

**Penwith
Landscape
Partnership**

Managing the Increase in Nitrogen Prices

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Introduction

1. Role of Nitrogen
2. Cost vs Benefit
3. Short Term Options
 - Grazing Management
 - Farm Business
 - Alternative Sources of Forage
 - Soil Health
 - Capital Fertiliser
4. Medium Term Options
5. Spring 2022



ROLE OF NITROGEN

- + Growth Promotor
- Replaces normal biological functions so plants become reliant

Cost increased £240t to £>600t

Efficiency is VERY IMPORTANT = Profit

1kgN = 5-30kgDM

Site	Conventional plots		
	Total N applied/ (Kg/ Ha)	Additional Yield (Compared to no Fert) (Kg/ Ha)	Additional Yield/Kg N applied
Site 1	275	2700	9.8
Site 2	205	900	4.4
Site 3	275	4600	16.7
Site 4 (Grazed)	240	4600	19.2
Site 4 (Silage)	460	10300	22.4

1kgN = 5kg Grain, 2.5kg Oilseed

Arable

Cereals = £200/t

Rapeseed = £400/t

AN = £690/t

RB209 Recommendations

-50 kg/ha N on cereals

-70 kg/ha N on oilseeds.

Effects on yield would be relatively small

Cereals = -0.36t/ha

Oilseeds = -0.25t/ha

Note the more Nitrogen applied, the lower the increase in yield

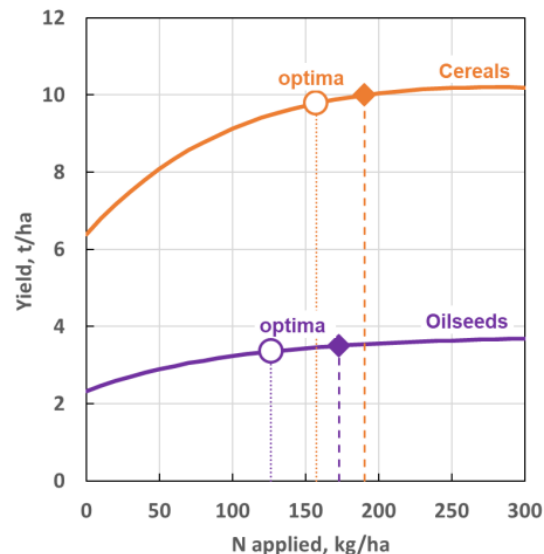
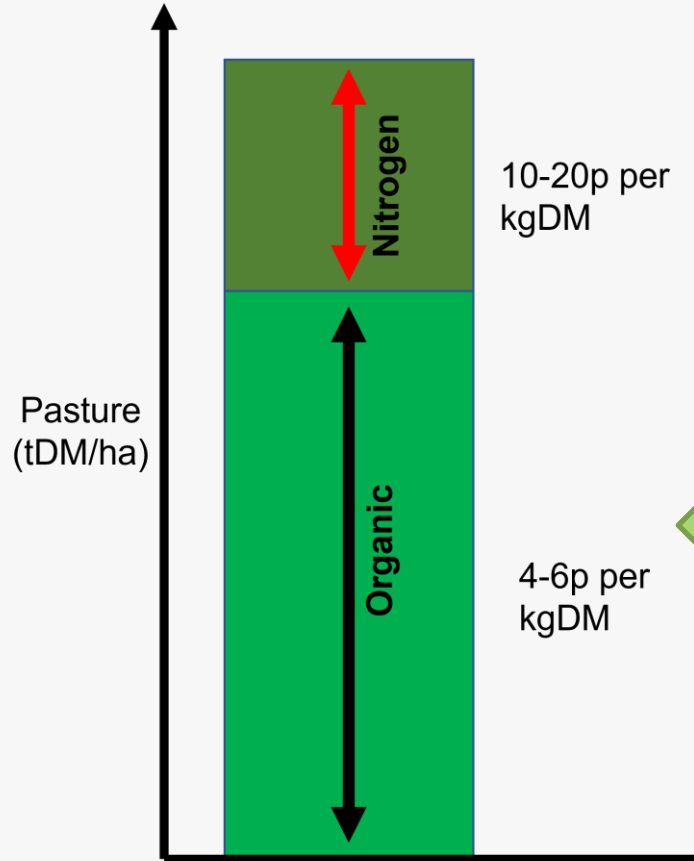


Figure 4.3: Average response shapes for cereals and oilseeds to applied N as used in the current version of RB209 showing optima at break-even price ratios (BER) of 5:1 and 2½:1 respectively (diamonds) and of 8:1 and 4:1 respectively (circles).

