Pasture responses to environment

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Te Whare Wānaka o Aoraki
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New Zealand's specialist land-based university

Water and nitrogen = ryegrass

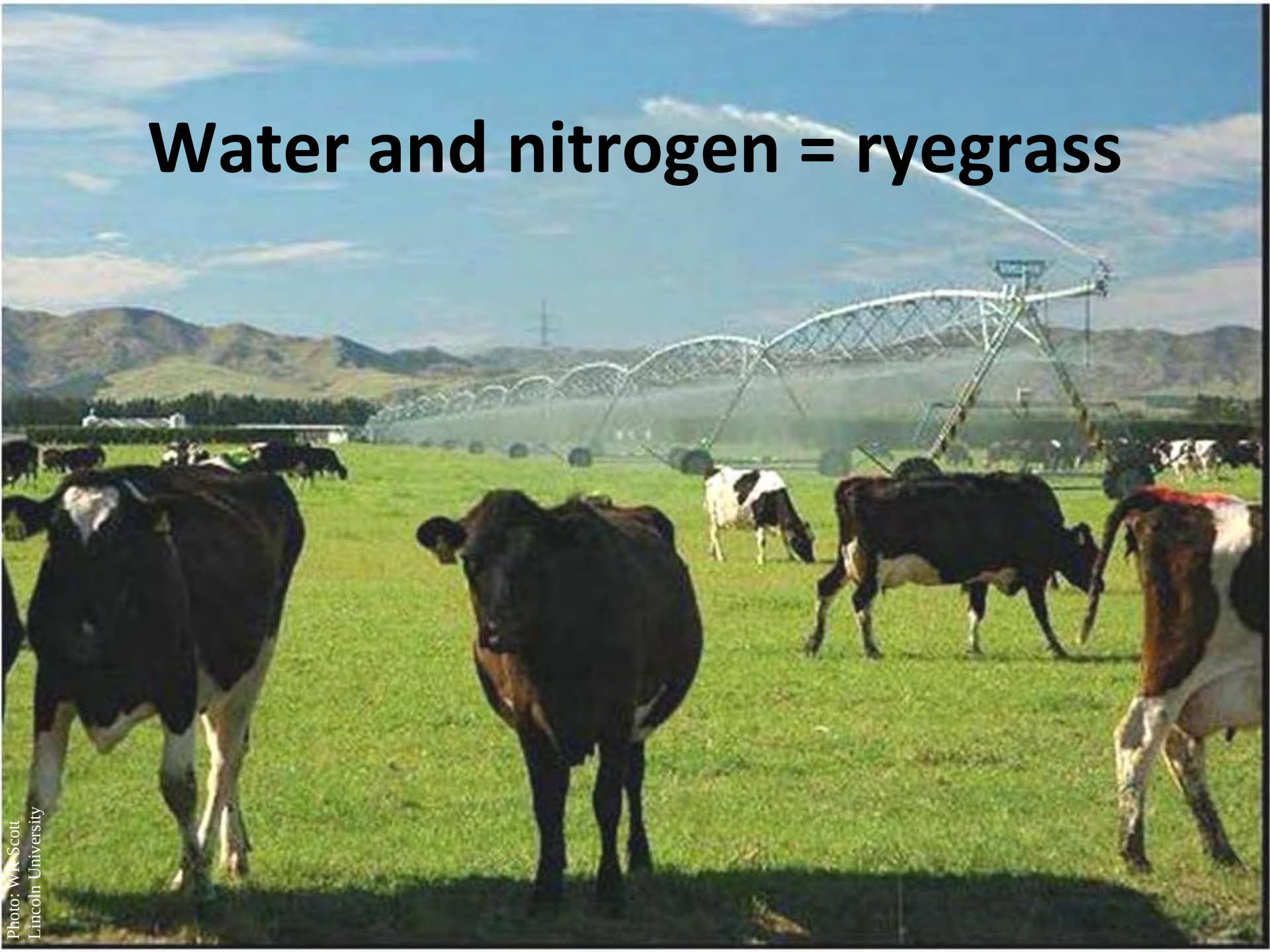
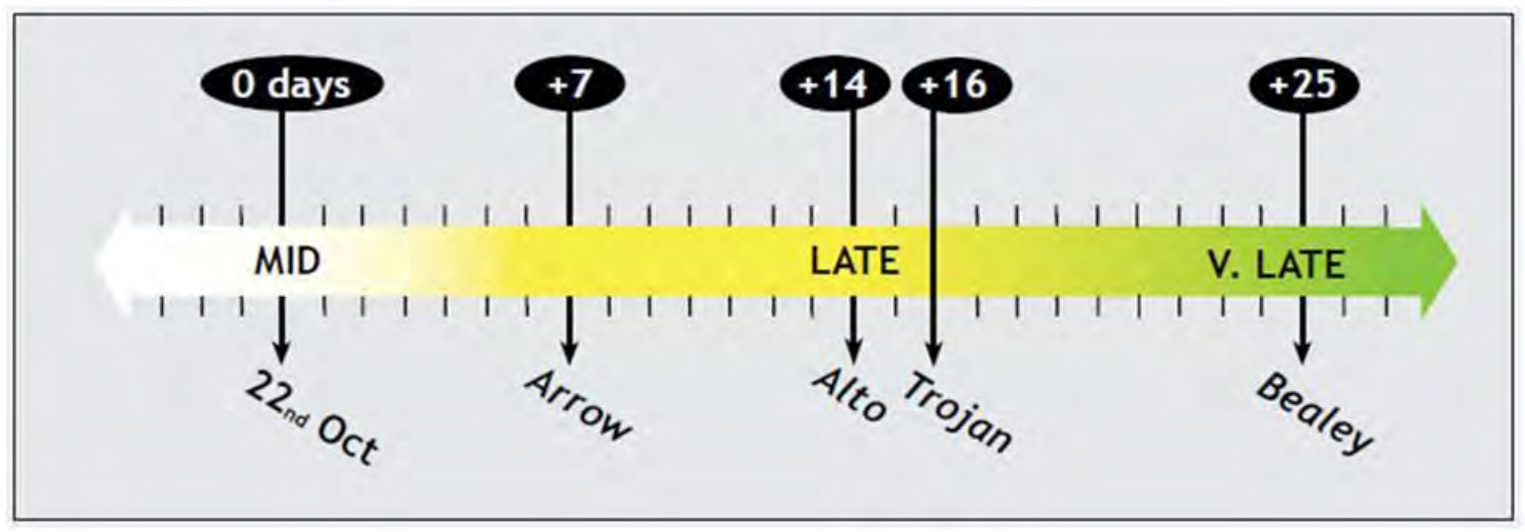


Photo: Wes Scott
Lincoln University

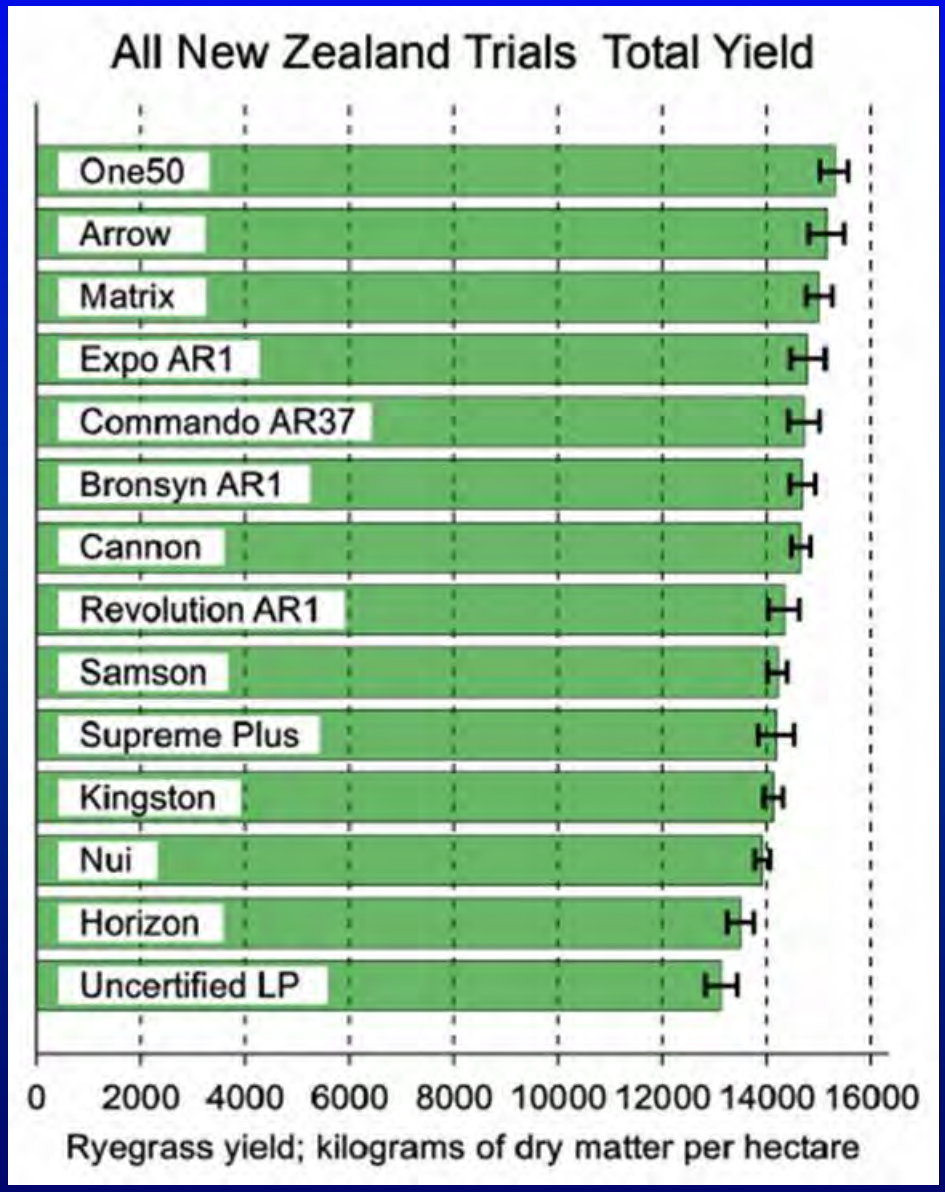
Heading date

- Heading = flowering time in spring.
- Early heading - higher early spring growth.
- Late heading - late spring quality.



Source: www.agriseeds.co.nz

Perennial ryegrass cultivars

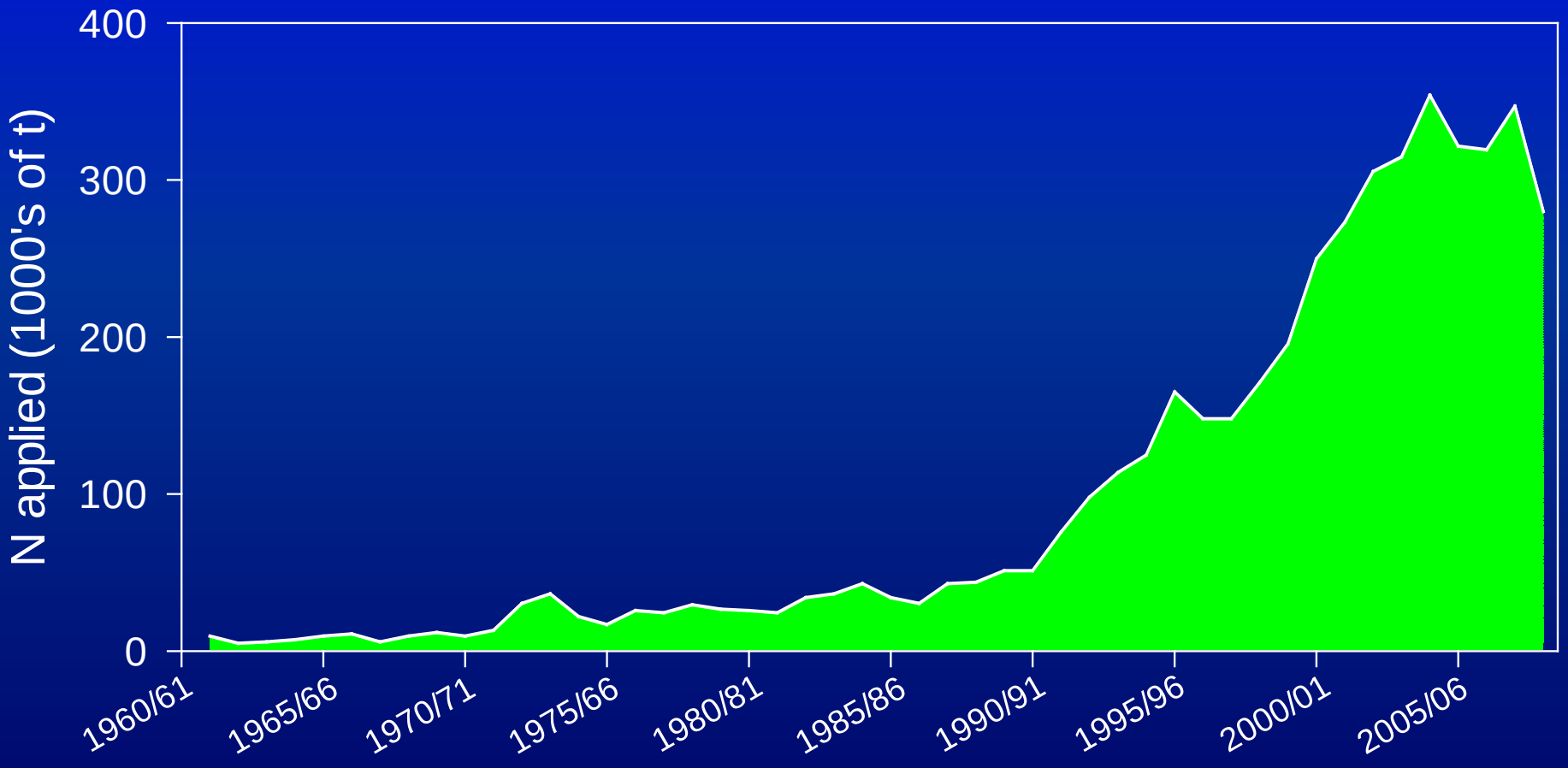


Source: National Forage Variety Trials (www.nzpbra.org)

