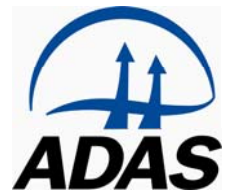


**12th Ramiran International Conference
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Strategies to reduce diffuse pollution from cattle slurry applications

**John Williams, Lizzie Sagoo, Brian
Chambers, John Lapworth, Dave
Chadwick and John Laws**



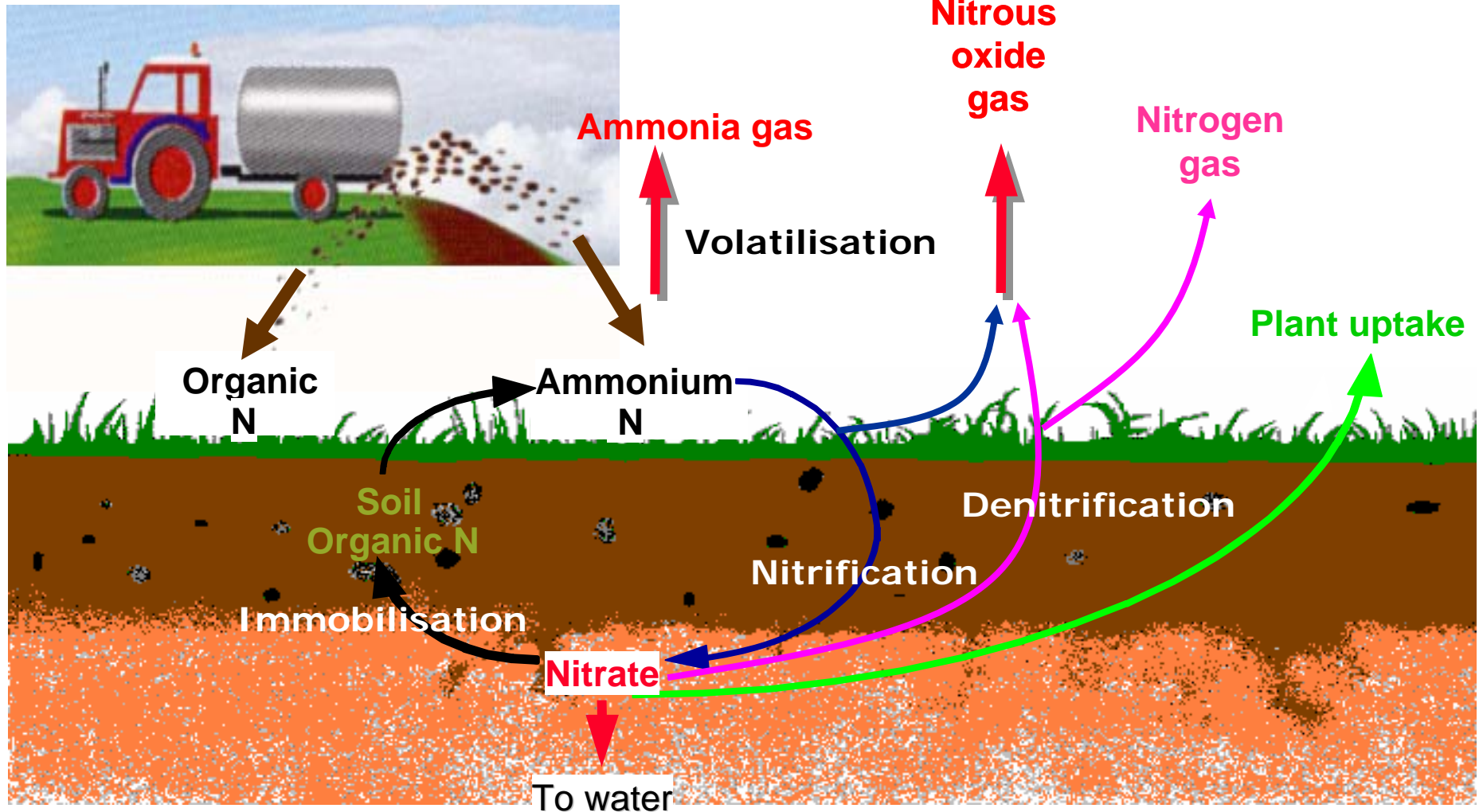
Background

- **Around 47 million tonnes of slurry applied to agricultural in the UK each year**
 - **210,000 tonnes of total N and 110,000 tonnes of readily available N**
- **Slurry applications need to be carefully managed to minimise diffuse N pollution:**
 - **Spring timings - nitrate leaching**
 - **Band spreading slurry - ammonia volatilisation**

Project objective

