



Reducing Nitrogen Emissions on Grassland Farms

Protected Urea



Low Emission Slurry Spreading



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Sources of N

Organic Manures



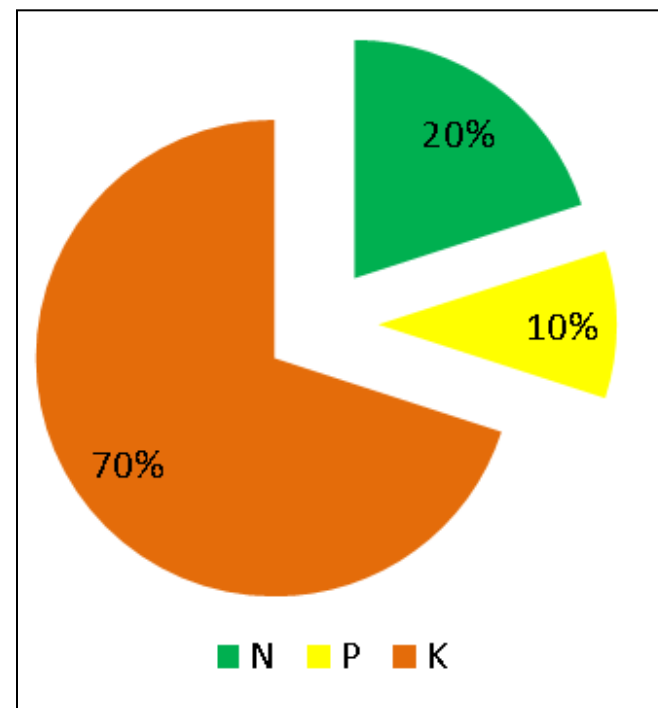
Fertiliser N



What's in Cattle Slurry?



Nutrient	Kg/m ³
N	1.0
P	0.5
K	3.5
S	0.3
Mg	0.4
DM %	6.3%



Where to Apply Cattle Slurry?



Soil Analysis



Crop Demand
(N, P & K)



Which Method of Application?

