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SUBDIVISION: BENEFITS AND COSTS

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Abstract

Subdivision is one of the widest used and least researched inputs on livestock farms in New Zealand. Benefits accruing from subdivision in the pasture development stages can be high, however once pastures are developed gains from additional levels may be small. Costs of subdivision have been calculated and are influenced by the size of the property, the number of paddocks and the type of fencing chosen.

Keywords: subdivision, pasture development, fencing costs

INTRODUCTION

Subdivision is one of the widest used and least researched inputs into farming, However, like any other input, the costs must be weighed against the benefits to obtain a measure of the most economic level of use. In this paper an attempt will be made to define the costs and benefits accruing from additional subdivision on sheep and beef farms.

Benefits Arising From Subdivision

Veiy little research has been carried out that allows a direct measurement of the benefits of subdivision. The benefits from internal subdivision can be classed as firstly those that improve the pasture to animal conversion process, (improve pasture utilisation, allow optimum spells from grazing and allow animal requirements and feeding priorities to be met), secondly those that protect property (avoid danger areas or protect shelterbelts, gardens etc.), thirdly those that minimise labour (simpler and faster mustering) and fourthly the benefits of aiding management decisions (smaller areas for feed budgeting and prevention of weed invasion).

Suckling (1975) at Te Awa made estimates of the benefits to be gained from different levels of development (Table 1).

TABLE 1: Estimates of Carrying Capacity Associated With Different Levels of Development.

	Level of development	'Estimated' carrying capacity (s.u. per hectare)
	Unimproved grassland	3.7
plus	subdividing sunny from shady faces	7.4
plus	pasture improvement and low fertiliser	13.6
plus	high fertiliser for two years	17.3

Grazing System (or Subdivision) Comparisons

Sheath (1981) reported a trial carried out at Whatawhata comparing different grazing durations with different ratios of easy/steep land. He observed that as grazing durations decreased, the manager was able to exert an increasing amount of control on the allocation and utilisation of pasture; and more equitable grazing between preferred easy and rejected steep land zones was achieved.

Alien (1984) at Tara Hills studied three systems of stocking on improved tussock country for summer grazing of Merino hoggets. Continuous grazing, a two paddock rotation and a six paddock rotation were compared, under three stocking rates.

Results measured on LWG and wool weights indicate maximum production was obtained at the medium stocking rate when run under the two paddock rotation system. The gain was largely due to improved intertussock utilisation.

Many other trials have been set up to compare set stocking or rotational grazing (e.g. Radcliffe, 1973, at Tongoio and Waerenga-o-kuri; Clarke et ***al.*** 1982, at Ballantrae; Sharrow and Krueger, 1979, in Oregon), or comparing different lengths of rotation (e.g. Campbell 1969, Hayman 1981, Bartholemew et al. 1981; and G.D. Miller 1971). All these trials infer a comparison of different levels of subdivision. Because of difficulties in trial design they are often simplified to one stock type, breeding ewes, lambs, or beef steers alone, and usually have relatively small numbers of paddocks in each treatment, quite typically 4-8. Any gains in response to more intensive management are usually small, at stocking rates well above those accepted as practical by farmers, and probably uneconomic when considered on a whole farm basis. Those trials that do show worthwhile responses do not suggest large numbers of paddocks are necessary for high levels of animal production.

Farm survey data can be used to assess subdivision effects. Fitzharris and Wright (1984) have reported a survey carried out in the Gisborne hill country area over several years. Levels of production and profit were associated largely with stocking rate but also in some years with numbers of paddocks, fertiliser levels, sheep:cattle ratios and stock management. (Note: "Being associated with" does **not** mean a "cause and effect relationship".)

Forty one farms were in the study for at least five years, and trends over time showed that those with increasing lamb and wool output per ha tended to have increasing stocking rates, while farms with improving profitability over time tended to have a greater proportion of cattle. No other significant associations showed up.

The Meat and Wool Board economic service in their annual collection of statistics has, since 1981, recorded the number of paddocks per farm. Analysis of this data is awaited with interest to see whether or not the relationships shown in the Gisborne study hold on a national or farm type basis.

One of the problems of this type of study is that in averaging the data much interesting and valuable information may be lost. For example in Fitzharris and Wright (1984, Fig. 1) one of the farms that should be looked at closely was running over 12 su/ha, with less than 20 paddocks and yet had as high production as other farms at similar levels of stocking with over 30 paddocks. The management skills of this farmer may have been good enough without high levels of subdivision.

Management Advantages

Many of the studies although reporting minor changes in pasture or animal production accruing from changes in subdivision have commented on the benefits accruing to management. For example, Sharrow and Krueger (1979) state that "flexibility available under rotational grazing is important . . "; MacLusky and Morris (1964) comment "the benefits of rotational grazing may not be so much in terms of herbage yields as in control of its utilisation". Campling (1975) notes that it is "also easier to assess the quantity and quality of herbage available within the rotational system, and the cost of extra fencing and water reticulation was small".

