Economic Development, Jobs, Transport and Resources

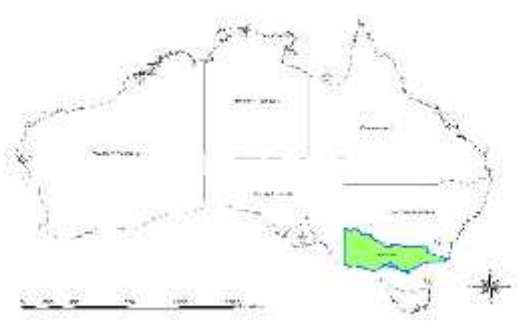
The effects of inhibitor use and urea fertiliser application on pasture production and nitrous oxide emissions

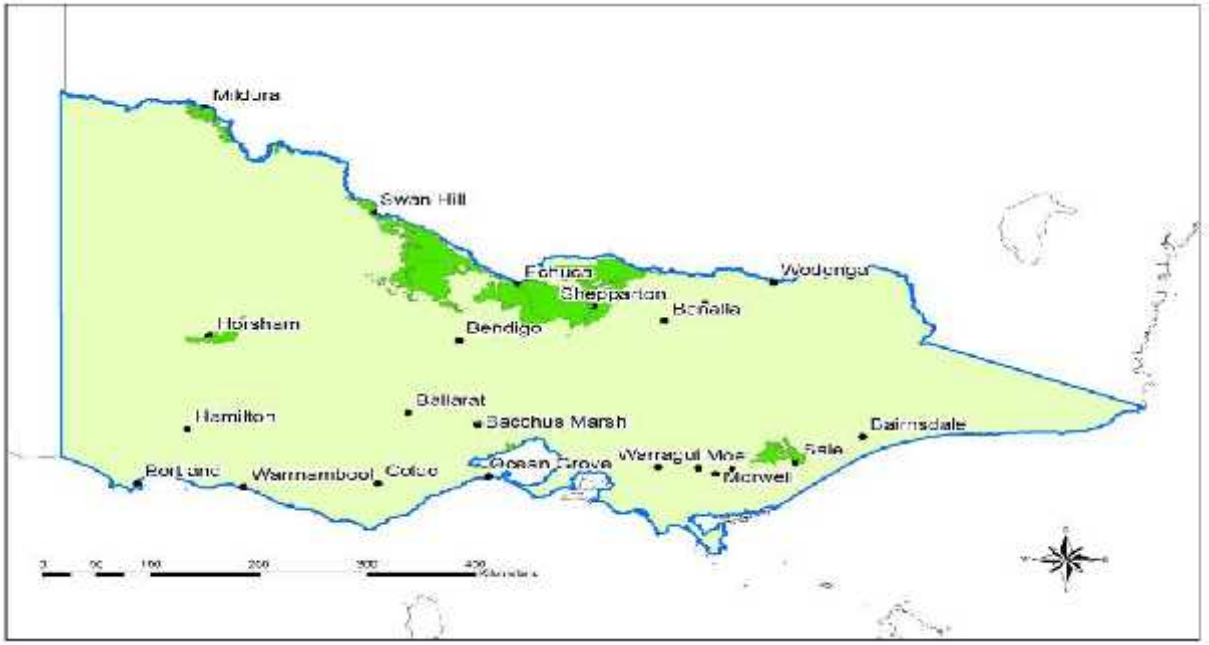
Kevin Kelly and Graeme Ward

Australian Government

Dairy Australia
Your Levy at Work

AGRICULTURE VICTORIA




Mildura
Swan Hill
Echuca
Shepparton
Wodonga
Bendigo
Benalla
Horsham
Ballarat
Hamilton
Bacchus Marsh
Daimsdale
Bairnsdale
Warrnambool
Colac
Wangaratta
Wodonga

Aim

- To evaluate the mitigation potential of inhibitor coated inorganic fertiliser applied to pastures

