Economic Potential of Ley Pasture Legumes for Central Western NSW

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ABSTRACT

Inclusion of annual medics with lucerne as a pasture ley for central western NSW had a substantial economic advantage over using a pure stand of lucerne in years of adequate autumn rainfall. A minor economic advantage was gained by not planting medics in years of inadequate autumn rain. The Net Present Value (NPV) was calculated for a 100 ha paddock for four management strategies, using pasture dry matter data obtained from Trangie, Dubbo and Narromine NSW. The best NPV option of the four management strategies was for wheat undersown with a mix of Sava snail medic (*Medicago scutellata*), Sephi barrel medic (*Medicago truncatulata*) and Aurora winter active lucerne (*Medicago sativa*). The evidence presented will help to reverse the decline in the number of farmers including medics with lucerne in leys in central western NSW.

KEY WORDS

Budget, net present value, economic, ley, lucerne, medic.

INTRODUCTION

Ley pastures help achieve profitable cropping and grazing systems in central western NSW by providing for higher stocking rate (11). Legume based leys improve the levels of soil nitrogen (6), improve soil structure (2) and help control disease (16). However Bellotti *et al*. (3) suggested that low levels of investment in ley pastures in low rainfall southern Australia was due to a perception by the farmers that legume leys were not cost-effective. The seasonal rainfall distribution has a major impact on medic pastures despite claims that they are hardier than lucerne and cheaper to maintain (5). The probability of rain exceeding 25mm necessary for medic establishment in each month during April and May ranges from 0.47 to 0.55 (14) at Trangie NSW. The probability of rain exceeding 25 mm in September for flower and seed set was 0.49. In turn this impacts on the value of the ley.

This paper aims to evaluate the economic potential of the grazing component of a ley in seasons of good autumn rain and poor autumn rain for central western NSW.

METHOD

The four pasture management strategies all involved undersowing Janz wheat in the establishment year.

- MS1 Aurora lucerne and Sephi barrel medic undersown during autumn (current practice).
- MS2 Aurora undersown during autumn (current practice).
- MS3 Sava snail medic and Sephi barrel medic undersown autumn with Capella glycine oversown into the crop stubble on moisture during the subsequent spring/summer.
- MS4 Aurora, Sava and Sephi medics undersown during autumn.

The analyses were simulated for a paddock located near Narromine (32?,13′ south, 148?,10′ east) in central western NSW. Cash flow budgets for each management strategy were calculated for the six pasture ley years prior to the next crop cycle, a common local practice. Lucerne, Capella and seeding rates were set at 1 kg/ha, Sephi at 2 kg/ha and crop seeding rates at 20 kg/ha. The costs of seed and inoculum per ha were MS1 $32.50; MS2 $24.58; MS3 $58.46 and MS4 $37.76. Common operational costs were $126.15/ha sourced from (12). The budgets were calculated a second time (MS1b) assuming inadequate autumn rain for medic germination.

Production estimates for lucerne and glycine (kg DM/ha) were obtained from experimental data from a nearby site at Rawsonville (32?,13′south, 148?, 35′ east)(9). An average season from October to March produced a dry matter yield for Capella of 664 kg/ha and for lucerne a yield of 1244 kg/ha. An average season from April to September produced 0 kg/ha for Capella and of 100 kg/ha for lucerne. Production estimates for Sephi were obtained from experimental data from Narromine and Sava from Tamworth (31?,07′south, 150?, 57′ east). An average season from April to September produced 500 kg DM/ha for Sephi (4) and 300 kg/ha (7). Feed was transferred from periods of high production to low production as standing paddock feed to even out the feed year and a deterioration rate of 37% (per 6 months) was applied to dry standing feed (8).

A requirement of 400 kg of dry matter per annum per dry sheep equivalent DSE for this region (10) and a utilisation of fodder in a grazing situation of 50% (A. Bell, pers. com) was assumed. Dry matter production was converted into DSE per year (Figure 1).

