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# Organic Manure Management to the Benefit of Soil and Water Quality

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# Estimated quantities of organic manures recycled to land in the UK

Manure type	Fresh weight (million tonnes)	Dry solids (million tonnes)
<b>Cattle</b>	<b>73.3</b>	<b>12.0</b>
<b>Pig</b>	<b>10.4</b>	<b>1.0</b>
<b>Poultry</b>	<b>4.4</b>	<b>2.1</b>
<b>Sheep</b>	<b>2.6</b>	<b>0.6</b>
<b>Total</b>	<b>90.7</b>	<b>15.7</b>
<b>Biosolids</b>	<b>-</b>	<b>0.5</b>
<b>Industrial 'wastes'</b>	<b>3.8</b>	<b>-</b>

# Land area receiving organic manures in the UK (000 hectares)

Manure type	Tillage	Grassland	Total	% of total UK land area
<b>Farm</b>	<b>800</b>	<b>3,100</b>	<b>3,900</b>	<b>34</b>
<b>Biosolids</b>	<b>48</b>	<b>32</b>	<b>80</b>	<b>0.7</b>

\*UK agricultural land area= 11.4 million hectares

# Organic manure benefits to soils

- **Major plant nutrients**
  - nitrogen and phosphorus
  - sulphur and magnesium
- **Organic matter**
- **Trace elements (copper)**

**But applications need to be carefully managed to minimise water and air pollution**

**Organic manures are potentially  
worth**

***£200 million***



# Organic matter inputs

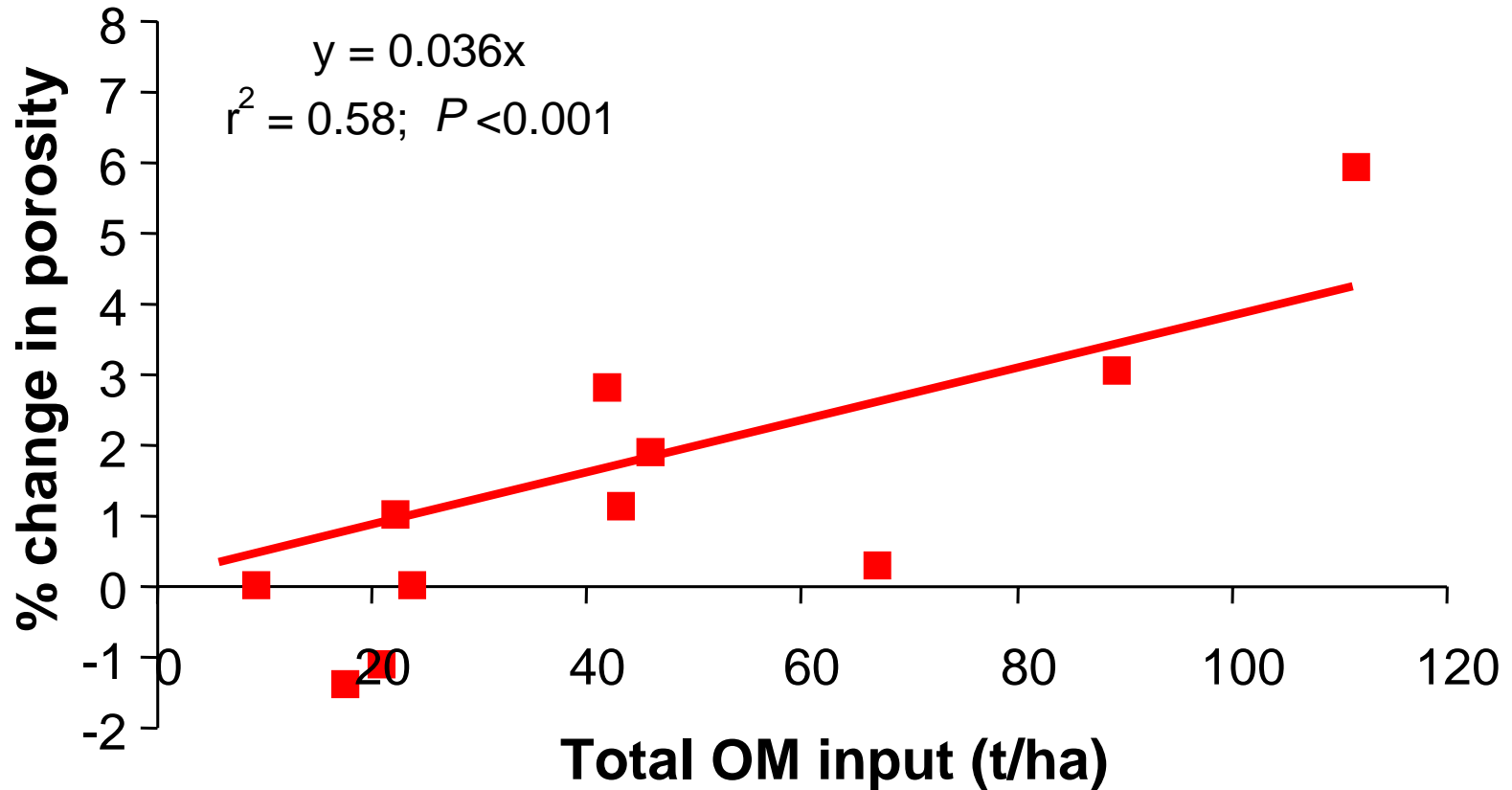


- Approximately 10 Mt organic matter are returned to soils in the UK via organic manure additions each year

