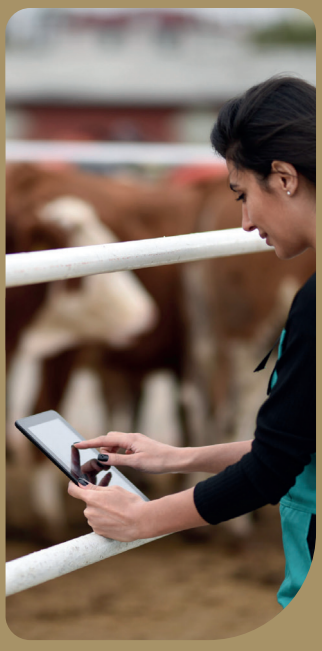
AGRICULTURAL INDUSTRIES CONFEDERATION








Nutrient Management on Farm

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NUTRIENT MANAGEMENT ON FARM

Why are Nutrients Important to Agriculture?

Plants, the basis of life on earth, require just 17 essential elements to grow and develop. Some, including carbon and oxygen come from the air, while most others come from the soil and are naturally cycled as plants grow, die and decompose. However, when crops are harvested, the nutrients they contain are removed from the land rather than returned to the soil.

Organic materials return some nutrients to the soil, but mineral fertilisers are often needed to make up the shortfall. The main nutrients needing to be supplied are nitrogen (N), phosphorous (P), potassium (K) and sulphur (S), with the quantities of each being carefully matched to the needs of the soil and the plants. These nutrients do not simply "make plants grow", rather deficiencies or imbalances can limit yield or quality. Effective nutrient management therefore means identifying what nutrients need to be replaced and supplying them through the appropriate combination of organic materials and mineral fertilisers.

Similarly, plants provide the nutrients which are essential for rearing livestock, directly determining an animal's health, growth, and productivity. The availability of nutrients to provide energy, protein and mineral balances affects how efficiently animals convert feed into body mass, milk, or eggs.

Nutrients in mineral form are crucial to supporting today's global population. They have enabled the dramatic increases in food production over the past century. Our World In Data estimate that just under half of the people alive today are dependent on manufactured fertilisers because the food they eat would not be available without the nutrient inputs from these fertilisers. While they present challenges, they remain indispensable. Improving the efficiency of nutrient use is key to sustaining future food security.

Why is Managing Nutrient Use on Farm Important?



Economic

Improves efficiency and profitability by ensuring inputs are matched to crop and livestock needs, reducing waste and unnecessary costs.



Environmental

Minimises losses to air, water, and soil, helping to reduce emissions, protect natural resources, and support climate and biodiversity goals.



Social

Underpins food security, animal welfare, and public trust by supporting safe, sustainable, and responsible food production.

The Role of Feed and Fertiliser in Delivering Nutrients on Farm

The animal feed and fertiliser sectors play a vital role on farm by supplying products specifically designed to complement home-grown feeds, and organic materials. This enables crops and livestock to meet their nutritional requirements efficiently and sustainably, in line with productivity, welfare, and environmental goals.

Profitable food production requires that nutrients are applied to land or fed to livestock from the right source, at the right rate, at the right time, and in the right place. This approach will also minimise environmental impacts.

Professional advice provided by advisers qualified under the Fertiliser Advisers Certification and Training Scheme (FACTS) and the Feed Adviser Register (FAR) demonstrates what effective nutrient management looks like in practice.

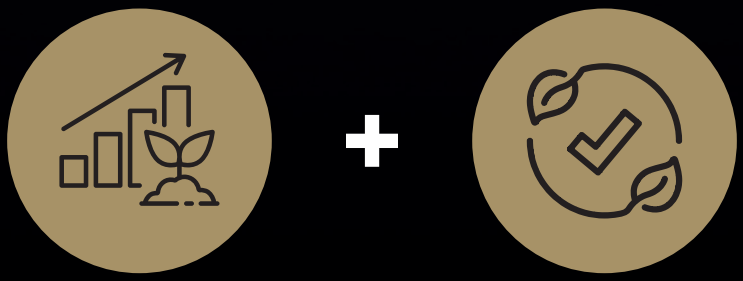
Improving the efficiency of nutrient use is key to sustaining future food security...

THE PROCESS OF GOOD NUTRIENT MANAGEMENT

Using professional advice to develop a nutrient management plan that is implemented on farm to optimise food production, while minimising environmental impact.



Professional Advice + Nutrient Management Planning + Implementation =



Optimised Profitable Production + Minimised Environmental Impact

Professional Advice

Why advice is important:

Quality independent advice – FACTS qualified advisers provide advice on fertiliser use and nutrient management on farm, balancing crop productivity, cost, and environmental protection.

Help your business succeed – FAR qualified advisers provide feeding and nutrition advice to livestock farmers, focusing on animal performance, efficiency, health, fertility and environmental outcomes.

