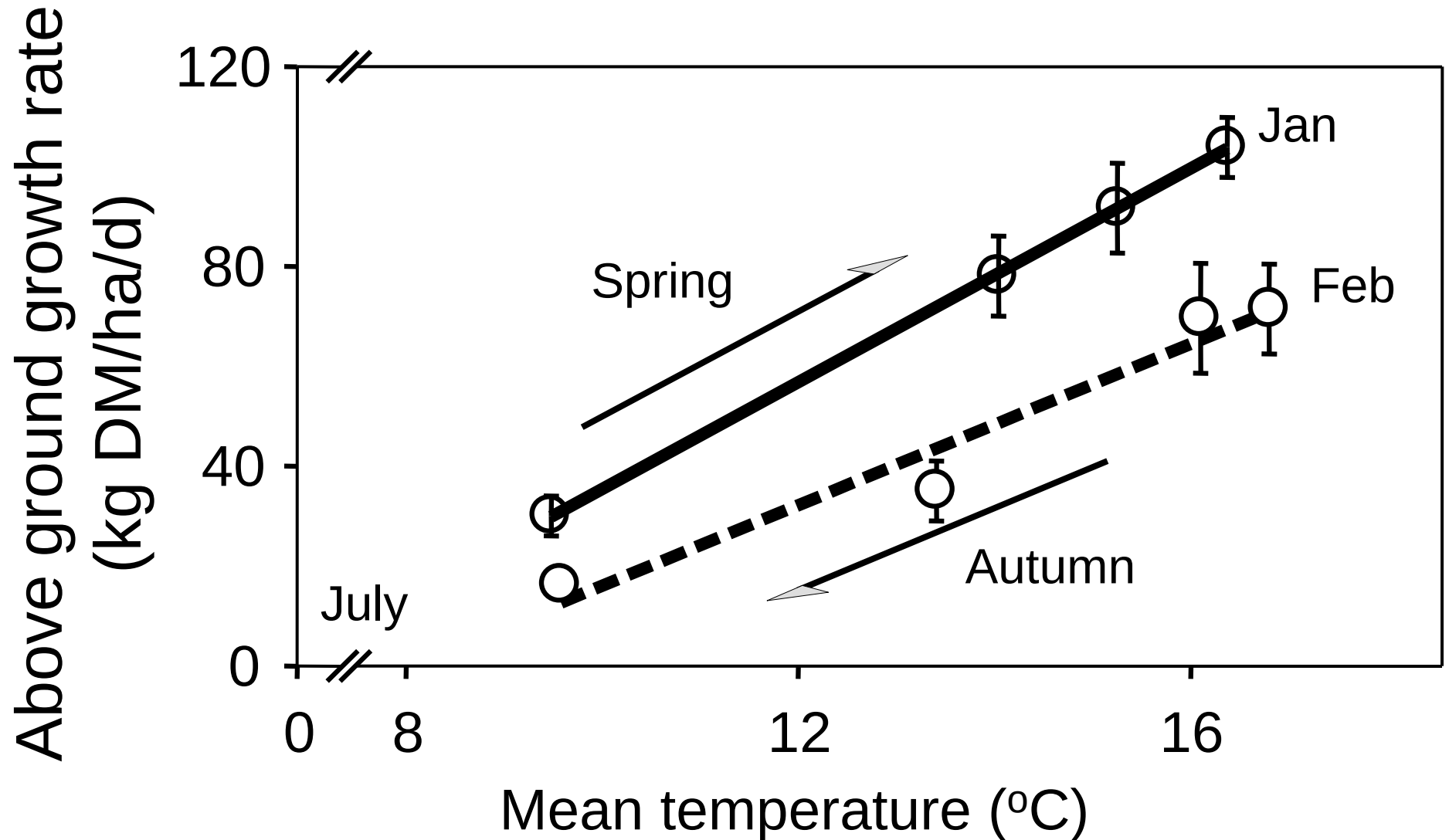
Seasonal grazing management

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

