

Global Food Security
Northwijkerhout, Netherlands September 2013



**Lincoln
University**
Te Whare Wānaka o Aoraki
AOTEAROA • NEW ZEALAND



Sustainable intensification of livestock systems in New Zealand

Dr Derrick Moot
Professor of Plant Science

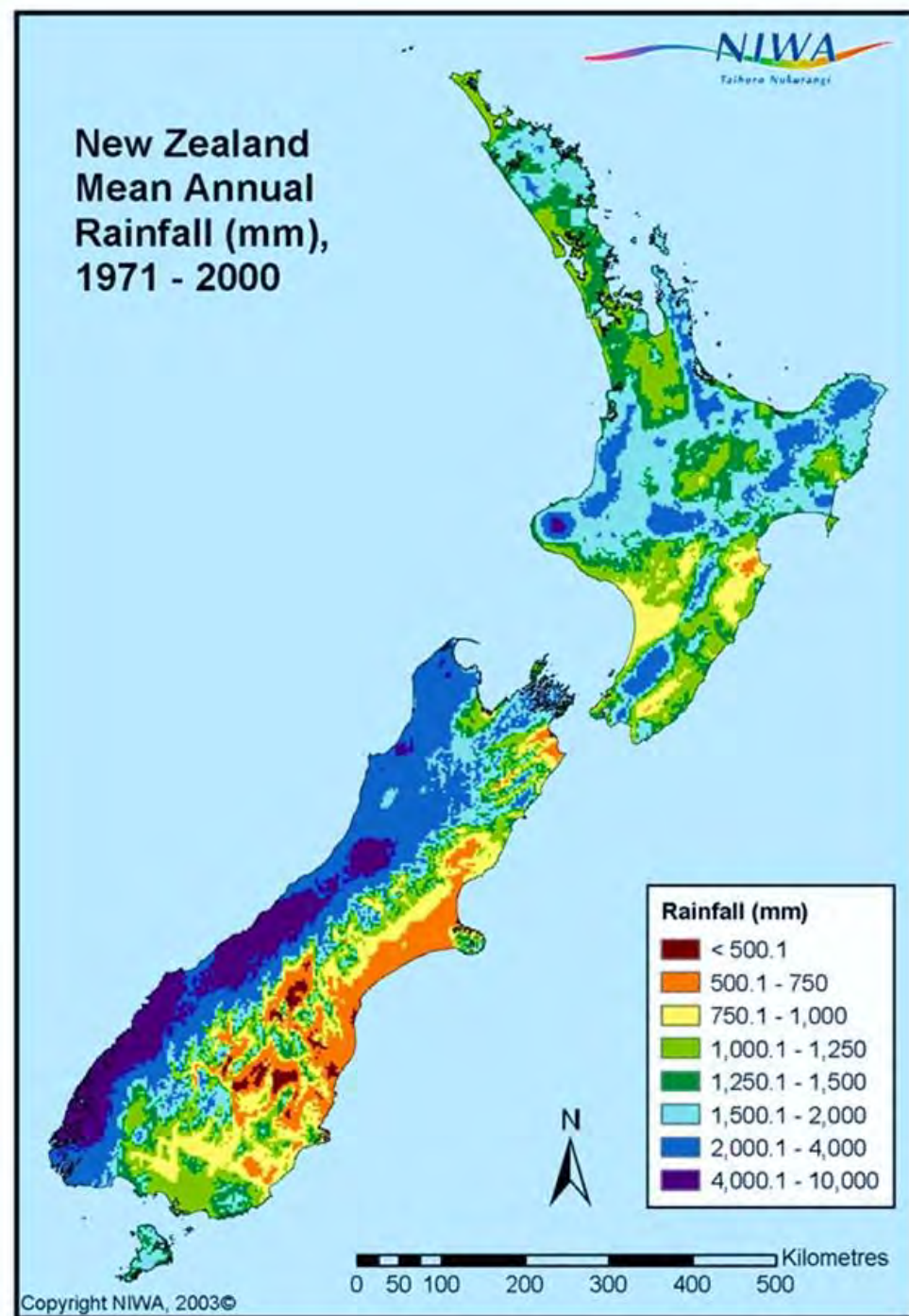
New Zealand's specialist land-based university

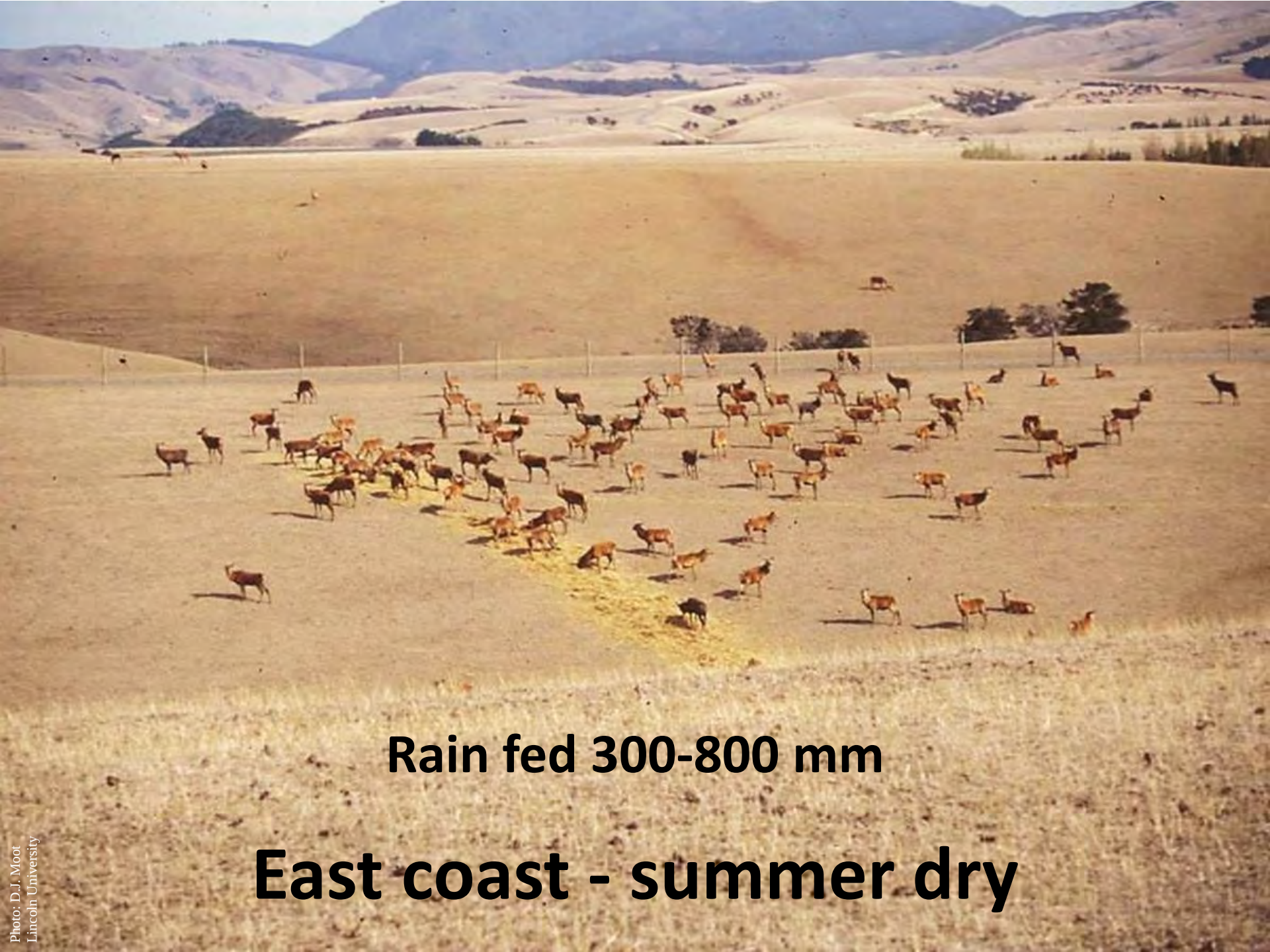


This work by [Derrick Moot and the Lincoln University Dryland Pastures Research Team](#) is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](#).



