beef+lamb new zealand

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

Lincoln University
Te Whare Wānaka o Aoraki
AOTEAROA • NEW ZEALAND

21 October 2015

Dryland Pastures

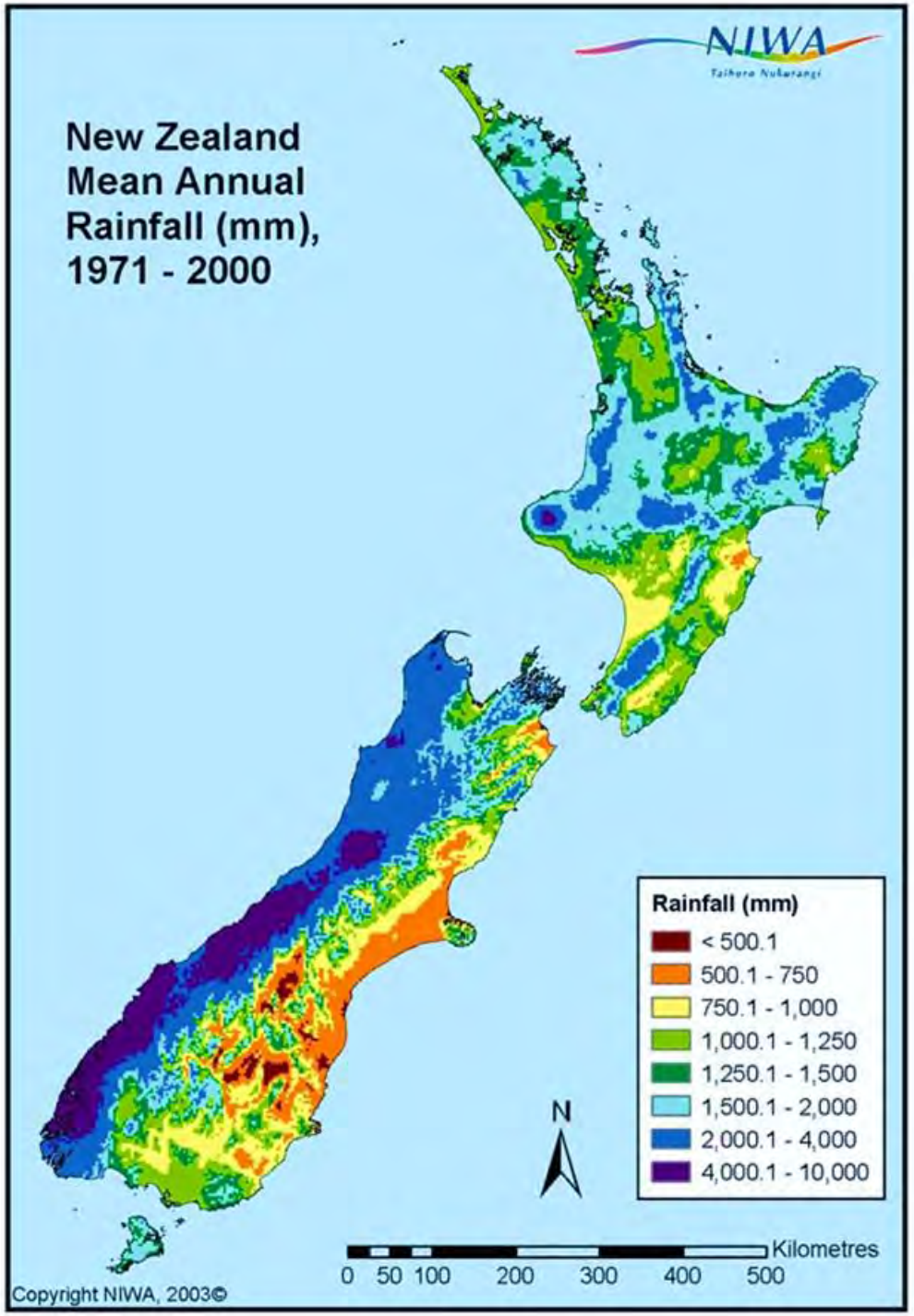
Professor Derrick Moot

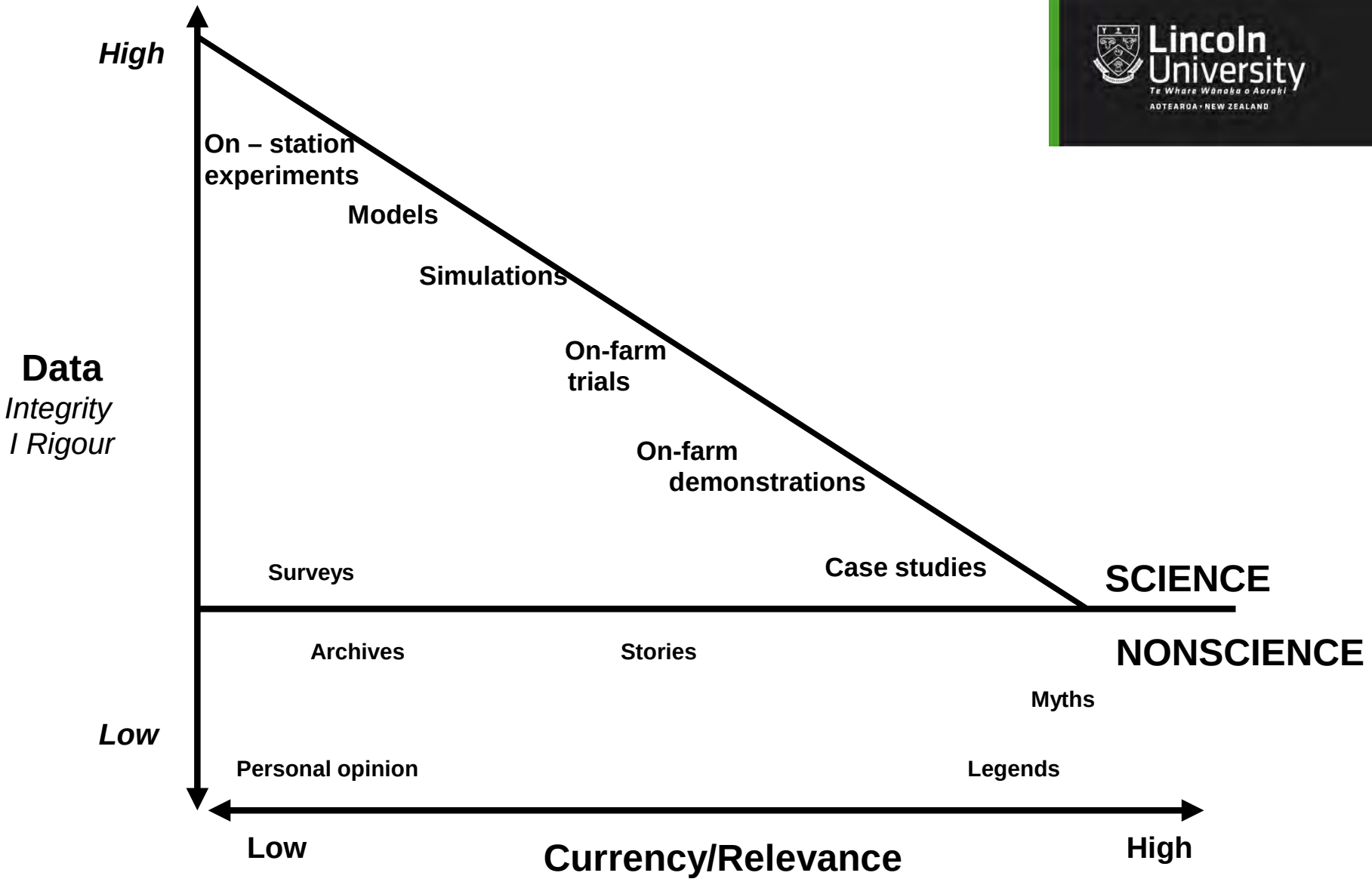


New Zealand's specialist land-based university

Strong rainfall gradient

West ⇒ East





New Zealand's specialist land-based university

(modified from Bonoma 1985 and Crookston 1984)