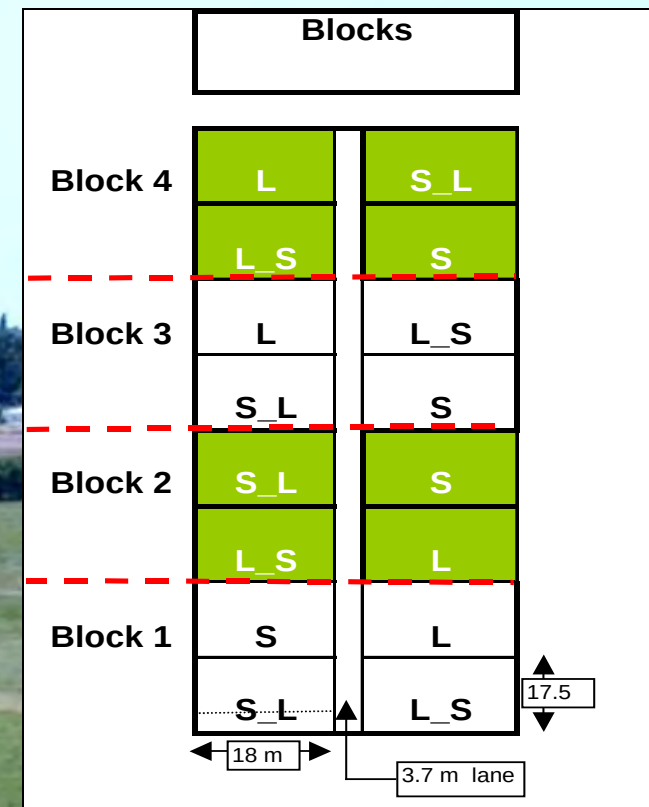
Never lamb on or set stock lucerne

Vegetative growth



38 days resting

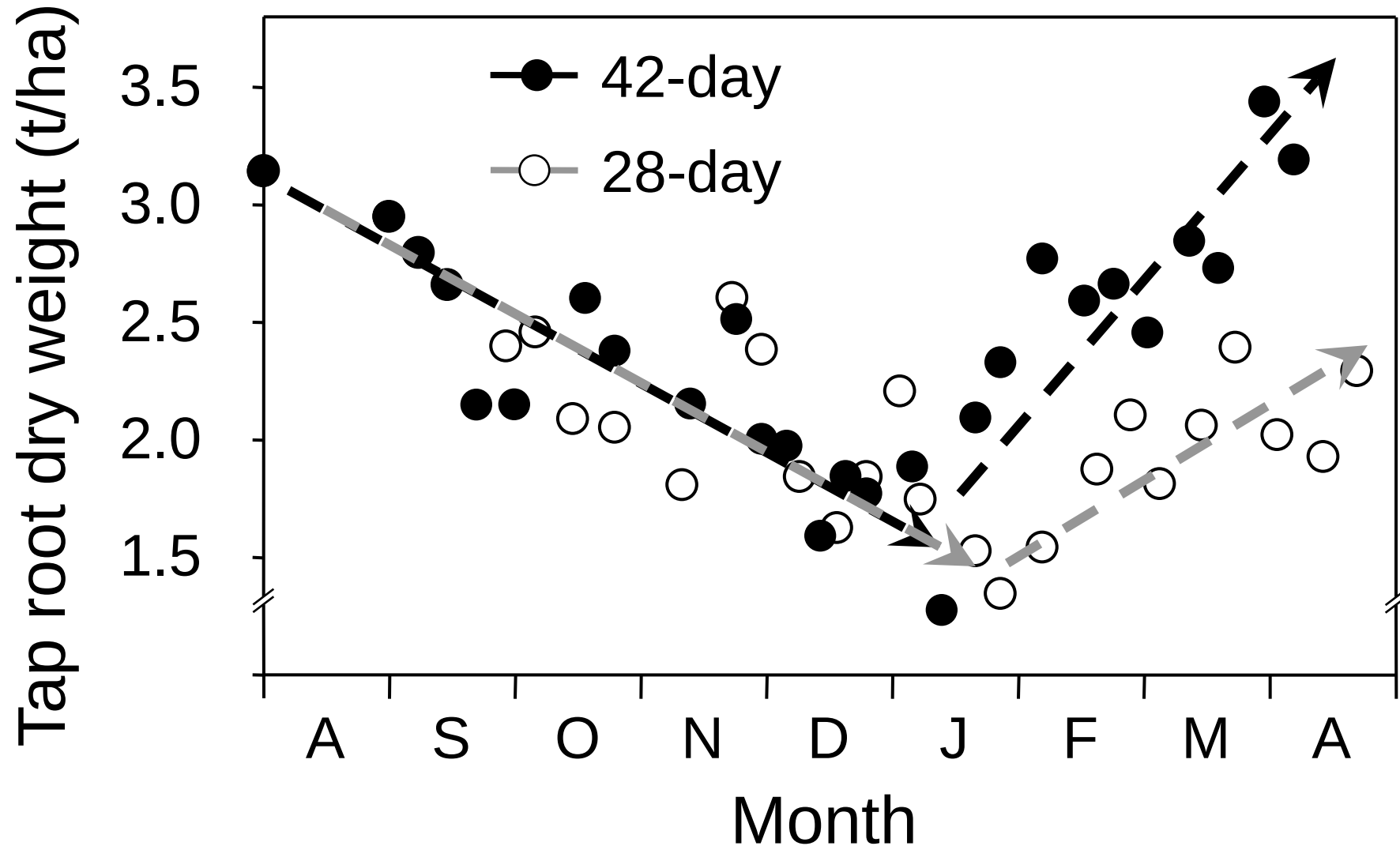
4 days grazing



25 days resting

3 days grazing

Partitioning to roots





Doug and Fraser Avery "Bonavaree"

