SUMMER FORAGE CROPS IN CANTERBURY

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SUMMARY

Conserved forages used for summer feeding tended to be more expensive than forage crops feed off *in situ, ad libitum.*

INTRODUCTION

One of the principal factors limiting farm production in Canterbury is the regular occurrence of drought conditions during January, February and March. Most livestock policies on Canterbury farms are orientated to destocking at this time and supplementary feeding has become a regular and expensive part of the farm programme. Feed supplies from lucerne and ryegrass clover pastures in January, February and March are grossly short of livestock feed demand with the result that lambing performances have declined in North Canterbury areas since the mid-sixties. This trend is illustrated by Figure 1 which shows the district lambing percentages for the Rangiora County for the period 1952 to 1972. A close relationship exists between January and February rainfall and lambing percentage. When the January and February rainfall is relatively high the resultant lambing percentage in the subsequent spring is correspondingly high, but if a relatively dry period occurs prior to tupping, the lambing percentage declines as a result.

To-date, pasture and lucerne have been relied upon as the main source of feed for the tupping of ewes. However, in recent years when the autumn rainfall has been poor there has been a need to supplement pasture and lucerne with hay, grain and sheep nuts. Most supplementary feeds are expensive and labour demanding, and not the preferred way to carry ewes through a dry spell. As little can be done to improve rainfall, other than irrigation, the obvious step seems to be to grow feeds which will produce more than pasture or lucerne under dry conditions and which are cheap to grow and easy to feed off.

METHODS

The potential of summer forage crops as sources of feed for sheep and beef cattle during the summer and autumn drought periods, was studied in two projects. The first consisted of a comparison of summer forage crops on light land and the second investigated the usefulness of growing maize for greenfeed.

Summer forage crops

The object of the first project was to compare seven different types of summer forage on a property prone to summer drought, and to relate them to animal performance.

A 2.8 ha area on an Eyre stony silt loam was used at Swannanoa, 13 kilometres southwest of Rangiora. The district receives an annual rainfall of between 400 and 600 mm. The area was ploughed in September 1972 out of pasture and a fine seedbed prepared. On November 1 1972, Wisconsin 346 maize, Giant marrow-stemmed kale, Rangi rape, York Globe turnips, Uni-white lupins, Maple field peas, and Trudan II sorghum were drilled, each on an area of about 0.4 ha. Prior to drilling, 250 kg/ha of superphosphate and 125 kg/ha sulphate of ammonia were broadcast onto the area and harrowed into the surface of the seedbed. After establishment the crops were given no further treatment.

On February 12 1973, yield data was obtained by sampling. On the same date 300 mixed-age Corriedale ewes were randomly drafted into two mobs of 150. One mob was grazed on a drought affected pasture and fed barley straw at the rate of 2.2 bales/100 hoggets/day. The other mob was grazed on the forage crops. A sample of ewes from each mob was weighed at the commencement and at the finish of the trial period which concluded on March 10, 1973. Rams were joined with each mob of ewes on the 5th March 1973. Rainfall records were kept during the period of the trial.

Maize

The objective of the second project was to examine the production, economics and management of maize as a summer forage crop.

Three trial areas in the Waiau district of North Canterbury were cultivated and Wisconsin 575 greenfeed maize seed was sown in early December, 1971.

The maize seed was drilled in three areas in 30 cm rows at 94 kg/ha, also on one further area maize was drilled in 15 cm rows. On all sites the experimental crops followed pasture. Superphosphate 190 kg/ha was drilled with each crop.

Herbage yeilds were measured by sampling the crops 105 days after drilling. All crops were fed off *in situ, ad lib,* by sheep and/or cattle.

Liveweight records of 200 weaned Angus heifer calves grazed on 5.3 ha were kept.

On all sites the costs of production were recorded and compared with maize silage costs on a dry matter basis. As the maize on the trial areas was not taken through to silage the comparison of greenfeed yields and yield at silage stage was based on unpublished data provided by Dr. K. Jagusch of Lincoln College.

RESULTS

Summer forage crops

In the first project measurements of rainfall were made between drilling and cutting. One hundred and eight millimetres was recorded with the distribution pattern shown in Table 1.

Waterloss rates were estimated at the Eyrewell forest which is 16 kilometres from Swannanoa, are also shown on Table 1. The results show a possible water deficit of 227.26 mm during the period of growth up until sampling.

TABLE 1. Rainfall and estimated waterloss.

