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Balancing Potassium Requirements

On pastoral farms, pasture production is about getting the best from both the grasses and the legumes in the sward. Legumes are generally more demanding of nutrients than grasses and thus any nutrient deficiencies will often impact legume vigour well before grasses are affected. However, it is worth the effort to ensure the legumes are well supplied with adequate nutrients because they reward you by providing significant quantities of “free” fixed nitrogen to drive grass growth.

Potassium (K) is a key nutrient for both plants and animals. However, it can become a problem because legumes require significantly more K than the animals which graze the pasture. Typically, pastoral herbage requires K to be about 3% for optimal growth. On the other hand, the stock grazing such pasture generally only require about half this level for growth and maintenance. As a result, there are many situations on soils fertilised with K or where soil K reserves are good (most South Island greywacke derived sedimentary soils) where stock are receiving more than double the K they need. This can lead to metabolic imbalances with large amounts of K accumulating and consequent increased requirements for the other major cations: calcium, magnesium and sodium. Such nutrient imbalances can lead to metabolic problems through the winter.

Application of autumn nitrogen can also lead to excessive K uptake at the expense of other nutrients, even on soils with average K levels. Whenever animals are accumulating higher levels of K than they require, their bodies try to maintain nutrient balance and excrete the excess K. Further, not only does high K affect calcium, magnesium and salt uptake from the soil, it also directly affects the uptake of sodium and magnesium from the rumen into the animal’s bloodstream.

Magnesium uptake in pasture is further impacted by the onset of cooler temperatures: pasture levels can be roughly a third lower during the winter. Thus, right when magnesium uptake is already lower, an excess of K can make the situation worse. Stock magnesium levels can be further compromised where salt intake is low or nitrate levels are high. Generally the latter situation is typical of spring pastures but it can also occur in brassica crops or in autumn saved pasture.

As a general rule, K reserves in South Island sedimentary soils are very good. Even where soil test K levels seem to suggest that levels are lower than desired, it is likely that there is still more than sufficient to maintain both a healthy pasture sward and healthy animals. Even in situations where K application may be required to offset losses in hay and silage, it is important not to overact and overdo the K fertiliser application.

If K is excessive and this upsets stock magnesium and sodium balance during the winter and early spring, this metabolic imbalance may not always be obvious at the time but it can reveal itself in the form of poorer performance later in the season e.g. in reduced ewe milk production and lowered lamb growth.

So remember, potassium is an important driver of legume vigour but don’t be tempted to overdo the K fertiliser. If you’re not sure whether you need additional K or not, undertake a soil test which measures reserve K status or have your herbage K levels assessed by plant testing.