Nitrogen deficient pasture

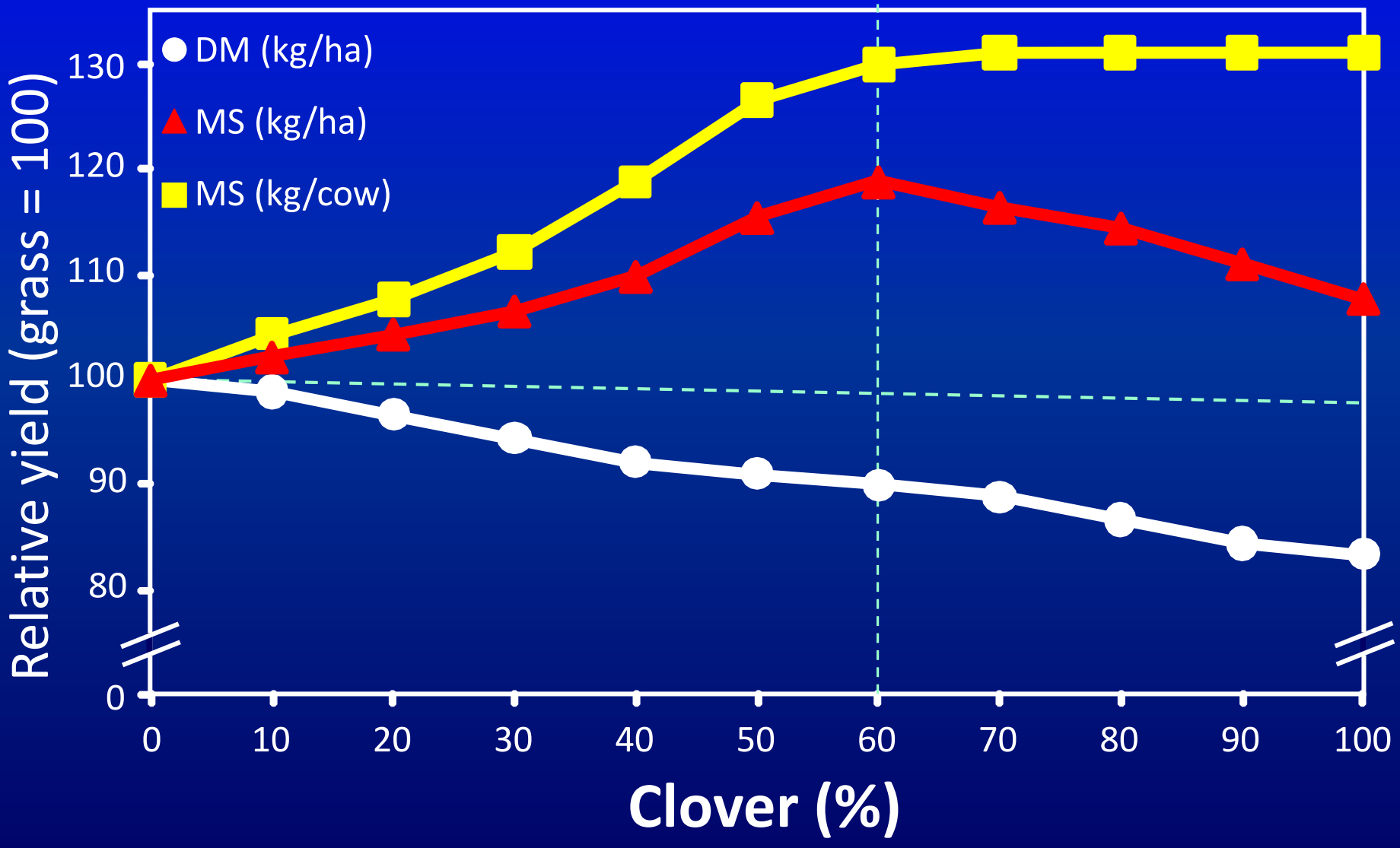
1000 kg N/ha

Nitrogen fertiliser use



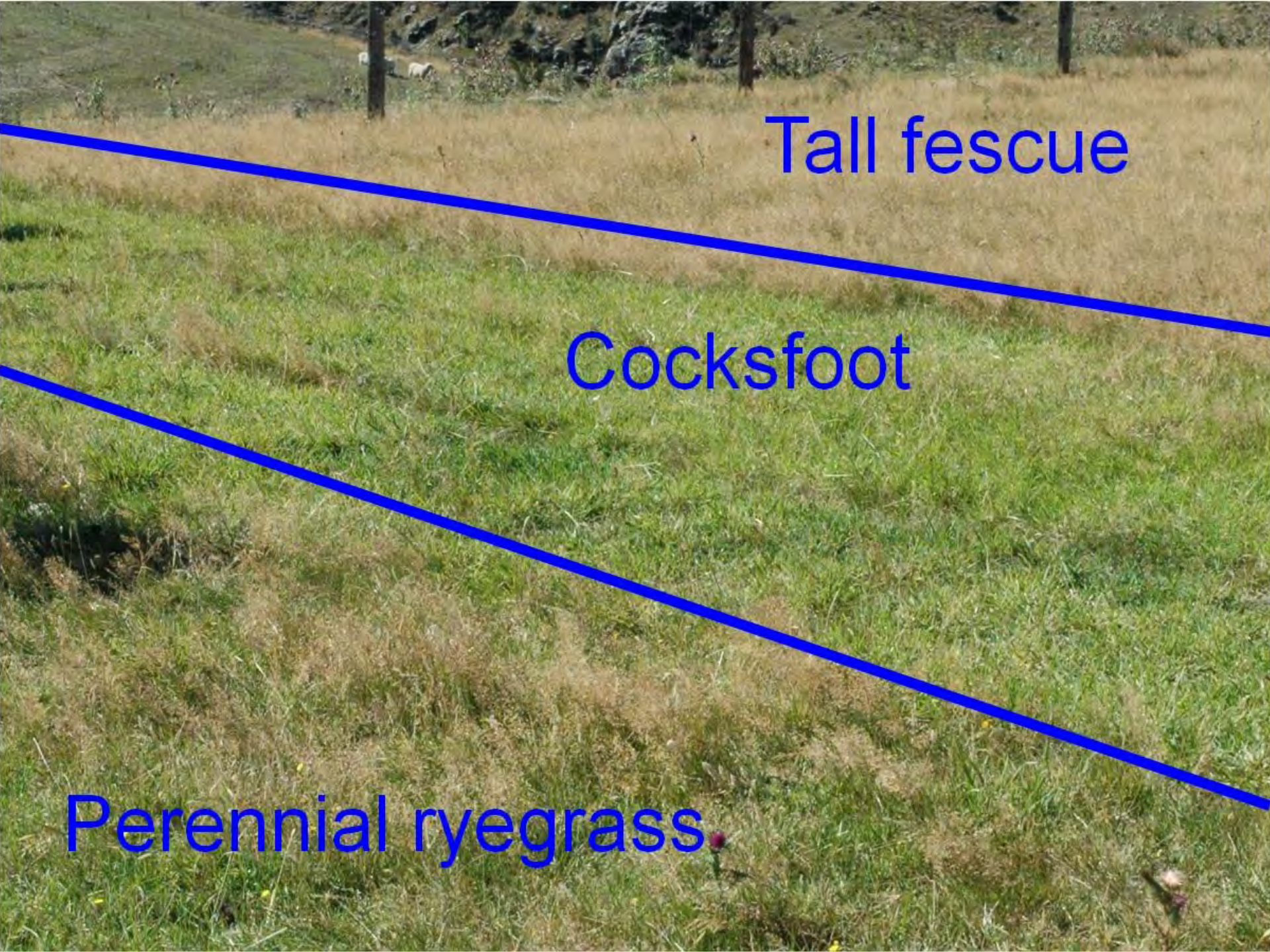
New Zealand Fertiliser Manufacturers Association 2009

