Paper 12
GRAZING MANAGEMENT IN PRACTICE NORTH ISLAND DAIRYING

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INTRODUCTION

In the past, lucerne was predominantly grown on North Island light soils where rainfall was in the 750 to 1000 mm range. These areas such as Hawkes Bay and Coastal Manawatu were generally not dairying districts. Dairying was concentrated on heavier soils such as Waikato, Taranaki, Northland and Coastal Bay of Plenty. In these localities there was generally no need for lucerne.

The settlement of the light pumice soils for dairying during the 1950's and 60's caused a lucerne grazing system to evolve. Initially, lucerne was principally grown as a reliable source of high-quality hay, but after the severe drought of 1969/70 and bad grass grub infestations, farmers started planting more lucerne for grazing. The advent of bloat drenches and wilting of lucerne to make high-quality silage assisted this process. The area of lucerne increased rapidly, and by 1978 Central Plateau dairy farmers had on average planted about 25% of their land in lucerne (Mace, 1980).

The advantages of lucerne on coarse soil types stem from its superior annual production, most of which occurs between October and April. On average, lucerne annual yield is 50% higher than pasture on pumice soils (McQueen and Baars, 1980). However, lucerne's superiority is very dependent on soil texture. Lucerne yields are 128% higher on coarse soil where pasture is browntop dominant, to 33% higher on fine pumice where ryegrass is dominant.

In other dairying districts lucerne superiority is less being 23% in South Taranaki (Thomson and Lagan, 1981), 15-53% on Northland volcanic soils (Percival, 1978) and 14-25% on free-draining Waikato soils (P.W. Rattray, pers. comm.; Hutton, 1974; Croy and Weeda, 1975).

The dairy grazing system described relates principally to Rotorua and Coastal Bay of Plenty management practices, but it also exists in a limited manner in other dairying districts.

THE FARMING SYSTEM

Lucerne Feed Distribution

The seasonal distribution of lucerne growth determines the farming system but this is modified by the proportion of the farm in lucerne.

All of the extra feed produced by lucerne occurs in the December, January and March cuts (Table 1). From April until late-October, there is little difference in total dry matter grown between lucerne and pasture (McQueen and Baars, 1980), but the ill-effects on stand vigour and survival of grazing lucerne too early (Janson, 1975b) or too frequently (Douglas and Wilkinson, 1976) in spring makes lucerne a poor contributor to vital post-calving feeding.

The poor seasonal distribution of lucerne growth has prompted some management strategies aimed at minimizing effects on milkfat production.

Table 1: Seasonal distribution of lucerne and pasture production at Reporoa.

	Yield (Kg DM/ha)					
Cutting date	28/10	13/12	26/1	15/3	30/4	Total
Lucerne	3030	3 660	3 230	2 390	1 210	13 520
Pasture*	3080	2 620	1 950	1 180	1 230	10 060

* Pasture yields are totals recorded between lucerne cutting dates. (From McQueen and Baars, 1980).

Overdrilling Grasses and Cereals

As has been the case elsewhere in New Zealand, there has been considerable interest in boosting winter-early spring feed supplies by introducing complementary grasses into lucerne swards. Initially, major interest was in introducing Tama or Italian ryegrass into stands at about 6-8 kg/ha, but the outstanding feature was the variable results from site to site and season to season.

McQueen and Baars (1980) showed over a three year period, that Matua prairie grass was the only overdrilled species to give higher yields than lucerne alone over the winter months. Ryecorn provided the greatest yield increase

in the early spring. Overdrilling increased mean annual yields by 0-10% depending on overdrilled species. The variability of results in trials occurs also on farms, with the greatest problem being to establish and maintain high populations of the overdrilled species.

For some years, Central Plateau farmers overcame this problem by sowing prairie grass during lucerne establishment. Grass populations and yields were high, but the effects on lucerne production and longevity were disastrous. Baars (1977) showed that Matua prairie grass and Roa tall fescue boosted total yields by 7 to 23% in the first two seasons after establishment, but lucerne yields in the third season were only 48 to 70% of pure lucerne.

