SATELLITE IMAGERY AND PASTURE MANAGEMENT

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Soil tests have been a useful tool for agronomists and farmers in determining fertiliser requirements in grazed pastures, but spatial sampling is a limitation in their use. Satellite remote sensing has been developed to the stage where it can be a valuable tool in helping determine fertiliser programmes for grazed pasture (Reid et al. 1993). Remote sensing can be used for a snapshot of a total grazing property. Vickery and Hedges (1987) reported several methods of processing Landsat MSS (Multi Spectral Scanner) data to represent fertiliser needs as a function of pasture growth rate. Can any vigour differences under close grazing be detected by this remote sensing technique?

A 10 hectare portion of a large grazed paddock was treated with 250 kg/ha of single super-phosphate during autumn. A similar section of the same paddock was left untreated. Soil samples were taken in late winter for analysis, representing treated and untreated areas. A SPOT satellite image over the area was recorded in mid-October and then analysed using the Hedges and Vickery (1987) approach of pattern analysis to produce a range of pasture vigour classes. These were then expressed by counting the recording units or pixels (20x20 metres), and each vigour class detailed as a percentage of the total area. At the time of the satellite recording in mid-October, it was not possible to visually determine any pasture vigour or availability differences between the treated and non-treated areas. The area was close grazed with sheep and had an even cover of approximately 700 kg/ha of dry matter available.

The soil test results indicated that there was a higher soil P level where fertiliser had been applied (13 vs 23 ppm Colwell P), and the pasture vigour classes from the satellite image showed a marked difference between the treated and untreated areas. Table 1 shows the difference in the vigour classes with and without fertiliser taken from the satellite image analysis.

Table 1. Pasture vigour classes as % of paddock area from SPOT image analysis

<table>
<thead>
<tr>
<th>Vigour class</th>
<th>Unfertilised</th>
<th>Fertilised</th>
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<tbody>
<tr>
<td>Very fast</td>
<td>7.7%</td>
<td>55.2%</td>
</tr>
<tr>
<td>Medium</td>
<td>65.7%</td>
<td>44.5%</td>
</tr>
<tr>
<td>Slow</td>
<td>26.6%</td>
<td>0.3%</td>
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The higher proportion of “very fast” vigour class and the lower proportion of “slow” class in the fertilised area indicates that differences in pasture vigour on the paddock under study were being detected using this approach.

The results highlight the sensitivity of the remote sensing technique in showing treatment effects by the comparison of the tabulated and image differences in the pixel counts of the two areas of grazed pasture. The advantages of a technique for estimating the potential nutrient differences of pastures based on satellite recorded reflectance data, compared with more conventional techniques such as soil tests and fertiliser test strips, are low cost, as well as greatly increased spatial sampling for the nutrient status of the pasture. The sensitivity of the system under close grazing is a further advantage over trying-to determine comparisons by eye at times of relative feed shortage when grazing pressure is high.


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