Assessing management options for the autumn feed deficit

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Abstract. *In temperate Australia, peak pasture production commonly occurs in spring, with minimal growth during autumn. For grazing systems, this inter-seasonal variation in pasture availability can lead to significant feed deficits in autumn and winter, with substantial and costly supplementary feeding often required. We used the decision support tool GrassGro® to assess a number of management options for reducing the autumn/winter feed deficit for a simulated crossbred ewe enterprise at Wagga Wagga, New South Wales. The management options examined included reducing the stocking rate, increasing soil fertility, changing the time of lambing and changing the pasture composition. Sowing phalaris into the annual pasture had the greatest effect on reducing the amount of feed supplement required and increasing the mean annual gross margin (from $75/ha to $149/ha). Increasing the soil fertility was also effective at reducing the feed deficit and increasing the mean annual gross margin. Both reducing the stocking rate and changing the time of lambing decreased the amount of supplementary feed required, but they also reduced gross margins, largely through lower income from lamb sales.*

Introduction

Variation in pasture availability is one of the most important issues facing grazing enterprises. A typical trend in temperate Australia is for a peak of pasture production in spring and low pasture availability in autumn/winter. Feed deficits due to within-year variation in pasture availability may be readily addressed by management actions. Here we applied the computer based decision support tool GrassGro® to compare the relative benefits of four management options for reducing the autumn/winter feed deficit: 1) reduce stocking rate, 2) increase soil fertility, 3) change lambing time, and 4) modify the pasture composition. The analysis was based on a simulated crossbred ewe enterprise at Wagga Wagga, New South Wales (NSW), which regularly requires substantial supplementary feed during autumn/winter. GrassGro® models the whole grazing system (soil–pasture–animal), and allows a broad range of management options to be compared quickly and easily for a grazing enterprise (Moore *et al.* 1997).

Methods

We ran GrassGro® simulations using historical weather data (1950–2007) for Wagga Wagga, NSW. Mean annual precipitation over this period was 575 mm and the soil represented in the simulations was a moderately fertile clay-loam over a medium-clay. For the 'business as usual' farm system, the simulated pasture was composed of annual ryegrass (*Lolium rigidum*) and subterranean clover (*Trifolium subterraneum*) grazed by a Border Leicester x Merino ewe flock at a stocking rate of 6 ewes/ha. Lambing occurred on 21 July, with lambs sold either when they reached 45 kg or otherwise by 10 December. If the condition score of the thinnest animal fell below 2, stock in that age-class were fed a supplement of whole wheat.

To assess the effects of changes in management decisions, we applied the four management options individually and then ran the simulation over the period 1950–2007. For management option 1, the stocking rate was reduced to 5 ewes/ha. For management option 2, we increased the soil fertility scalar from 0.8 to 0.9 (approximately equivalent to changing fertiliser application from 108 to 130 kg superphosphate/ha/yr). For management option 3, lambs were born and sold one month later (lambing 21 August). For management option 4, we retained annual ryegrass and subterranean clover populations and added phalaris (*Phalaris aquatica*). Net present values (using a tax rate of 30% and a discount rate of 4%) were calculated over 25 years. The following costs were assumed: sowing phalaris $230/ha repaid over 5 years, ewes $74/head, superphosphate $460/tonne, whole wheat $195/tonne, lamb prices 280 to 350 c/kg dressed (dependent on lamb weight).

Results and discussion

Significant supplementary feeding costs were associated with the original farm system examined ('business as usual') (Table 1). Of all the management options assessed, changing the pasture composition to one based on phalaris had the greatest effect of reducing supplementary feeding costs and increasing gross margins. Increasing soil fertility also reduced supplementary feeding costs and increased gross margins. Although lower stocking rate and later

Table 1. Long term mean annual production values for each management option.

Management Option	Pasture growth (t/ha/yr)	Pasture utilisation rate (%)	Supplementary feed costs ($/ha)	Gross margin ($/ha)	Net present value over 25 yrs ($/ha)
Business as usual	6.65	45	122	75	858
Reduce stocking rate	6.72	38	90	72	905
Increase soil fertility	7.57	42	99	103	1,168
Change lambing time	6.53	44	115	28	320
Change pasture species	6.60	51	74	155	1,409

lambing time were effective in reducing supplementary feeding costs, they resulted in lower gross margins than the 'business as usual' simulation, largely due to lower income from lamb sales. Net present values (NPV) over 25 years largely reflected gross margins, with the exception of reduced stocking rates, which had greater NPV than 'business as usual' due to income from the sale of stock.

Conclusions

Here we have demonstrated how the GrassGro® decision support tool can provide important information on the potential consequences of management decisions when addressing key grazing issues, such as autumn/winter feed deficits. Changing more than one management factor at a time may further reduce supplementary feeding costs and increase profitability.

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References

Moore AD, Donnelly JR, Freer M (1997) GRAZPLAN: Decision support systems for Australian grazing enterprises. III. Pasture growth and soil moisture submodels and the GrassGro DSS. *Agricultural Systems* **55**, 535–582.