Experiment site – Quantify growth

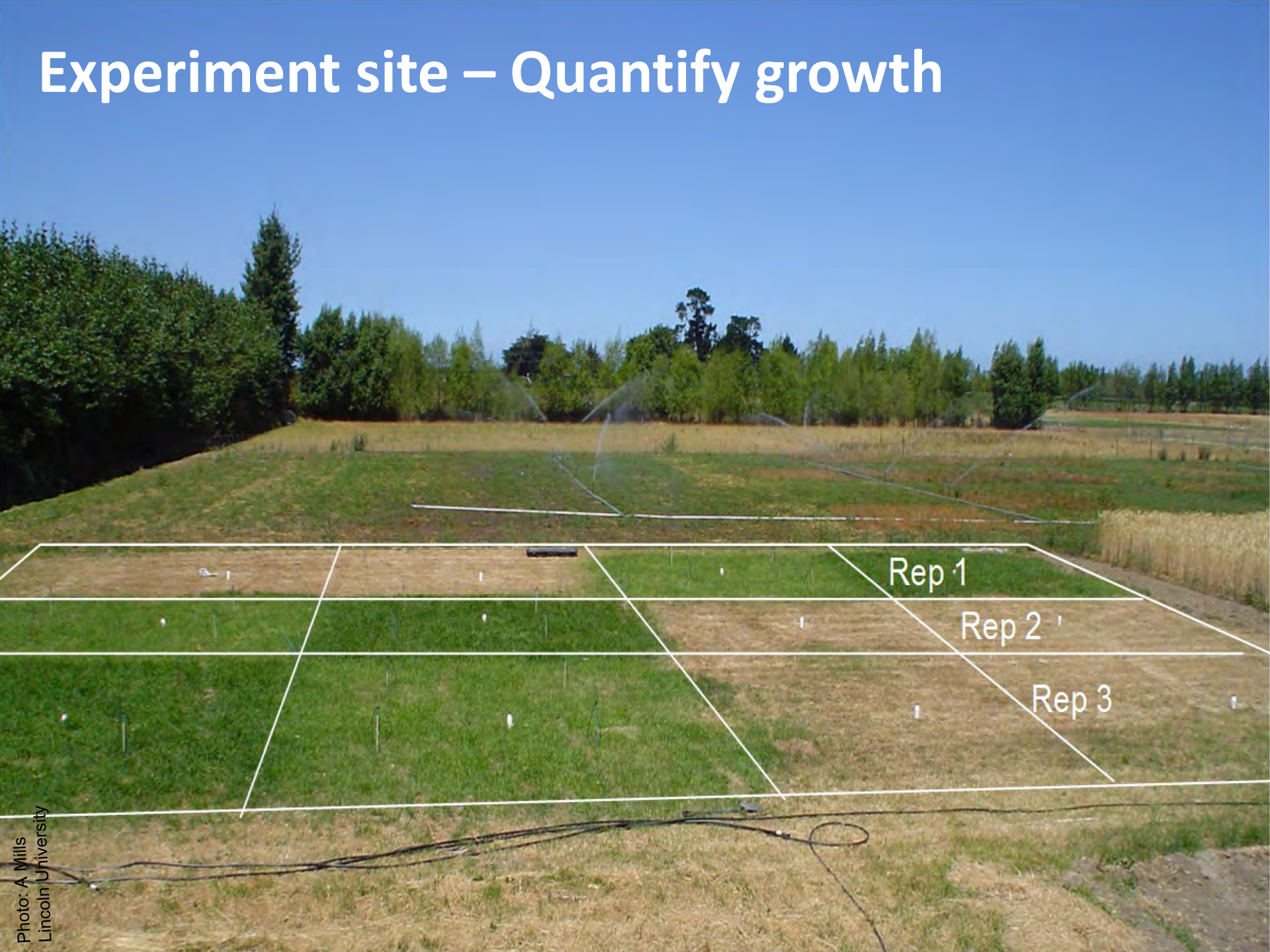
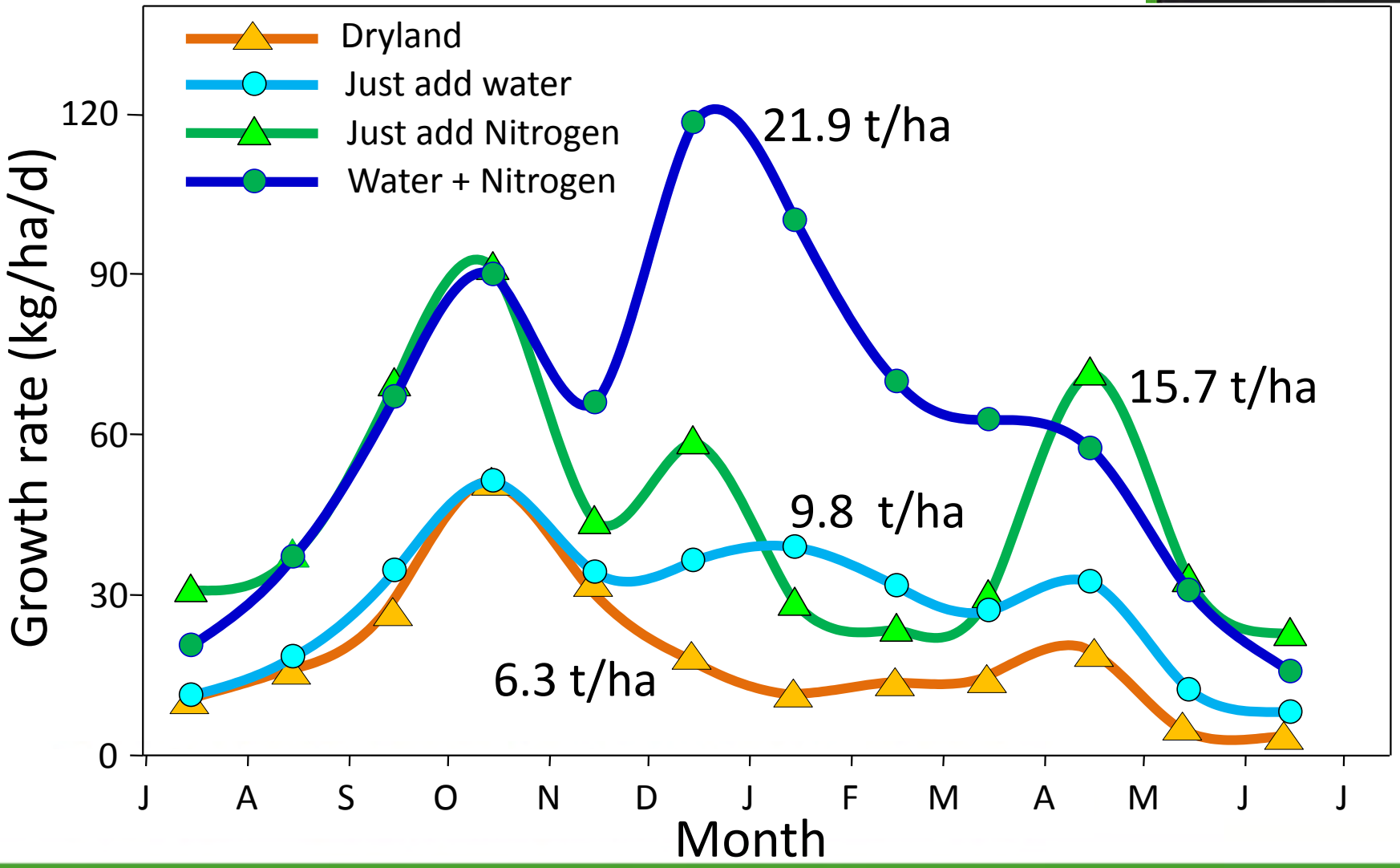


