



## A new relationship with Nitrogen

*Tim Kerr (Hutchinsons Nutrition Manager) looks at ways of using organic manures, ammonium nitrate and urea fertilisers more efficiently this spring.*

**It is fair to say that events over recent years have changed the way we think about Nitrogen.**

Firstly, the high cost of N fertiliser has focussed our attention on maximising the return on a major investment.

Secondly, incoming legislation on urea-based fertiliser has highlighted risks associated with the use of urea as a fertiliser.

Thirdly, there is a broader recognition that N fertilisers are the largest contributor to the carbon footprint of crops where N fertiliser is applied – providing further impetus to look at N differently in pursuit of mitigating climate change.

Finally, we have experienced a number of dry springs which have presented challenges in managing N applications to maintain crop uptake.

### NUTRITION SPECIAL

Starting 2023 optimistically, let's look for the positives that we can take from the current situation.





*Tim Kerr (Hutchinsons Nutrition Manager)*

## > Making better use of Nitrogen

This is not just about N fertilisers; the value of N in manures has also tripled. Such a valuable resource should be managed with that in mind. An average tonne of poultry manure is now worth more than £50 in available nutrients alone.

Applying manures accurately at the right time, and minimising ammonia losses - it's a win: win – better use of manures and less additional N needed to meet crop requirement as a result. Two economic benefits, and two environmental benefits, a reduction in ammonia emissions and lowering the carbon footprint of the growing crop.

Ensuring N is available to winter cereals as they start growing again has proven to increase tiller survival which maintains yield potential. The soil will typically supply around half the N required, but mineralisation of organic N is temperature and moisture dependant – meaning it is unwise to rely on the soil supplying too much early N (especially if the soil temperature is below 5 degrees C at rooting depth).

Ammonium nitrate supplies readily available nitrate N as well as slower release ammonium N. Urea once in soil solution will supply ammonium N. For those using urea for the first time – it is worth knowing that as urea must undergo chemical change to become plant available, it is advisable to apply it earlier than you would ammonium nitrate – once conditions allow, urea can be applied without any major risks attached.

Increasingly, we find the best and most consistent results come from front-loading N applications.

An application of 80kg once conditions allow helps to meet the early crop demand. Once winter cereals begin rapid growth – they will need nearly 20kg of N per week to keep up with demand. If we continue to experience dry Aprils – the risk of N loss via leaching diminishes and the speed at which applied N gets to the roots can be impeded.

### How do you solve a problem like Urea?

The legislation referred to earlier is the impending restrictions on the use of urea-based fertilisers. These restrictions will be audited from the spring of 2024 – meaning that fertiliser used in the spring of 2024 will need to meet the new guidelines. Of course, this doesn't stop anyone from following the guidelines from now on though...

Urease inhibitors are effective at reducing the risk of ammonia losses from urea. From 2024 these will need to be used from 1st April each year. Volatilization cannot be effectively managed by the calendar though.

If we experience warm dry conditions in March, there could still be significant N losses from urea.

For liquid N users it is simple to respond to the conditions and include an inhibitor if needed. Not so simple for granular urea, which needs to be protected before it is delivered. More people are opting for protected urea – with a urease inhibitor impregnated or applied to the fertiliser prior to bagging. Protected urea offers benefits in terms of performance over untreated urea – increased efficiency of N will inevitably reduce the amount of N needed to meet the optimum N supply.

Therefore, the fact that legislation is telling us that urea can be inefficient – gives us the opportunity to learn how to make it as effective as possible. This is important, given the reduction in the amount of ammonium nitrate that is available for the UK farmer.

The use of methylene urea products as a source of foliar N is a very effective way of maintaining N uptake through dry periods. Bypassing the soil and supplying a source of N that is safe and highly efficient offers further opportunities to rely less on conventional N fertilisers.

