CSIRO

GrassGro e-news

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Intense rotational grazing: is it worth the investment?

On large paddocks, grazing pressure can be unevenly distributed, resulting in areas that are either under- or over-utilised. Subdivision of a large paddock into smaller paddocks can allow for greater control of grazing and may increase pasture production by avoiding under- or over-grazing. However, the costs associated with subdividing a paddock can be high, and the benefits need to be substantial to justify such a management decision.

We examined the potential benefits of subdividing a large (200 ha) paddock and implementing intense rotational grazing for a Merino ewe enterprise on *St Enochs*, a property near Skipton (SW VIC) (Fig. 1).

Figure 1. Merino ewes grazing a large paddock on a stoney rise at *St Enochs*, Skipton (VIC).

Pastures were dominated by wallaby grass, with some annuals (legumes and grasses) also present. We used a 'Farm System Choice' analysis in GrassGro to assess the effects of subdividing the 200 ha paddock into 2, 4, 6, 8, or 10 smaller paddocks. For each level of paddock subdivision, we applied a fixed time grazing rotation of either 1, 2, 3, 4, or 5 days. We compared these rotational systems to the current situation where the large paddock is set stocked at 8 ewes/ha.

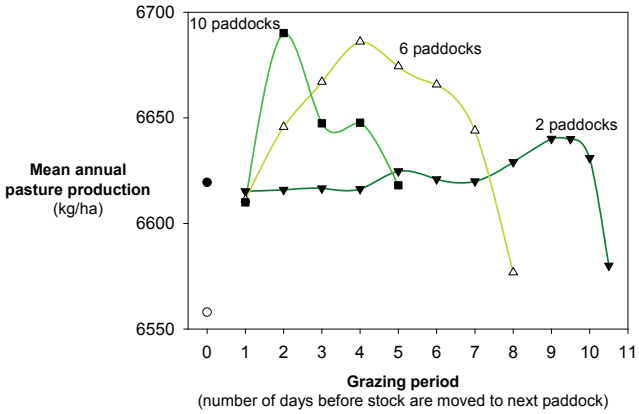

Figure 2. Mean annual pasture production as grazing period increases for: single paddock with uneven grazing (○); single paddock with even grazing (●); two paddocks (▼); six paddocks (Δ); ten paddocks (■).

GrassGro assumes spatially homogenous grazing intensity, so we also assessed the current set stocked paddock under an uneven grazing pressure, where a third of the paddock is over-grazed (by 30%) and a third is under-grazed (by 30%).

The single 200 ha paddock with uneven grazing pressure had slightly lower productivity and lower annual gross margins than when grazing pressure was assumed to be even (Fig. 2, Table 1). Subdividing the 200 ha paddock and implementing intense rotational grazing had only modest effects on average annual pasture production (Fig. 2). The greatest pasture production and highest average annual gross margins were achieved by the ten paddock system with a fixed grazing period of 2 days per paddock (Fig. 2, Table 1). Although intense grazing rotations on the ten paddock system produced only a limited increase in annual pasture production, the annual gross margins for this system were substantially higher than for the single paddock system (both even and un-even grazing) (Table 1).

Table 1. Mean gross margins for each level of paddock subdivision with net present values (NPV) over either 10 or 15 years where fencing costs either $1,500 or $2,500/km.

	1 paddock (uneven)	1 paddock (even)	2 paddocks	4 paddocks	6 paddocks	8 paddocks	10 paddocks
Mean annual gross margin ($/ha)	198	208	211	213	215	220	225
Fencing at $1,500/km							
NPV over 10 years ($/ha)	1252	1316	1319	1312	1317	1340	1356
NPV over 15 years ($/ha)	1660	1745	1754	1751	1761	1795	1820
Fencing at $2,500/km							
NPV over 10 years ($/ha)	1252	1316	1314	1296	1295	1312	1323
NPV over 15 years ($/ha)	1660	1745	1748	1734	1739	1767	1787

Higher gross margins from systems with many paddocks and short grazing period were achieved largely through greater income from lamb sales. Lambs were heavier on the systems with many paddocks and intense rotations as a consequence of greater pasture production (Fig. 2) and higher clover content (Fig. 3). Changing from a single 200 ha paddock to ten smaller paddocks with a 2 day grazing period more than doubled the clover content of the pastures (6.7% to 16.5%) (Fig. 3).

