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THE ESTABLISHMENT OF NEW PASTURES ON A WAIKATO DAIRY FARM

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INTRODUCTION

In 1984, after a 3-year period of sharemilking near Morrinsville, my wife and I purchased a 38 ha dairy farm near Tatuanui. The property was subdivided into 31 paddocks and the soils were a mixture of Waitoa, Waihau and Te Pungina loams.

The farm had been producing near the district average of around 500 kg milkfat (MF)/ha which seemed to be about the maximum production level for the existing pastures.

The new farm pastures (like those on the property where I had been sharemilking), contained a high proportion of paspalum (*Paspalum dilatatum* Poir) and the content of this species was thought to be contributing to winter and early-spring management problems on each farm.

The decision to renew existing pastures was made for the following reasons:

(1) The inability to winter more than 3 cows per ha, without substantial off-farm grazing, or the purchase of costly supplementary feed on the older pastures,
(2) The desire to alter the seasonal pasture growth curve to more closely match a stocking rate of 3.7-4.0 cows/ha, producing 200-210 kg MF/cow without supplements.
(3) To enable us to attain a production target of 800 kg MF/ha *profitably.*

The philosophy behind our decision to renew the old pastures on the new property is best illustrated in Fig. 1. The graph shows the average growth rates observed on new pastures compared with those on the old, and contrasts these growth rates with our expected daily DM cow requirements.

PASTURE RENEWAL METHODS

The following methods of pasture renewal have been tried together with various pasture species and mixes (Table 1).

(1) Paddocks assessed to contain 30% or more of paspalum in the autumn were sprayed with glyphosate in the spring and direct-drilled into greenfeed maize. New grass was then direct-drilled into autumn maize stubble.
(2) Paddocks containing less than 30% paspalum but more than 10% were sprayed with glyphosate in the autumn and then direct-drilled.
(3) Pastures with less than 10% paspalum had new grass direct-drilled in the autumn, without any spray application, or
(4) These pastures had seed broadcast (oversown), followed by harrowing, also in the autumn.

Cultivar choice

The ability or potential to produce more dry matter (DM) than existing pasture species has been the deciding criterion in cultivar choice. Information on cultivars and their management was obtained from various industry sources.

Ellett perenial ryegrass has been the most widely sown pasture cultivar on the farm together with Grasslands Pitau white clover. Ellett was the recommended cultivar because of its high endophyte content which seemed to improve plant persistency. Since 1986, Concord annual ryegrass has been tried, along with sowing of Grasslands Matua prairie grass and

Grasslands Pawera red clover (Table 1). Concord was recommended for its high winter and early spring production and reputed ability to survive beyond the first summer. The mixture of Matua and Pawera was sown to produce additional high quality DM, especially over the late summer portion of the lactation period (Goold 1984).

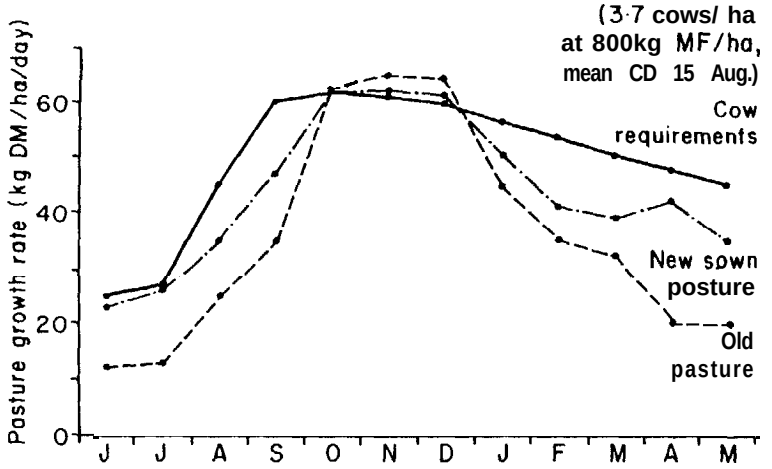

Figure 1: Growth rate of old and new pastures compared with cow requirements.

Table 1: Pasture renewal programme.

