Cereal Nitrogen Requirements: General Principles & Recent Research

Sarah Clarke

ADAS

Optimising N Management

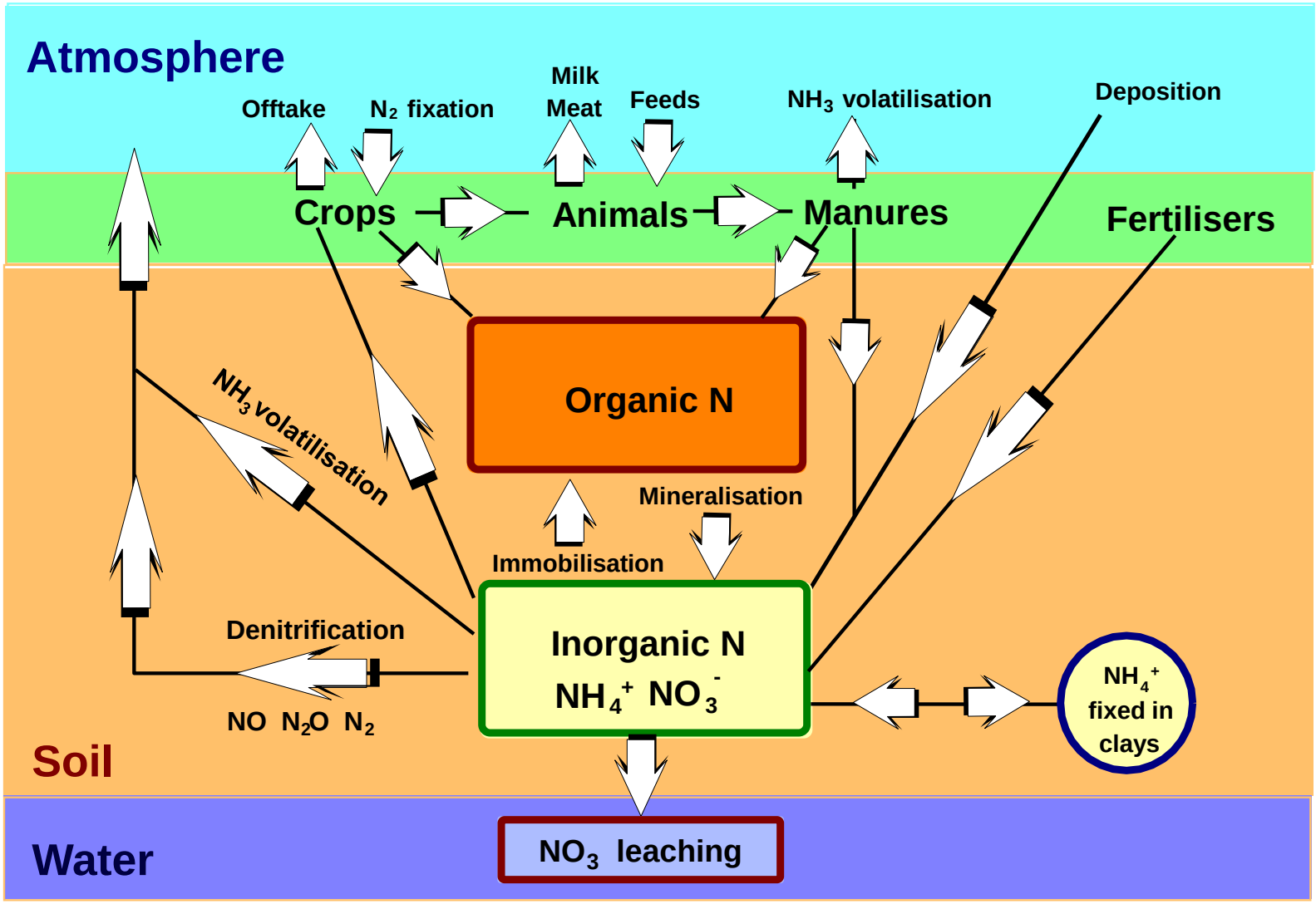
Match

NITROGEN SUPPLY

with

CROP DEMAND

Nutrient balances



Source: Goulding, Rothamsted

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Crop N Demand: Amount

Crop N Demand

- **Rule of thumb**
  - Wheat: **~25 kg N/t**

BUT…

This will be affected by:

- Season
- Soil type
- Availability of other nutrients
- Economics
- Cereal species
- Crop type
- Variety

etc. …

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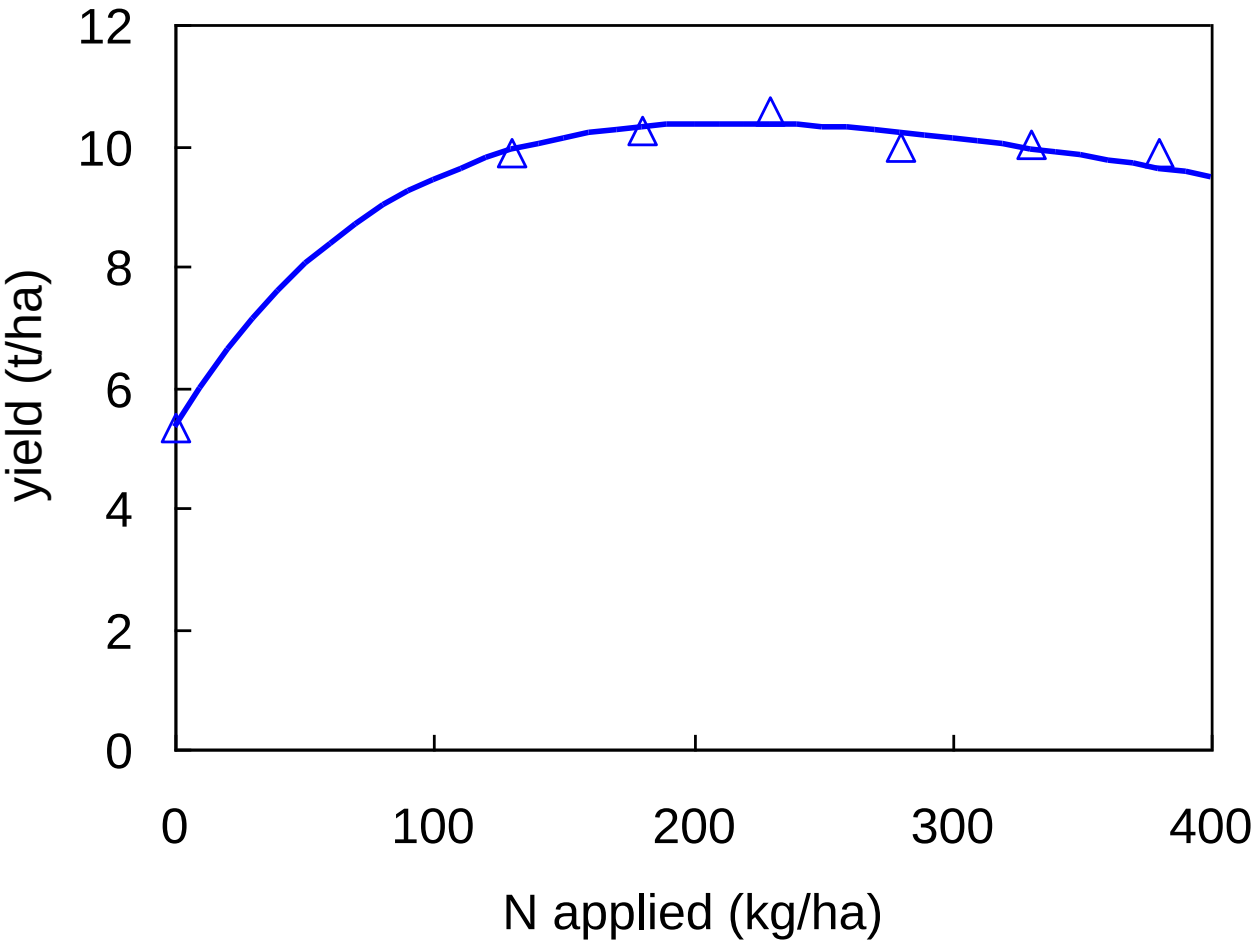
