



Department for Environment Food & Rural Affairs
Consultation on reducing ammonia emissions from solid urea
fertilisers

**Submission from the Agriculture and Horticulture
Development Board (AHDB)**

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Introduction

AHDB's purpose is to inspire our farmers, growers and industry to succeed in a rapidly changing world. We are the independent go-to source of trustworthy information and evidence-based research. We equip the primary food production industry with easy-to-use, practical know-how and market insight which farmers and processors can apply straight away to make better decisions and improve their performance.

AHDB's consultation response

AHDB welcomes the opportunity to respond to DEFRA's consultation on reducing ammonia emissions from urea fertilisers. Our response follows the following questions that frame this consultation.

- Q1a
- Q4a
- Q4b
- Q5a
- Q5b
- Q6a
- Q12a
- Q18a
- Q19a
- Q19b

General urea fertilisers policy questions

Q1a Should the use of liquid fertilisers (such as UAN) containing urea remain unrestricted?

Yes, AHDB believes that the use of liquid fertilisers containing urea remain unrestricted. These fertilisers are used by farmers and growers in a number of sectors including horticulture and cereal production. For example, application of foliar nitrogen late in the season is the most efficient method of increasing grain protein of milling wheat and it is important for this sector that farmers have this option. AHDB has published research on this topic and the report is available at <https://ahdb.org.uk/foliar-applied-nitrogen-for-grain-protein-and-canopy-management-of-wheat>.

Q1b If No, why?

Q2a Should the policy applied relate to solid compound fertilisers (as well as solid straight urea fertilisers)? Yes/No/Don't know.

Q2b If No, what solid compound fertilisers should/should not be restricted and why?

Q2c If you agree should the policy applied relate to all compound fertilisers containing greater than 1% carbamide (ureic) nitrogen? Yes/No/Don't know.

Q2d If you disagree what should be the threshold of carbamide nitrogen content in order for the policy to reduce ammonia emissions to be effective?

Q3a Do you agree or disagree with the Impact Assessment results for each of the policy options presented? Agree/Disagree/Don't know.

Q3b If you disagree please specify which of the results you disagree with and provide additional evidence to support your response.

Q4a Would these policy options (on an England only basis) have a significant impact on the UK internal market and ensure a level playing field for users?

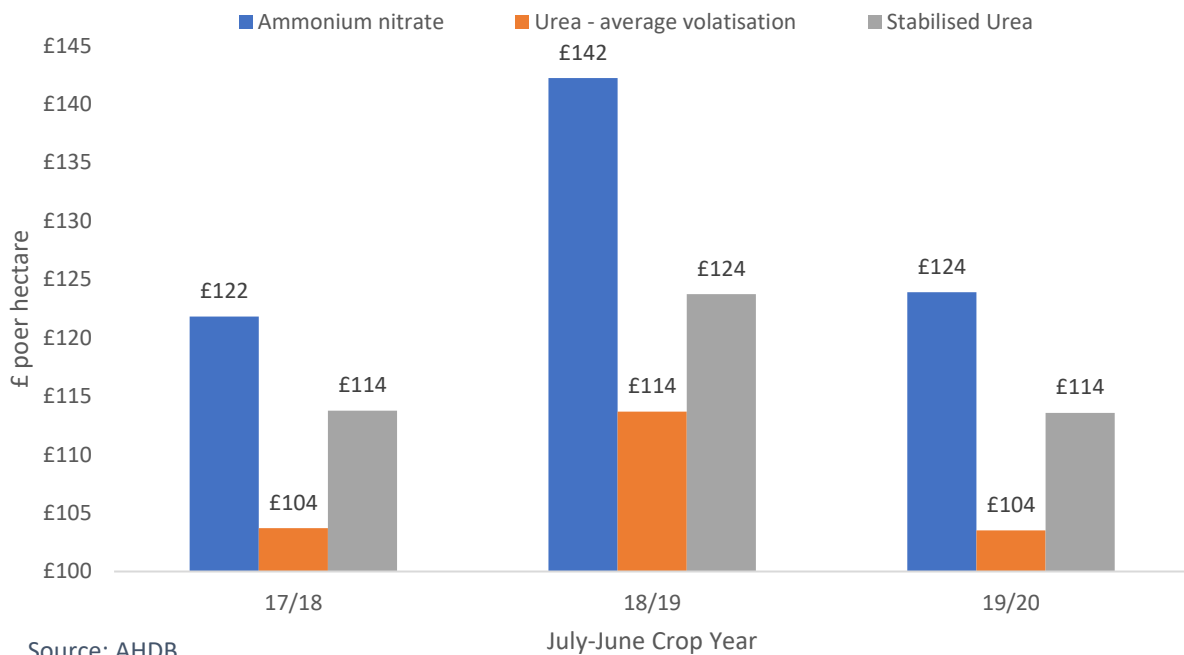
Yes, AHDB believes that banning the use of urea would have a significant impact on the UK fertiliser market.