# Typical organic matter inputs from organic manures (250kg/ha total N)

Manure type	Organic matter (t/ha)
<b>Farm manures:</b>	
- FYM	5 - 7
- slurry	2.5 - 3.5
- poultry manure	2.5 - 3.5
<b>Biosolids:</b>	
- cake	7
- liquid	3.5 - 5

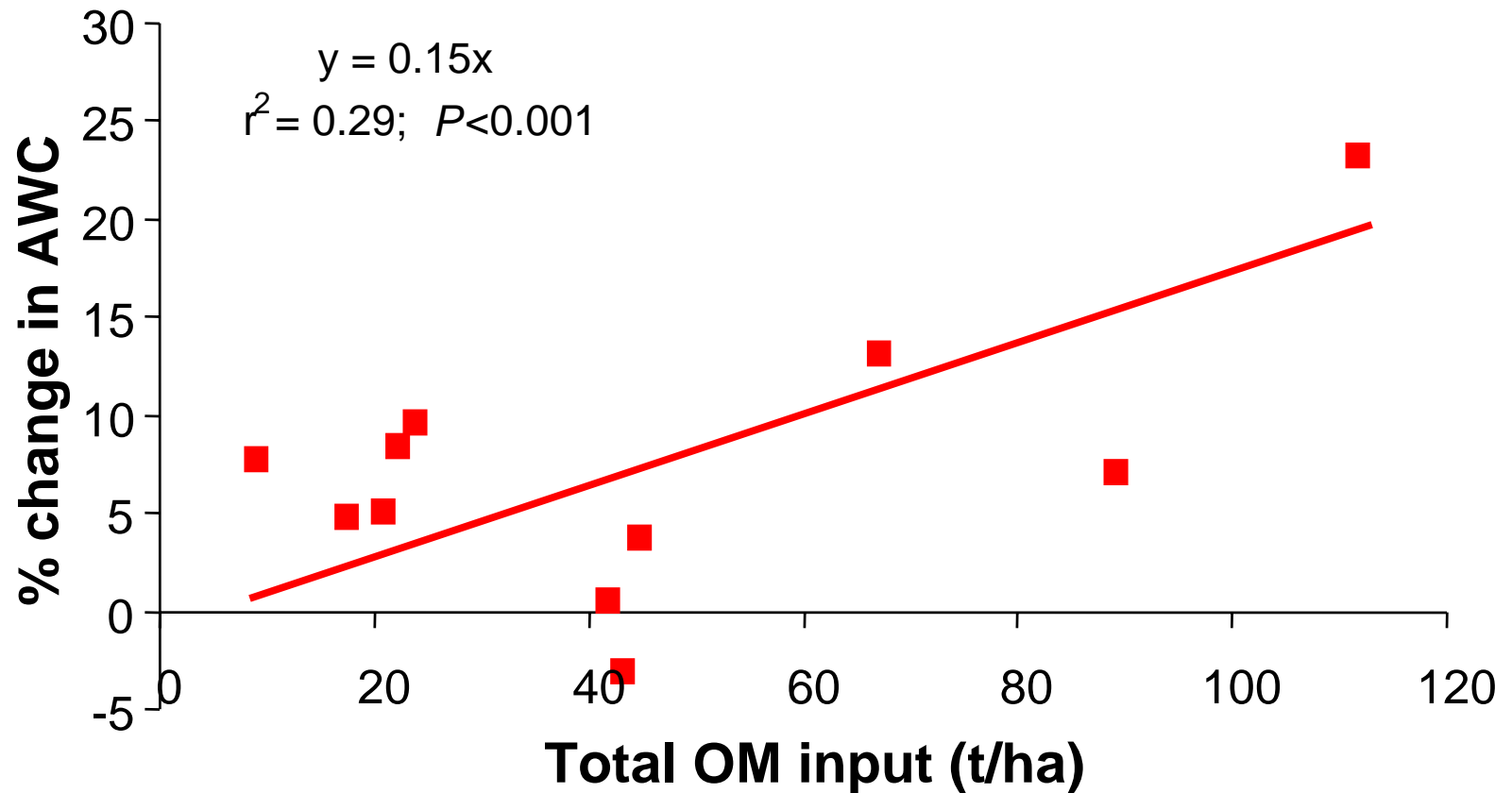
# Effect of farm manure organic matter inputs on topsoil porosity