<https://projectblue.blob.core.windows.net/media/Default/Research%20Papers/How%20best%20to%20respond%20to%20costly%20fertiliser%20nitrogen%20for%20use%20in%202022.pdf>

Nitrogen

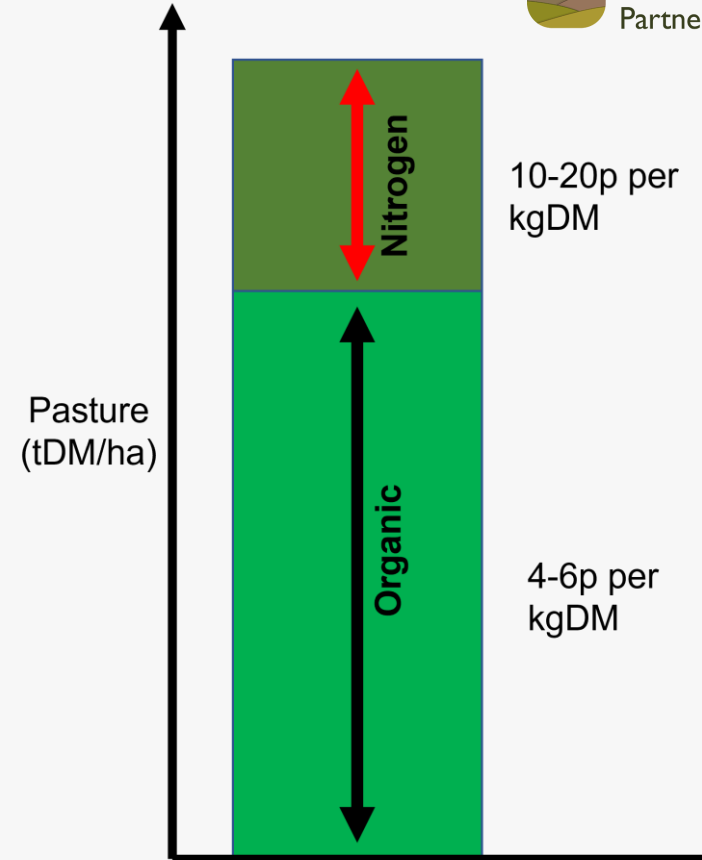


Focus on managing soil and pasture to optimise what the farm can grow without nitrogen – this is your lowest cost feed and where all of your profit is coming from



Nitrogen

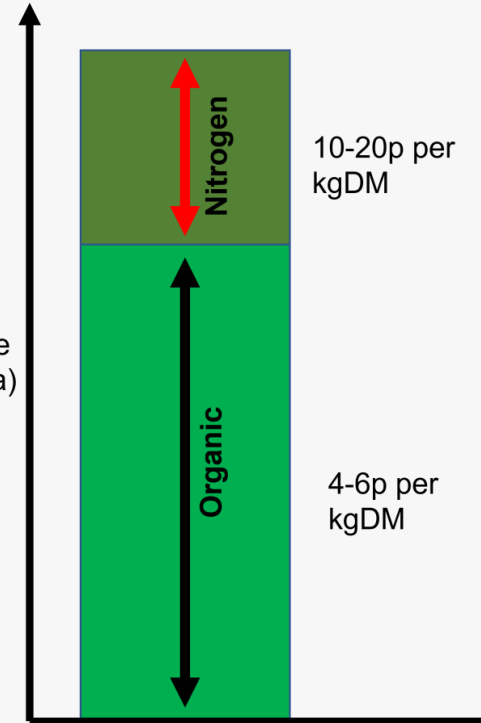
Land Cost	Ha
Rent	£ 260.00
Lime	£ 28.82
Re-Seeding	£ 32.60
Total	£ 321.42
Pasture Grown (No N Fert) (kgDM/ha)	8,000
Cost (£/kgDM)	£ 0.04



Nitrogen

Cost of Pasture Grown with Artificial Nitrogen		
	ha	
Fertiliser Cost (£/t)	£ 650.00	
Product %N	34%	
Product Applied (kg/ha)	312	250 Units/Acre or 2.5 Bags / Acre
Cost (£/kgN)	£ 1.91	
Amount of N Applied (kgN/ha)	106	
Cost (£/ha)	£ 202.80	
Spreading Cost	£ 37.05	3x applications at £5/Acre
Lime Required (kg/year)	212	
Lime Cost Inc Spreading (£/t)	£ 35.00	
Total Lime Cost (£)	£ 7.43	
Total Nitrogen Cost	£ 247.28	
Cost (£/kgN)	£ 2.33	
Efficiency (kgN:kgDM)	15	Only achieved if PH, Soil Structure, Plant Species and Timing of application are correct
Extra Pasture (kgDM)	1591	
Cost of Extra Pasture (£/kgDM)	£ 0.16	

