

## **Ambitious research shrinks GHG footprint of UK arable products**

### **Findings show lower nitrous oxide emissions from UK agriculture than previously thought**

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The results of a major UK research project on 'Minimising Nitrous Oxide (MIN-NO) have been announced showing emissions due to nitrogen fertiliser use on UK arable land, to be less than half the level previously estimated.

Roger Sylvester-Bradley, MIN-NO Project Lead and Head of Crop Performance, ADAS UK, said: "This research is the most ambitious to date in providing a comprehensive national assessment of nitrous oxide emissions in actual farming conditions, and has significantly improved scientific understanding in this important area".

The MIN-NO research was conducted over a 5 year period with a consortium of 23 government, academic, farming and commercial partners with interests in the future sustainability of the food, feed and fuel supply chain.

The research concluded:

- A predicted decrease in emissions from UK agriculture of almost 10% than previously thought
- A greenhouse gas intensity per tonne of UK harvested wheat (which recognises the recent emissions reductions by fertiliser producers,) of 20% less than previously estimated.
- Reduced intensities for harvested rapeseed and sugar beet.

The project also confirmed that sourcing of nitrogen fertilisers from production facilities which are modified to abate nitrous oxide makes a substantial reduction in the Greenhouse Gas (GHG) footprint of the final marketed product whether it be chicken, cooking oil, whisky or a biofuel product. Choosing fertilisers with the lowest carbon footprint leads to a reduction in the GHG footprint. For example, bread can be reduced by 7%, bioethanol from wheat by 15% and biodiesel from oilseed rape by 16%.

Welcoming the findings, AIC's Chief Executive David Caffall said: "It is pleasing to see massive investment by the supply industry is also having potential added value in the market place."

However, prospects for mitigating nitrous oxide associated with arable cropping are less than was thought previously. Farmers already using abated nitrogen fertilisers and following good practice can do little more than to continue to focus on fine-tuning their overall nutrient management for optimum efficiency.

The potential for adding value from investment in the research was highlighted by Richard Laverick, Chief Technical Officer for AHDB.

“The project has provided our industry with a vital and far more accurate understanding of the behaviour of nitrous oxide emissions in arable agriculture. It will help inform all involved in producing for the food, feed and biofuel supply chains. The findings are significant and will make a major difference to the UK’s ability to meet sustainability criteria for a range of supply chains.”

The MIN-NO findings are especially pertinent to the biofuel industry. Clare Wenner, the Head of Renewable Transport at the Renewable Energy Association said, “This extensive research shows that the greenhouse gas reductions from using UK-grown feed wheat and oil seed rape to produce renewable fuel are particularly relevant. The production of bioethanol and biodiesel from these crops also yields a valuable high protein animal feed which adds to the overall environmental benefits of UK renewable fuels.”

Ultimately MIN-NO’s work is good news and means that the proportion of the UK’s emissions attributed to agricultural production will decrease relative to other sectors of the economy.

The findings: [http://cereals.ahdb.org.uk/publications/2015/october/29/minimising-nitrous-oxide-intensities-of-arable-crop-products-\(min-no\).aspx](http://cereals.ahdb.org.uk/publications/2015/october/29/minimising-nitrous-oxide-intensities-of-arable-crop-products-(min-no).aspx) will now be used by consortium members to inform both governments and industry of the progress being made towards meeting the UK’s GHG reduction targets.

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Notes:

### **Minimising nitrous oxide intensities of arable crop products (MIN NO)**

A collaborative project was conducted from 2009 to 2014 involving 23 partners from government, industry and academia – See MIN NO consortium partners, below. It provided new evidence of the size of direct N<sub>2</sub>O emissions due to major UK arable crops and suggested better means of estimating and mitigating these and other greenhouse gas (GHG) emissions associated with arable crop products.

The 5 year programme involved intensive three year field-based experiments and industry data from commercial farms. It then used models to estimate a national picture of emissions due to major UK arable crops and their products.

Nitrous oxide (N<sub>2</sub>O) is an important GHG, with 298 times more warming potential than carbon dioxide. It contributes 41% of agriculture's GHG emissions. It is produced by the action of microbes on nitrogen mainly in soils that are wet and warm. Previously, predicted levels of nitrous oxide from soil were 1% per unit of nitrogen applied – average MIN-NO estimates for UK arable land are 0.46% of N applied.

Emissions from soil due to incorporated crop residues such as straw etc. were also negligible in the 12 months following harvest except where residues were green, such as in sugar beet leaves. However, the more difficult question is whether the residues have a longer term effect on background emissions in future years.

The work was sponsored through the Defra Sustainable Arable LINK programme (project LK09128) including a contract for £300,000 from HGCA now AHDB Cereals and Oilseeds.

*Lead participant:*

ADAS UK Ltd

*Research participants:*

SRUC

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