

# Inhibiting ammonia, enhancing profitability



*"It was time to re-evaluate our approach to ensure all round value for money."*

MAX WARD

It's nearly a year since a standardised approach for the use of urea-based fertilisers was implemented which included promoting the use of urease inhibitors. *CPM* explores the state of play within industry for the second of this month's Real Results Roundtables.

By Janine Adamson

It was on 1 April 2024 that guidelines were put into place to help limit ammonia emissions from urea fertilisers and reduce their contribution to both air pollution and ecological damage.

Monitored as a Red Tractor farm assurance standard, the guidelines apply to any fertiliser containing more than 1% of urea nitrogen – untreated solid urea/liquid UAN fertiliser can be applied between 15 January to 31 March each year, otherwise a urease inhibitor must be used.

As the industry approaches a year of implementation, has the use of urease inhibitors taken off? To discuss the

benefits of the technology, *CPM* brings together ADAS' senior crop research consultant, Dr Christina Baxter; Frontier agronomist, Lucy Tagger; farm manager, Max Ward; and BASF business development manager, Andrew Clune.

Max manages two arable operations – H & D Murraywells and Castle Howard Estate in North Yorkshire – growing barley, oilseed rape, wheat and vining peas across 600ha. It was during a move from solid to liquid fertiliser that he made the decision to use a urease inhibitor.

## SCENE SETTING

To begin the Roundtable discussion



### Boosting the bottom line

Growers are under pressure to improve productivity by optimising inputs to benefit both gross margins and the environment; this is where urease inhibitors can come in, says ADAS' Dr Christina Baxter.



## Forward-thinking

Farm manager Max Ward switched to liquid UAN three seasons ago and has included a urease inhibitor from the start.

on urease inhibitors, Christina highlighted that beyond the current season's crop performance, the general conversation in farming is all about improving efficiency and increasing production on the land that's already being used to produce food.

"As a result, growers are under more pressure to improve productivity by optimising inputs to benefit both gross margins and also the environment. This is where urease inhibitors can come in," she explained.

In agreement, Lucy added that with more land entering stewardship schemes, it's critical to maximise food-producing areas. "That's certainly what Max and I are trying to achieve – pushing those crops on good land which have the greatest potential. Anything that can be done to achieve that is welcome."

Following the introduction of the urea fertiliser guidelines last year, Lucy shared that of her customers, there's currently a mix of approaches. "Some, such as Max, are very aware of the benefits of including an inhibitor and have been using them since before the stewardship came into place, rather than because of it. Others use them because they have to as they're still to learn of the benefits," she said.

## HOW THEY WORK

Urease inhibitors work by binding urease enzymes which slows down hydrolysis and volatilisation, helping to minimise the breakdown of urea into ammonia and reducing losses. As such, research has shown that

urease inhibitors can improve nitrogen use efficiency, which Max said was a primary driver behind his adoption of the technology.

"We've been using liquid UAN fertiliser for approaching three seasons now and have included an inhibitor from the start; we want to get the maximum value from the products which are being applied.

"We made the switch to liquid at the same time as we were upgrading our sprayer and moving to wider tramlines. It was time to re-evaluate our approach to ensure all-round value for money," he explained.

In response, Christina stated that much research has been done to explore the efficiency of urea-based fertilisers. "They're less efficient by around 10%, so there's a significant gap compared with ammonium nitrate. This means if you're using urea fertilisers, you should actually be applying 10% more to catch up with that.

"Equally, volatilisation varies a lot depending on environmental conditions but the losses tend to be about 20-25% of the N applied. By using a urease inhibitor you're protecting all of those losses so efficiency-wise it makes total sense, particularly in applications post-February when volatilisation is more likely."

Andrew highlighted that although prices have settled somewhat, when the war in Ukraine started two and a half years ago there was a huge spike in fertiliser prices. "Urea suddenly became very attractive.

"This means as people move over or perhaps switch back after some time, it's important to remember that urea is different in how it behaves compared with ammonium nitrate."

## THE BENEFITS

Despite having an initial input cost, Christina shared that trials have shown BASF's Limus (dual-active urease inhibitor) can in fact offer a yield benefit compared with untreated liquid urea-based fertiliser. "Of course this can vary based on the season or conditions, but that uplift tends to pay for the extra cost of the inhibitor."

Max confirmed that he's observed this outcome. "Last year, despite being very difficult, all of our milling wheat made spec in terms of protein, which we've never achieved before by solely using fertiliser. I'd say the cost is definitely covered by extra yield

and hitting market specifications."

According to Andrew, this could be down to how Limus works. "There are variations in classes of ureases enzymes, so variety in actives is beneficial. Limus combines two active ingredients - NBPT and NPPT - and has been shown to reduce ammonia inhibition more than a single active.