Design

- Replicated field study (2 sites)
- Treatments

1) Nil
2) Urea
3) Urea + DCD - UAN (years 2&3)
4) Urea + DMPP
5) Urea + nBTP

50 kg N/ha after every second DM harvest

Measurements

- DM yield (3 years)
- Static chambers for N_2O flux estimation

o Glenormiston

1) July 2012 – July 2013
2) June 2014 - April 2015

o Terang

1) May 2013 – May 2014
2) May 2014 – April 2015

Sites

Glenormiston (Dermosol)

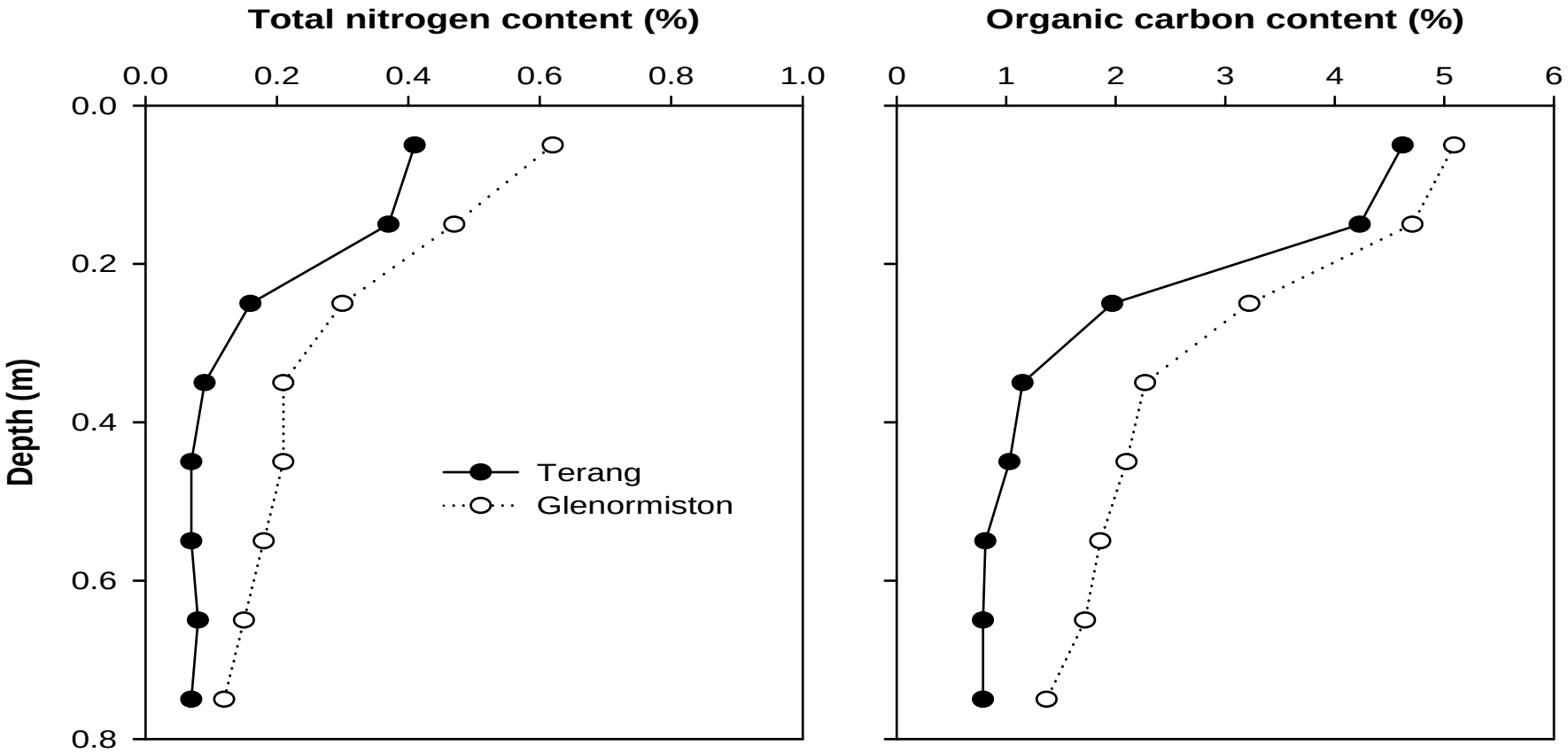
Terang (Chromosol)