Current farm practice recognizes this. Nowadays lucerne stands are kept pure for about four years. Once the stands appear to be thinning out or loosing vigour they are generally overdrilled with 6-8 kg/ha of perennial ryegrass (Nui/Ellets) and sometimes 2 kg/ha of red clover. Perennial ryegrasses are used because they should not require redrilling each autumn, and because of the hope that eventual reversion will be to a ryegrass/white clover sward.

These older stands containing some grasses, generally have nitrogen applied to them in July and are grazed before pure lucerne in the spring.

Later Calving

If farmers are to manage their lucerne correctly in spring, cows calving too early are likely to be underfed and production will suffer. Calving date is influenced by the proportion of lucerne on a property. Where lucerne occupies 25% of farm area, calving commences about August 20. Where lucerne occupies 70% of farm area calving commences about September 1.

Shorter Lactation

Lucerne growth slows considerably in April/May, and therefore cows must be dried-off so that winter greenfeed can be built up. An efficient system using minimum conservation requires that the average lactation be 210-220 days with a drying-off date about the 10th of May.

Winter Grazing

Lucerne stands are only grazed once during the winter. This grazing takes place during May or June to allow maximum build-up of green-feed for spring grazing (Janson, 1975a). During this spelling interval of about 100 days pasture and forage crops are grazed. Swede and kale crops ideally suit a lucerne grazing system. They provide a cheap winter supplement and they fit into the programme of renewing lucerne stands about every eight years.

Flexible Summer Management

The decision to cut a lucerne stand for hay or silage has possible long-term implications for milkfat production. If the decision is wrong, a severe shortage of feed for grazing will result, since it takes 30 to 45 days before the cut stand can be grazed. Pasture normally recovers from hay or silage conservation more rapidly than this. Grazing and conservation decisions must be very flexible over the November to March period. The most flexible policy is to cut only small areas of hay or silage at any one time. In this way there is little chance of being caught by changes in weather conditions. Lucerne ready for cutting will still be good milking quality feed if required.

Lucerne growth from November to March is generally more predictable than that of pasture and with careful planning, feed shortages should not result from feed conservation.

GRAZING MANAGEMENT

The technical requirements of lucerne management are undoubtedly more demanding than of pasture, but many farmers have shown that lucerne can be relatively simply fitted into a grazing management system.

When and How to Graze

To maximise dry matter yields and maintain stand longevity, lucerne should be grazed or cut when basal shoots/terminal buds are beginning to appear (Keoghan, 1967; Thom, 1978). Every attempt should be made to ensure that this rule is observed, but in September and again in May/June it is not always practical to achieve this in every stand.

Once farmers have become used to the growth pattern of lucerne, they can predict when stands will be ready and plan accordingly. It is simpler to plan a continuous lucerne rotation on dairy farms, than on sheep farms, because of the central race system, more intensive subdivision and fewer mobs of stock.

During lactation, grazing or cutting is on a rotation of 30 to 50 days. Lucerne must not be set stocked under any circumstances (Iversen, 1967; Peart, 1968). Grazing is on a daily shift basis using portable electric fencing. Cows are not back-fenced. It usually takes three to five days to graze one paddock, but on very restricted grazing when lucerne is being used as a supplement to pasture for one or two hours per day, the paddock could take up to 10 days to graze. Janson (1976) showed this has little effect on lucerne yield.

Utilisation efficiency at each grazing is kept to a maximum by:

1. Avoiding lucerne becoming overmature.
2. Giving a new break of lucerne every day.
3. From December to February, topping lucerne stubble after grazing to enable cows to graze harder at next grazing.
4. Using dry stock to "clean up" paddock after the milking herd.
5. Ensiling stubble.