### What does the future have in store?

**Green ammonia** – produced without the need for fossil fuels - will be arriving soon. Using fertilisers produced from green ammonia has a significant impact on reducing carbon footprint – the main argument against it has been cost. The gas price looks to have hastened progress in this area.

**Fixing N from the air** – air is nearly 80% N – so if we can get more direct biological fixation by plants – like legumes – we can further reduce our reliance on N fertilisers. We are currently reviewing 3 products that all fix N – in different ways. This could be a real game changer if the products prove effective.

**Lots of reasons to think positively about the future of N – which is good news given we are now officially needing to feed more than 8 billion people!**

# Optimising FYM with Omnia



*We look at how Omnia has helped to save money by making the most from organic manure.*

*Balancing the value from his pig slurry with his use of expensive fertiliser has been the driver for one Yorkshire grower to move into precision farming.*



**Today all the crops on High Ness Farm, just outside Thirsk, receive a variable rate application of fertiliser ensuring that expensive nitrogen is applied where it will have the most impact and return on investment or 'feeding to crop potential', rather than just a blanket application as was the case historically.**

"With nitrogen prices at an all time high, this has been more important than ever for our business," says farmer Stephen Fall.

Mr Fall has certainly reaped the rewards from this approach having seen some of the highest yields ever in his oilseed rape, for example, which yielded over 5t/ha over a weigh bridge this summer.

However, he points out that getting to this point has been a journey that began over twenty years ago in an aim to apply his pig slurry more efficiently and evenly onto his arable crops. He grows around 100 hectares of potatoes, grown on his own land or land rented for one year to grow potatoes and has another 200 hectares of wheat, rape and barley.

This allows him to extend his own rotation whilst giving other farmers

a break crop, an arrangement that works well for both parties as it gives the person supplying the land a spring crop which can help to clean up problem weeds.

"With around 700 sows at High Ness Farm there is a lot of slurry to make use of!" he says.

As a result, organic matter reserves in the soils at High Ness Farm are generally very good, but it can be very variable and that has been the challenge that he struggled to address.

"When we started out we used our irrigator to spread the separated slurry, but it was very variable depending on how thick it was. Pig slurry tends to sink, and you can't use a stirrer when pigs are in the building for obvious reasons"

He explains that more recently he has brought in a contractor who applies the slurry through an umbilical spreader and whilst this has improved consistency in the application of the slurry, satellite imagery of the biomass of the crops shows there was still a large variation in crop performance across individual fields linked to variable nitrogen reserves in the soil.

"On top of this our nitrogen was going on at a standard flat rate so we were clearly not addressing these variations which left us with poorer performing areas of crops - and it was this that pushed us into adopting a variable rate approach for our nitrogen about seven years ago."

Initially Mr Fall used SOYL to generate his variable plans, however in 2022 he moved over to Omnia digital farming. "As I have a Hutchinsons agronomist **David Stead**, it just made sense to bring everything under one roof, as it were."

Mr Fall says transferring over from SOYL to Omnia has been very straightforward without the need to invest in any additional technology or kit.

**Chris Blashill**, digital services specialist for Omnia worked closely with Mr Fall and David Stead to ensure the accuracy and smooth delivery of his variable rate fertiliser plans using Omnia last spring.

"There is a common misconception that variably applying fertiliser saves money by allowing for less to be used, says Mr Blashill. "However variable rate applications are about targeting >



David Stead (Area Business Manager)



Chris Blashill (Digital Services Specialist)

identify and answer the questions: should I apply more to poor areas to even up the field or less to these areas as the potential is low?"

Mr Blashill uses the example of targeting low biomass areas of the crop early in the seasons to improve tillering and promote growth. "By the second fertiliser application in the spring it is still important to ensure that backward areas are pushed as this helps with stem extension, evening up the crop and helping to reduce lodging risk."

However, he points out that by the third pass, if those backward areas have not caught up they are probably not going to, so this is when it is time to flip the model and focus on the more forward areas and push these harder for that extra 3-4% return.

