

The effect of high and low rates of reactive phosphate rock or water soluble fertilisers on net returns from 2nd cross lamb production

Bruce Clements¹, Michael Keys², Martin Williams³ and Howard Sinclair⁴

NSW Agriculture, Bathurst¹ & Queanbeyan², Incitec Fertilisers, Orange³ and 'Amaroo' Newbridge⁴

A grazing demonstration was commenced in March 1995 to compare pasture production, livestock performance and the economics of high and low rates of single superphosphate (SSP), reactive phosphate rock (RPR) and a low rate of a blended product with both forms of phosphorus (Incitec Longlife). Phosphorus and sulphur applied per hectare were similar in the two high phosphorus treatments and similar (but lower) in the three low phosphate treatments.

The site is on Rex and Howard Sinclair's property near Blayney at an elevation of 1000 m. It has an average rainfall of 800 mm and the soil is naturally acidic throughout the profile. These conditions should be ideal for the use of RPR products but may be less than ideal for SSP. The paddocks were sown with white and sub clovers and a mixture of perennial ryegrass, cocksfoot and phalaris in the 60's and is typical of pastures on acidic soils in this area having reverted to natives (*Danthonia*, *Micro-laena* and *Stipa* spp.) as the dominant grass species. The soil is a brown clay loam with a cation exchange capacity (CEC) of 6.3 meq/100g and 18% aluminium. Soil pH(CaCl₂) was 4.3 to depth. Average phosphorus status was 4 mg/kg (Bray) and 14 mg/kg (Colwell) with sulphur levels also very low.

All treatments are compared against the common district practice (hereafter referred to as the control) where 125 kg/ha SSP is only applied one year in three. The initial treatments applied in November '94 were 420 kg/ha SSP (Hi SSP), 300 kg/ha RPR (Hi RPR), 140 kg/ha SSP (Lo SSP), 100 kg/ha RPR (LoRPR) and 105 kg/ha Longlife (L'Life). In years 2 and 3 the high rates were reduced to 280 kg/ha SSP and 200 kg/ha RPR while other treatments remained the same.

Initial stocking rates were 5 ewes/ha on the

control and the three low phosphorus rate paddocks and 6 ewes/ha on the two high rate paddocks. At the end of the second year stocking rates were increased to 6 ewes/ha on the three low phosphorus rate paddocks, 7.5 ewes/ha on the two high rate paddocks while the controls remained at 5/ha.

The enterprise is a traditional 2nd cross prime lamb system with shearing in November. Lambing commences 1st August with lambs weaned at 18-20 weeks in December. Paddocks are set stocked for most of the year but are spelled in winter for 6-9 weeks (depending on the year) to allow available pasture to reach 1000-1200 kg/ha for lambing. Dry autumns occurred in all years, the first two years having above average rainfall but in >97 only 545 mm fell and less than 10% of lambs reached the marketable target of 38 kg at weaning.

Results

Table 1 summarises the gross return/ha/annum from lambs and wool together with variable and fertiliser costs over the three years for the six treatments. Lambs reaching 38 kgs were valued at \$1/kg and the remainder at 854/kg. Less than 1 lamb/year achieved the target weight from the control paddock whereas, despite increased stocking rates, 10-15% achieved that weight from the three low fertiliser rate paddocks and 15-30% from the two high fertility paddocks. The high rate of SSP consistently resulted in the greatest number of lambs reaching the target weight. Wool returned 3334/kg greasy for the >95 clip, 3174/kg in >96 and 3734/kg in >97. Compared with the control, wool cut/hd averaged 10% more on any 'fertilised' paddock.

In 1995 the very high applications of fertiliser required to significantly raise the level of fertility in

Table 1: Returns and Costs (\$/ha/annum) averaged over 3 years.