**Strong rainfall gradient
West $\Rightarrow$ East**





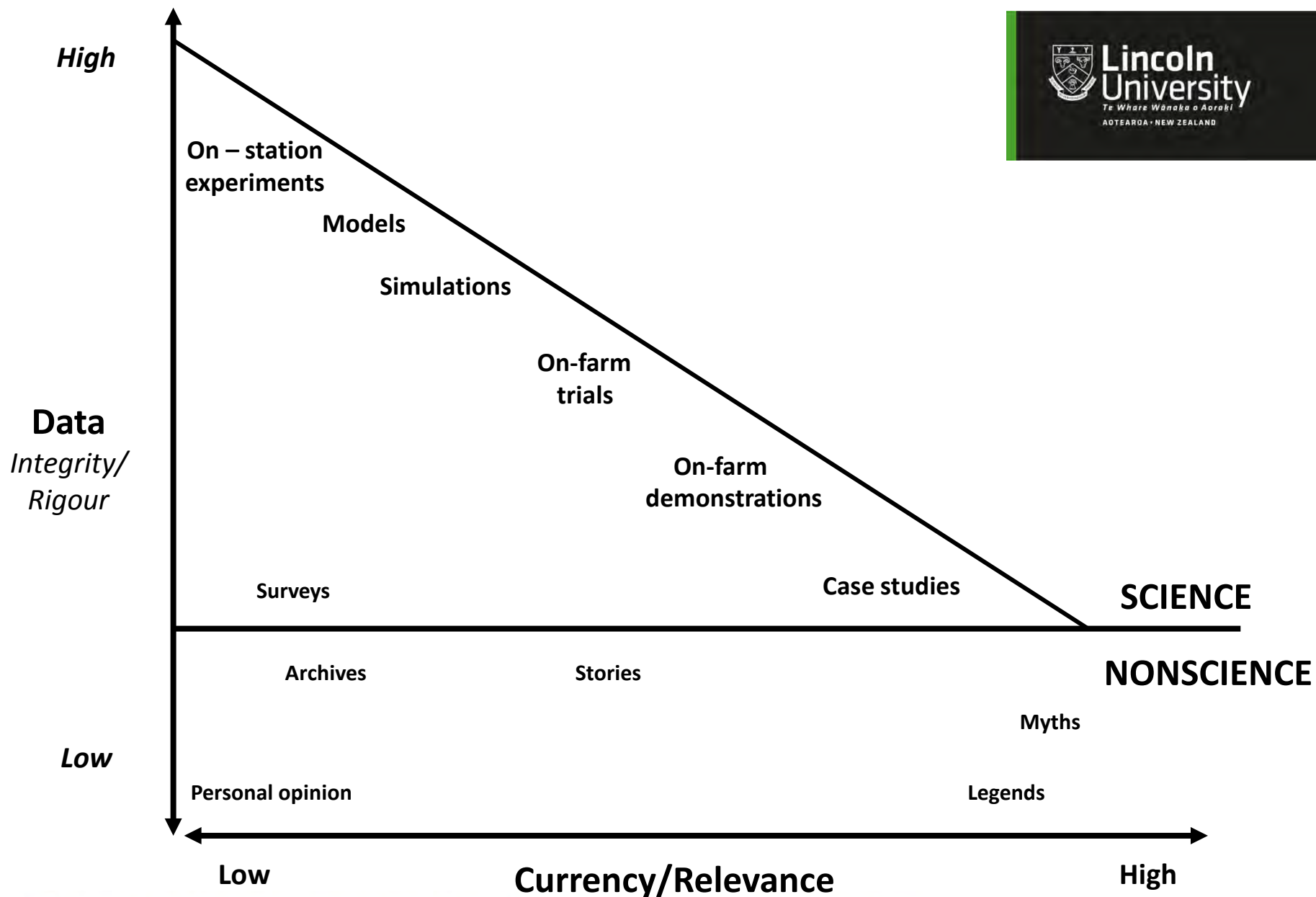
Rain fed 300-800 mm

East coast - summer dry



By 2030 - Drier:

**Drought – increased duration and frequency
Annual and tap rooted dryland pasture species?**



New Zealand's specialist land-based university

Farmer questions?

a) Which dryland species?

- Ryegrass/white clover familiar but fails
- Other grasses - different mgmt
- Lucerne – cut and carry