Photo: A Mills
Lincoln University

Growth rates (2 year means)



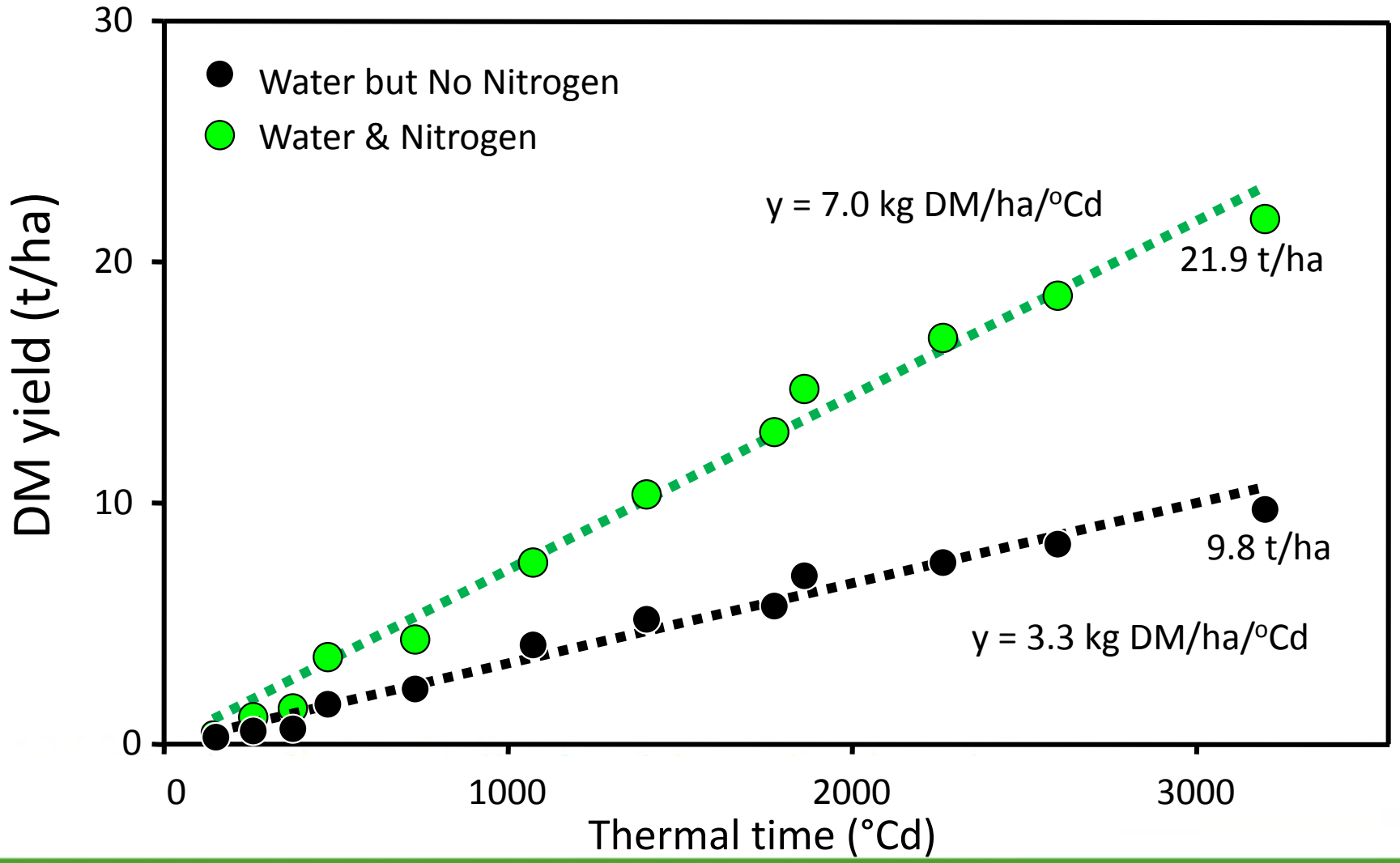
Mills *et al*. 2006, 2009

Winter

⇒ temperature response

Photo: KM Pollock
Lincoln University

Where do we get our N?