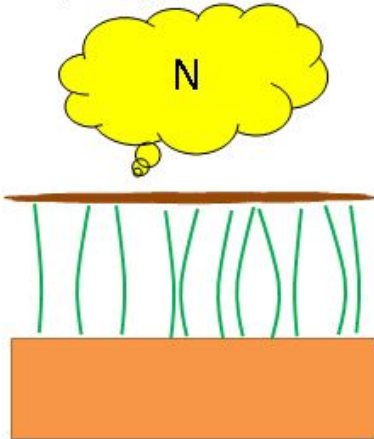


	Spring	Summer
Units N/1000 gal	6	3

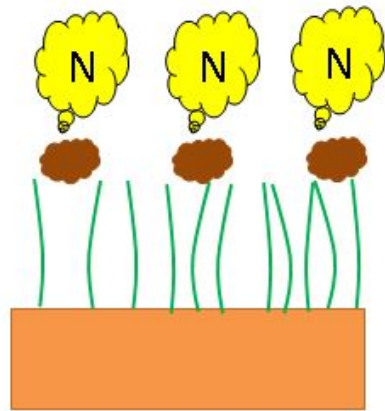
	Spring	Summer
Units N/1000 gal	9	6

	Spring	Summer
Units N/1000 gal	9	6

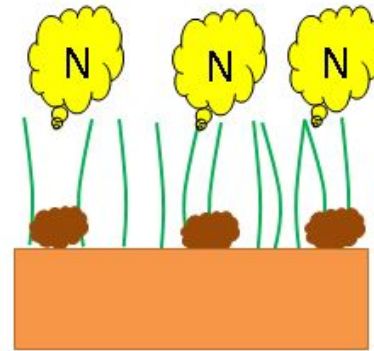
	Spring	Summer
Units N/1000 gal	11	8



