Superphosphate boosts productivity and profitability of native grass pastures in Tasmania

D.A. Friend, P.L. Dolan and A.M. Hurst

Tasmanian Institute of Agricultural Research, Kings Meadows, Tasmania.

ABSTRACT

Applying superphosphate to native grass pastures in Tasmania resulted in a mean increase in carrying capacity from 2.9 to 6.0 DSE/ha over five years on two sites where drought was not a major factor. Applying this result to a medium merino enterprise over a 10-year period, the average annual gross margin was $90/ha on fertilised compared with $54/ha on unfertilised pasture.

Key words

Native grass pasture, superphosphate, carrying capacity, gross margins analysis.

INTRODUCTION

Application of superphosphate to native grass pastures was shown to more than double pasture production in trials conducted in Tasmania (Friend *et al.*, this conference). Results of the trials showing the effect on carrying capacity of the pastures are presented in this paper, together with an economic analysis of the costs and returns.

MATERIALS AND METHODS

The trials, which were conducted at three sites in Tasmania, used paired paddocks to compare the growth, botanical composition and carrying capacity of fertilised with unfertilised native grass pasture (Friend *et al.*, this conference). The trial at Bothwell has been running for six years (1994–2000), and trials at Nile and Pawtella have been running for five years (1995–2000). Details on the pastures, the fertiliser programs and grazing management are given by Friend *et al.* (this conference).

Carrying capacity was calculated from records of stock movements onto and off the paddocks. No measurements were made of stock weights, wool weights or other wool characteristics, as several different mobs of sheep usually grazed each paddock over a year.

Using stocking rates from the trials and assumed costs and prices, gross margin analysis was applied to a medium wool enterprise (3) to compare the likely returns on fertilised and unfertilised native grass pasture over a 10-year period. Costs of animal husbandry, pasture improvement and livestock trading were based on estimates for 1999/2000, while returns from wool sales were based on a price of 650 ?/kg for 21 micron wool, which was close to the median price over the 1990s (Callum Downs Commodity News, wool reports). The fertiliser schedule used in the analyses was based on the trials: 250 kg/ha single superphosphate plus molybdenum applied in the first year, and 125 kg/ha single superphosphate applied in the second year and every third year subsequently. Oversowing of subterranean clover seed was also included as a cost in the first year.

RESULTS

Application of superphosphate increased carrying capacity from 2.5 to 6.0 DSE/ha at Nile, from 3.3 to 6.0 DSE/ha at Pawtella and from 2.8 to 3.8 DSE/ha at Bothwell. These increases reflect increases in pasture production from application of superphosphate on the three sites (Friend *et al.*, this conference). The relationship between pasture production and carrying capacity was similar at all sites. Averaged over all paddocks, sites and years the pastures supported 0.71 DSE/kg DM production.

The gross margin analyses used the mean stocking rates for Nile and Pawtella: 2.9 and 6.0 DSE/ha for unfertilised and fertilised pasture respectively. These figures are considered to reflect likely carrying capacities given normal seasons, whereas Bothwell experienced severe drought over much of the period of the trial (Friend *et al.*, this conference). The analyses (Table 1) show that although there was a negative return on the fertilised pasture in the first year, cumulative returns on the fertilised pasture exceeded those on the unfertilised pasture after three years, and averaged over 10 years were 67% higher on the fertilised pasture.

Table 1. Comparative profitability of unfertilised and fertilised native grass pasture in Tasmania based on gross margin analysis.

Cumulative returns ($/ha)

Year	Unfertilised pasture	Fertilised pasture
1	54	-9
2	108	71
3	162	182
4	216	293
5	270	373
Average gross margin per year over 10 years	54	90

DISCUSSION

These trials show that, given normal rainfall years, fertilising native grass pastures could give greatly increased economic returns compared with unfertilised pastures on a medium merino wool enterprise. Achieving these returns means utilising the increased pasture production through increased stocking rates. Stocking rates were adjusted several times each year in the trials in order to match pasture production. This may be more difficult to achieve when management of the whole farm has to be considered (4).

The estimated gross margins were based on current costs and prices. Whether these gross margins will be maintained depends on the relative price received for wool compared with the costs of animal husbandry and applying superphosphate. The analyses also assume no adverse effects on the quality of wool produced on fertilised pasture, e.g. an increase in variability of fibre diameter (Friend *et al.*, this conference). The stocking rates used in the analyses were based on those run on the trials over five years. Continuing increases in carrying capacity were achieved on farms in NSW from fertiliser programs that continued for over 20 years (1; 6). Such increases in carrying capacity would further increase returns from fertilised pasture.

Investing in pasture improvement must be considered from a whole-farm point of view, and involves considering different development options and opportunity costs of the investment (4; 5; 2). Fertilising native grass pastures represents a low-cost option compared, for example, with replacing native grass

pastures with pastures based on introduced species (2). This study has shown that applying superphosphate to existing pastures is a sound economic option for improving their productivity.

ACKNOWLEDGMENTS

We are grateful to A. Gibson, A. Phillips, S. Geard and P. Ellis for making their properties available and for their cooperation and assistance in managing the trial sites. Funding for the work was provided by the Natural Heritage Trust and Meat and Livestock Australia.

REFERENCES

1. Crofts, F. 1989. Proc. Fourth Ann. Conf. Grassl. Soc. NSW, 71−76.

2. Crosthwaite, J. 2000. Proc. 41st Ann. Conf. Grassl. Soc. Vic., 9−20.

3. Department of Primary Industries, Water and Environment, Tasmania. 1999. Livestock Enterprise Budgets: Low Rainfall Districts – Tasmania, 1999 – 2000.

4. Simpson, P. and Langford, C. 1995. In: Community Grasses Project, Workshop Proceedings, Albury 1995. (Eds A. Curtis and J. Millar). (Charles Stuart University, Johnstone Centre of Parks, Recreation and Heritage, Report No. 39). pp. 44−52.

5. Simpson, P. and Langford, C. 1996. Managing High Rainfall Native Pastures on a Whole Farm Basis. (NSW Agriculture).

6. Wyndham, E. and Wyndham, A. 1992. Proc. Seventh Ann. Conf. Grassl. Soc. NSW, 57−59.