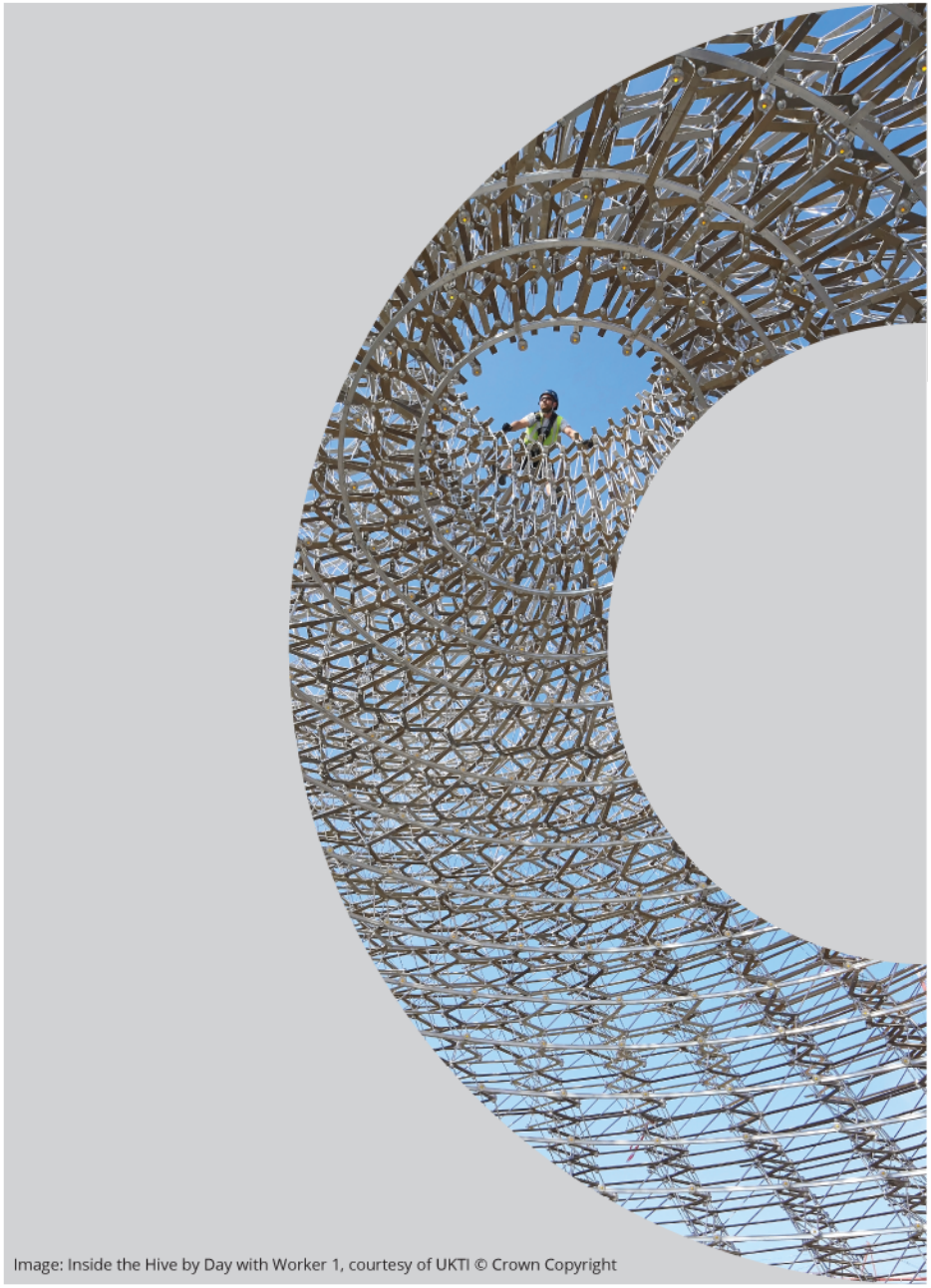


Image: Inside the Hive by Day with Worker 1, courtesy of UKTI © Crown Copyright

The role of digestate in the location of AD plants & the industry's future

Will McManus, WRAP

WRAP's **vision** is a world in which resources are used sustainably

WRAP's **mission** is to accelerate the move to a sustainable, resource-efficient economy through:

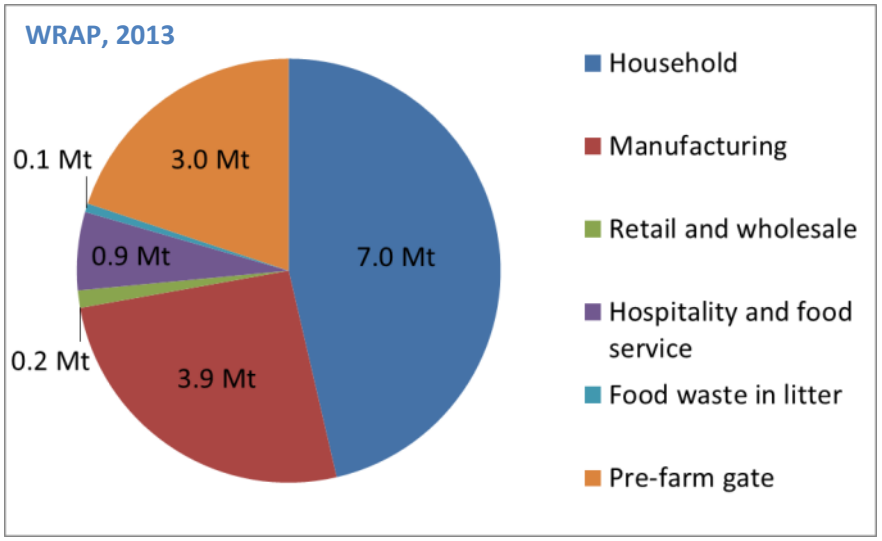
re-inventing how we design, produce and sell products.
re-thinking how we use and consume products.
re-defining what is possible through re-use and recycling.