Develop practical slurry *application timing* strategies which will minimise nitrogen losses to the air and water environments and maximise crop N recovery

Nitrogen - "Pollution Swapping"



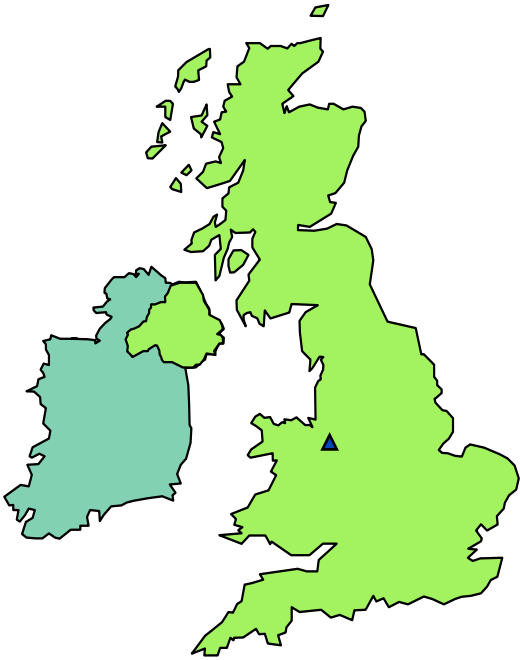
Site details

- **Grange Farm, Betley (Cheshire)**

- **320 cow dairy unit**

- **Mixed grass and arable cropping**

- **Sandy soils - NVZ designated in December 2002**



Slurry application - 11 m³ tanker with 12 m trailing hose boom



Slurry application timings

| Cropping year | Autumn | Winter | Spring - 1 | Spring - 2 | Spring - 3 | Summer - 1 | Summer - 2 |
|-------------------------------|---------------|---------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Grass (2002/03) | 28 Oct | - | 10 Feb | 17 Mar | 22 Apr | 9 Jun | 23 Jun |
| Winter wheat (2004/05) | 4 Nov | 17 Jan | 21 Feb | 21 Mar | 4 May | - | - |