Long term average rainfall

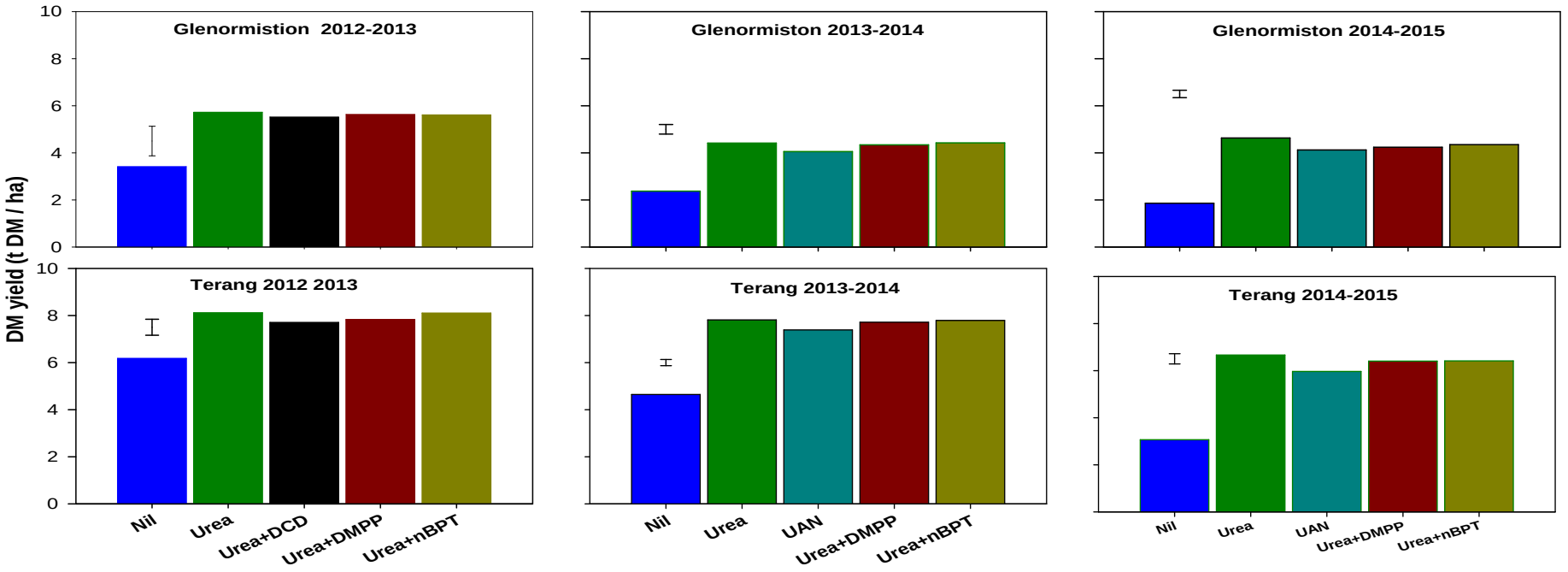
735 mm

780 mm

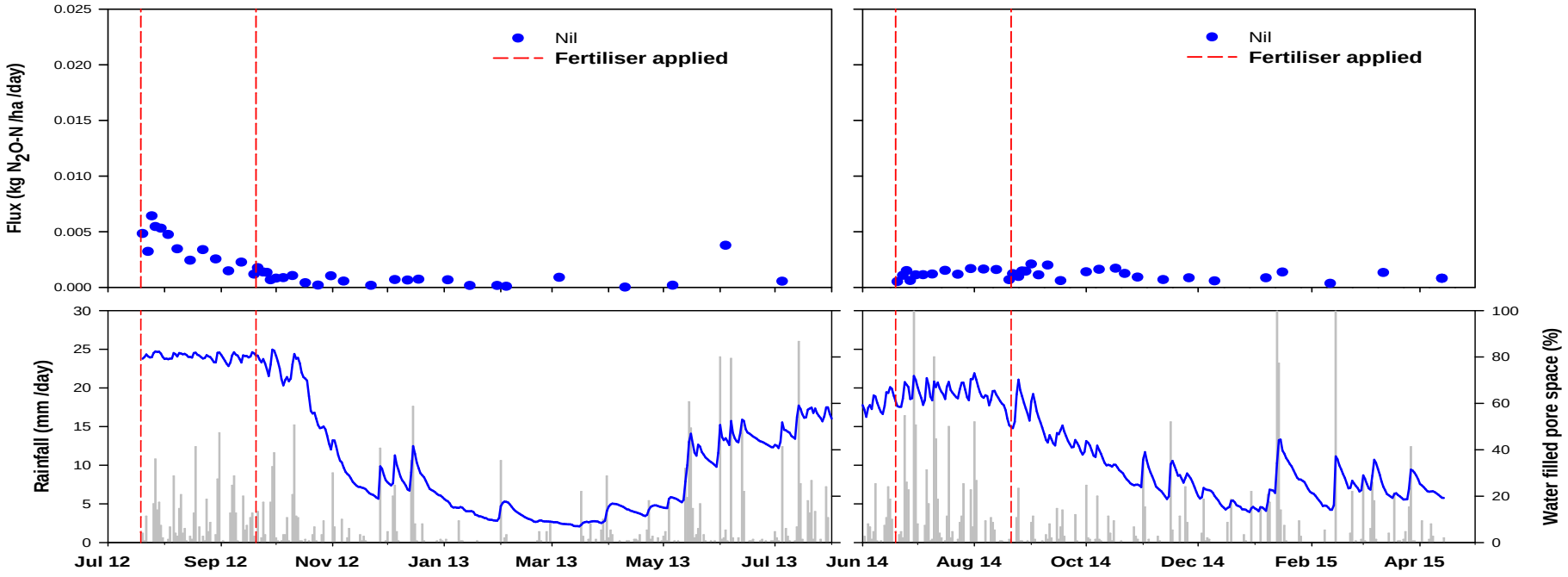
