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Evolutions in nutrient management

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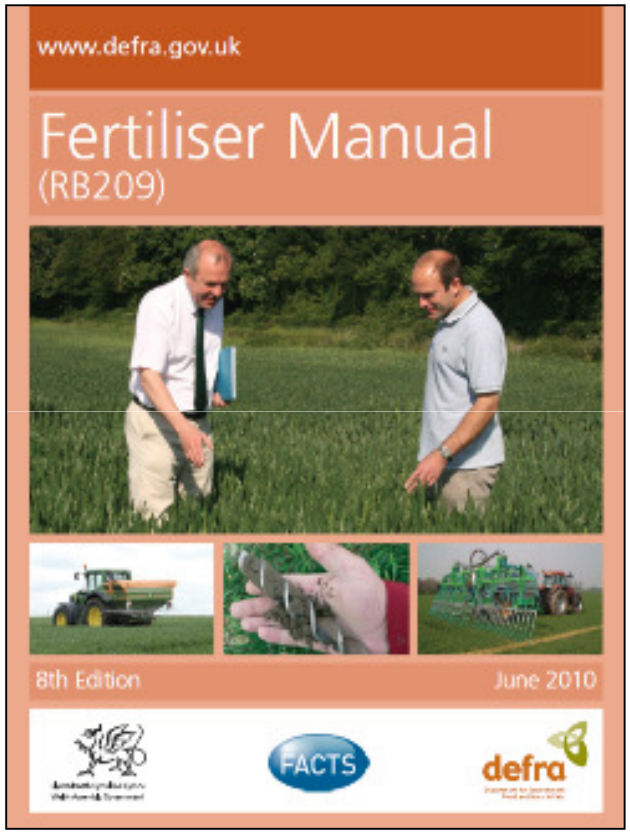
Background to RB209 review

- 8th edition RB209 published 2010
- Since then, ~£11 million spent on relevant research
- AHDB funded review of new data and revision of RB209
- 'AHDB Nutrient Management Guide' due for publication May 17



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Data sources

Scientific literature, publicly funded projects (e.g. AHDB) and commercial data

Crop	No. site seasons	No. site x season x treatment combos
Winter wheat	395 (UK) 507 (Denmark)	776 (UK) 507 (Denmark)
Winter barley	103	152
Winter triticale	22	47
Winter oats	7	26
Winter rye	1	1
Spring barley	33	95
Spring wheat, triticale, oats and rye	0	0

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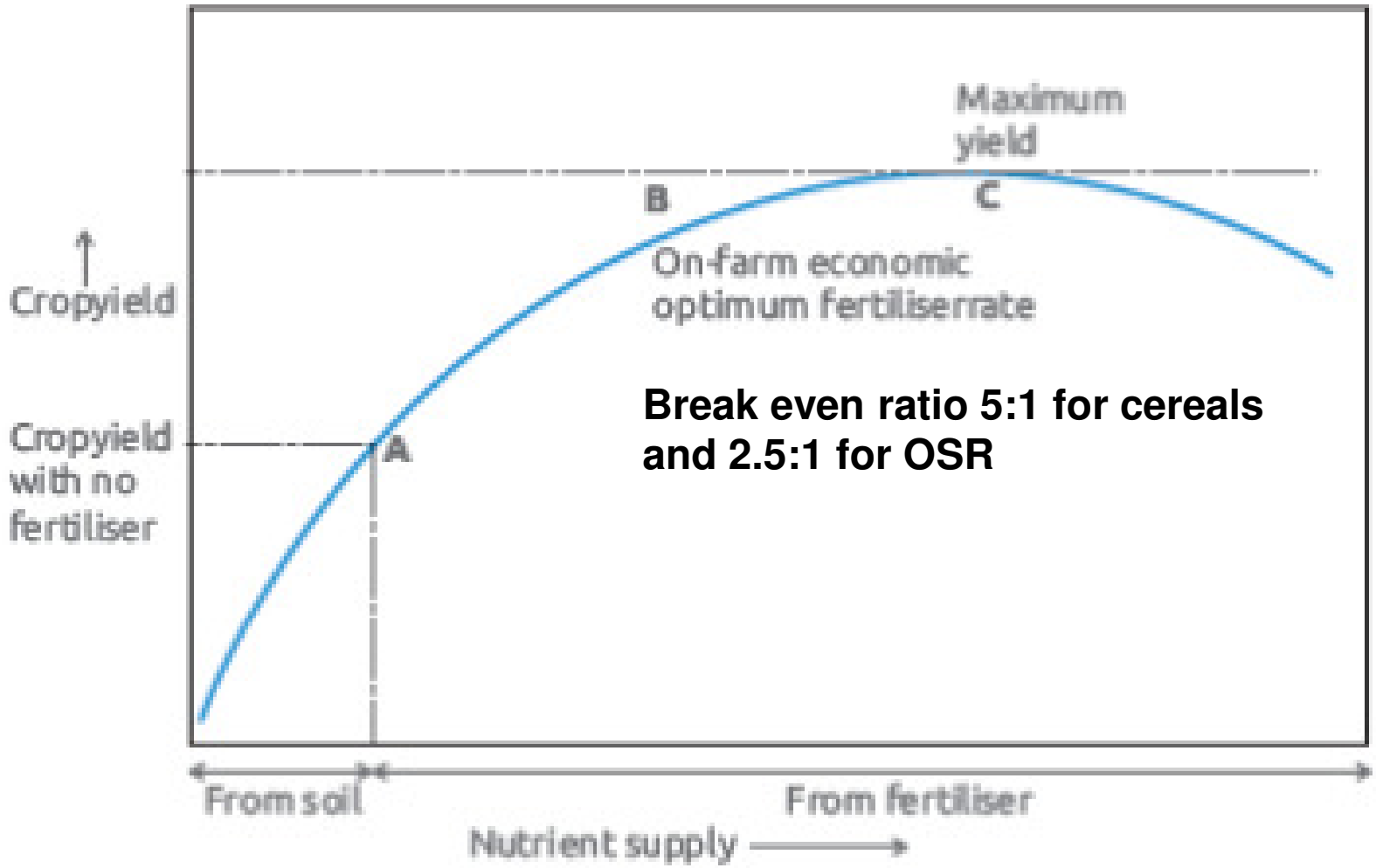
Economic optimum N rate