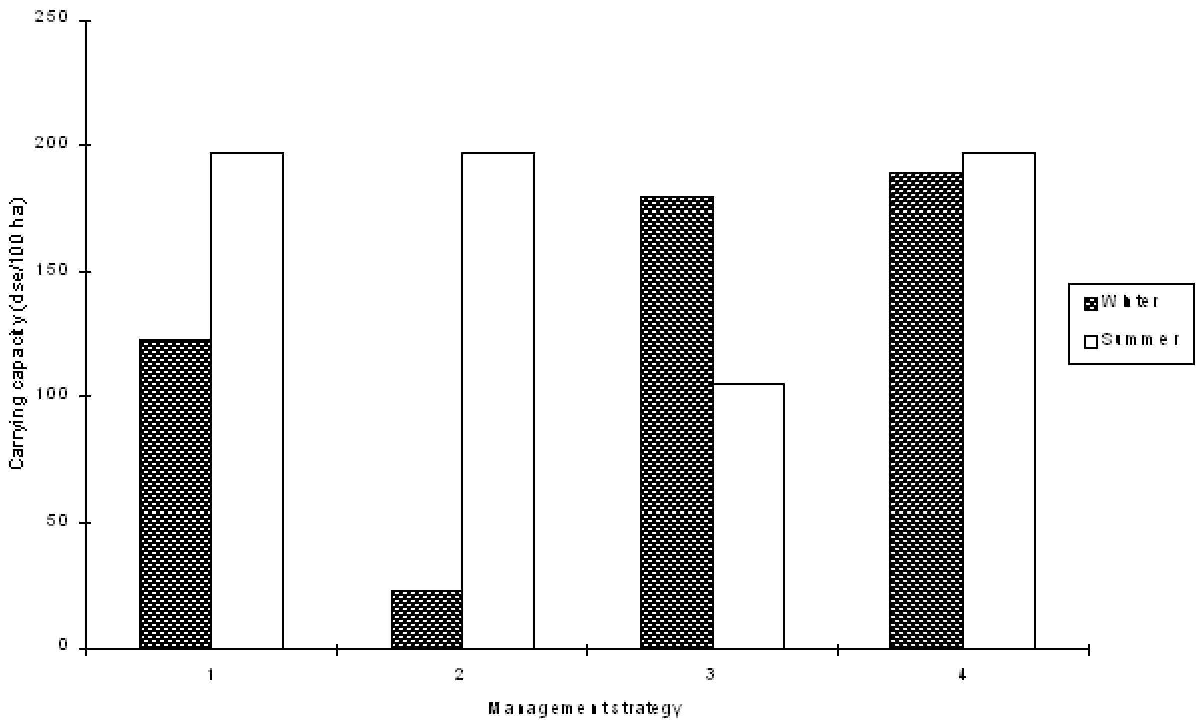

Figure 1. Carrying capacities for each management strategy for an average season at Trangie NSW

Wool produced from wethers (1wether = 1 DSE) was assumed to be 21 micron. The energy requirements of a 21 micron wether were assumed constant for the entire year (13). Income, variable costs and replacement costs per 1000 wether (15). The budgets assume an enterprise period of 6 years and a 7% per annum discount rate (1). The NPV was calculated for a 100 ha paddock for each management strategy (MS1 – MS4) (see example in Table 1) including years of poor autumn rain (MS1b –MS4b).