Agronomist David Stead cites an example of this feeding to potential approach that he took this year with some of Mr Fall's fields.

"We added into Omnia a satellite biomass (NDVI) map taken in March. In the map (below left) there were clear areas of darker and lighter green showing areas of thicker and lighter crop around the edges of the field which were low in biomass and underperforming. These received a higher application of nitrogen than the thicker, greener areas in the middle of the field where crops looked good."

"The map (below left) shows the result of just that one nitrogen application – by June (below right) much of the variation had gone and many of the lower biomass areas had caught up with the rest of the field".

For Mr Fall, it has all been about optimising those areas of his crop production that were not supported sufficiently by the levels

of organic manure in the soils and best addressing these - not wasting expensive bagged fertilisers or compromising yield.

Having seen the benefits from this feed to potential approach in his yields he has taken this one step further and had an area of his farm TerraMapped this autumn which will give him a much deeper insight into his soils and allow for much more accurate variable rate plans to be drawn up going forward.

**TerraMap is Hutchinsons revolutionary soil scanning service that provides greater definition and more accurate soil maps than any other system, enabling growers and agronomists to make the most of precision technology.**

It does this by providing high-definition mapping of all common nutrient properties, pH, soil texture, organic matter and CEC as well as elevation and plant available water. It also measures the levels of P, K, Mg, pH and % of clay, sand, silt, texture and elevation as well as calcium, manganese, boron, copper, molybdenum, iron, zinc, sulphur, OM, organic carbon, active carbon, CEC.

The results from TerraMap are then used to create maps within Omnia.

**For more information on managing crop nutrition with Omnia, please email the team: [info@omniadigital.co.uk](mailto:info@omniadigital.co.uk) or visit our website: <https://omniadigital.co.uk>**

> applications throughout the season in a smarter way with a realistic appraisal of the yield potential of the crop – so that basically we are feeding the crop where it will yield - it's not about using less, and this is fundamentally important."

"By constantly evaluating biomass through the season, either through tractor mounted sensors or NDVI satellite imagery, it can help to



Borehams 25th March OSR J T Fall



Borehams 15th June OSR J T Fall

# Making the most of manures and cover crops

*Higher fertiliser prices once again bring the nutritional benefits of manures, slurries, and cover crops right to the fore, but how do we get the most from them?*



For manures and slurry, crop nutrition specialist, **Rob Jewers**, says the key is to understand the material's nutritional content and apply it in spring, when nutrient availability, crop demand and uptake is greatest.

"We rely on natural soil processes to breakdown manures and make nutrients available, and this activity varies. Soil biology is more active in warm, moist soils, so that's when nutrient availability is greater.

"Hence, manures are used a lot more efficiently when applied in the spring than autumn, and it's also when crops are taking up more nutrients."

RB209 shows the nitrogen in poultry manure, for example, is around 10% available to plants in autumn, and 35% available in the spring, which makes quite a difference, he notes.

Phosphate and potassium is held in organic form, so availability for these is more consistent year-round, at nearer 60% and 90% respectively, depending on how effectively soil processes breakdown material, he notes.

Testing the nutritional content of manures is well worthwhile, Mr Jewers continues. "You can use standard RB209 figures, but in many cases, the nutrient content can be higher or lower than this suggests."

The table overleaf shows some typical nutrient contents. Taking representative fertiliser prices for AN at £690/t, TSP £735/t and MOP £650/t, the value of 'available' nutrition could be anywhere from £217 to £551/ha, depending on the type of manure used, he notes.

Analysis of manure samples should be married with an accurate assessment of soil nutrients and crop requirements to determine optimum application amounts.

Mr Jewers says incorporating material quickly after application is important to reduce losses of nitrogen as ammonia. "Ammonia is given off quite readily, so ideally you should incorporate within six hours to get the maximum amount of nutrition, or at least within 24 hours depending on the material applied."



*Rob Jewers (Crop Nutrition Specialist)*

Ploughing is preferred, so those on reduced, or no-till systems, may look to injecting slurries or digestate instead of using farmyard manure.

