The practicality and profitability of feed inputs on the Stratford Demonstration Farm

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Abstract

A four-herd dairy farm farmlet trial was carried out on the Stratford Demonstration Farm in Central Taranaki for four seasons (2001/2002 to 2004/2005). This trial examined the profitability and practicality of different feed input systems including on-farm forage cropping and the use of new pastures. The farmlets included:

1. A self-contained control group moderately stocked at 3.3 Jersey cows/ha.
2. A group with the same stocking rate (SR) but using high quality silage made on the farmlet to allow milking for a long lactation (280 days/cow) and feed purchased to balance the winter feed budget (MPF).
3. A group, high stocked at 4 Jersey cows/ha to allow direct grazing of the grass by milking cows with minimal supplements made but feed purchased (grass silage and hay, maize silage, winter grazing-off) to allow a moderate to long lactation length (270 days/cow) and to balance the winter feed budget (HPF).
4. A group also at the moderate SR and self-contained but with 12% of the farmlet cropped with summer turnips and Triticale cereal silage crops to increase total feed production, as well as introduce the use of higher quality pasture cultivars (crop).

Increased milk production was achieved by the increased inputs with a response rate of 142 g milksolids (MS)/kg dry matter (DM) from buying-in feed to extend the lactation and 84 g MS/kg DM from buying-in feed to run a higher SR. The cropping and regrassing system also resulted in a 4.9% increase in MS production, but crop yields were much lower than expected, significantly affecting the results.

The MPF group with purchased feed to extend the lactation produced the best economic result under the costs and milk payouts used. The HPF group produced the most variable and lowest economic result. The extra milk production from this group was sufficient to cover the extra feed costs but not the cost of running the extra cows. The extra milk production on the cropping farmlet covered the cost of the cropping and allowed a high level of regrassing at no net cost, but minimal economic benefit. The value of the new pastures in the system, however, improved each season. Labour costs, feed costs and milk payout are critical factors in the differing economic results. These vary greatly from farm-to-farm, and year-to-year and differences here can change the relative economics of each system.

Keywords: economic farm surplus, feed input systems, milksolids production, profit

Introduction

From the late-1980s and through to today, there has been an increasing trend for dairy farmers to source extra feed from off the farm. This trend has resulted in major increases in milk production off dairy farms and major changes in some management systems. A further development has been the use of higher digestibility and more short rotation ryegrasses and crops to improve feed grown on the farm. There have been many questions and debates in the Dairy Industry on the profitability of these newer systems, and how practical they are for most farmers to operate, as many of these systems require high capital and labour input compared to standard systems.

In the early 1980s, a minority of dairy farmers grazed yearlings off on a May-to-May basis, a few purchased extra supplements and only light rates of nitrogen (N) fertiliser were used. Now, very few farmers graze yearlings on the milking area, and many buy-in extra feed to varying levels and use much higher levels of N fertiliser to produce higher levels of milk production and profit. We now have a greater diversity of farm systems being used with feed inputs ranging from mostly self-contained producing on-farm grass grown only, to systems where half the feed used on the farm is brought-in.

With the increasing demand for feed from Taranaki farmers, the close supply has become limited and prices have increased or a high freight cost is required. The higher feed cost makes the economics of such systems more marginal. Management systems are therefore needed that allow more feed grown on the home farm to overcome the so-called "feed barrier" to increase production and profit without relying on off-farm purchased feed. This trial also aimed to evaluate systems for increasing feed grown on the farm, improved feed quality and pattern of growth.

This trial on the Stratford Demonstration Farm was aimed at identifying the profitability and practicality of some of these systems in central Taranaki, and areas of similar conditions. Relatively simple systems were chosen due to the practicality of operations on the Demonstration Farm with its limited resources, and also so that systems most likely to be widely adopted by farmers were studied.

Method

The four-herd farmlet trial on the Stratford Demonstration Farm commenced in June 2001 continuing for four seasons to finish in May 2005 with farmlet details outlined below. The farm is located on the eastern boundary of Stratford in central Taranaki. It has a flat contour with a Stratford sandy loam volcanic ash soil, which is free-draining and easy to cultivate. The farm is relatively high altitude at 310 m above sea level, and has an annual rainfall of near 2100 mm reasonably evenly spread over the year. Annual pasture growth without N fertiliser is 12.5 t DM/ha.