Table 1. Example of Calculations used to determine Net Present Value for MS1

Management strategy 1	Formulae	Years					
Aurora, Sephi		1	2	3	4	5	6
Stocking rate (dse/ha)		0	1.23	1.52	1.52	1.52	1.52
Number wethers (dse/100ha)		0	123	152	152	152	152
Costs ($/100ha)							
Sheep variable costs			$964.32	$1,191.68	$1,191.68	$1,191.68	$1,191.68
Replacement costs (wethers)			$910.00	$1,085.00	$1,085.00	$1,085.00	$1,085.00
Sowing costs	148.13 x 100	$14,813.00					
Fertiliser costs					$1,500.00		
Total costs		$14,813.00	$1,874.32	$2,276.68	$3,776.68	$2,276.68	$2,276.68
Returns ($/100ha)							
Wheat 1.6t/ha @ $74/t (net)	(1.6t/ha x$ 74) x 100	$11,840.00					
Wool sales	dse/100ha x $20.48	$0.00	$2,519.04	$3,112.96	$3,112.96	$3,112.96	$3,112.96
cfa sales	dse/100ha x 0.188% x $22	$0.00	$528.00	$638.00	$638.00	$638.00	$638.00
Total returns		$11,840.00	$3,047.04	$3,750.96	$3,750.96	$3,750.96	$3,750.96
Net income	Total returns -	-$2,973.00	$1,172.72	$1,474.28	-$25.72	$1,474.28	$1,474.28

	total costs						
Cumulative returns		-$2,973.00	-$1,800.28	-$326.00	-$351.72	$1,122.56	$2,596.84
Discount factor - 7%		1.0000	0.9346	0.8734	0.8050	0.7938	0.7350
Discount cash flow		-$2,973.00	$1,096.02	$1,287.64	-$20.70	$1,170.28	$1,083.60
Net present value		$1,643.83					

RESULTS

Comparison of the NPV figures enables a comparison of the profitability of different management strategies over the future planning period by discounting back to the present (8). Only Aurora and Sephi (MS1) and Sava, Sephi and Aurora (MS4) had positive NPVs and only in an average season, with a favourable environment for medic pastures (Figure 2). All other management strategies had negative NPVs. Using a summer productive subtropical perennial such as Capella had a cost penalty due to spring sowing requirements. Financial losses occurred for Aurora and Sephi (MS1b) and Sava, Sephi and Aurora (MS4b) when established in poor medic years. The return in a favourable medic year was much greater than the loss in an unfavourable medic year. Aurora lucerne (MS2) planted as a pure stand had a risk management component as there was less cost incurred when seasons were unfavourable for medic establishment.