Daily Lucerne Consumption

The amount of lucerne fed daily generally depends upon the lucerne/pasture ratio on the farm. On the typical farm containing 25% lucerne, cows are grazed on lucerne for 12 hours per day in late-September and October, and

again from February to April. Over the November to January period, lucerne is generally cut for hay or silage, but the occasional paddock is needed for grazing. Farms containing 50% or more lucerne, graze lucerne for 12 or 24 hours per day throughout the lactation. Farms containing 10 to 15% lucerne, may graze it on a 12 hour per day basis in September to lengthen pasture rotation, cut it for silage and hay over the October to January period, then use it as a supplement to pasture for two to four hours daily on a continuous rotation over the February/March period.

In any continuous lucerne rotation, the area of lucerne offered to the cows daily, reflects the number of days before the lucerne is expected to regrow to the basal shoot stage.

Utilisation and Feed Conversion Efficiency

Lucerne will often grow more dry matter than pasture, but this may not result in a proportionate advantage in milkfat production (Thomson and Lagan, 1981). There is some debate as to how much of this is due to lower feed conversion efficiency of lucerne, and how much is due to lower annual utilisation. The higher fibre content of the stem material in mature lucerne reduces its nutritive value.

It is known that at any given level of cow production, or stage of lactation, utilisation at each grazing is higher on lucerne than on pasture. Bryant (1978) showed that lucerne single-grazing utilisation of 34 to 52% gave similar milkfat yield to pasture single-grazing utilisation of 27 to 29%. Thomson and Lagan (1981) noted a similar pattern. They suggested, that the greater utilisation efficiency of lucerne at each grazing, is due to lucerne having a greater proportion of its usable growth above milking cow grazing-height.

However, Central Plateau dairy farmers and advisers feel that it is more difficult to achieve high annual feed utilisation with lucerne than with pasture. This is because very little of the stem material left at one grazing is consumed at following grazings, and ultimately it decays.

On the other hand, Thomson and Lagan (1981) noted that similar apparent intakes of pasture and lucerne, resulted in lower levels of milkfat production from lucerne. This shows that lower feed conversion efficiency, brought about by the low digestibility of lucerne stems, is one reason why the superior feed production of lucerne is not always converted into superior milkfat production.

GRAZING SCHEDULE

1st Harvest — September 15 to October 15. Older lucerne stands containing more grass are grazed first. The earlier grazed lucerne is not at basal shoot stage. Utilisation probably 60-70% due to amount of grass present and the absence of mature stem.
Density — 100 cows/ha/12 hours.

2nd Harvest — About 50 days later (November). Most stands cut for silage.

3rd Harvest — About 35 days later (December/January). Some stands cut for hay or silage. Lucerne tall and stalky. Utilisation about 50-60%. Stands often topped after grazing to enable greater utilisation at next grazing.
Density — 250 cows/ha/12 hours

4th Harvest — About 30 days later (January/February). Generally grazed. Utilisation and topping as for 3rd harvest. Normally only one topping required per season.
Density — 200 cows/ha/12 hours

5th Harvest — 35 to 40 days later (March). Lucerne generally shorter and less stalky. Utilisation 60-70%.
Density — 220 cows/ha/12 hours

6th Harvest — 40 to 45 days later (April/May). The end of the lactation. Utilisation 75-85% with supplements.
Density — 300 cows/ha/12 hours

7th Harvest — (June). Winter clean-up. Utilisation 90% with supplements. Hard grazing to reduce aphids and weeds.
Density — 360 cows/ha/12 hours.

MILKFAT PRODUCTION

In general, lucerne is likely to increase milkfat production only on soil types where it consistently out-yields pasture by at least 30%, but the beneficial effects of lucerne are more obvious where it has a feed production advantage of 50% or more.

Mace and Peterson (1979) reported on 10 farms in the Rotorua district where lucerne has a feed production advantage greater than 50%. They showed, that where the area of lucerne on a farm increased by 327%, production per cow and per hectare increased by 45% and 61% respectively. The production increases per hectare shown in Figure 1 are relative to Central Plateau and New Zealand trends.