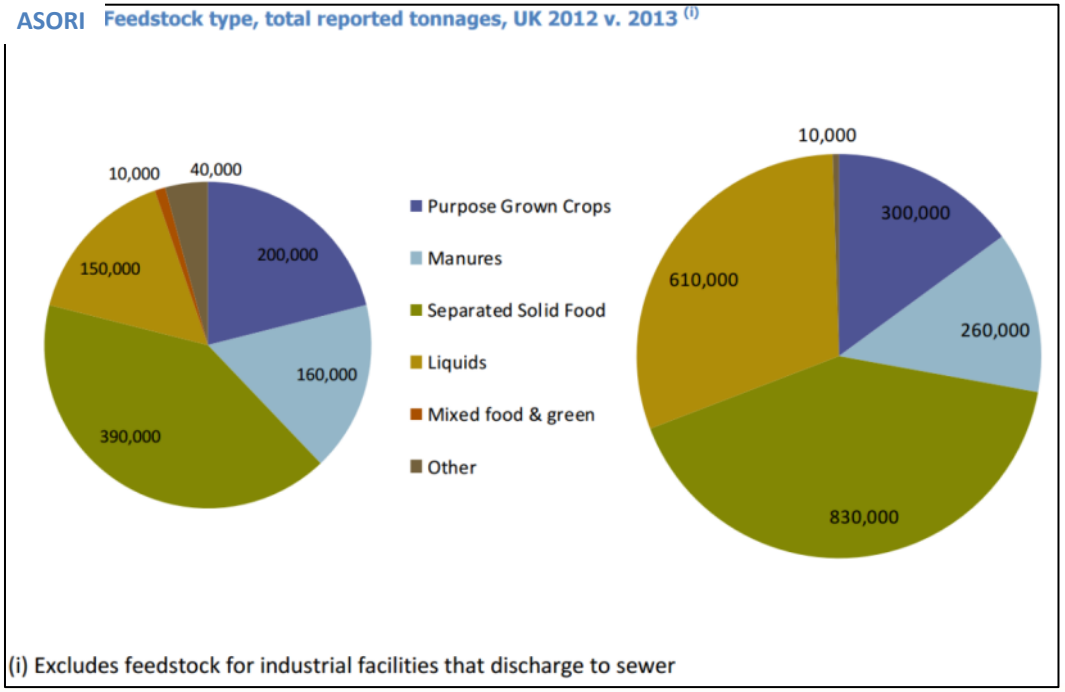
- Location of AD sites influenced by a number of factors
  - Using digestate is just one of these
  - Is it commercially significant?
- Changing financial drivers in the sector
- Understanding digestate's fertiliser replacement value is a useful part of the equation

- Five year research programme
- 22 experimental sites across England, Scotland and Wales
- **WP1:** To quantify the effects of repeated compost and digestate applications on soil and crop quality
- **WP 2:** To quantify the nitrogen supply characteristics of contrasting digestate products
- **WP 3**: farmer focussed training

DC-Agri - world leading research

A little context...