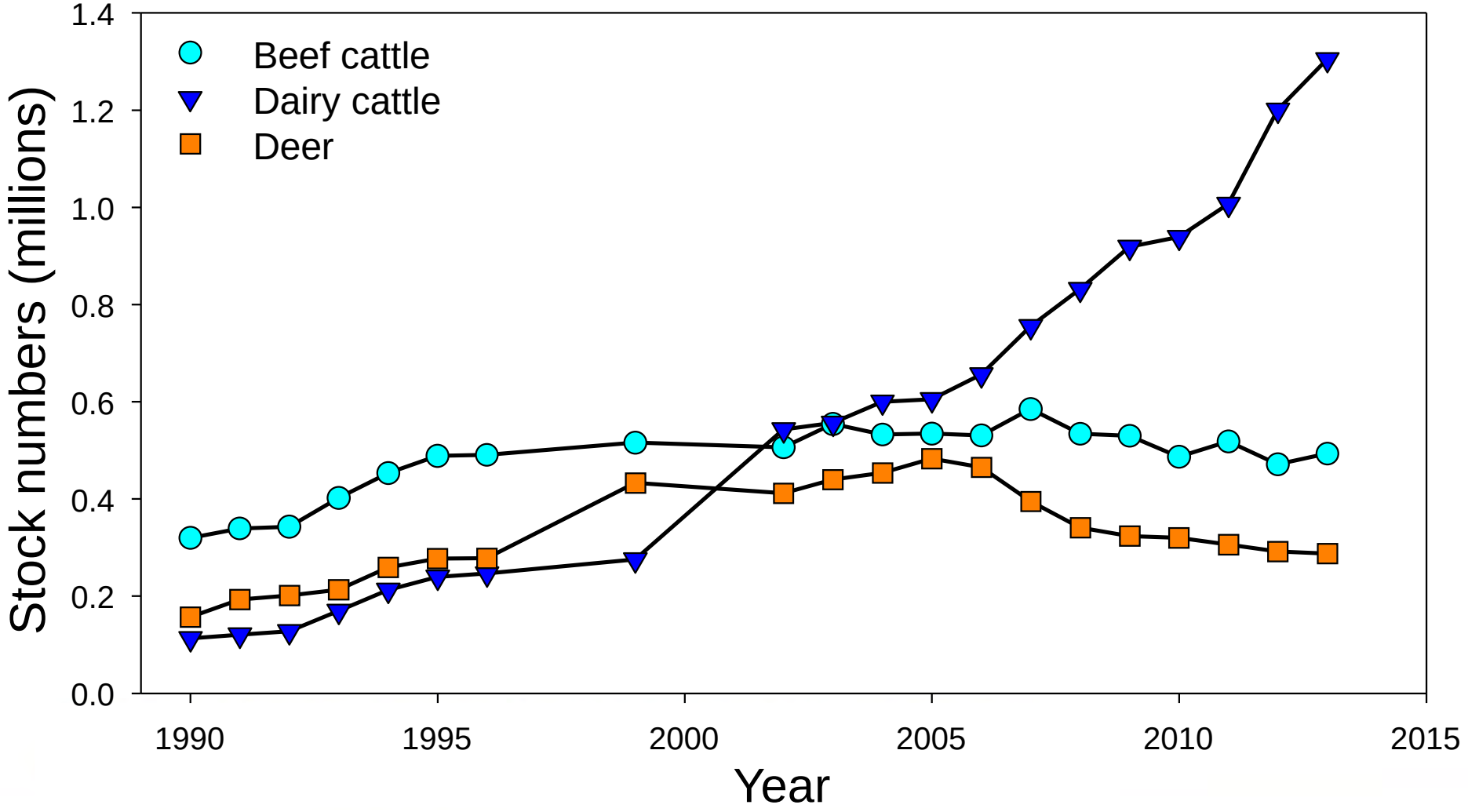


Mills *et al*. 2006; 2009

Water and nitrogen = ryegrass (230,000 ha irrigated dairy)