Year	Area (ha)	Cultivar (sowing rate kg/ha)	Method
1965	5	Ellett (18)/Pitau (3)	1
1966	13	Ellett (6)/Concord (4)	183
1966	7	Ellett (5)	4
1986	1.4	Matua (25)/Pawera (3)/Pitau (3)	2
1967	16	Ellett (8)	3
1967	7	Concord (6)	3
1967	2.4	Matua (25)/Pawera (3)/Pitau (3)	1

Management of new sown pastures

In every instance, establishment of the new grass sowings was observed to be successful. The only fertiliser applied in addition to normal farm maintenance occurred in 1986-87 when the new grass sowings received an autumn application of diammonium-phosphate (DAP) at the rate of 150 kg/ha. No maintenance fertiliser was applied to the farm in the 1986-87 year. Maintenance fertiliser has been 400-500 kg/ha of 30% potassic superphosphate, with a third of the farm receiving an additional 150 kg/ha of muriate of potash in 1984-85. The whole farm also received in 1984-85 an application of lime at the rate of 1 tonne/ha.

The new pastures were grazed as soon as individual plants were considered strong enough to resist pulling out of the ground. This was assessed by the resistance of the plants to hand plucking. Experience has shown that grazing with mature cows (no young stock are kept on the farm) resulted in grass pulling if the new pastures were allowed to grow too long (<1500 kg DM/ha). After the initial grazing the new pastures were placed into the normal farm rotation, with pre-grazing herbage levels of 2000-2500 kg DM/ha and post-grazing levels of 700-900 kg DM/ha. The ryegrass-based pastures were grazed on 30- to 35-day rotation from the start of calving through to 10 September. A 15-day rotation was then

continued through until the end of December, extending to a 20- to 24-day rotation through late summer-autumn. The grazing interval was extended to a maximum length of 90 days during the winter.

Farm production statistics

Details of the production increases on the Tatuanui property since takeover are shown in Table 2.

Table 2: Farm production statistics

Year	COWS	Cows/ha	MF/cow	MF/ha	Total MF kg
1980-83 av.	130	3.4	150	512	19450
1984-85	146	3.8	165	633	24 052
1985-86	156	4.1	171	702	26 680
1986-87	140	3.7	160	590	22 415*
1987-88 Target	140	3.7	200	737	26 000
1986-89 Target	140	3.7	218	800	30 400

* Drought Year

Economics of renewal methods

The following calculations have been made using pasture production data collected while sharemilking on the previous property. Only methods 1 and 3 were evaluated and the older pastures contained approximately 30% paspalum in this comparison. On-farm pasture growth rates were calculated using an adapted assessment method similar to that used at Ruakura's No 2 Dairy. Pasture cover (kg DM/ha) was estimated weekly by visual assessment with DM calibration cuts taken at various intervals throughout the year.

The costings of the various renewal methods have been based on 1987 prices.

Method 1

	$ per ha
Spray contractor	30
Glyphosate @ 3.5 litres	100
Seed cost @ 21 kg/ha	60
Drill contractor (double pass)	50
Interest on money @ 20%	48
Total Cost	288

These pastures have an estimated 5-year life span, and therefore the annual cost of this methods is $57.60/ha.

Method 3

	$ per ha
Seed cost @ 10 kg/ha	25
Drill contractor (single pass)	35
	60
Interest on money @ 20%	12
Total cost	72

These pastures have an estimated 2-year lifespan and therefore the annual cost of this method is $36.00/ha.

The benefits derived from the renewal methods were calculated as follows:

Method 1. There was a 12-l 5% increase in annual DM yield of the new sown pastures compared with the older swards, most of this increase occurring between May and October, when it was most needed. This pattern of production advantage is shown in Fig. 2.