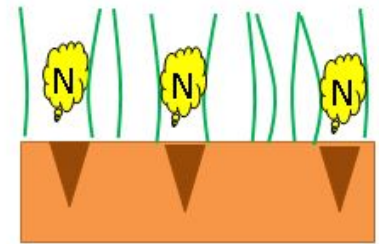
Splash-plate



Dribble bar

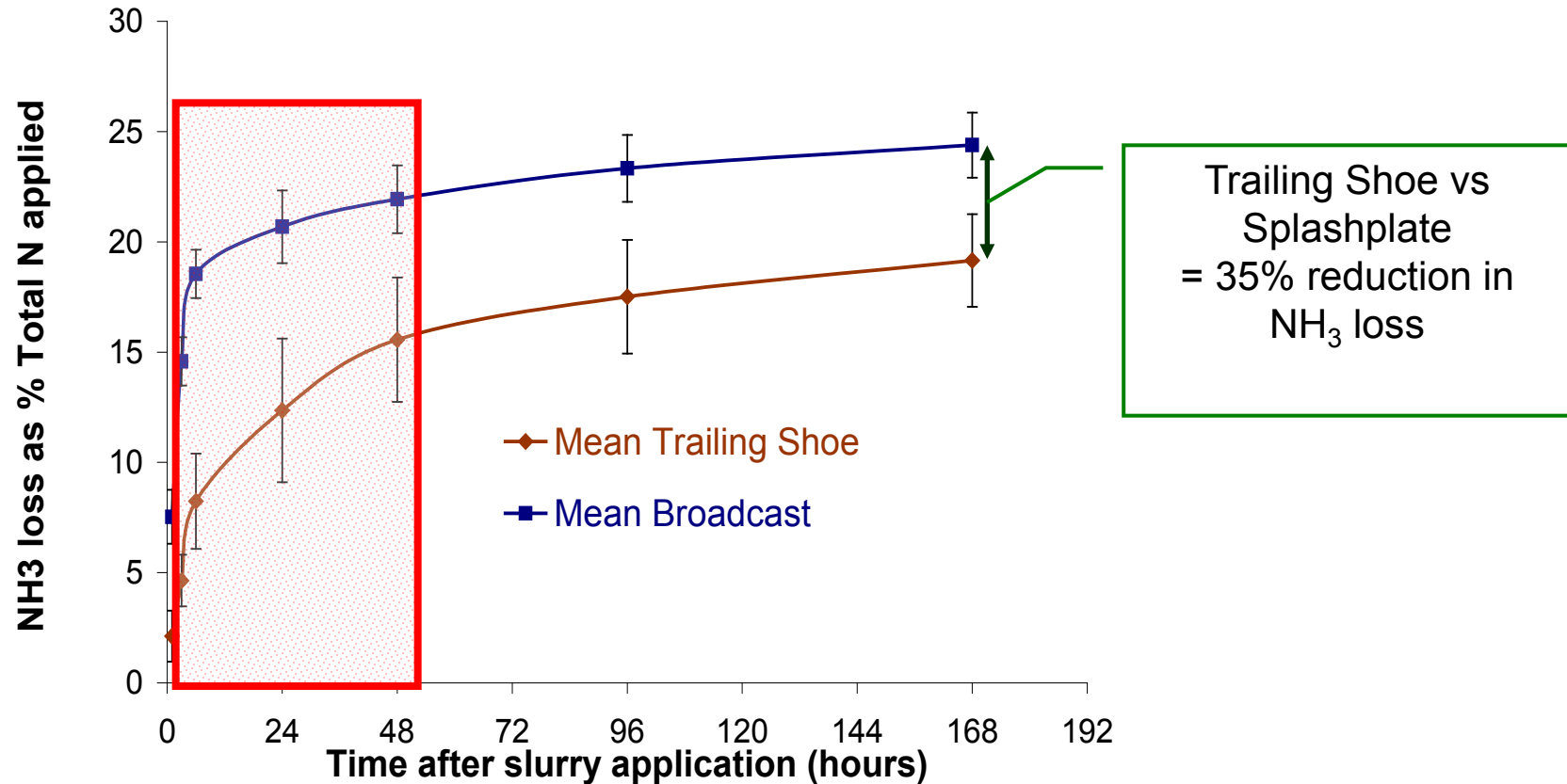


Trailing shoe



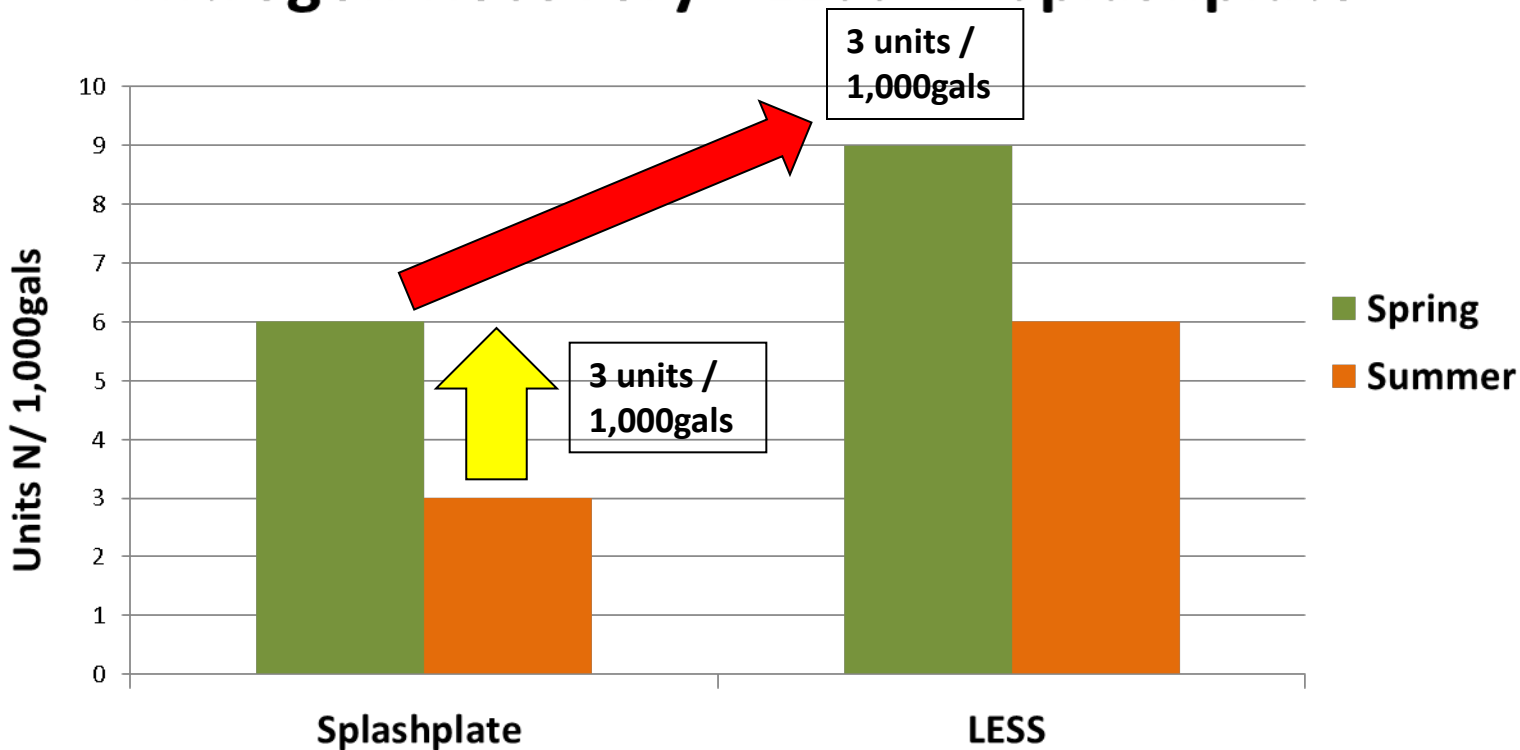
Injection

Application Method – Reducing Ammonia Loss



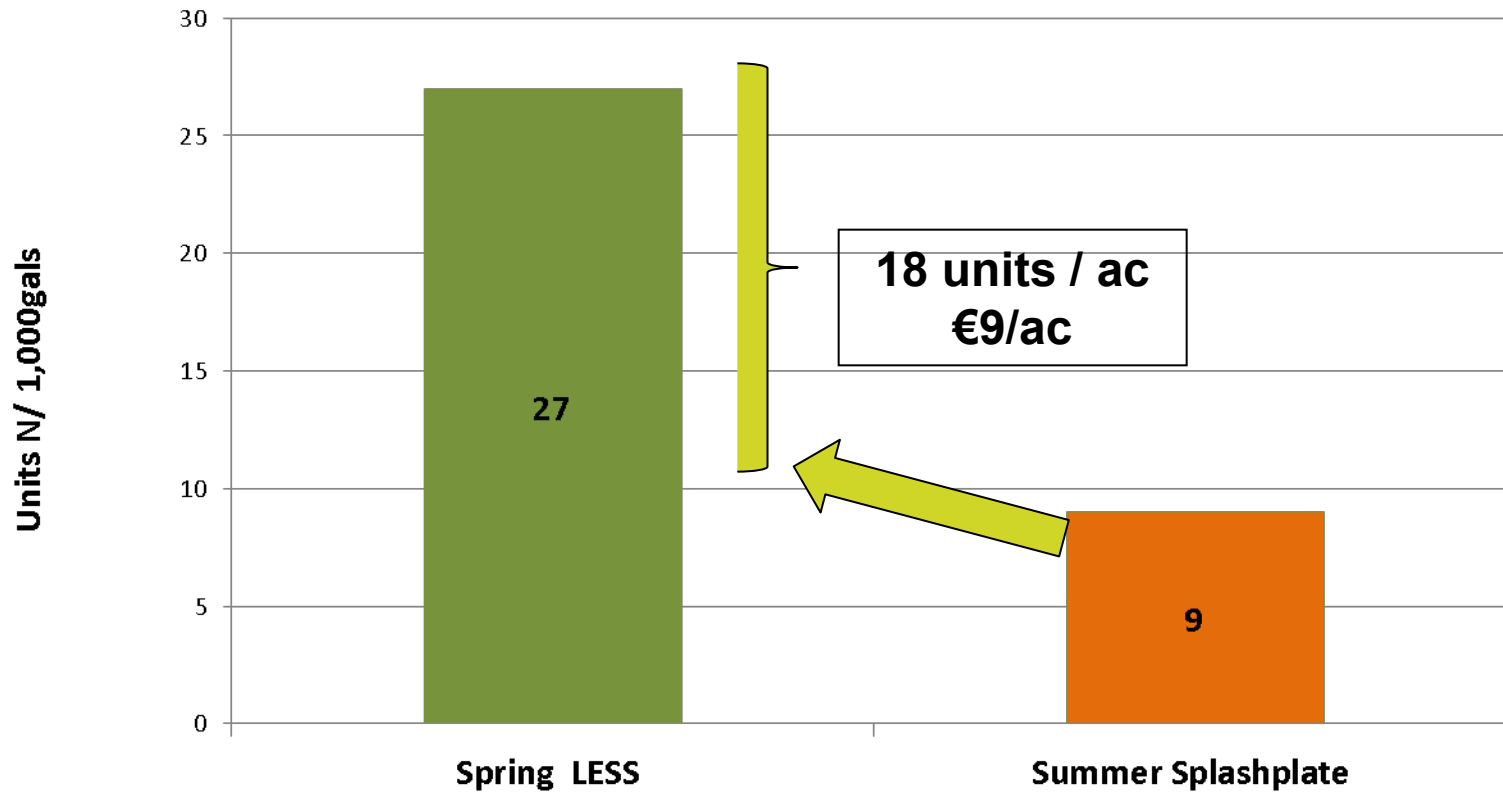
When & How to Apply?