Food waste arisings & utilisation in AD

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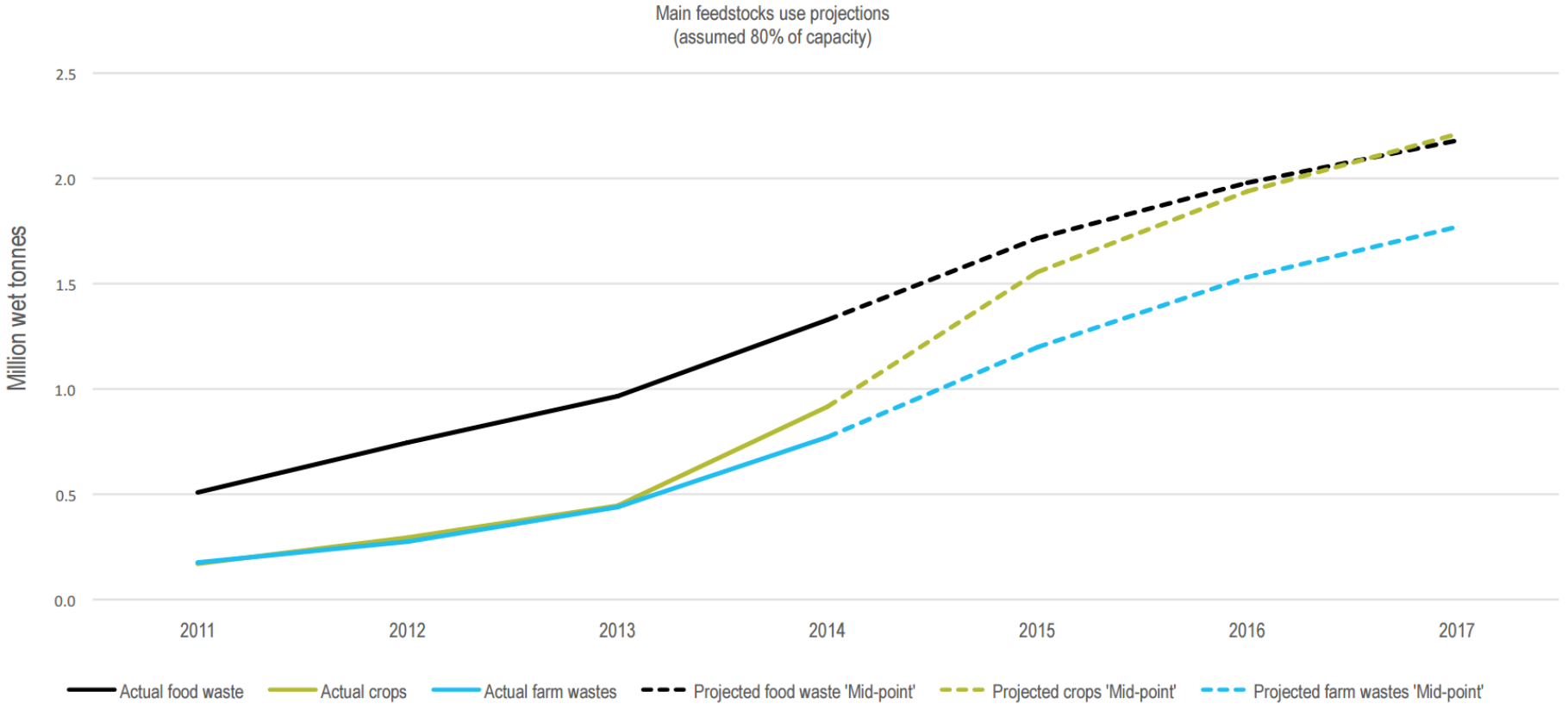
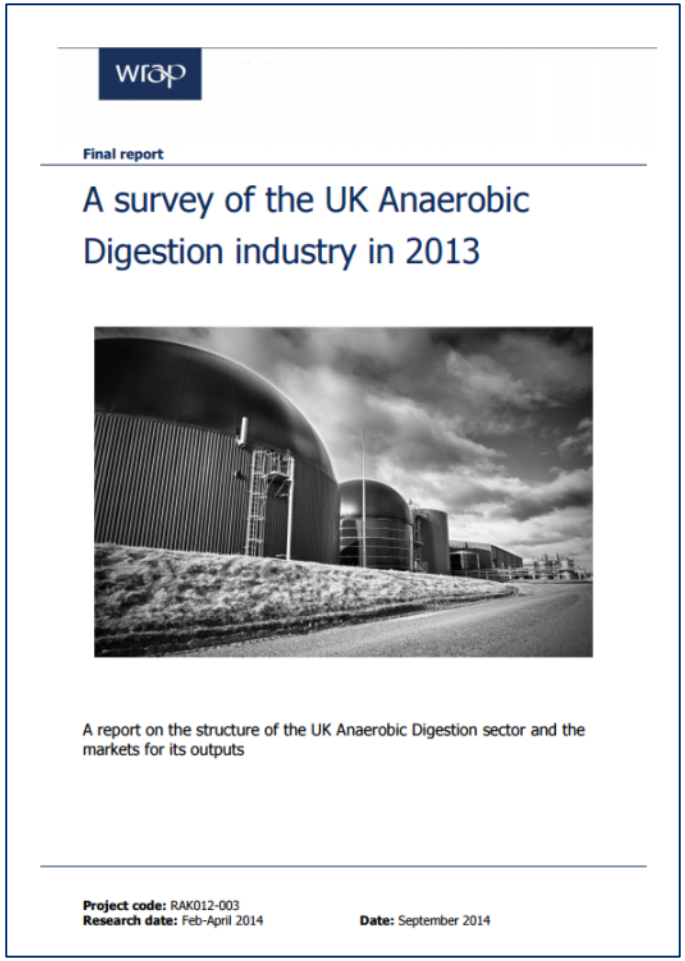
Extract from ADBA's Market Report, 2015



Feedstock projections

- ASORI 2013 figures on the value of digestate supplied to agriculture
  - *average cost to operator of £3.73 per tonne*
  - *range of -£13 to +£3 per tonne*
  - based on limited data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Final report

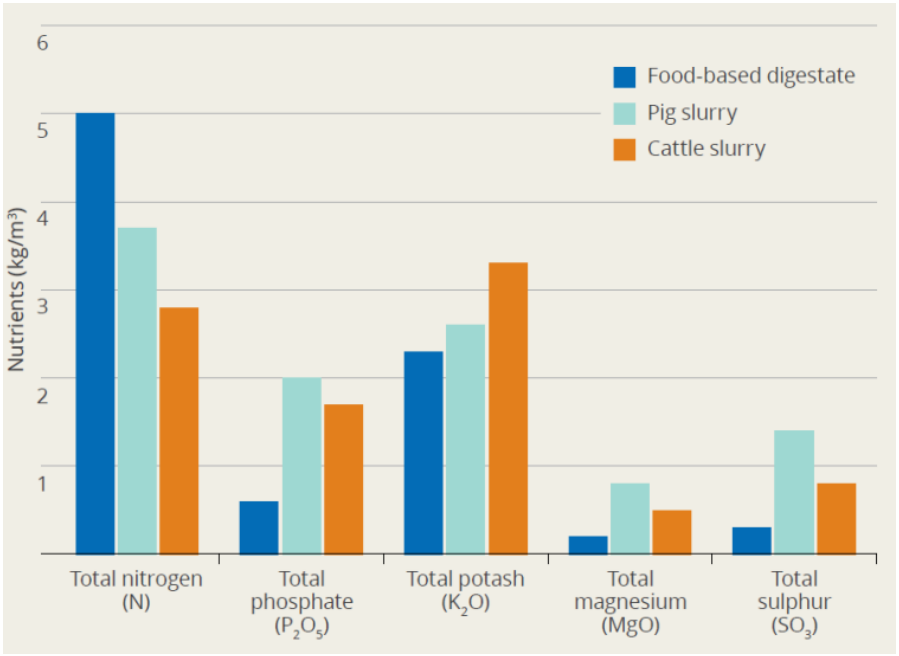
A survey of the UK Anaerobic Digestion industry in 2013

A report on the structure of the UK Anaerobic Digestion sector and the markets for its outputs