Q4b If yes, please indicate how.

The ability to use urea as a fertiliser product in the UK not only gives farmers and growers the opportunity to manage costs, but also protects the domestic market from wider market forces. As the UK is predominately a user of ammonium nitrate with a large proportion produced domestically, allowing the use of urea in the UK allows market forces to operate and protects against monopolisation. If we were to move to a single fertiliser use, the risk is that the price of the product does not move with global markets, and users potentially see higher costs and reduced productivity.

On a £ per hectare basis, the active fertiliser of non-stabilised urea is distinctly cheaper than that of AN (Figure 1). In the 2019/20 crop year for instance, active ammonium nitrate had a value of £124/ha, whereas urea was £104/ha. This is due to urea having a larger nitrogen content (46% vs 34.5% for AN).

Figure 1: Active fertiliser cost of a £ per hectare basis



So, at a headline level, urea is cheaper than ammonium nitrate. However, the volatilisation of urea means that approximately a quarter of the urea applied in a field could be lost to the atmosphere as ammonia (NH₃).

Taking into account the average rate of ammonia losses for both ammonium nitrate and urea, we see that if 185kg nitrogen is applied per hectare in either ammonium nitrate or urea form, ammonium nitrate has a greater effective fertiliser input of over 182kg N/ha than that of non-stabilised urea at 139kg N/ha. So this means that non-stabilised urea loses circa 45kg/ha of effective fertiliser.

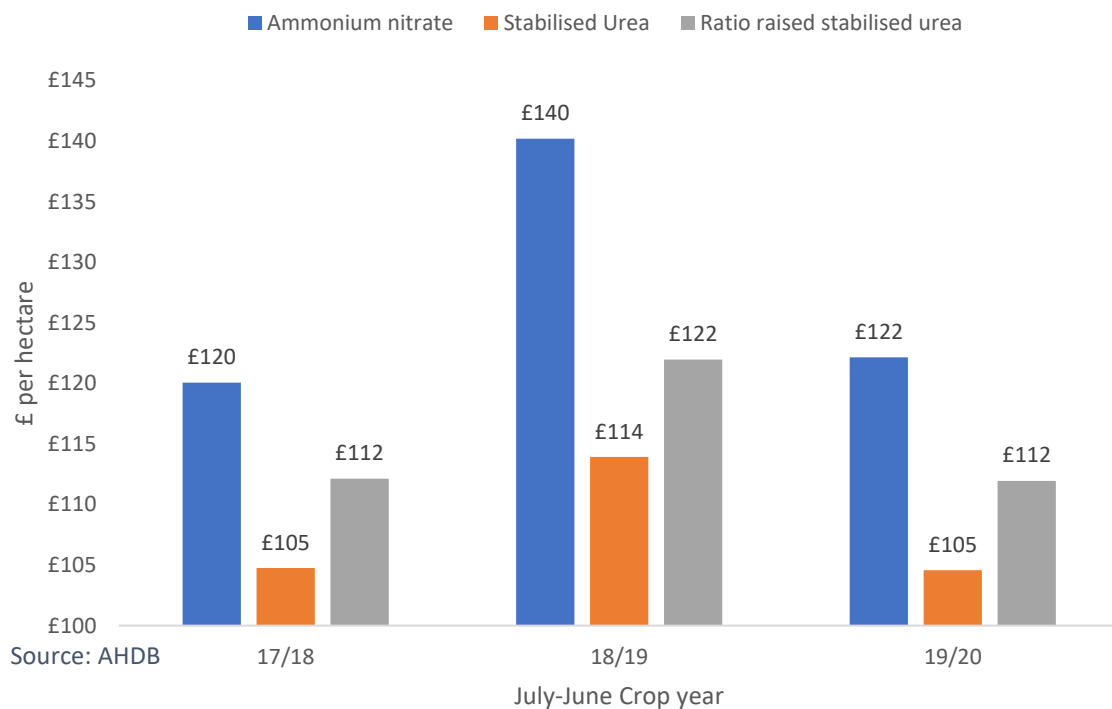
This would require 1.3x the amount of urea applied to meet the same effective nitrogen application as ammonium nitrate. This would significantly increase costs, in 2019/20 this would increase £/ha application of urea by circa £33/ha.

