Effect of fertilisers on pasture growth in carpet grass dominated pastures

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Abstract: *Carpet grass dominated pastures are common on phosphorus deficient soils in the Macleay Valley. While nitrogen is also commonly deficient in these pastures, the application of nitrogen fertilisers is of limited value, as it reduces the production of clover in winter and spring and only increases grass growth in summer; a period when there is already high levels of growth. In contrast to nitrogen, the use of phosphorus fertiliser increased the growth of grasses in summer and also legumes in winter and spring.*

Key Words: *pasture, carpet grass, fertiliser, clover*

Introduction

Pasture surveys in the Macleay Valley (Rose *et al* 2005) found that carpet grass was the most widespread species in hillslope pastures (93%) and formed a significant percentage of total pasture yields. This is a problem as carpet grass is a low yielding, low quality species that has little response to fertiliser. These pastures were also found to have low abundance of legumes.

Carpet grass is favoured by low fertility and frequent close defoliation, while low phosphorus fertility and often marginal aluminium limits white clover growth. The dominance of carpet grass results in low calving percentages, low weight gains and limits the types of enterprises on this country. Two trials were set up in 2005 at Collombatti (mid Macleay Valley) and Bellbrook (upper Macleay). The trials were designed to study the effect of fertiliser and rest periods on pasture growth and to determine the feasibility of providing higher yielding, quality pastures and partially fill the winter feed gap. This paper reports on the results of different fertiliser treatments for one rest interval at the Bellbrook site.

Methods

The trials were randomised complete block designs with four replicates. Lime was applied at 2 tonnes/ha at Collombatti and 1 tonne/ha at Bellbrook, except for the control plots. Fertiliser treatments consisted of single superphosphate and urea applications. Single superphosphate was applied at the start of the trial at 0 kg/ha, 250 kg/ha and 500 kg/ha. Urea was applied at 0 kg/ha, 130 kg/ha and 260 kg/ha; using 4 split application over 2 years. Combination treatments of 250 kg/ha single superphosphate plus 130 kg/ha urea; and 500 kg/ha single superphosphate plus 260 kg/ha urea were also applied. Stock were excluded from the trial and yields were measured by mowing. Rest period treatments of 4, 8, 16 and 52 weeks between cuts were applied to all fertiliser treatments. The 52 week treatment was included to simulate landholders who lock up paddocks for restoration. For simplification only the 4 week rest data is presented in this paper. Note that this method is not selective and can give different results to grazing.

Results and Discussion

Growth rates were increased by the application of fertiliser (see figure 1). Phosphorus lifted growth rates in the first summer even though white clover was absent. However, its major effect was in the second year due to winter and spring growth of clover, which has had an ongoing effect on grass growth in the second summer. The major effect of nitrogen was on grass growth over both summers, but this left a deficit over winter when grasses were frosted, and clover did not take off. So while the use of nitrogen increased the total yield, it did so mainly in summer when there is already sufficient feed. Single superphosphate on the other hand significantly improved the winter/spring feed situation. The success of this is still dependant on receiving sufficient rainfall in this period for clover germination and growth. Pasture quality would be expected to

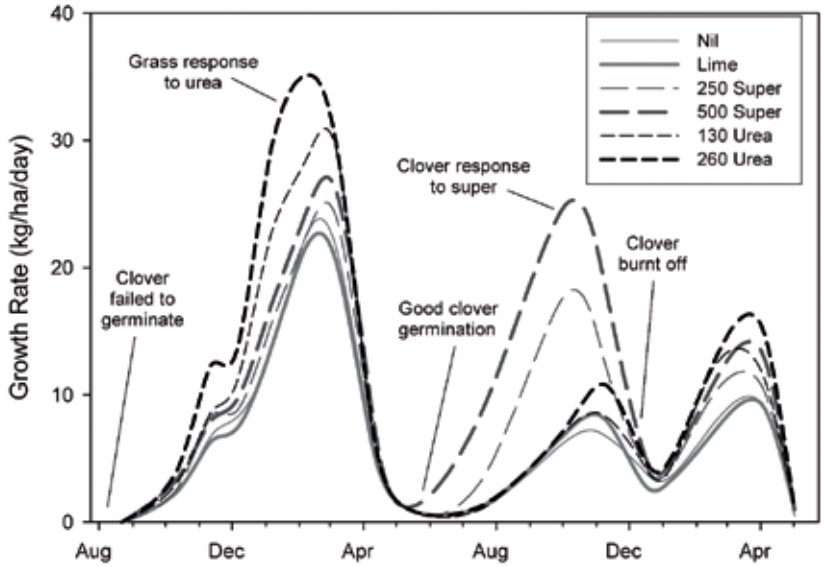

Figure 1: Effect of fertilisers on growth rates over 22 months for 4-week harvests

Table 1: Effect of fertilisers on yields and cost of extra pasture grown over 22 months for 4-week harvests. (Costed at prices current May 2009, Single superphosphate $540/t, Urea $816/t, Lime $85/t, SS=single superphosphate, U= Urea)

Fertiliser Treatment	Yield (kgDM/ha)	Cents/kgDM Extra Feed
No fertilizer	4020	
Lime	3960 – no change	
Lime + 250 SS	5324 – increase of 32%	16.9
Lime + 500 SS	6914 – increase of 72%	12.3
Lime + 130 U	5335 – increase of 33%	14.5
Lime + 260 U	6314 – increase of 57%	13.0
Lime + 250SS + 130U	5842 – increase of 45%	17.9
Lime + 500SS + 260U	7314 – increase of 82%	13.1

be higher where clover makes a contribution to the feed available, and to the nitrogen in the soil becoming available to summer grasses.

Total yield was not affected by lime alone (See table 1) while lime + 500 kg/ha single superphosphate was the most economical application. The improved yields for this treatment were due to both better grass and clover growth spread over summer and winter (see figure 1), giving a broader spread of growth and better quality. Lime + 260kg/ha urea was the next most economic treatment. However, improvements were mostly due to grass growth over summer—clover growth has been suppressed by nitrogen applications.

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References

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