Production increases of this magnitude well in excess of national trends, have been achieved by many pumice soil farmers. The sowing of large areas of lucerne is one of the major reasons why total milkfat production in the Rotorua district increased by 65% over a 10 year period (Mace, 1980). There results have generally been achieved where the grazing of lucerne is complementary to that of pasture. Lucerne has provided a reliable source of milking-feed between October and April, whereas pasture has provided a high proportion of the feed from April to December.

When a 100% lucerne grazing system is compared with 100% pasture the inadequate seasonal feed distribution of lucerne becomes obvious. Thomson and Lagan (1981) found that while lucerne produced 23% more dry matter than pasture, milkfat yield per cow was 21% less and milkfat per hectare was 12% less. The major reason for the failure of the lucerne system was the 37 day shorter lactation on lucerne. A farming system combining lucerne and pasture does not have such an extreme feed deficiency in August and April/May.

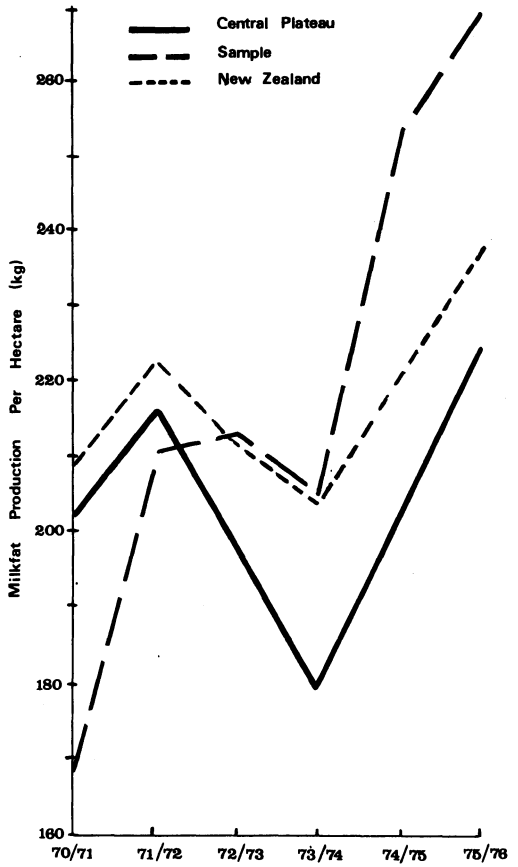

Figure 1: Seasonal trends in milk fat production per hectare.

The relative yield of lucerne and pasture is the most important factor in determining milkfat production, but nutritive value does have some small influence. Both Bryant (1978) and Thomson and Lagan (1981) reported significant depressions in the fat percentage of milk in some trial periods. These results were inconsistent. Central Plateau dairy farmers have long suspected a similar depressing effect of lucerne on fat percentage of milk. Thomson and Lagan suggested that this depression could only be explained by a direct effect of lucerne on rumen metabolism and the precursors of milk constitutents. Bryant (1978) concluded that the feeding value of lucerne is not an important limitation to its use with dairy cows.

STOCK HEALTH AND NUTRITION

Changes in Diet

Previously it was considered that changing from pasture to lucerne and *vice versa* would cause nutritional upsets, but this appears to have no basis. Nowadays farmers do not even consider this factor. They switch from one feed to the other depending upon requirements.

Feed Preference

In a mixed sward cows prefer grass to lucerne in spring months. However in the February/March period the grazing preference is reversed.

Bloat

Cows are usually drenched before they go onto a fresh break of lucerne. Dosage rates vary from 5-14 ml of Pluronic or Marlophene per cow, per 12 hours, depending on month, freshness of growth and utilisation percentage. Bloat tends to be most severe in April and May after frosts. Drenching rates have to then be increased substantially until control is achieved. Instead of drenching, some farmers spray stands using paraffin oils.

