

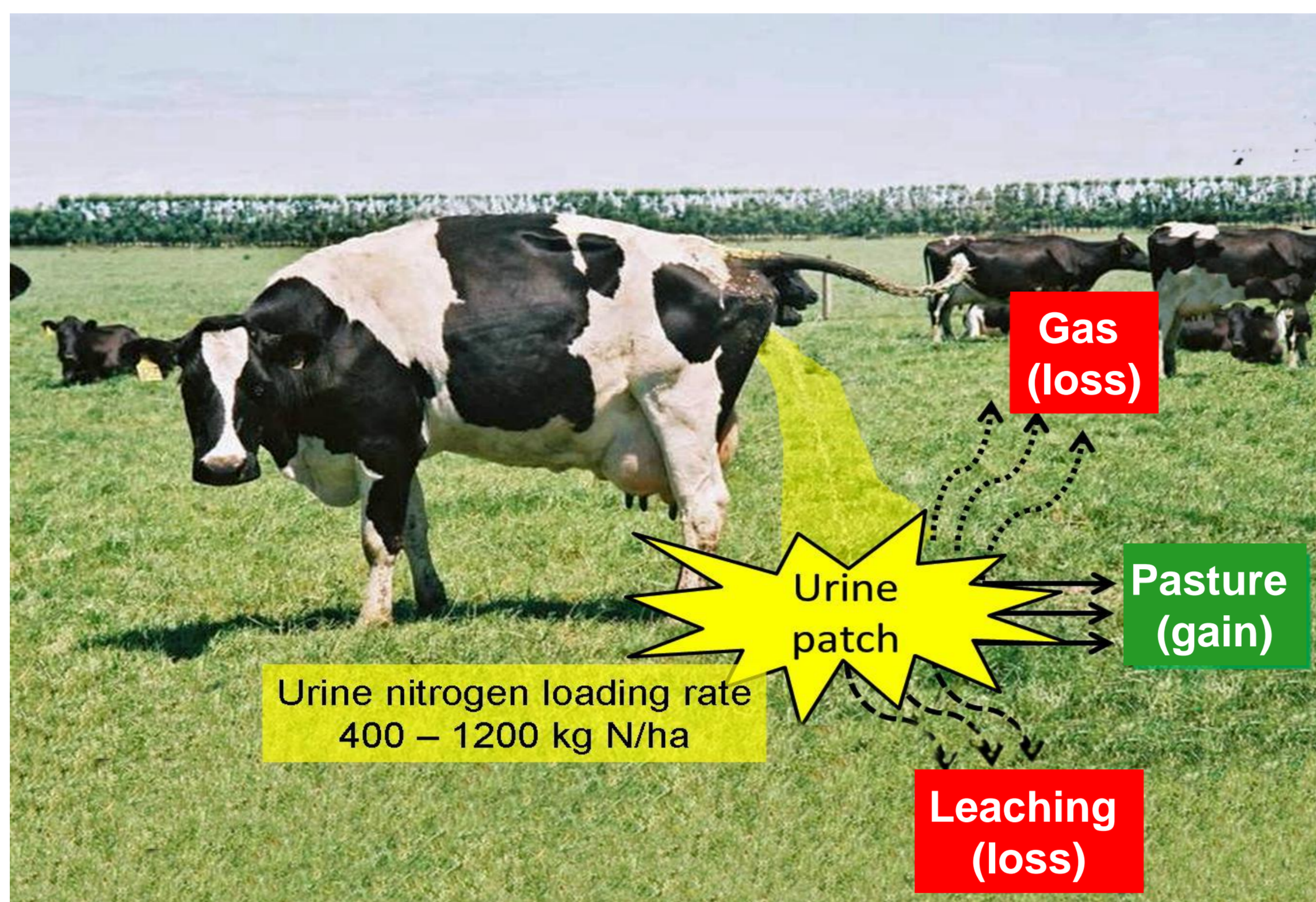
The effect of urinary nitrogen content and DCD nitrification inhibitor on nitrogen emissions – a grassland lysimeter study in Ireland

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1. Introduction



Mitigation

- Dietary manipulation (reduce N excretion in urine)
- DCD nitrification inhibitor

Objectives

Quantify the effect of :

- Urine N application rate on nitrous oxide emissions, nitrate leaching & pasture N uptake
- DCD on nitrous oxide emissions, nitrate leaching & pasture N uptake