Clover content & milksolids production



Cosgrove, 2005

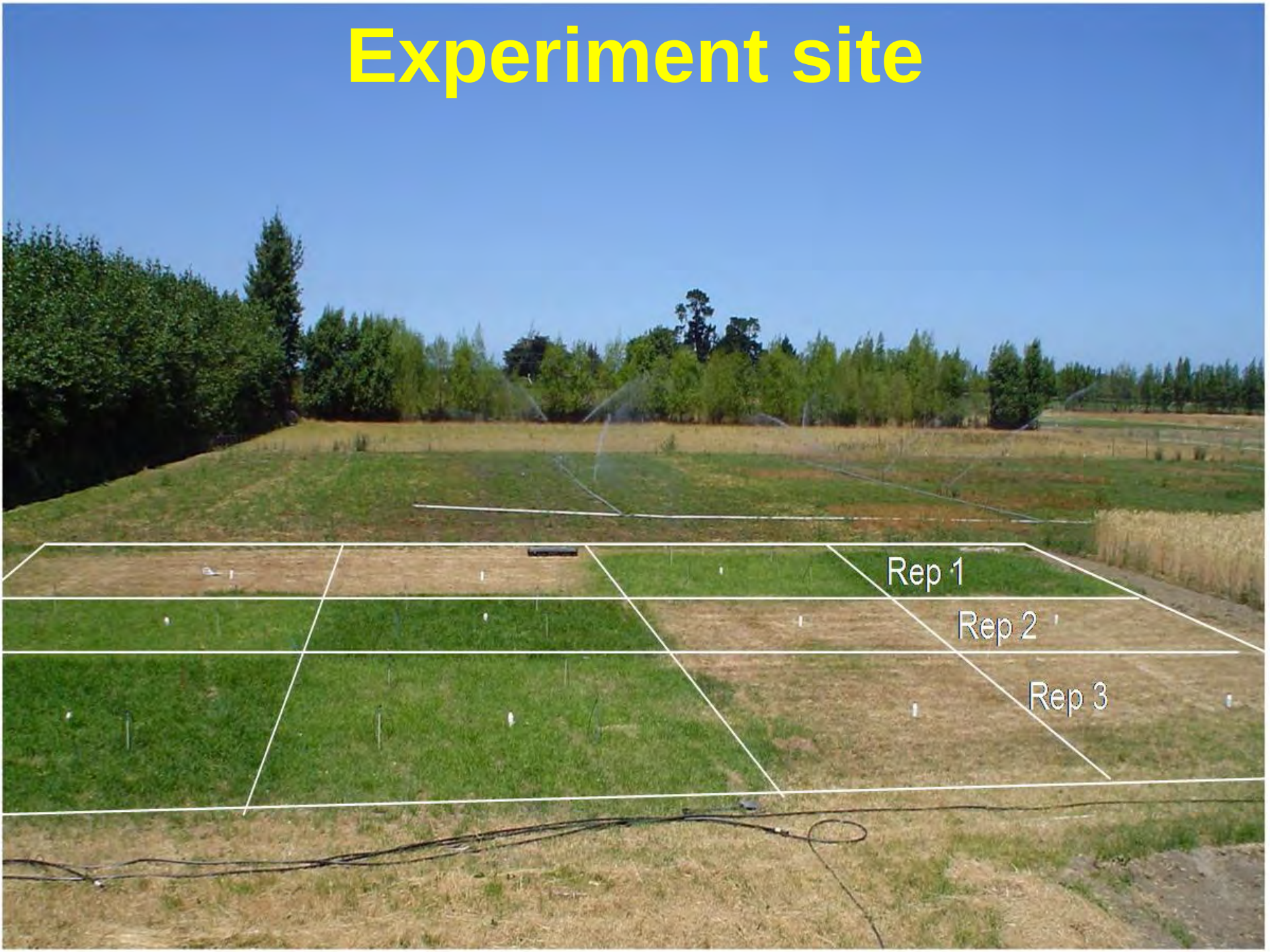
Sheep prefer 70% legume, 30% grass


Tall fescue
Cocksfoot
Perennial ryegrass

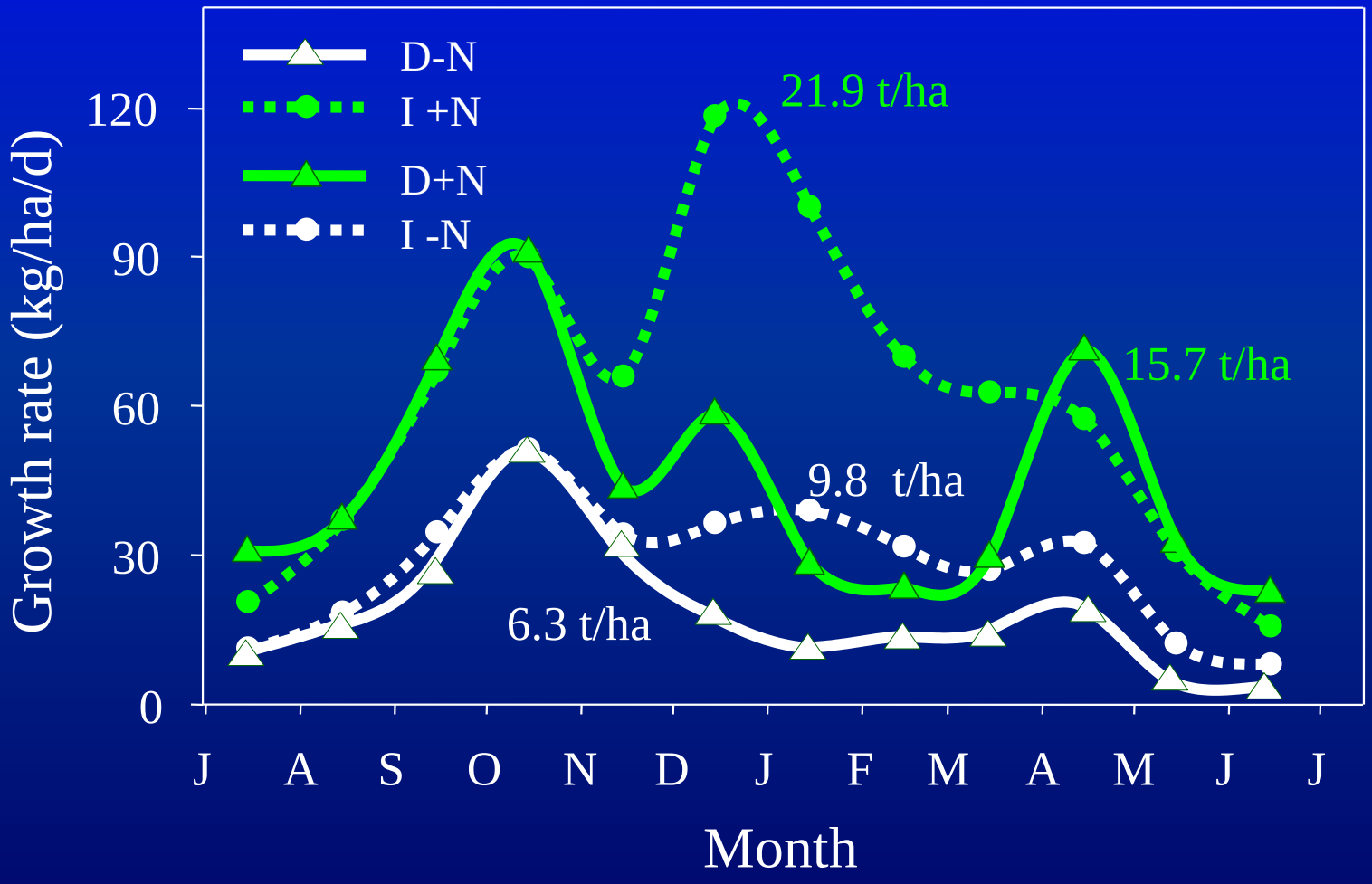
Objective

Quantify the effect of temperature, moisture and nitrogen on cocksfoot yields.

Experiment site

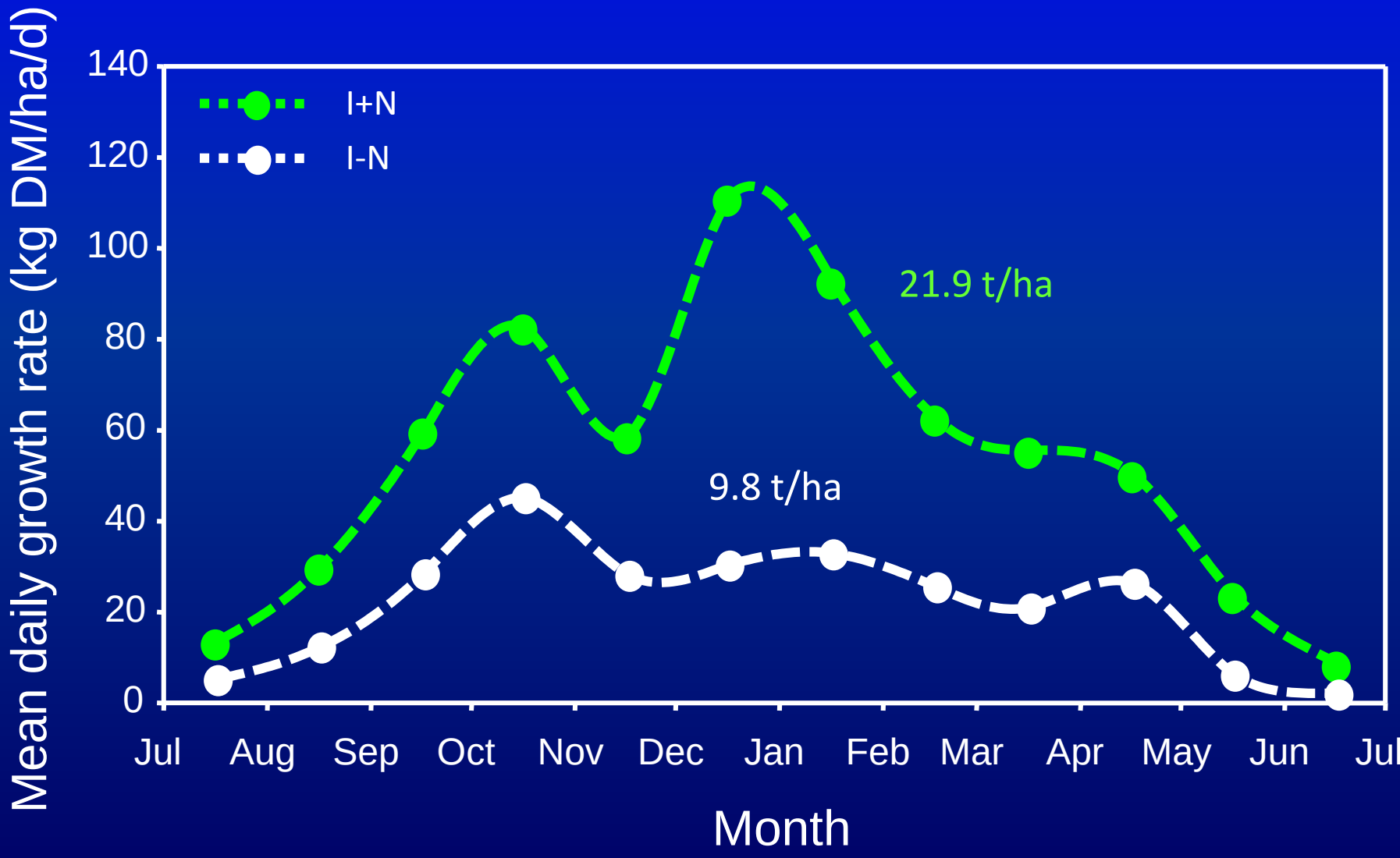


Growth rates (2 year means)



