Lincoln University
Te Whare Wānaka o Aoraki
AOTEAROA • NEW ZEALAND

# Dryland Pastures

**24 June 2015**

**Professor Derrick Moot**

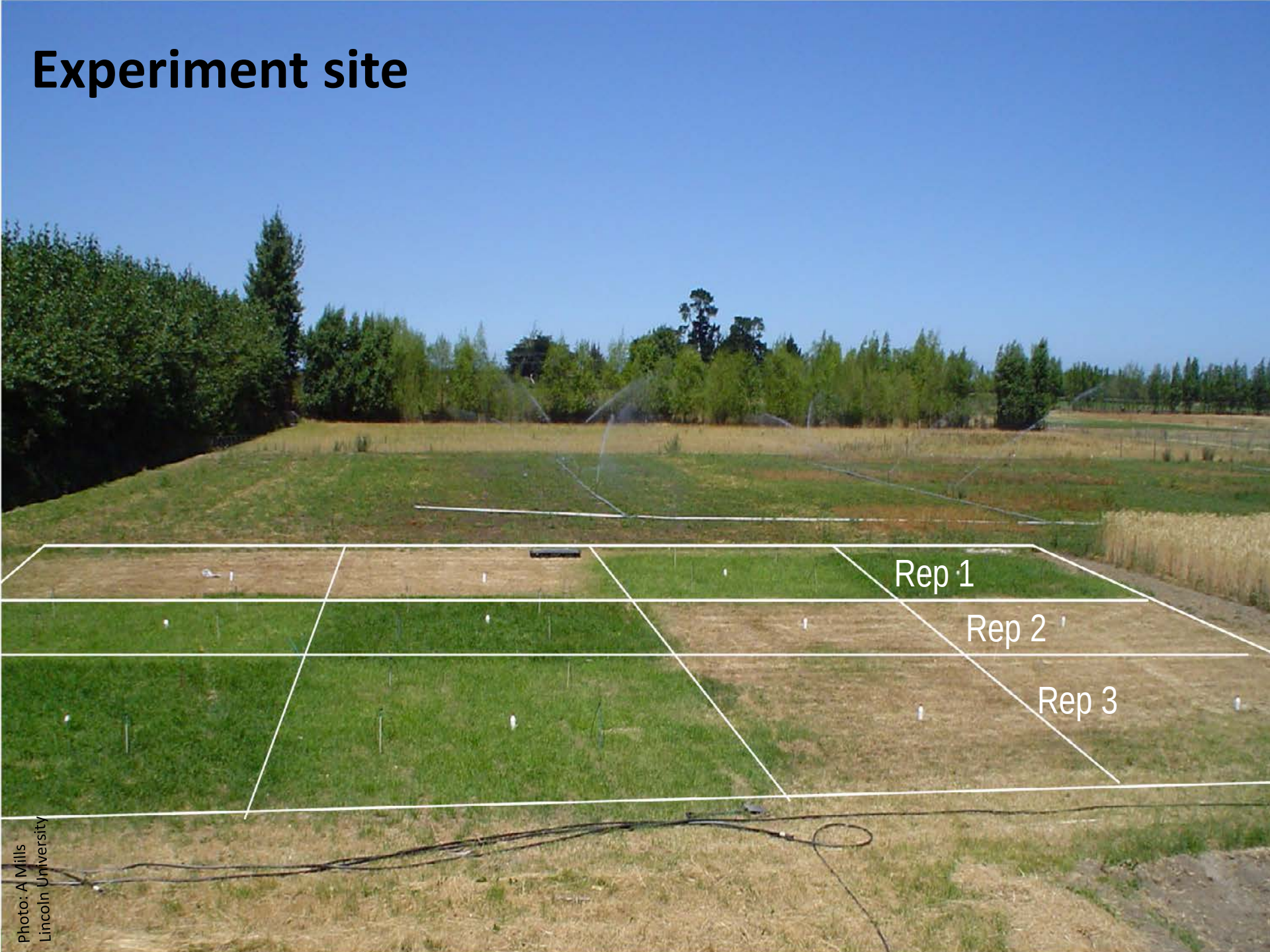
**Website:** http://www.lincoln.ac.nz/dryland
**Blog:** https://blogs.lincoln.ac.nz/dryland/


Rain fed 300-800 mm
East coast - summer dry

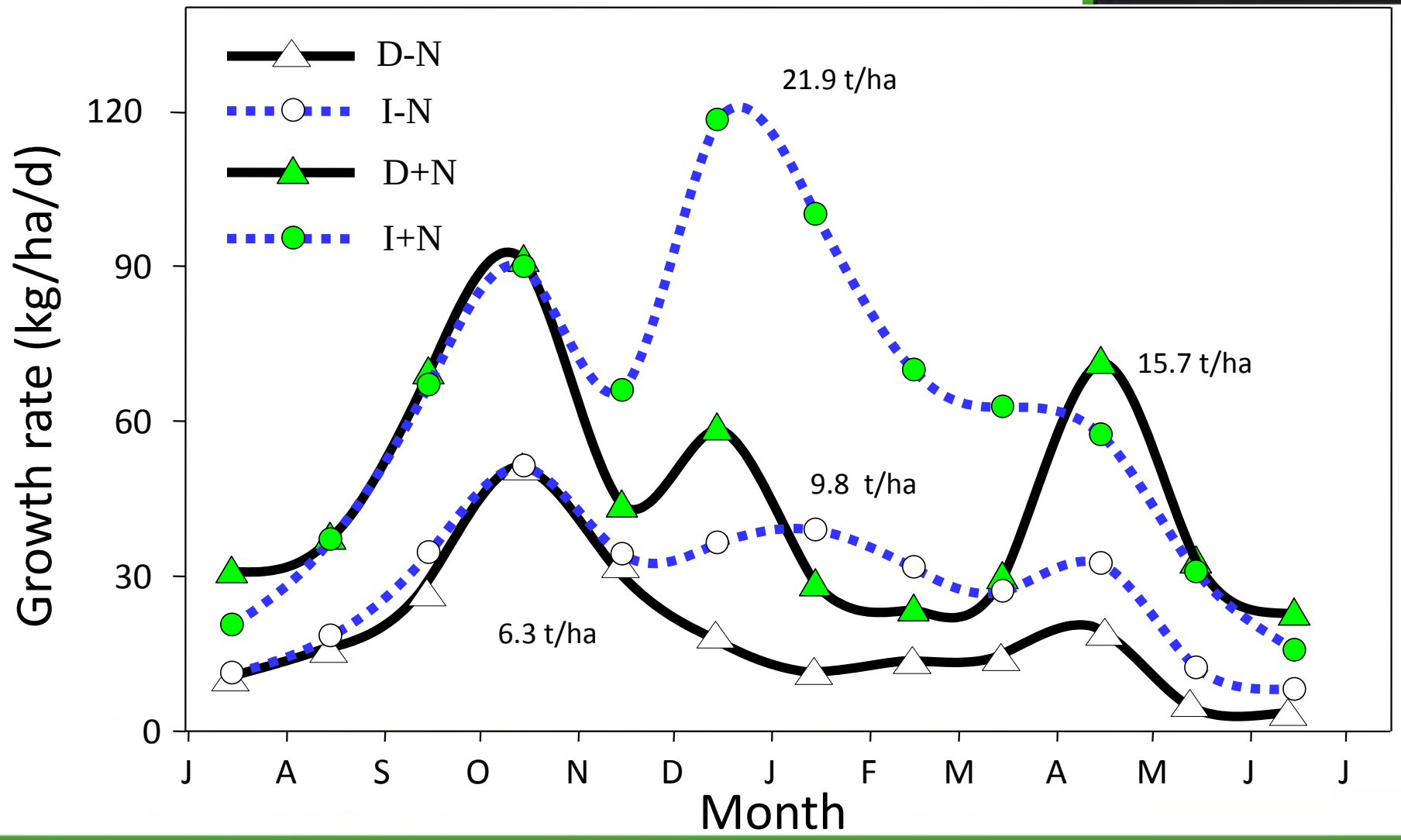
# By 2030 - Drier:

## Drought – increased duration and frequency

# Experiment site



# Growth rates (2 year means)



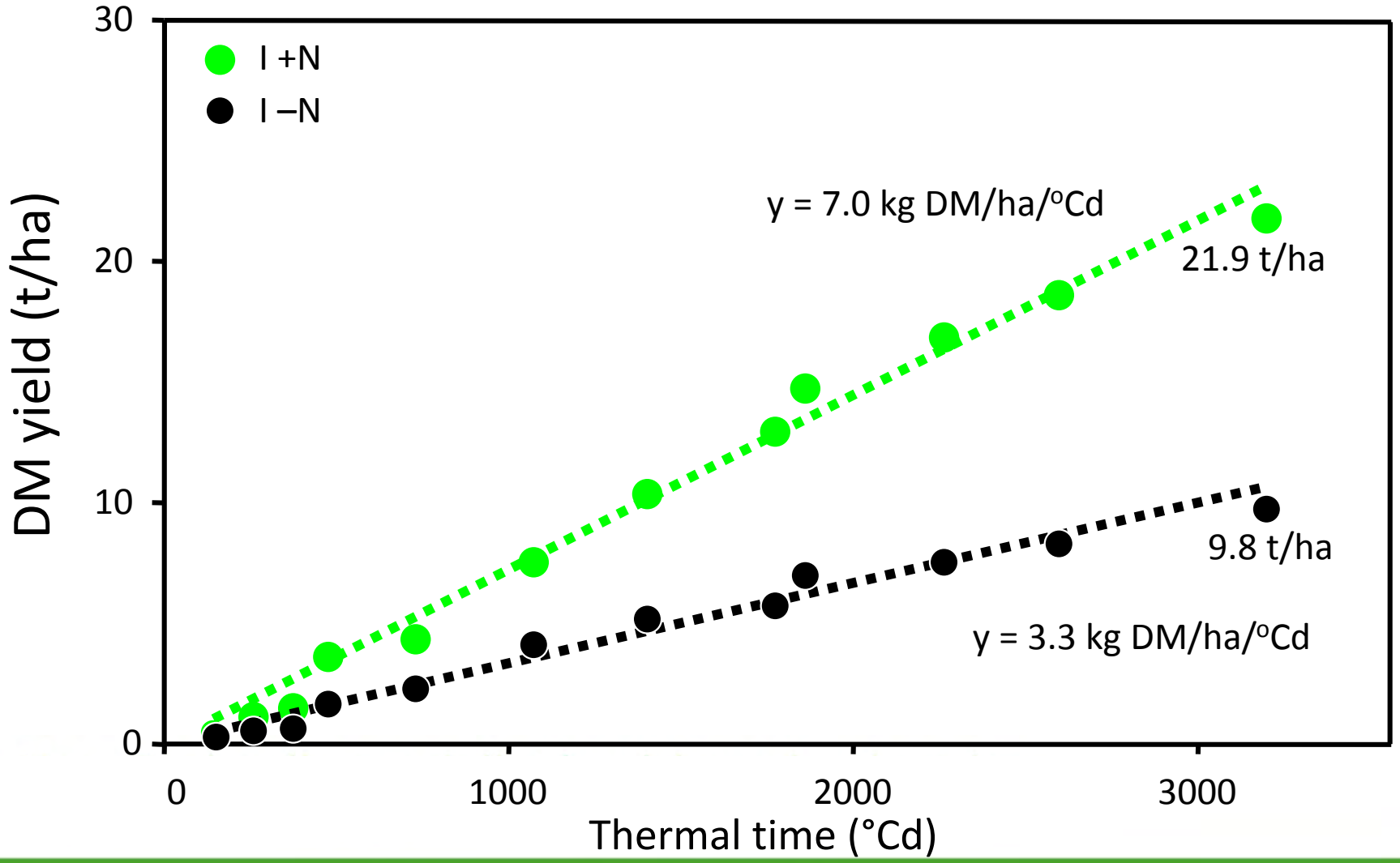

Mills *et al*. 2006, 2009

# Winter

# ⇒ temperature response

Photo: KM Pollock
Lincoln University

# The Nitrogen gap

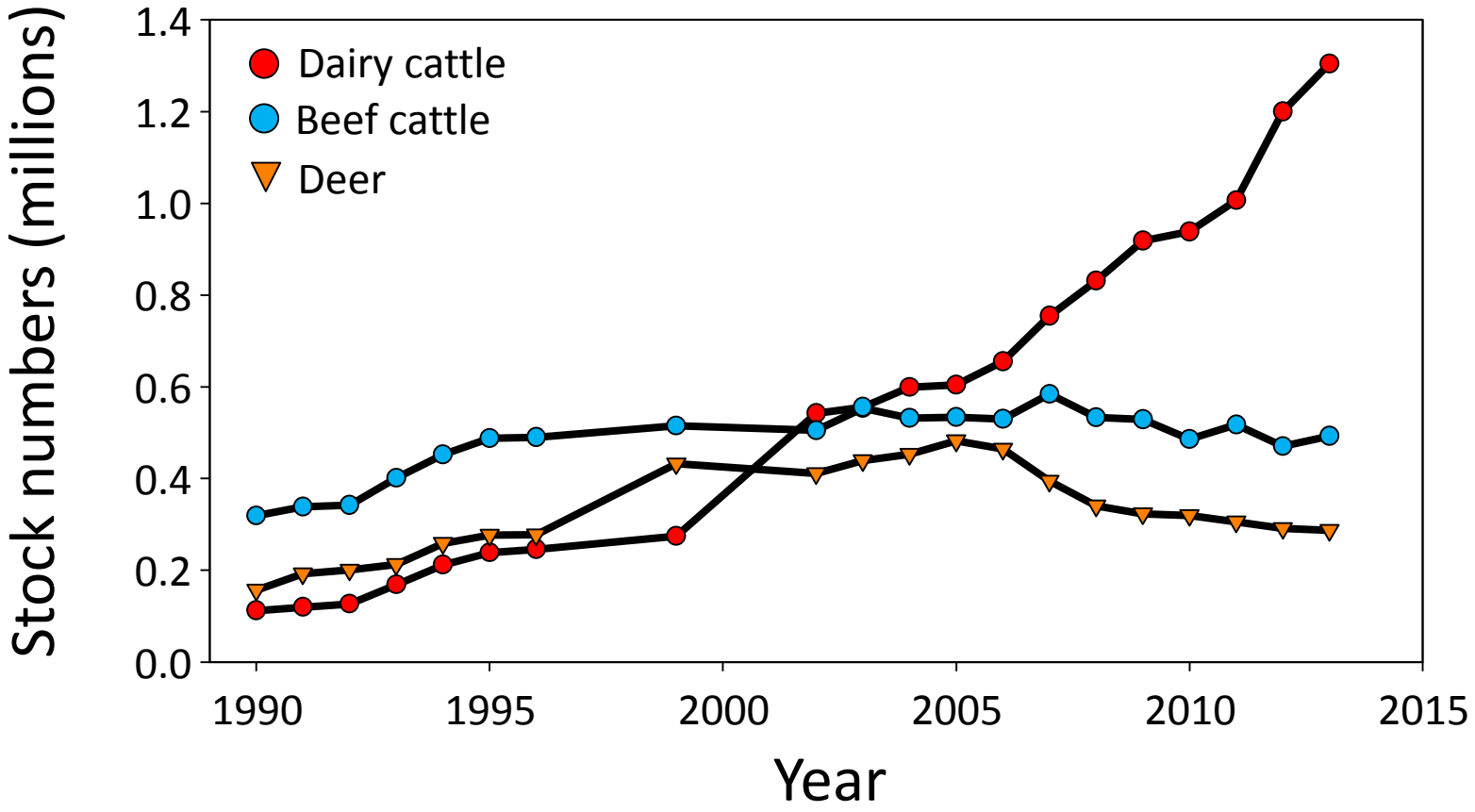



Mills *et al*. 2006; 2009