**Bulk density ↓↓ ( $P < 0.01$ )**

**Data from 4 study sites following 7-9 years of annual farm manure additions**

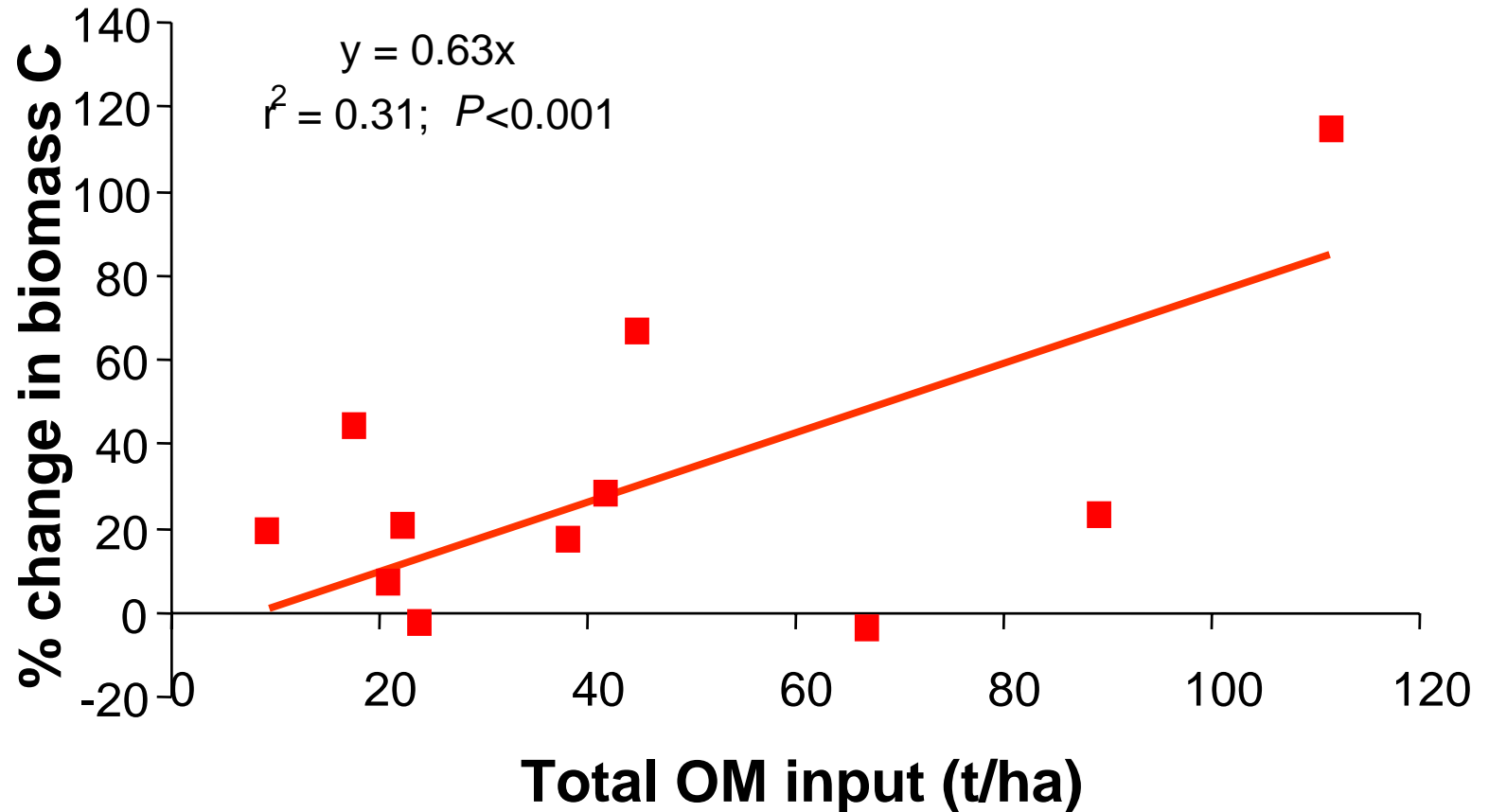
# Effect of farm manure organic matter inputs on topsoil available water capacity (AWC)