Initial conditions



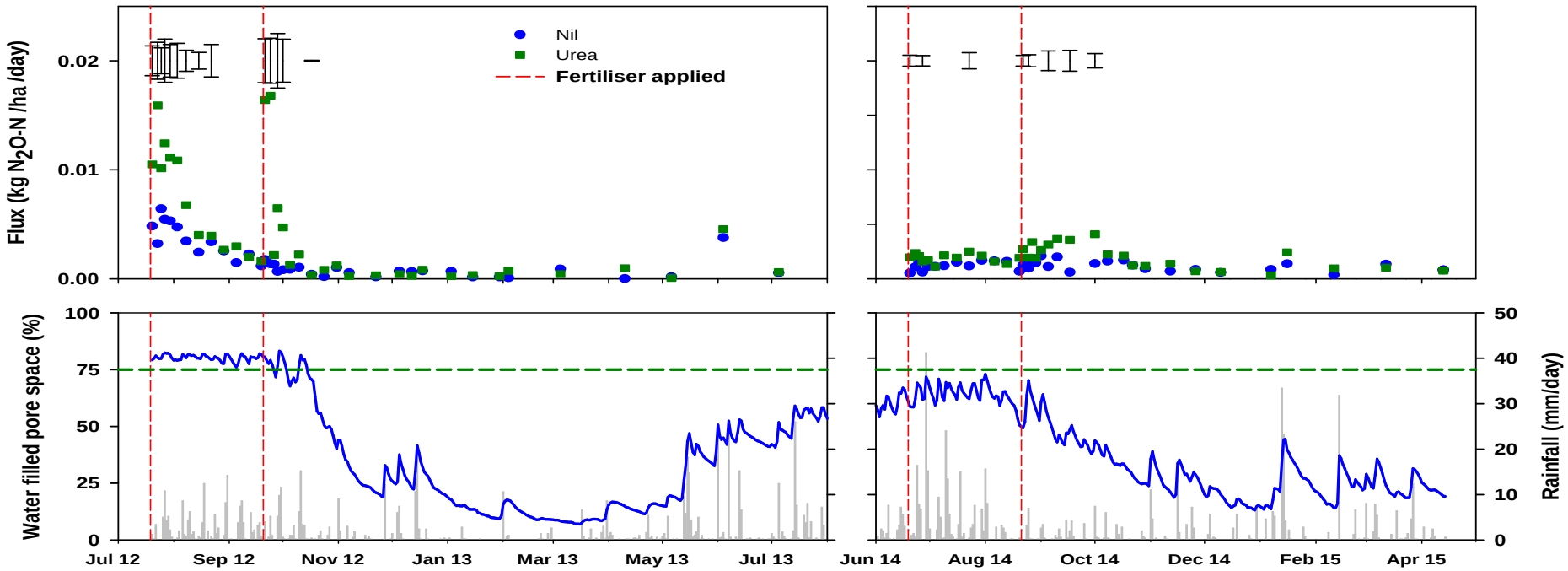
Pasture production