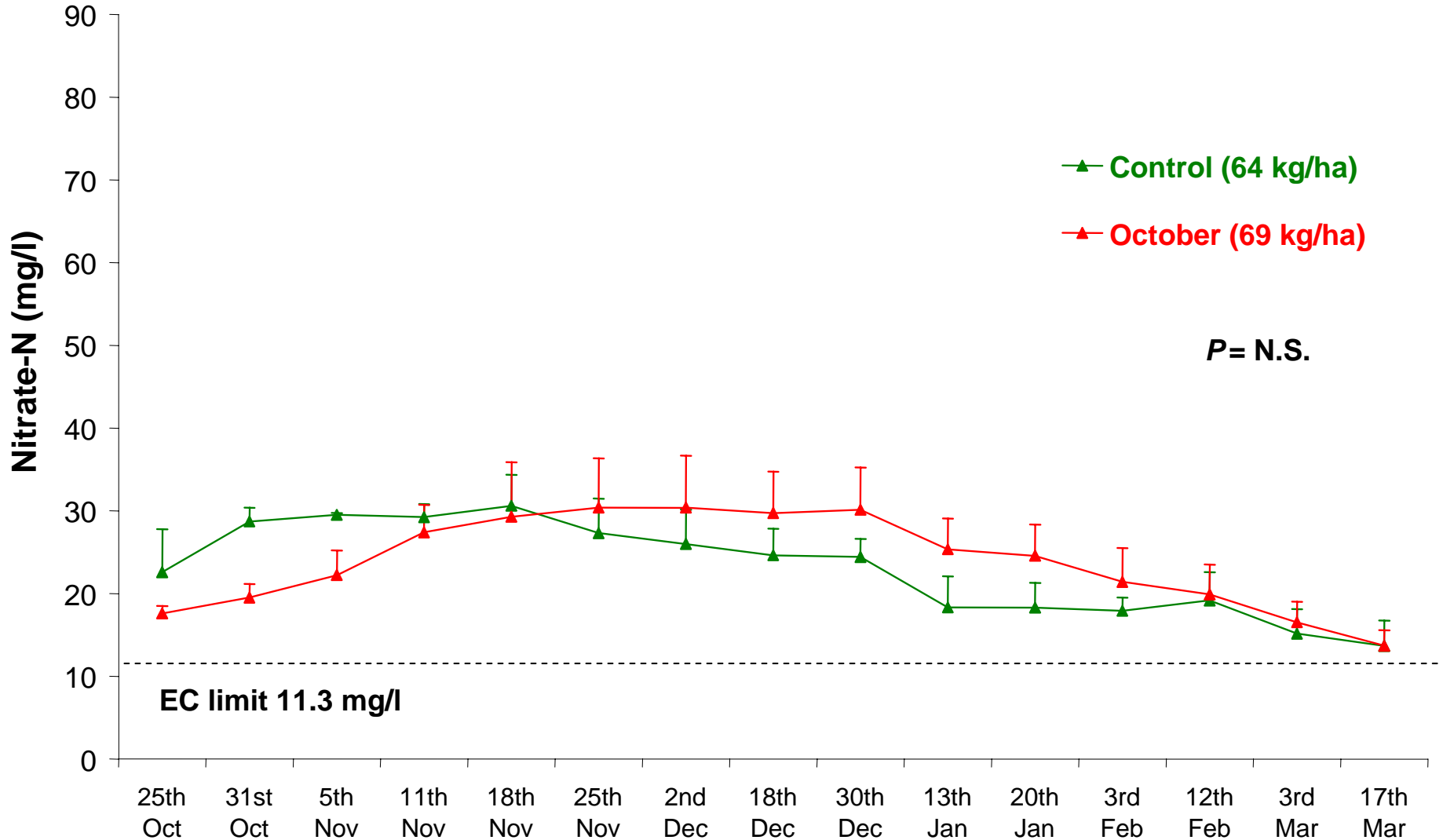
3 replicates of each application timing and an untreated control in a randomised block design (plots 24m x 24m)

Measurements

- **Ammonia**
 - **Micro-meteorological mass balance (shuttles)**
- **Nitrate leaching**
 - **Porous ceramic cups**
- **Crop yields and N offtakes**