**70t/ha OM addition: c.1.25t/ha potato yield increase**

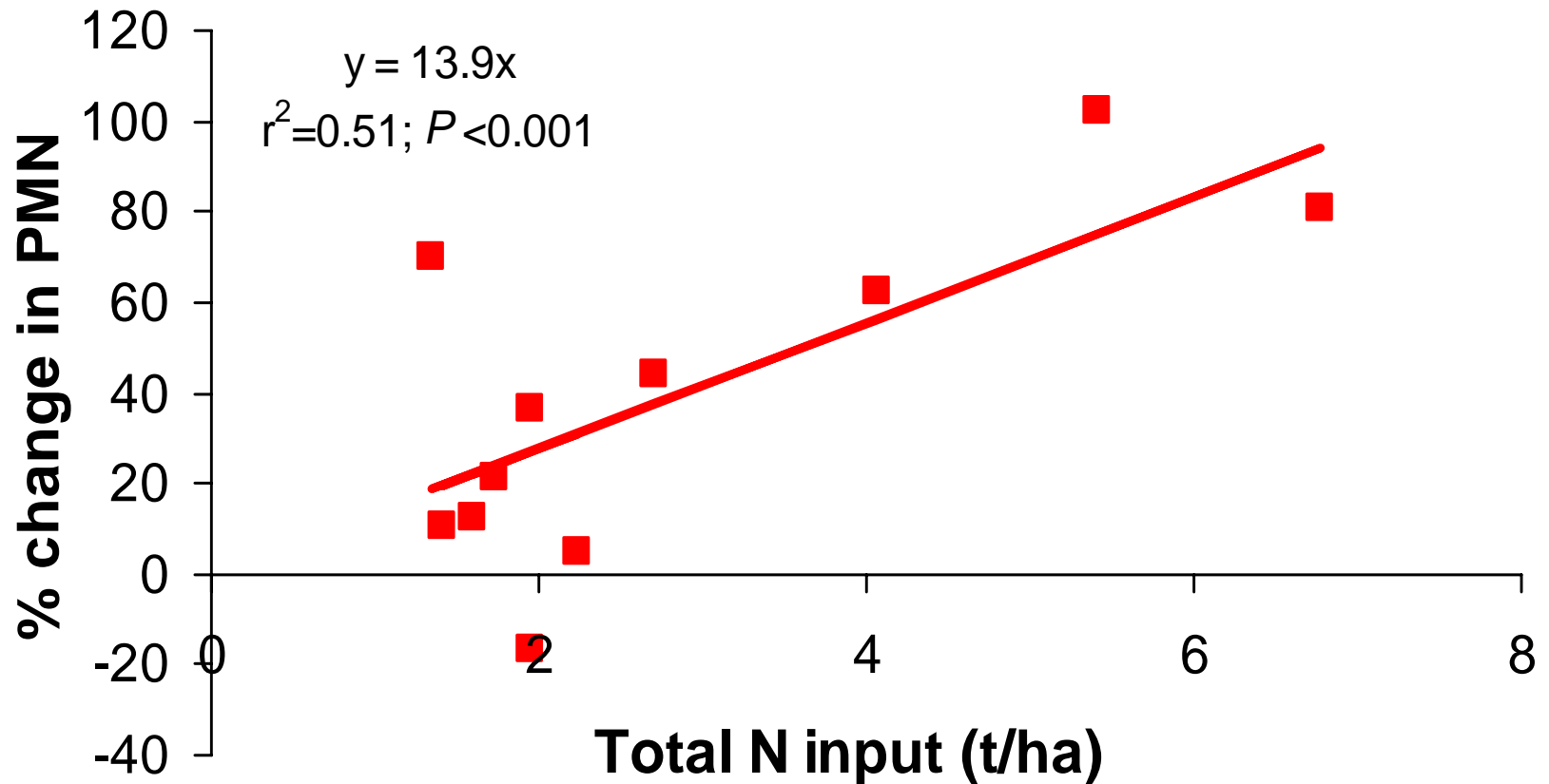
**Data from 4 study sites following 7-9 years of annual farm manure additions**

# Effect