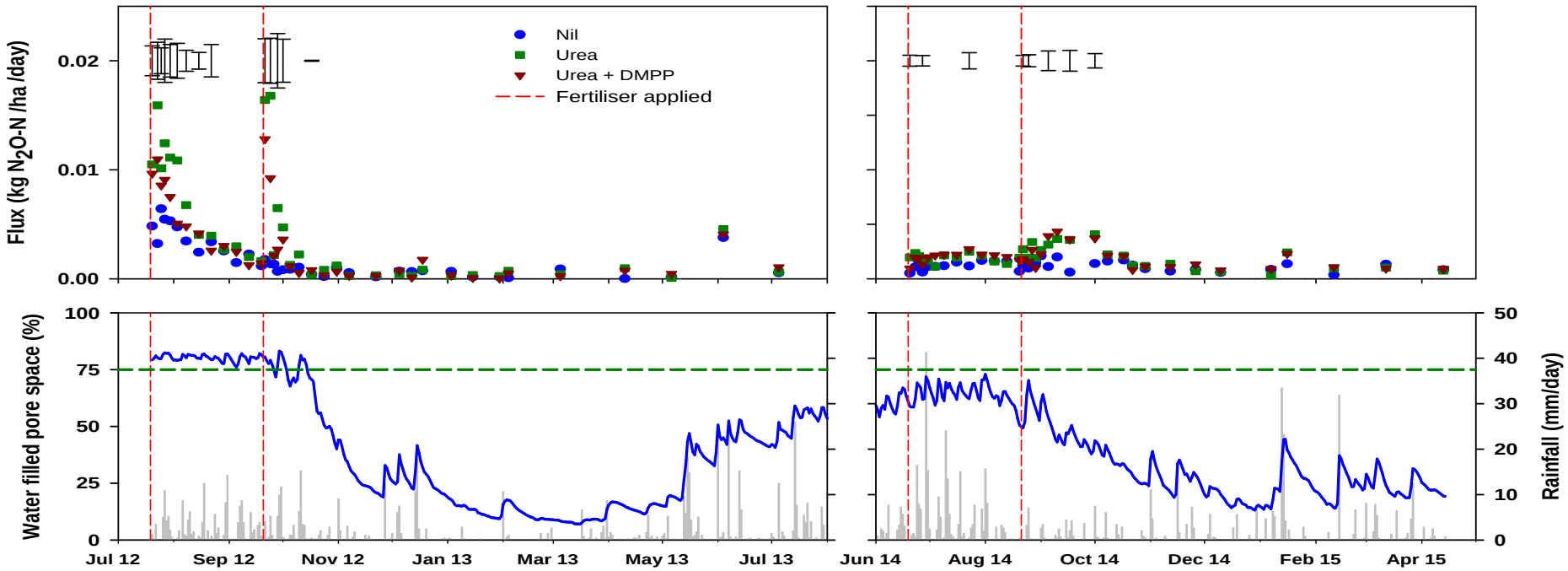
N_2O emissions - Glenormiston (Dermosol)



N_2O emissions - Glenormiston (Dermosol)