Nitrogen Recovery - LESS 'v' Splashplate











LESS 'v Splashplate

Cattle slurry applied at 3,000 gal/ac



In Summary – Slurry Questions to Ask?

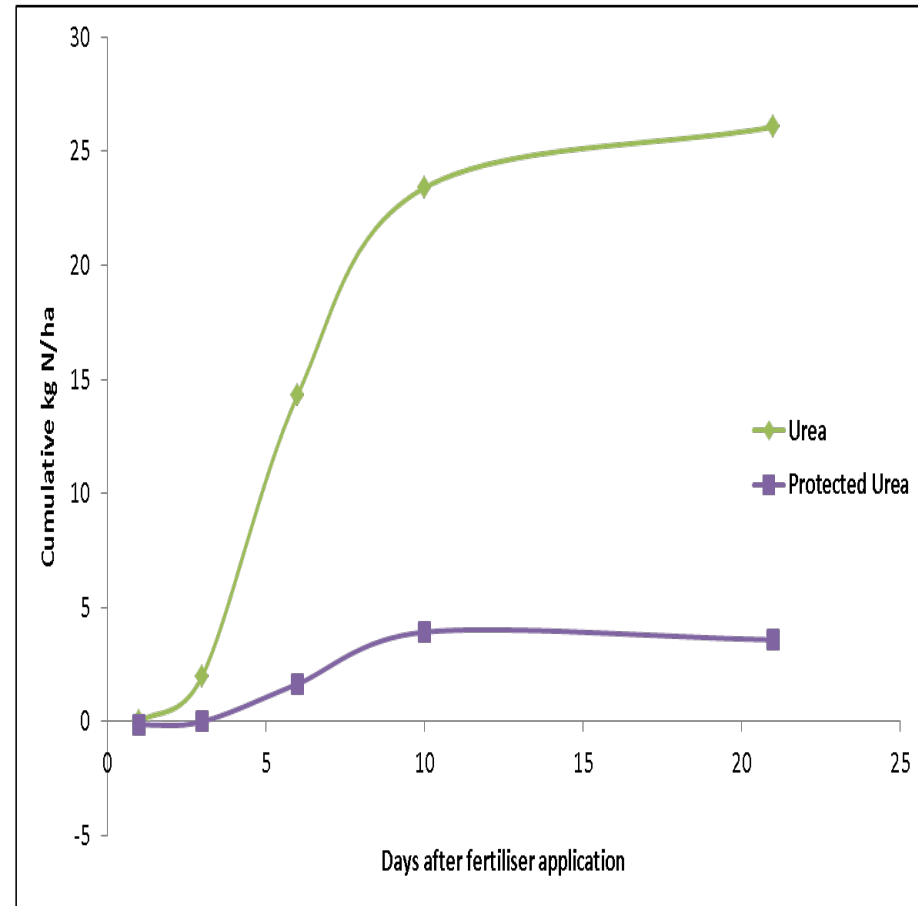
Where ?	When ?	How ?	Rate?
  <ul style="list-style-type: none"> • Fields with large requirements 	<p>cloudy</p>  <p>sunny</p>  <ul style="list-style-type: none"> • Cool, Damp Conditions • Spring better than summer 	 	 