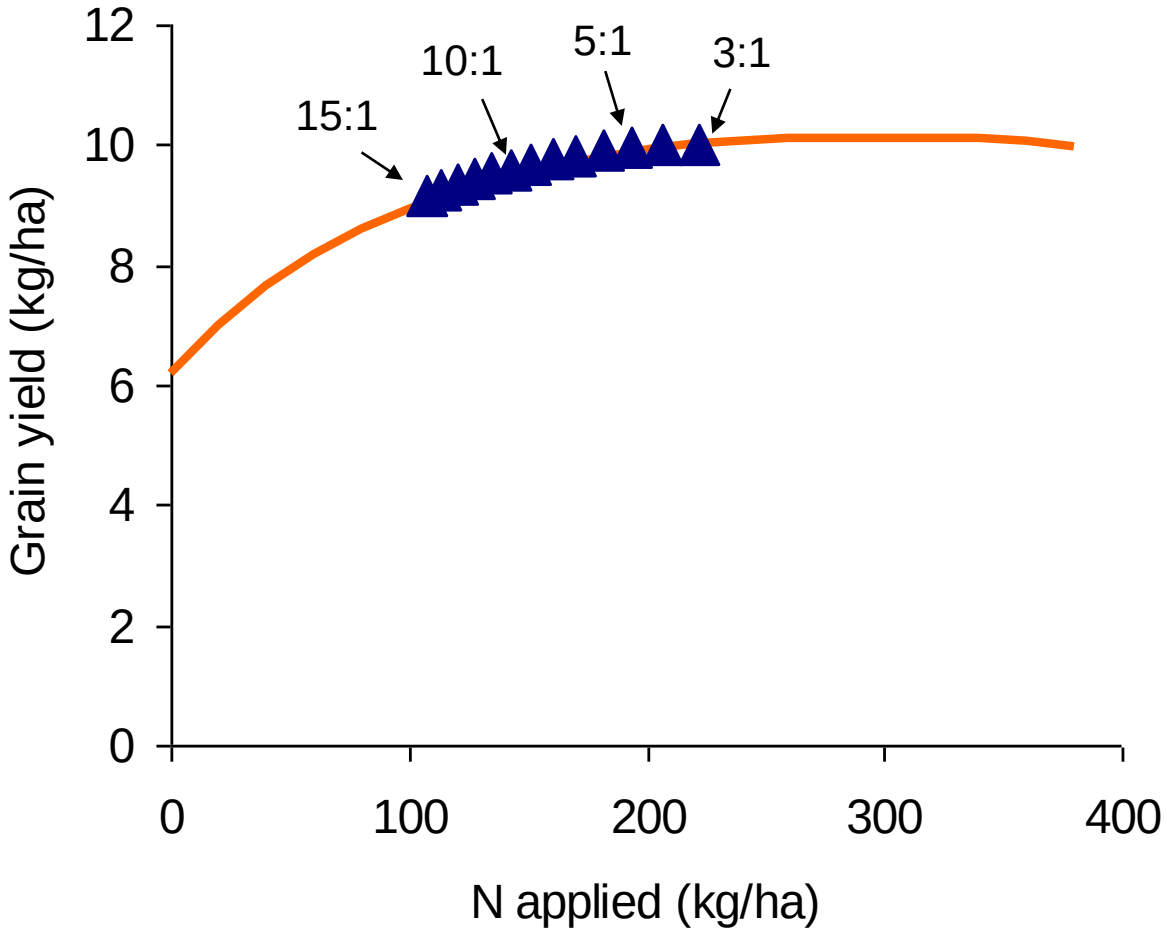
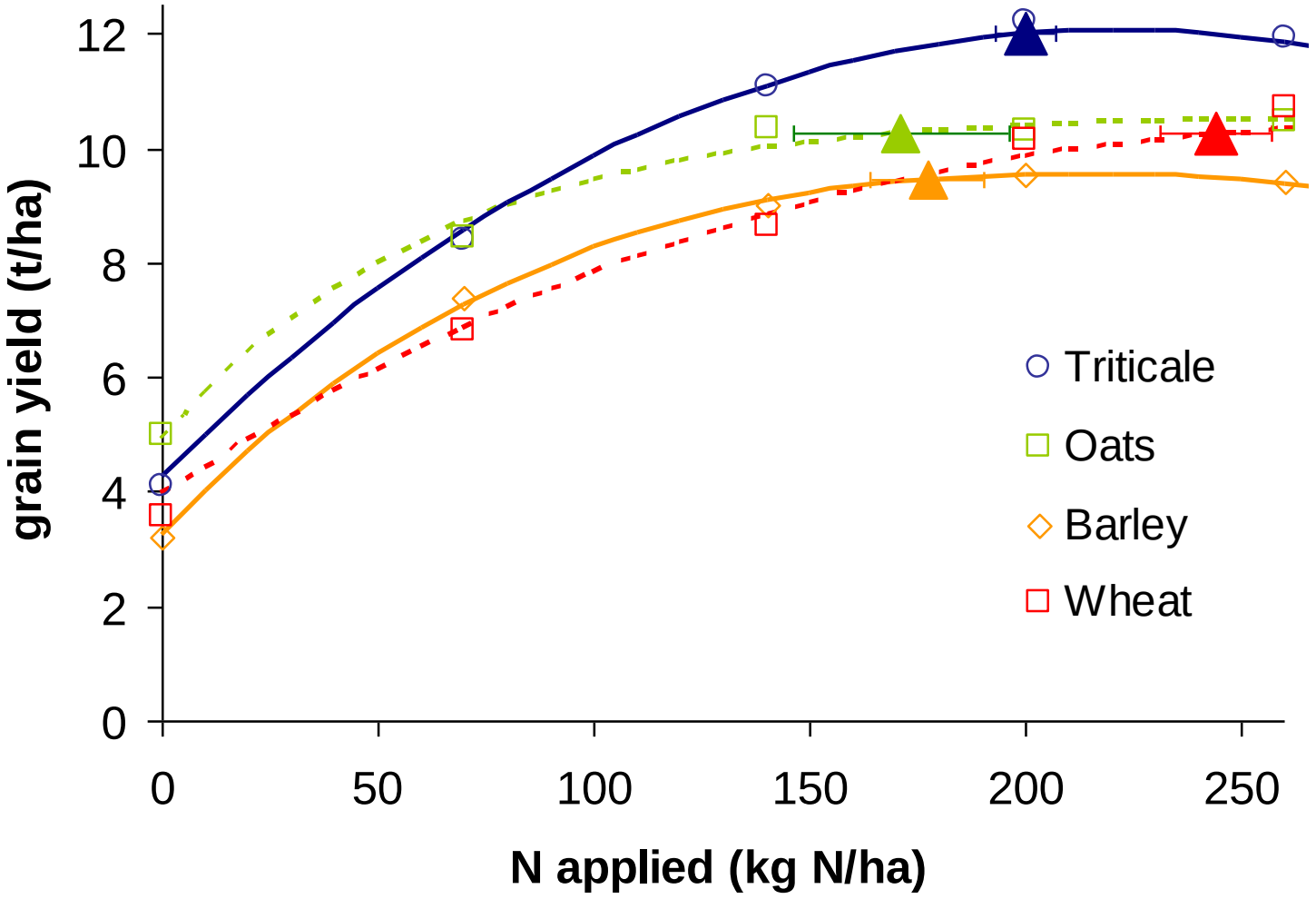
Nitrogen response



