

## Reasons to improve soil management and nutrition

Ambitions to maximise forage quality and yield will be increased when sowing productive modern grass varieties into soil that is in good heart, and that starts with getting nutrition right and fully understanding your goals.

### Intro

Quantifying the health of your soil as it varies from field to field will offer insight into why some areas may be underperforming, and which parts of the farm are reaching their grass production potential.

Soil fertility and structure are fundamentals for grassland management and contribute to increasing yield and quality. Tom Oates, nutrition agronomist at Origin Fertilisers, says ignoring soil health now will lower future grass productivity.

“Soil texture is the foundation on which a grassland production system is based. Identifying soil type, and therefore its capabilities, will help highlight any future production limitations that might arise from certain soil textures. These could include the risk of nutrients leaching, soil moisture retention and potential compaction issues – all these factors will help influence decision-making,” says Mr Oates.

As much emphasis should be placed on soil health and its management as other parts of the farm suggests Mhairi Dawson, from grass breeder Barenbrug: “The soil is as important as the people, cows and crops that we grow on it. It is what feeds the forage and directly influences productivity gains and reduces exposure to external costs. The healthier the soil, the healthier the microbial population, which contributes to more efficient nutrient cycling and in-turn better crops, productivity, and increased profitability.”

### Identifying underperforming areas

Using the data from soil testing can allow a tailored approach to restoring the balance of both nutrients and structure without wasting valuable inputs. Most farmers will test forage for an insight into the additional nutrients needed to increase animal health, and testing the soil should be seen as equally important to influence crop nutritional quality and yields.

Ms Dawson says a healthy soil will have many facets, and it is key to getting the balance correct: “Part of the soil health is having good structure and physical condition, along with a nutritive balance and biological elements, such as organic matter and microbial life. For a soil to function at its best, these all need to work in balance with the other.”

Part of this is down to measuring regularly to find out where improvements can be made and if the remedial actions are working. Mr Oates notes that swards can be underperforming for a variety of reasons including soil compaction, poor drainage, or suboptimal pH. “It is easy to push remedial works for improving soil pH to future years, but nutrient availability is significantly reduced if the correct pH is not maintained.

“The optimum pH for a grass/clover sward is pH 6, and it is a mistake to think that anything below this is ok. Phosphorus availability is greatly reduced in acidic soils, therefore it’s critical to correct soil pH before investing in nutrients,” comments Mr Oates.

Farmers looking to improve soil pH through a lime application can spread granular lime via a fertiliser spreader, which offers an alternative to the bulk lime typically spread by a contractor's belt spreader.

### **Correcting the nutritional balance**

For grassland, there are some essential nutrients that are found to be commonly lacking across the country, and according to the PAAG (Professional Agricultural Analysis Group) soil report, only 9% of UK grassland soils are at target P and K levels, which offers clear evidence to base fertiliser applications on soil reports.

Nutrient deficient areas can be targeted with prescription fertiliser applications to increase levels. This allows a tailored approach to nutrition and can replace essential nutrients following a harvest.

With fertiliser prices high, Mr Oates suggests that making the most from each application is key, which may mean a change of strategy. Nutrients such as sodium (Na) won't influence grass growth directly, but a minimum level in the diet is essential for livestock health and performance. "If the sodium content of forage is too low, the animal automatically substitutes potassium (K) for sodium as an alternative buffer in the saliva. Potassium inhibits magnesium (Mg) absorption into the rumen wall, hence increasing the risk of grass staggers."

Mr Oates went on to say that there is less risk of staggers when potassium and sodium levels in herbage is at a ratio of <20:1 (K:Na). Sulphur (S) is another key nutrient and is essential for nitrogen (N) conversion into plant available forms, helping to improve nitrogen use efficiency of any N that is applied.

"For grass we want a N:S ratio to be below 12:1. Sulphur is an essential nutrient that is key for protein formation, crop quality and nitrogen conversion, so overlooking a sulphur application will lead to some of the nitrogen applied not being available to the plant," adds Mr Oates.

### **Improving soil organic matter**

The condition of soil organic matter and structure when choosing species should be a key driver in decision-making, as Ms Dawson explains: "If you have a heavily panned soil, planting deep rooting species won't solve this issue, more fundamental action, such as subsoiling, is required to correct the problems.

"However, once the structure and health are at a good level, this opens more options, including sowing deep rooting species to help maintain good soil structure. It is about being realistic with the soil's capabilities and looking at viable ways to improve it."

Matching your species to your soil will also have great benefits to improving soil health. "A varied root system brings the widest range of benefits including soil stability, drought tolerance, improved water infiltration and water holding capacity. Additionally, growing legumes for nitrogen fixation has big environmental positives," concludes Ms Dawson.

Good levels of soil organic matter allow the soil to react to changing weather conditions and survive extremes for longer, which has a greater benefit to maintaining the nutrient balance.

Mr Oates points out that soil organic matter will indirectly raise sward nutrition by improving soil structure as it acts as glue, binding soil particles together, helping to reduce soil erosion. "When soil temperatures are above four degrees, the organic matter in the soil starts to

mineralise, meaning soil organisms break it down and convert organic N and P into available forms for swards to utilise.”

Structure is especially vital in wet conditions, with heavy rainfall able to be absorbed into the soil like a sponge and limit runoff. “Good organic matter means nutrients are held in the form of cations on the organic matter, therefore increasing the swards availability to essential nutrients,” concludes Mr Oates.

### **Improving soil nutrition - case study The Shepherd family, Hassop, Bakewell**

Soil testing to understand where improvements were needed was an essential part of the early works undertaken by the Shepherd family when they moved to their 445ha farm, which is part of the Chatsworth Estate.

The soil results highlighted several areas that needed addressing, but it also showed where nutrient availability was good, so allowed a targeted application for nutritional improvements. Potash (P) and phosphorus (K) levels needed raising, but lime content in the soil was good.

“We split the farm into geographical blocks, firstly to make it more manageable, and secondly to maintain grass production levels when we carried out a full reseed. We started increasing soil nutrition by using fertiliser to target the low nutrient areas, along with organic manures and a top-up of nitrogen.”

This method helped the Shepherd family increase production on the good swards and allowed reseeds to be carried out on the areas that required it. The improvement was a process that took several years and regular testing to monitor gains.

“As we started to increase the levels of soil nutrition, we saw gains in DM, protein, ME and D value of the forage. This meant we could reduce the amount of fertiliser we applied and rely more on the nutrients from the manures. I now have the confidence to test soils on a more infrequent basis as the work we have put in to build the nutrition is being maintained.”

The process still requires regular reseeding with swards down for around five years. However, the most recent silage testing results returned 33.7% DM, 13.1% protein, 11.5% ME and 71.7% D value. Yields have increased from 8-10t/ac when the family took the farm over, to 11-12t/ac on first cut to supply good quality nutritional forage for the high yielding Holstein herd.