# EXPERIENCE WITH LUCERNE-GRASS SYSTEMS FOR SHEEP PRODUCTION

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*Abstract*

Limitations that were experienced with lucerne/Tama are discussed chiefly in a dryland context. With irrigation, the addition of Matua prairie grass, 'Grasslands G14' phalaris, and Nui ryegrass with white clover to the lucerne/Tama system enabled less reliance to be placed on hay feeding in winter. End-of-September lambing in an attempt to achieve better matching of feed supply and demand has proven to be unsatisfactory for lamb finishing in dominantly lucerne systems. Change to greater content of perennial grass should enable earlier lambing at beginning of September, even at a high stocking rate (22 ewes/ha), and this is currently being researched. Improved lamb performance is also desired.

## INTRODUCTION

ABOUT 12 years ago the use of lucerne *(Medicago sativa)* was fully discussed in a meeting at Lincoln College (Langer, 1967). A new approach to grazing management, the question of associate species (whether perennial grasses or annual Tama ryegrass), and the proportion of the farm that should be in lucerne, were discussed.

Since then the area of lucerne has expanded, partly because it is a relatively resistant species to grass grub (Gordon and Kain, 1972), but also due to the increase in its use for grazing in areas of summer moisture stress because of the advantage lucerne has shown over grass pastures under these conditions (Flay, 1962). However, the situation that some had envisaged, with the major portion of many farms in lucerne, has not eventuated.

Our research over the intervening period shows both the prospects and the problems in handling a lucerne feed supply for fat lamb production. It has been done both under dryland and irrigated conditions on light land in Canterbury. 'Grasslands Tama' ryegrass (*Lolium multiflorum* Lam.) was the associate species (Vartha and Fraser, 1977, 1978). Over the past 3 *years*, 'Grasslands Matua' prairie grass (*Bromus unioloides* (Willd.) Beauv.), a new phalaris cultivar, (*Phalaris aquatica),* 'Grasslands G14', and 'Grasslands Nui' ryegrass *(Lolium perenne* L.) with white clover (*Trifolium repens* L.) have been added to the lucerne/Tama

system. These grasses help meet some of the problems exposed by the earlier research, such as the uncertain establishment of Tama ryegrass for greenfeed. They also enable a reduction in the level of hay feeding in the winter and allow for the feeding of herbage with lower oestrogen levels during mating of the ewes.

## LUCERNE/TAMA

Previously published papers (Vartha and Fraser, 1977, 1978) give full descriptions of the lucerne/Tama system and only the management framework will be given here. The purpose of the grasses is to provide a cool-season supplement to the warm-season growth of lucerne. Tama ryegrass was favoured for this purpose, occupying the same area of land where overdrilled into lucerne. There would also be pure-sown Tama in a renewal rotation for lucerne, sown initially in Wairau lucerne, but with renewal sowings from 1976 in Saranac (a similar yielding cultivarj to counter the possible problem of bacterial wilt under irrigation. Farmlets comprised five paddocks of lucerne, of which two were. overdrilled with Tama ryegrass and one used as a feeding pad in winter and then taken for the first hay crop in that year. There was one pasture of pure Tama ryegrass, usually summer-fallowed for a repeat crop, but when necessary sown to new lucerne and rape in late spring, with the rape being used as flushing feed in early autumn. Renewal was only necessary on the irrigated farmlets where lucerne plant density declined after 3 to 4 years. Poor stand persistence mainly due to root diseases has to be accepted with irrigation (T. P. Palmer, pers. comm.). No replacement was needed on dryland. Pastures were rotationally grazed except over winter, when stock were confined to the lucerne pad for 100 days and fed barley straw and lucerne hay. To enable grazing of the pure lucerne to be delayed later in spring, pure-sown Tama followed by Tama-overdrilled lucerne was grazed from the beginning of August. Stocking rate was 15 ewes/ha on dryland, projected to fatten lambs off their mothers and to provide sufficient hay for the winter period. The irrigated comparison was of similar structure except that higher warm-season herbage yield enabled a higher stocking rate up to 27 ewes/ha, but as a consequence the lambing date had to be delayed to mid-late September. This was to allow for herbage accumulation to cater for the increased pre-lambing feed demand. Early weaning of lambs was also necessary.

For dryland, 2 of 4 years were affected by autumn drought, herbage yield in dry years being only 70% of that in years with

TABLE 1: HERBAGE YIELDS FROM DRYLAND LUCERNE/TAMA (kg DM/ha)

| | Rainfall (mm) Annual | Autumn | Mean Yield | Tama us: Pure | Overdrilled | Hay % of Reqd. |
|---|---|---|---|---|---|---|
| Dry years | | | | | | |
| 1973-4, 1976-7 | 733- 795 | 94-142 | 6100 | 4 500 | 1300 | 40 |
| Wetter years | | | | | | |
| 1974-5, 1975-6 | 954-1136 | 211-312 | 8 700 | 6 500 | 4 300 | 240 |

higher rainfall (Table 1). Drought had less effect on establishment and autumn growth of pure-sown Tama than it did on overdrilled Tama. Summer fallow conserves moisture for the former, but for the latter, overdrilling had to be delayed after the first autumn rains, and thus plant establishment prior to cool-season was limited. In this circumstance pure lucerne had to be more frequently grazed during the following spring because of a lower Tama yield (Table 2), and in consequence there was considerable reduction in hay made (Table 1) in the subsequent year.