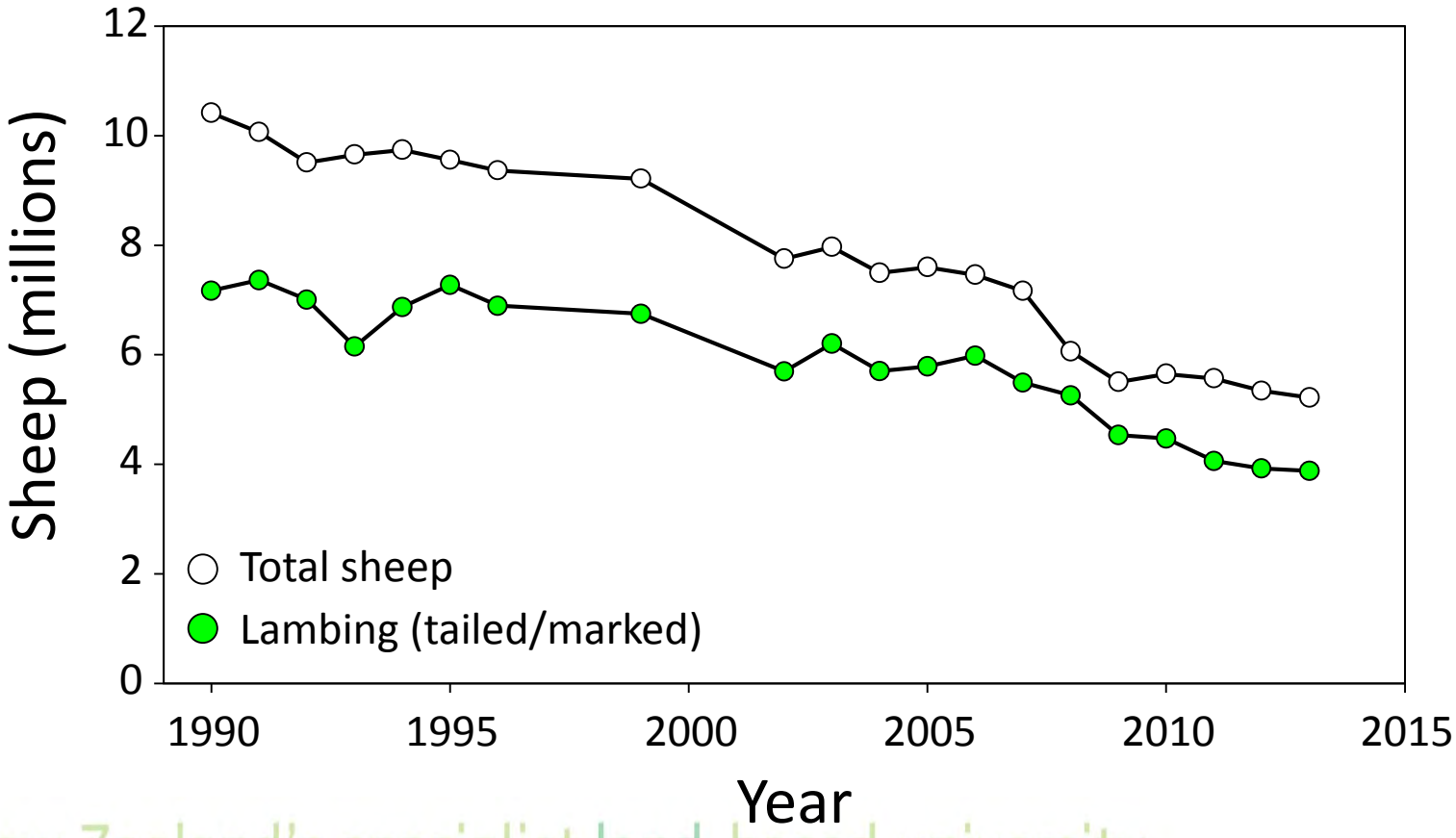
# Water and nitrogen = ryegrass

Photo: Dr WR Scott
Lincoln University

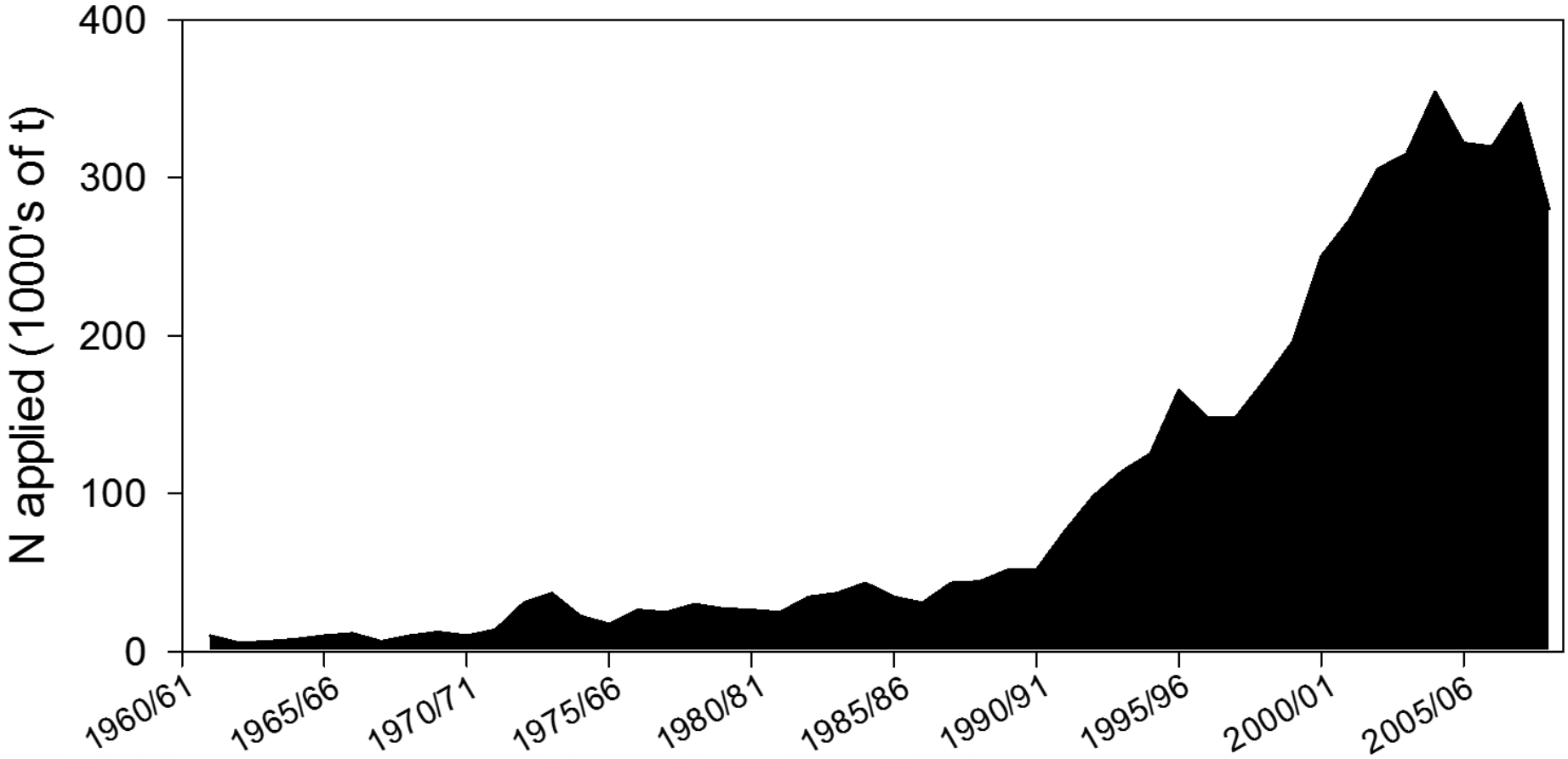
# Cattle and deer numbers in Canterbury



# Sheep numbers in Canterbury



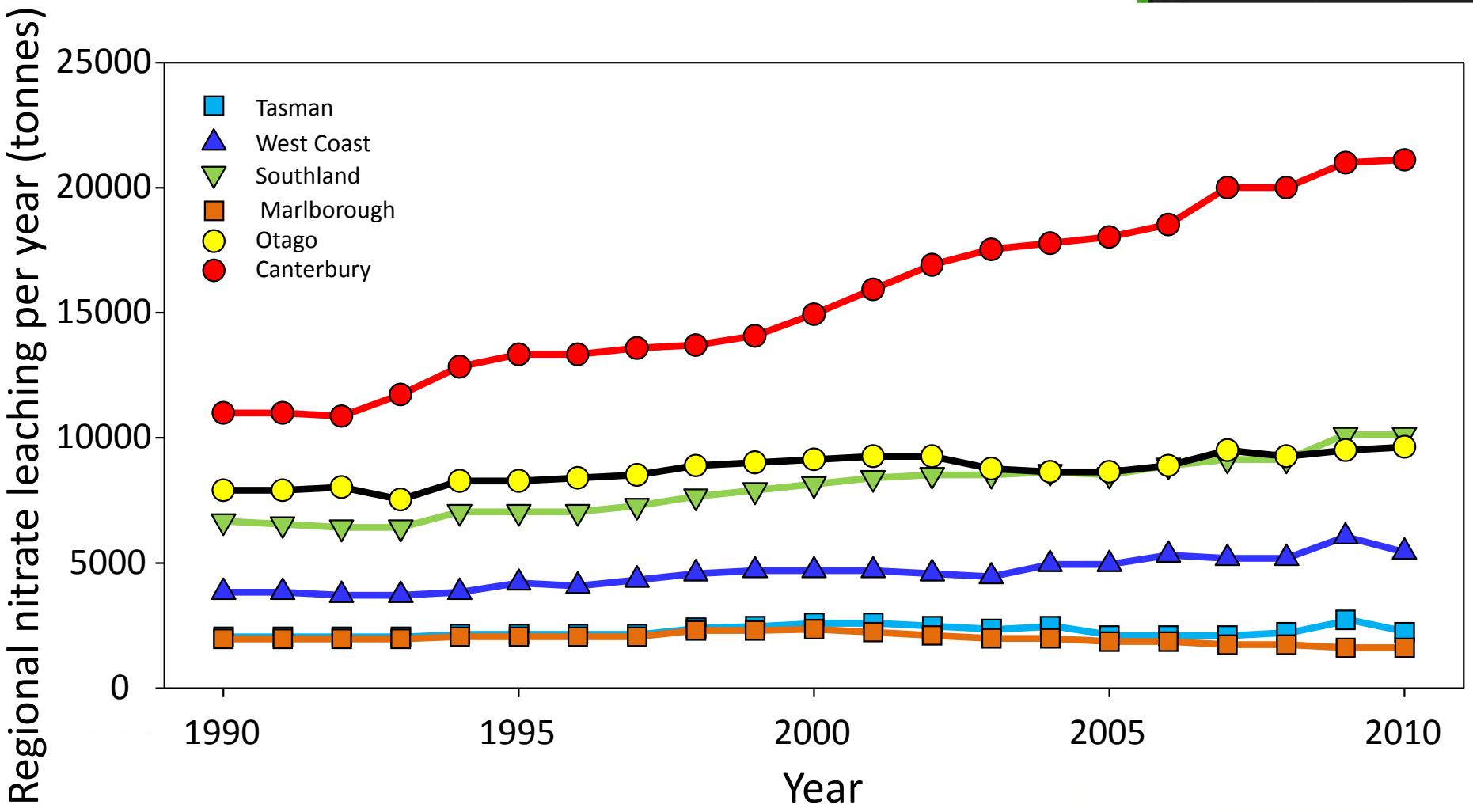
# Nitrogen fertiliser use




New Zealand's specialist land-based university