RG/Wc

Lucerne

CF/Sub

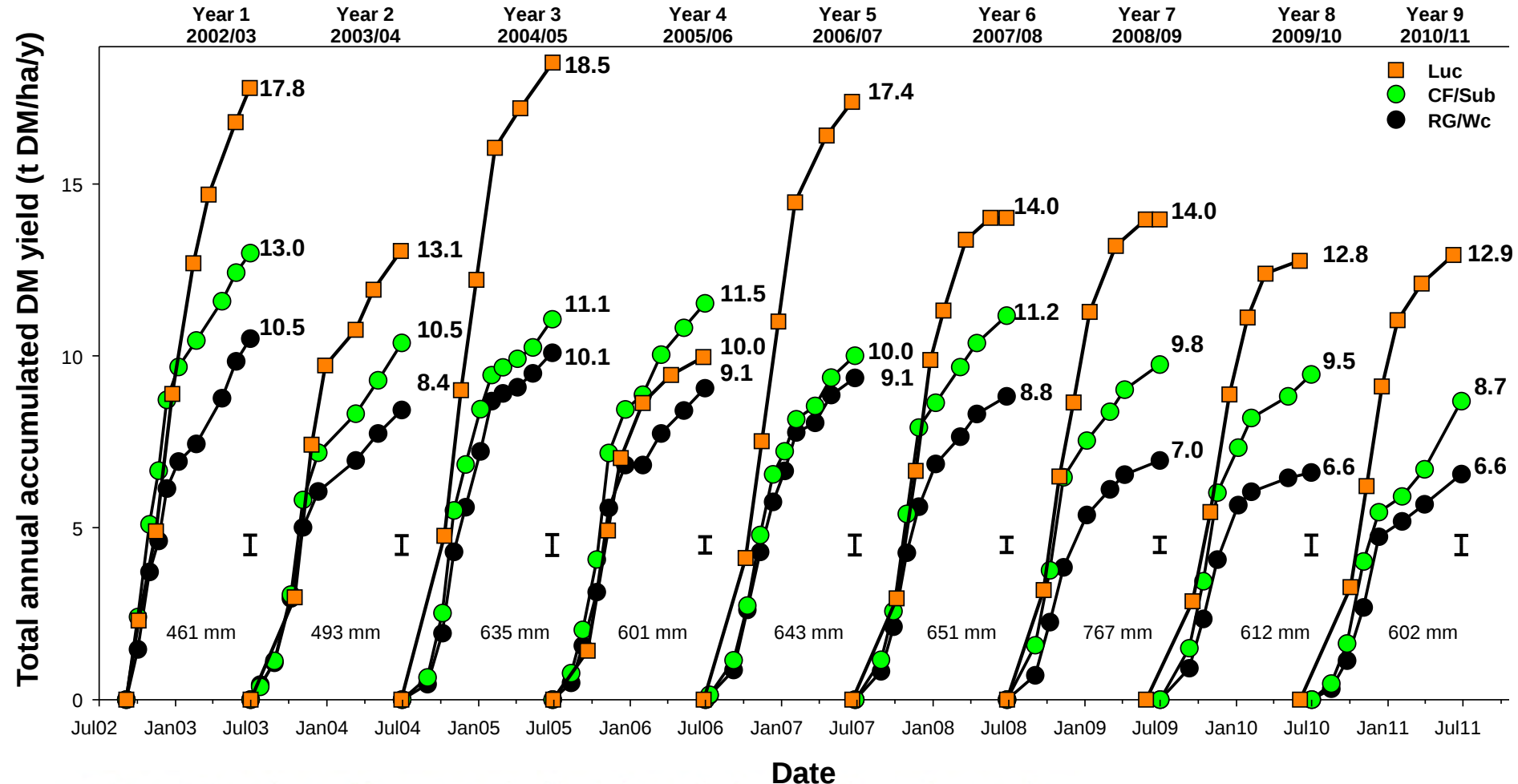
CF/Balansa

CF/Cc

CF/Wc

‘Grazing Expt. - MaxClover’

MaxClover Total DM yields

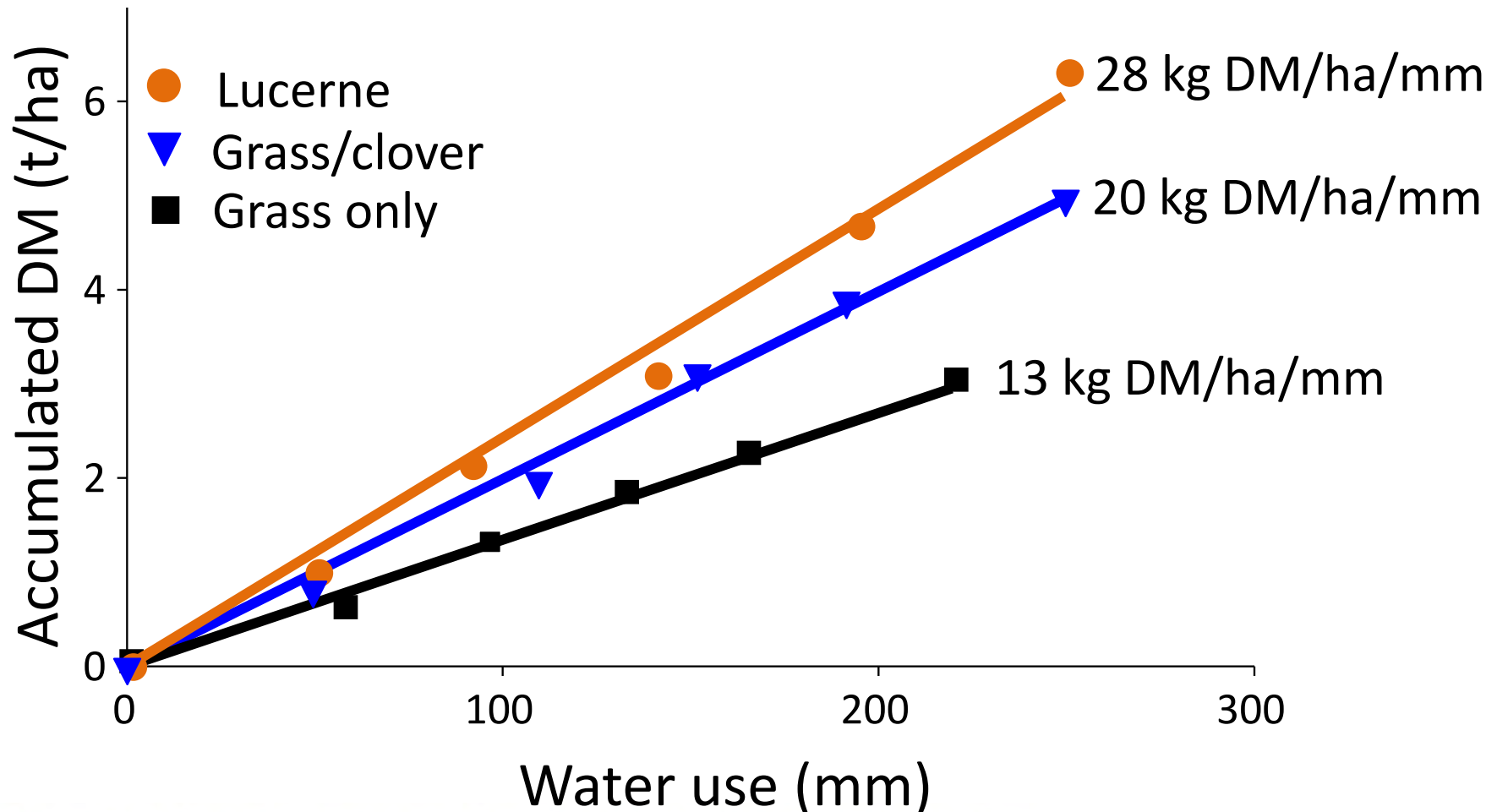


New Zealand's specialist land-based university



Unsown species <5% in Year 1>45% in Year 6
RG/Wc pastures

Spring WUE



New Zealand's specialist land-based university

Farmer issues

b) With lucerne - inappropriate US mgmt!

- 10% flowering – basal bud formation
- Average 23% higher but 3-weeks later
- Ewes and lambs on lucerne pre-weaning