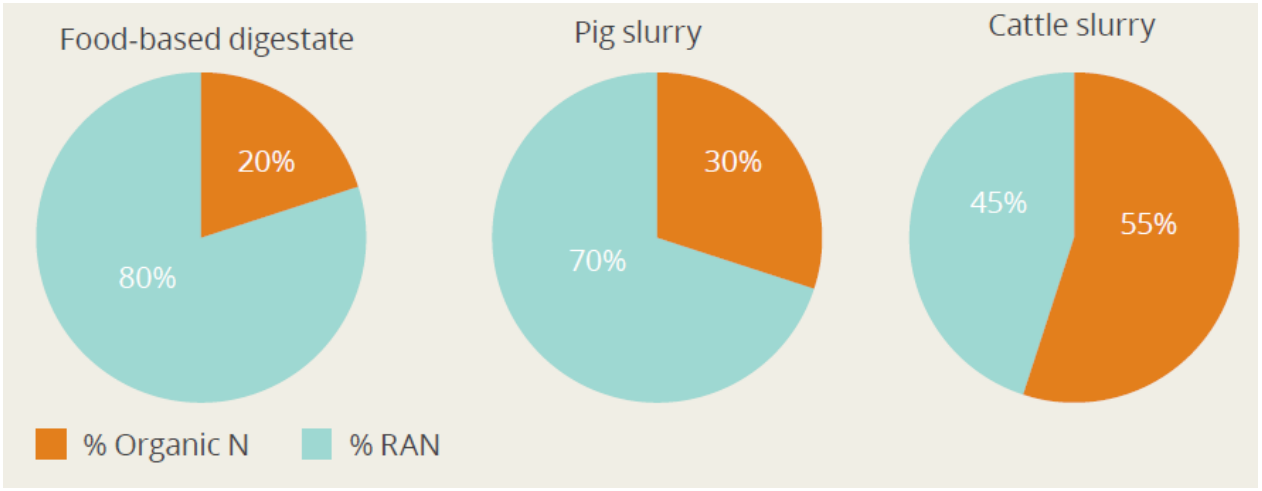
Project code: RAK012-003
Research date: Feb-April 2014 **Date:** September 2014

Market value of digestate

DC-Agri results

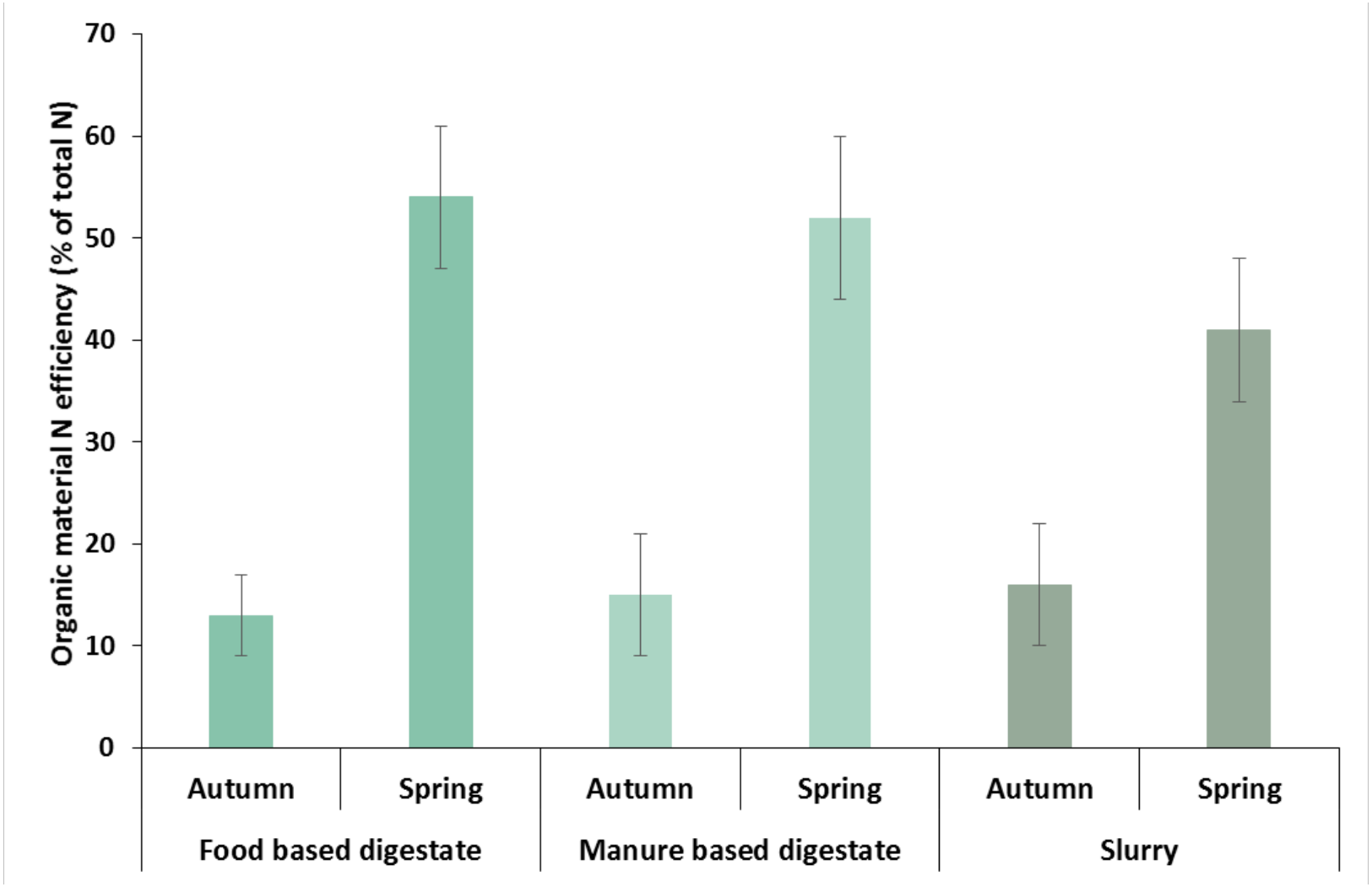


'Typical' nutrient content of food-based digestate and comparator organic materials