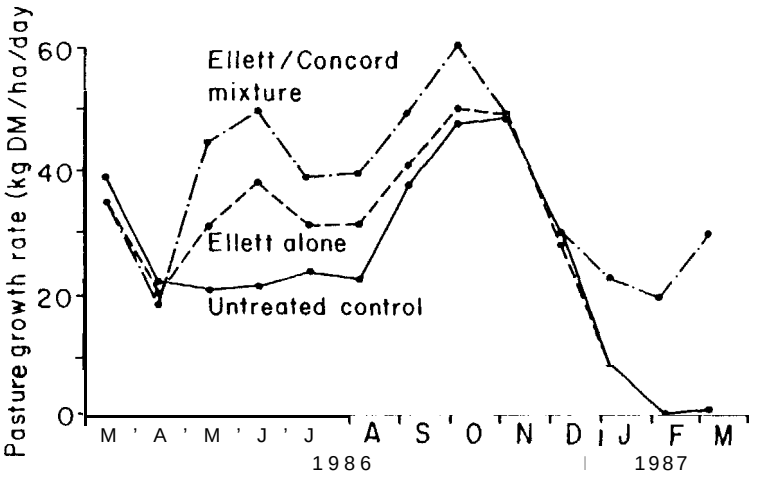

Figure 2: Growth rate of Ellett/Concord mixtures and untreated. older pastures

Annual DM yield of the old pasture was 13 500 kg/ha and a 12% advantage to the new pastures meant an additional 1620 kg of DM per ha was grown. At a conversion efficiency of 25 kg DM per kg milkfat, this extra DM would have resulted in an additional 65 kg MF/ha. With a MF payout of $3.50/kg this extra DM would have grossed $227/ha.

At a cost of approximately $57/ha, this renewal method thus had an estimated profit of $170/ha, or a return on capital invested in the order of 200%.

It can also be estimated that this renewal method could have resulted in the saving of 100 bales of hay, valued at $3.50/bale, resulting in a gross benefit of $350/ha.

Method 3. A smaller DM yield advantage was recorded to this renewal method, although the economics were just as attractive.

An 610% annual yield increase was recorded, most of the extra growth occurring over the vital winter-early spring months.

Using the same conversion equations as for Method 1, the 8% yield increase could result in an additional 43 kg MF/ha, or a gross increase in the order of $150/ha. At a lower cost ($36/ha) this method had a net profit of $114/ha, or a 216% return on capital invested.

The equivalent hay-saving conversion was 68 bales/ha, resulting in a gross benefit of $238/ha.

Yields of perennial/annual ryegrass mixtures

The advantages of regrassing older pastures which contained a high proportion of paspalum also became apparent on our new property. On 12 March 1986, 1.5 ha of old pasture, after hard grazing by the dairy cows, was undersown with 6 kg/ha of Ellett perennial ryegrass together with 4 kg/ha of Concord annual ryegrass, at a cost of $65/ha. At the same time 13 ha of older pastures were sprayed with glyphosate and undersown with the same mixture. The subsequent DM growth rates of these pastures are shown in Fig. 2. Extremely dry summer conditions were experienced at Tatuanui over 1986-87, resulting in sharply declining growth rates from late November through until the following March. The pastures sprayed and undersown with the mixture produced 25% more DM than adjacent control paddocks from April through until October, and despite the dry summer there has been no evidence to suggest that the Ellett component has been reduced through Argentine stem weevil damage. My assessment is, however, that very little Concord survived through to the second winter.

Prairie grass evaluation

On 30 March 1986, 1.4 ha of old pasture was sprayed with glyphosate at 3.5 l/ha and then undersown with Matua prairie grass at the rate of 25 kg/ha. Pitau white clover and Pawera red clover were then both broadcast at the rate of 3 kg/ha and the area lightly harrowed. The total cost of this treatment was $340/ha.

At the same time, a 1.5 ha area of old pasture was sprayed and undersown with Ellett ryegrass at 16 kg/ha and Pitau white clover at 3 kg/ha. The total cost of this treatment was $1 10/ha.

The DM growth rates from these 2 sowings have been recorded since sowing and the data are shown in Fig. 3.