Experiment - flexible grazing

38 days resting

4 days grazing

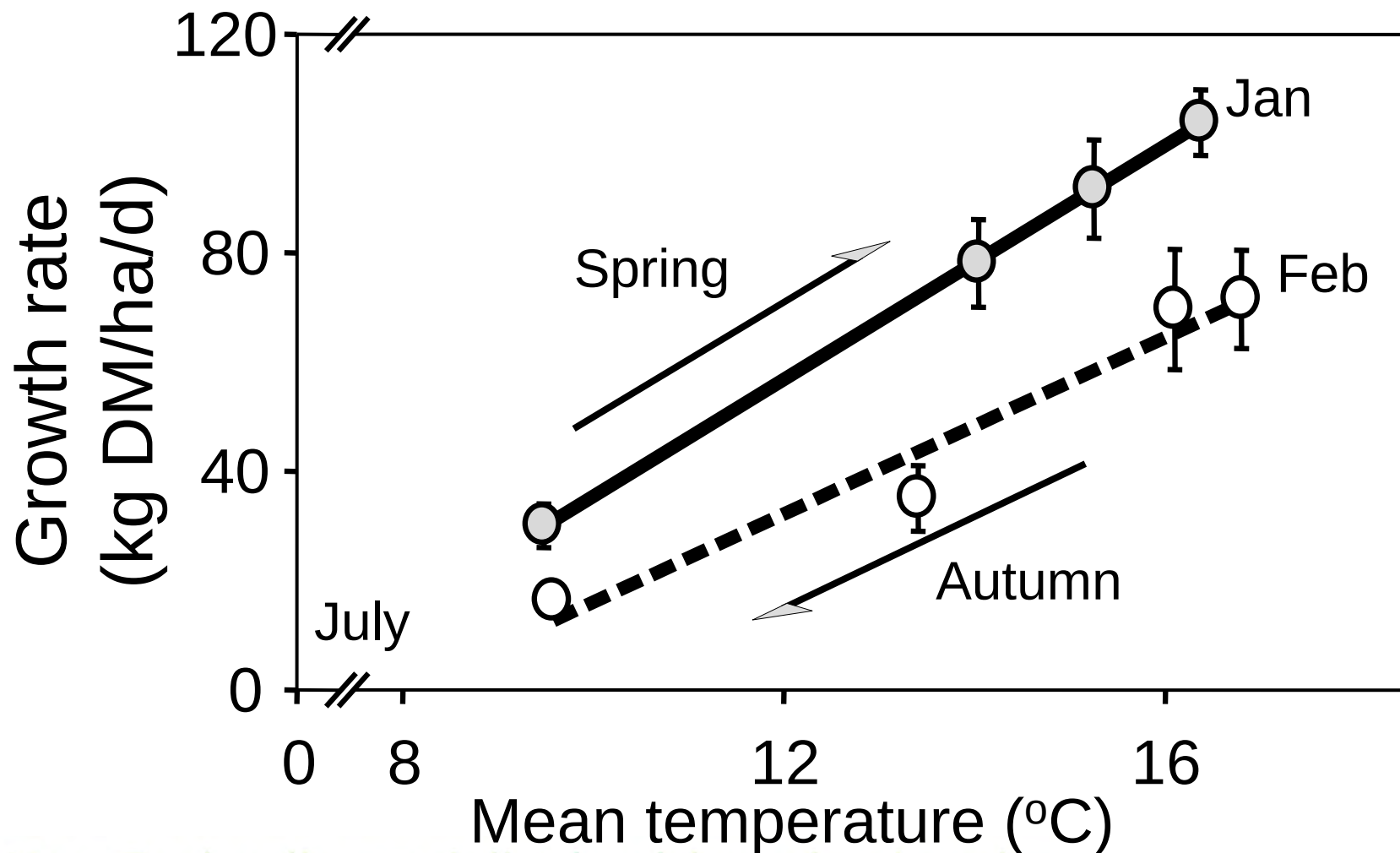


25 days resting

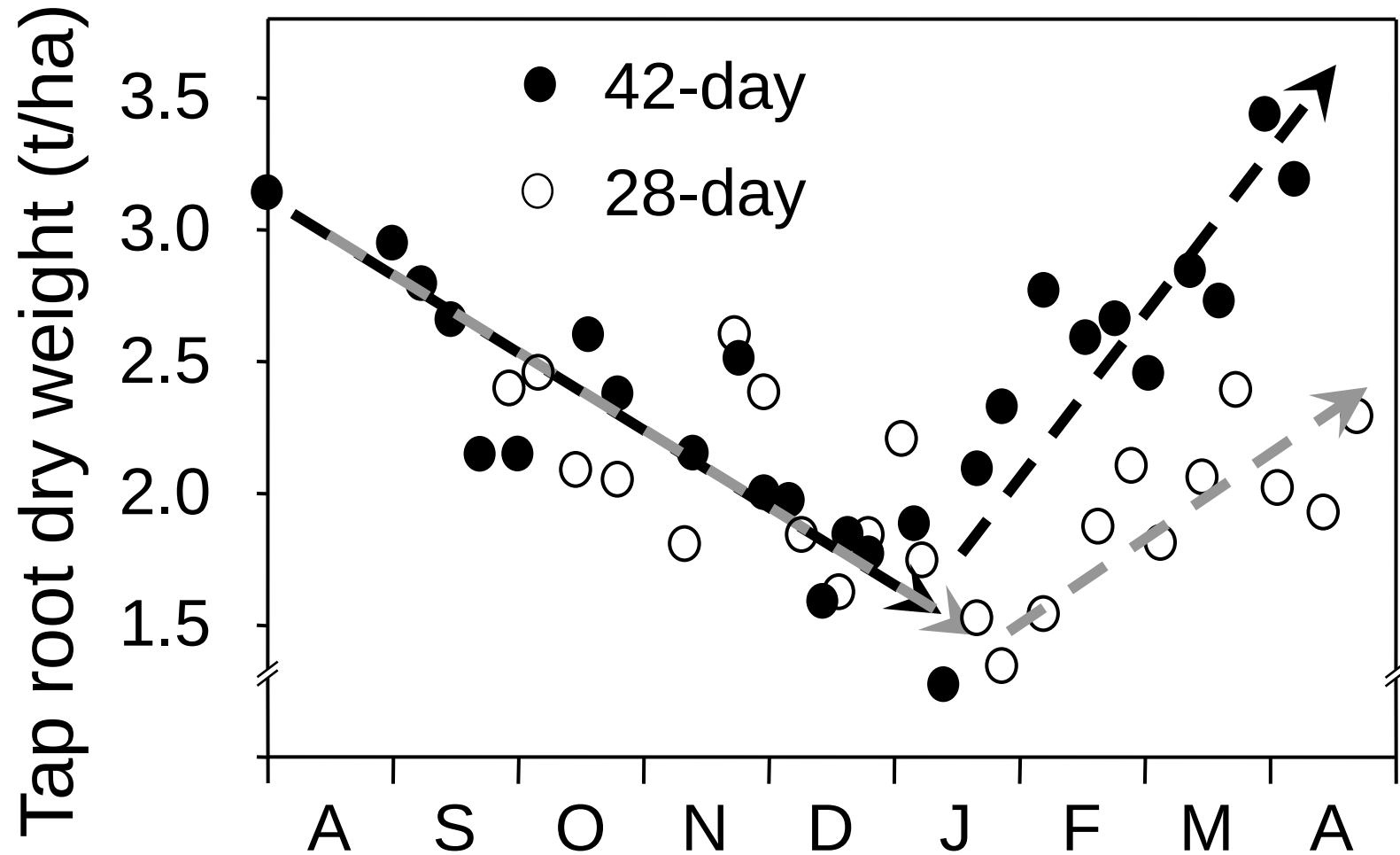
3 days grazing



Vegetative growth

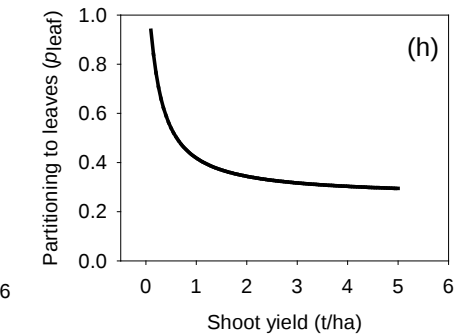
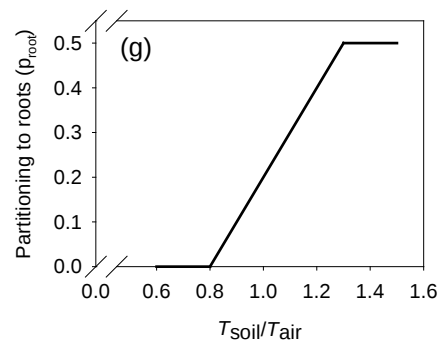
