Pastoral 21
South Otago site summary

Aim of the South Otago trial

- Increase MS production from 646 to more than 810kg MS/ha/yr (expressed per whole dairy system hectares).

- Increase operating profit from $2033 to more than $2185/ha/yr (expressed per whole dairy system hectares).

- Reduce N losses by 30% (from 28 to 19 kg N/ha/yr); P losses by 40% (from 1.5 to 0.9 kg P/ha/yr); and sediment losses by 50% (from 250 to 125kg P/ha/yr).

Three approaches where trialled and compared against a control.

1. A control farmlet typical of dairy farm systems in the region including forage crop wintering on a support block.

2. Optimised crop wintering farmlet
   Traditional winter crop feeding but with higher feed allocation targets to achieve better animal performance, combined with cereal silage and annual ryegrass grown on the milking platform. Less N fertiliser was applied and calving was delayed by two weeks to reduce the amount of supplement used in spring. This farm system also investigated different grazing strategies for crops on undulating land to protect the gullies and reduce the potential runoff and sediment loss.

3. Restricted shoulder and winter grazing farmlet
   Cows wintered in a loose-housed barn (also used in the shoulders of the season) to reduce the amount of pasture damage during spring and autumn, and to reduce the amount of urinary N deposited on pasture during autumn.

Key findings

Profit

At an average milk price of $6.45 for the three years of the trial, neither of the trial farmlets achieved the profit targets and delivered lower operating profits than the Control farmlet.

The Optimal farmlet trial was able to reduce some milking platform operating expenses, but not winter feeding and cropping costs. The farmlet was unable to increase total milk production by enough to increase revenue.

The Restricted farmlet was unable to generate enough extra revenue to counter the high capital cost associated with the loose-housed barn and had increased wintering costs due to the amount of imported feed needed while cows were housed.

Production

Results from three full lactation seasons show that there was very little difference between the Control, Optimal and Restricted herds. This was primarily driven by the two trial farmlets being unable to lift per cow production enough.

Environmental results

The Optimal and Restricted herds both reduced Phosphorous loss compared to the Control herd by 31% and 37% respectively. Sediment loss values were reduced by 52% and 65% for the Optimal and Restricted farmlets respectively.

Averaged across the 3-year monitoring period, estimated whole-system N loss values for the Control, Optimal and Restricted farmlets were 18, 14 and 13 kg N/ha/yr respectively, representing reductions of 24% and 29%

Table 1: Farmlet details for Optimum and Restricted farmlets (start date 1 September 2011) - Telford

Normal practice crop wintering (Control)	Optimised crop wintering (Optimal)	Restricted winter and shoulder grazing (Restricted)
2.9 cows/ha	2.8 cows/ha	2.8 cows/ha
PSC 10 Aug	PSC 24 Aug	PSC 10 Aug
120kg N/ha/yr	30kg N/ha/yr	80kg N/ha/yr
Summer turnips + some whole crop cereal	Whole crop cereal and Italian ryegrass	Pasture silage
Wintering on crop	Wintering on crop	Wintering indoors on silage
Normal crop grazing	Critical source area protection	N/A

for the Optimal and Restricted farmlets, compared to the Control.

Nutrient losses were reduced by:

Phosphorous and sediment

- Protecting Critical Source Areas (CSAs) during winter grazing for the Optimal herd

- Removing cows from crop and pasture during winter and shoulder seasons for the restricted herd.

Nitrogen

- Lowering total annual N fertiliser inputs (resulting in a small reduction in stocking rate)

- Minimising N losses to water from surface runoff by reducing run off entering water ways

- Eliminating summer turnip crops reducing N loss from cultivation and loss while grazing on bare ground

- Removing winter applications of N fertiliser

- Feeding cereal silage instead of pasture silage in autumn as it has a low N content, reducing urinary N excreted.

How were these results achieved?

Farm management recommendations. If limiting the use of N fertiliser then:

- Apply N fertiliser when a deficit is indicated by a feed wedge

- Target N fertiliser to pastures that have the greatest yield potential (i.e. Italian ryegrasses in spring).

- Apply N fertiliser when paddocks displayed signs of deficiency (i.e. clear urine patch, yellowing, or poor performance) rather than blanket application to all paddocks

When using short rotation (hybrid) ryegrasses:

- Ensure regular pasture walks are completed in early winter/spring as hybrid winter growth rates mean pasture quality can get away.

- To avoid a high proportion of the farm being out for re-grassing short rotation ryegrasses in autumn, consider under sowing summer crops.

When protecting critical source areas (CSA) (gullies and swales):

- Avoid cultivation and planting these areas

- Plan ahead of time where to site supplemental feed and water troughs

- Fence off CSAs to protect from stock

Table 2: A summary of production from the Optimal and Restricted systems, and comparison with performance of the Control, as an average of three seasons (2012/13-2014/15). A similar level of feed offered per cow in winter has been assumed for all three systems for the purposes of the comparison.

Farmlet	Optimal	Restricted	Control
MS produced (kg/cow/yr)	334	335	330
MS produced (kg/ha/yr)	930	947	963
Days in milk	242	253	246
Pasture growth (t DM/ha/yr)	13.1	13.8	13.1[1]
Pasture eaten (t DM/ha/yr)	11.3	11.5	11.9
Pasture utilisation (%)	86%	83%	90%
N fertiliser on pasture (kg N/ha/yr)[1]	42	74	109
Turnip fed (kg DM/cow)	0	0	128
Silage made on farmlet (kg DM/ha)	360	890	362
Whole crop silage made on farm (kg DM/cow)	256	0	15.8
Total supplement offered (kg DM/cow)	427	523	604
N leached milking platform (kg/ha/yr)	14	13	18
P loss risk (kg/ha/yr)	0.41	0.38	0.6
Sediment risk loss (kg/ha/yr)			
Estimated OP ($/ha/yr)[2]	2103	1944	2234

[1] Based on two years of data.

[2] These numbers are being updated once the production data has been finalised.