Protected Urea

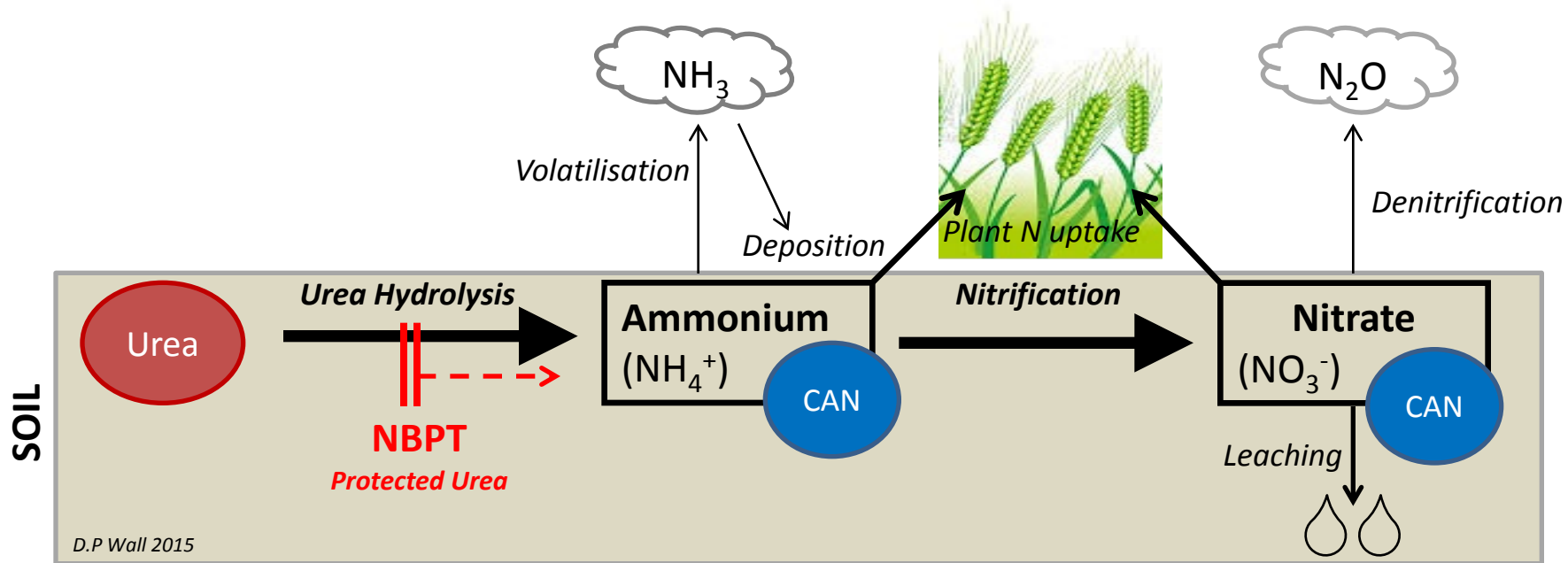


What is Protected Urea?