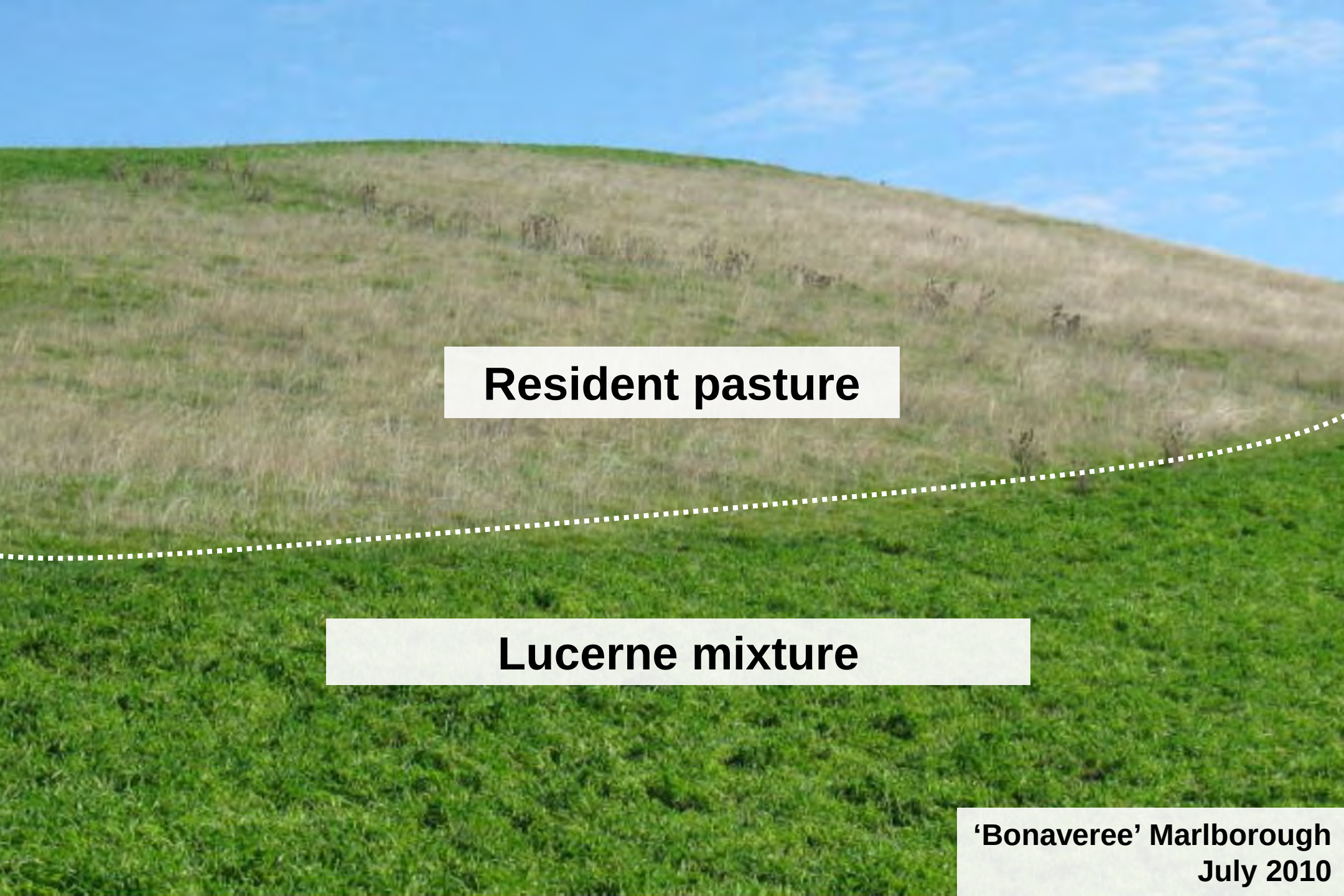


23/01/2005

Seasonal grazing management

Spring/summer (Nov-Jan)

- Priority is stock production (lamb/beef/deer)
- graze 8-12 weeks solely on lucerne
- 5-6 paddock rotation stocked (7-10 days on)
- 10-12 ewes plus twin lambs per hectare