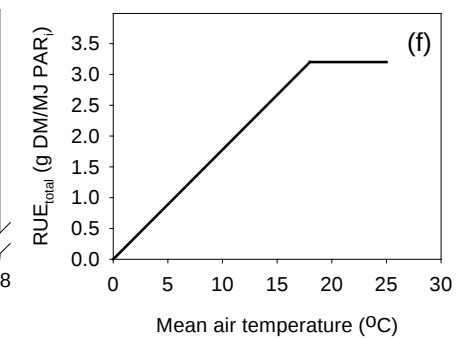
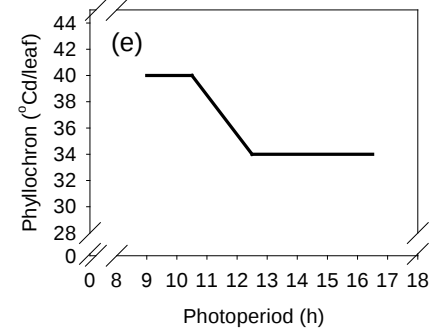
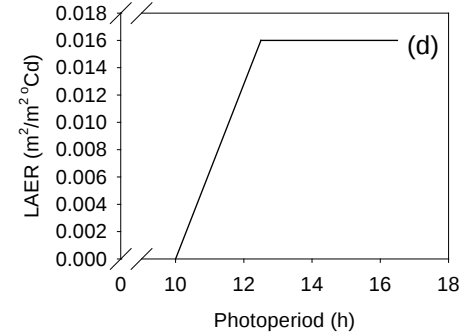
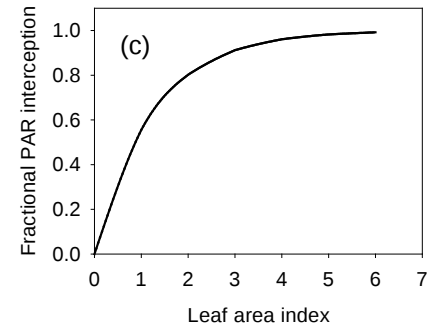
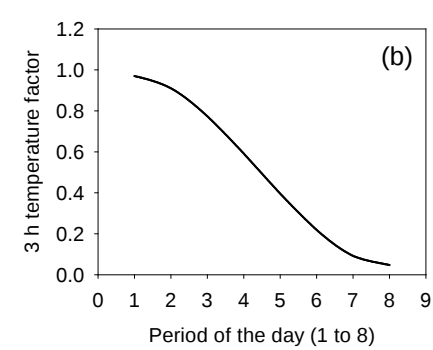
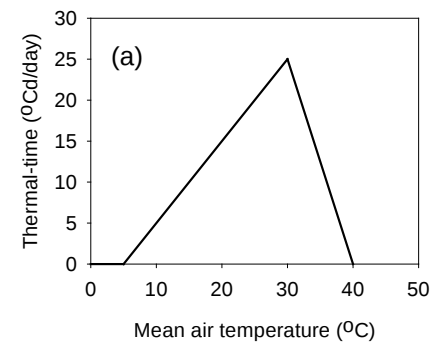
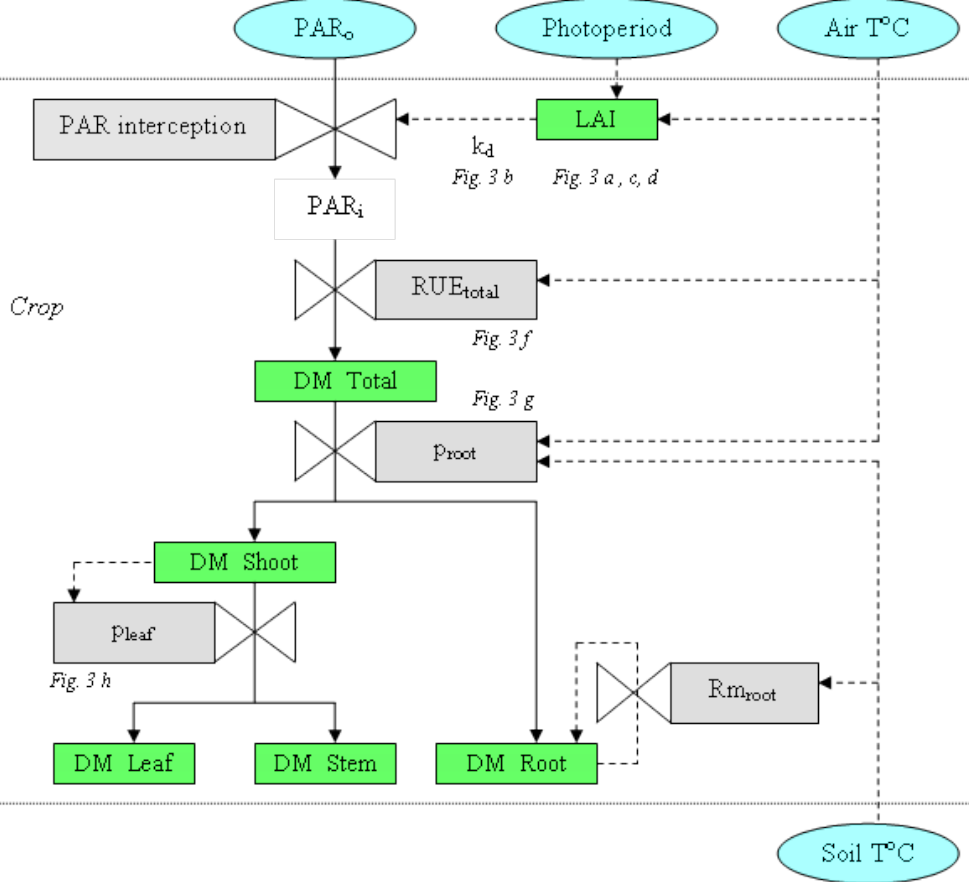