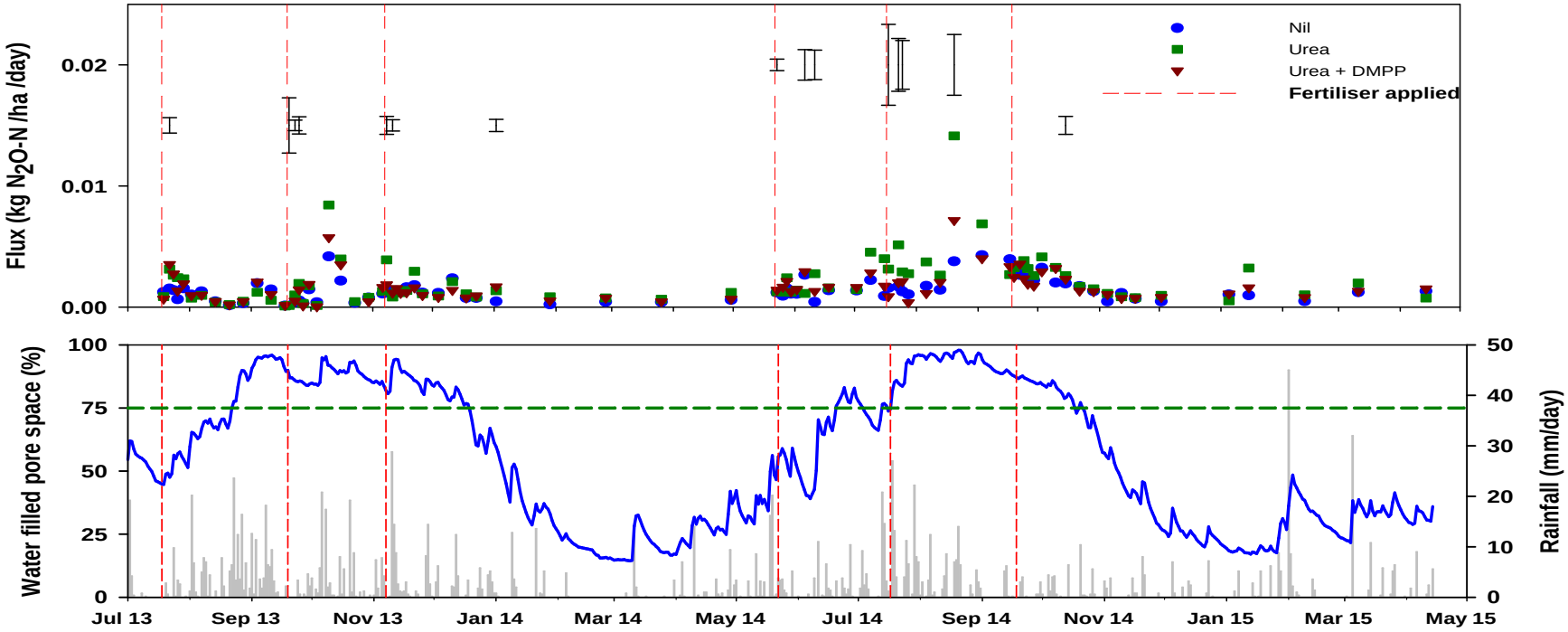
N_2O emissions - Glenormiston (Dermosol)