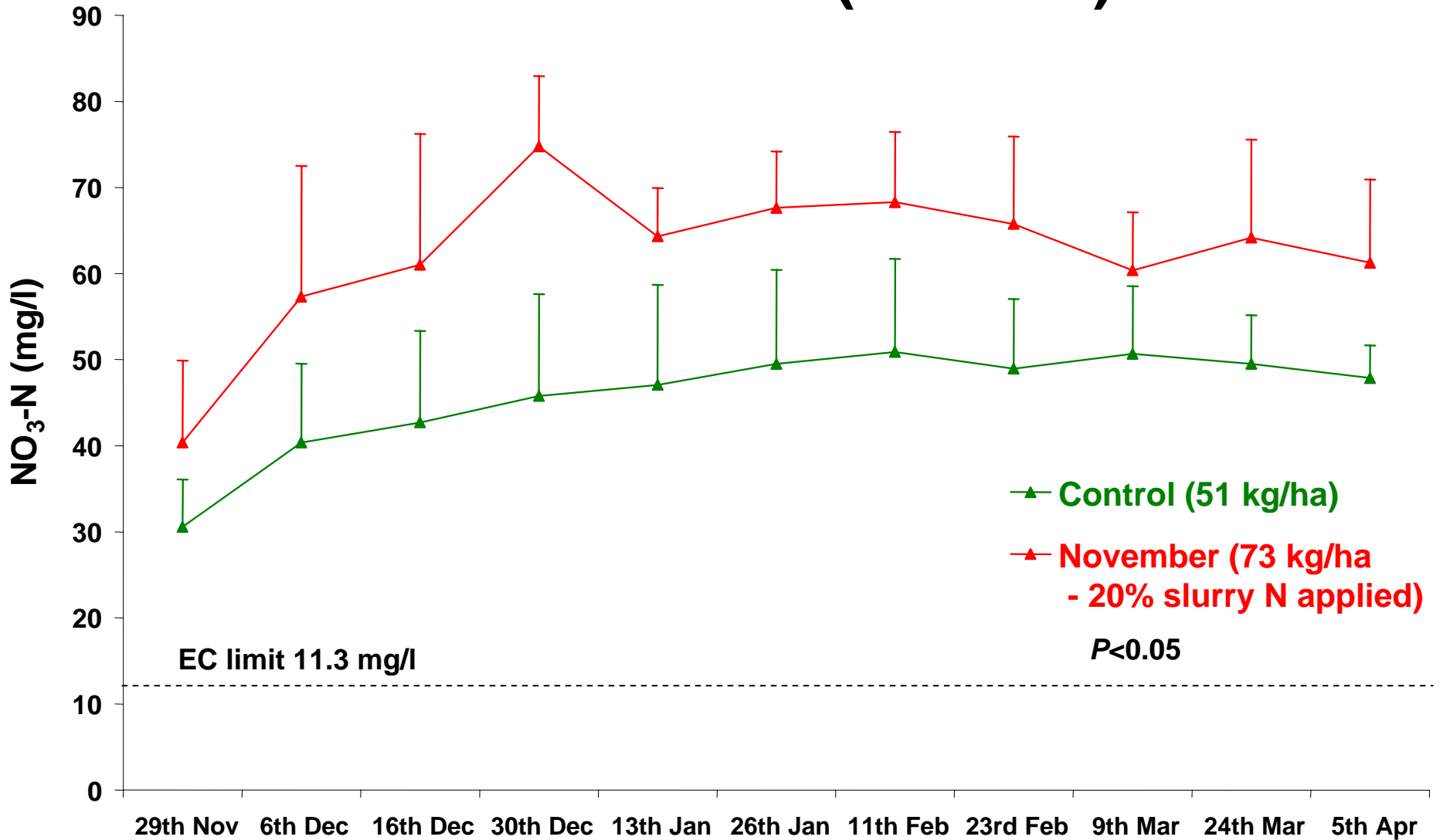
Nitrate concentrations in drainage water - grassland (winter 2002/03)