Recent trials and analysis of past trials have indicated that on pasture-based systems, and systems with moderate levels of purchased feed, that economically optimum comparative stocking raate (CSR) for dairy farms should be in the 80-90 kg liveweight (LW)/t DM range to obtain high per hectare production levels from cows doing high per cow MS production equivalent to the range of 90-100% of the cows' body weight. The Stratford trial was designed to achieve these targets.

Layout

Farmlet 1 – Control farmlet (40 cows milked on 12 ha)

This was a standard high-producing, self-contained, all grass system (except replacement stock grazed-off). Stocking rate was 3.3 Jersey cows/ha (CSR 85 kg LW/t DM), which was determined as being the economic optimum for a self-contained system in the previous trial on the Demonstration Farm.

Farmlet 2 – Moderate stocked, purchased feed (MPF) - 40 cows milked on 12 ha

This was a moderate stocked farmlet at 3.3 cows/ha as per the control. High quality silage made on the farmlet was used to feed milkers for a longer lactation length and during grass deficit periods, to achieve high per cow production. Winter supplements were purchased as needed to cover any winter feed deficit to allow standard winter feeding levels.

Farmlet 3 – High stocked, purchased feed (HPF) - 40 cows milked on 10 ha

This farmlet was stocked at 4 Jersey cows/ha to be high enough to have minimal or nil surplus grass to make into supplements. Feed was purchased to allow a longer lactation length (at least as long as the control group), and for wintering, at standard feed levels. The target CSR was 85 kg LW/t DM to achieve moderate-high per cow milk production similar to the control level or better.

Farmlet 4 – Crop (40 cows milked on 12 ha)

This was a moderate stocked farmlet (as per the control) with forage crops of Triticale, cereal silage and turnips grown on-farm and regrassing with newer higher quality high digestibility higher producing ryegrasses to increase farm production without the need for purchasing extra feed off-farm to overcome the "feed barrier". The target was to achieve similar or better production to the MPF group with a CSR of 80 kg LW/t DM.

General management

All farmlets received near 150 kg N/ha/yr total in five split applications over the year with the aim of achieving 14000 kg DM/ha/yr pasture growth. Phosphorus (P), potassium (K), and sulphur (S) inputs were 45, 100 and 25 kg/ha/yr respectively with split spring and autumn dressings. Average soil test values (AgResearch quick test units) for the farm over the years were pH 5.8, Olsen P 44, K 5.5, calcium 4, magnesium 25 and sulphate-S 15 ppm.

The paddocks on the farm were randomized on a block basis so each farmlet was spread over the entire farm. Existing pastures on the farm are generally old (30-50 years) ryegrass/ clover/other grass mixes.

The herd is a high breeding worth (BW) (126) Jersey herd with a mid-season LW of 370 kg/cow. The herds were randomized at the start of the trial based on age, BW, production worth, LW, condition score (CS) and calving date, and generally remained in their set herd for the period of the trial. Each year, in-calf heifers were randomized on BW and LW, and bought in at a 20% replacement rate. The planned calving date for all herds was 1st August, with breeding and animal health management the same for each group.

Farmlets and herds were managed according to set guidelines and protocols designed to achieve optimal performance for that system along with simplicity, and to ensure a fair comparison.

Measurements and monitoring

Pasture covers and pasture yield measurements were assessed using a rising pasture plate meter and eye assessment on a weekly basis from calving to Christmas, and two-weekly for the remainder of the year. Surplus grass was harvested as round bale silage or hay with sample bales being weighed and quality tested to determine yields and qualities for feed budgeting purposes. Purchased grass silage and hay was also in big bales with samples measured as above. Maize silage was purchased in bulk and samples measured for quality and quantity when fed out. Triticale crops were harvested as baled silage in three years, and pit silage in one year. Bales were weighed and quality sampled to determine yields of baled crops, whereas the pit silage crop was measured in paddock pre-harvesting as well as pit measurements. Turnip crops were measured in-situ pre-grazing by quadrant measurements. No statistical analysis has been carried out on any of the results.

