Farming Advice Service Technical Article
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Nutrient Management Planning

There has never been a better time to review your farm nutrient planning. The cost of fertiliser is at an all-time high, and a potential payment for a review available through the **Sustainable Farming Incentive (SFI)** nutrient management standard due to be launched later this year.

In addition, the Environment Agency are carrying out visits across the country looking at compliance with the **Farming Rules for Water**, **NVZ** and **record keeping**, amongst other things.

It's easy to think you are carrying out all the standard nutrient planning steps, but are you really? Only attention to detail at every stage ensures that you are optimising crop growth and quality in a cost-effective manner.

So, **Step 1** is **understanding what the crop needs**, whether it is arable, forage, fruit or vegetable. We are very lucky in the UK to have the **Nutrient Management Guide (RB209)**. This series of booklets gives robust nutrient advice and recommendations based on years of research and analysis carried out by independent organisations. The guide is constantly being revised and updated as we understand more about crop growth and nutrient interactions.

However, nutrient recommendations are only going to be accurate and relevant if we use the right farm and field information to start with. This takes us on to **Step 2** – **understanding what nutrients are in the soil** that will be available to the crop for growth. **Phosphorus, potassium and magnesium** are relatively easy – we can soil sample and the results classified into simple Indices so that we can look up nutrient recommendations. At target Indices the aim is to replace what the crop will remove, so this is directly linked to yield and what we do with crop residues. If Indices are below the target for the rotation, then recommendations are designed to meet crop requirements and include an allowance to build soil reserves. If they are above target then there is no requirement for any applications, as soil reserves are sufficient to feed the crop. It is important that we maintain soil P&K levels in-between sampling. Most applications of organic manures can provide more than a year's requirement of phosphate and potash; any ensuing imbalance must be factored into subsequent nutrient plans.

Soil pH is generally measured at the same time as other nutrients, and this is critical. The optimum availability of most plant nutrients in soil occurs over a small range of soil pH values, depending on your soil type and cropping. For soils prone to acidity, more frequent testing may be needed than the cycle used for phosphate, potash and magnesium. Not correcting soil acidity can cause large yield losses, but overuse of lime is wasteful and costly, and can create problems with the availability of some micronutrients.

Nitrogen is trickier to measure as it is mobile and easily leached from the soil. As such, we have a very good way of estimating the nitrogen that will be available to the crop through identifying the **Soil Nitrogen Supply Index**. This is called the field assessment method and it is based on the soil type, the previous crop and the rainfall range for the area. We can also physically test the Soil Mineral Nitrogen in the soil and consider estimates of nitrogen already in an existing crop, as well as mineralisable soil nitrogen. Consider sub-dividing fields for soil sampling and / or the field assessment method if there are variations in soil type or a field is over 4 hectares.