Nitrogen deficient pasture
1000 kg N/ha

# Regional annual nitrate losses



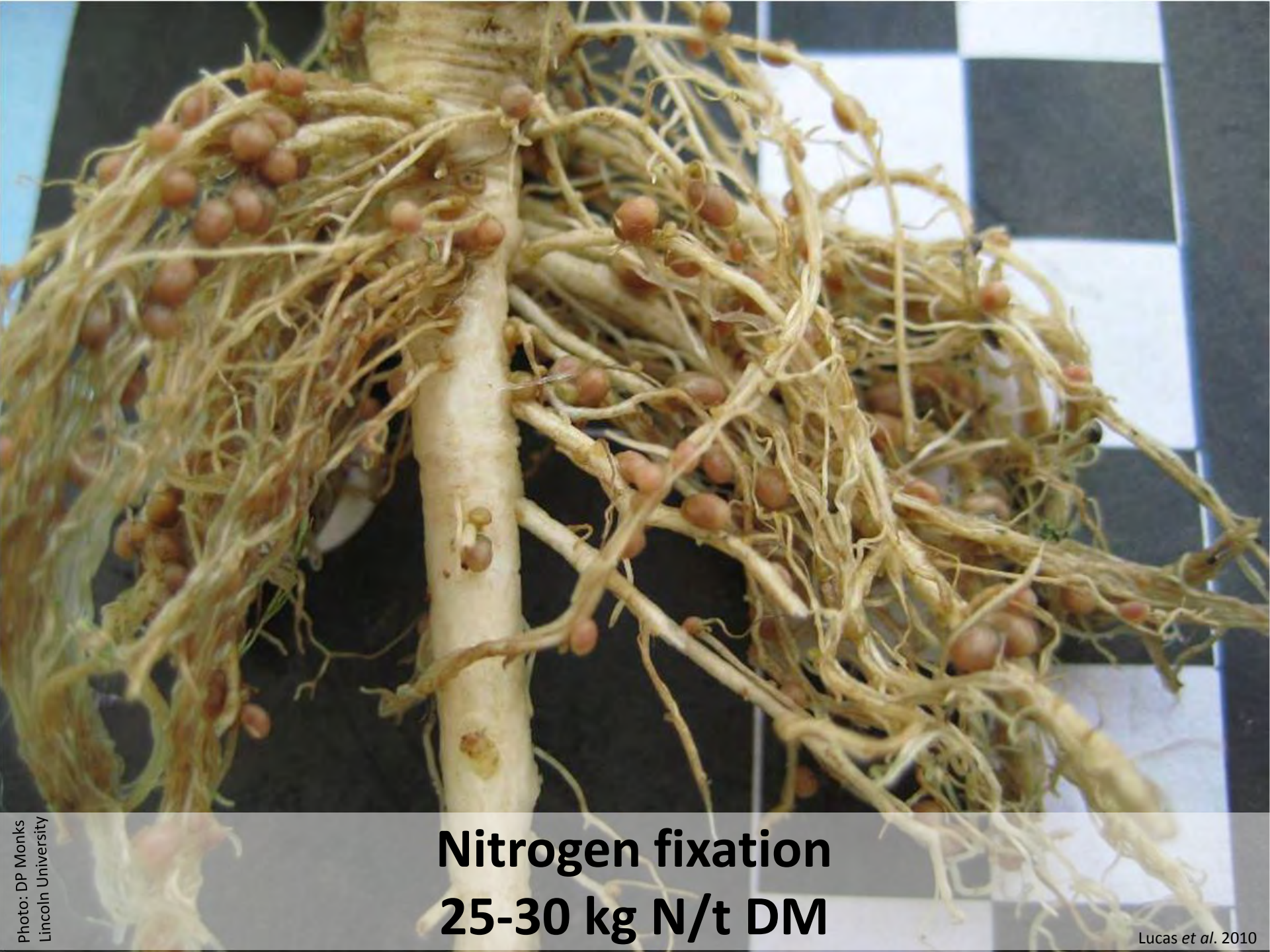

Redrawn from Dymond *et al.* 2013


# High feeding value pastures have;

- **high legume content**
- **high leaf content**
- **low stem content**
- **young herbage age**