Mills *et al*. 2006

Pasture Growth Rates – 2 yr mean

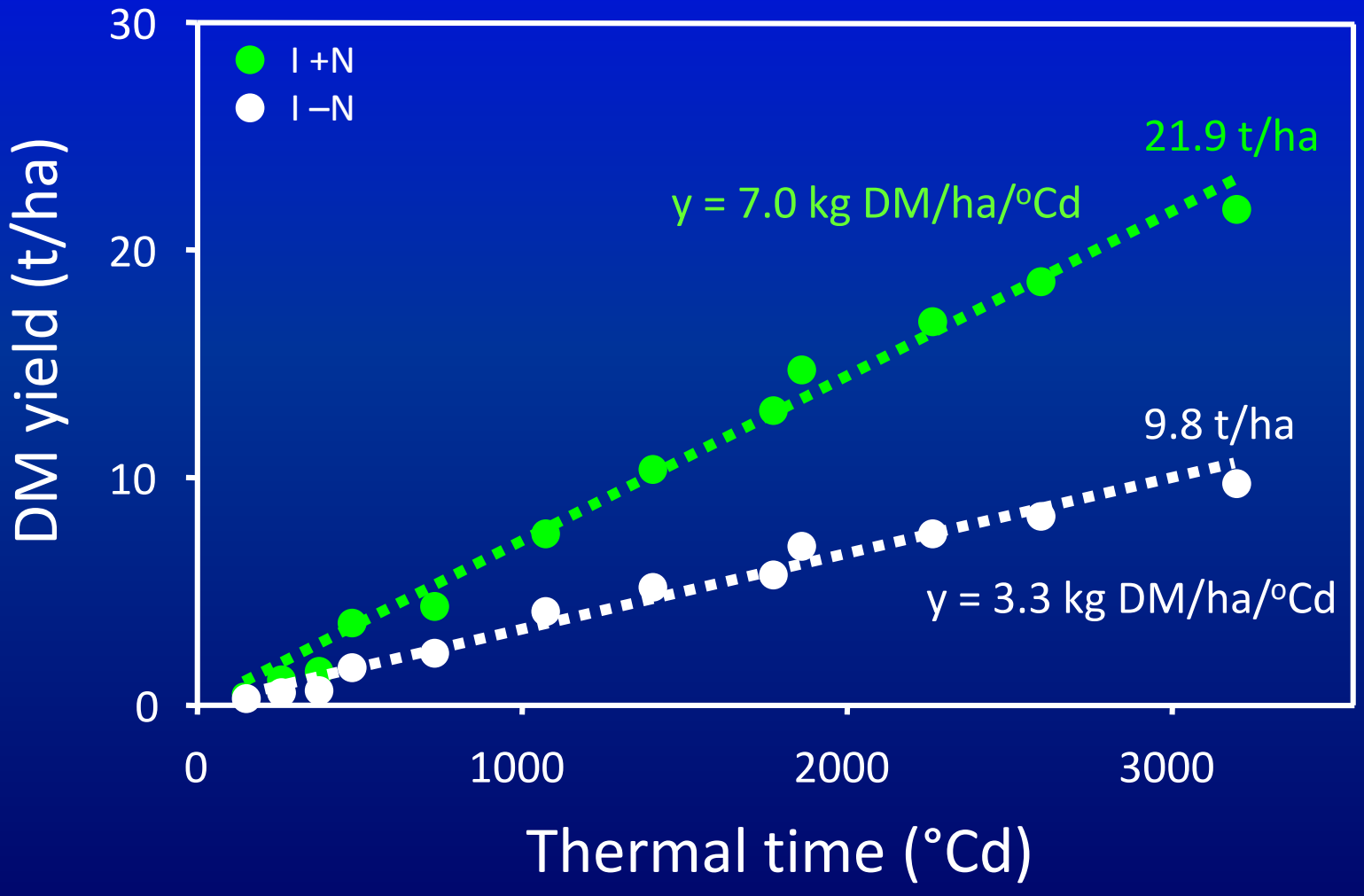


Mills *et al*. 2006

Winter ⇒ temperature response

Photo: KM Pollock
Lincoln University

The Nitrogen gap

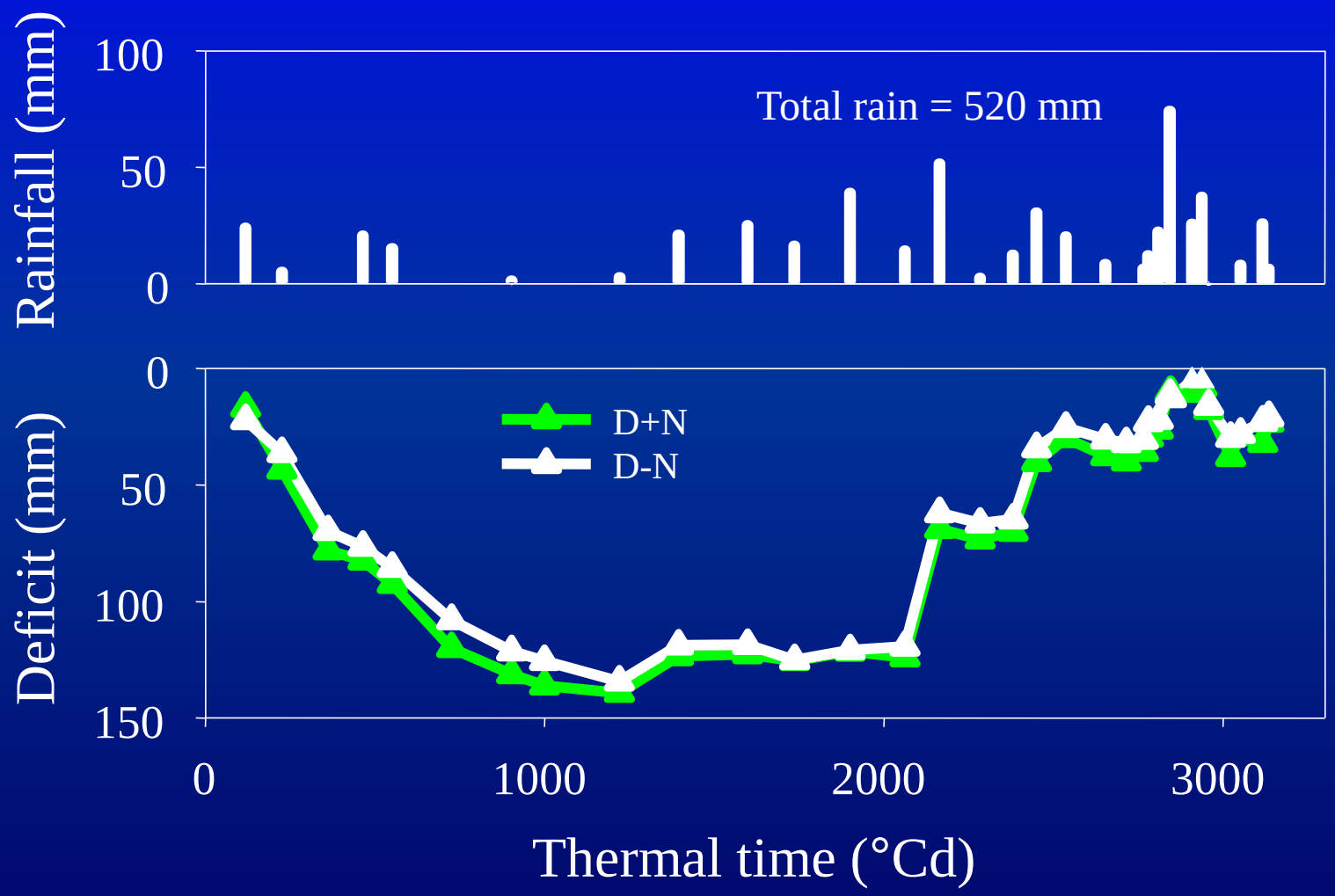


Mills *et al*. 2009

Summer ⇒ moisture response

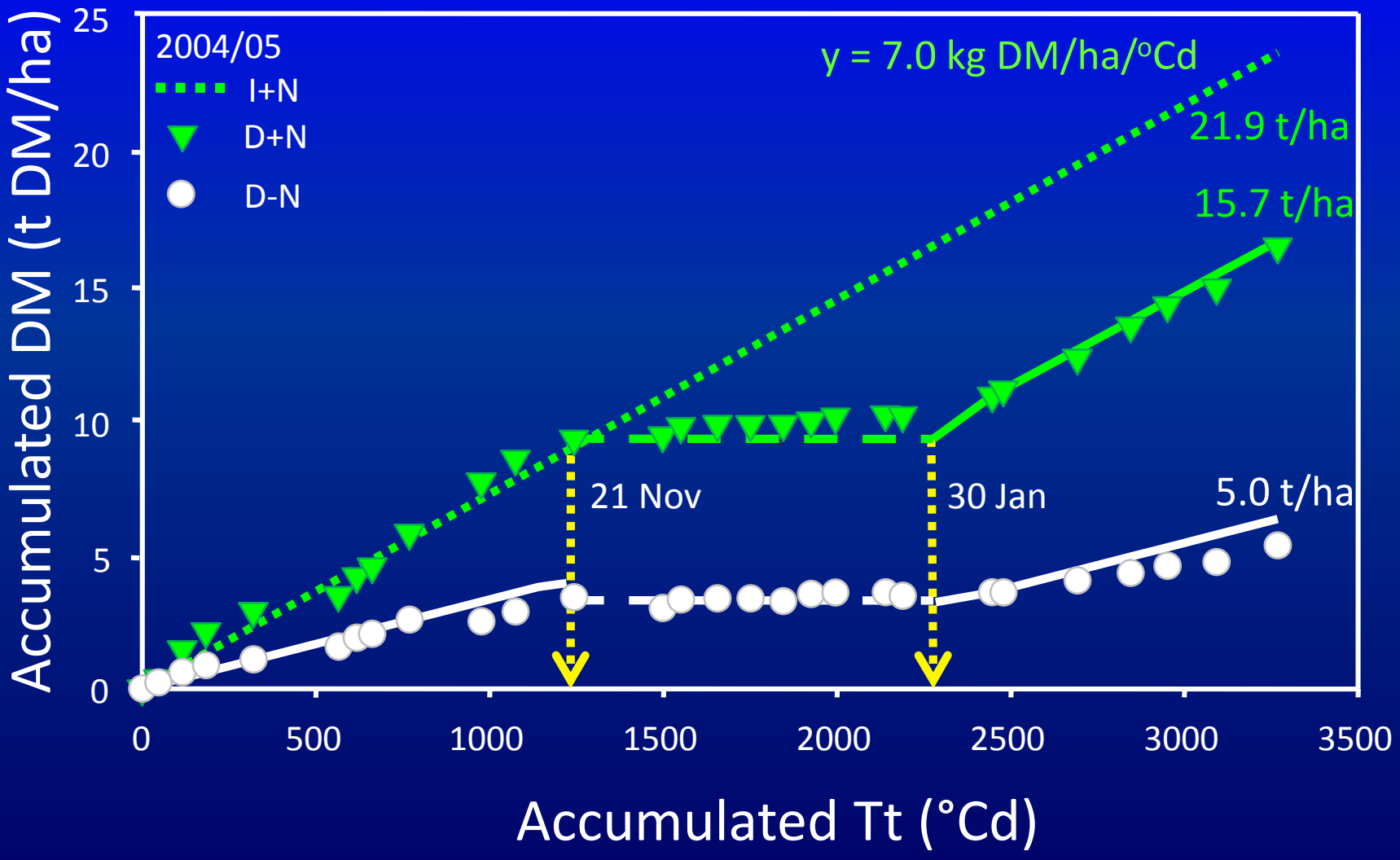
Photo: A Mills
Lincoln University

Soil moisture deficit 2003/04



Mills 2007

The Nitrogen gap



Mills *et al*. 2006

Experiment 4 - ‘MaxClover’

RG/Wc pastures

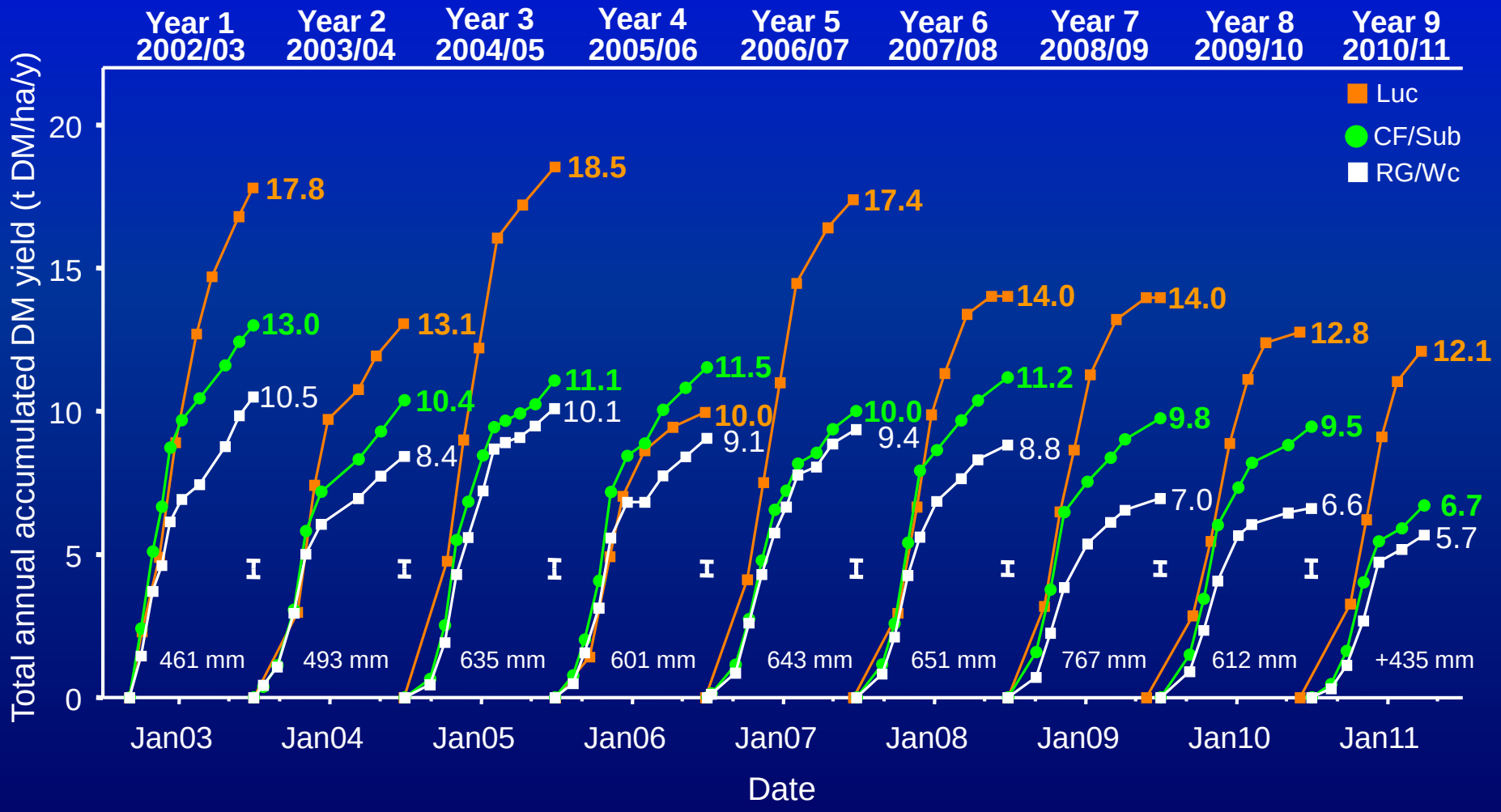
Unsown species

<5% in Year 1

>45% in Year 6

‘MaxClover’ Total DM Yields

(to 30 March 2011)