2. Methods

- Two separate one year studies, separate sets of soil monolith lysimeters, one soil type
- Single autumn urine application – 5 N rates; DCD applied twice (total 30 kg DCD ha⁻¹)
- Randomised block design, 4 replicates per treatment

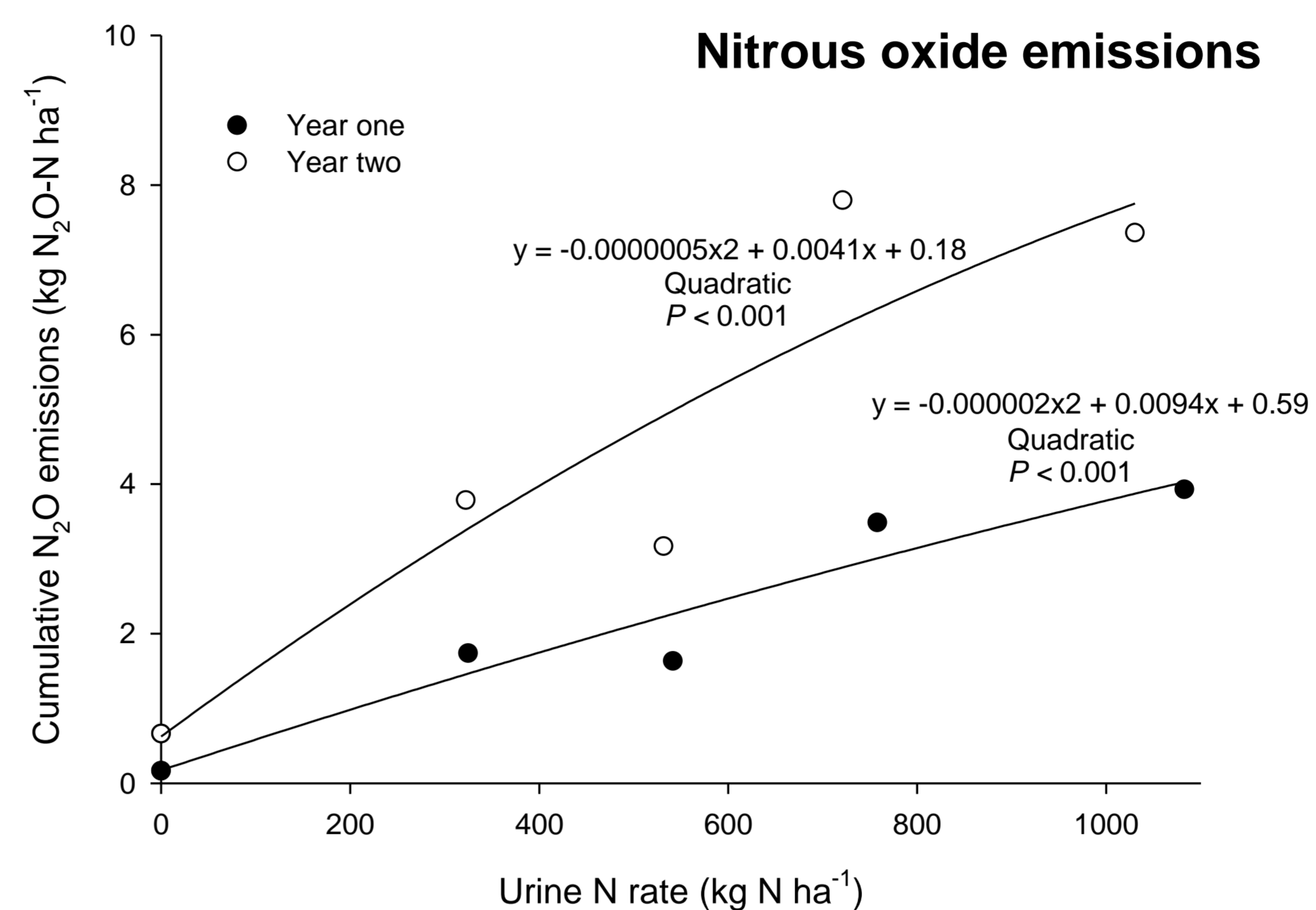
Treatment	kg N ha ⁻¹	DCD
Control	0	
U300	300	
U500	500	
U500+DCD	500	Yes
U700	700	
U1000	1000	
U1000+DCD	1000	Yes