Readily available nitrogen (RAN) content of food-based digestate

DC-Agri data: nitrogen content



DC-Agri data: nitrogen use efficiency

Ammonia gas

Nitrous oxide gas

Nitrogen gas

Volatilisation

Plant uptake

Organic N

Ammonium N

Denitrification

Soil Organic N

Nitrification

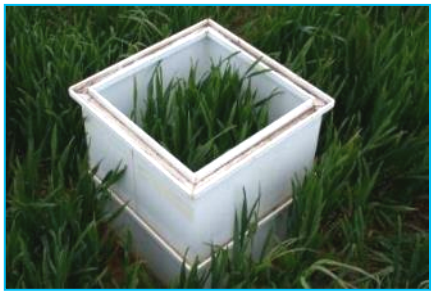
Immobilisation

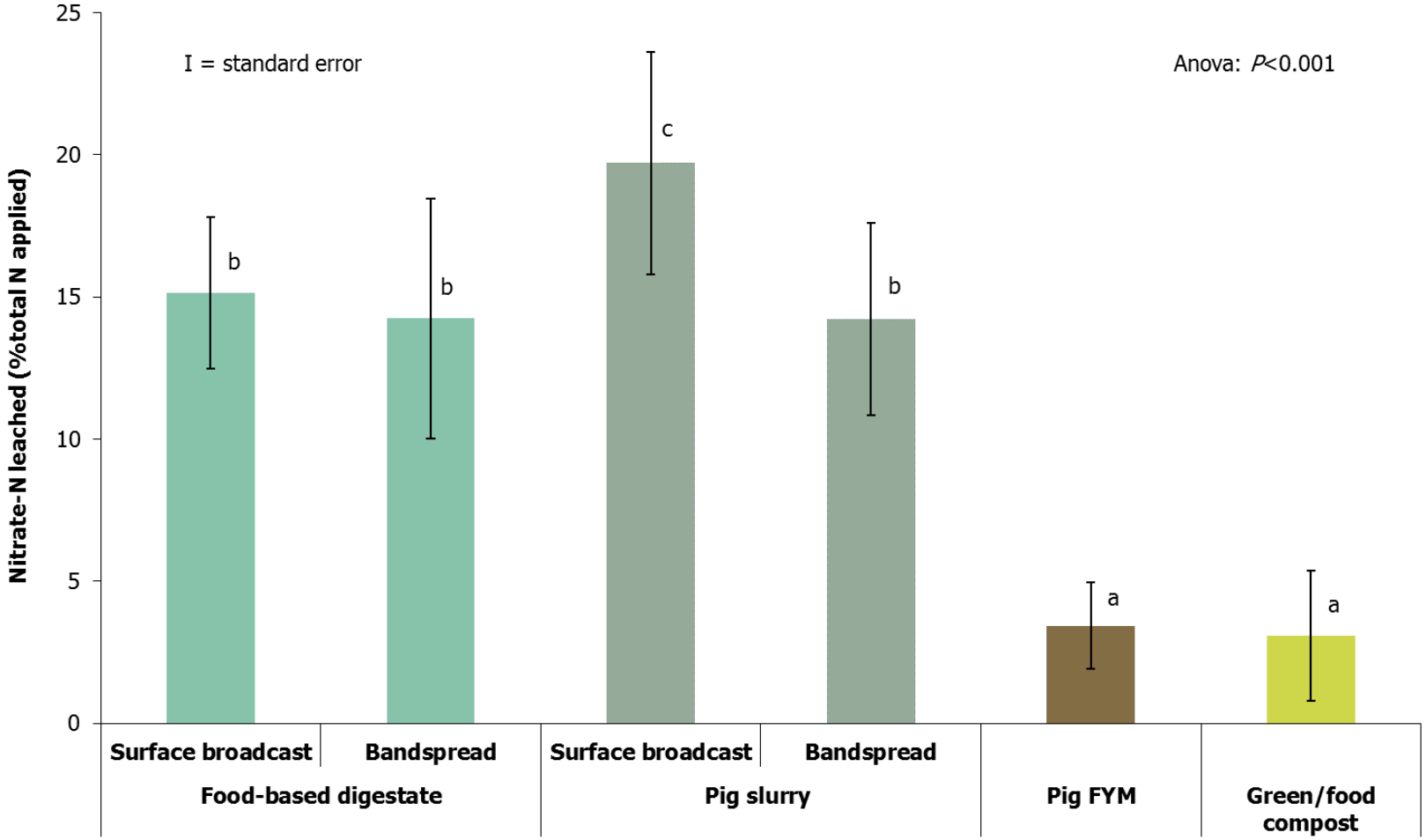
Nitrate

To water (NO_3-N, NH_4-N, P, FIOs etc).