Drainage volume = 228mm

Autumn SMN = 178 kg/ha

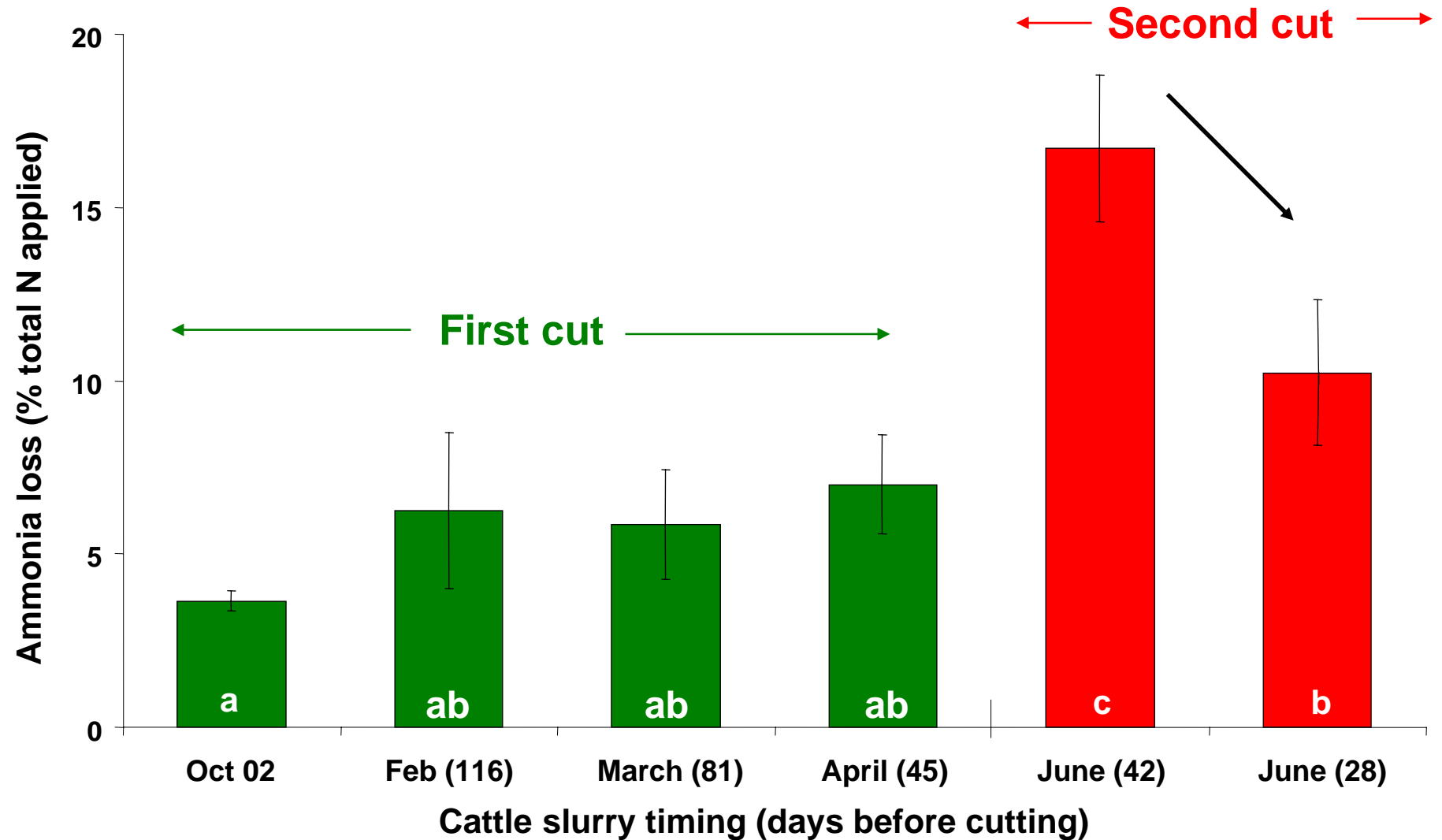
Nitrate concentrations in drainage water - winter wheat (2004/05)