The cows were weighed and condition scored six times/yr, and milk yields were assessed by two-weekly herd testing using Livestock Improvement Corporation (LIC) services throughout the milking season.

The economic farm surplus (EFS) was calculated using standard Dexcel guidelines except a cost of capital in stock was also included as the trial covered differing SRs but the cost of capital for extra shares was not included. Feed costs used were standard market rates for buying-in feed or grazing in the district, with standard losses allowed for and the cost of operation, capital and depreciation on supplement storage and feeding-out systems included as part of the feed cost.

New pastures and crops

Eleven to twelve percent of the crop farmlet was cropped and regrassed each year starting in the first season. This high level was chosen to get a significant result from extra crop yields and to have a rapid change into new pastures within practical constraints. Four to seven percent was as Barkant summer turnips sown after cultivation in early-November and grazed by the cows in February to early-March. Four to seven percent was as Monster Triticale direct drilled around the start of November and harvested for silage around the end of February. The areas of each crop varied from year-to-year depending on the areas of paddocks used. The general aim was 4% turnips and 7% Triticale.

Where possible, crop paddocks were shut for grass silage in the spring then sprayed with Round-up®, and cut for silage before establishing the crop. New pastures were generally direct drilled after crop harvesting and weed control, although cultivation occurred when needed to smooth out the paddock contour.

Summer rainfall in the area is such that pasture growth is usually adequate to support the moderate SR of 3.3 Jersey cows/ha without summer supplements. Turnips were however used to provide feed in the crop farmlet as a summer feed deficit was likely due to having 12% of the farmlet out of pasture. Turnips also provided a high quality feed over a period when pasture quality often is low due to summer heat problems.

Triticale was used to provide a high yielding crop over a short period when grass pasture is usually in surplus supply. It was chosen as it could be direct drilled without a fallow period and could be harvested early in the autumn and new pastures established well before the winter which is very important in this cooler winter district. The Stratford district is considered marginal for maize crop growing and maize harvesting is five to six weeks later than Triticale, but it would be an alternative crop to use in the system where suitable.

New pastures used were Feast II short rotation ryegrass, Maverick gold hybrid ryegrass, Banquet tetraploid ryegrass and Quartet AR1 tetraploid ryegrass. These were selected for their high digestibility, late flowering and winter active characteristics.

Results and discussion

The four years of the trial covered a broad range of climatic conditions for the district including a very wet mid- to late-spring in 2001, a very dry summer-early autumn in 2003, and very wet February in 2004 (638 mm of rain recorded), and a very cold early spring in 2004. These extremes of weather conditions presented some management problems but represented typical conditions overall. The MS payout also varied greatly ranging from a low of $3.60/kg to a high of $5.30/kg with an average of $4.40/kg. Input costs were reasonably consistent on a per unit basis over the period of the trial.

Milk production

The purchased feed groups and crop group all exceeded the control group's milk production which averaged 318 kg MS/cow and 1060 kg MS/ha. The MPF group averaged 10% better at 351 kg MS/cow and 1168 kg MS/ha. The HPF group averaged 327 kg MS/cow and 1306 kg MS/ha which was 3% ahead of the control group on a per cow basis and 23% ahead on a per hectare basis. The main difference in per cow production was due to days milked/cow with the purchased feed groups and cropping group having more days/cow due to milking on longer in the autumn. The extra days milked compared to the control group was plus 31 days, plus 19 days and plus 14 days for the MPF, HPF and crop groups respectively. Milk production/cow/day was similar between the MPF groups but was lower with the HPF group as the cows generally never milked as well while being fed supplements compared to the grass fed groups, even though the aim was to have equal feeding levels.

The days-in-milk/cow was mainly influenced by drying-off date with the control and cropping group being dried-off on winter feed budget based on available feed whereas the purchased feed groups had feed brought-in to allow them to milk to late-May every year. The HPF group had less days/cow due to a higher proportion of the herd being dried-off before the final drying-off date due to low production or CS.

The control group had the highest variation in milk production between the years with a 23% range. A major effect here was the very early drying-off date of April 5th after the very dry 2003 summer. The MPF, HPF and crop groups had a 9%, 14% and 16% variation respectively highlighting the effect of purchased feeds reducing the milk production variations due to climate.