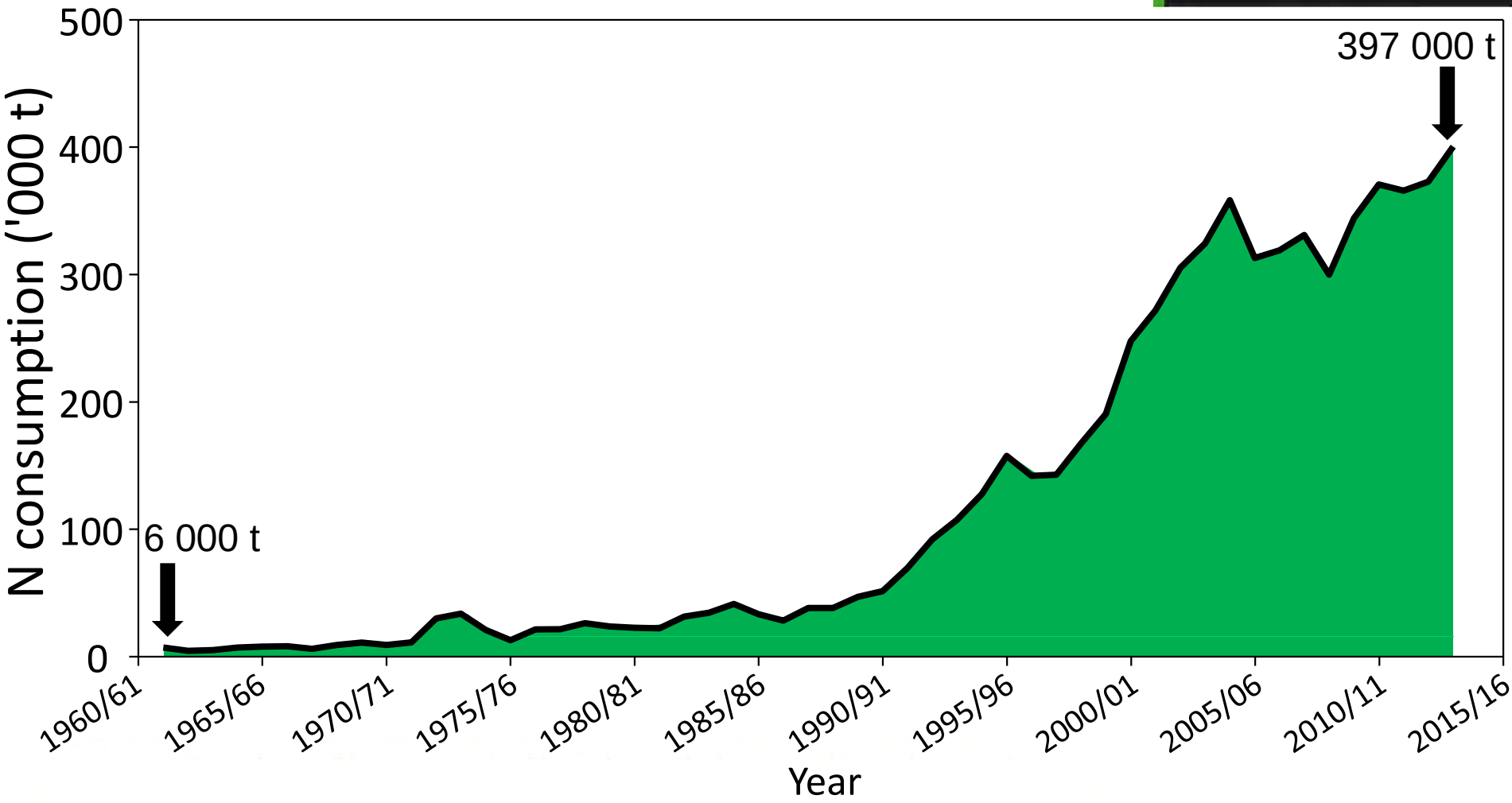
Photo: Dr WR Scott
Lincoln University

Deer & cattle numbers in Canterbury

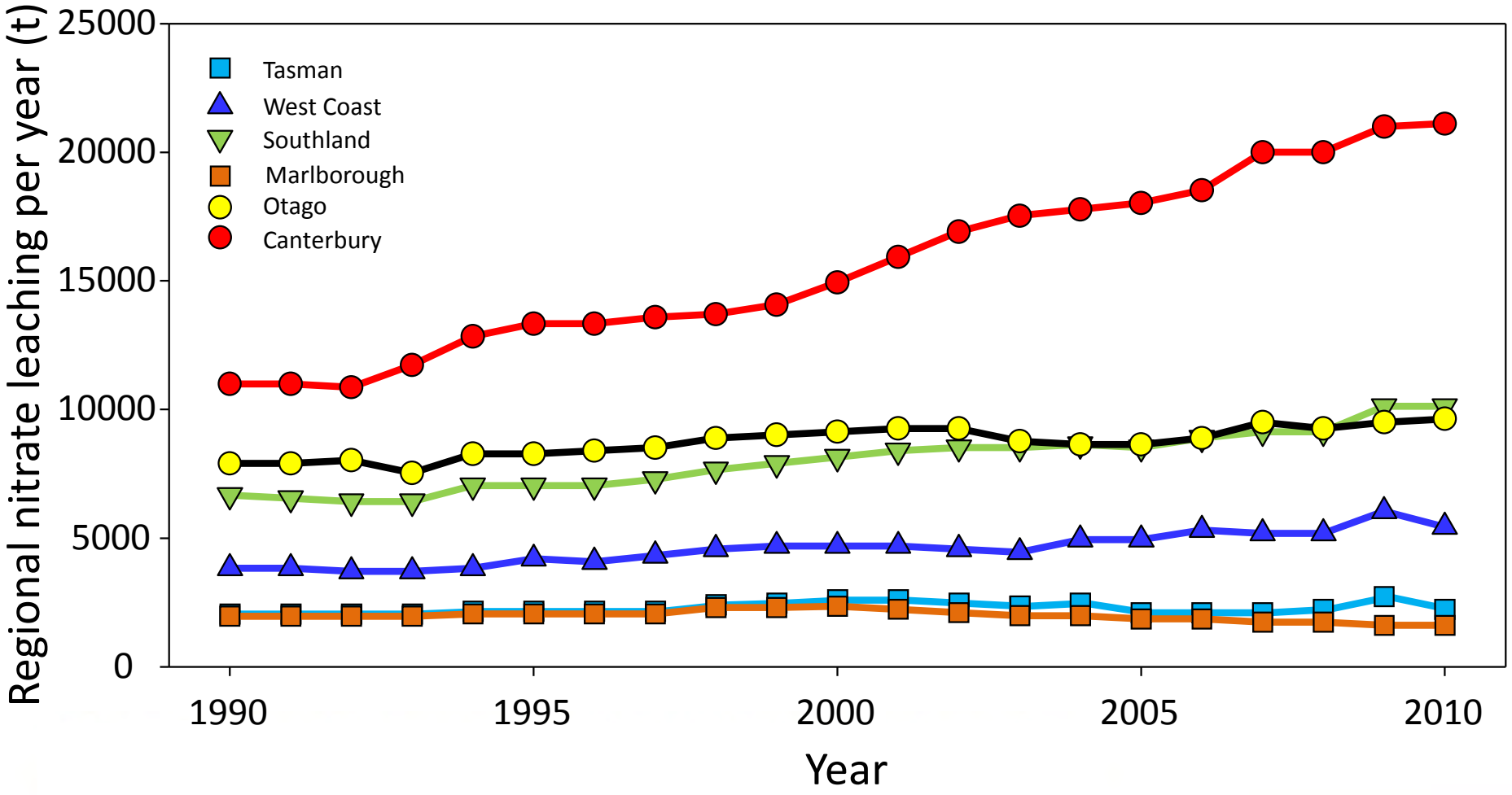


Moot *et al.* 2010: Department of Statistics

Fertiliser N use in NZ
- Nationally sustainable?