Drainage = 127 mm

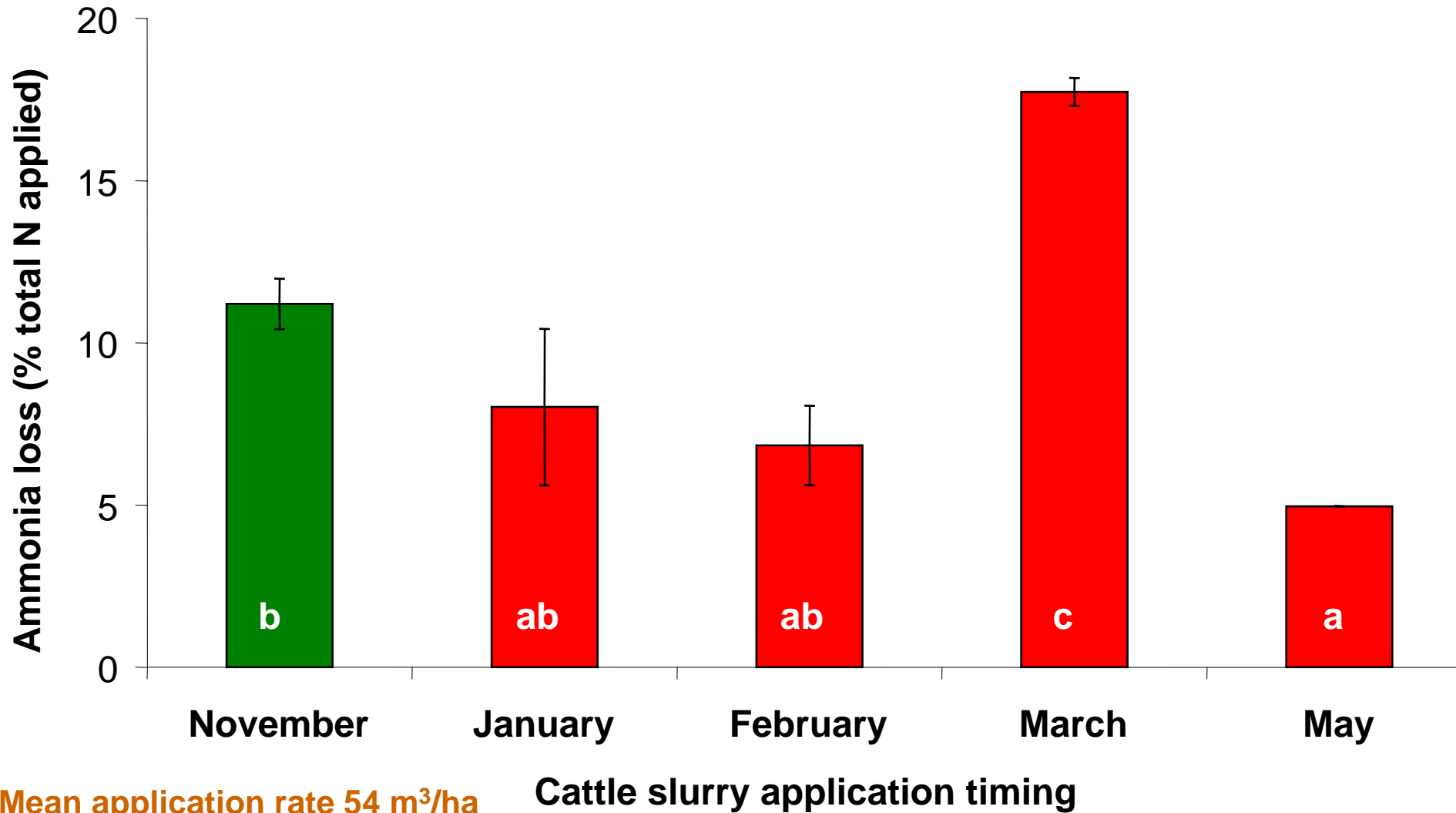
Autumn SMN = 151 kg/ha
Following maize crop

Ammonia emissions following cattle slurry applications to grassland (2002/03)