The response rate (extra MS produced for the extra supplements used) to purchased feed was 142g MS/kg DM (7.6 kg DM/kg MS) for the MPF group where the supplement was used to extend the lactation and 84g MS/kg DM (12 kg DM/kg MS) where the supplement was used to run a higher SR as well as an extended lactation. This response rate was reasonably consistent with a range of 78 to 92g MS/kg DM for the HPF system and 133 to 188g MS/kg DM for three of the years for the MPF extended lactation system. The MPF group, however had a much lower (88g MS/kg DM) response in the year when the control group milked particularly well in the autumn relative to other groups.

Supplements

Supplement levels made, fed and purchased varied from year-to-year with the climate and its effect on pasture growth totals and pattern. The control group and crop group operated on a self-contained basis while the purchased feed groups used brought-in feed to feed cows adequate throughout the year and to allow the herds to milk to late-May and still have adequate feed for wintering. For the MPF group this was as hay for wintering while the HPF group had a combination of purchased grass silage, hay, maize silage and winter grazing-off. The cost of this averaged around 34 to 35 c/kg DM which includes the landed cost on the farm plus the cost of storage and feeding-out including interest and depreciation on capital involved.

The control group averaged 38% of the farmlet harvested/year and 1036 kg DM/ha of supplement made. The MPF group had slightly higher levels than this for no apparent reason. The HPF group had much lower levels due to the high SR and supplements made tended to be light quick crops on this farmlet. The crop group had a lower area harvested/cropped at 33% with the main difference being less summer supplements harvested due to crop paddocks out of the grazing rotation. Total supplements made, however at 1396 kg DM/ha were the highest due to having the Triticale cereal silage crop.

The self-contained control and crop group had near nil brought in feed (net kg DM/ha), the exception being one year on the control group when extra supplements were used during a bad spring. The MPF group averaged 811 kg DM/ha purchased with a range from 600 to 1400. The HPF group averaged 2939 kg DM/ha purchased ranging from 2188 to 3430 kg DM/ha with extra supplements used in lower pasture growth years.

Purchased feed equaled 5% and 17% of total feed use for the MPF and HPF groups respectively but ranged from 4% to 9.5% for the MPF and 12% to 20% for the HPF group over the years.

Cropping

The weather had major effects on the cropping programme especially in the timing of operations. Very wet weather during the 2001/2002 year delayed crop planting by a month which reduced turnip crop yields significantly and extremely wet weather in the 2004 summer significantly affected the Triticale cereal silage crop. Diamond Back Moth was also a significant pest of the turnip crop in 2002/2003 and leaf diseases affected the Triticale crop each year.

Tumip crop yields only reached the target 12 t DM/ha in one year (Table 2) and this was during the very wet summer when it was difficult at times to graze the crop in wet conditions. Triticale crops at 8 to 10 t DM/ha (Table 2) were only two-thirds or less of the target yield of 15 t DM/ha and the quality was generally low in the 7.7 to 10.3 MJME/kg DM range. The best quality crop was during the dry summer and when the crop was made into fine chop pit silage. The other crops suffered badly from leaf fungal diseases, poorer compaction in bales and low grain levels in wet summers.

These Triticale crop yields were generally no more and sometimes less than the equivalent pasture growth on the farm over the same period and were lower quality. There were also additional costs over and above harvesting standard grass silage or hay off the same area.

There were minimal definite immediate benefits in milk production from the cows grazing the turnips in the first three years of the trial, but in the fourth year the crop herd produced 11% more MS/cow/day compared to the grass fed groups during the turnip feeding period. During the very dry summer-autumn period in 2003 the turnips provided adequate supplement to the lower grass feeding levels whereas the other groups required silage feeding. During the other summers there was sufficient grass to feed the cows adequately during the summer and some light hay crops were harvested to use surplus grass while the turnips were being grazed.

Overall despite the poor Triticale crop yields, the system of cropping and new grass produced enough extra feed to allow a two week longer lactation and a 5% increase in milk production over the control group. If target crop yields of 15 t DM/ha had been achieved the herd should have been able to milk to late-May as planned so the challenge is to obtain suitable crop yields of good quality.

The crop system also provided to be an effective means of regrassing a relatively high level of the farmlet

Table 1 Results summary (four-year average).