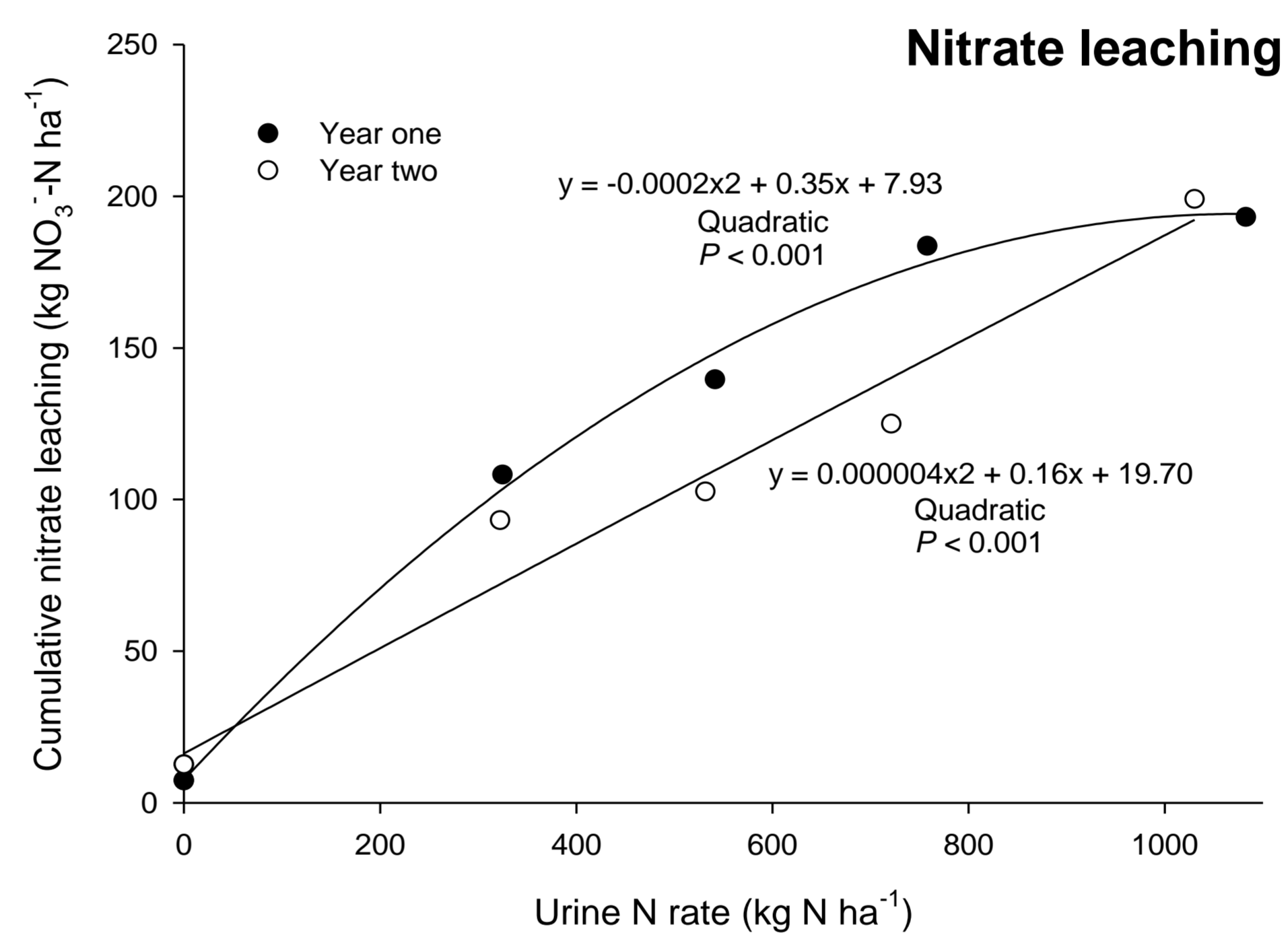
- Nitrous oxide (static chamber), nitrate leaching and pasture N uptake (standard methods)
- Analysis of variance including block & treatment effects