However, when stabilised with urease inhibitors, urea's nitrogen value per hectare increases to over 170kg N/ha. This would mean that the requirement to apply more urea to offset the ammonia losses and match ammonium nitrate's effective nitrogen application drops dramatically to only 1.07x.

From a cost perspective, when applying the higher ratio of urea with urease inhibitors, the cost per hectare is increased to £112/ha (compared to £122/ha for ammonium nitrate), beating the cost per hectare of ammonium nitrate to achieve the same effective nitrogen application rate.

Therefore stabilised urea can give a grower the opportunity to get a similar level of nitrogen application on a per hectare basis as ammonium nitrate fertilisers.

Figure 2: Stabilised urea has a cheaper £/ha due to smaller ammonia losses and provides less readily available nitrogen compared to ammonium nitrate. When raising the urea application rate by 1.07 to equal ammonium nitrate's available nitrogen, the cost per



Option 1 Ban questions

Q5a The Impact Assessment suggests that this option provides the greatest reduction of ammonia emissions. Do you agree or disagree with this being the preferred option?

Disagree, AHDB does not believe that the use of urea should be banned.

Q5b If you disagree please state why and what your preferred policy option would be.

AHDB believes that the approach should be to stabilise urea using urease inhibitors. This would provide significant ammonia reductions whilst ensuring farmers and growers have an alternative option to ammonium nitrate.

Q6a Do you agree or disagree with the assumption that there will be a shift to the use of ammonium nitrate as a result of a ban?

AHDB agrees that there would be a shift to ammonium nitrate if the use of urea was banned.

Q6b If you disagree, what alternatives might be used?

Q7a Would storage and transportation of ammonium nitrate be a challenge to farmers and/or industry? Yes/No. Please delete appropriately: I am a farmer / an industry representative / Other (please specify).

Q7b If Yes, how? Please list the potential challenges and ways these might be mitigated.

Q7c If you have suggested ways to mitigate potential challenges, what do you estimate the financial costs of these would be?

Q8 If a ban is the agreed approach, how quickly following confirmation of this do you think this option could be introduced without impacting on the availability of suitable alternative fertilisers?

- a. 0 to 6 months*
- b. 7 to 12 months*
- c. 1 to 2 years*
- d. More than 2 years*

Q9a Would this policy option impact any other specific sectors such as horticulture or other small-scale end-users? Yes/No/Don't know.

Q9b If yes, please indicate who.

Q9c If yes, please provide further details including whether alternatives can be used.

Q10a If it is necessary to ban the use rather than the sale (and use) of solid urea fertilisers, do you agree or disagree that farmers should be required to hold and present records of fertilisers purchased, such as receipts or invoices, when required? Agree/Disagree/Don't know.

Q10b If you Disagree, what other enforcement options would you suggest? Please specify.

Q11a Do you agree or disagree with the analysis of the environmental impacts of this measure? Agree/Disagree/No view.

Q11b Do you have evidence of environmental impacts which have not been considered? Yes/No. If yes please provide links or references.

Option 2 Urease Inhibitors (UI) questions

Q12a Would farmers use solid urea stabilised with UI?