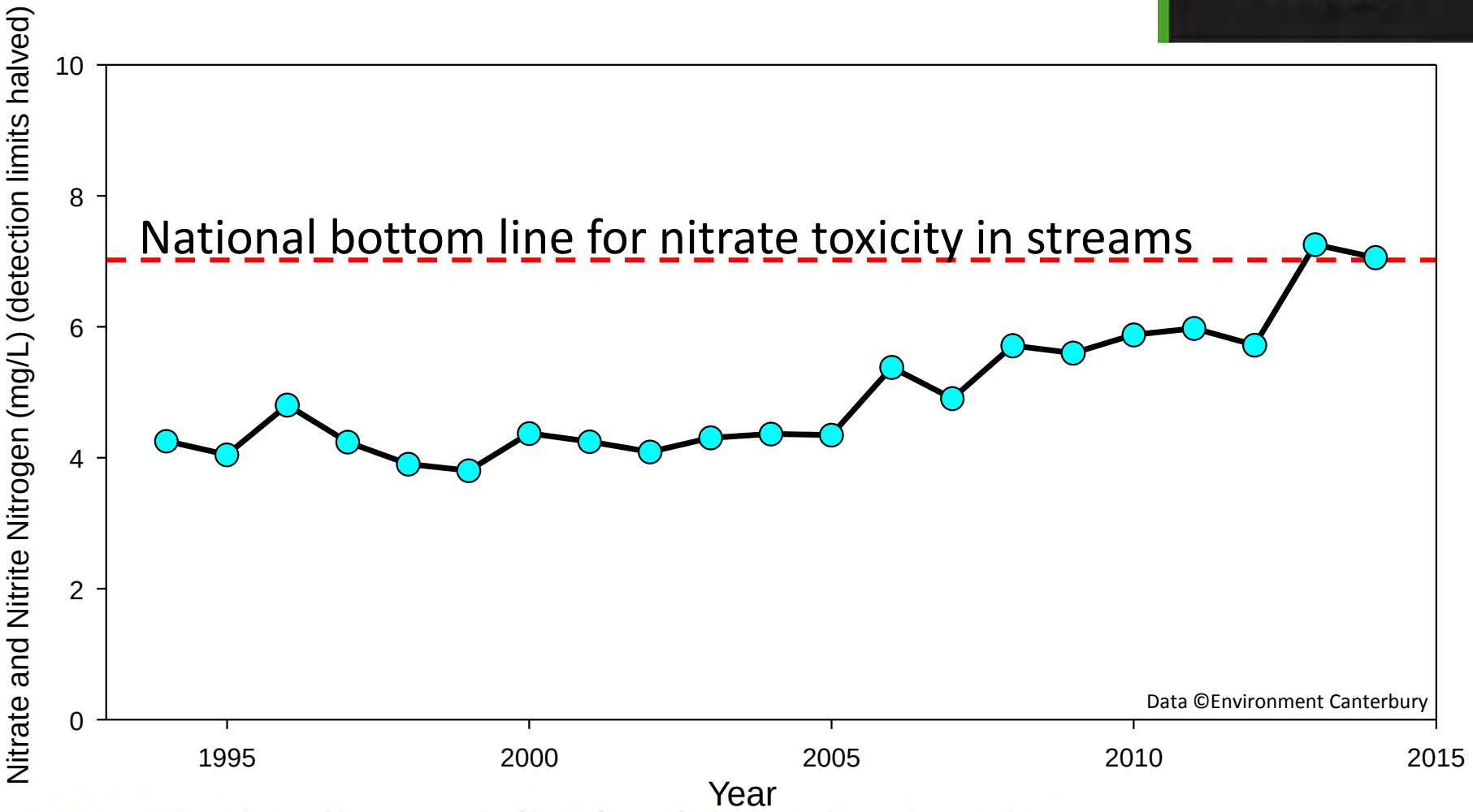


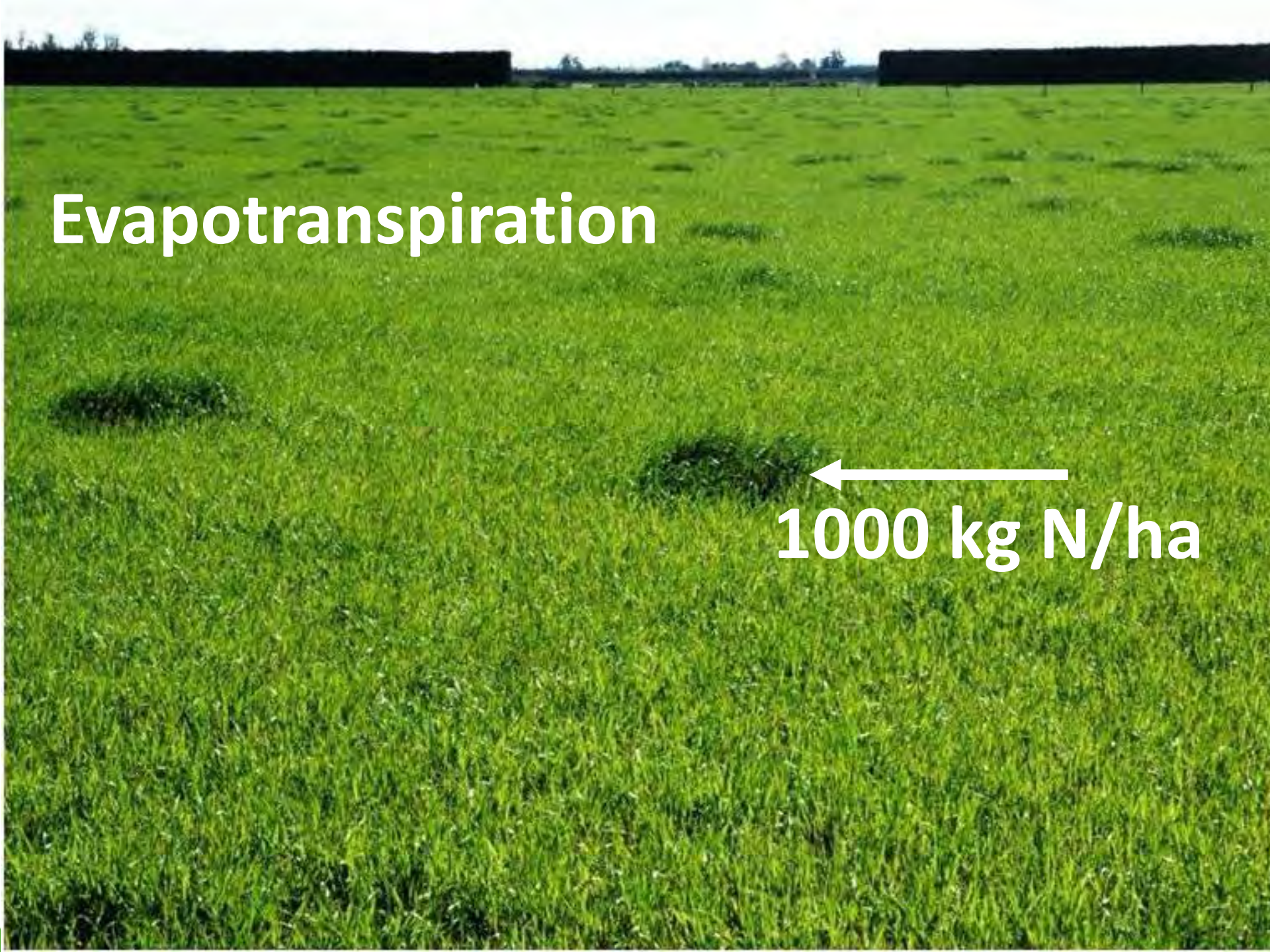
Regional annual nitrate losses - Sustainable regionally?



Redrawn from Dymond *et al.* 2013

Mean annual nitrate levels in Harts Creek - Sustainable locally?