Economic effects on optimum N rates

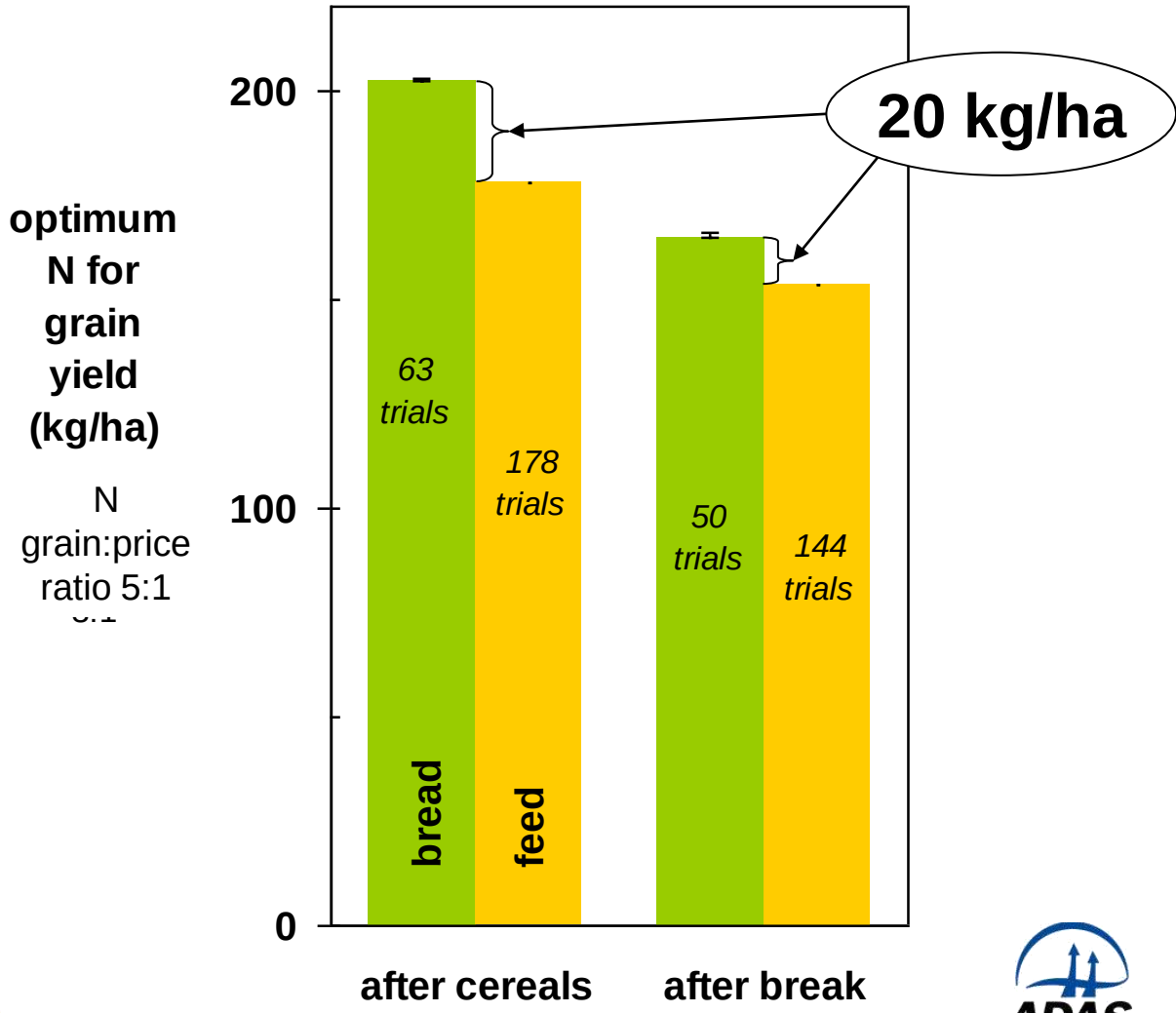


Species effects on optimum N rates

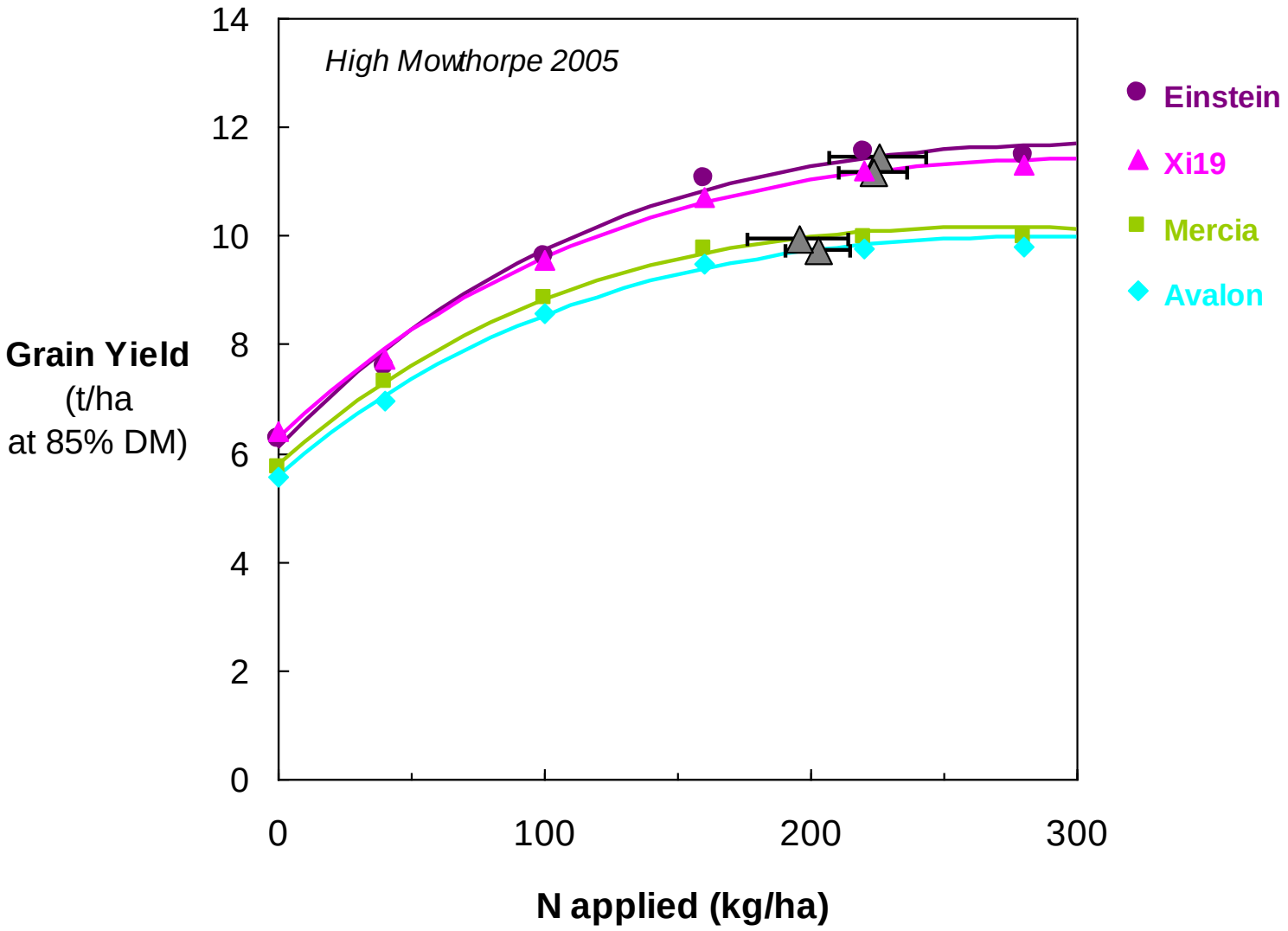


Effects of crop type

- Optimum N rate for bread-making varieties ~20kg N/ha higher than feed varieties
- Grain N at optimum for yield
  - bread varieties = 2.17% (=12.4% protein)
  - feed varieties = 2.0% (=11.5% protein)