1. Urea + Urease Inhibitor
2. Reduces Ammonia Loss
3. Increases the recovery of N from Urea
4. NBPT, 2-NPT & NPPT

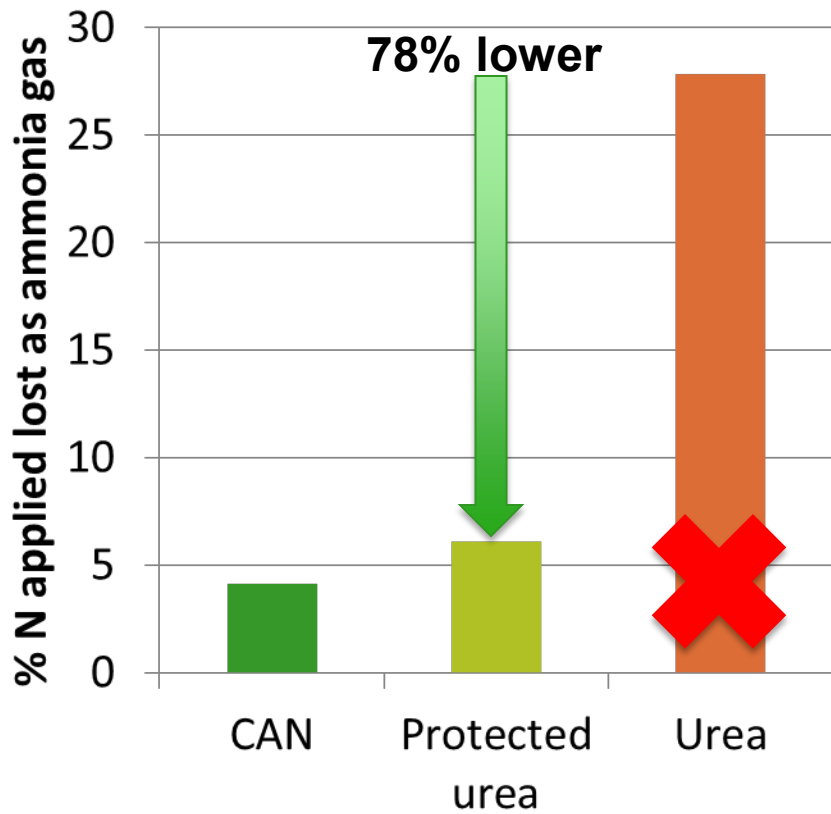


Nitrogen Forms, Loss Pathways & Plant Uptake

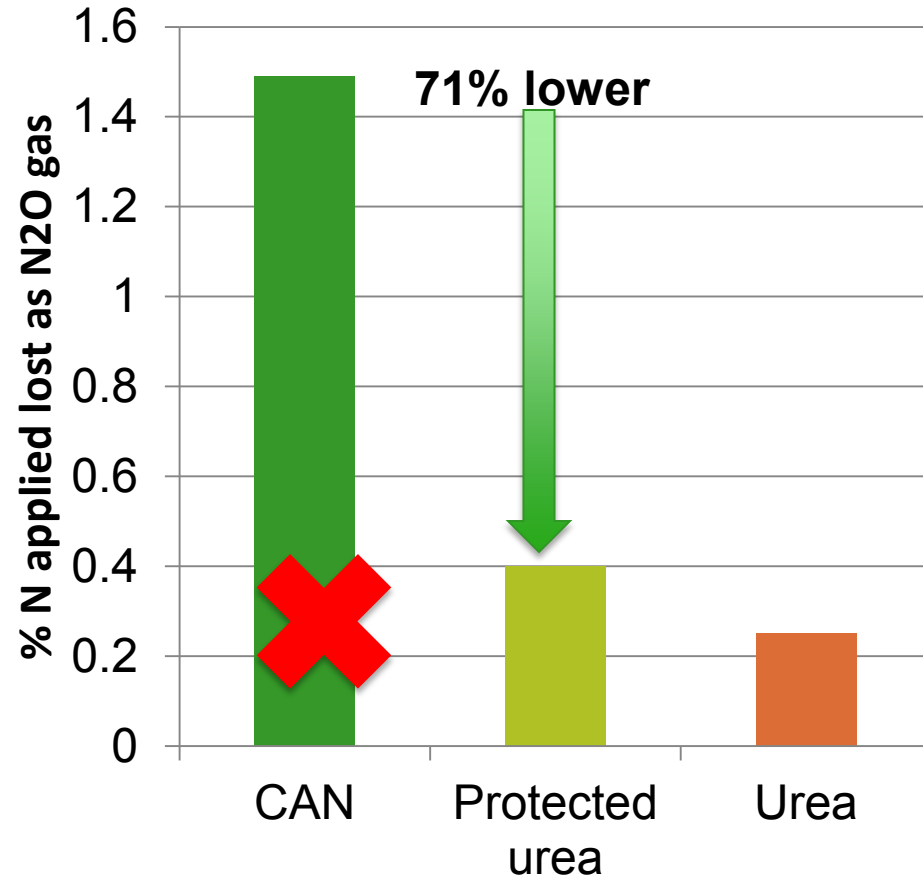


Emissions