Partitioning to roots

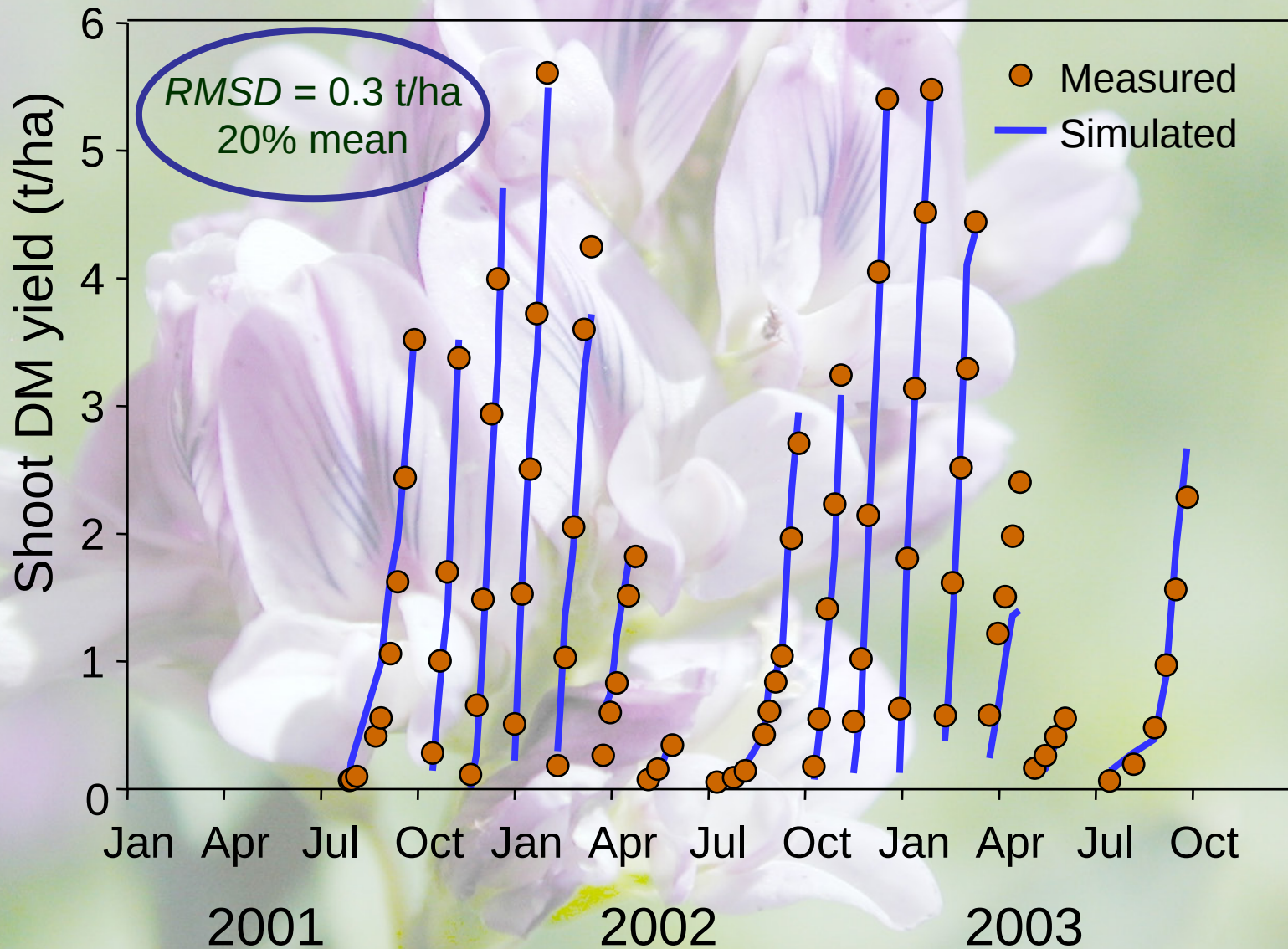


Modelling

Environmental factors



Predictions of shoot yield



Extension – solution to every problem



SERVANT LEADER



Photo: 'Bonavaree'
Marlborough

Where to plant

New Zealand's specialist land-based university



Landscape farming

New Zealand's specialist land-based university



When to graze

Photo: 'Bonavaree'
Marlborough



Which animals?



Photo: Lincoln University Research Dairy Farm

New Zealand's specialist land-based university

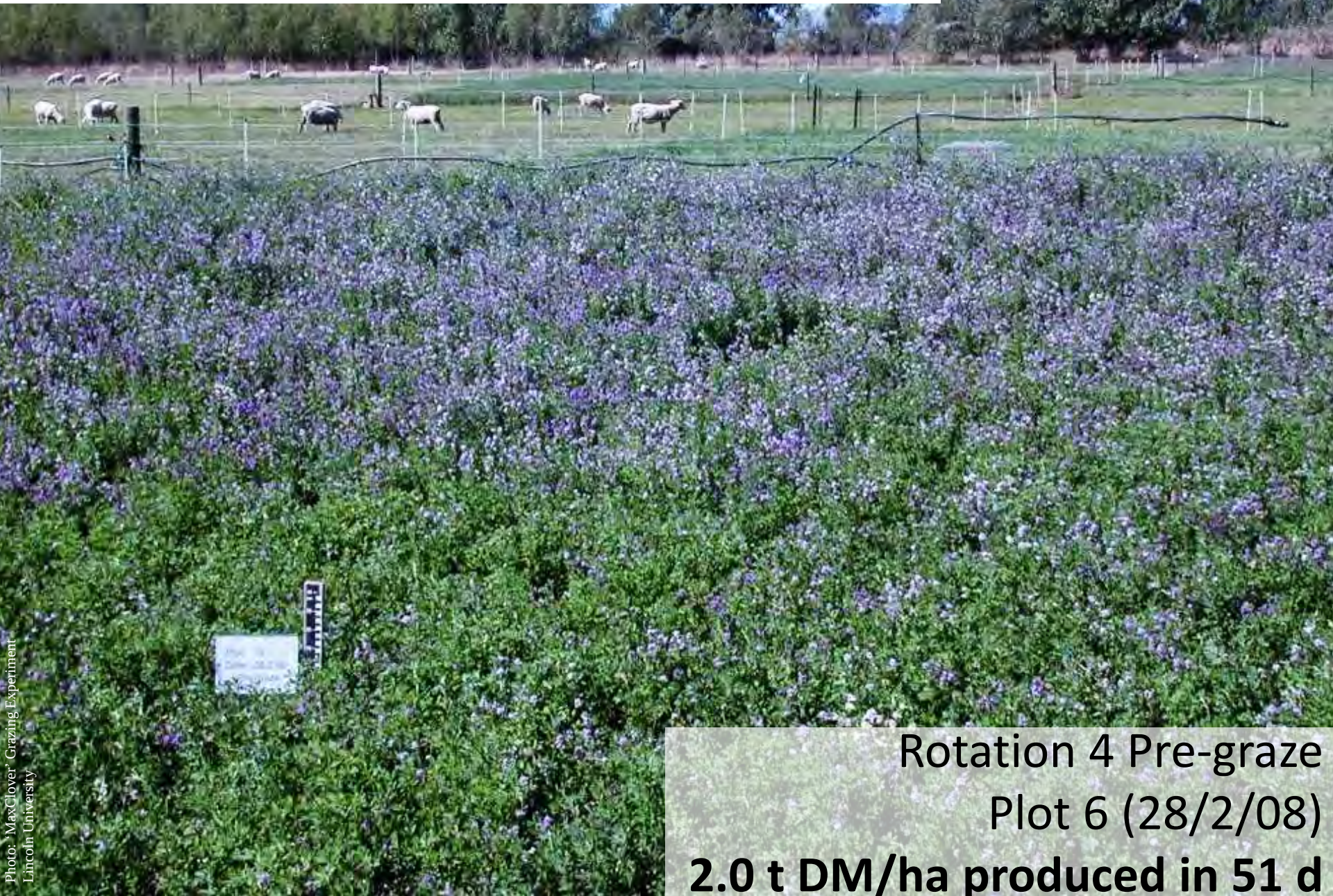


11.09.2009
What else to feed

Spring = animals



Autumn = flowering plants



Rotation 4 Pre-graze
Plot 6 (28/2/08)

2.0 t DM/ha produced in 51 d



In the field



Photo: 'Bonavaree' Marlborough
"Beyond Reasonable Drought Field Day"