"This means it's more efficient and we can see a uplift in performance of around 3%, compared with a urease inhibitor that only has one active ingredient. On average, this could offer a £60/ha yield uplift over single active alternatives."

Lucy added that in terms of margin over input cost, Limus pays for itself, but actually, the advantages go beyond. "It's a win-win because of the environmental benefits too – we can all sleep at night knowing we're doing the right thing."

Max agreed and said sustainability was another reason behind him making the switch to liquid UAN fertiliser. "We want the reassurance that we're placing it exactly where we want it to be; environmental impact is always being considered."

## CARBON FOOTPRINT

To expand on the topic of sustainability, Christina explained ADAS has the YEN Zero network which aims to calculate the carbon footprint of crop products and the emissions associated with the inputs applied by growers.

"We use that network to communicate to growers where their hotspots lie, so what's causing the major emissions in



## Wider benefits

According to Frontier agronomist, Lucy Tagger, Limus pays for itself but actually, the advantages go beyond.

► their crop management systems. A lot come from the use of nitrogen fertiliser because it's very carbon intensive to manufacture, but there are also the emissions once it's applied because it releases nitrous oxide – a very potent greenhouse gas. This has 300 times greater global warming potential compared with carbon dioxide."

On average, for wheat, the emissions associated with nitrogen application can be up to half of the crop's total carbon footprint, she continued. "So in regard to a urease inhibitor, although ammonia isn't a greenhouse gas, it's important we have targets to reduce ammonia emissions for air quality reasons.

"But equally, that ammonia is deposited as nitrous oxide so does contribute to the carbon footprint of a crop. If based on UK trial data we assume volatilisation of solid urea reduces by 70% when using a urease inhibitor, and 44% for liquid UAN, when applying 200kgN/ha we can improve the carbon footprint of wheat by up to 9% depending on conditions.

"This means a urease inhibitor can play a considerable role in reducing the carbon footprint of crop production, which we know a lot of growers are under pressure to achieve by food manufacturers further up the supply chain."

## GOING BEYOND

Although the cut-off date for applying non-inhibited urea is 31 March each year, Christina suggested that really, it's all about conditions. "There's still a benefit from using it in other scenarios where you're going to have volatilisation because of the associated efficiencies which can be achieved.

"An example being if you're applying nitrogen earlier in the spring, the soils are still warmer compared with during the winter and therefore there's a risk of losses."

In agreement, Andrew stressed it's critical to not lose sight of the bigger picture. "We're post-2020 and therefore have to reduce ammonia emissions by 16% compared with 2005. The environment is being monitored to see what those emission levels are and how much ammonia is in the atmosphere – there are audits

between fertiliser manufacturers and inhibitor sales as well; it's not just a Red Tractor inspection that will dictate how successful this is."

He added that using an inhibitor shouldn't be to simply tick a box, rather to reduce emissions as much as possible.

To concur, Lucy reminded of the variability in March conditions. "We can see anything from snow and freezing temperatures to approaching 20°C. With this in mind, I'd say anything above 10°C and you should be including an inhibitor regardless of calendar date; I can't see why you wouldn't."

## LEADING THE WAY

Despite this strength of message, the Roundtable was optimistic about England's progress. "I think it's fair to

say that although other countries are very much aware of ammonia emissions, they're yet to be legislated or stewarded in the same proactive way," commented Andrew.

As such, Christina added that she believes it's a good news story for all. "It's a positive policy change which still benefits the grower in terms of improved efficiency and potential yield uplifts."

Andrew added: "If you break it down to a farm level – what are we doing by reducing emissions? The answer is, we're stopping the nutrients which have just been applied from



### The bigger picture

Using a urease inhibitor shouldn't be to simply tick a box, rather to reduce emissions as much as possible, stressed BASF's Andrew Clune.

leaving the farm, we're keeping them in the soil for the crops to use.

"That's such a benefit for the grower and the environment. Therefore anything that can help to keep nitrogen in the soil and stop leaching or volatilisation is a benefit. You've paid for those nutrients, keep them in the right place," he concluded. ●

## Real Results Roundtable

**B**ASF's Real Results Circle is a UK-wide agricultural network now in its eighth year. The initiative is focused on bringing together growers, industry experts and BASF to create a more resilient farming system that's sustainable for farm business profit, for the people we feed and for the planet we live on.

Real Results Roundtable is a new initiative which explores related topics, such as resilient disease control, environmental stewardship and return on investment. Roundtables centre around Real Results Circle farmers and associated experts from the wider industry.

By coming together to openly discuss and therefore face challenges as one, we can find out what really works and help to shape the future of UK agriculture.

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