Break even ratio 5:1 for cereals and 2.5:1 for OSR

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Updating N rate tables

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Wheat N rates

- **Winter wheat:**

Small increases of ~20 kg N/ha for light sands and silts for most SNS indices

- **Spring wheat:**

No data

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Winter wheat N rates

	SNS index						
	0	1	2	3	4	5	6
Light sand	~~160~~ **180**	~~130~~ **150**	~~100~~ **120**	~~70~~ **90**	~~40~~ **60**	0-~~40~~ **60**	0-40
Shallow	280*	240	210	180	140	80	0-40
Medium	250*	220	190	160	120	60	0-40
Deep clay	250*	220	190	160	120	60	0-40
Deep silt	~~220~~ **240***	~~190~~ **210**	~~160~~ **170**	130	100	40	0-40
Organic				120	80	40-80	0-40
Peat						0-60	

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Winter barley N rates

- **Winter feed barley:**

Small increases of 10-20 kg N/ha for

1. Light sands and silts for all SNS indices
2. Shallow soils at SNS index 0

- **Winter malting barley:**

Small rise for sands but reductions for other mineral soils, as greater reduction needed to meet 1.8% grain N target

Winter malting barley quality

	Grain %N target			
	1.8%	1.7%	1.6%	1.5%
Applied N at SNS index 0	147	132	112	87
SNS index 1	113	98	78	53
SNS index 2	80	65	45	20
SNS index 3	47	32	12	0
Reduction on recommended N for malting barley	**0**	**15**	**35**	**60**

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Spring barley N rates

- **Spring feed barley:**

Increases of 20-30 kg N/ha for light sands

- **Spring malting barley:**

Small rise for sands at SNS index 1 but falls for other mineral soils, as greater reduction needed to meet 1.8% grain N target

Spring barley malting quality

	Grain %N target		
	1.8%	1.7%	1.6%
Applied N at SNS index 0	122	92	62
SNS index 1	88	58	28
SNS index 2	55	25	0
SNS index 3	22	0	0
Reduction on recommended N for malting barley	**0**	**30**	**60**

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Winter oats, rye & triticale N rates

- **Oats** N rates increased by 40 kg N/ha
- **Triticale** now same N rates as winter wheat, except:
  - Reduce rates by 40 kg/ha if lodging risk high
  - Reduce rates according to price differential
  - Use yield adjustment to reduce rates on land with low yield potential
- **Rye** N rates unchanged due to lack of data