Treatment	Control	Lo RPR	Hi RPR	Lo SSP	Hi SSP	L'Life
Gross Return - Lambs	113.24	139.53	202.58	136.47	215.37	161.84
Gross Return - Wool	60.10	67.37	81.91	62.31	87.76	65.57
Variable Costs/ha	55.75	59.47	72.48	59.47	72.48	59.47
Fertiliser Costs/ha	9.83	36.00	68.00	32.51	70.50	34.00
Net Return/ha	107.76	111.44	144.01	106.82	160.15	133.95

the two high rate treatments (420 kg/ha of SSP or 300 kg/ha RPR) suppressed the net return so there was little dollar benefit achieved. The superiority of the two higher fertility treatments became apparent in '96 and '97 when the application rates were dropped to 280 kg/ha SSP or 200 kg/ha RPR as shown in Fig. 1. While Longlife appeared to perform better than the equivalent rate of either SSP or RPR, property records prior to the start of the demonstration revealed this paddock consistently carried more stock/ha than the other five and this result needs to be confirmed in a different situation.

Costs of production totalled \$11.15/ewe made up of the following costs:- replacement ewes \$5.15; labour/ewe \$1; shearing \$3.20; and animal health \$1.80. These additional costs of production for the extra stock run on the various treatments over the first 3 years totalled:- Lo RPR \$90.15/ha; Hi RPR \$224.68/ha; Lo SSP \$79.15/ha; Hi SSP \$232.18/ha; and L=Life \$83.65/ha. Fertiliser costs were calculated based on SSP \$200/t (\$2.25/kg of phosphorus), Longlife \$280/t and RPR Supreme \$160/t. Spreading costs were added - low rates of SSP cost \$4.50/ha and increased to \$5 & \$5.50/ha for the higher rates. Because RPR only spreads one third as far, its spreading cost was three times that of the equivalent rate of SSP.

What has happened to the pastures and is the high stocking rate sustainable?

Clover levels on all treatments has risen from 5% in October 1994 to 35% on the most heavily stocked paddocks in October 1996 (c.f. 25% on all other treatments) and 20% in November 1997 (similar to all other treatments). Annual grasses remain stable in all paddocks at 10-15%, native grasses remain stable at about 40% but the sown perennials have increased from 15% to 30% on the 2 high fertiliser/high stocking rate paddocks compared with a slight reduction in all other paddocks.

What has happened to soil test values?

On the Hi SSP paddock soil pH (CaCl_2) has remained unchanged and phosphate levels have

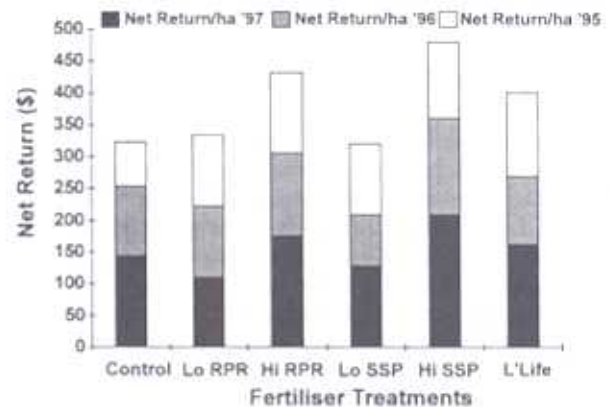


Figure 1: Net return/ha over three years for Hi and Lo rates x 3 fertiliser types.

risen from 7 to 24 mg/kg Bray (15 mg/kg is regarded as adequate for good pasture production). The low fertiliser treatments now average 9.5 mg/kg Bray phosphorus (up from 4 mg/kg). Sulphur is now adequate in all paddocks.

Conclusions

The higher rates of fertilisers have shown superior production from both pastures and stock. Perhaps the best way to evaluate the economics of the various products and treatments is to consider the % return on extra dollars invested compared with the controls. The two high rate treatments are showing 35-50% return despite the fact we are in a high cost build-up phase and the highest stocking rates were not achieved till the third year. At 7.5 ewes/ha even at these high fertiliser rates the cost of super/ewe in '97 was only \$8.13. The dry autumns and very dry conditions of >'97 did not favour the less soluble RPR products, but at the high rate this fertiliser has still resulted in increased returns.

Reference

- P.W.G.Sale (1997) 'The role of reactive phosphate rock fertilisers for pastures in Australia' *Aust. J. Exp. Agric.* 37, 845-1098