of farm manure organic matter inputs on topsoil microbial biomass



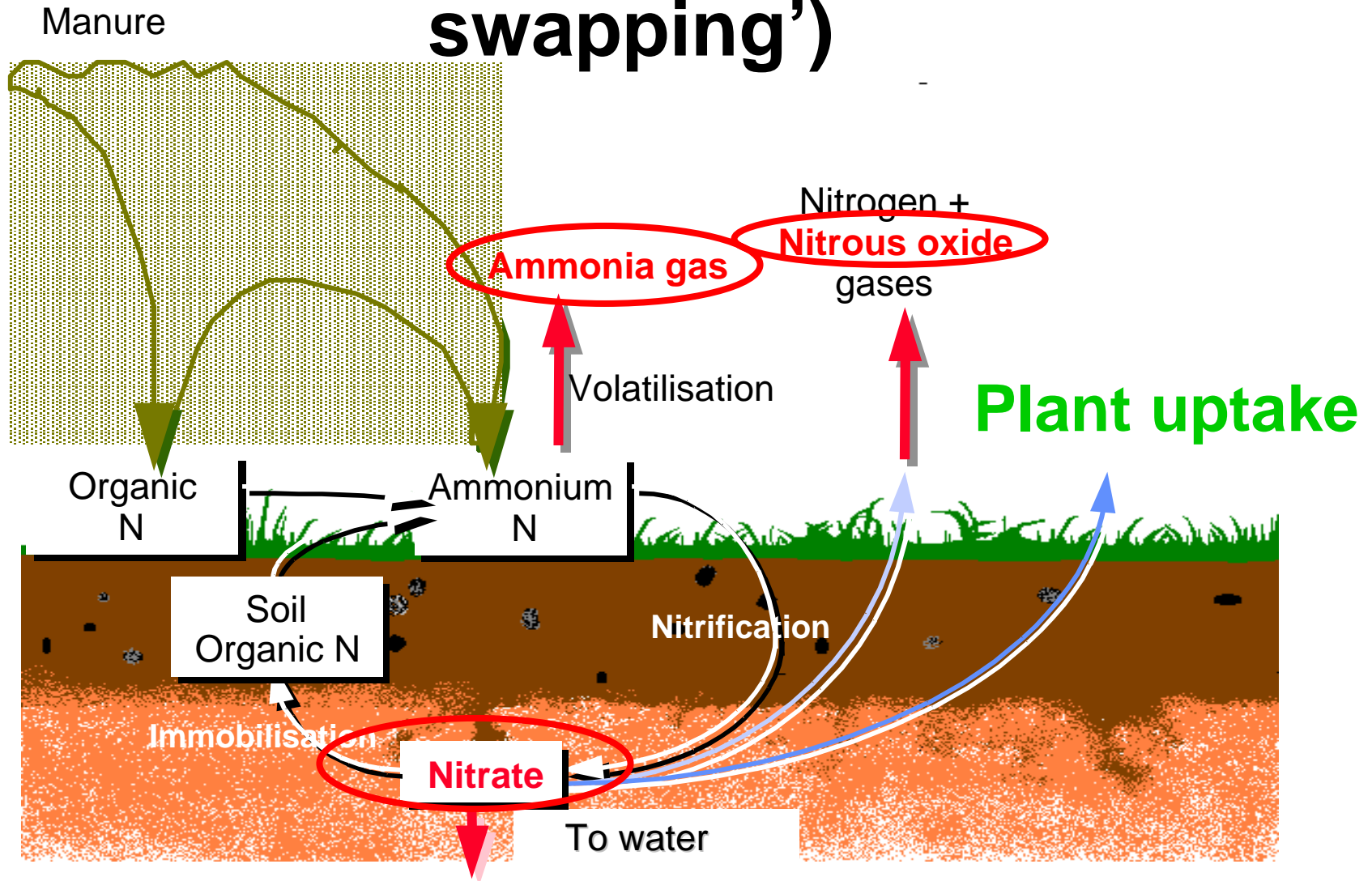
Data from 4 study sites following 7-9 years of annual farm manure additions