Pasture
(tDM/ha)



Suckler
Cows

6300kgDM Pasture

FCR = 20:1

Calve = 280kg @ £2.2/kg
Cull Cow = 78kg @ £1.4/kg
=£725
Less
Heifer Calves Retained = 42kg @ £2.2
Total Income = £633

Revenue = £0.10/kgDM

Organic Grass = £0.04/kg
Nitrogen Grass = £0.16/kg



-6p per kgDM eaten if the pasture or forage was grown with nitrogen.
Therefore farm must focus on improve soil health and pasture management to avoid using N-fert

Suckler Weaned Calve to Finish @ 20m

4200kgDM Pasture

FCR = 12:1

Weaned Calve = 280kg
Finished Animal = 620kg
= 340kg @ £2.2/kg
=£748

Revenue = £0.18/kgDM

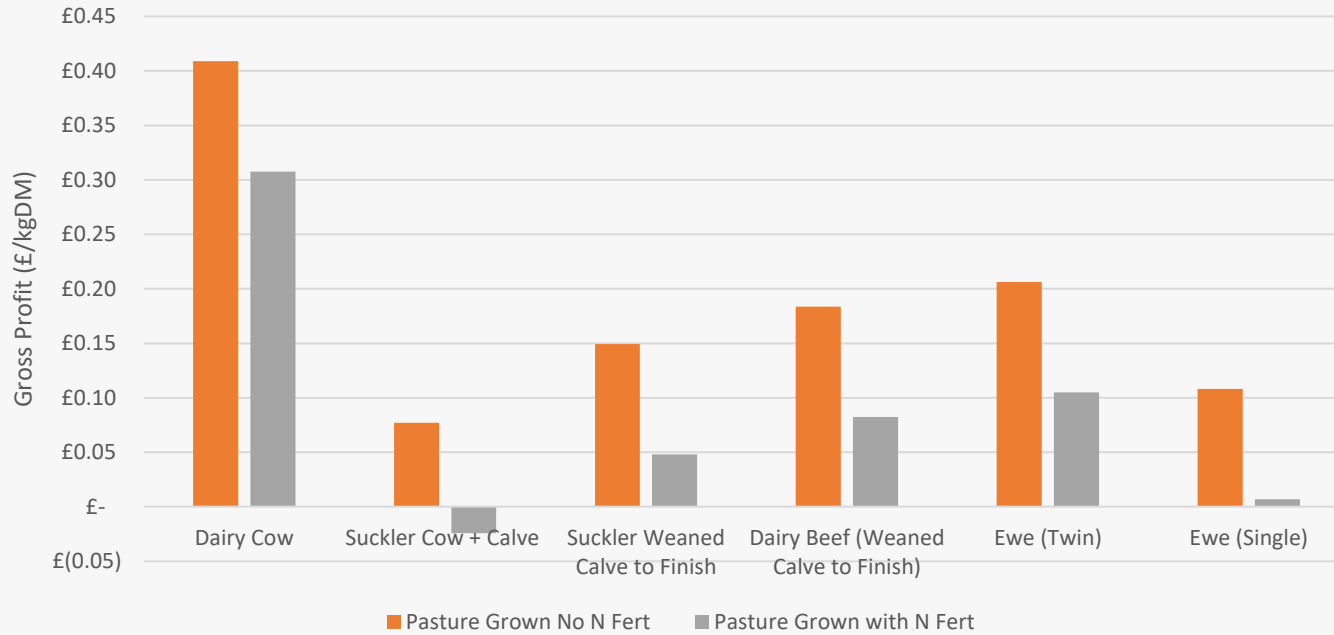
Organic Grass = £0.04/kg
Nitrogen Grass = £0.16/kg



+2p per kgDM eaten if the pasture or forage was grown with nitrogen.
Therefore farm must focus on improve soil health and pasture management to minimise using N-fert

Nitrogen

Gross Profit from 1 kgDM Pasture Grown vs Grown with Artificial Nitrogen @ £650/t



Quick Options

Grazing Management

- Reduce on-time per paddock (don't eat the re-growth)
- Appropriate rest periods
- Worth 1000-3000kgDM/ha/year (more than most people were growing with N fert!)

Advice available through PLP – see last page for details!