	Nov.	Dec.	Jan.	Feb. (to 12th)	Totals
Rainfall (mm)	25.4	49.3	30.5	3.5	108.7
Estimated water loss (mm)	83.7	102.3	110.36	39.6	335.96
			Possible water deficit =		227.26 mm

Dry matter yields of individual crops after 104 days of growth are shown in Table 2.

TABLE 2. Dry matter yields of individual crops

Crop	% Dry Matter	Yield kg/ha
Maize	31	8587
Peas	46	6940
Turnips	33	6650
Rape	30	6040
Kale	33	5820
Lupins	41	4120
Trudan	41	–

Maize gave the highest yield and Trudan II was so poor that it was impractical to obtain yield data. Hot weather dessicated all crops to a marked degree, causing dry matter percentage levels to be higher than commonly experienced.

TABLE 3. Ewe liveweights – average liveweight per head (kg)

	12.2.73	10.3.73	gain/loss
Ewes on forage	61.69	67.59	+ 5.9
Ewes on barley straw	63.28	61.69	– 1.59

During the 27 day period the ewes grazed on the forage crops they gained an average 5.9 kg/head whilst the ewes fed on pasture and barley straw lost on average 1.59 kg/head.

Observation of the behaviour of ewes grazing the forage crops indicated they preferred the crops in the following order: rape, turnips, maize, peas, kale, lupins.

Maize

In the second project, yields of individual maize areas at Waiau are shown in Table 4. Measurement was at 105 days.

TABLE 4: Yield of maize at Waiau

Area	Green weight (kg/ha)	Estimated D.M. (kg/ha)
1	95,375	19,075
2	50,450	10,090
3	75,550	15,110
4	76,150	15,230

Dry matter determinations of samples were not made and estimated dry matter yields are based on available information at this stage of growth. Dry matters of 20% have been assumed.

Estimated dry matter yields ranged from 10,090 kg/ha to 19,075 kg/ha. On Area 4 the crop was sown in 15 cm rows whilst the remainder were sown in 30 cm rows.

Calf Weighing

On areas 3 and 4, 200 weaned angus calves were grazed over a 42 day period. Grazing was *in situ ad lib* and calves were weighed at 14 day intervals. No changes in average liveweight over the duration were recorded.

Economics

Table 5 shows the expected costs of greenfeed maize (column 1), the actual costs at Waiau (column 2), the costs of maize silage (column 3) and the costs of greenfeed production if the crop had been originally planted as silage but grazed *in situ* (column 4).

TABLE 5. Comparative costs of maize as greenfeed and silage

Item		Column 1 Expected Greenfeed Cost $/ha	Column 2 Actual Greenfeed Cost $/ha	Column 3 Silage Cost ($/ha)	Column 4 Crop planted for silage but grazed instead ($/ha)
1.	Seed	13.70	13.70	25.90	25.90
2.	Fertilizer	13.55	4.54	13.55	13.55
3.	Cultivation	9.08	9.08	9.08	9.08
4.	Drilling	5.73	5.73	24.71	24.71
5.	Weed & Pest	27.20	–	27.20	27.20
6.	Harvest	–	–	27.59	–
7.	Truck & Cartage	–	–	10.85	–
8.	Vacuum Pack	–	–	48.86	–
		$69.26	$33.05	$187.74	$100.44

The difference between expected and actual greenfeed costs arises mainly because of weed and pest control. Weed and pest control were not needed at Waiau and has since been found to be necessary only in a minority of cases in Canterbury.

When comparing greenfeed cost with silage cost the main differences are due firstly to seed price (F1 hybrid is used for silage at 55c/kg whereas F2 hybrid seed is used for greenfeed at 14.5c/kg); secondly precision drilling as against a normal farm drilling is more costly and thirdly a very high cost of harvesting, carting and stack covers is involved with silage. It should be noted that the feeding-out cost with silage has not been included.

These costs can be related to the dry matter yields as shown on Table 6.

TABLE 6. Maize cultivar dry matter yields (t/ha) and costs

Time of Cutting (days)	W575 F2	W575 F1	PX 610 F1
110	15.11*	16.2†	18.9†
150	–	22.2†	29.6†
Cost of production $/ha	$69.26 (expected) 33.05 (actual)	187.74 (ensiled) 100.44 (grazed)	187.74
Cost $/ kg D.M. (as silage)	–	0.84	0.635
Cost $ /kg D.M. (as greenfeed)	0.46 (expected) 0.22 (actual)	0.62	0.53

* The dry matter yield figure of 15.11 t/ha from Wisconsin 575 F2 hybrid was obtained from the trial areas at Waiau.