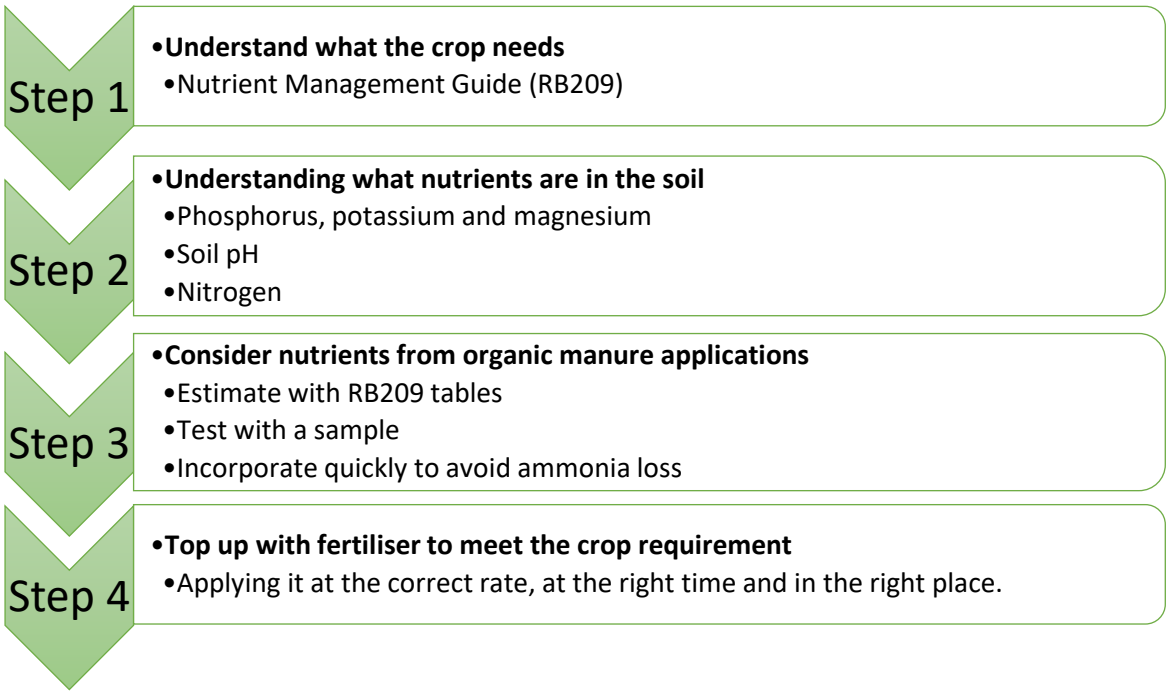
So now we to move on to **Step 3** and accurately take into account the supply of nutrients from any planned **organic manure applications**. This is where we can realise large savings in the use and cost of manufactured fertilisers by matching crop requirements with organic manure applications. In order to accurately calculate the supply of nutrients we must know the nutrient content to begin with. RB209 has standard values for most organic manures. Analysing a representative sample of manure as close to spreading as possible is best, as there are many factors that will affect the nutrient content. This is particularly true for livestock manures. These factors include type, diet and age of livestock, and bedding type. Considerations for liquids are how much dilution there is from wash water and rainfall that may be collected in the storage facility. We must also think about minimising nitrogen losses to air in the form of ammonia but also downwards through nitrate leaching.

The key to this is, **incorporating manures as soon as possible** and if spreading liquids, then **use precision application techniques** such as dribble bars. A trailing shoe of injectors can reduce ammonia losses by up to 70%. Remember; the less nitrogen you lose, the more there is available for the crop, so your costly nitrogen fertiliser requirement goes down. Timing is important as well; if you can apply to a growing crop then nitrogen utilisation will be higher.

Use free software such as MANNER-NPK to accurately calculate nitrogen supply. This takes into account losses based on crop, soil and manure type; nutrient content, application method and rate; incorporation timing and method; windspeed, rainfall and topsoil moisture. You might wonder if is it worth going to this extra effort just to fine tune by a few kg? With nitrogen fertiliser reaching £2.52/kg nitrogen[1] this can soon add up over the whole farm.

Finally, we reach **Step 4** – to top up with fertiliser to **meet the crop requirement.** Even at this stage there are ways in which we can optimise efficiency. Cost is a big factor in fertiliser choice, but you should also consider type and quality. Urea is cheaper per kg of nitrogen than ammonium nitrate. However, if it is unprotected without a urease inhibitor and you apply in warm dry conditions then much of the nitrogen will be lost through volatilisation. This is not good value for money. Fertiliser is a high value input and you want to **ensure you are applying it at the correct rate, at the right time and in the right place**.

Regular maintenance and service of your spreading equipment is also essential, as is calibration for each fertiliser product you are intending to use. If the rate is wrong, or the placement is uneven, then parts of the crop could be under- or over- fed, which will affect yield.



[1] Prices as of February 2023.

Farming Rules for Water

The Farming Rules for Water require the four nutrient planning steps above to be followed. By doing so you can be assured that not only are you saving money, you are also meeting **regulatory compliance**.

The Farming Rules for Water require the following conditions to be met and evidenced for full compliance:

- Fields must be soil sampled for phosphorus, potassium, magnesium & pH at least every 5 years
- Nutrient plans must be completed for each field before any applications are made, demonstrating an assessment of the crop nutrient requirement taking account of the results of soil sampling and the nutrient content of organic manures and fertilisers
- You must avoid applying organic manures that could raise the soil phosphorus Index above the target level
- You must assess the risk of pollution, particularly when applying high readily available manures such as slurry, poultry manure and digestate in the autumn
- You must plan to have an established green cover by 15 October each year following organic manure applications, unless you are trying to control persistent weeds or leaving medium/heavy soils to weather before a spring crop

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There is plenty of free advice on nutrient management planning and the Farming Rules for Water available to all farms through:

- **Catchment Sensitive Farming**
- **The Farming Resilience Fund**

And useful online and printed resources available from:

- **Tried & Tested**
- **The Nutrient Management Guide (RB209)**