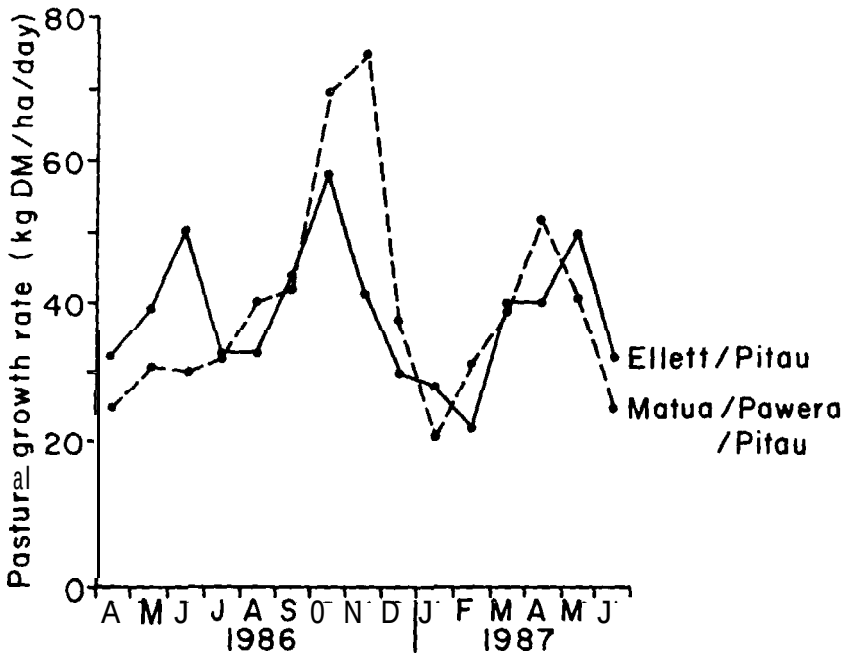

Figure 3: Growth rate of Matua prairie grass and Ellett perennial ryegrass wards.

Total DM yield from 1.4.86 to 31.3.87 for the Matua pastures was 13.6 tonne/ha, while the Ellett sowings yielded 13.3 tonne/ha. While these yield differences were small, there were large differences in the seasonal spread of the DM yield.

Some advantages observed to the Matua prairie grass pastures at this stage are:

(1) High late-spring/early-summer production.
(2) High palatibility.
(3) Protection to the cows from ryegrass staggers over the summer.

At the same time, some disadvantages have been observed:

(1) Requires more precise management.
(2) High establishment and maintenance costs.
(3) Less suited to wet soils than ryegrass.
(4) The lack of research evidence to show that extra growth from Matua can increase MF yield.

Higher MF yields from Matua pastures may be possible, I believe, provided the following management procedures are adopted:

(1) Matua is grazed on a 30- to 40-day rotation during autumn/early winter.

(2) Matua is grazed with 180-200 cows/ha rather than the normal 350-400 cows/ha over the winter to avoid excessive treading damage to the plant crowns.

Matua/Pawera mixtures may be more suited to less intensively stocked farms, which are concentrating on high per-cow performance through offering higher feeding levels. On highly stocked farms it may be necessary to on-off graze Matua stands over wet periods and thereby increase the requirement for more fertiliser inputs.

CONCLUSIONS

The present strategy for achieving our production goals consists of growing more total annual DM especially over the critical winter and spring periods. To this end we are undersowing older pastures with high-producing species and converting the extra growth into milkfat, using high quality cows over a 280- to 300-day lactation period. Calving date has been moving earlier to capitalise on the higher winter growth rates recorded from the newer pastures.

The choice of renewal method wilt continue to be made according to the amount of paspalum present in the older pastures with spray being used if the paspalum content exceeds 10%. Glyphosate will also continue to be used if new clover cultivars are included in the seed mixture of the new pastures.

Maize silage will continue to be grown, or purchased, to fill feed deficit periods while it is profitable to do so.

However, our experience to date, has been that undersowing, even if it has to be repeated annually, is presently the cheapest form of providing additional feed for the cows.

Even assuming that the best managements are practised to produce high quality pastures for the lactating cows, I believe that the breeders of new pasture cultivars must place more emphasis on palatibility and digestibility, to enable tomorrow's farmers to achieve still higher milkfat yields (profitably) from fewer and fewer, genetically superior cows. Should these plants perform and persist under the *current* management abuses to which present-day pastures are subjected, then we are well on the way to a profitable future.

References

Goold G.J. 1984 Increasing dairy farm production by use of better grasses and clovers. *Proceedings 36th Ruakura Farmers'* Conference *36*: 5-a.