Wilting lucerne prior to grazing provides some bloat protection. This is less effective than drenching and is time and energy-consuming. It also forces cows to consume poor quality, lower stem material.

Cow Infertility

Although there were initial fears that high coumestan levels in lucerne would cause cow infertility problems, there is no evidence that infertility is a greater problem on farms grazing lucerne. The fact that factory-supply cows are mated in November and December, when lucerne is relatively free of leaf spot, could be a reason that coumestan levels are not a problem.

Sodium Deficiency

Ever since milking-cows have grazed lucerne on pumice soils, farmers have observed stock craving for salt blocks or any sodium-containing substance. Joyce and Brunswick (1975) demonstrated that lucerne grown on pumice soils is deficient in sodium. They obtained a 14% response in milk production when cows grazing lucerne were supplemented with sodium. They also reported a survey which indicated that the majority of lucerne stands in the North Island are sodium deficient.

Farmers do not generally consider that daily drenching with sodium chloride is practical, even when bloat-drenching is being carried out. Most farmers rely on salt blocks. Some add about 20 gms of sodium chloride, per cow per day, to stock water. Free access to too much salt can cause stock deaths. Therefore administration must be controlled. It has been demonstrated that applying fertilizer containing sodium is the least effective method of correcting sodium deficiences (Smith, 1981).

CONCLUSION

Because of the greatly superior dry matter production of lucerne on some of the drier pumice soil types, it is clear that sowing a proportion of the farm in lucerne will increase both production and profit. This farming system could

have limited application in other dairying districts of New Zealand, where dry summers severely limit dairy production. However, successful dairying on lucerne requires high standards of management. Under poor management lucerne grazing can be a costly exercise.

Undoubtedly the greatest disincentive to using lucerne to boost animal production is the extra costs involved. Thomson and Lagan (1981) estimated that in South Taranaki the extra annual cost of lucerne is $129 per hectare when compared with pasture. At present, returns of about $2.50 per kg of milkfat lucerne must produce an extra 52 kg of milkfat per hectare to break even. However, on the pumice soils, where extra annual costs of lucerne are only about $80 per hectare, the necessary extra milkfat production is being more easily achieved.

In addition, the higher financial returns per hectare from dairy farming mean that the relatively high costs of lucerne-grazing can be more easily recovered in a dairy grazing situation than under sheep grazing.

In the future, it can be expected that the relative difference between lucerne and pasture yields on pumice soils will become less. Improving soil fertility and moisture retention, and more drought-tolerant ryegrasses, will narrow the gap.

Lucerne will only retain its superiority if its cool season growth and pest and disease resistance are improved.

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DISCUSSION

Q: What are the reasons for the short stand life?

Mace The relatively high rainfall in our region means that grass weeds and disease, such as bacterial wilt, have a more detrimental effect on lucerne stand life than they do in dryland South Island stands. Also because of the more intensive, high return nature of dairy farming Central Plateau dairy farmers require, and can pay for, continually high-producing dense lucerne. They therefore tend to cultivate run-out lucerne long before South Island farmers would.

Q: How do you re-sow lucerne?

Mace Although there is little research evidence to support the idea, we feel it is best to spell the paddock from lucerne before re-sowing. Farmers therefore grow a crop such as swedes, turnips or oats in the paddock before re-sowing to lucerne.

Stephen: What other changes had taken place on the 10 survey farms where large milkfat increases were reported?

Mace: In most cases the farmers were relatively new to farm ownership, and were therefore motivated to do all the things necessary to increase milkfat production. However, it should not be considered, that change in farm ownership was the most important factor in these production increases, for in most cases these farmers had tried in vain to increase production in their first years of farm ownership, in the late 1960's, by using conventional pasture renewal and management techniques. Also, subsequently, many older established farmers have significantly increased production by increasing the area of lucerne on their farm.