Getting the best out of every paddock on your farm

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Most farmers have a reasonable idea of the carrying capacity of their paddocks. However, it is much more difficult to judge whether each paddock is actually achieving its potential productivity. Various technologies have been developed to help us achieve production targets. For example, calculations based on average rainfall are used to indicate the potential stocking rate (French, 1987), and soil tests can be used to guide soil fertility management. Each technique takes us part of the way to assessing the capability of the grazing system. Today, the computer-based decision-support tool GrassGro can provide a more comprehensive assessment of land capability by simulating the key environmental resources of the grazing system. When used in combination with conventional technologies, GrassGro can also help to pinpoint constraints to maximum production.

Case study: "Connemara", Southwest Slopes, NSW

The "Connemara" wool enterprise relies on high stocking rates supported by regular investment in phalaris-based pastures, superphosphate, and lime. Annual rainfall is 790 mm. Stocking rates achieved on the 'best' paddocks have been increasing and are presently 22 DSE/ha, while 'poorer' paddocks are estimated to run approximately 10 to 16 DSE/ha. However, the French-Schultz calculation, suggested a potential stocking rate of 28 DSE/ha. This was regarded as 'unachievable' (Burbidge, 1996). The stocking rate calculation was assumed to be an overestimate because some rain falls outside of the growing season and some is lost in runoff from sloping land and shallow soils. GrassGro was employed to determine the potential carrying capacity of key paddocks using local weather data, soil profile descriptions, the pasture, and sheep bloodline for "Connemara". The analysis indicated that slightly more conservative stocking (about 18 wethers/ha) was sustainable over the longer term, but 28 DSE/ha was not sustainable.

Detection of a constraint to production

Unexpectedly, simulation of a typical 'poorer' paddock (Airstrip) predicted that it was also capable of carrying a similar stocking rate to 'best' paddocks. This had never been achieved in practice. The paddock had been sown to phalaris but had relatively poor sub-clover content. Small-leaved clovers (e.g., cluster clover) were abundant. The ability of the soil to retain rainfall was not substantially different to that of 'best' paddocks. This indicated an unforeseen soil fertility problem. Subsequently, a fertiliser trial showed there was no response to phosphorus or sulphur but a large response to nitrogen. This pointed to a N-cycle problem. A 'subtractive' soil fertility trial revealed potential deficiencies of potassium, magnesium, and copper for sub-clover growth in surface soil. Soil testing also indicated a potential sulphur deficiency. A cocktail of the potentially deficient nutrients was applied to strips in various paddocks (August 2002). Assessments were made in September just before drought stopped pasture growth. On Airstrip, sub-clover growth was promoted and pasture growth rate increased from 49 to 99 kg/ha/day.

At this stage, the indications are that a number of adjacent paddocks (a landscape covering about 30% of the farm) suffer from this nutrient syndrome. There is still work to be done to formulate the fertiliser needed to address this problem, but the prospects are that productivity of the affected farm landscape will be vastly improved and many years of superphosphate investments will begin to return a profit.

References

Burbidge, G. 1996. *Proc. 11th Ann. Conf. Grassld Soc. NSW* 65–68.

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