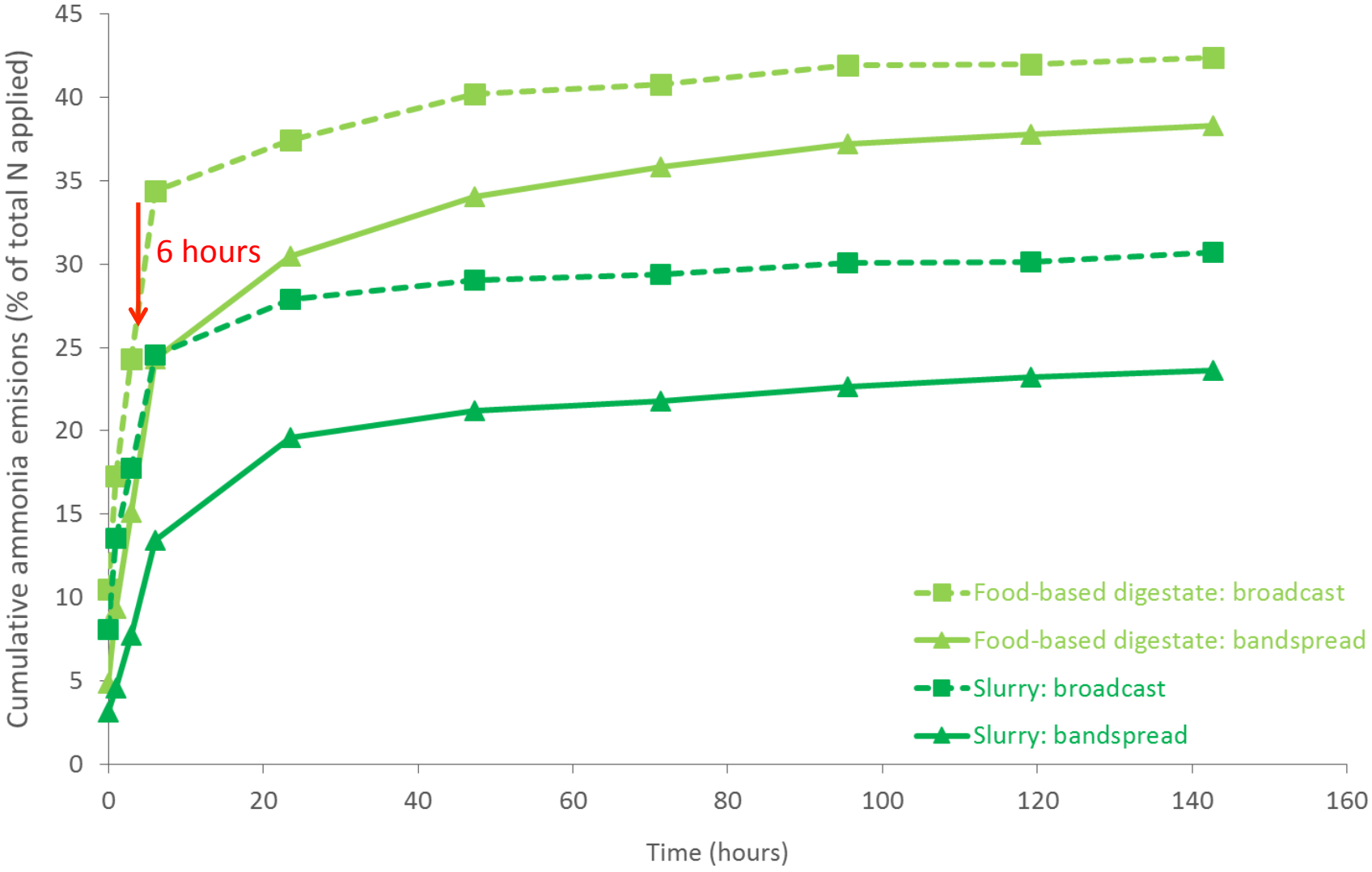
Digestate nitrogen supply and losses

- Air samples (from N_2O chambers and NH_3 tunnels) were analysed for:
  - N_2O, CH_4 and CO_2
  - NH_3
- Water samples (from Teflon cups)
  - Nitrate-N
  - Total phosphorus
  - E.*coli*