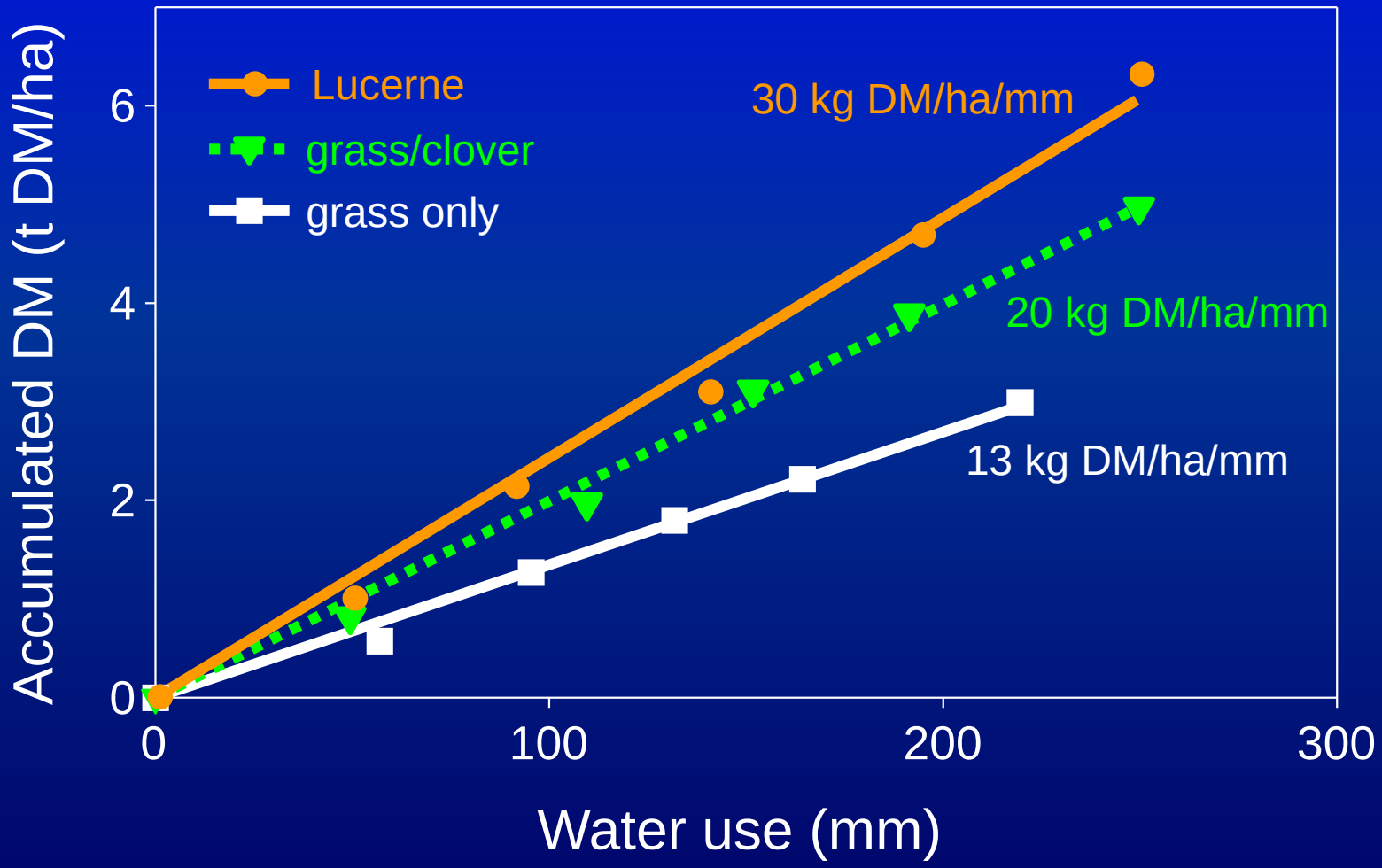
Growth in the field

20 month old plants – grazed by sheep

agresearch

Widdup *et al*. 2003

Spring WUE: legume = (nitrogen)

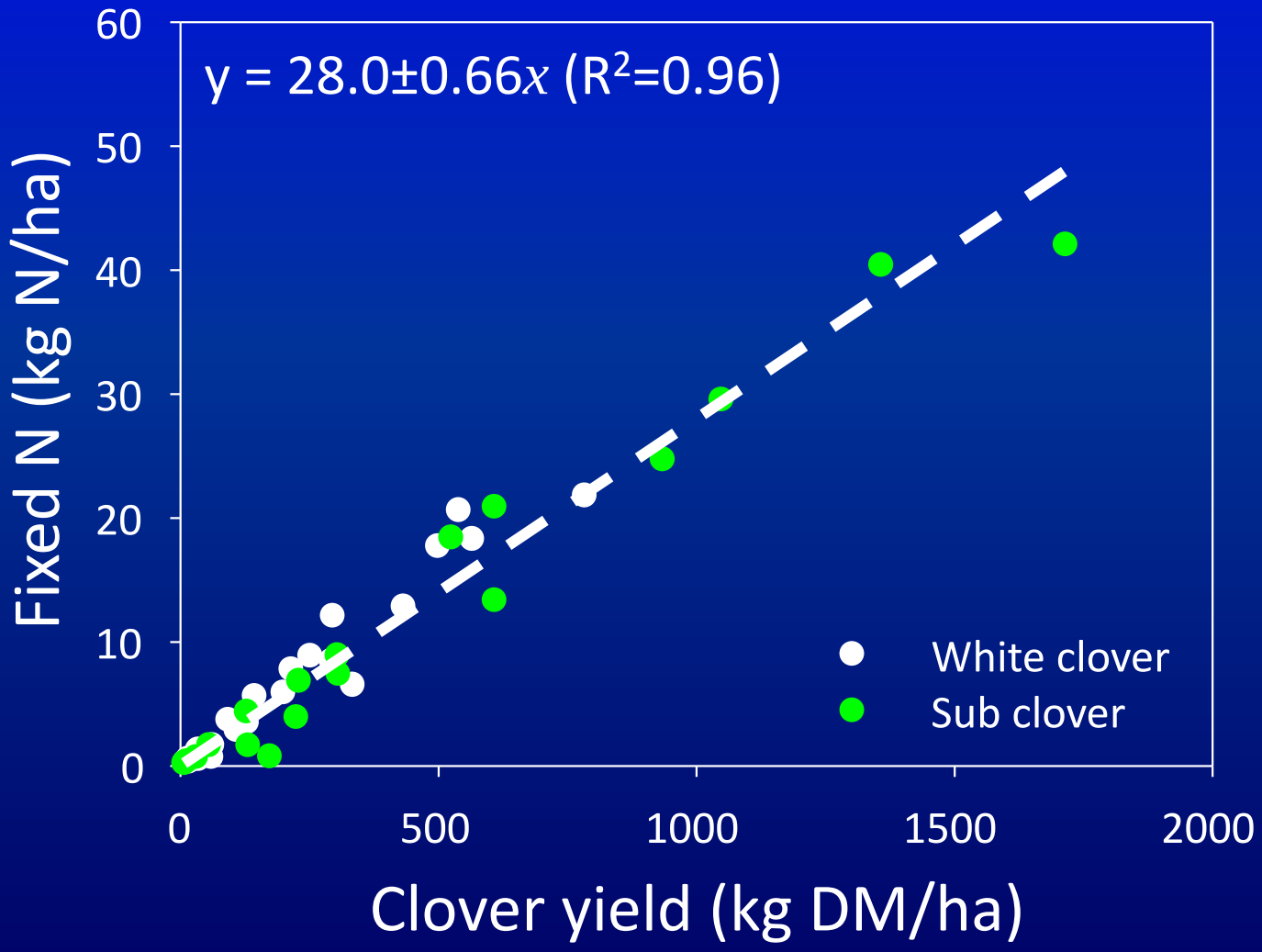


Moot *et al*. 2008

Nitrogen fixation
25 kg N/t DM

Lucas *et al*. 2010

Biological N fixation



Lucas *et al*. 2010

Transformational change
&
Adaptation to climate change

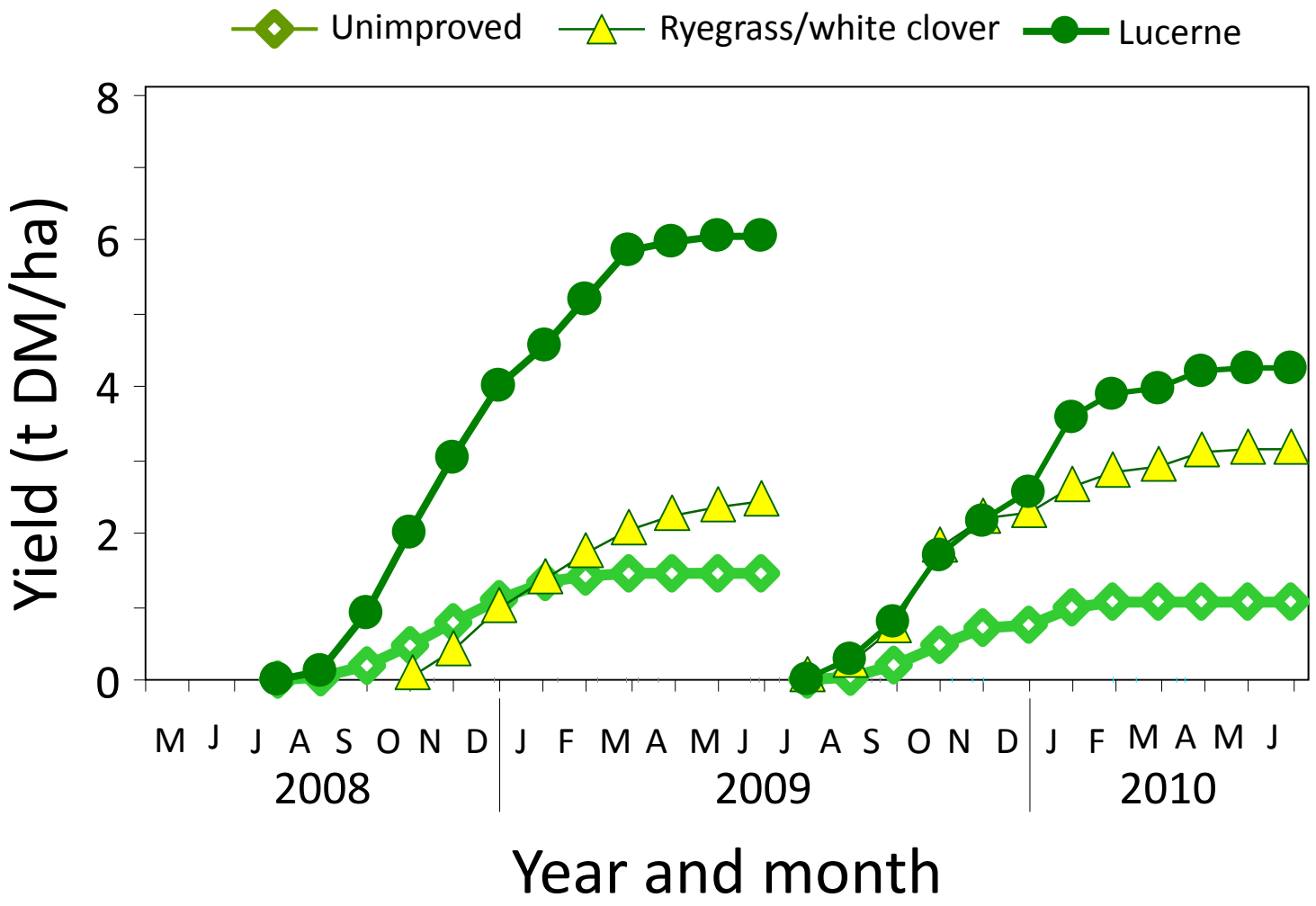
Kearney *et al*. 2010

Hills Creek Station

- 60 000 ha by one company -

Kearney *et al*. 2010

Pasture growth



Kearney *et al*. 2010

Doug and Fraser Avery “Bonavaree”