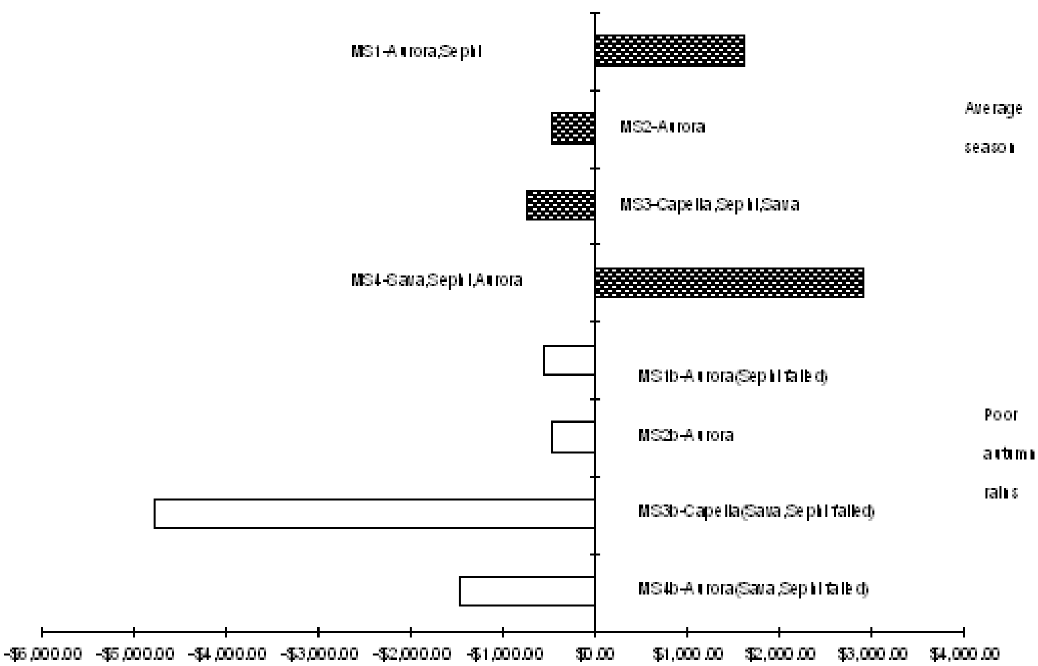

Figure 2. Net present value of each management strategy

DISCUSSION

Undersowing wheat with a combination of Sava and Sephi medics and lucerne was the best option for NPV of the four management strategies investigated in an average season. The reduction in NPV caused by a poor medic season is an acceptable risk. The next most profitable option was the Aurora and Sephi mix, which at present is the commercial practice in the region.

Benefits to subsequent crops, such as higher levels of available N, would add to the profitability of each scenario. This was not included in this paper due to limited data. Subtropical pasture legumes had negative NPV due to high projected seed costs and a spring sowing requirement with its additional cost (9). The importance of a medic in the ley is high when NPVs are compared in an average season favourable to medic growth.

REFERENCES

1. Bannister, P., and Milavec, T. 1997. ‘Policy and Guidelines Paper.’ pp. 3-4. (Office of Financial Management, NSW Treasury: Sydney.)

2. Bellotti, B.1990. In: Pastures for the North-West plains, fourth edition. (Eds E. Roberts and W. McDonald.) pp 22-26. (New South Wales Agriculture and Fisheries: Tamworth.)

3. Bellotti, W.D., Butler, J.H., Grace, P.R., Hignett. C.T., Little, D.L., Moore, A.D., and Reeves, T.G. 1995. *Aust. J. Exp. Agric.* **35,** 1060.

4. Bowman, A.M., Chan. K.Y., Kelly, P., Smith, W., Lukins, P and Hertel, K. 1996. Final report for GRDC project DAN 157SR.

5. Clarkson, N.M.1978. *Tropical Grasslands* **12,** 214-215.

6. Dalal, R.C., Strong, W.M., Weston, E. J., Cahill, M.J., Cooper, J.E., Lehane, K.J., King, A.J., and Gaffney, J. 1994. 15th International Congress of Soil Science’ Acapulco, Mexico, pp. 64-74.

7. Holford, I.C.R., Schweitzer, B.E., and Crocker, G.J. 1998. *Aust. J. Soil Res.* **36,** 57-72.

8. Makeham, J.P., and Malcolm, L. R. 1993. The farming game.’ (Rowprint Services: Victoria, Australia.)

9. M^{c}Intosh, G.T., 2000, M. Rur. Sci thesis, University of New England, pp. 78-96.

10. Mullen, C.L. 1999. ‘Pasture guide for the Dubbo, Gilgandra and Narrromine (east) districts’. pp. 15-25. (New South Wales Agriculture: Dubbo.)

11. O’Brien, G. 1997. Economic returns from pasture development. *12th Annual Conference of the Grassland Society of New South Wales*. Dubbo, p 112.

12. Patton, D., and Mullen, C. 1999. In: Farm budget handbook, central NSW, winter crops’. pp 39-44. (NSW Agriculture: Dubbo.

13. Rickards, P.A., and Passmore, A.L. (1977). ‘Planning for profit in livestock grazing systems.’ (Agricultural Business Research Institute, University of New England: Armidale, Australia.)

14. Smith, W., and Cooper, J. (1996). ‘Meteorological Data, Agricultural Research Centre, Trangie’. (NSW Agriculture: Trangie.)

15. Webster, S. (1998). ‘Farm budget handbook 1998 NSW, wool and sheepmeat budgets’. pp. 20-21. (NSW Agriculture: Orange, NSW.)

16. Weston, E., Dalal, R., Strong, W., and Lehane, J.1997. 12th Annual Conference of the Grassland Society of New South Wales'. Dubbo, pp. 11-17.