3. Results

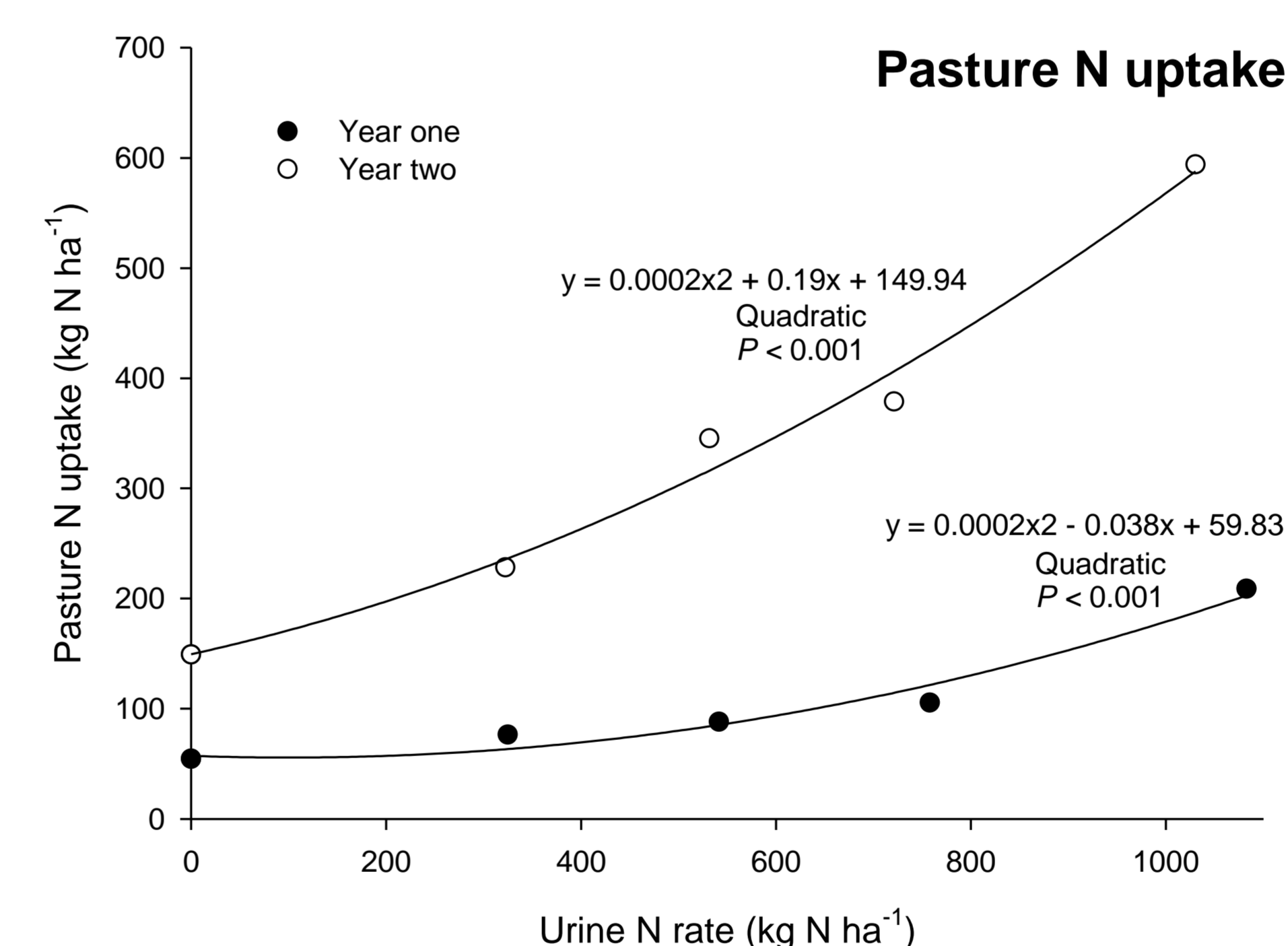
Effect of urine



Non-linear relationship ($P < 0.001$) between urine N application rate and total N₂O emissions



Non-linear relationship ($P < 0.001$) between urine N application rate and total nitrate leaching



Non-linear relationship ($P < 0.001$) between urine N application rate and total pasture N uptake

Effect of DCD

Percentage change by DCD*

Treatment	Year one		Year two	
	U500+DCD	U1000+DCD	U500+DCD	U1000+DCD
Nitrous oxide	- 61%	- 71%	NS	NS
Nitrate leaching	- 62%	- 47%	NS	NS
Pasture N uptake	+ 74%	NS	NS	NS

* where significant $P < 0.05$; NS = not significant $P > 0.05$

4. Conclusions

- Non-linear relationships between urine N application rate and cumulative nitrous oxide emissions, nitrate leaching and pasture N uptake. Reducing N excretion in urine provides opportunity to reduce urine patch N losses.
- DCD nitrification inhibitor reduced N losses and increased pasture N uptake, although the effect varied between years and urine N application rates.

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