	Control	MPF	HPF	Crop
Stocking rate				
Target kg LW/t DM	85	80	85	80
➢ kg DM/cow	4354	4654	4354	4654
➢ CSR(kg DM/kg LW)	11.8	12.5	11.8	12.5
Cows/ha milked	3.33	3.33	4.00	3.33
LW/ha @ 370 kg/cow	1233	1233	1480	1233
Milk production				
MS/cow	318	351	327	334
MS/ha	1060	1168	1306	1112
kg MS/cow/day	1.29	1.26	1.22	1.27
Days milked/cow	246	277	269	260
Days milked/ha	826	922	1066	864
Drying-off date (final)	27 April	27 May	24 May	10 May
Supplements				
kg DM/cow made	311	346	84	419
kg DM/ha made	1036	1151	336	1396
kg DM/cow used	350	601	794	424
kg DM/ha used	1165	2001	3175	1412
Net kg DM/ha	-25	-811	-2939	0
% farm harvested	38	43	11	33
N (kg/ha)	163	163	165	161
Pasture growth				
t DM/ha grown	14.5	14.4	14.5	14.9
Feed reconciliation				
Total feed input (t DM/ha)	14.8	15.4	17.7	15.1
kg DM/kg MS	14.0	13.3	13.6	13.8
g MS/kg DM	72	76	74	73
Actual CSR (kg LW/t DM)	83	80	84	81
Supplement response:				
➢ kg DM/kg MS		7.6	12	
➢ g MS/kg DM		142	84	

Table 2 Crop yields and quality.

Year	Triticale		Turnips
	kg DM/ha	MJME/kg DM	kg DM/ha
2001/2002	9.2	9.7	7.0
2002/2003	10.0	10.3	9.5
2003/2004	8.0	9.3	12.0
2004/2005	10.0	7.7	11.0

without costing milk production plus the cropping allowed a break from pasture and double or triple spraying of weeds which should result in a better new pasture with less weeds and old grasses.

New grass

New pastures were established in the autumn after the crops were harvested. The aim was to use high digestibility, late flowering varieties with good winter growth. These were generally direct drilled into the crop area as soon as possible after crop harvesting was finished and weeds sprayed. Feast II short rotation ryegrass was used in two years following the turnip crop. This established very quickly and had winter growth rates around three times the standard pasture growth. Mid-spring growth tended to be lower, however at times mainly due to the pasture becoming less dense due to pugging during wet weather. Annual growth was still, however, relatively good (15% above standard pasture growth in the first year) and pasture utilisation was good all year. The Feast II paddock has continued to grow well even in the fourth season, although it was undersown with Maverick Gold in the second autumn to improve sward density.

The Triticale crops were followed by Maverick Gold hybrid ryegrass in year one and four, Banquet tetraploid ryegrass in year two and Quartet AR1 tetraploid ryegrass in year three. These tended to grow at double the standard pasture growth rate through the first winter and relatively moderate to good growth compared to

Figure 1 Milk payout effect on EFS/ha.