Nitrate leaching losses

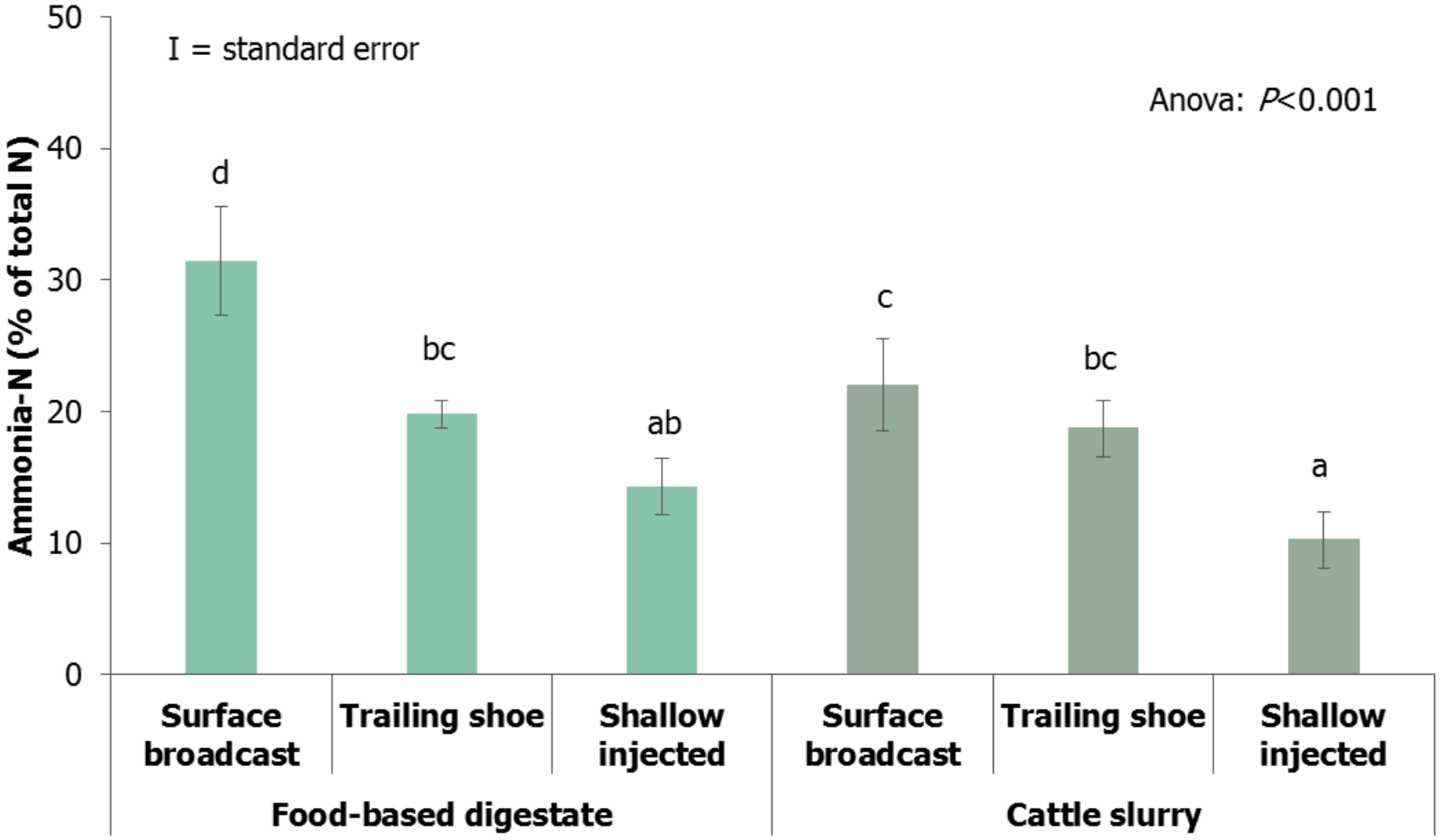


Cross-site ammonia emissions curve

Broadcast application

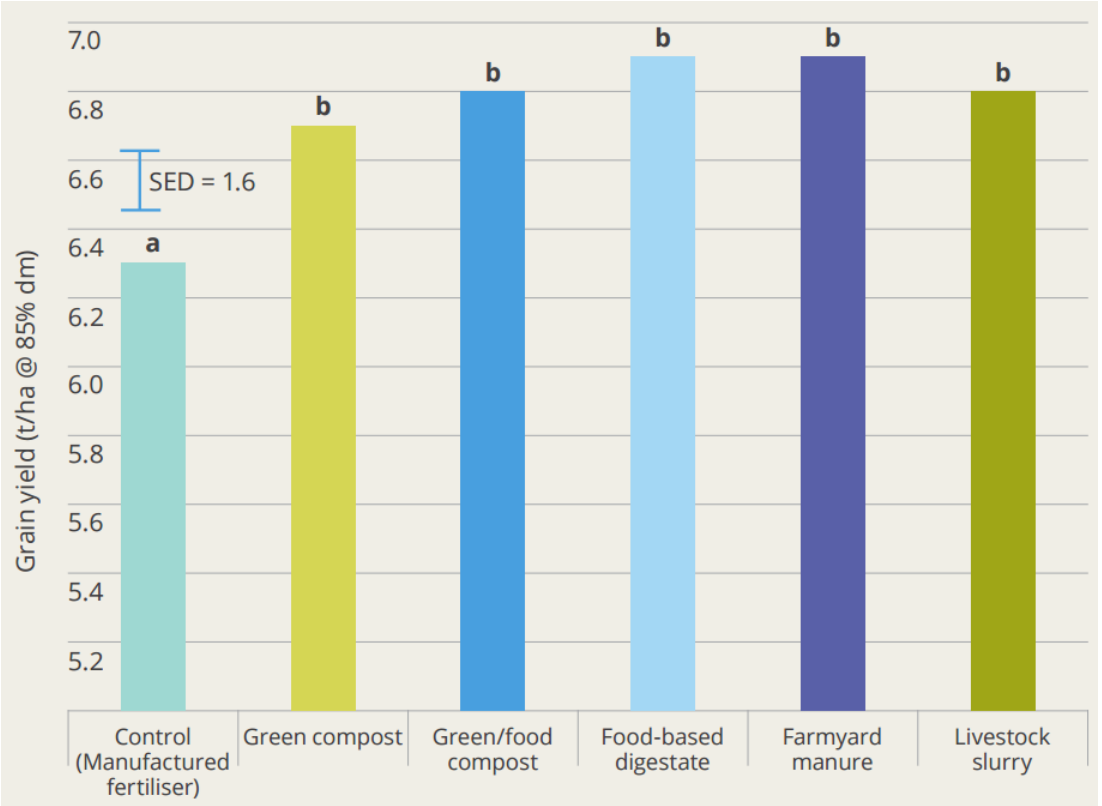
Bandspread application (trailing shoe)

Shallow injection application



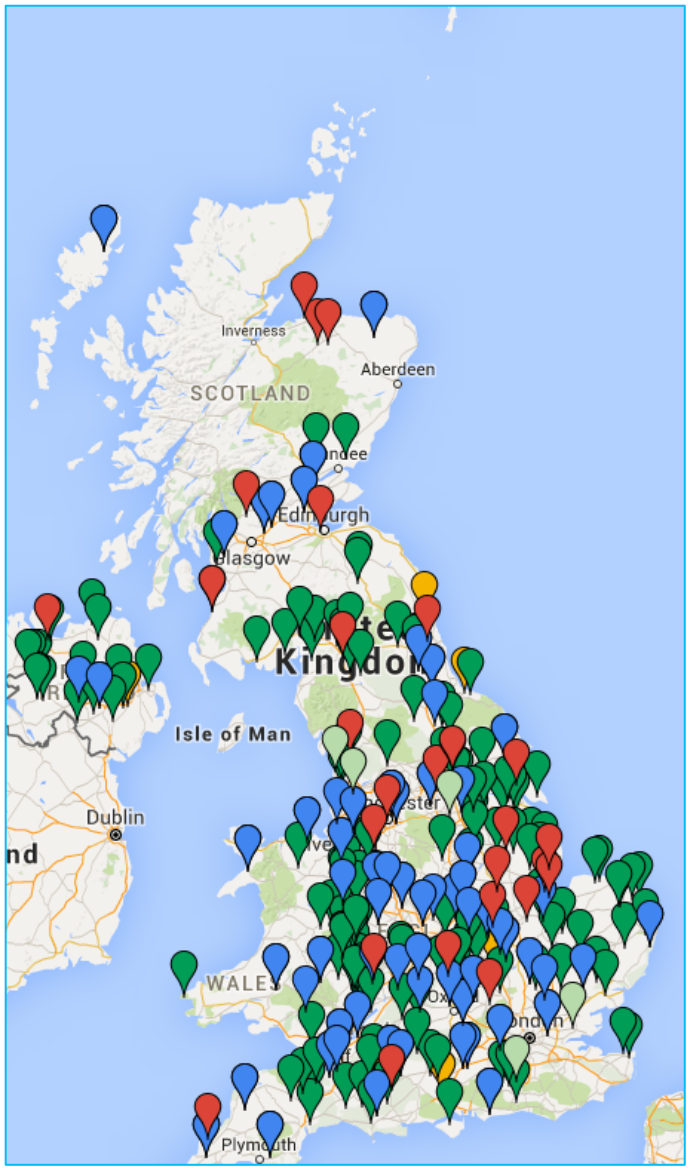
Ammonia losses from application techniques