Resident pasture

Lucerne mixture

**'Bonaveree' Marlborough
July 2010**



'Bonaveree' Marlborough
July 2010

Maximize reliable spring growth – high priority stock





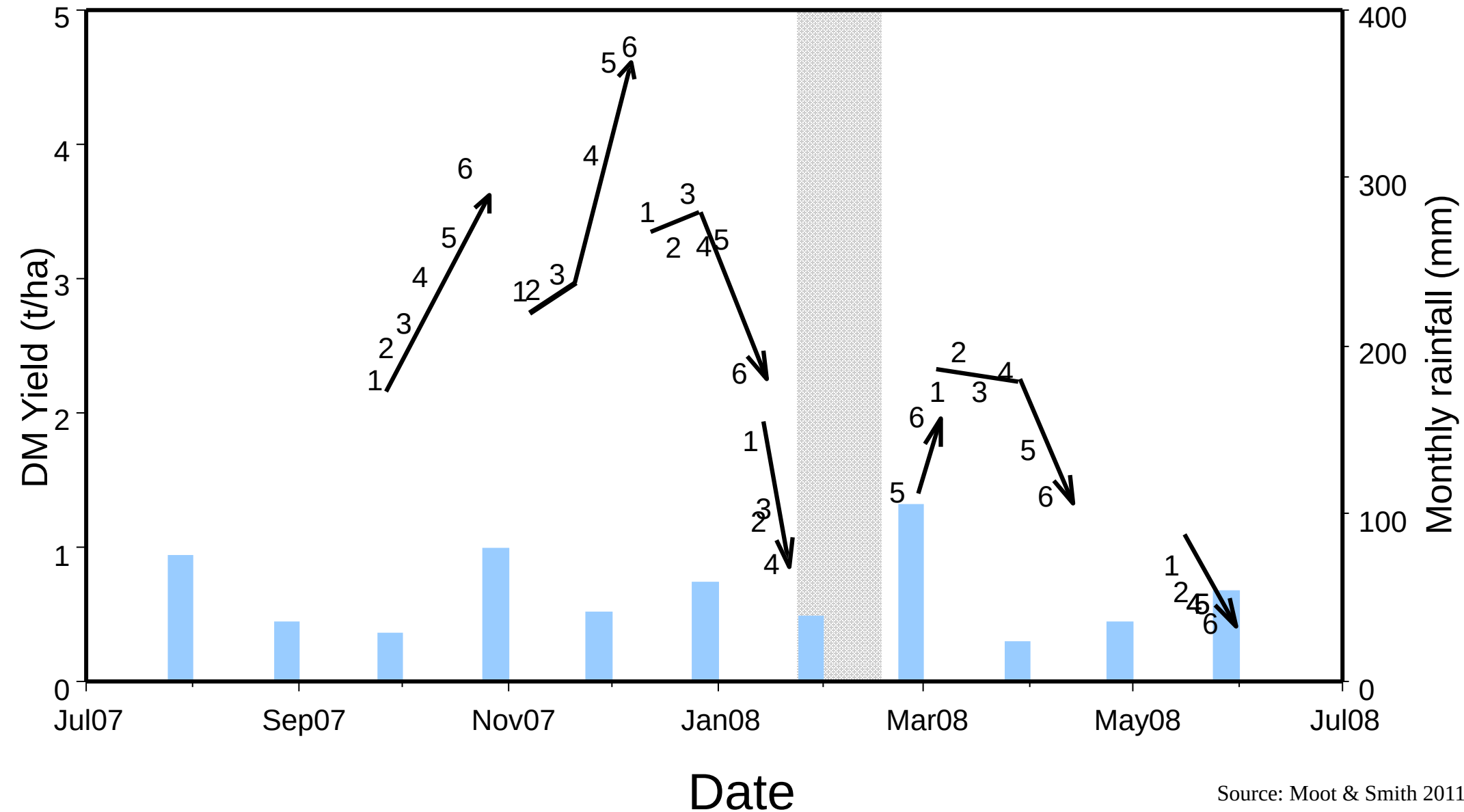
Rotation 1 Pre-graze
Plot 1 (21/9/07)
2.3 t DM/ha
20-25 cm tall