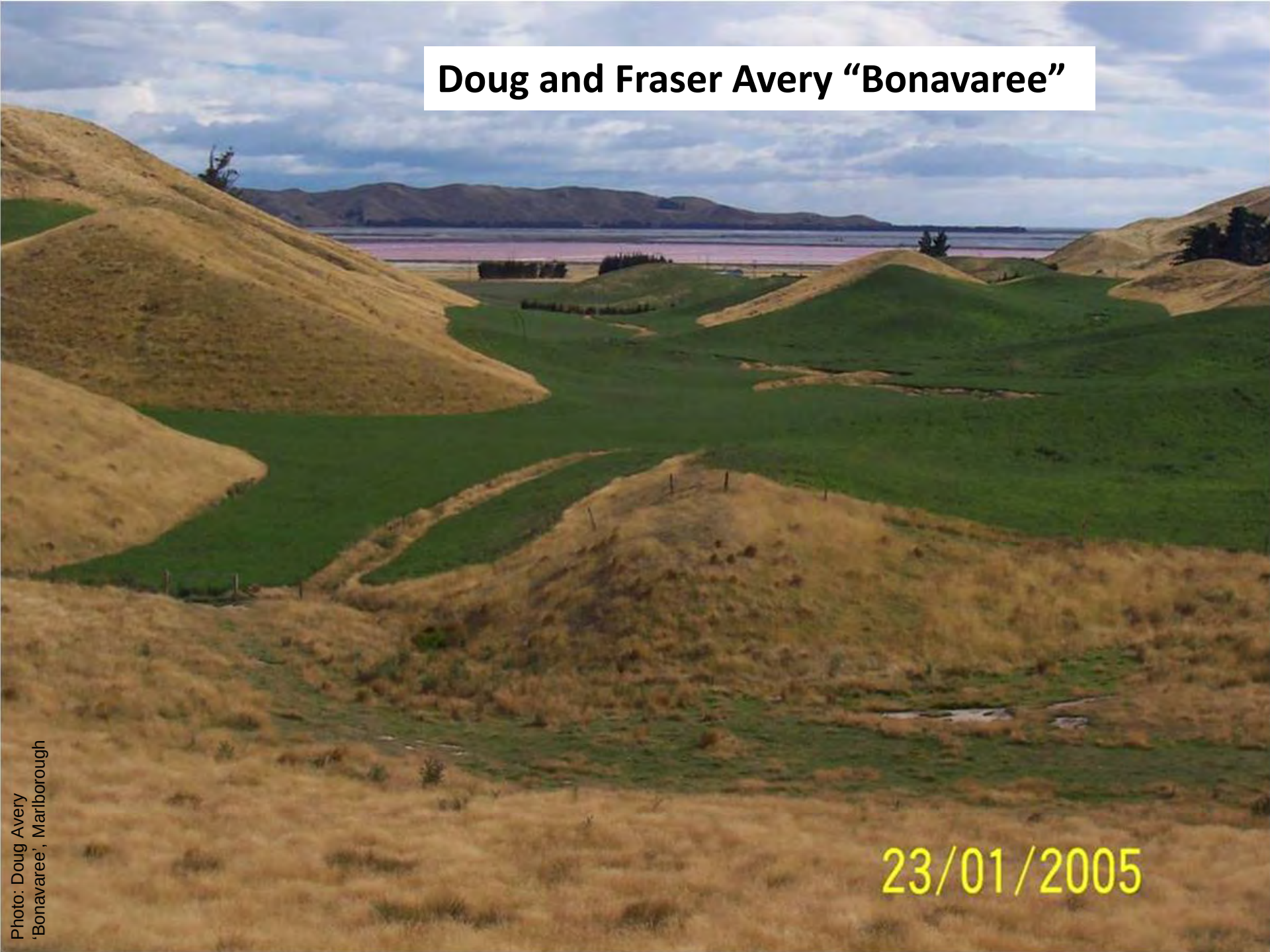


Photo: Doug Avery
‘Bonavaree’, Marlborough

When to graze

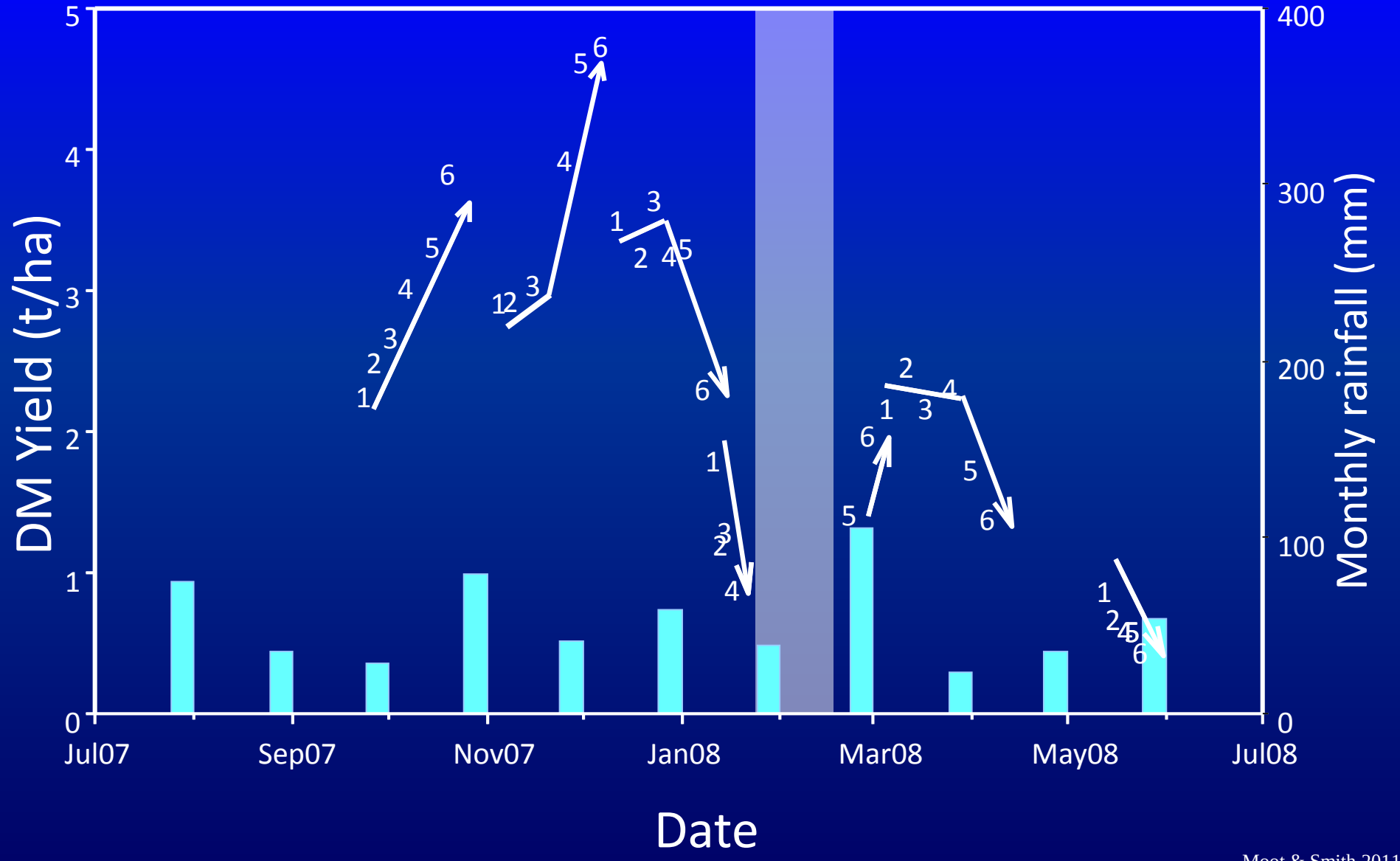
Photo: 'Bonavaree', Marlborough

How to graze

Photo: 'Bonavaree', Marlborough

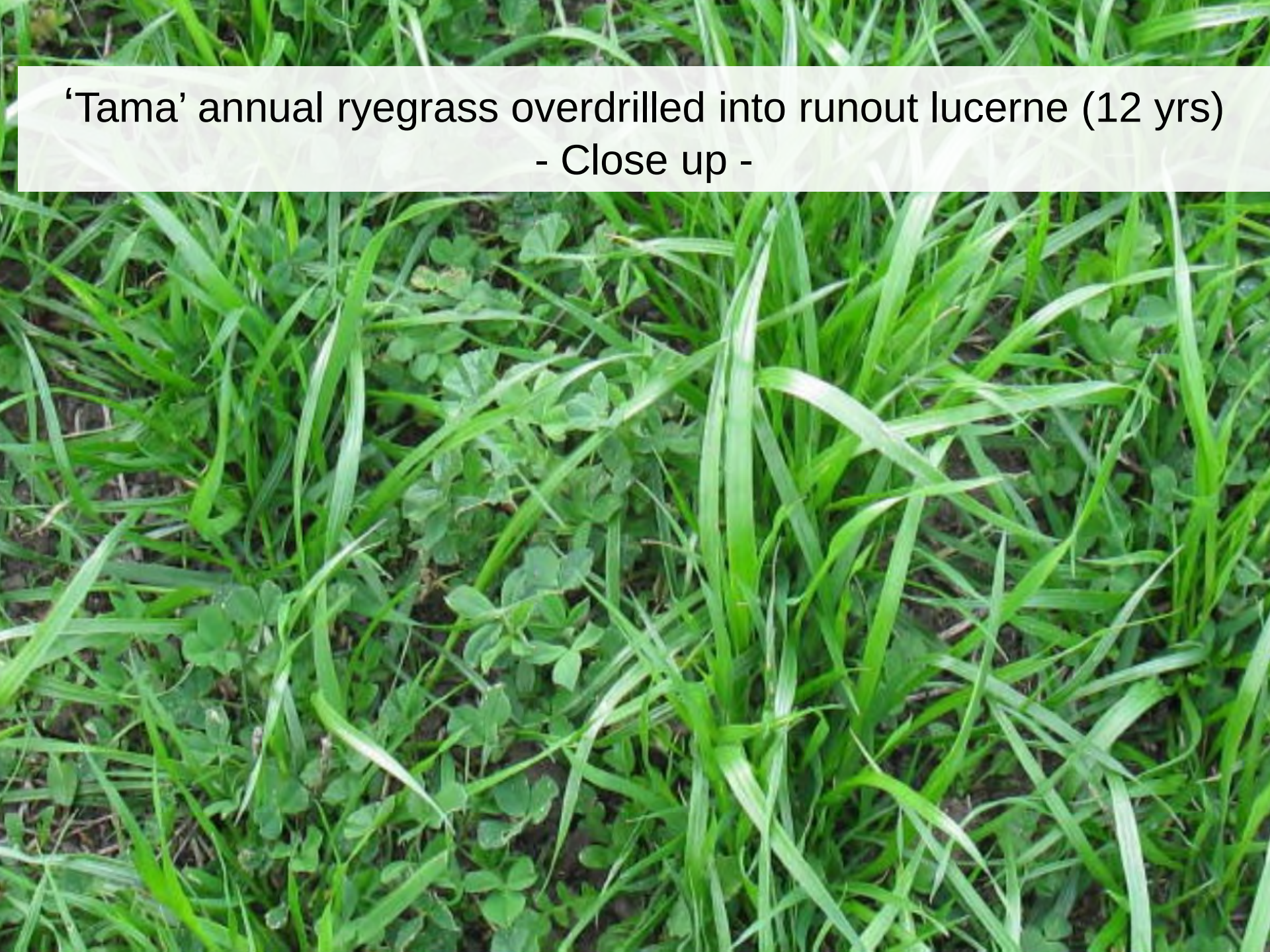
Rotation 1 Pre-graze
Plot 1 (21/9/07)
2.3 t DM/ha
20-25 cm tall