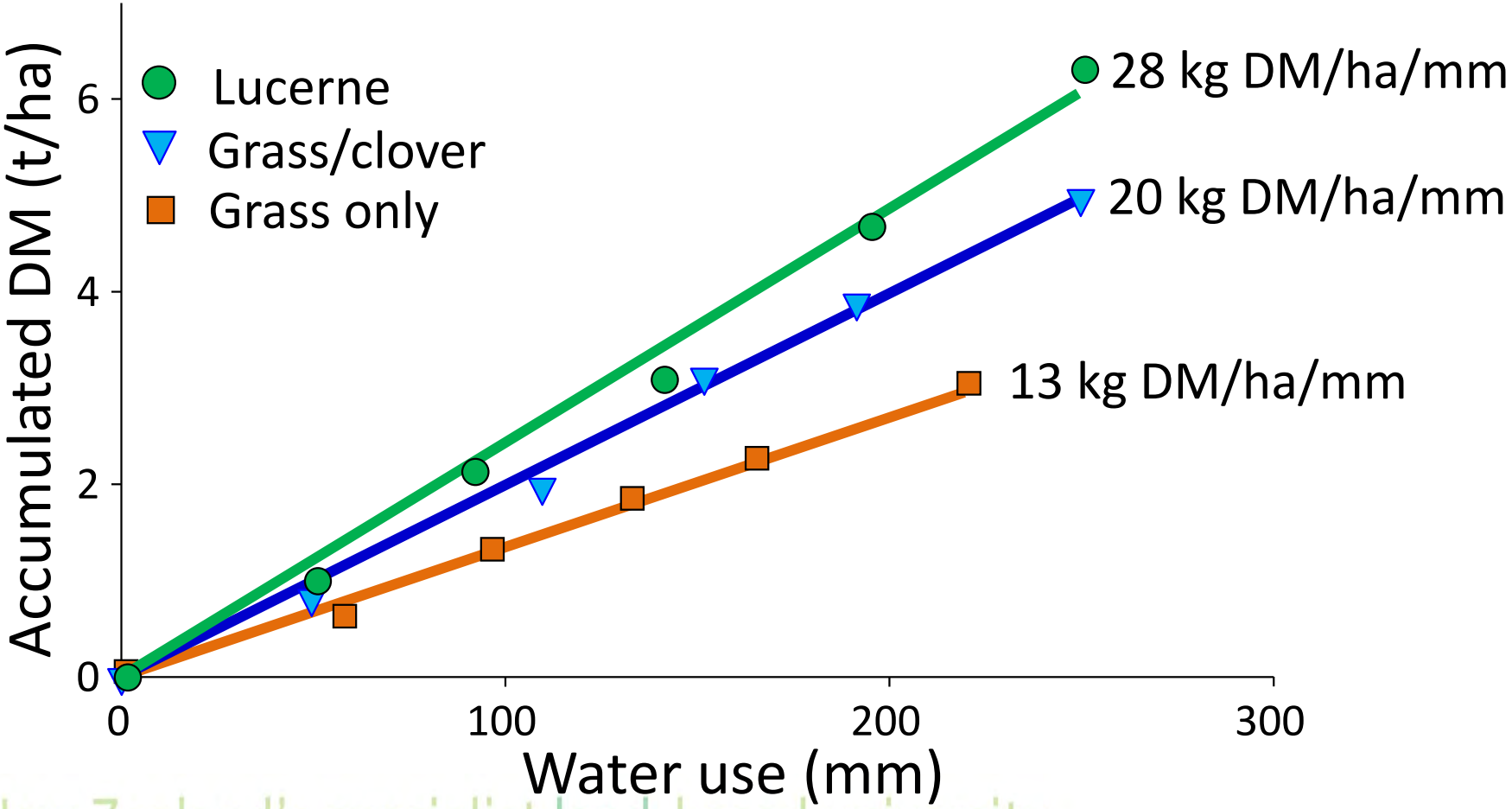



Evapotranspiration
1000 kg N/ha

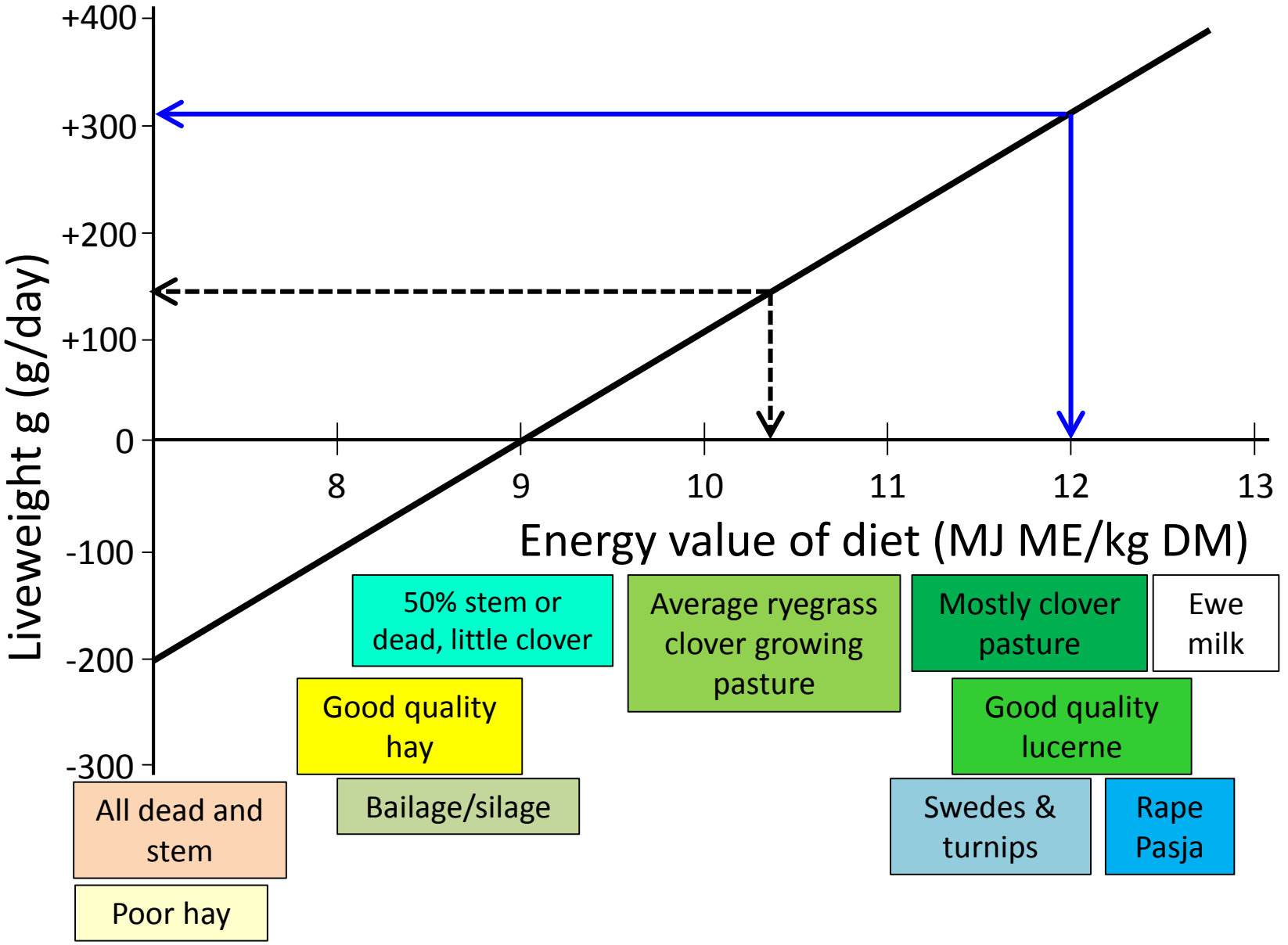
Nitrogen fixation
25-30 kg N/t DM

Lucas *et al*. 2010

Spring WUE



Moot *et al*. 2008



Adapted from Stevens 1999

High feeding value pastures have;

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


Over 200,000 ha sown
700+ txt alerts
“28-35% Rate of return on investment”

Case study – Bonavaree farm, Marlborough

Over grazed – high erosion risk

Dryland Lucerne conversion

Lincoln University
Te Whare Wānaka o Aoraki
AOTEAROA • NEW ZEALAND

- **Lucerne/prairie grass/plantain mix in late January 2013.**
- **Sown October 2012 and first grazed late March 2013.**
- **16 ha split into five paddocks and water troughs installed.**

Lucerne, prairie and plantain October 2012.
Twin ewes and lambs at 12 ewes /ha and 1 steer/ha.

Maximize reliable spring growth – high priority stock

‘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: Doug Avery, 'Bonavaree', Marlborough
6/10/2015