Effect of variety on optimum N rates



Effect of variety on optimum N rates

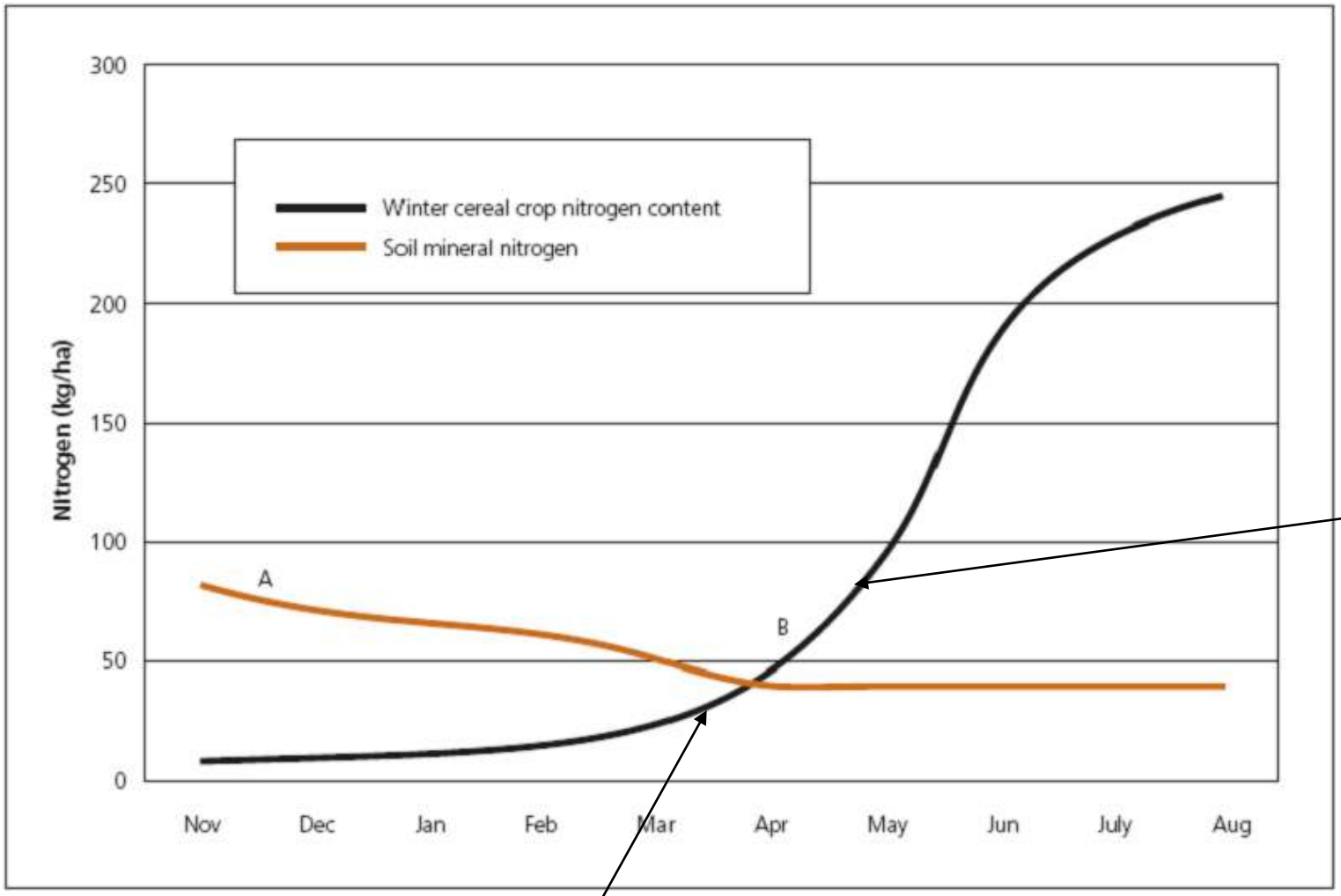
- Wheat breeding has increased yield & optimum N rate and maintained grain protein – N Use Efficiency not improved
- Barley breeding has increased yield AND N Use Efficiency without increasing optimum N rate through reduced grain Nitrogen

- Research is ongoing into better testing of varieties for improved N Use Efficiency.

Crop N Demand: Timing

Crop demand - timing

Nitrogen Uptake by a Winter Cereal Crop in Relation to Available Soil Nitrogen



rapid uptake during stem exten-sion

Manage N supplies for adequate tillering in early spring

Summary

- Trying to match Nitrogen supply to crop demand is key
- Choose species/varieties to make this easier
- Where applying Nitrogen, timing as well as amount is important

Thank you