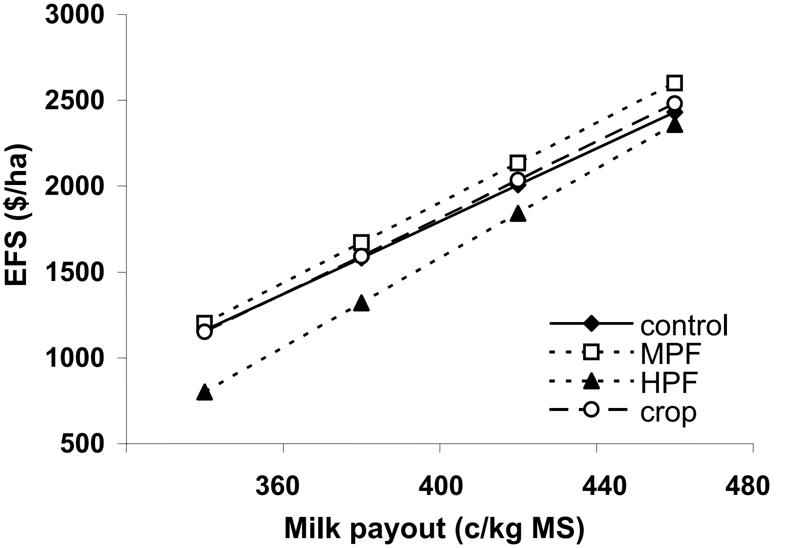
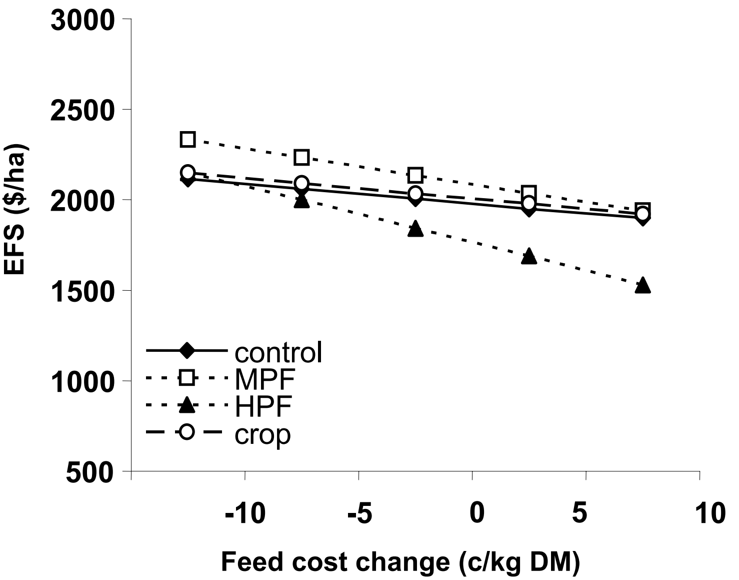


Figure 2 Feed cost effect on EFS/ha.



standard pastures for the rest of the year (on average 11% better annual growth). The Maverick Gold continued to have above average growth in subsequent winters. Pasture utilisation was generally good on these new pastures with the cows grazing them out well at every grazing.

Kopu II clover was also sown with new grasses. This established well in the first autumn but poorly for the other three years.

With no new pasture in the first year and only 12% of the farmlet regrassed each year, it has been difficult to assess the benefit of the new pastures. The indications have been positive however, prompting the need for further studies. The crop farmlet generally entered the winter with lower pasture covers but with the good winter growth on the new grass the pasture covers at calving were on target and spring grass levels tended to be better than the control group. The benefit of the higher quality feed from the new grasses was not definite in the first three years due to the lower areas of new grass and other factors. However, in the fourth year, with 35% of the farmlet in new pasture, indications of definite milk production differences (up to 6%) occurred while the crop herd was grazing the new pastures especially in the late spring-early summer period of the 2004/2005 season when standard pasture quality was relatively low. Care was required on the new pastures to avoid pugging damage, especially in the first winter and spring. Where this occurred, it resulted in some reversion to old grasses and weeds, especially in the shorter rotation grasses. The newer grasses used have thus shown promise but a much larger percentage of the farmlet in new grass is required to get definitive results.

Labour and practicality

Differences in labour input into each system were not measured but the main differences were in the harvesting and feeding-out of supplements including cropping and the time required for milking. The control group had the lowest labour input with the mainly all grass feeding system. The MPF and crop group were assessed at similar labour inputs while the HPF group required the highest labour input with extra time required for milking more cows, milking for a longer lactation and high levels of feeding-out of supplements. On the positive side, the MPF group had minimal input and stress involved in harvesting supplements which can be a problem with Stratford's weather.

The ability to milk to the end of May yet still set the farm up well for the spring required careful planning but was no major problem for the MPF group, however with the HPF group it required wintering the whole herd off for three to four weeks.

The cropping system was affected greatly by the weather which caused significant problems in getting the timing of operations right as well as its effect on the crop. The availability of contractors at the right time can also be a problem, especially at planting time. The cropping system definitely needed a higher level of organisation and timing. The new grass pastures also required careful management especially during the first winter to avoid pugging damage and also possible nitrate poisoning problems.