Lucerne grazing - Maxclover



Moot & Smith 2011

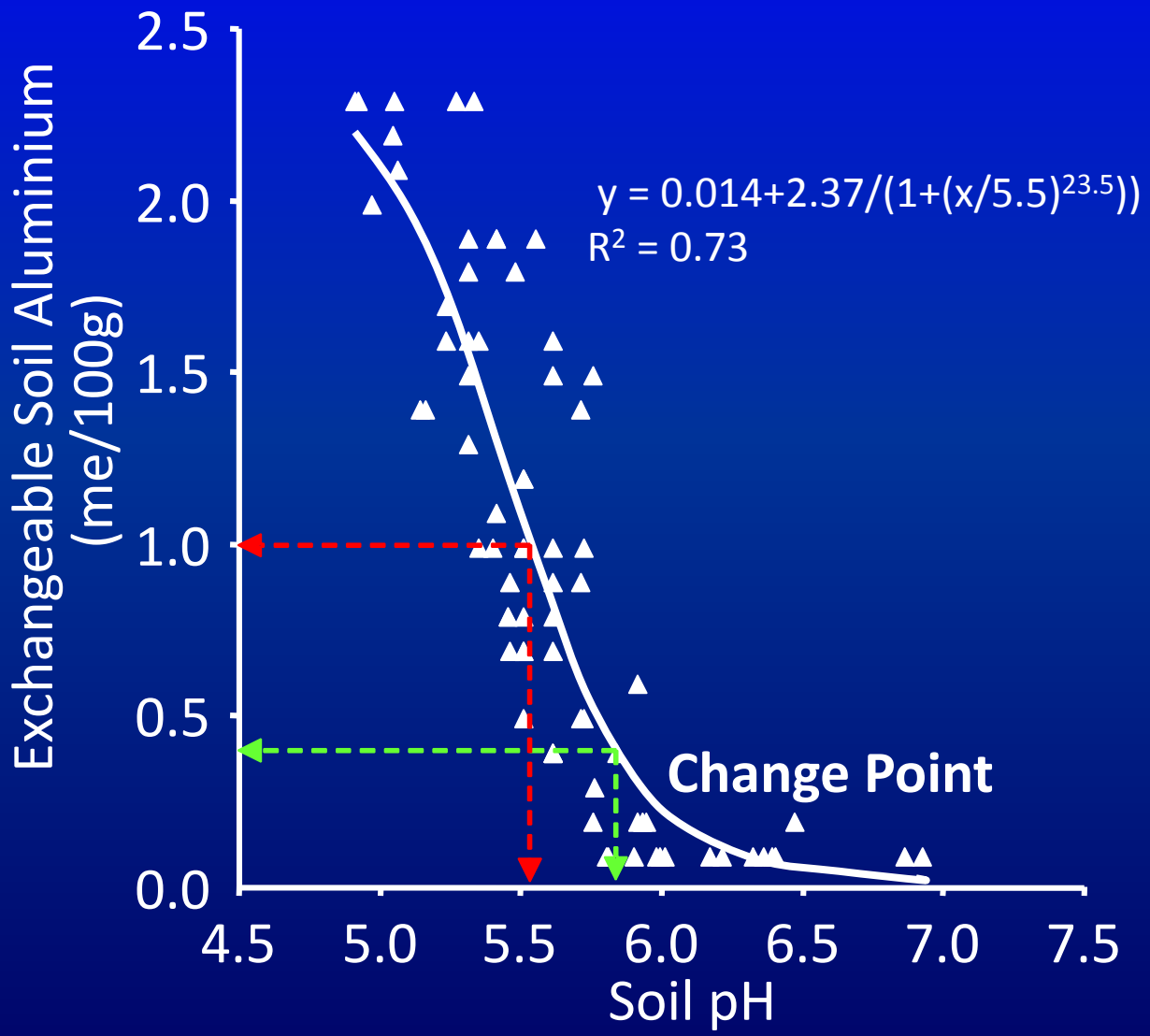
Six paddock rotation on farm



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

Clay Downs South Canterbury

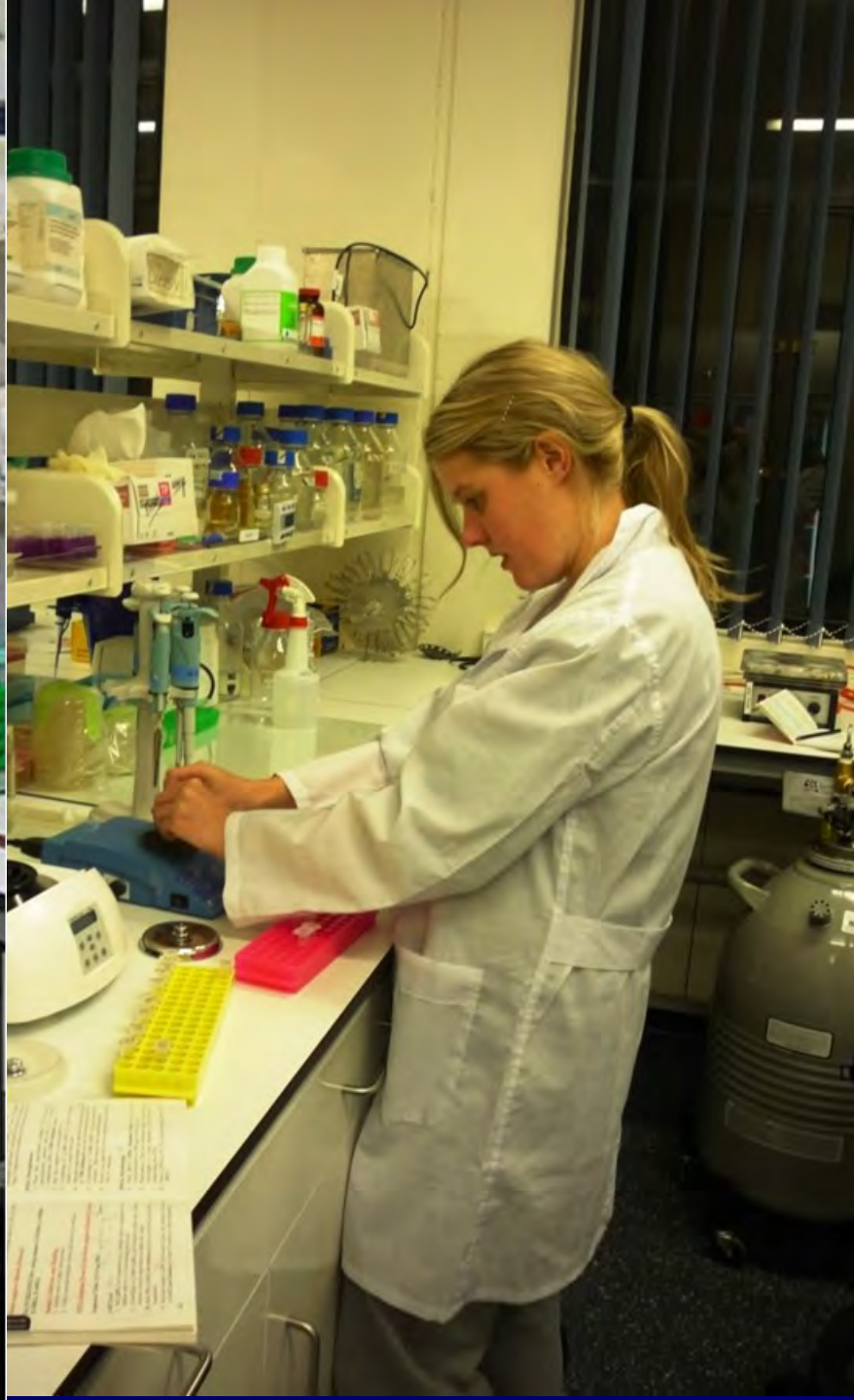
Soil pH & exchangeable Aluminium



Moir & Moot, 2010

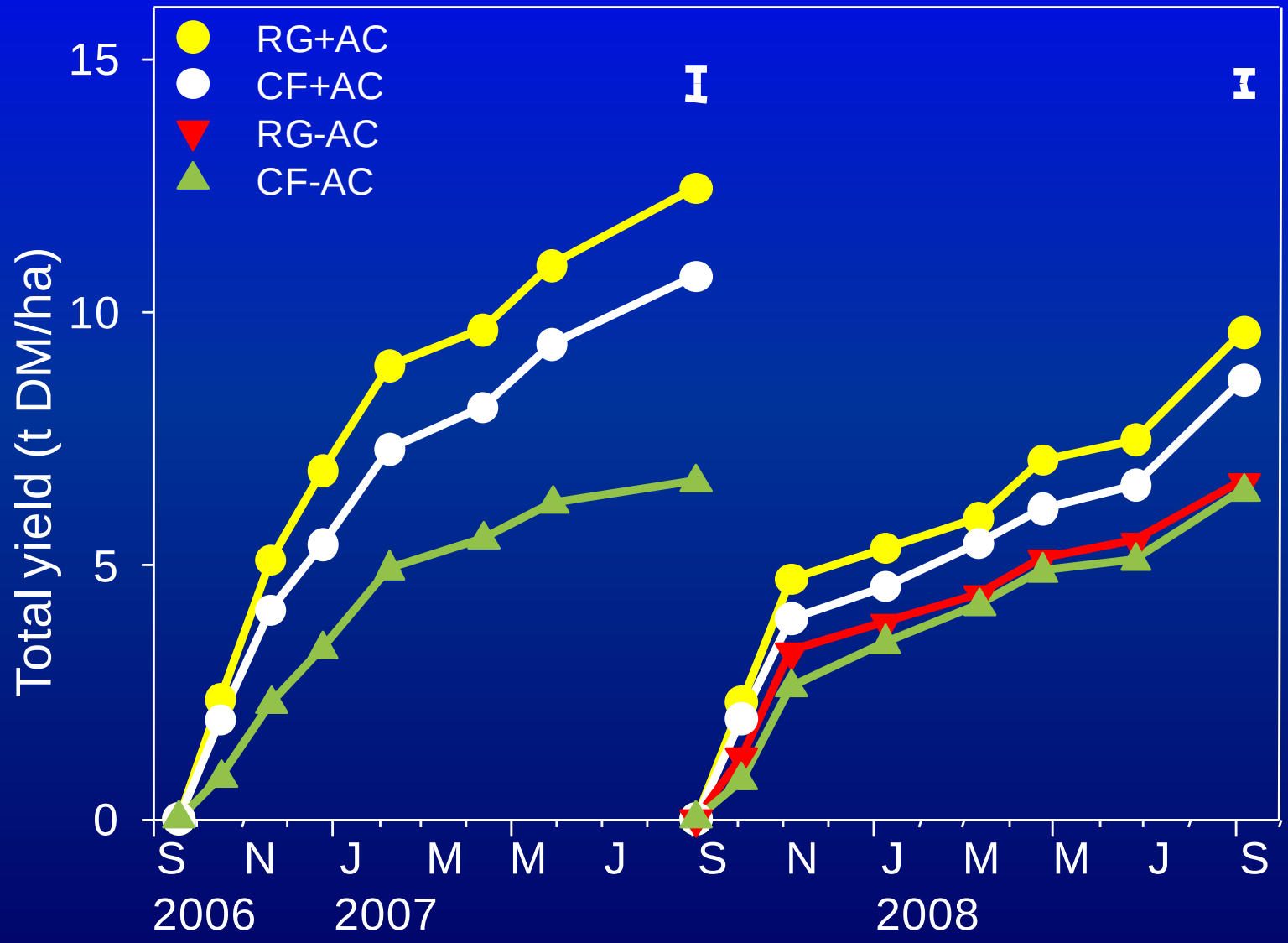
Photo: Lees Valley, Canterbury


Which rhizobia are in here?