Yes, AHDB believes that farmers would choose to use urea stabilised with a UI as an alternative to ammonium nitrate.

Q12b If not, why? What alternatives might farmers use?

Q13 At what concentrations should UI be applied to solid urea in order for there to be good efficacy? Please support your answer with evidence.

Q14a With regards to the efficacy of UI in solid urea when blended/coated with other minerals (e.g. sulphur), do you have further evidence that might support this consideration? Yes/No.

Q14b If Yes, please submit your further evidence.

Q15a As a supplier, when would sufficient volumes of treated urea be available to the UK market if there was a requirement to include UI in the melt?

- a. 0 to 6 months*
- b. 7 to 12 months*
- c. 1 to 2 years*
- d. More than 2 years*

Q15b Would a requirement to include UI in the melt (as opposed to a coating) increase the price of UI treated urea? Yes/No/No view.

Q15c If Yes, by how much?

Q16a Would this policy option impact any other specific sectors such as horticulture or other small-scale end-users? Yes/No/Don't know.

Q16b If yes, please indicate what sectors/which users.

Q16c If yes, please provide further details including whether alternatives can be used.

Q17a If it is necessary to ban use rather than sale (and use) of uninhibited solid urea fertilisers, should farmers be required to hold and present when required, records of fertilisers purchased, such as receipts or invoices? Yes/No/No view.

Q17b Can invoices/receipts contain details of the name of the specific fertiliser product bought? Yes/No/Don't know.

Q17c What other option(s) might be more effective for monitoring and enforcing the measure?

Q18a Do you agree or disagree that UI-treated solid urea would be a better option to use than ammonium nitrate, should this policy option be chosen?

AHDB believes that allowing farmers to choose if they use UI-treated solid urea or ammonium nitrate is best option for the industry. This would provide significant ammonia reductions whilst ensuring farmers and growers have an alternative option to ammonium nitrate.

Q18b If you Disagree, why?

Q19a Are you aware of any evidence of negative health or other environmental impacts from use of UIs that are licensed for use in the EU or UK?

AHDB is aware of some uncertainty in regards to the effect on the environment of urease inhibitors.

Q19b If Yes, please provide evidence/references.

In 2015 AHDB conducted a limited review of urease inhibitors. It highlighted research in regards to urease in the wider-environment and potential effects of certain urease inhibitors and suggested further research is necessary.

Urease is produced by 17-30% of the soil bacterial population (1). It is described as an extracellular enzyme released by microbial cells and used extracellularly. In addition, recent evidence shows that the urease inhibitor NBPT can be absorbed by plant roots, limiting uptake as well as assimilation of urea (2).

1. A. B. J. M. Lloyd, J. M. Sheaffe, Urease activity in soils. *Plant Soil* **39**, (1973)
2. L. Zanin, N. Tomasi, A. Zamboni, Z. Varanini, R. Pinton, The Urease Inhibitor NBPT Negatively Affects DUR3-mediated Uptake and Assimilation of Urea in Maize Roots. *Front Plant Sci* **6**, 1007 (2015) <https://doi.org/10.3389/fpls.2015.01007>

Since AHDB's review additional research has taken place and it may now be possible to draw firmer conclusions on the environmental impacts of urease inhibitors on the environment.

Option 3 Restricted Period questions

Q20 In your opinion, are farmers likely to apply more solid urea than needed during the open application window? Yes/No/No view.

Q21a Do you think this policy aligns with Farming Rules for Water and the Code of Good Agricultural Practise in terms of nutrient management? Yes/No/Don't know.

Q21b If No, please explain why and note any potential conflicts.

Q22 (To farmers currently using solid urea between April and December) What fertiliser(s) might you use to substitute solid urea from April to December under this option?

Q23 (To fertiliser suppliers) What fertiliser(s) might be in more demand to substitute solid urea from April to December under this option?

Q24a Do you have suggestions for more effective or less burdensome approaches to enforce this requirement? Yes/No.

Q24b If Yes, please provide details here.

Q25 Are there any other suggestions you would like to make that are not covered in this consultation document, or not covered by the previous questions?