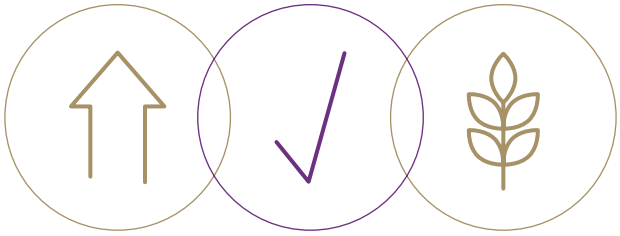
Managing complexity – Mixed farming systems must consider both sources of advice to avoid a surplus or deficit of nutrients within a farm system.

What does 'good' look like:

Farmers should engage the services of professional advisers relevant to their farming system, who are registered on the FAR and FACTS databases.

These advisers have a professional qualification and complete annual continuing professional development (CPD) to ensure that their knowledge of good practice remains up to date.





Nutrient Management Planning

Why is using a nutrient management plan important?

It evidences the dynamic decision-making process a farmer uses to determine the nutritional requirements of their farming system. It demonstrates sustainable improvement, change and learning, that requires regular review and updating, rather than acting as a static document, driving many benefits for a farm, including:

Productivity – Maintains soil fertility, productivity and long-term resilience. This optimises crop and forage growth, improving yields, protein content and feed quality, in turn facilitating the conversion of nutrients into meat, milk and eggs more efficiently.

Compliance – Helps meet regulatory, assurance and environmental scheme requirements through responsible nutrient use and management.

Sustainability – Drives efficiency, reduces nutrient losses, improves soil and livestock health, water and air quality, and contributes to lower greenhouse gas emissions.

What does 'good' look like:

A clear understanding of the nutrients contained in all inputs onto, and outputs from, the farm, enabling informed decisions that optimise productivity, profitability and environmental performance.
This understanding is developed through:

- Undertaking regular soil analysis and interpreting results to maintain optimum soil fertility and pH.
- Assessing the nutrient value of all organic materials available on the farm, including livestock manures, slurries, digestate, composts and crop residues.
- Formulating livestock diets that accurately match animal requirements to improve feed efficiency and reduce excess nitrogen and phosphorus in manures and slurries.
- Understanding the environmental characteristics and sensitivities of the area and water catchment in which the farm operates.

Implementation

Why is this important to implement on farm:

Nutrients applied optimally improves farm profitability and reduces unnecessary environmental impact. Disciplined adoption of the nutrient management plan therefore ensures that nutrients are applied to land or fed to livestock from the right source, at the right rate, at the right time, and in the right place.

What does 'good' look like...

For growing crops, inc. grass and forage:

Right Source – Use the appropriate nutrient source to match soil conditions and crop requirements.

Right Rate – Apply the correct amount of nutrients based on crop need, soil nutrient supply, and realistic yield targets using regularly maintained, serviced and calibrated equipment.

Right Time – Apply nutrients when the crop can make best use of them, taking account of weather and ground conditions before spreading to minimising losses to air and water.

Right Place – Apply nutrients accurately where crops can access them most effectively and where the risk of loss is lowest including incorporating organic materials quickly after spreading.

What does 'good' look like...

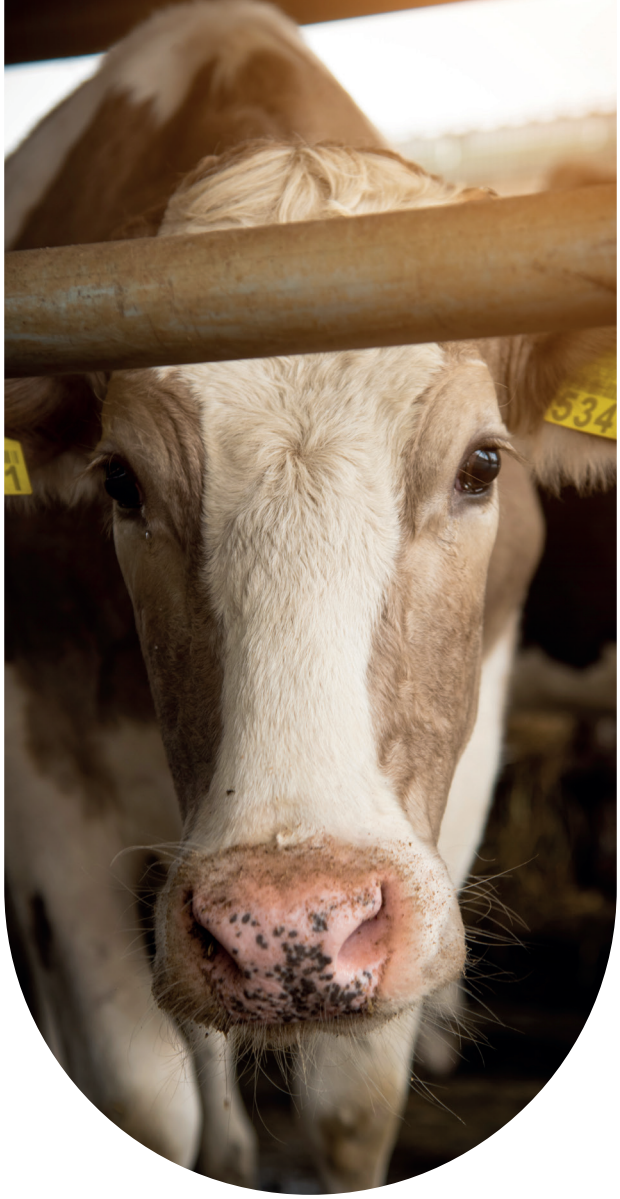
For feeding livestock:

Right Source – Select and formulate bought-in feeds and farm-produced forage and crops that provide the nutrients required by the animal, matching nutritional supply to species, age, production stage and performance objectives.

Right Rate – Supply nutrients at levels that meet, but do not exceed, animal requirements, using ration formulation and feed and forage analysis to maximise feed efficiency and minimise excess nutrient excretion.

Right Time – Provide nutrients at the stage of production when animals can use them most effectively, adjusting diets as nutritional requirements, forage quality and performance targets change.

Right Place – Deliver nutrients through feeding systems that ensure animals have consistent access to balanced diets whilst minimising feed waste and nutrient losses.



Optimised Profitable Production

Good nutrient management supports resilient farm businesses by:

Maximising Profitability – Increasing yields, protein content and forage quality while ensuring inputs are used efficiently to reduce waste, improve profitability and support food production.

For livestock, ensuring accurate ration formulation to improve digestion efficiency and Feed Conversion Ratio (FCR), as well as optimise water intake, and reduce nutrient excretion and slurry volume.

Building Business Resilience – Aligning nutrient applications and use with crop and livestock requirements, so that farmers can better withstand weather, market and geopolitical pressures, whilst meeting supply chain and market specifications.

Ensuring Best Practice – Investing in FACTS and FAR advice to help meet any contractual, regulatory or supply chain requirements.

Minimised Environmental Impact

Good nutrient management achieves reductions in environmental impact through:



Air Quality

Reducing ammonia emissions from livestock through the effective collection of manures and slurries from livestock housing and having sufficient slurry storage to allow applications to be matched to crop demand and field conditions.

Complying with the Urea Stewardship Scheme in England where solid fertilisers containing more than 1% urea applied between 1 April and 14 January must be treated with an effective urease inhibitor.



Water Quality

Reducing phosphates from entering watercourses through surface runoff and soil erosion by adopting good soil management practices, adopting suitable crop rotations, and ensuring cover crops are established on bare soils.

Reducing nitrates being leached from soil by ensuring nitrogen fertiliser applications are timed to meet crop demand and avoid periods when significant rainfall is forecast, or when soils are saturated.



Greenhouse Gases (GHG)

Reducing methane emissions from livestock by optimising animal diets for energy, protein, starch and fibre, as well as selecting products that help reduce GHG production.

Reducing nitrous oxide emissions from soil by optimising nitrogen applications to crop need, improving soil structure and drainage, maintaining soil pH and using nitrification inhibitors.

Reducing GHG emissions as the sector introduces low carbon fertilisers and new innovations such as recovered/recycled nutrients becoming more readily available on the market.

Key Metrics and Definitions

Organic materials: Any bulky organic nitrogen source of livestock, human or plant origin, including livestock manures, biosolids (sewage sludge), compost, digestate and waste-derived materials.

- **Biosolids:** Treated sewage sludge.
- **Compost:** Organic material produced by aerobic decomposition of biodegradable organic materials.
- **Digestate:** Organic material produced by anaerobic digestion of biodegradable organic materials. May be separated into liquid and fibre fractions after digestion.

Feed Conversion Ratio (FCR): A measure of the efficiency of an animal's body converting feed into desired output (milk, meat etc.) and is calculated as the mass of feed consumed divided by the mass of output gained.

Feed Efficiency (FE): The inverse of FCR, calculated as the mass of output divided by the mass of input. It indicates how effectively an animal uses feed to produce a unit of output.

Nitrogen Use Efficiency (NUE): the ratio of total nitrogen output in harvested material to total nitrogen supply from all sources.

- Nitrogen supply includes that from the soil as well as that from applied fertilisers and manures.
- This ratio can be expressed as a percentage:

$$\text{NUE} = \frac{\textit{N removed in harvest crop (kg N)}}{\textit{N supply from all sources (kg N)}} \times 100$$

- For a purely arable farm, NUE can be calculated at a crop, enterprise or farm basis.

In relation to livestock, it is only possible to calculate NUE at the enterprise or farm level.

Phosphorus (P) Balance: A measure of how much phosphorus enters and leaves a farming system. It ensures soils and feed materials have enough for crop and animal growth whilst preventing environmental impact from surplus P.

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