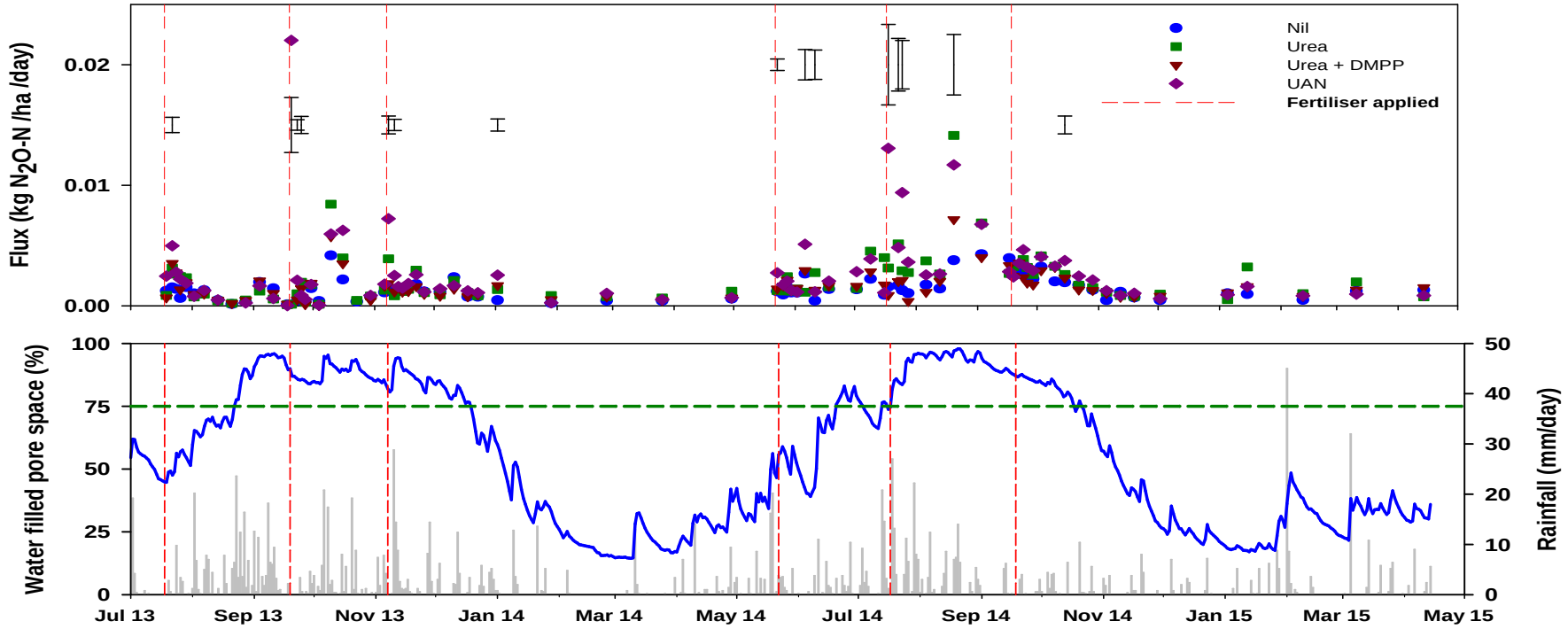
N_2O emissions – Glenormiston (Dermosol)

	Days	Nil	Urea	Urea +DCD	Urea +DMPP	Urea +nBPT	l.s.d. (p=0.05)
N_2O-N (kg N/ha)	351	0.44	0.75	0.56	0.60	0.80	0.203
Emission factor (2012-2013)			**0.31%**	**0.12%**	**0.16%**	**0.36%**	
	Days	**Nil**	**Urea**	**UAN**	**Urea +DMPP**	**Urea +nBPT**	
N_2O-N (kg N/ha)	299	0.32	0.48	0.42	0.50	0.46	0.083
Emission factor (2014-2015)			**0.16%**	**0.10%**	**0.19%**	**0.14%**	

N_2O emissions - Terang (Chromosol)