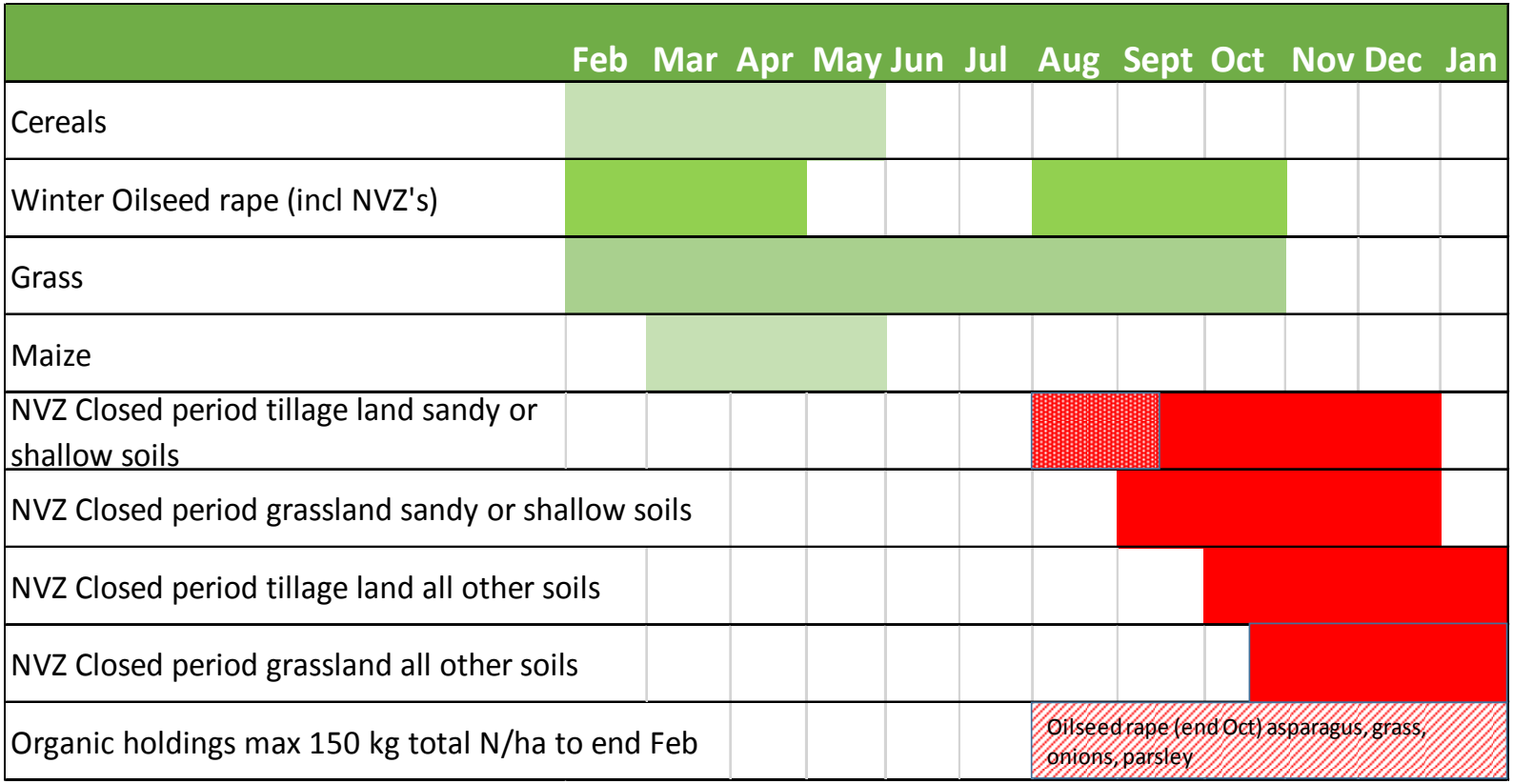
The benefit was valued at £55-160/ ha, taking into account the value of bagged fertiliser saved and the cost of spreading, but not sourcing



Average winter cereal yields from 2011-2013 at the soil quality experimental sites (results are an average across eight site/seasons), comparing organic materials applied in combination with manufactured fertilisers, against the fertiliser-only control. The standard error of the difference between mean values (SED) was 0.16. Bars labelled with different letters indicate significant differences between treatments ($P<0.05$).

How does this relate to the location of AD sites?





If a crop is sown on sandy or shallow tillage land on or before 15 September you may apply organic manure between 1 August and 15 September inclusive

1. Location of AD sites influenced by a number of factors
   - Using digestate is just one of these
   - Is it commercially significant?
2. Journey from waste collection to renewable fertiliser
   - Minimise length
   - Where to place AD plant on this journey?
3. Optimising digestate requires investment
   - In the UK, market drivers exist, but aren't strong
4. Changing financial drivers in the sector
   - Increased pressure on AD businesses
   - Disposal alternatives are expensive
   - Understanding digestate's fertiliser replacement value is a useful part of the equation

Some final thoughts…

- Translating research into practical advice
  - Trained 3,256 people, helping farmers make informed decisions
  - 35% committed to taking action
- Increased impact by working with the biggest names in farming
- Project legacy & online resources

Visit www.wrap.org.uk/dc-agri

For the *DC-Agri* research summary, Good practice guides, and range of training resources