A Farmer-Based Decision Support System for Managing Pasture Quality on Hill Country

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Introduction Despite considerable effort to promote formal feed budgeting in New Zealand, survey data suggests it is only adopted by 20% of farmers (Nuthall & Bishop-Hurley, 1999). Recent work (Gray *et al*., 2003) has identified that farmers may use a different approach - micro-budgeting - to manage feed. Rather than operate at a whole farm level, micro-budgeting focuses at the paddock level. This paper describes micro-budgeting as used by a high performing hill country sheep and cattle farmer to manage pasture quality over spring and a decision support model developed to help other farmers undertake this process.

Farmer practice During spring, the farmer identifies separate sheep and cattle blocks. Different areas of the sheep block are allocated to mixed-age and two-tooth ewes, separated into triplet-, twin- and single-bearing ewe blocks, and a hogget block containing dry and lambing hogget areas. The cattle block is separated into rising one-year (R1) and rising two-year (R2) areas. The sheep are set-stocked from Sept. to early Jan. and the cattle are grazed on a 12-15 d rotation within each block. The farmer monitors pasture cover in each paddock fortnightly. Feed demand for the next two weeks is compared with forecasts of pasture growth for each paddock, and stock numbers adjusted to match feed demand with supply. The aim is for sward height on the sheep and cattle blocks to not exceed 1200 kg DM/ha and 1500 kg DM/ha respectively, thereby maintaining pasture quality and minimising within- and between-block variation. Options include shifting stock from areas with a feed deficit to those with a feed surplus; buying additional cattle for paddocks with a surplus; increasing stocking rate; and freeing up areas for additional stock, a forage crop or production of grass silage.

Decision support system A decision support system has been developed on an Excel spreadsheet (Table 1). Paddock number and area are entered in columns 1-2. The stock class is identified in columns 3-5, by age, birth rank and lambing date, and stock numbers in column 6. Feed demand per head is calculated from notional live weight, docking percentage and mean lambing date for each stock class (column 7). Per hectare demand in each paddock (column 8) is calculated from the number of grazing stock multiplied by feed demand (kg DM/head) divided by the paddock area (ha). Estimated pasture growth rates (PGR) are entered in column 9, and pasture cover at the start of the period in column 10. Final pasture cover is calculated (column 11) and compared with the target covers entered in column 12. The paddock area or stock numbers required to meet target cover are calculated in columns 13-14. This information is used to decide if an area can be freed for other stock, or if additional stock can be shifted from paddocks that are short of feed into paddocks with a surplus. Columns 15-16 provide an estimate of the stock numbers to be added to or removed from each paddock to ensure target pasture cover levels are reached. In this example, additional single-bearing ewes or R1 cattle may be placed in paddocks in this block. The cattle may come from the cattle block, if it is short of feed, or they may be purchased.

Table 1 A decision support system for managing pasture quality on hill country

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
						Intake		PGR	Pasture cover					Extra stock	
Paddock		Stock				kg DM		kg DM	kg DM/ha			Required		Ewes	Cattle
No.	ha	Class			No.	/head	/ha	/ha per d	Start	Final	Target	ha	No.	S	R1
1	5.0	MA	S	E	53	2.57	27.2	31.0	1170	1223	1200	4.72	56	3	1
2	4.5	MA	S	E	60	2.57	34.3	31.0	1230	1184	1200	4.65	58	-2	-1
3	5.2	MA	S	E	70	2.57	34.6	31.0	1250	1200	1200	5.20	70	0	0

Conclusions This decision support system for feed management is modelled on the practice of an expert farmer. The approach is quite different from the methods normally advocated by extension agents, but may prove more attractive for use on farm. This work suggests that the development of effective decision support systems for farmers requires an in-depth understanding of how they currently manage their feed.

References

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