I believe it is in this last mentioned area that subdivision plays it greatest role. Subdivision is an aid to management, if adequate it will allow farmers to ration and allocate feed to priority stock, it will allow early recognition of feed surpluses and deficits, and may improve utilisation of pastures. Like other inputs subdivision suffers from diminishing returns. On many hill country properties maximum gains will probably be obtained at about 4-5 paddocks for each different group of animals. So for a hill country property with ewes, hoggets, cows and replacement heifers — 16-20 paddocks should give most of the advantages possible from increasing levels of

subdivision. The more complex the farm the more subdivision required.

McMeekan (1961) also mentioned diminishing returns related to intensity of grazing systems, he said "even extreme differences in grazing methods are associated with relatively small effects on efficiency stocking rate is still the most powerful weapon influencing effiency on a per acre basis".

Subdivision Costs

The benefits must be weighed up against the costs of subdivision. Fencing is only one of the costs of permanent subdivision — additional tracking and water supplies may also be required on many properties.

As fencing becomes more intensive, additional time is required for maintenance, additional capital is tied up in this relatively fixed asset, and additional costs are incurred — depreciation, interest and maintenance materials.

Costs of subdivision will vary with —

1. Size of farm
2. Number of paddocks and other requirements water, tracking etc.
3. Type of fencing

Size of Farm

As a generalisation the larger the farm the lower the length of fence per hectare required to give a certain number of paddocks (Table 2). Therefore on the **same class** of country where initial stocking rates and benefits of subdivision are expected to be similar, larger farms could justify having a greater number of paddocks.

Forty metres of fence per hectare would give more than 32 paddocks on a 1000 hectare farm, under 16 paddocks on a 360 hectare farm and about 3 paddocks on a 64 hectare farm.

TABLE 2: Metres Per Hectare of Fencing For A Given Number of Paddocks.

	Size of farm		
No. of paddocks	**1024 ha**	**360 ha**	**64 ha**
8	19	32	75
16	25	42	100
32	37	63	150
64	50	84	200

Number of Paddocks and Other Requirements

Obviously the more paddocks the greater the amount of fencing, gates and troughs also required (Table 3).

TABLE 3: $ Capital Cost of Fencing and Troughs ($5.30/m Fence and $100 per Trough) at New Price. ($ per Hectare).

	Size of farm		
No. of paddocks	**1024 ha**	**360 ha**	**64 ha**
8	101	170	404
16	133	225	542
32	198	338	820
64	268	454	1110

Type of Fencing

Table 3 was calculated for a seven wire post and batten fence with a construction and material cost of about $5,300/km. Using a four wire insultimber electric fence, the cost can be brought down to about $1,200/km. Considerable savings can be made in capital and annual costs if lighter internal fences are used (Table 4). Obviously farms do not have to use just one type of fence -however there are opportunities to reduce the capital and annual costs associated with extra subdivision by using more modern fencing materials (Table 5).

TABLE 4: $ Capital Cost of Fencing On A 360 ha Property Using Conventional or Insultimber Fences ($ per Hectare)

No. of paddocks	Conventional $5.30/m	Insultimber $1.20/m
8	170	83
16	225	93
32	338	119
64	454	144

TABLE 5: Annual Costs per Hectare ($) Of The Fences Shown In Table 4.

Fence Type		$/hectare/year No. of paddocks			
		8	16	32	64
Conventional (40 yr life)					
Deprec.	2.5%)				
Int.	20%) 27.5%	47	62	93	125
Rep. & Maint.	5%)				
Modern (20 yr life)					
Deprec.	5%)				
Int.	20%) 30%	25	28	36	43
Rep. & Maint.	5%)				

Alternatives to Subdivision

Some of the supposed advantages of increased subdivision can be gained without cost-by following the system of Smith and Dawson (1977). They described a successful on-farm grazing package using only 16 paddocks. The gains arose from reducing the number of mobs by combining groups of animals that had similar nutritional requirements. Malcolm Smith now, like many advisers I've spoken to, believes that on farms at stocking rates close to potential, closer subdivision allows more "accurate" and for the average farmer an easier assessment and rationing of feed and hence better output.

Close subdivision therefore is a management aid only, not a necessity on all farms. Remember that on hard hill country at Te Awa 20 years ago, Suckling was running over 17 ewes per hectare using set stocking and minimal subdivision, a level of production still not achieved on many hill country properties today.

CONCLUSIONS

This review brings out several points about subdivision.

1. Subdivision is an input into the total farm. Diminishing returns rules apply and if other management skills are good, probably at relatively low levels (maybe as low as 4-5 paddocks per major stock group).

2. Subdivision will allow better utilisation of pasture grown if land with contrasting pasture growth rates and types can be kept separate, i.e. sunny from shady, easy from steep, developed from undeveloped.
3. The major benefit from increased subdivision may be to improve the accuracy of management decision but in many cases this improvement will be small. Alternatives to subdivision, such as amalgamating mobs, should be considered closely before capital is invested in permanent subdivision.
4. Lightweight modern fences offer one means of reducing both capital and maintenance expenditure in subdivision.
5. Fencing costs are relatively less on large compared to small properties, i.e. to provide the same level of subdivision.
6. Research is needed to assess the true value of subdivision on hill country, "When are gains from subdivision at a maximum?"

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