# Sheep prefer 70% legume, 30% grass

Photo: Jo Grigg
Tempello, Marlborough



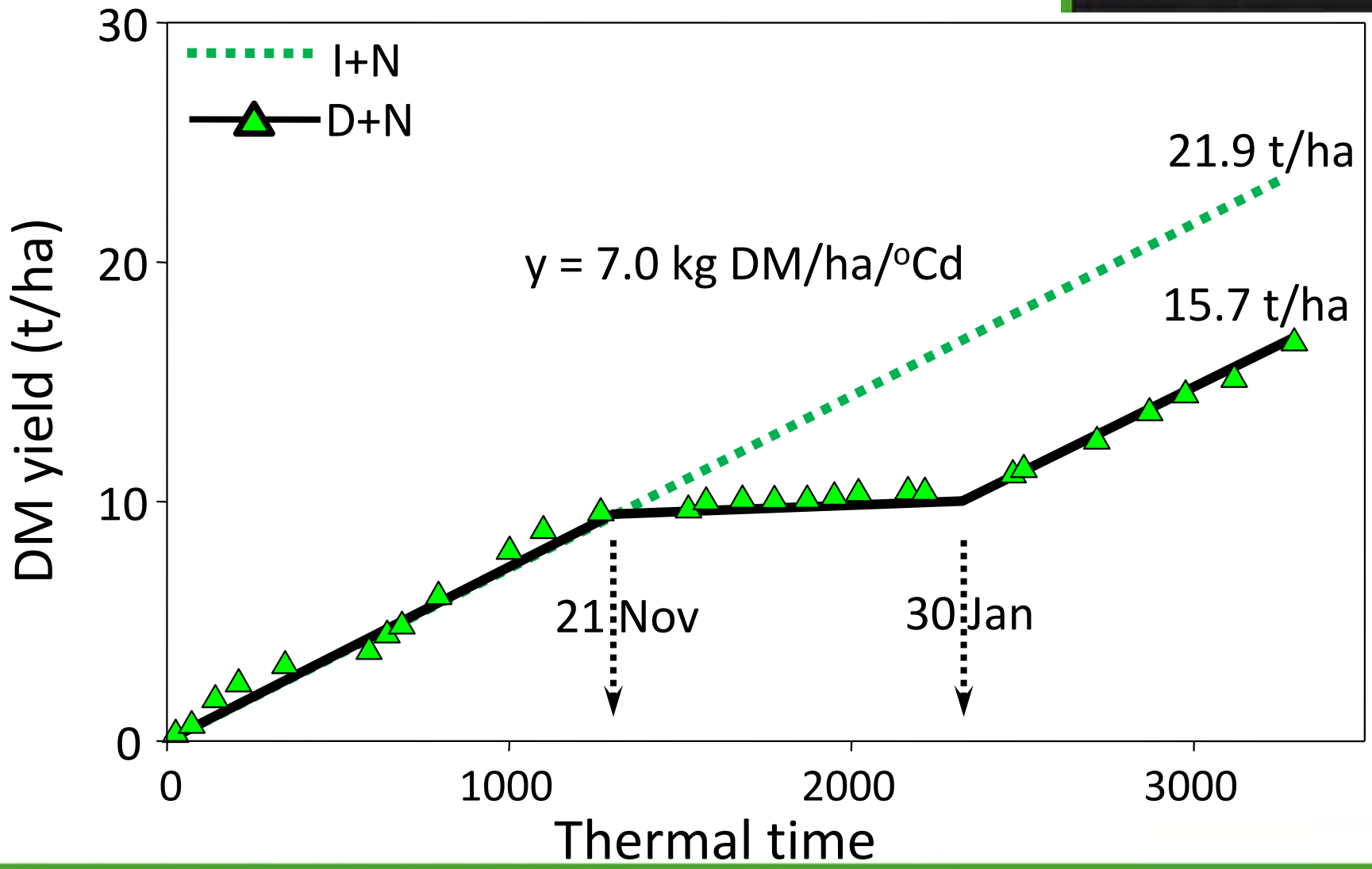
# Nitrogen fixation
# 25-30 kg N/t DM

Photo: DP Monks
Lincoln University

Lucas *et al*. 2010

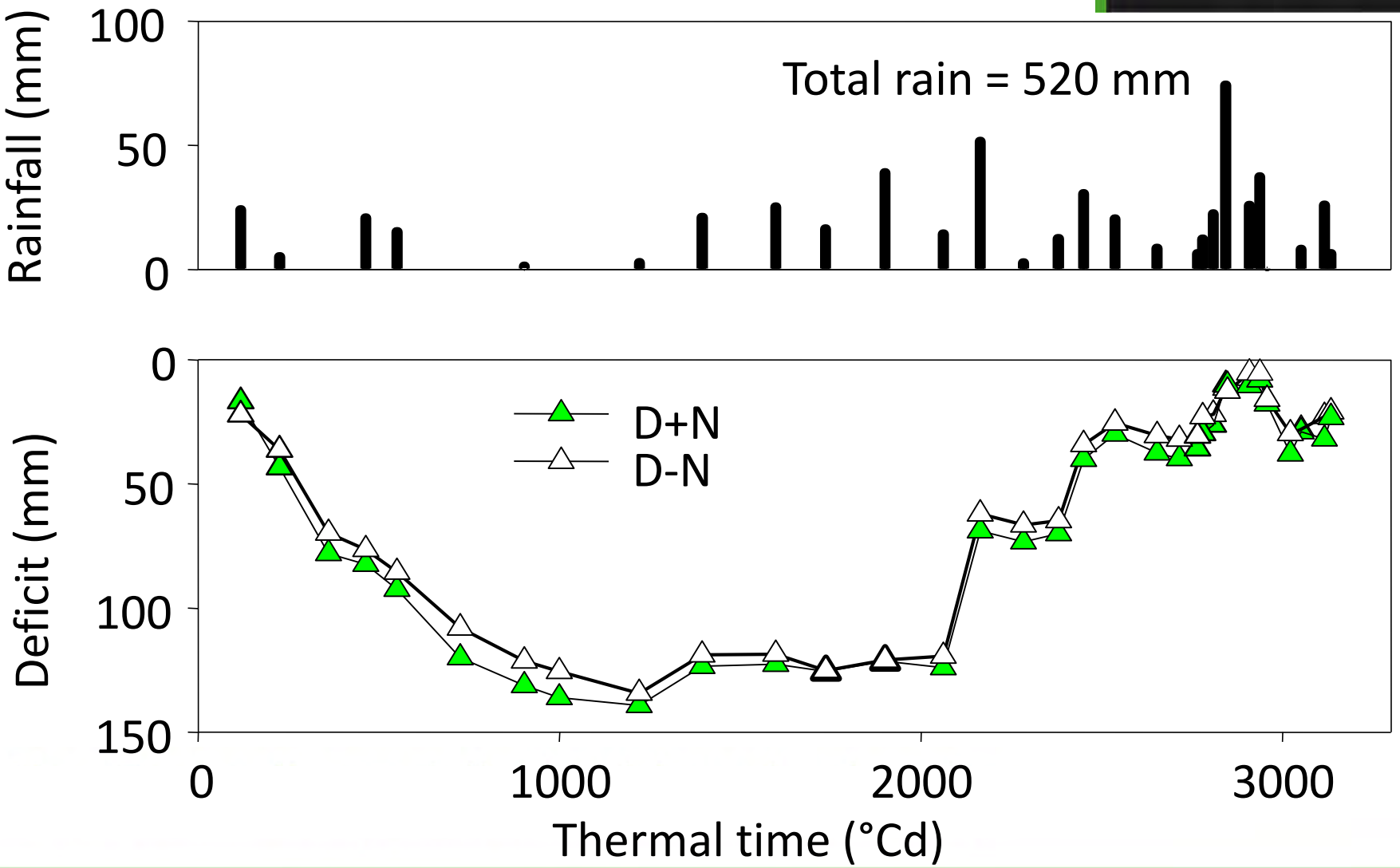

# Summer ⇒ moisture response

# Water stress effect on yield

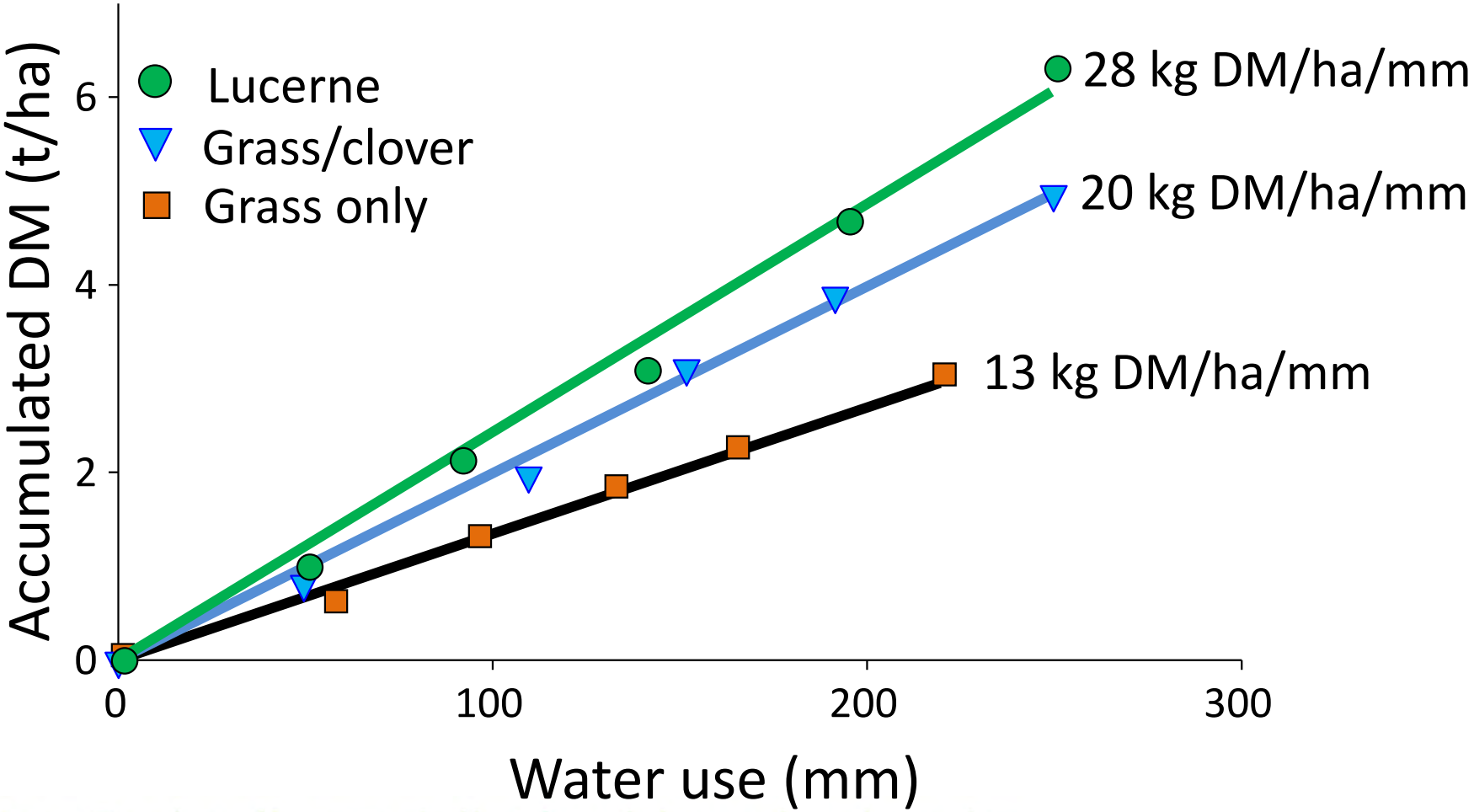



Mills *et al*. 2006

# Soil moisture deficit 2003/04



# Spring WUE

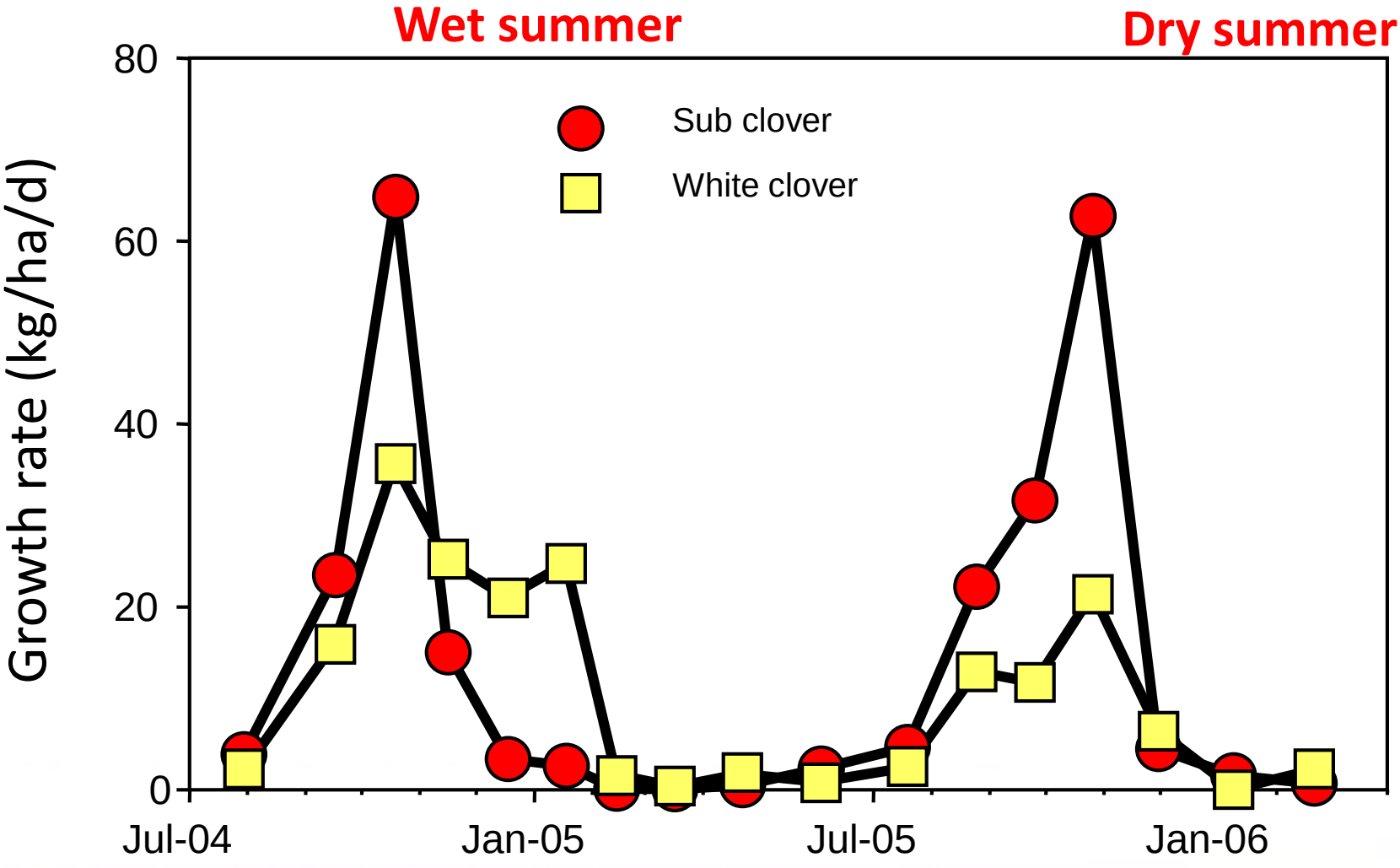





Moot *et al*. 2008

# Subterranean clover - annual

# Seasonal clover growth




Brown *et al*. 2006

# LEGUMES AT MEADOWBANK

## We're in clover

**Will Grigg**

**Website: www.lincoln.ac.nz/dryland**

**Field Day handouts and presentations page (20 June 2013)**

# Grazing after shutting up for sub clover seeding.

**Close up of germinating clover seedlings  on 1 May**

# WHAT'S HAPPENED TO PRODUCTION AT MEADOWBANK?

- Similar stock numbers, better fed.
- Ewe efficiency **increased 40%** since 2005

| | 2005 | 2012 | Change |
|---|---|---|---|
| **Ewe Lambing%** | 121% | 142% | ↑ 21% |
| **Hogget Lambing%** | 60% | 81% | ↑ 21% |
| **Weaning weight** | 28 kg/hd | 34 kg/hd | ↑ 21% |
| **Return** | $730/ha | $2640/ha | ↑$1910/ha (>**260%**) |

