

Correcting soil nutrient deficiencies key to forage quality gains

Nutrient deficiencies within the soil profile can have a huge bearing on the final quality of the forage, so addressing these at the start of the year can help crops access the vital nutrition they require.

Intro

Making the most of any inputs applied throughout the season relies on the soil being able to utilise the nutrients effectively to maximise home-grown forage, and using a detailed soil analysis to identify where soil nutrient deficiencies are will help farmers address these issues and reduce exposure to external costs.

While many growers may be focussing on the three main nutrients – nitrogen, potassium and phosphorous – significantly scaling back on trace and minor nutrients, such as sodium (Na) and sulphur (S), can lead to forage becoming less palatable and a reduction in nitrogen use efficiency.

While the addition of sodium will not directly influence grass growth or final yield, a minimum level in the diet is essential to maintain livestock health and performance. Tom Oates, nutrition agronomist at Origin Fertilisers, explains that its value shouldn't be forgotten when deciding on fertiliser strategies.

“Sodium is a vital nutrient and deficiency can significantly affect production through reduced grass consumption and lower milk yield. A little and often approach is best with sodium as it isn't held in the soil for any length of time. Increased grass quality and better utilisation of swards through increased palatability are significant benefits following regular applications.”

Much of the sodium consumed by livestock is used in the production of saliva, which is secreted into the rumen to maintain a constant pH by neutralising acids formed by bacteria.

“If the sodium content of forage is too low, the animal automatically substitutes potassium (K) for sodium as an alternative buffer in the saliva. This has a knock-on effect as potassium inhibits magnesium absorption into the rumen wall, hence increasing the risk of grass staggers.”

There is also less risk of staggers when potassium and sodium levels in herbage results in a ratio of K:Na at <20:1. The increase in sodium also has benefits for allowing livestock to graze swards tighter and increase intake from forage. “Sodium supports synthesis of glucose and converts it to fructose, therefore making the grass more palatable, as the sodium has converted the sugars into more soluble carbohydrates,” concludes Mr Oates.

Improving palatability is essential when grass becomes less digestible later in the season or following a slurry application. Research into the effects of applying sodium as a grassland fertiliser was carried out over many years by Bangor University, and revealed significant increases in digestibility, sugar content, grass intake, along with butterfat and milk yield gains.

Sulphur requirement

Like sodium, sulphur has high mobility in the soil and is prone to leaching, so therefore requires a little and often approach to maintain levels. It plays an essential role in boosting

nitrogen use efficiency, ensuring that the high-N Sweetgrass fertiliser works at its greatest efficiency.

Sulphur deficiency is highest in light soils and areas of high rainfall, but its presence within the profile helps increase nitrogen use efficiency, as Mr Oates explains.

“Sulphur is associated with improving crop quality and protein production, and high input grassland systems will also require high sulphur applications to ensure all the nitrogen is taken up by the plant to gain the best return from the investment.”

Grass with a sulphur deficiency will show a pale green or yellowing of the leaves and it will be the younger tillers that will show these symptoms first.

Addressing pH

Detailed soil analysis will also highlight any fields suffering a pH deficiency, which is critical to address before an application of nutrition, as areas with suboptimal pH levels will mean the nutrients aren't fully available to the plant.

Mr Oates advises that the ethos of leaving a pH just under optimum to be addressed in future years can lead to wider problems with nutrient accessibility. “A pH of 6 is optimum for grass and clover swards and the soil analysis results will show the current levels in the soil. If results are at pH 5.7 then nutrient availability is significantly reduced. A soil at pH 5.5 is 10 times more acidic than a pH of 6.5.”

Incorrect pH levels have a bearing on the availability of other nutrients, so its influence in the profile is considerable. Mr Oates continues: “The availability of phosphorus is greatly reduced in acidic soils, meaning the plants will become deficient quicker, so ensuring the pH is correct before applying nutrition offers the greatest return on any investment.”

Farmers requiring a lime application this year should consider granular lime, as opposed to the traditional bulk route, which usually requires a contractor to apply it. Granular lime can be spread from a fertiliser spreader and could be a useful little and often approach for maintaining pH levels within the soil.

Case study

Andrew Hall, dairy farmer, Coleshill

Producing more milk and reducing looseness in his herd have been among the notable benefits seen by Andrew Hall following a change in fertiliser strategy over the past two years.

Mr Hall had regular problems with his 154-strong Ayrshire herd struggling to retain the grass in the rumen for long enough to appreciate the nutritional qualities from the forage. Alongside this, swards weren't being grazed tight enough, which added an additional topping job during the year to trim the unpalatable stems and allow new growth to flourish.

“It didn't matter how good the grass was as it wasn't able to stay inside them long enough for the nutrients to be broken down. That is no good for them and no good for us. We would also get penalties if our butterfat dropped too low,” says Mr Hall.

However, after reading about how different nutrients can influence factors affecting animal health and forage quality, for the past two seasons Mr Hall has been using a tailored blend of nutrients from Origin Fertiliser's Sweetgrass fertiliser, switching from a straight CAN (calcium ammonium nitrate) product.

“I believe plants can only use so much straight nitrogen, so it is about balancing the inputs. I read about a different approach to grassland fertiliser applications and thought it was worth a go to try and solve my problems,” comments Mr Hall.

The Sweetgrass blend Mr Hall chose was a 23N, 0P, 0K + 5Na + 5SO₃. It is applied across three applications of 50kg N/ha, at monthly intervals in the spring. “Since we started using the tailored fertiliser our butterfat percentage has remained constant, never dropping below 4.1%, and milk yield has increased, too, as we have had to buy a bigger tank.”

The addition of sodium has been key, and the plant tissue tests have revealed that sodium’s presence has meant the palatability and forage uptake has increased, while looseness has reduced, as has the need to supplement as much concentrate into the diet.

Mr Hall’s herbage registered a K:Na ratio of 5:1 this summer, and although he had never applied sodium and sulphur directly, he is sure the change has offered him multiple benefits. “We have never applied sodium directly but its addition has increased the palatability of the sward to the cows and allowed them to graze tighter and make the most from the young leaves,” concludes Mr Hall.