He also reminds growers to ensure spreaders are well maintained.

"You can tray test their accuracy, but it's not very easy or practical, so if you make sure the machine is well maintained, it's more likely to spread the material evenly. Try to avoid overlaps and large heaps on headlands too."

Although technology exists to variably apply manures and slurries, it is challenging to manage the balance of nutrients, as it is impossible to vary them independently, he notes.





**Ian Robertson** (Head of Soil Services)

## > Cover crops

Measuring the nutritional content of above ground biomass is similarly important for anyone growing cover crops, says head of soil services, **Ian Robertson**.

Cover crops are an excellent way of capturing and cycling carbon and nutrients, through processes that are driven by soil microbial activity, which must be “fed” with a constant supply of material year-round, he says.

“But if you’re growing a cover crop, evaluate it, so you know exactly what you’ve got. You can then make decisions about how to manage it.”

Hutchinsons can undertake cover crop evaluation to do exactly this. Fresh samples are analysed to provide an assessment in kilos per hectare of macro and micro nutrients, including; nitrogen, carbon, phosphate, potassium, calcium, magnesium, sulphur, boron, manganese, zinc, iron, copper and molybdenum.

Different species have different mineral profiles, so the total amount contained within any cover will vary depending on the mix sown, and how well each species established. It is therefore vital to measure what’s there, he says.

Nitrogen is the main nutrient growers can purposefully pursue with cover crops, by sowing mixes such as Maxi-N, which contain a high legume content. “Nitrogen is the most detrimental applied nutrient to your soil, so if you can introduce more nitrogen into the system through a cover crop, it’s far better for long-term soil health.”

Many legume-based mixes could easily contain 100-200kg N/ha, presenting a significant potential fertiliser saving at current prices.

“It’s hard to tell how much N has been fixed from the atmosphere, or taken up from the soil, but ultimately, it’s there in the crop, so hasn’t been lost from the system.”

### Typical nutrient content

Manure	Application (t/ha)	%DM	Total nutrient (kg/t or m <sup>3</sup> )			*Available nutrient (kg/t or m <sup>3</sup> )		
			N	P	K	N	P	K
Cattle FYM	41	25	6	3.2	9.4	0.6	1.9	8.5
Pig FYM	35	25	7	6	8	0.7	3.6	7.2
Biosolids (digested cake)	22	25	11	11	0.6	1.65	5.5	0.5
Digestate (whole) m <sup>3</sup>	45	5.5	3.6	1.7	4.4	1.98	1.02	3.96

\*Note: Available nutrient estimates are amount plants are likely to take up from three month-old material applied in spring to medium soil. Figures based on RB209 recommendations.

Once growers have assessed the nutritional content of the cover crop, Mr Robertson recommends discussing with your advisor how best to utilise this, and tailor nutritional programmes for following crops. Nutrient availability is influenced by many factors, including temperature, moisture, soil type, soil biology, termination method and timing.

Ideally, Mr Robertson says returning green material directly to the ground by rolling or crimping cover is more effective for feeding soil biology and returning nutrients than spraying with glyphosate and leaving a “brown forest” that takes longer to break down and release nutrients.

However, he acknowledges the practical challenges around terminating without glyphosate, especially on heavier ground, which reinforces the need to plan cover cropping carefully from the outset, considering everything from species choice and rotation, to nutrition and termination.

**For more information on nutrition or evaluating cover crops, please speak to your agronomist or contact us: [information@hlhlt.co.uk](mailto:information@hlhlt.co.uk)**

### Key points

- Soil biology drives nutrient availability
- Test nutrient content before applying manures or terminating covers
- Manures best applied in spring
- Avoid applying to waterlogged soils
- Incorporate manure quickly after application
- Plan cover crop species and termination carefully

For more information on any of our products or services, please contact your local Hutchinsons agronomist, or contact us at:

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