† The dry matter figures for F1 hybrids at 110 days and 150 days are from data provided by Dr. K. Jagusch of Lincoln College.

Table 6 shows the cost of dry matter as silage as 0.84c/kg and 0.635c/kg for the two varieties. If these were fed off as greenfeed then the cost per kg of dry matter would have been 0.62c and 0.53c respectively. The expected cost at Waiau was 0.46c while the actual cost of dry matter was 0.22c.

DISCUSSION

The Swannanoa results showed that the production from summer forage crops varied considerably under conditions of low rainfall, high temperatures and high evaporation. Generally each crop grew well during the November, December period when the bulk of total production occurred. However, as conditions became hotter and drier during the months of January and February, the crops were dessicated to varying degrees.

Maize produced the greatest amount of dry matter and appeared to withstand adverse conditions best. The peas and brassicas looked promising at first but suffered badly as conditions deteriorated.

The lupins and sorghum were disappointing and least suited to growth under these conditions.

In comparing the growth and production of these crops two features become evident. Firstly, the crop must be sown early to allow rapid accumulation of feed during favourable growth conditions. Secondly the crop must be able to withstand heat and drought and carry over its bulk until required for feeding.

The ewes on the forage crops gained an average of 5.9 kg/head in comparison with the other mob which lost 1.59 kg/head and it can be presumed that this response in body weight prior to and during early tupping will be reflected in an improved lambing performance.

Unfortunately the nature of this experiment did not allow for an analysis of stock performance on individual crops, so the part each crop played in giving this weight gain is not known. The order of grazing preference was interesting but unlikely to be of practical significance as the ewes would not normally have a choice of feeds.

As maize was the most productive forage, it is pertinent to compare its production cost with that of the barley straw fed to the control mob of ewes.

The cost of maize dry matter was 0.37c/kg. based on an actual growing cost of $32/ha. Barley straw costed at 25c per 20 kg bale gives a dry matter cost of 1.45c/kg which is in excess of three times the cost of maize forage.

Maize can fit neatly into the normal farm rotation as substantial areas come up each year for winter crops and pasture renewal.

In the second project the economic comparison showed that if summer food is required, it would be more profitsble to feed maize *in situ* rather than ensile it and feed out the following summer. In most reported cases the cost of greenfeed production is high. We suggest, in practise, that this can be reduced substantially to a level of about $30/ha although in some cases weed and pest control may increase this cost. The crop that was sown to be ensiled but used instead as greenfeed, has loaded the cost of dry matter higher than it should have been, but for the purpose of a valid comparison this was necessary. Even with this in mind we have a 20 to 30% advantage to greenfeed. If the crop is specifically sown as a greenfeed, the advantage is between 50 and 100%.

There are several important side issues, which favour greenfeed maize, that are often overlooked. The first is that with standing greenfeed the paddock is usually eaten out between the middle and end of March. This allows a further crop, such as a ryegrass greenfeed or a cereal greenfeed to be sown and this will contribute significantly to total annual production.

The second advantage is that greenfeed, fed *in situ,* is less work and this can be quite important when large numbers of sheep or cattle are involved. The third advantage in drought situations is that it allows large stock concentrations on small areas and because of this the balance of the farm can be spelled so that recovery is quicker when rain does come. Even if drought is not a problem, a concentration of stock in this manner would allow a build-up in autumn-saved pasture and contribute significantly to a reduction in the amount of hay required in the winter months.

Where close row spacing was used, total yield of maize was not affected, but its utilisation was better because stems were thinner.

The weighing trial that was carried out showed no change in liveweights of cattle over the 42 day period. This, perhaps, could be explained by the sudden change in diet and the low protein and energy levels in maize.

CONCLUSION

These projects have shown:

: that maize was the highest yielding summer forage crop under these light land conditions and offers an alternative means to augment summer-autumn feed supplies.

: that it is possible to achieve ewe liveweight gains on summer forage crops at a relatively low cost and at a critical time in relation to lambing performance.

: that where summer feed is required, greenfeed maize is more economic than silage.

: and that whether drought conditions exist or not, maize will contribute significantly to raising total annual feed production and should lead directly to better stock performance and higher stocking rates.

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