Lincoln University
Te Whare Wānaka o Aoraki
AOTEAROA • NEW ZEALAND

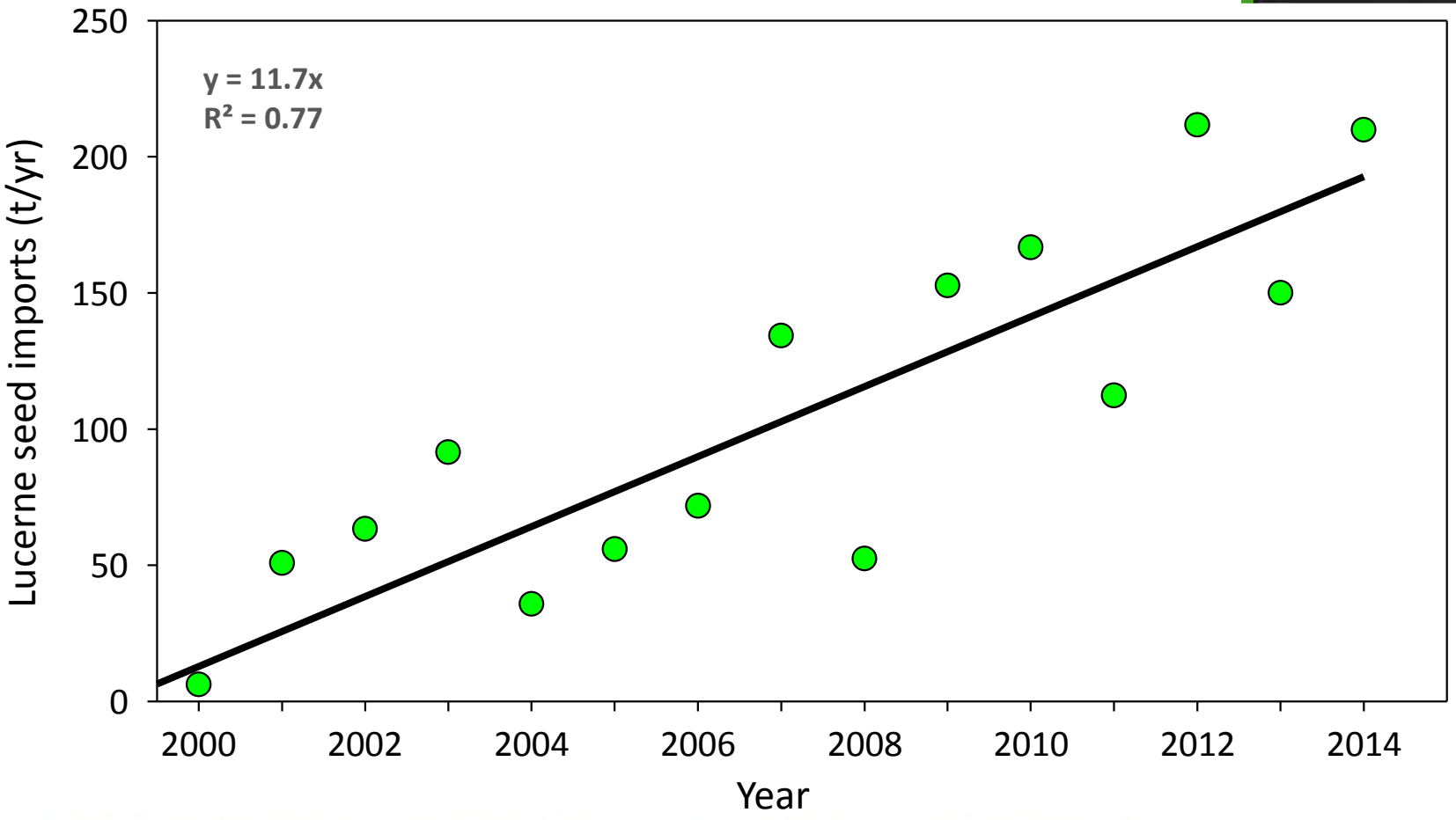
Resilient drought-proofed landscape

SI Farmer of the Year 2010

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

Doug Avery

Lucerne seed imports in NZ



Data supplied courtesy MPI.govt.nz 14/10/2015

Sub. clover dominant pasture 8 Oct 2015

Bulls grazing sub. dominant pasture
8 Oct 2015

Ashley Dene
9 Jan 2015

Sustainable dryland farming?

- **Production** – 40-100% incr. LWG/ha
- **Risk** – beat the drought
- **Economic** – 30% IRR
- **Environment** – efficient water and N fert., lowered CO_2 emissions, ecosystem services, dry profile
- **Social** – "green" dryland, fire breaks, employment, landscape farming

Lincoln University
Te Whare Wānaka o Aoraki
AOTEAROA • NEW ZEALAND

Website

Handouts & presentations

FAQs

Direct link to Blog

www.lincoln.ac.nz/dryland

References

Anderson, D.; Anderson, L.; Moot, D.J.; Ogle, G.I. 2014. Integrating lucerne (*Medicago sativa* L.) into a high country merino system. *Proceedings of the New Zealand Grassland Association 76*: 29-34.

Bonoma, T.V. 1985. Case research in Marketing: Opportunities, problems and a process. *Journal of Marketing Research 22*: 199-208.

Crookston, R.K. 1994. Proceedings, Systems-oriented research in agriculture and rural development: International Symposium. Montpellier, France, p. 803-806.

Department of Statistics. 2015. Agricultural Production Survey variables (various years). Accessed: (various dates). Online: http://www.stats.govt.nz

Dymond, J.R.; Ausseil, A.G.E.; Parfitt, R.L.; Herzig, A.; McDowell, R.W. 2013. Nitrate and phosphorus leaching in New Zealand: a national perspective. *New Zealand Journal of Agricultural Research 56*: 49-59.

Lucas, R.J.; Smith, M.C.; Jarvis, P.; Mills, A.; Moot, D.J. 2010. Nitrogen fixation by subterranean and white clovers in dryland cocksfoot pastures. *Proceedings of the New Zealand Grassland Association 72*: 141-146.

Mills, A.; Moot, D.J.; McKenzie, B.A. 2006. Cocksfoot pasture production in relation to environmental variables. *Proceedings of the New Zealand Grassland Association 68*: 89-94.

Mills, A.; Moot, D.J.; Jamieson, P.D. 2009. Quantifying the effect of nitrogen of productivity of cocksfoot (*Dactylis glomerata* L.) pastures. *European Journal of Agronomy 30*: 63-69.

Moot, D.J.; Avery, D. 2013. Sustainable intensification of livestock grazing systems in low rainfall regions of New Zealand. p. O3.O3 (4 pgs). *In*: GIller, K.; van Ittersum, M. (Eds.). *First International Conference on Global Food Security*. 29 September - 2 October 2013. Elsevier Ltd, Noordwijkerhout, The Netherlands. p O3.O3 (4 pgs).

Moot, D.J.; Brown, H.E.; Pollock, K.; 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.; Mills, A.; Pollock, K.M. 2010. Natural resources for Canterbury agriculture. *Proceedings of the New Zealand Grassland Association 72*: IX-XVII.

NIWA 2013. Climate Explorer – National Median Annual Rainfall Map. Accessed: 1/10/2010 2010. http://climate-explorer.niwa.co.nz.

Saunders, C.; Barber, A.; Taylor, G. 2006. Food Miles - Comparative energy/emissions. Performance of New Zealand's agriculture industry. Research Report No. 285. Lincoln University Agribusiness & Economics Research Unit (AERU), Lincoln University. 105 pp. Accessed: 14/9/2009. http://www.lincoln.ac.nz/story_images/2328_RR285_s13389.pdf

Stevens, D.R. 1999. Ewe nutrition: decisions to be made with scanning information *Proceedings of the New Zealand Society of Animal Production 59*: 93-94.

Acknowledgements for data/graphs:

- **Environment Canterbury (ECAN) for Harts Creek data (data ©ECAN); MPI.govt.nz for the lucerne seed import data; the New Zealand Fertiliser Association for the nitrogen fertiliser data & Malcolm McLeod (Landcare Research) for the N leaching graph**