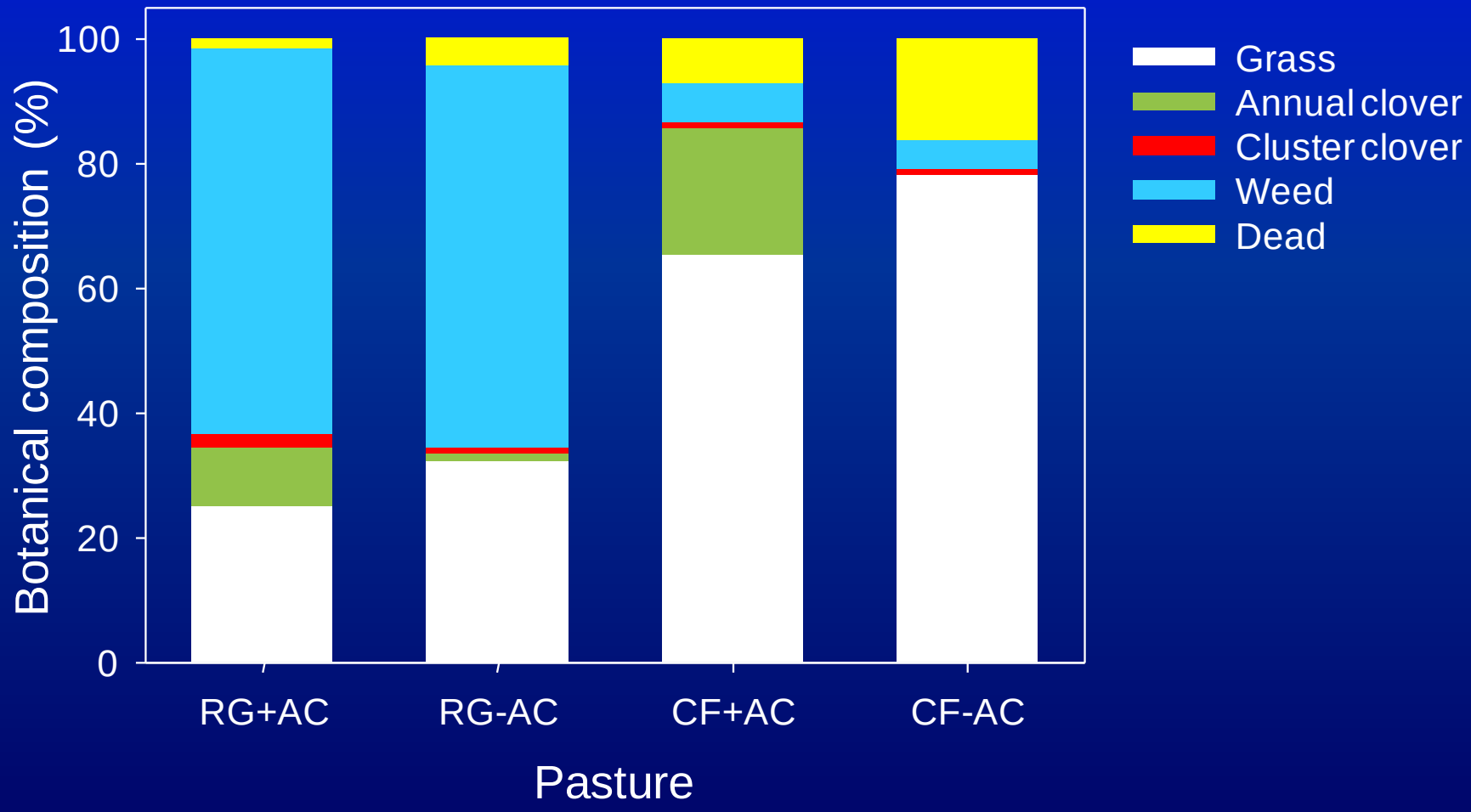
Costello & Costello 2003

Total DM yield



Ates *et al*. 2010

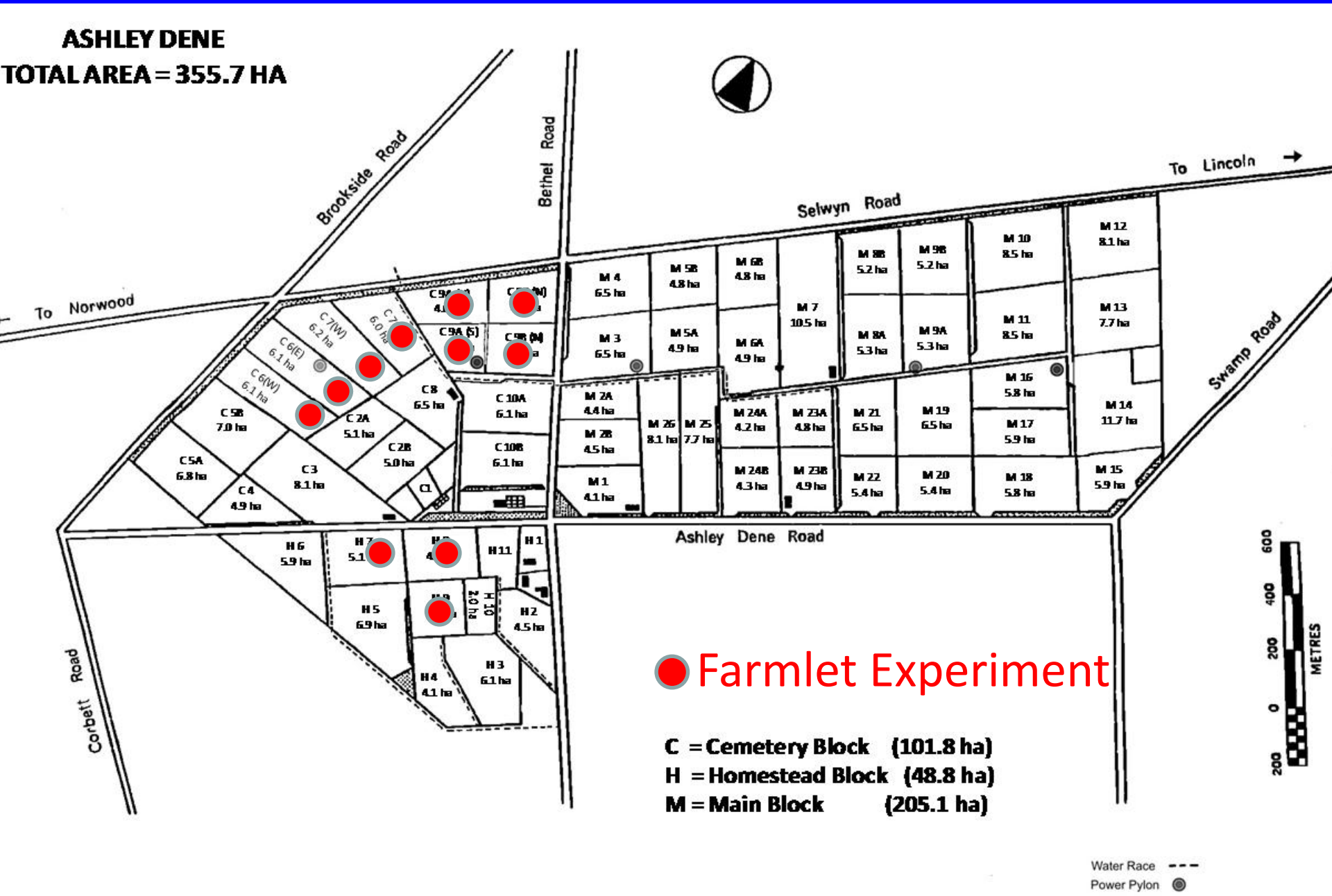
Botanical composition – 26 June 08



Ates *et al*. 2010

Ashley Dene Dryland Research Farm
Pastoral 21 – Phase II (5 Years)

Springston, Canterbury


ASHLEY DENE
TOTAL AREA = 355.7 HA
Brookside Road
Bethel Road
To Lincoln
Selwyn Road
To Norwood
Swamp Road
Ashley Dene Road
Corbett Road
C 7(W) 6.2 ha
C 7 6.0 ha
C6(E) 6.1 ha
C6(W) 6.1 ha
C9A (S)
C8 6.5 ha
C 10A 6.1 ha
C 10B 6.1 ha
C5B 7.0 ha
C2A 5.1 ha
C2B 5.0 ha
C5A 6.8 ha
C3 8.1 ha
C4 4.9 ha
C1
M 4 6.5 ha
M 5B 4.8 ha
M 6B 4.8 ha
M 7 10.5 ha
M 8B 5.2 ha
M 9B 5.2 ha
M 10 8.5 ha
M 12 8.1 ha
M 3 6.5 ha
M 5A 4.9 ha
M 6A 4.9 ha
M 8A 5.3 ha
M 9A 5.3 ha
M 11 8.5 ha
M 13 7.7 ha
M 2A 4.4 ha
M 2B 4.5 ha
M 1 4.1 ha
M 26 8.1 ha
M 25 7.7 ha
M 24A 4.2 ha
M 23A 4.8 ha
M 21 6.5 ha
M 19 6.5 ha
M 16 5.8 ha
M 17 5.9 ha
M 14 11.7 ha
M 24B 4.3 ha
M 23B 4.9 ha
M 22 5.4 ha
M 20 5.4 ha
M 18 5.8 ha
M 15 5.9 ha
H6 5.9 ha
H11
H1
H5 6.9 ha
H10 2.0 ha
H2 4.5 ha
H4 4.1 ha
H3 6.1 ha
Farmlet Experiment
C = Cemetery Block (101.8 ha)
H = Homestead Block (48.8 ha)
M = Main Block (205.1 ha)
600
400
200
0
200
METRES
Water Race
Power Pylon

Lucerne + cocksfoot

Lucerne + Prairie grass

Flexible grazing management

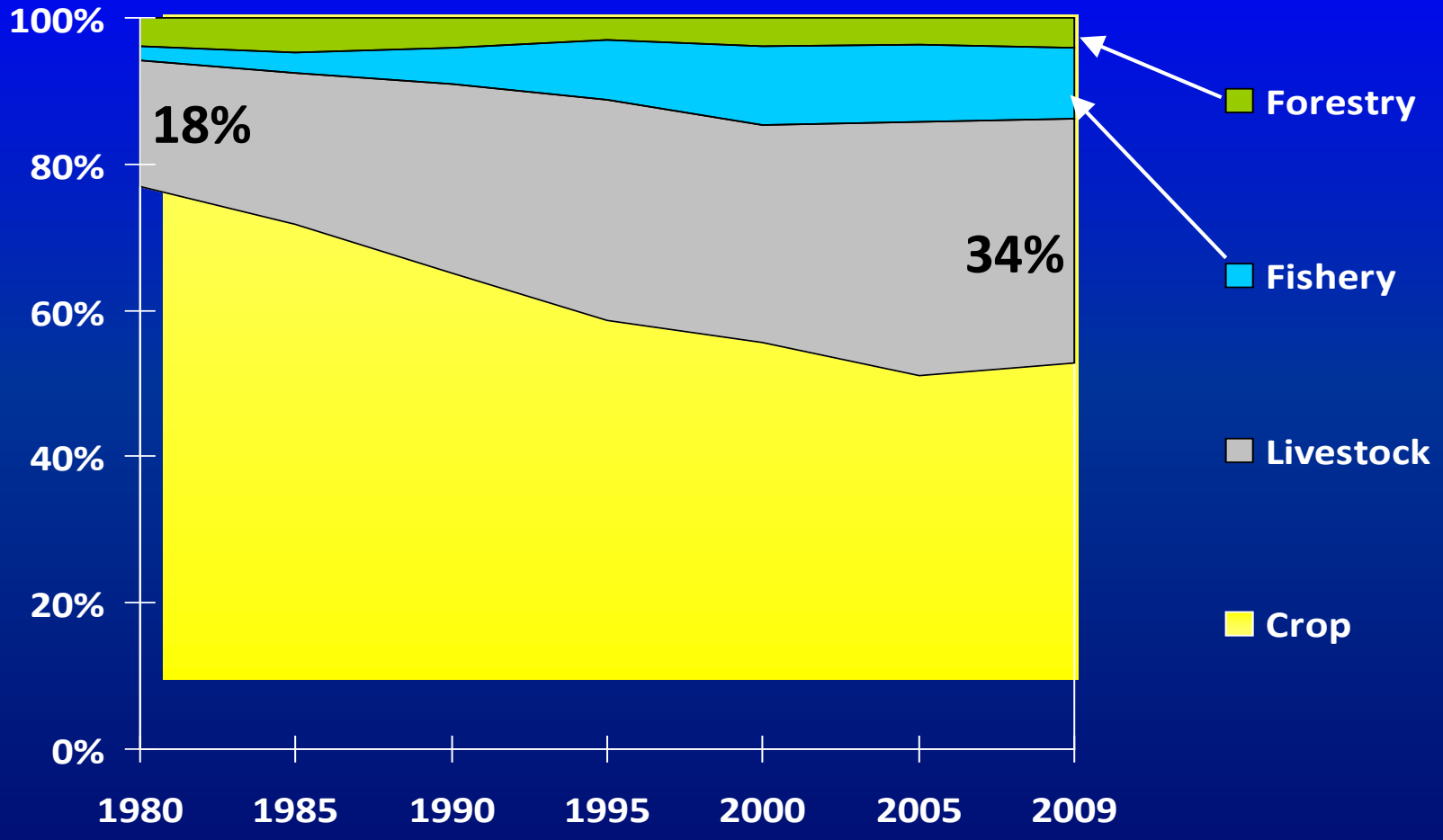
Lucerne 4 Lambs

Sustainable Farming Fund

Ministry of Agriculture and Forestry
Te Manatū Ahuwhenua, Ngāherehere

Deer = no risk of bloat

Shares of output values within agricultural sector 1980-2009, (%)



Meat sector has grown fastest at the expense of crops

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
- Global demand for meat will exceed supply for at least the next decade

Acknowledgements

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

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beef+lamb new zealand

Sustainable Farming Fund
Ministry of Agriculture and Forestry
Te Manatū Ahuwhenua, Ngāherehere

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