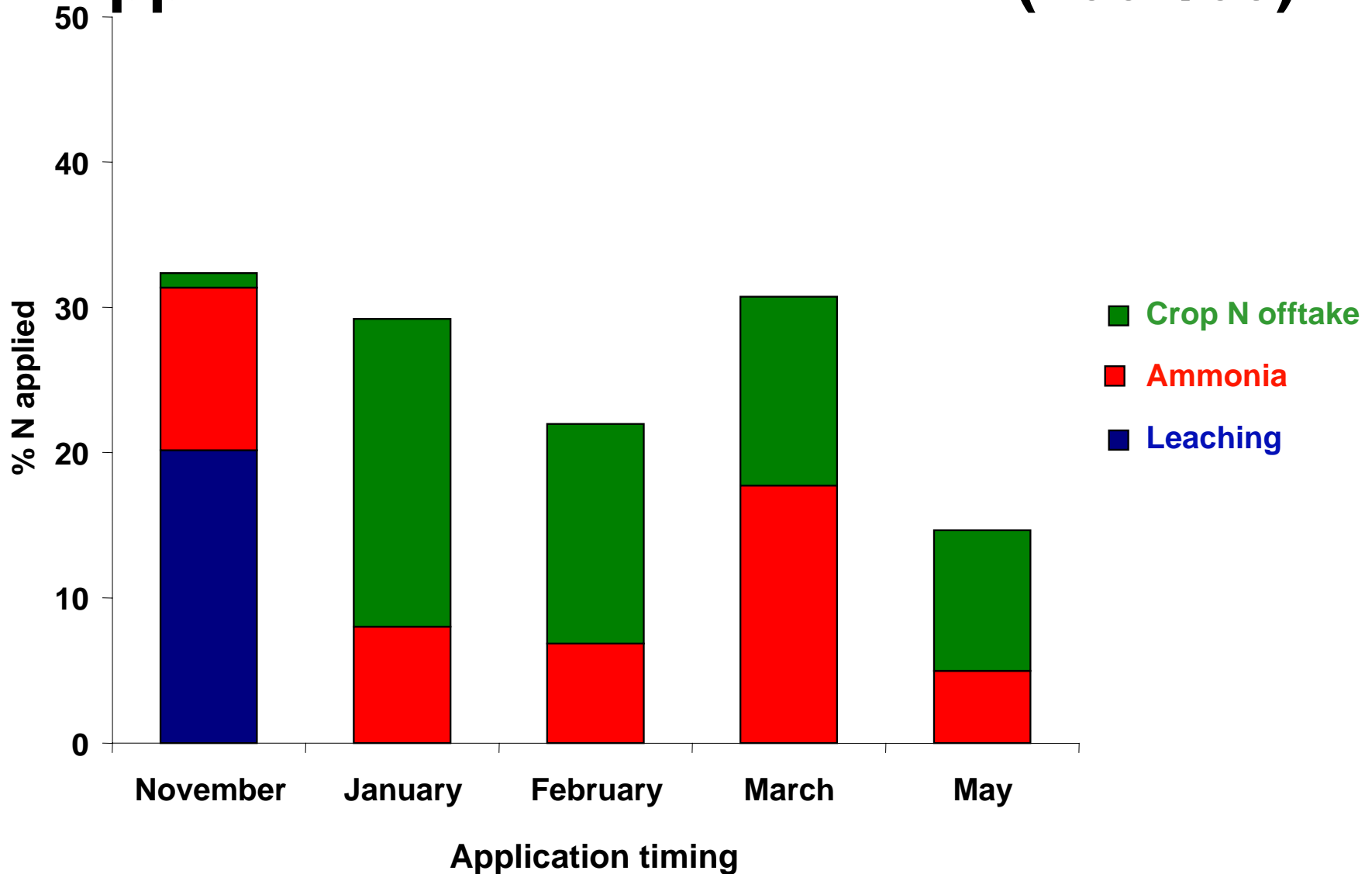


Mean application rate 55 m³/ha

Ammonia emissions following cattle slurry applications to winter cereals (2004/05)



Fate of N following cattle slurry applications to winter cereals (2004/05)



Conclusions

- **Crop N utilisation:**
 - **Spring timings more efficient than autumn/early winter (arable)**
- **Nitrate leaching (autumn/early winter spreading):**
 - **Winter cereals - 20% of total N applied**
 - **Grass not different from untreated control**
- **Ammonia emissions:**
 - **Winter cereals - higher in March than following other application timings (lack of crop cover and reduced slurry infiltration)**
 - **Grassland - c.3 fold increase in early summer compared with autumn/early spring timings (pollution swapping)**

Acknowledgements

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