Better dairy farm management increases the economic return from phosphorus

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Introduction Some 60% of New Zealand dairy farms on allophanic and sedimentary soils have soil Olsen phosphorus (P) levels to 75 mm depth above the target range for near-maximum pasture production of 20-30 µg/ml (Roberts & Morton 1999). For an economic response in milksolids (MS) production from high Olsen P, the pasture needs to be capable of high production, and the extra pasture grown be converted to milk. This paper seeks to justify this contention and outline some of the farm management practices required to achieve it.

Pasture production responses to Olsen P Results from several mowing trials at different sites and three grazing trials at one site have been used to establish the relationship between soil Olsen P and relative pasture production for allophanic soils (Figure 1). Each data point represents a P treatment from one trial site for one year. From the Flexi-fitted curve, on average, 97% of maximum pasture production occurred at an Olsen P level of 22µg/ml. There was a large degree of variability about the average curve so that for some sites, near-maximum pasture production was achieved at Olsen P less than 20 µg/ml, whereas at other sites there were still small pasture production responses above 30 µg/ml. Examination of the soil and pasture properties at each site could not clearly identify the factors that determined the differences in responsiveness of pasture production to Olsen P. However, Sinclair et al. (1997) reported that trial sites with high absolute pasture production gave lower relative production for a specific Olsen P than sites with low production. High pasture production (17.5 t DM/ha/yr) in the P responsive 1996-2000 grazing trial was achieved from a high ryegrass/clover content (67%), nitrogen (total soil N uptake 550 kg/ha) inputs and water (>192 mm rainfall/season) and adequate drainage.

Utilisation of the extra pasture grown The three P grazing trials carried out in South Taranaki demonstrated that the key farm management practices required to achieve 90% pasture utilisation and convert the 5-15% increases in pasture production above an Olsen P of 22 µg/ml to more milk were high stocking rate associated with >300 kg MS/cow, identification and conservation of pasture surpluses in spring as silage and the feeding of high quality silage to extend the lactation. A comparison between one of the trial farmlets and 65 commercial dairy farms with similar soils, Olsen P, pasture production and cow live weight is shown in Table 1. This data indicated that the average dairy farm in South Taranaki was not gaining the full financial benefit from high Olsen P because stocking rate was too low, all surplus pasture was not conserved and the lactation was too short.

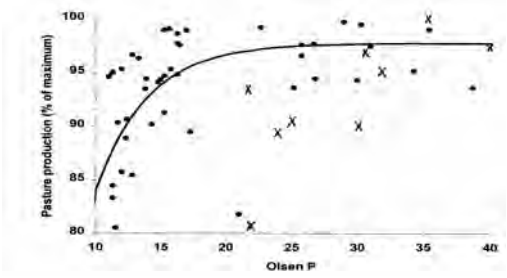

Figure 2 Effect of Olsen P on relative pasture production-average for allophanic soils (- = mowing, x = grazing).

Table 1 Comparison of trial farmlet and average for dairy farms on allophanic soils in South Taranaki (1994/95)

Parameter	Farmlet	Dairy farm
Olsen P (µg/ml)	35	37
Annual pasture (t DM/ha)	17.0	17.0
Cows/ha	3.8	3.0
Pasture intake (t DM/ha)	15.0	13.2
Conserved feed (t DM/ha)	0.83	0.48
% utilisation	90	80
Kg MS/cow	308	302
Lactation (days)	240	228
Kg MS/ha	1100	915
Economic surplus ($/ha)	2280	1700

Conclusions Management practices to help ensure profitable returns from soil P levels above the recommended target ranges include pastures with potential for high production together with sufficient cows/ha, complete conservation of surpluses and a long lactation length to utilise the extra pasture grown and convert it to milk.

References

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