Photo: D Hollander
Lincoln University

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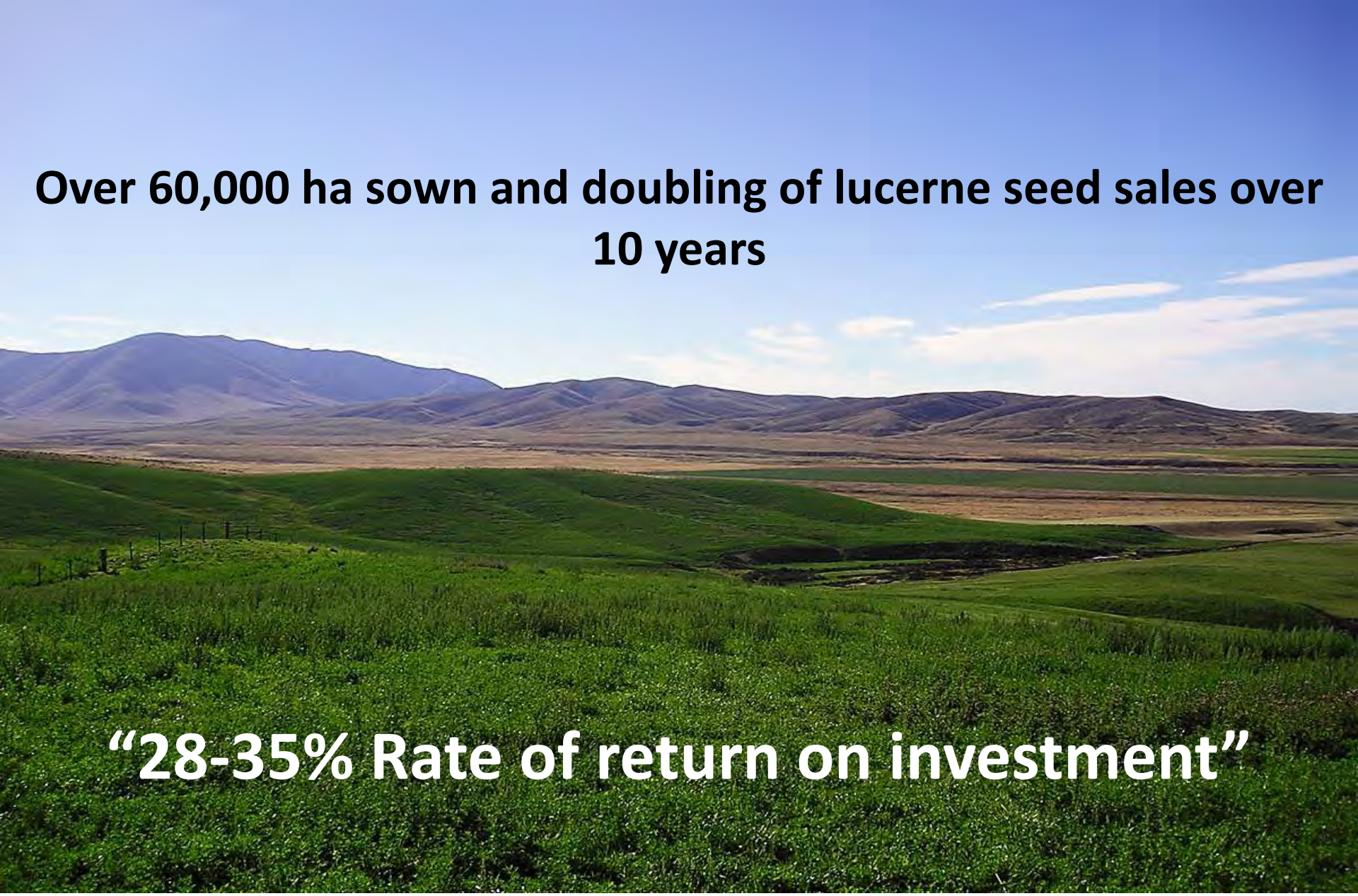
# Lucerne

## ~8 months after sowing

## > 1.5 m length


Drilling seed with fertiliser

Direct drilling = seed + fertiliser


Over 60,000 ha sown and doubling of lucerne seed sales over 10 years
“28-35% Rate of return on investment”