Adjusting N rates for expected yields

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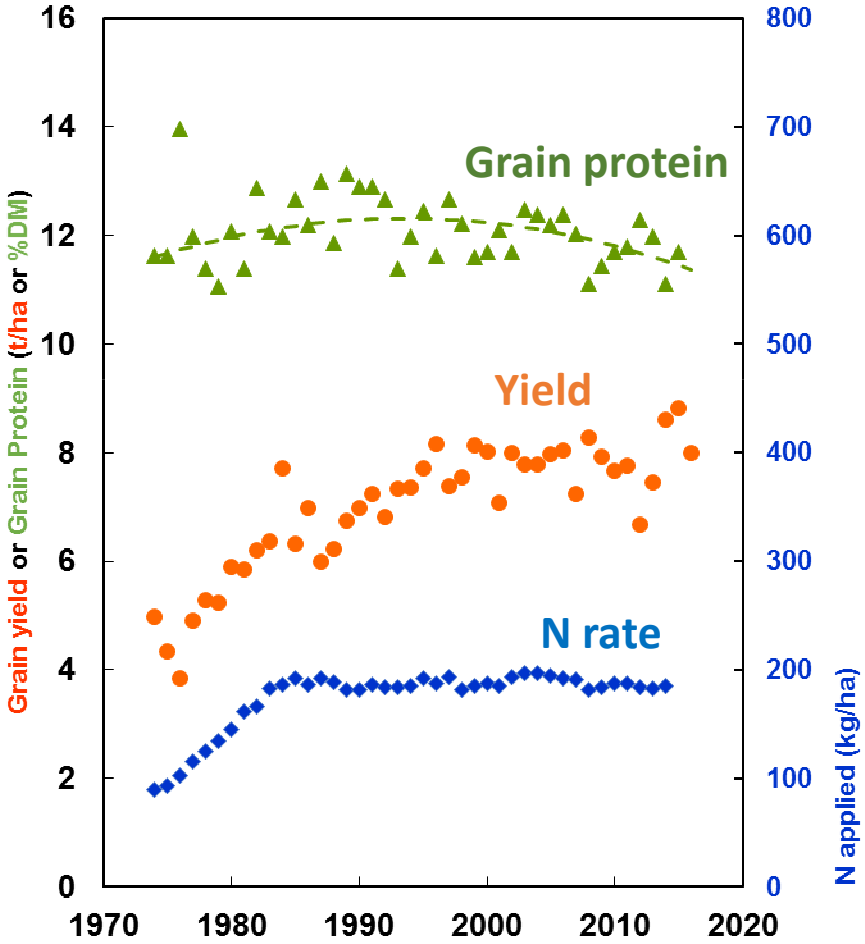
Is more N required?



- **Winter wheat**
- N fertiliser rate unchanged since mid 1980s
- Yields increased rapidly to late 1990s, then variable
- Grain protein decreasing
  - N dilution?

Source: BSFB, Defra, AHDB

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Adjusting N rates for expected yield

N rates should be adjusted up or down by 20 kg/ha per t/ha increase or decrease in expected yield from:

- 8.0 t/ha in winter wheat (up to 14 t/ha)
- 6.5 t/ha in winter feed barley (up to 12 t/ha)
- 5.5 t/ha in spring barley (up to 10 t/ha)

OSR remains the same at 30 kg N/ha per 0.5 t/ha above 3.5 t/ha

This is consistent with NVZ rules

Adjusting N rates for expected yield

Need to be confident of achieving expected yield

Any yield limiting factors must be dealt with including:

- Disease + weed pressure
- Supply of other nutrients
- Poor soil structure (could take several years)

If expected yield is unlikely to be high due to *uncontrollable* factors (e.g. climate, soil type, aspect), then do not increase N rate for high yield

Updating N timings

Winter barley N timing

- earlier N increased yield by 0.3 t/ha

	New RB209
Total less than 100 kg/ha	**Apply as single dressing by GS30-31**
Total 100-200 kg/ha	**Apply half during late tillering (mid-Feb / early March) and half at GS30-31**
Total more than 200 kg/ha	**Apply 40% during late tillering (mid-Feb / early March), 40% at GS30-31, & 20% at GS32**

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Winter oilseed rape N timing

- Adopt “Canopy Management” principles
- Reduce and delay N for crops with large canopies (GAI>2)
- Apply additional N at yellow bud/early flowering for crops with expected yield >3.5 t/ha

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Measuring soil mineral N

- Target where Soil N Supply is large (>120 kg/ha) or uncertain

- Autumn sampling
  - Better than spring, except shallow soils
  - 0-60cm recommended

- Spring sampling
  - 0-90cm best
  - mineralisation analysis can help

- Sample handling & storage
  - Don't freeze, don't mix, keep cool
  - SMN increases with storage ***get to lab quickly***

Building up P & K indices

- recommended rates above or below maintenance

Period over which to adjust soil index	Current P or K Index					
	0	1	2-	2+	3	4 or higher
	Adjustment to application (kg/ha)					
10-15 years	+60	+30	0	-30	-60	No phosphate or potash required
5-10 years	+100	+50	0			

"On calcareous soils it may be more appropriate to maintain soils at P Index 1 and apply fresh P fertiliser"

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Take home points

- N rates greater for cereals at some SNS indices & soil classes, e.g. light sands
- Link between expected yield and N requirement
  - 20 kg N/ha per t/ha yield (wheat, w & s barley)
- Earlier N recommended for winter barley
  - Increases yield by 0.3 t/ha
- Canopy Management N timings for OSR
- Option to build up P & K indices more quickly
- No change for sulphur requirement

Thank you

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