TABLE 2: CONTRIBUTIONS TO ENERGY SUPPLY TO STOCK (% of total)

| | Dry Years | Wetter Years |
|---|---|---|
| Pure lucerne | 38 | 26 |
| O/D lucerne | 32 | 46 |
| Tama | 11 | 16 |
| Lucerne hay | 13 | 6 |
| Barley straw | 6 | 6 |

The effects of irrigation were to provide a more assured establishment of overdrilled Tama as well as increased yields of luceme and pure Tama.

## PERENNIAL GRASSES WITH LUCERNE

A major change in provision of more grass was required for the reasons that the long winter-feeding period on the pad was expensive and labour-demanding and the surplus herbage to provide hay had been erratic on both systems and clearly inadequate on the irrigated. A less impotant reason for more grass was to avoid feeding pure lucerne at mating time-less important because we were already achieving 130 to 140% lambing (survival to sale) with Border Leicester-Corriedale ewes. One paddock each of Matua prairie grass and 'Grasslands G14' phalaris, both sown

with Saranac lucerne, and one paddock of Nui ryegrass sown with white clover, were added to make, with the existing lucerne and Tama system, nine paddocks in total. The object was to provide for a longer feeding period into the winter than could be obtained from autumn-growth lucerne, and for earlier spring growth.

The dryland comparison was discontinued, and comparison was then made of the modified system under part irrigation at 20 ewes/ha versus the lucerne/Tama under full irrigation at 25 ewes/ha, both systems lambing in late September. The reason for only part irrigation was that it was felt better use could be made of available water in December and January for cash cropping and a longer life of lucerne stands could be obtained (Lauder, 1959) .

The new pasture mixtures were sown in summer on land that had been irrigated. In its first year (1977-8) the lucerne/phalaris mixture yielded 4 100 kg/ha of legume and 6 200 kg/ha of grass; the Nui mixture yielded 2 100 kg/ha of legume and 8 400 kg/ha of grass. The lucerne/Matua yielded 16 800 kg/ha, but because of rapid growth of Matua in late winter and early spring it was necessary to graze this paddock more frequently than normal for a young lucerne stand, and as a result the lucerne disappeared from the mixture. Some white clover subsequently grew, and 30 kg/ha of nitrogen was applied in the spring,

TABLE 3: HERBAGE IN 1978-9 SEASONS (kg DM/ha)

| | *Lucerne/Perennial/Tama* | *Lucerne/Tama* |
|---|---|---|
| Mean yield/farmlet | 11900 | 11 600 |
| Lucerne | 10 540* | 13 960 |
| O/D | 12 690 | 14080 |
| Tama | 8 400 | 7 900 |
| Matua | 16 250 | — |
| Phalaris | 10 790 | — |
| Nui | 12 440 | — |
| Pad | 11 180 | 5 900† |
| Hay % of required | 120 | 22 |

*Including a weedy stand.
†Run-out lucerne stand.

For the 1978-9 season, stocking rate was 22 ewes/ha for the modified system. Mean herbage yield per farmlet (Table 3) was not markedly different for either system but a major difference was more cool-season contribution from the grass pastures and less

dependence on pure lucerne (Table 4). The effect was to reduce the period of hay feeding in winter from over 100 to 60 days, and the system was self-sufficient in hay. A low amount of hay made on the lucerne/Tama system reflected the slow growth of lucerne in a cold spring and consequent overgrazing of the stands. The lambs on neither of the systems grew rapidly, so that when weaned their prolonged finishing period through to February reduced the opportunity to make hay. Only 60% of lambs exceeded 25 kg liveweight (mean 28.5 kg) at the relatively late date of 16 February. As well as low rate of liveweight gain from late December, gains prior to this were only 156 g/day.

TABLE 4: COOL-SEASON PRODUCTION (1/3/78 to 1/9/78)

| | (*kg DM/ha*) |
|---|---|
| Lucerne | 1 650 |
| Nui | 4 150 |
| Phalaris | 3 600 |
| Matua | 6 250 |

## DISCUSSION

A previous instance of slow growth rate of lambs, with finishing dates of 15 January and 18 March, respectively, was experienced in the earlier dryland/irrigated lucerne/Tama comparisons, when spring weather was wet and cold. In such years there has been no shortage of feed for ewes, and even before weaning lamb growth rate has been unsatisfactory.

Late lambing means fattening at a period of summer when it is known that, even with irrigation, the digestibility of lucene stem decreases considerably, although that of leaf is maintained (Fletcher, 1976). One approach in attempting to improve finishing is to bring forward the lambing date to 1 September. The previous problem with lucerne/Tama was lack of feed in late winter and early spring. Our experience in 2 years with the addition of perennial grasses gives us confidence that we should be able to make this change.

While lucerne is potentially high producing where moisture supply is adequate, there are difficulties in equating its predominantly. warm-season growth with the production cycle of ewes and lambs. Full utilization cannot be made of the herbage produced because of the limits placed on the system by the deficit in early spring dry matter production. This deficit necessitates

having to lamb later, with the resultant poor lamb finishing performance. Because of this we feel some limit should be placed on the area sown to lucerne on farms where high stocking rates are envisaged.

Other research has been with high herbage allowance, a situation we do not consider to be realistic in a lucerne-based system because this tends to isolate the animal performance from the system as a whole, and that may not necessarily encourage high levels of herbage production or utilization. In any realistic system, herbage allowance must reflect herbage growth and stocking rate. This is obviously a different situation from the occasional paddock on a farm used for finishing the "tail" of the lambs.We feel that high stocking rates are necessary to justify shifting from dryland to irrigated *lucerne,* and consider there are further research needs in determining factors affecting finishing of lambs in these situations.

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