

Active Management Required to Maximise Pasture Growth

Background

Pastures and crops need nutrients to grow, just like humans do. They need the right soil pH_{CaCl2} (above 5 and ideally above 5.5 to stop sub soil acidification), the right nutrients in an available form, organic matter (to help retain nutrients and soil moisture), good soil structure (to allow for root growth) and a variety of micro-organisms to support plant growth.

Crops and pastures don't care where the nutrients come from – in a bag or from soil reserves or from added composts etc., as long as the soil has sufficient reserves to promote growth. Every time we 'harvest' we are removing nutrients, be it in hay, grain, wool or meat. Those nutrients need to be replaced or improvements made to the soil to increase nutrient availability if we wish to maintain productivity.

What was done

Two sites were selected on the same soil type, approx 300m apart. Both have been grazed with livestock for the last 30 years (i.e. no cropping or hay cutting). Site 1 has been limed four times (1990, 1997, 2007, 2017) at a rate of 2.5t/Ha and has had an annual fertiliser program with the equivalent of 130kg single super phosphate. Stock on this site are rotationally grazed to match stock feed requirements to FOO (Food On Offer). Site 2 has had no fertiliser or lime applied for approximately 30 years and is set stocked.

Photos of the sites were taken in September 2021 and both sites were soil tested in March 2022 with the samples sent to the same lab for analysis.

Results

The results (refer to Table 1) show a clear difference in nutrients (especially phosphorus and to a lesser extent sulphur) and pH between the two sites.

The pH in site 2 is well below critical levels. Once pH drops into the 4s it will impact not only on nutrient availability (making many nutrients unavailable to plants) but will also negatively impact on soil biological activity. Soil biological activity is essential for the breakdown of organic matter and the cycling of nutrients in the soil and also allows clovers to fix nitrogen.

Phosphorus in site 2 is well below the recommended level of 25-29 mg/kg. The low level of P in site 2 is directly impacting the productivity of the pasture.

Both sites have excellent potassium levels. This is a direct result of the potassium rich clay subsoils found in this location.

Sulphur is marginal in site 2, although not as deficient as the phosphorus. This is most likely due to the 'free' sulphur we receive on KI due to our close proximity to the coast (the sea 'sulphur' which comes with our seabreezes) plus the sulphur that is tied up in organic matter.

Organic matter is higher in site 2. This is due to the low pH (i.e. highly acidic) soil at site 2. As mentioned above, as soils acidify the biological activity of the soil slows. As biological activity slows, so does the breakdown and cycling of the organic matter in the soil. Often highly acidic soils can have high organic matter levels in the top soil; the organic matter can actually be pulled away as a mat of organic residues which have not broken down, and are sitting on the surface of the soil.

Take home messages

- If you want to grow productive pastures/crops then you need to 'feed' or actively manage the soil to maintain productivity.
- Allowing soil pH to decline not only impacts on nutrient availability but also soil health.
- Regular soil testing (using the same sampling transect, same laboratory and sampling at the same time to the same depth) enables you to monitor your pH and available nutrient levels.



TEST	RECOMMENDED LEVELS	SITE 1: (strong lime & fertiliser history)	SITE 2: (no lime or fertiliser for 30 years)
pH _{CaCl}	<4.8 lime immediately 4.8-5.2 lime soon	5.7	4.5
Ext. Phosphorus (Colwell) mg/Kg	25-29	33	12
Ext. Potassium (Colwell) mg/kg	120-250	139	178
Sulphur mg/Kg	6-8	10	7
Organic Carbon %	>1.8	2.09	3.40
Ece (Conductivity) dS/m	<2 low salinity	1.23	0.89

Table 1: Nutrient & pH results



Figure 1: Site 1 photo taken September 2021.



Figure 2: Site 2 photo taken September 2021.

Further Information

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