# Effect of farm manure total nitrogen inputs on topsoil potentially mineralisable N (PMN)

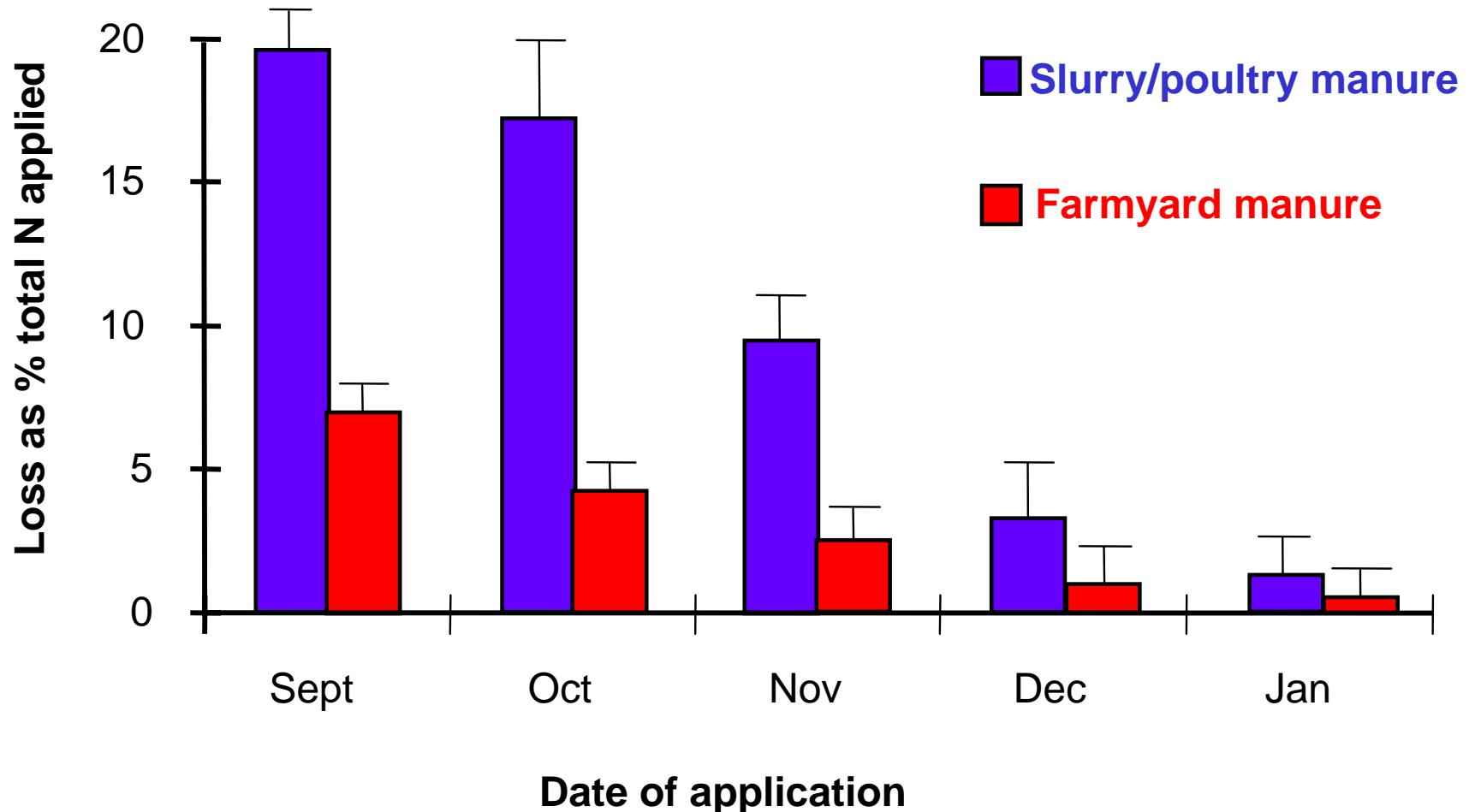


Data from 4 study sites following 7-9 years of annual farm manure additions

# Managing manures to minimise emissions to water and air ('pollution swapping')



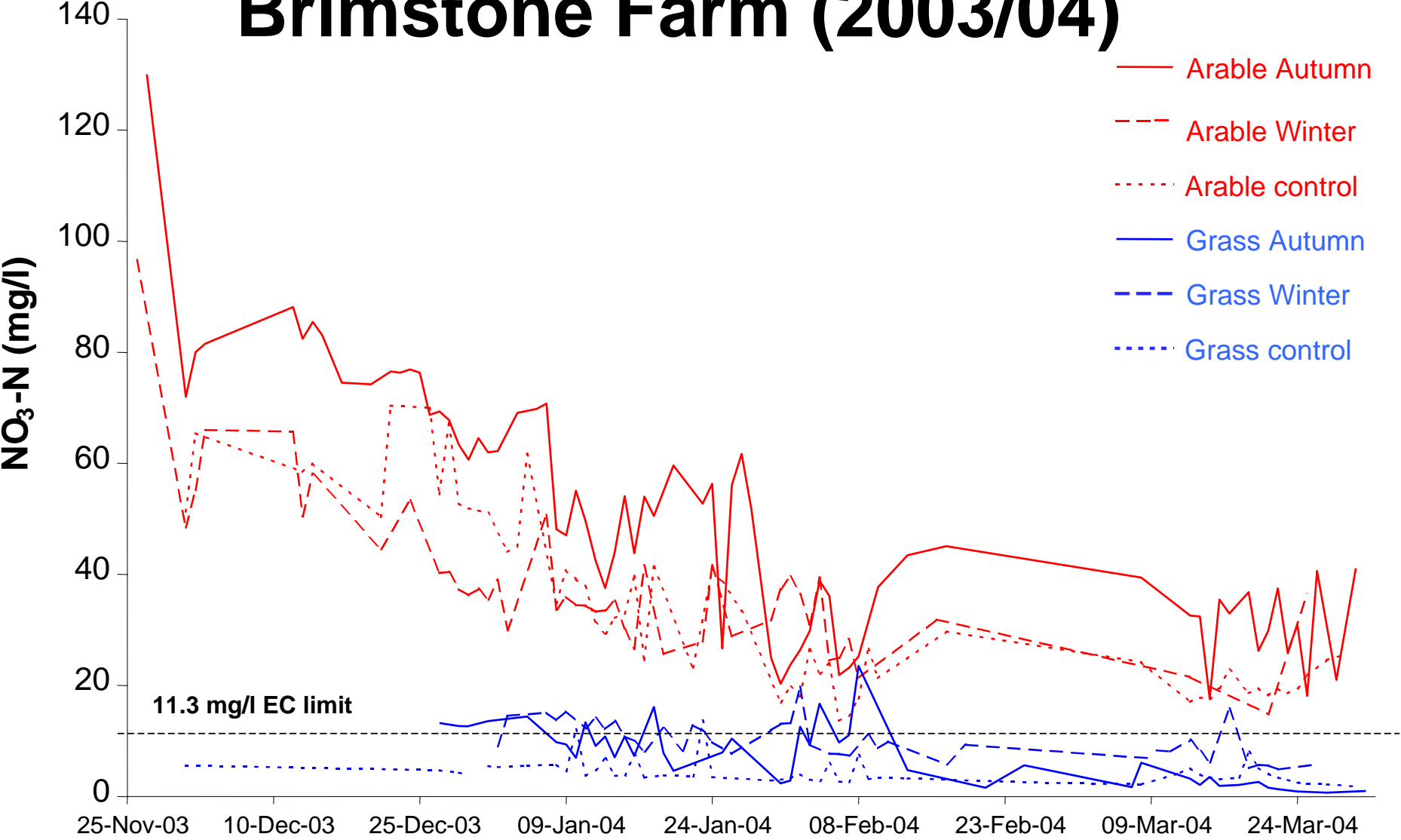
# Nitrate leaching losses following manure applications to free draining *arable* soils