Ammonia Emissions

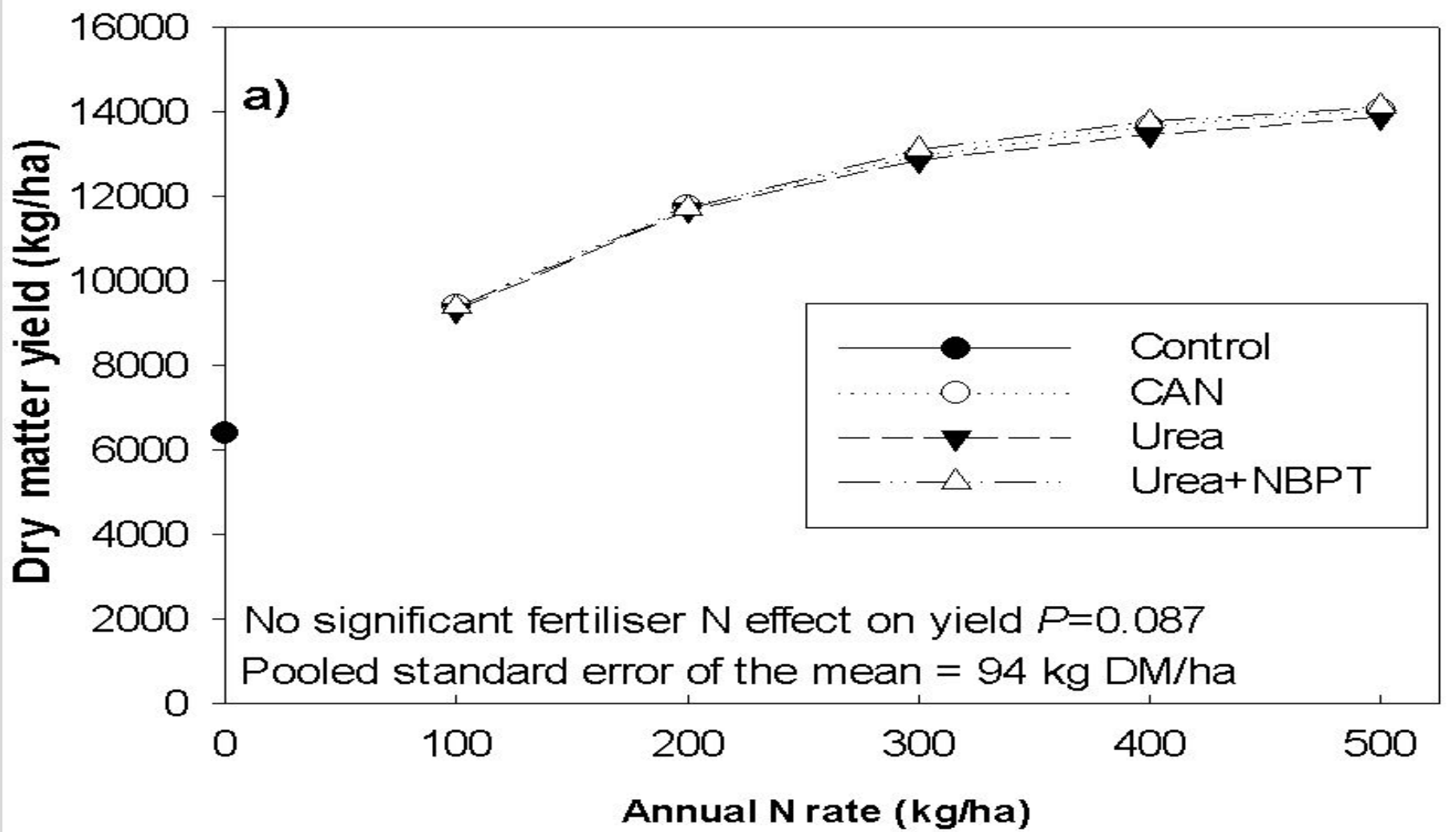


GHG emissions



Yield? CAN, Urea, Urea+NBPT

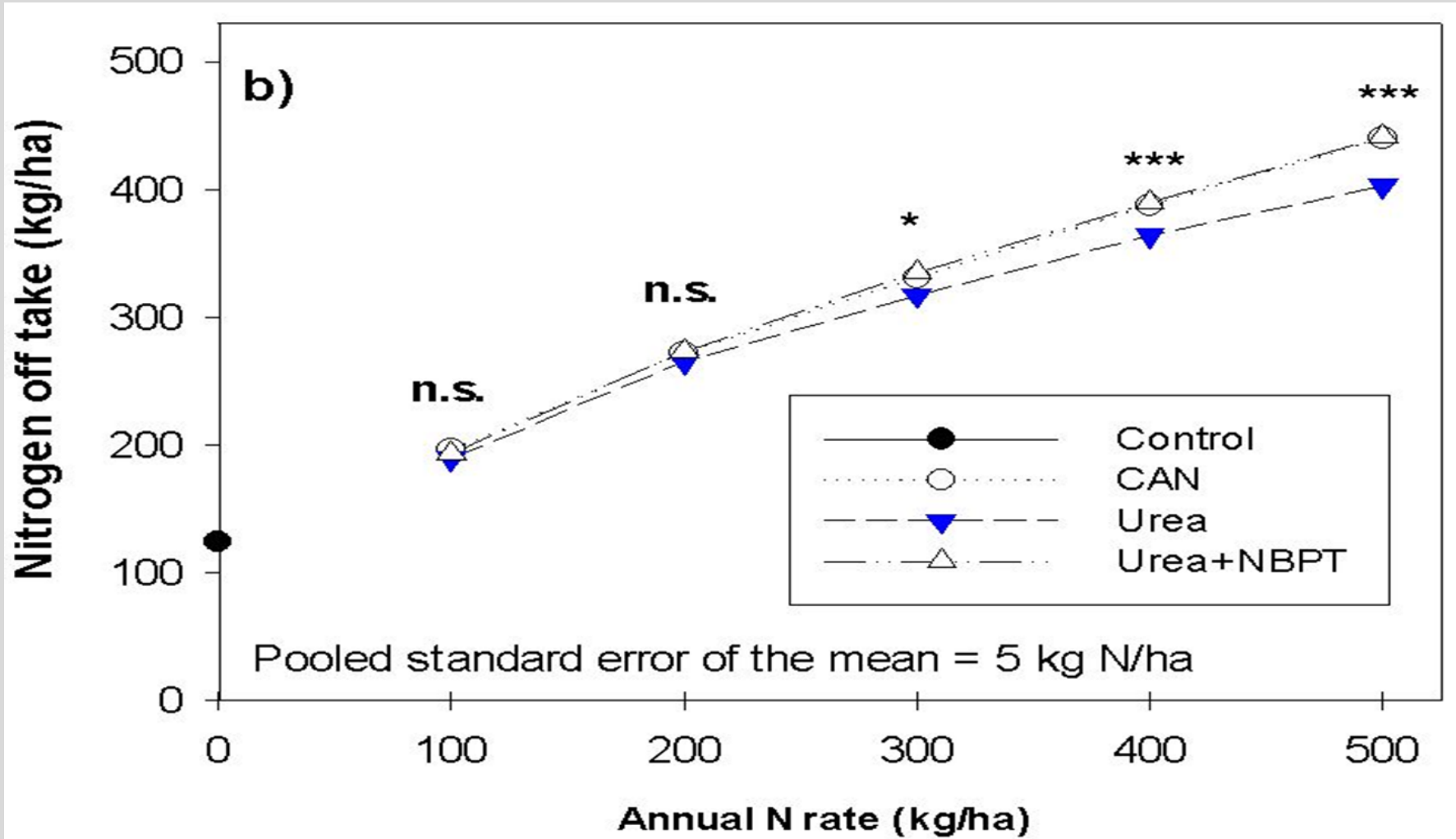
Six site-years 30 N applications



Forrestal *et al.* (2017) *Soil Use & Management* 33: 243-251

N recovery efficiency?