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

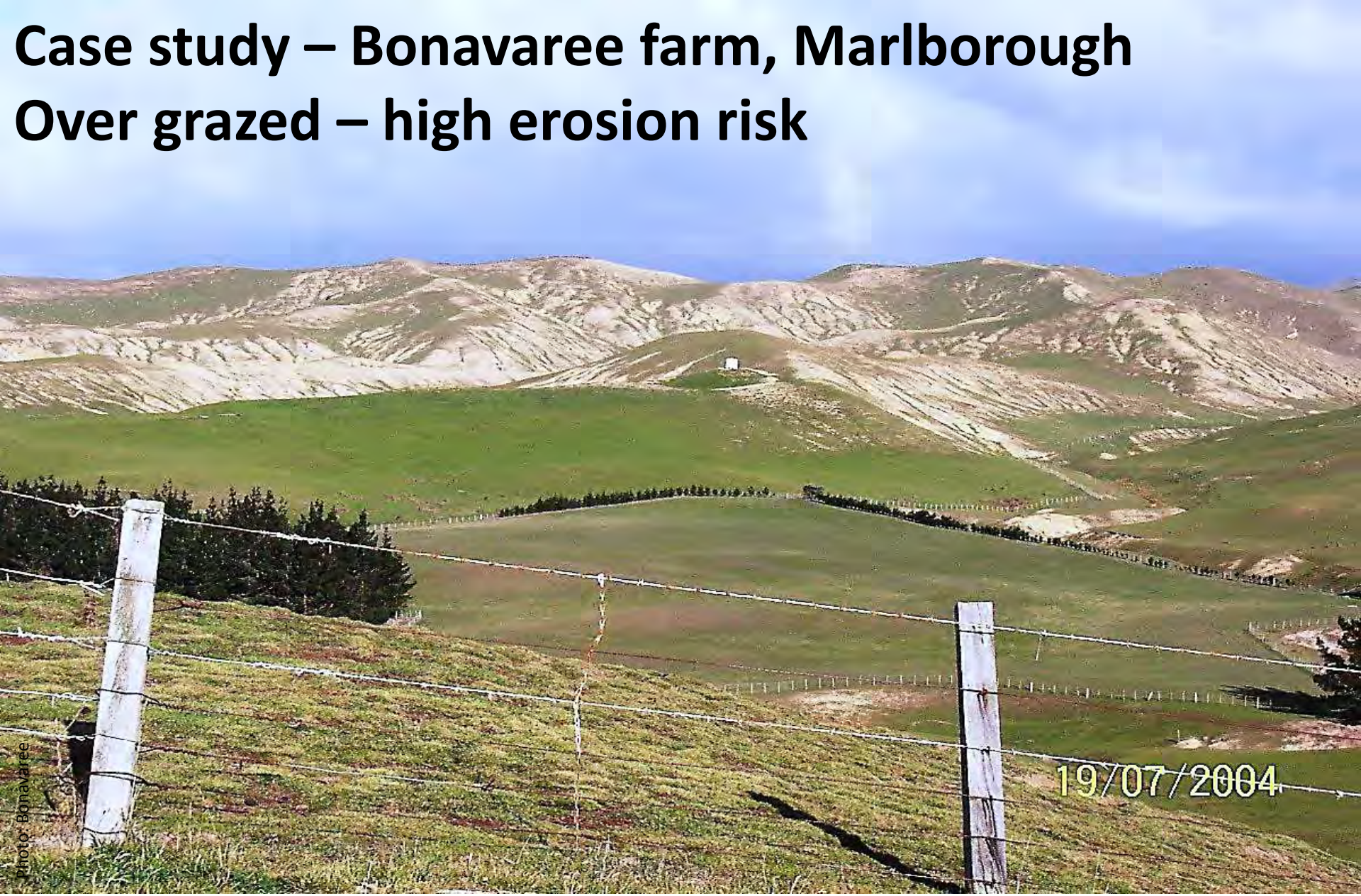



Photo: Bonavaree

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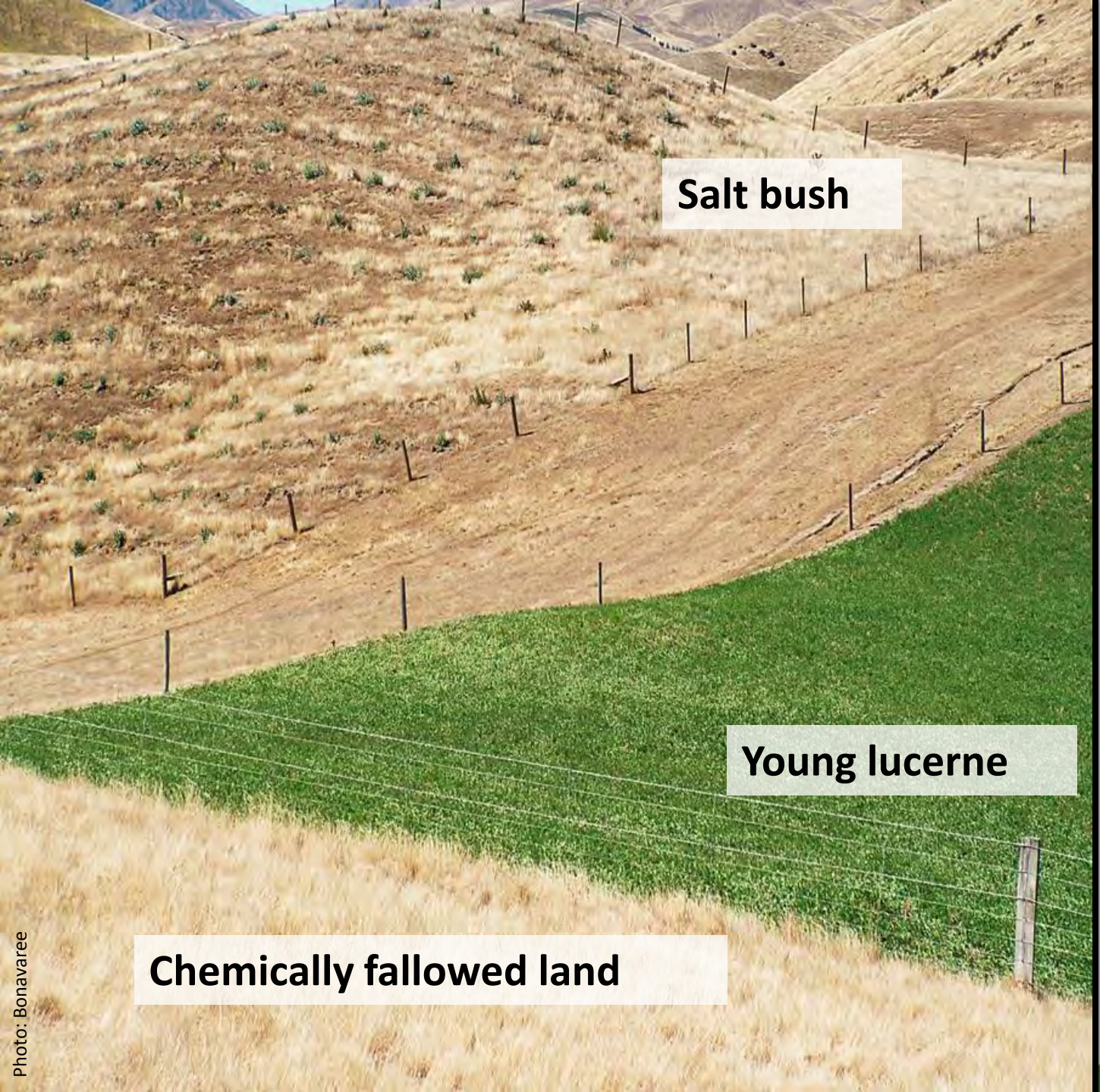


Photo: Bonavaree

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# Resilience through change – "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% |

Photo: Bonavaree


***"With better income we can focus on the environment and preserve it for generations to come"***

**Doug Avery**

# Resilient drought-proofed landscape

# SI Farmer of the Year 2010

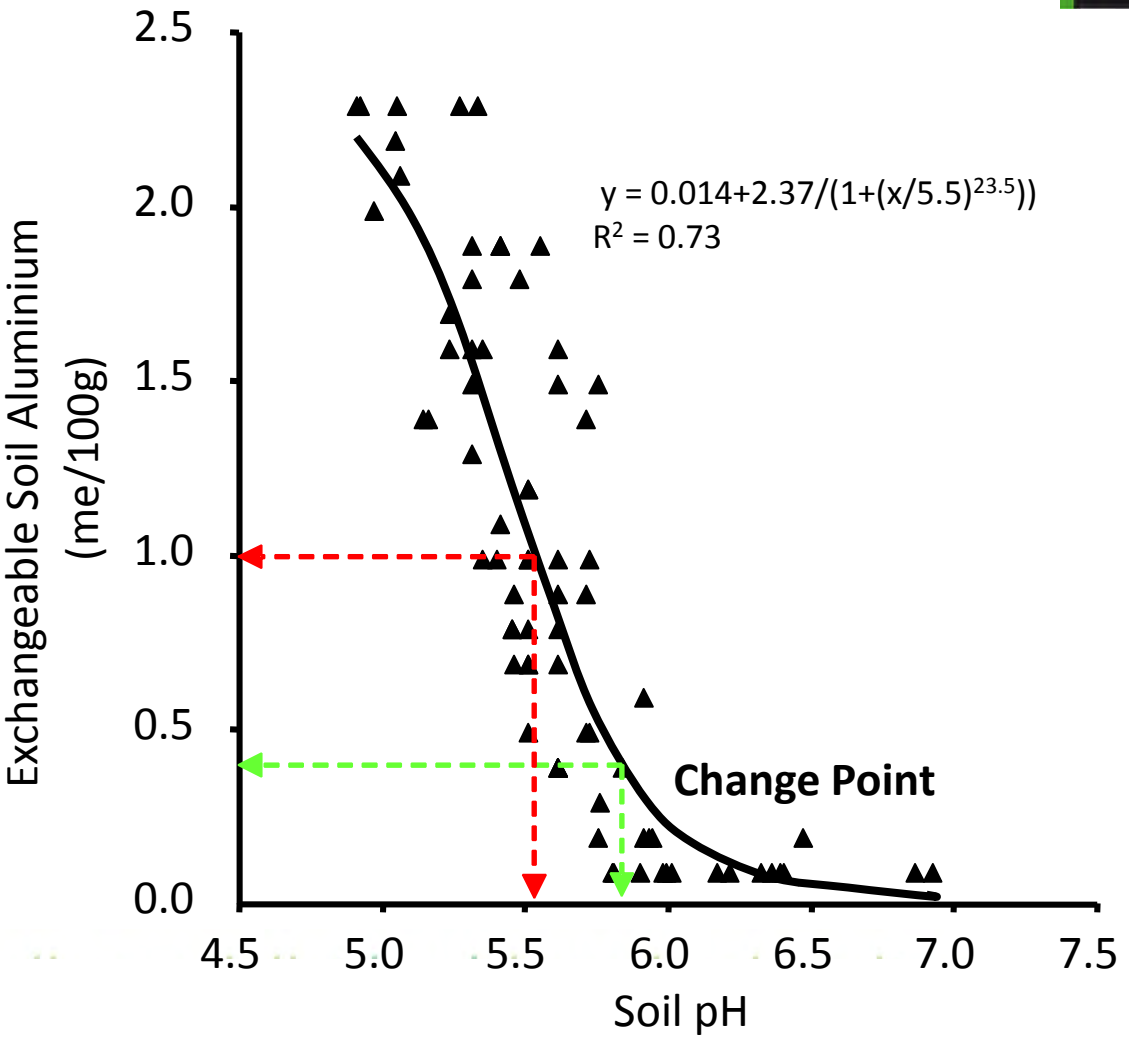

Photo: Bog Roy Station

New Zealand's specialist land-based university

# Landscape farming

Photo: Bog Roy Station

# Soil pH & exchangeable Aluminium




Moir & Moot, 2010


No Lime - Lucerne

Lupins tolerate aluminium

# Transforming dryland regions

S - profitable, resilient, legume based

W - new skills, no political profile

O - 2M ha, east coast NZ

T - Overseer, dairy industry

# Sustainable transformation

- **Farmers with incentives to change – economic, land sustainability, social.**

- **Appropriate research - on-farm application to reduce complexity of intensification**

- **Mutual integrity and trust  between scientist and farmers**

# References & Links

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