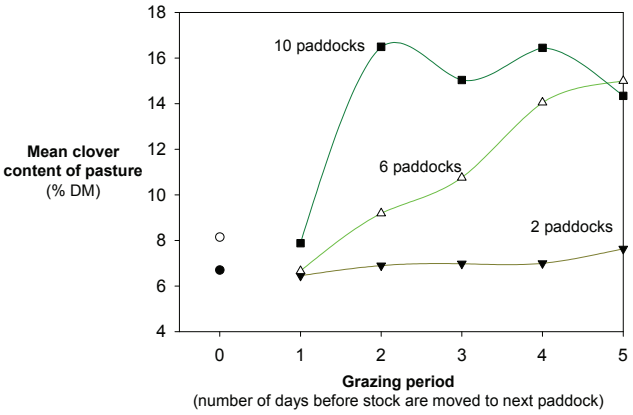

Figure 3. Mean clover content of the pasture as grazing period increases for: single paddock with uneven grazing (○); single paddock with even grazing (●); two paddocks (▼); six paddocks (Δ); ten paddocks (■).

The increase in clover content as the number of paddocks increased goes against results from a number of grazing trials which have observed that intense rotational grazing tends to favour grasses over legumes. However, the low proportion of sub-clover in the original (single paddock) pasture suggests that intense rotational grazing across many paddocks may reduce the dominance of wallaby grass in this system. Hence, intense rotational grazing may reduce the potential for a pasture to be dominated by one species, regardless of its identity.

We assessed the trade-off between productivity gains from subdividing the large paddock and the significant financial investment in implementing such a change (e.g. fencing, water points) by determining net present values (NPV) for each scenario using a discounted cash flow analysis. We assumed: paddock size of 1 x 2 km; two alternate fencing costs ($1,500 and $2,500/km), water troughs at $350 each; water piping at $750/km; interest rate of 9.5% (5 year loan); tax rate of 30%; discount rate of 4%. Possible changes in labour were not costed. For each level of paddock subdivision, we applied the grazing period which generated the maximum mean annual gross margin, and applied only the mean values in the discounted cash flow analysis (available here).

The discounted cash flow analysis indicated that the profitability in switching to an intense rotational grazing system depends on the cost of fencing used to subdivide the large paddock, and the time scale over which the return on investment is considered.

For all scenarios we assessed, the ten paddock system had the highest NPV, while the single paddock with uneven grazing consistently had the lowest NPV (Table 1). Subdividing into less than eight paddocks was only a good investment when it was considered over a longer time frame (15 rather than 10 years). The cost of fencing was also very important in determining the profitability of subdividing the large paddock, with a small number of subdivisions (<8 paddocks) only profitable when fencing is cheap ($1,500/km) and when considered over a longer time frame (Table 1). If current grazing on the single large paddock is spatially uneven, any level of paddock subdivision which results in more even grazing is likely to increase the long term profitability of the Merino ewe enterprise considered (Table 1).

GrassGro is limited in this analysis by having a maximum number of ten paddocks, and in not simulating key soil processes, such as nutrient cycling or erosion. The effects of an intense rotational grazing system on productivity may be different if it significantly influences these key soil processes. It is also possible that greater financial returns could be achieved by increasing the stocking rate to take advantage of the increase in pasture production under the intense rotational grazing systems.

Conclusion

This analysis suggests there may be modest benefits in subdividing the large paddock at *St Enochs* and implementing intense rotational grazing, especially if the current grazing pressure is uneven.

Intense rotational grazing on the highest level of subdivision considered produced the highest pasture production, mean annual gross margins and NPV's.

The benefits of subdivision and rotational grazing seen here rely heavily on an increase in clover content of the pasture. If the simulated increase in clover content does not occur, subdivision plus intense rotational grazing is unlikely to be a profitable management option, as income would not be adequate to cover the significant investment costs.

stone fence at *St Enochs*