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



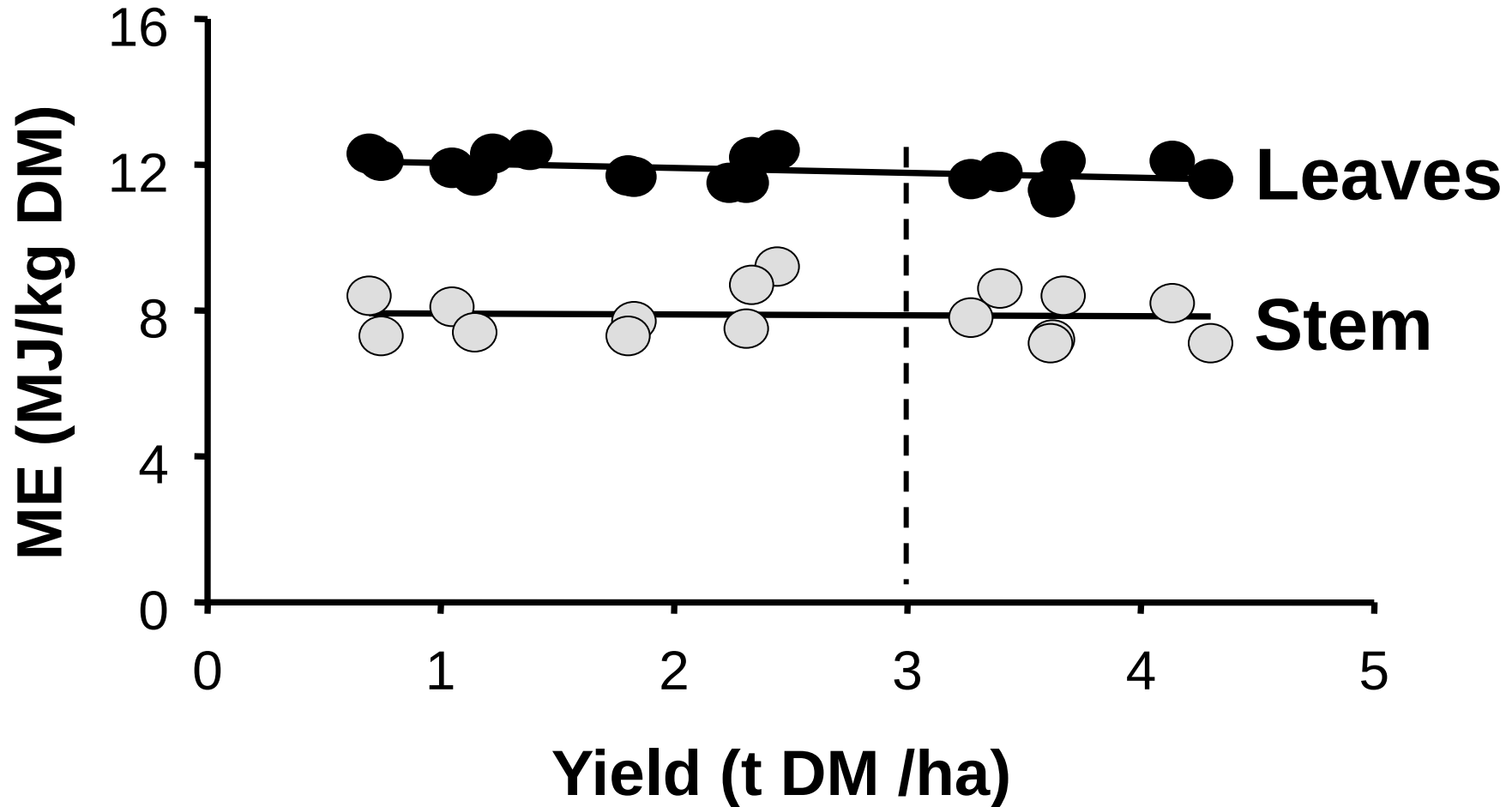
Grazing Rotations at Lincoln University





5th September 2011 – Cave Sth Canterbury

Metabolisable energy of lucerne









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)
 - ⇒ 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 with 10 in 1
- **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









Ewe hoggets grown on lucerne 54 kg ave





Corriedale 2th flushed on wilting lucerne



Lucerne (is not grass!!!)

- flushing at Bonaveree

04.03.2009



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

⇒ stand open for summer annual invasion control:
herbicide before July 1

K super if conserving (soil K > 6)