143 Extension days since 2007

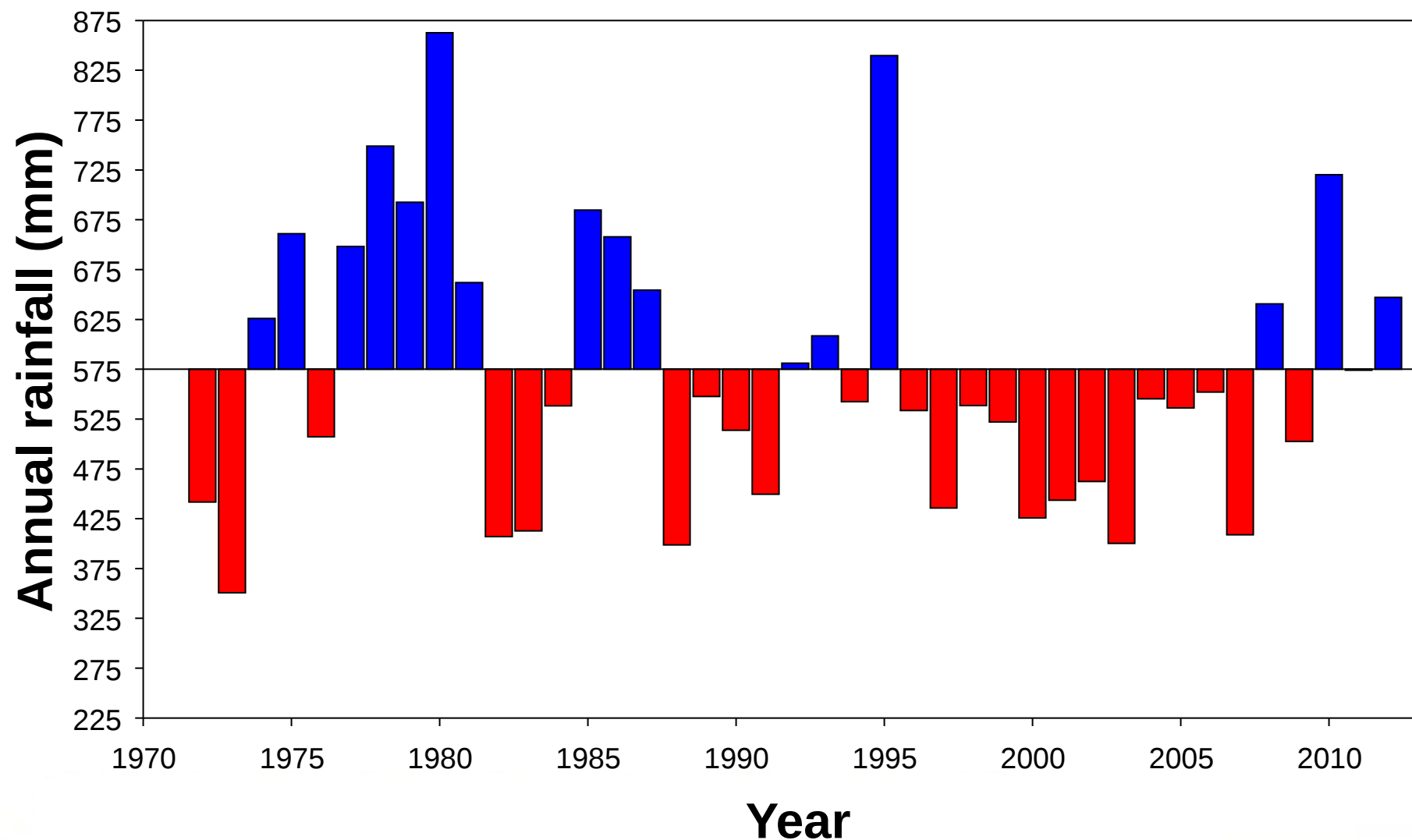
(to June 2013)

Case study – ‘Bonavaree’ farm

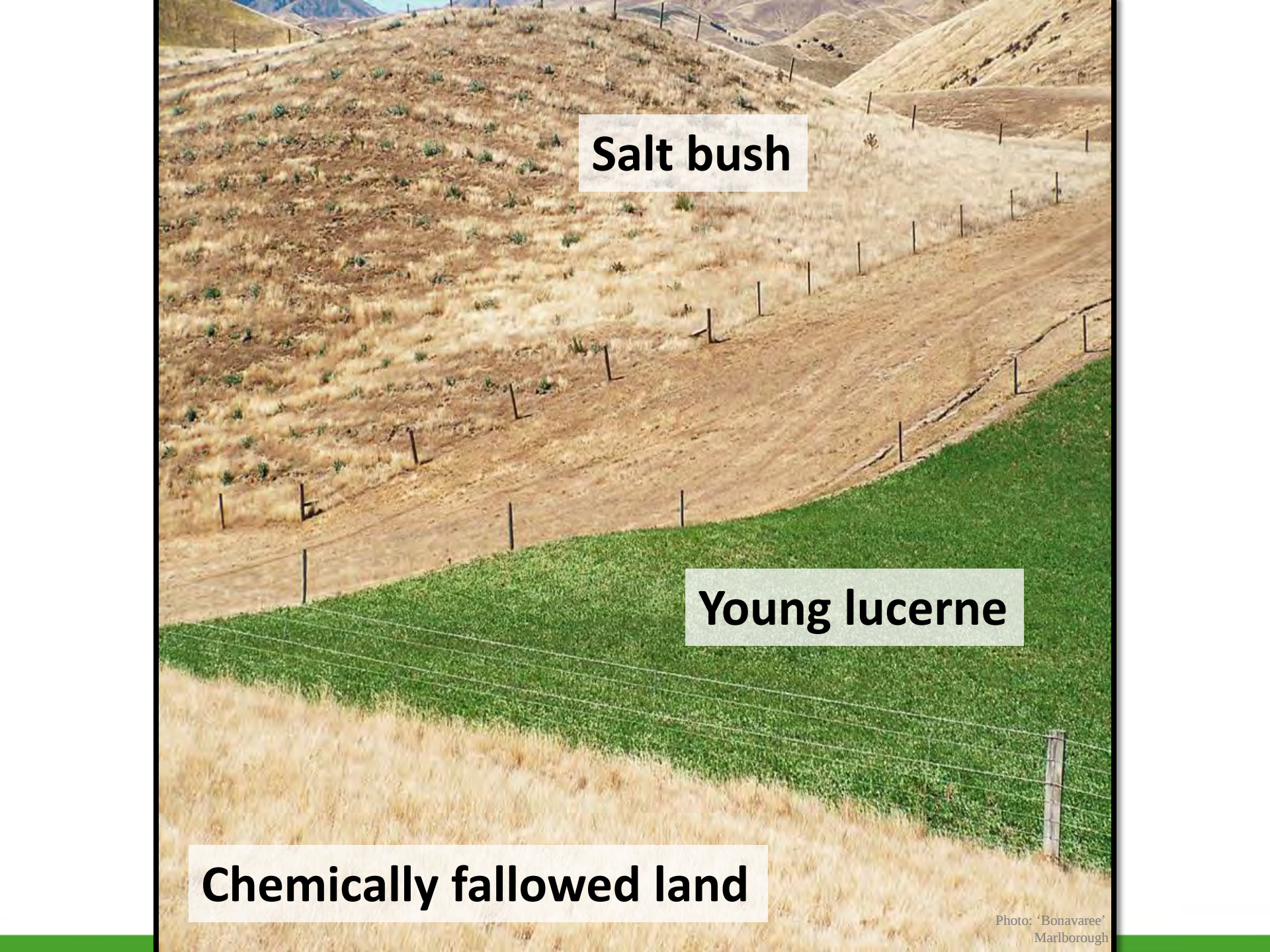
Over grazed – high erosion risk



Annual rainfall at 'Bonavaree'







Salt bush

Young lucerne

Chemically fallowed land

‘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)	\$US267	\$US665	↑ 149%



New Zealand's specialist [land-based university](#)