# Cracking clay soils (Brimstone Farm)

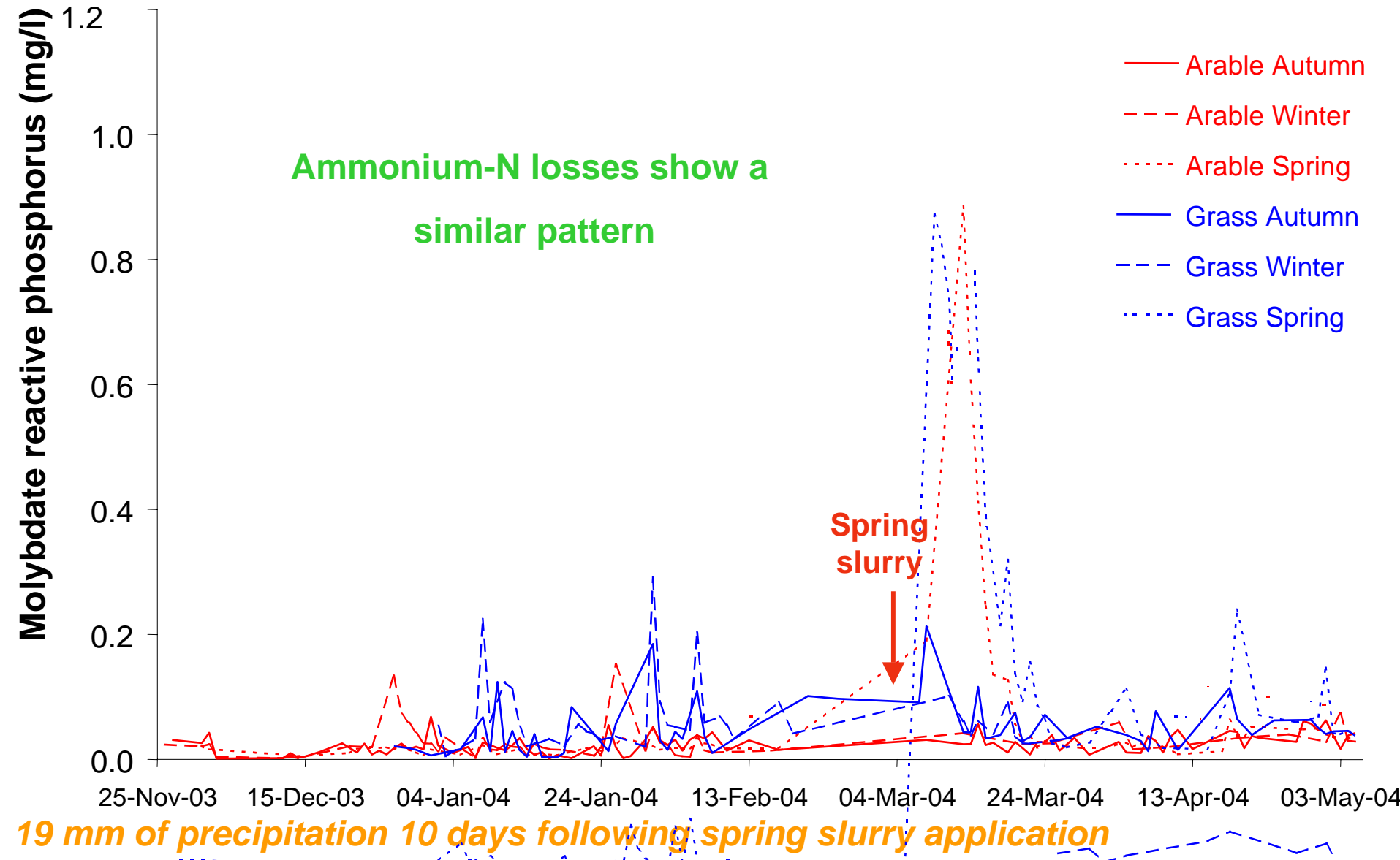


# Nitrate-N concentrations in drainflow at Brimstone Farm (2003/04)

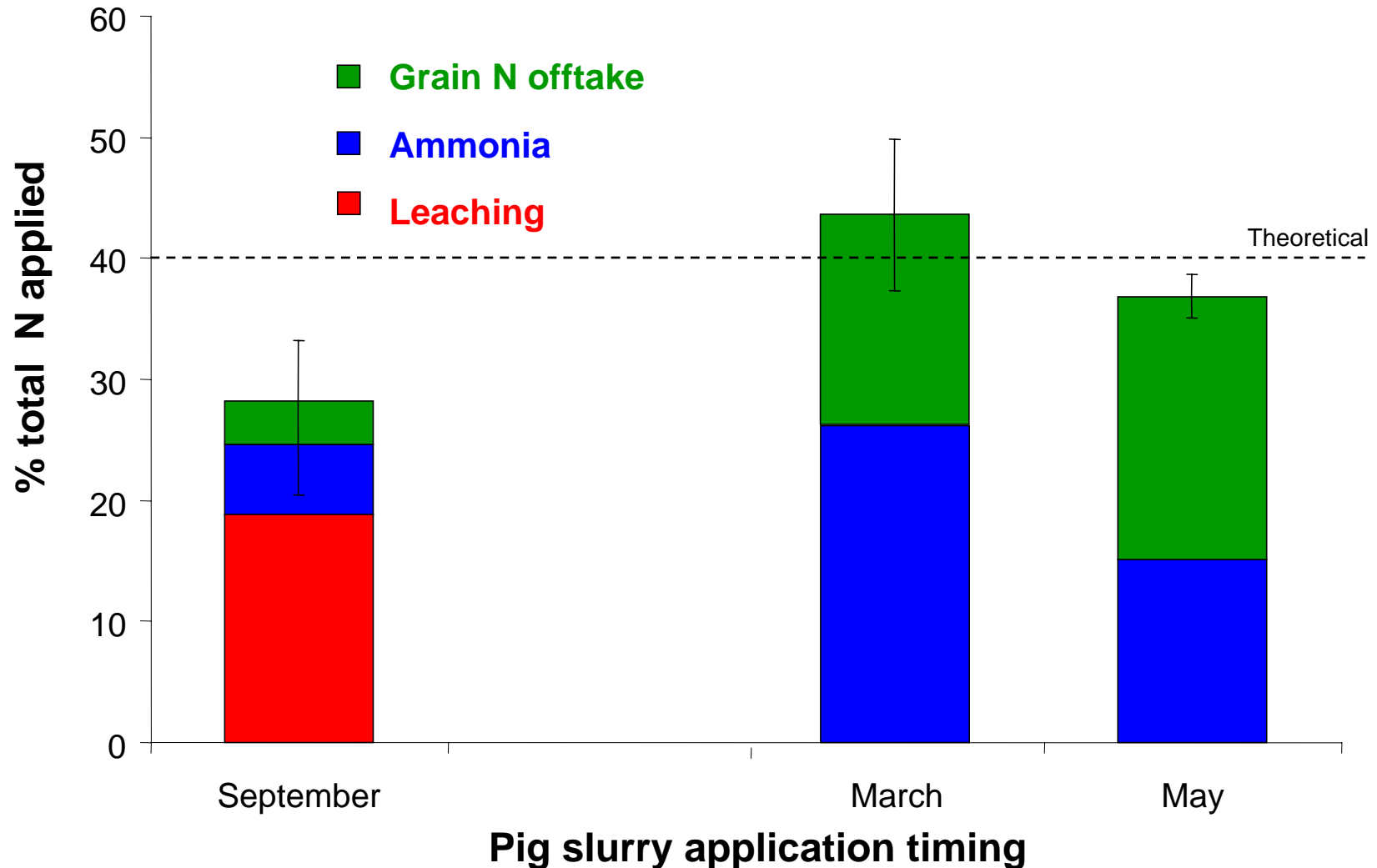


Up to 31<sup>st</sup> March when fertiliser N was applied

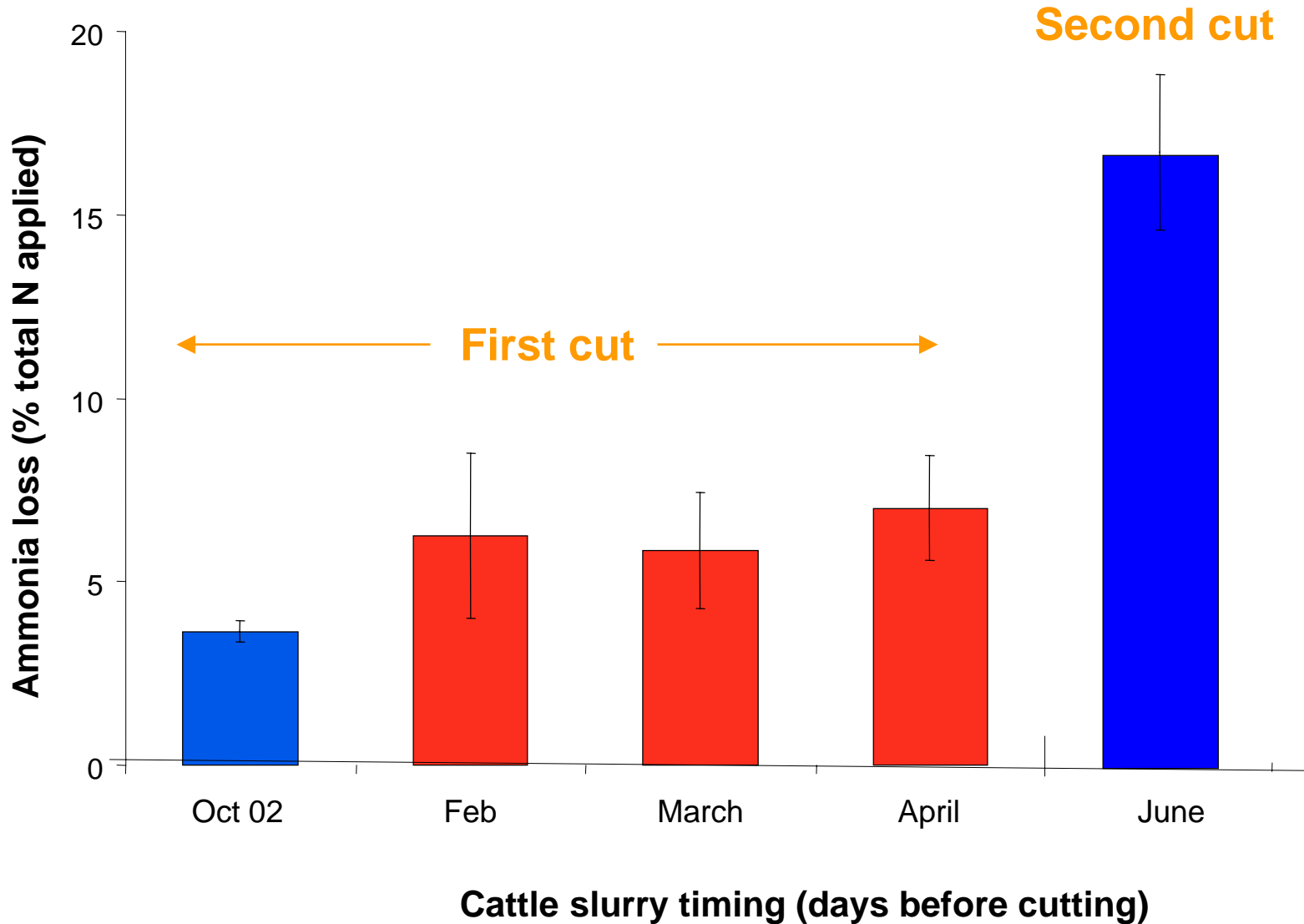
# Soluble phosphorus concentrations in drainflow at Brimstone Farm (2003/04)



# Fate of pig slurry N - shallow soil over chalk (winter wheat 2002/03)



# Ammonia emissions from cattle slurry - sandy grassland soil (2002/03)



# Summary

- **Organic manures valuable sources of:**

- **organic matter**
- **nutrients (£)**

**PLANET**  
NUTRIENT MANAGEMENT



- **Challenges for the future:**

- **Improve farmer confidence in manure nutrient supply**
- **‘Pollution swapping’- cracking clay soils**
- **Expand manure storage and improved spreading equipment (£ millions)**