Economics

Overall the MPF group had the highest EFS at $2135/ha (Table 1). The control group and crop group were similar at $2007/ha and $2034/ha respectively and the HPF group the lowest at $1842/ha. The relative differences varied between the years depending on the season and milk payout levels. The control group was best in one year, the MPF group best in two and the crop group best in one year, while the HPF group was the lowest for three years but was slightly ahead of the control and crop groups in one year.

The extra milk production from the HPF group covered the cost of the extra feed purchased but not all the extra costs of milking extra cows. The major extra cost is the labour cost which equaled $150/ha in this analysis, which may or may not occur in individual farm situations.

The extra milk production on the crop farmlet covered the cost of the cropping and allowed a high level of regrassing but produced minimal economic benefit over the period of the trial. The benefit should improve as higher levels of new pasture occur if they perform to expectation.

The major factors affecting the relative economics of the systems from year-to-year and farm-to-farm are labour costs, feed costs and milk payouts. The sensitivity to feed costs and milk payouts are outlined in Figure 1 and Figure 2. On this analysis the milk payout has a bigger effect on total EFS, however the relative profitability of each system does not change except at the extremes. At high milk payouts the purchased feed systems are relatively more economic, and at low payouts relatively less economic compared to the control group.

The feed cost variation has less effect on total EFS but a greater effect on relativities between the systems with lower feed costs resulting in purchased feed systems being relatively more economic and higher feed costs making them relatively less economic. The MPF group however, remains significantly ahead of the HPF group unless extra labour costs are excluded. With different supplementary feed costs systems, and economies of scale benefits on some farms compared to this analysis, the economics of high feed input systems would be better. This would be particularly so if high per cow production is achieved.

Conclusion

Using extra feed inputs to extend the lactation length has produced a good response rate of 142 g MS/kg DM, which has been quite economic over a range of milk payouts and feed costs with minimal extra labour and capital outlay. Using extra feed to run a higher SR has produced a moderate response rate of 84 g MS/kg DM. The extra milk production has covered the cost of the extra feed, however, with the cost of running the extra cows, extra labour and cost of capital included, the system has been relatively uneconomic under the cost structure used in this analysis. This, however, is very dependent on relative milk payouts, feed costs and capital costs, which vary from year-to-year and farm-to-farm, and the system could be economic in some circumstances, especially with lower supplement and labour cost.

The use of summer turnips and Triticale cereal silage has resulted in extra milk production which has

Table 3 Economic analysis (4-year average).

		Control	MPF	HPF	Cropping
Income					
Milksolids (4.40/kg)		4685	5142	5740	4918
Cattle ($71/cow)		235	235	283	235
Gross income ($/ha)		4920	5377	6023	5153
Expenditure					
Animal health	$57/cow	190	190	228	190
Breeding	$27/cow	90	90	108	90
Shed	$26/cow	86	86	104	86
Electricity	$26/cow	86	86	104	86
Hay/silage made (15¢/kg DM fed-out)		140	162	48	116
Supplements purchased (fed-out cost)					
- maize silage 34¢/kg DM (27¢ off-truck)				407	
- grass silage 37 ¢/kg DM ($70/bale)		17	87	218	
- Hay 34 ¢/kg DM ($76/bale)			212	272	
- Winter grazing $17/week incl freight				115	
Cropping					247
Replacements	$106/cow	353	353	424	353
Fertiliser and N	$300/ha	300	300	300	300
Repairs & maintenance	$250/ha	250	250	250	250
Vehicles	$125/ha	25	75	75	75
Administration	$100/ha	125	125	125	125
Standing charges	$100/ha	100	100	100	100
Standard depreciation	$75/ha	75	75	75	75
Wages standard	$225/cow	750	750	900	750
extra	$25/ha		25		
Interest on cows	$77/cow	256	256	308	256
Total expenditure	$/ha	2913	3242	4181	3119
EFS	$/ha	2007	2135	1842	2034

been sufficient to cover the cost of regrassing a relatively high 10-12% of the farm annually, but has not produced an overall economic benefit. Climatic conditions have a significant effect on the operation and practicality of this system, and obtaining good crop yields relative to grass growth over the same period is very significant in the economics. The effect of newer pasture cultivars shows promise, but a higher percentage of the farm in new cultivars is needed to prove this. With better crop yields and expected responses to new pasture cultivars, this system could be quite beneficial.

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