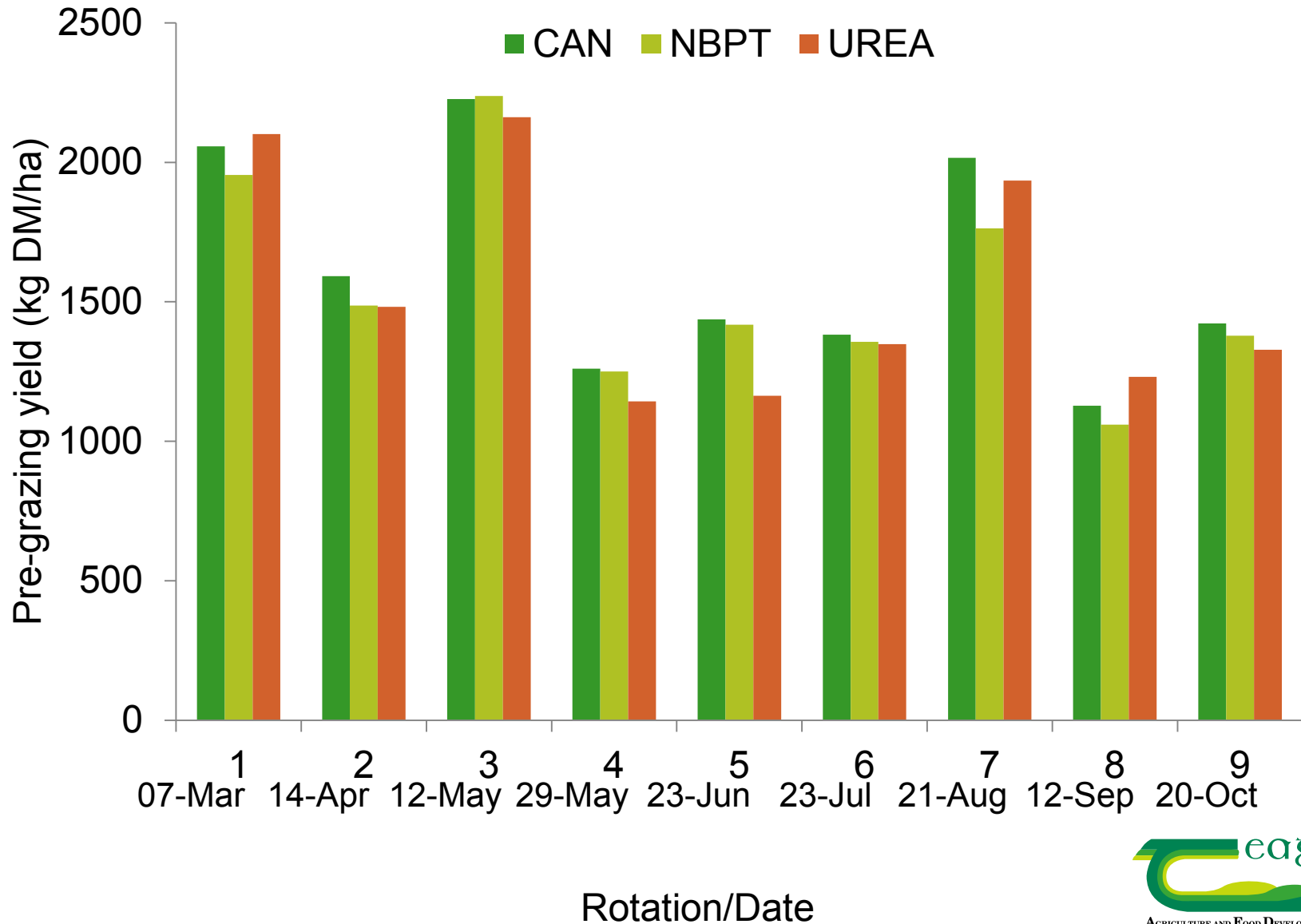
CAN vs Urea vs Urea+NBPT



Forrestal *et al.* (2017) *Soil Use & Management* 33: 243-251

Grass yield: Grazing

1 year × 9 applications × 2 sites × 2 N rates



Types of Nitrogen

What is the cost of 1 kg N?

- | | |
|-----------------------------|----------|
| 1. CAN @ €270/tonne | €1.00/kg |
| 2. Urea + NPBT @ €420/tonne | €0.90/kg |
| 3. Urea @ €370/tonne | €0.80/kg |

Sustainable Fertiliser N Products

Company	Product Name	Inhibitor Type	N%	P %	K%	S%
Grassland Fertilisers (Kilkenny) IFI	Topper N Protect	NBPT	46			
	Super Topper N Protect	NBPT	38			7.5
Grassland Agro	Eco Urea	NBPT	46	-	-	-
	Eco N 38	NBPT	38	-	-	7.6
	Eco 29-0-14 +S	NBPT	29	-	14	2
	Alzon Neo-N	2-NPT + MPA	46	-	-	-
	Alzon Neo-N + S	2-NPT + MPA	40			6
Goulding Fertiliser	KaN	NBPT	46	-	-	-
	KaN + S	NBPT	38	-	-	7
	KaN + S	NBPT	35	-	-	10
	KaN + K +S	NBPT	29		14	3.5
Target Fertilisers	UreaMax	NBPT	46	-	-	-
	UreaMax + S	NBPT	40	-	-	6
Yara	Yara Vera AMIPLUS	NBPT	46	-	-	-

In Summary

	CAN	Urea	Urea + NBPT
Cost of N	★★★★	★★★★★	★★★★
Yield	★★★★★	★★★★	★★★★★
N recovery efficiency	★★★★★	★★★★	★★★★★
Greenhouse gas	★★	★★★★★	★★★★★
Ammonia gas	★★★★★	★★	★★★★