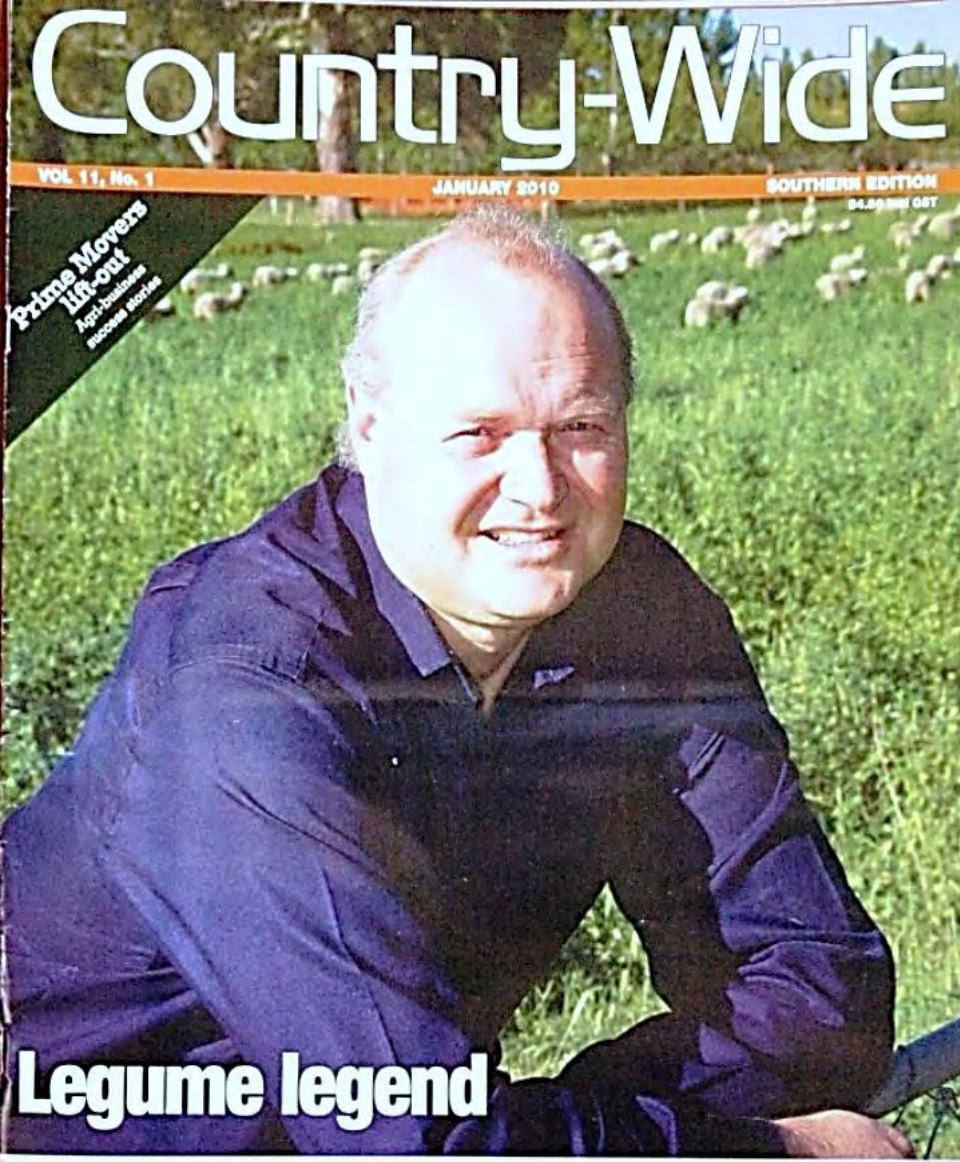
***“With better income we can focus on the environment and preserve it for generations to come”
(Doug Avery)***

New Zealand's specialist land-based university

Resilient drought-proofed landscape



SI Farmer of the Year 2010



Integrity & Trust

The Blog.....

- On-farm activity diary
- Slide shows, photos & video
- Ability for farmers to comment/question/query
- Farmers and researchers can respond

**Lincoln University**
Te Whare Wānanga o Aoraki
CHRISTCHURCH - NEW ZEALAND



Dryland PasturesConversations at Lincoln University

Home | About | Blog

Lambing onto Omaka Barley – North Face

Posted on August 27, 2012 by Cath Coulter

Omaka Barley is a great crop to use at Bonavaree. Barley is used here because it really fits in well with the Avery's system. The Omaka variety has been bred locally, and is very suitable for reliable dry matter production in a Marlborough dryland environment.

It is a multipurpose crop at Bonavaree, in that it is used as a green feed crop, and as a break crop. The Omaka is grazed multiple times from March till the end of August. Dry matter production is usually between 6–8 T/ha, and is grazed by both cattle and sheep.

Omaka Barley is also used regularly at Bonavaree for the purpose of breaking weed/pest cycles, and increasing base soil fertility in preparation for sowing lucerne, or a Bonavaree mix. Barley is used as the 2nd break crop in a multi stage lucerne renovation system that has been working very well. The 1st break crop used is an Annual Ryegrass that is grazed by multiple bearing ewes at lambing, and prime bull beef production. We will be following the progress of this renovation system through, with regular updates.

Some paddocks are used to grow Omaka Barley for two consecutive years, but because of the Avery's wider interest in establishing paddocks with Lucerne, barley is normally used as a 2nd break crop in the renovation process.



Recent Posts

▶ Lambing onto Omaka Barley – North Face

▶ Lambing onto Lucerne – Jaffries Front Flat (August)

▶ Bonavaree Dryland Blog

▶ Welcome to dryland pastures blog

Recent Comments

Cath Coulter on ▶ Bonavaree Dryland Blog

Gavin snow Loxton on ▶ Bonavaree Dryland Blog

▶ Barbara Stuart on ▶ Bonavaree Dryland Blog

Archives

▶ August 2012

Categories

▶ Dryland Lucerne

▶ Uncategorized

Meta

▶ Log in

▶ Entries RSS

▶ Comments RSS

www.lincoln.ac.nz/conversation/drylandpastures/

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**
- **On-going engagement and mentoring.**

Transformational change & Resilience to climate change



**Over 60,000 ha sown and doubling of lucerne
seed sales over 10 years**

“35% Rate of return on investment”



Acknowledgements



**Lincoln
University**

Te Whare Wānaka o Aoraki

AOTEAROA • NEW ZEALAND

New Zealand's specialist land-based university



Ministry of Agriculture and Forestry
Te Manatū Ahuwhenua, Ngāherehere

New Zealand's specialist land-based university

References

- Carberry, P. S. 2001. Are science rigour and industry relevance both achievable in participatory action research? *In*: B. Rowe, D. Donaghy, N. Mendham (Eds.). "Science and Technology: Delivering Results for Agriculture?". Proceedings of the 10th Australian Agronomy Conference, January 2001. 29 Jan - 1 Feb 2001, Hobart, Tasmania. Australian Agronomy Society. Online: <http://www.regional.org.au/au/asa/2001/plenary/2005/carberry.htm#TopOfPage>.
- Kearney, J. K., Moot, D. J. and Pollock, K. M. 2010. Dryland lucerne production in Central Otago. *Proceedings of the New Zealand Grassland Association*, **72**, 121-126.
- Mills, A. and Moot, D. J. 2010. Annual dry matter, metabolisable energy and nitrogen yields of six dryland pastures six and seven years after establishment. *Proceedings of the New Zealand Grassland Association*, **72**, 177-184.
- Moot, D. J. 2012. An overview of dryland legume research in New Zealand. *Crop and Pasture Science*, **63**, 726–733.
- Moot, D. J., Brown, H. E., Pollock, K. and Mills, A. 2008. Yield and water use of temperate pastures in summer dry environments. *Proceedings of the New Zealand Grassland Association*, **70**, 51-57.
- Moot, D. J., Brown, H. E., Teixeira, E. I. and Pollock, K. M. 2003. Crop growth and development affect seasonal priorities for lucerne management. *In*: D. J. Moot (ed). Legumes for dryland pastures Proceedings of a New Zealand Grassland Association Inc Symposium held at Lincoln University, 18-19 November, 2003, 201-208.
- NIWA. 2010. Climate Explorer – Canterbury Regional Median Annual Rainfall Map. Date Accessed: 1/10/2010. <http://climate-explorer.niwa.co.nz>. Last Updated: 1/10/2010.
- NIWA. 2013. CliFlo Database - National Climate database. Date Accessed: 14/09/13. <http://cliflo.niwa.co.nz/>. Last Updated: Not Specified.
- Teixiera, E.I., Moot, D.J., Brown, H.E. 2009. [Modeling seasonality of dry matter partitioning and root maintenance respiration in lucerne \(*Medicago sativa* L.\) crops](#). *Crop and Pasture Science* 60: 778-784.