Table 5. Effect of moving from set stocking to paddock grazing

Strategy	Annual yield (t DM/ha)	Utilisation (%)	Useable yield (t DM/ha)	Percentage increase (%)
Set stocking	6.0	50	4.3	
Continuous (variable)	8.5	60	5.1	20
Rotational	10.2	65	6.6	56
Paddock	10.2	80	8.2	92

<https://projectblue.blob.core.windows.net/media/Default/Imported%20Publication%20Docs/Planning-grazing-strategies-for-better-returns.pdf>

Quick Options

Soil Testing

- Soil Testing (Full Mineral?)
- 3 Years
- PLP – up to 10x Fields FOC (or more at cost)

Soil Fertility

- PH Correction
- P&K Correction

Soil Health

- Soil Structure Assessment & Correction
- Available via PLP
- Soil Aerator Hire - £60+VAT/day

Soil Testing and Soil
Health Assessment
available through PLP
– see contact details
on last page!

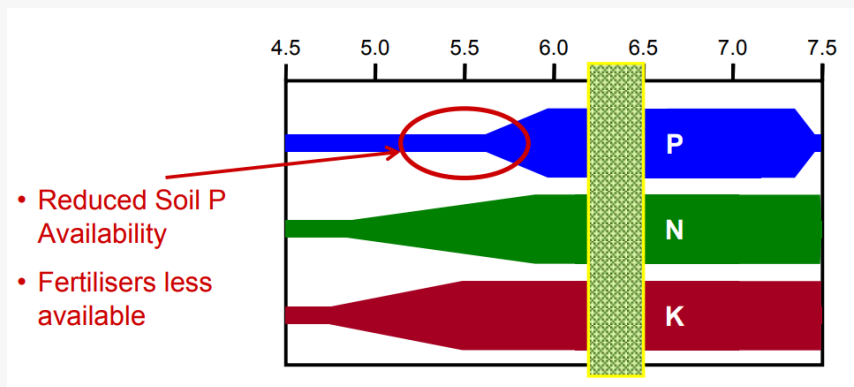
Quick Options

Lime

- Increase grass production annually
- Release up to 80kg N/ha/year
- Unlock soil phosphorus (P) and potassium (K)
- Increase the response to freshly applied N, P & K

Maintenance Lime Requirements

Lime Removals per year	Kg/ha
Drainage (leaching)	250-625
10,000 litres Milk or 1 Finished Beef Animal	30
150kg Nitrogen (Bag)	300
Total Lime Required	580 to 955kg/ha/year



Quick Options

Fertiliser

- Artificial N - timing, rates
- Slurry Management, timing and rates
- Slurry Sampling
- Foliar Application

Quick Options

Alternative Sources of Forage

Forage	Cost	kgDM	£/kgDM	Energy	Protein
Land	£247	8000	£ 0.03	High	High
Silage	£25	240	£ 0.10	Medium	High
Hay	£35	383	£ 0.09	Low	Low
Concentrate	£265	950	£ 0.28	High	High

Short Term Options

Farm Business

- Assessment of farm stocking rate and feed demand (kgDM/ha) compared to natural production potential of land.
- Removal of animals not performing.
- Reduction in stocking rate (sell trading stock).

Medium Term Options

- Legume establishment in Spring of 2022 post grazing / post silage
- Diverse Swards
- Foliar Nitrogen Application
- Soil Health
- Stocking Rate and System type

Figure 3: Nitrogen use efficiency 2020

Site	Conventional plots			Foliar Feed Plots		
	Total N applied/ (Kg/ Ha)	Additional Yield (Compared to no Fert) (Kg/ Ha)	Additional Yield/Kg N applied	Total N applied/ (Kg/ Ha)	Additional Yield (Compared to no Fert) (Kg/ Ha)	Additional Yield/Kg N applied
Site 1	275	2700	9.8	93	3500	37.6
Site 2	205	900	4.4	47	3400	72.3
Site 3	275	4600	16.7	75	3400	45.3
Site 4 (Grazed)	240	4600	19.2	65	1600	24.6
Site 4 (Silage)	460	10300	22.4	182	8300	45.6

Spring 2022

Nitrogen fertiliser only effective IF Soil Temperature
& Soil Moisture are NOT limiting!

- Monitor soil temperature closely – measuring at mid-day will provide the average temperature.
- Only apply when above 6 degrees

At a soil temp of 10 degrees:

- Urea needs >10mm rain within 3 days of spreading to avoid high losses.
- Ammonia Nitrate more stable and normally needs ~4mm to dissolve
 - ◆ Apply 20-30kg N/ha only. (20-30 Units/Acre)
 - ◆ Limit N used if you have medium to low stock rate as it has a prolonged effect (50-60 days) and so could cause unwanted surplus in May/June.

Advice and Services Available through PLP

- Pasture Management, Grazing Management
- Farm System review including stocking rate, use of inputs
- FOC (or part funded service)

James Daniel – Precision Grazing
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- Soil Testing – 10x samples FOC – additional at cost
- Soil structure and compaction assessment – FOC
- Hire of Aerator - £60 + VAT /day (includes delivery)

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