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



**'Bonaveree' Marlborough
July 2010**

Waterlogged





Redrill poorly established areas

Close up of a prairie grass and lucerne mixture



'Bonaveree' Marlborough
July 2010

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



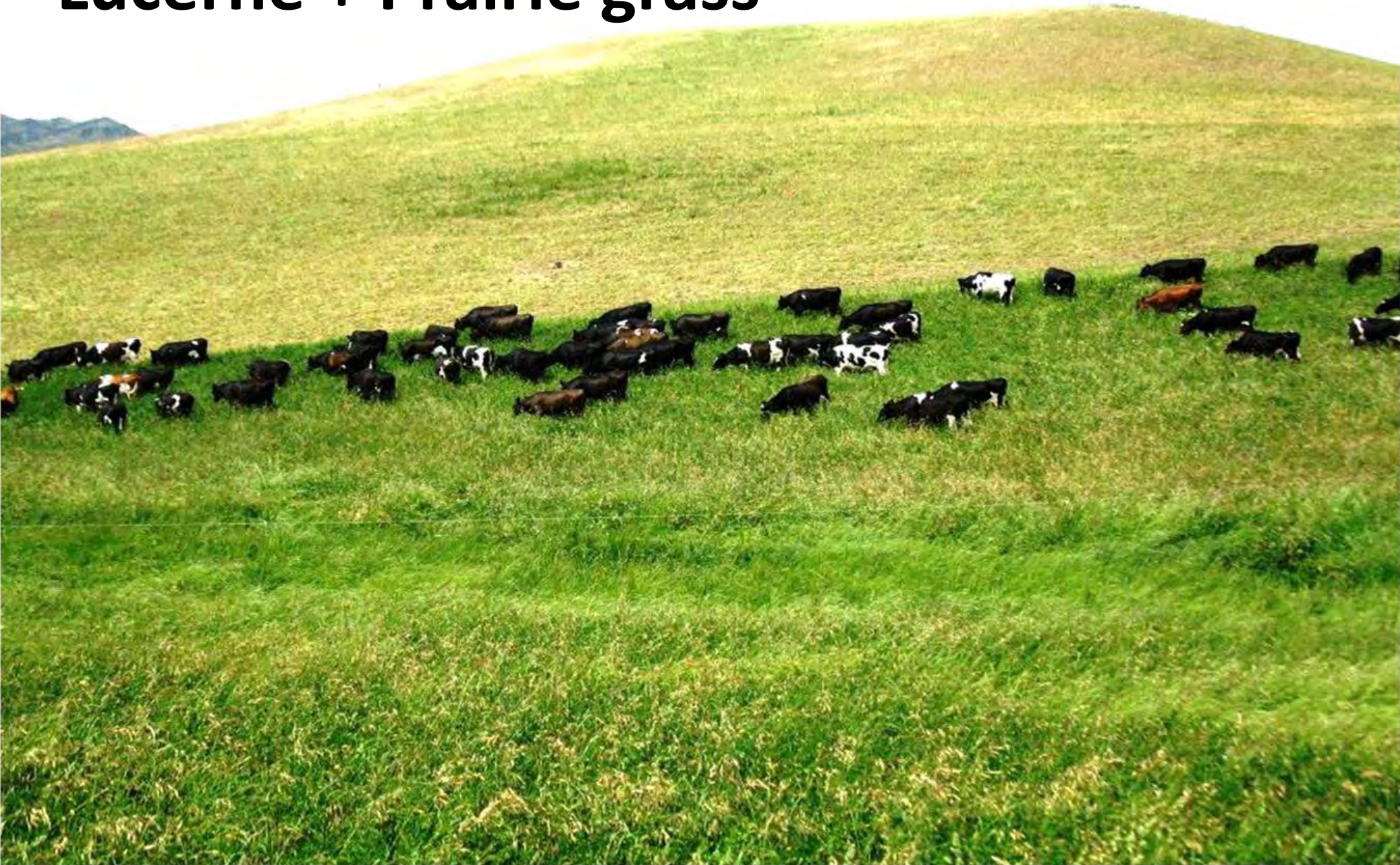
'Tama' annual ryegrass overdrilled into runout lucerne (12 yrs)
- Close up -



Lucerne + cocksfoot – Haka Valley



Lucerne + Prairie grass



Diverse drought-proofed landscape



SI Farmer of the Year 2010

Conclusions

- Aim to transform 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 and herbs have a key role to play in pastoral farming for deer, beef, and sheep.

Acknowledgements

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



Ministry of Agriculture and Forestry
Te Manatū Ahuwhenua, Ngāherehere



References

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Dryland Pastures – agronomy and grazing management

Professor Moot gave this presentation at:

Maheno Palmerston

On:

24 Jan 2012