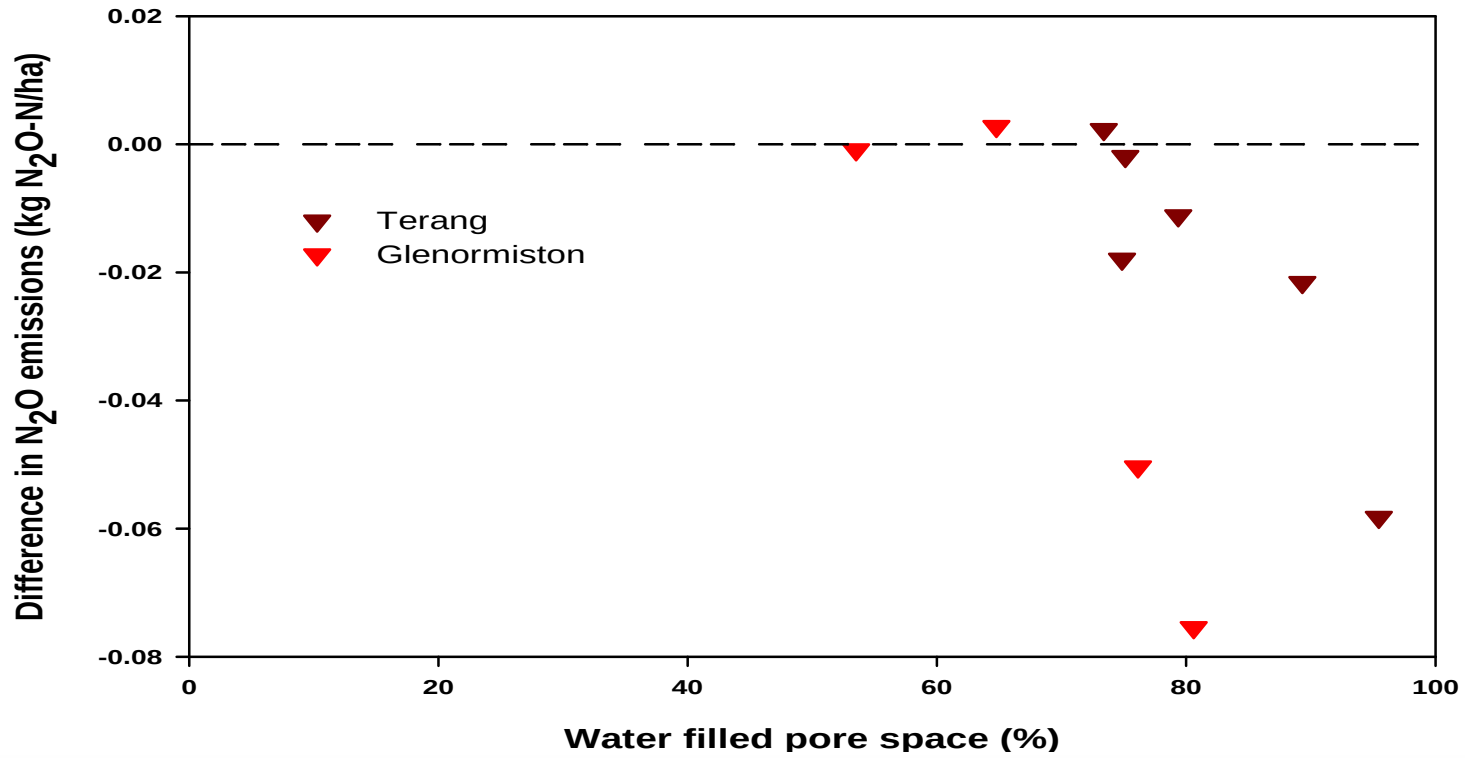
N_2O emissions - Terang (Chromosol)



N_2O emissions – Terang (Chromosol)

	Days	Nil	Urea	UAN	Urea +DMPP	Urea +nBPT	l.s.d. (p=0.05)
N_2O-N (kg N/ha)	308	0.23	0.38	0.45	0.31	0.38	0.114
Emission factor (2013-2014)			**0.09%**	**0.13%**	**0.04%**	**0.08%**	
	Days	**Nil**	**Urea**	**UAN**	**Urea +DMPP**	**Urea +nBPT**	
N_2O-N (kg N/ha)	327	0.50	0.73	0.82	0.59	0.68	0.189
Emission factor (2014-2015)			**0.18%**	**0.21%**	**0.06%**	**0.12%**	

Change in N_2O emissions from urea with DMPP



Summary

- Pastures were responsive to N fertiliser addition
- **No positive or negative effect of inhibitors on pasture production**

- N_2O emission for N fertiliser 0.09 to 0.31% of applied N
- **Emissions from fertiliser reduced by 0-65% by use of nitrification inhibitors**

Acknowledgements

Australian Government

Dairy Australia
Your Levy at Work

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Grains Research & Development Corporation

n2o.net.au
N_2O Network

Science guidance

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James Hollier and the -Warrnambool: Dairy Research - Technical Group

Landholders

DemoDAIRY Terang and SW TAFE Glenormiston Campus