Pastoral 21
Manawatu site summary

Aim of the Manawatu trial

- Increase MS production from 922 to 1210 kg MS/ha
- Increase operating profit at a payout of $7/kg MS from $1800/ha to $2200/ha
- Reduce N and P losses from 19 to 15 kg N/ha and 3.6 to 3.0 kg P/ha

This was achieved by comparing a Standard farmlet, managed as a typical pastoral based farm in the Manawatu region at a system 3-4, with a House farmlet using a 200-cow freestall barn to winter all cows and practice duration-controlled grazing (cows grazing on pasture for between 4 to 8 hours daily).

The trial ran for three consecutive lactation seasons, from June 2013 to May 2016.

Table 1: Farmlet design for Standard and House farmlets (start date June 2013) - Manawatu.

Farmlet	Standard	House
Stocking rate (cows/ha)	2.65	2.8
N fertiliser use (kg N/ha)	42	38
Cow BW/PW (2016)	121/142	122/145
Wintering off farm	40%	0%
Replacements	22%	22%
Cow liveweight (kg) (2013)	480	480
Freestall barn	No	Yes
Feedpad	Yes	No
Area in summer turnips	10%	11%

Key findings

Profit

At a milk price of $4.15/kg MS (average milk price from 2014-15 and 2015-16 season), the House farmlet had an operating profit of -$1488/ha compared to the Standard farmlet with an operating profit of $186/ha.

This financial difference was as a consequence of the House farmlet not generating extra revenue required to cover the large capital investment in standoff infrastructure (depreciation cost calculated at $914.50/ha), in addition to increased supplementary feeding, manure handling and working labour costs.

Averaged across the two seasons, the breakeven milk price for the House farmlet was $5.73/kg MS, $1.12/kg MS more than the Standard farmlet.

Production

Production results from the full two lactation seasons (2014-2016) indicate that:

- The House farmlet produced 8% more MS/ha/year than the Standard farmlet
- The Standard farmlet produced 4% less MS/cow/year than the House farmlet in the 2014-15 season, but produced 2.5% more MS/cow/year than the House farmlet in the 2015-16 season
- The House farmlet achieved 4-8 more days in milk than the Standard farmlet
- Milk production on a per hectare and per cow basis are well above the Manawatu regional averages for both farmlets
- Pasture production across the three seasons is relatively similar (difference of less than 1 t DM/ha/year) between both systems at around 13-14 t DM/ha/year
- Pasture eaten on the House farmlet was on average 0.6 t DM/head/year lower than the Standard farmlet
- Supplements consumed on the House farmlet was on average 0.5 t DM/head/year more than the Standard farmlet

Environmental

The Housed farmlet leached an estimated 7% less N and 50% less P than the standard farmlet. The Housed farmlet was able to achieve a 29% reduction in nitrate leaching in late summer/early winter grazing, by ~20% reduction in grazing time. Drainage plots with cow's duration controlled grazing showed a similar trend in reduction as estimated by Overseer, but at lower levels.

Table 2: Key results from two lactation season from 2014/15 to 2015/16 - Manawatu.

Farmlet	Standard	House
Production		
MS produced (kg/cow/yr)	458	461
MS produced (kg/ha/yr)	1212	1317
Days in milk	257	263
Feed and fertiliser		
N fertiliser use (kg N/ha)[1]	42	38
Pasture growth (t DM/ha/yr)	13.7	13.9
Pasture eaten (t DM/ha/yr)	10.3	10.2
Supplement intake (t DM/ha/yr)	3.5	5.4
Supplement purchased (t DM/ha/yr)	256	371
Supplement produced (t DM/ha/yr)	81	100
Animal		
Average BCS at calving	5.1	5.5
Financial		
Farm operating profit ($/ha/yr)[2]	186	-1488
Environmental		
N loss to water (kg N/ha/yr)[3]	14	13
N loss to water (kg N/ha/yr)[4]	9	7
P loss to water (kg P/ha/yr)	3.0	1.6

[1] Average N application rate for two years (2014-2016)

[2] Based on a milk price of $4.15/kg MS

[3] Overseer predicted average N loss from 2014-15

[4] Average 2014-15 N loss figures measured from drainage plots

How were these results achieved?

Use of freestall barn and duration controlled grazing

Lactating and dry cows were stood off and housed in a freestall barn during the wet winter/spring period (May-October) and the dry late summer/autumn period (January-April) to reduce treading damage and N urinary load. The number of hours housed during these periods was determined by specific housing protocols (Table 3).

Table 3: Housing protocols

Objective	Season	Criteria	Grazing Time (h/day)
Avoid treading pasture damage	Winter/ Spring	Soil moisture deficit <1.5 mm; average pasture cover <2000 kgDM/ha	0
Avoid treading pasture damage and maintain pasture quality	Winter/ Spring	Soil moisture deficit <1.5mm; average pasture cover >2000 kgDM/ha	4
Avoid soil compaction	Winter/ Spring	Soil moisture deficit 1.5 – 4 mm	8-12
	Winter/ Spring	Soil moisture deficit > 4 mm	No restrictions
Decrease 'at risk' urine N leached	Late Summer/Autumn	1 February to 31 May	12

Effluent slurry was collected in the freestall barn by a scraper system and stored in a 3000m3 capacity pond from April to August, depending on the SMD. The even spreading of effluent N by slurry tankers onto paddocks at times when actively growing pasture was able to capture the nutrients ensured gains were made.

There were also gains made through protecting pasture from treading damage in the wet period and having the capacity to extend lactation slightly compared to the Standard farmlet.

Improved feeding and feed utilisation

The use of standoff facilities allowed for improved feed utilisation given the increased provision of supplementary feed fed in the barn when cows were stood off paddocks.

The cows' diet and the quality of feed consumed were able to be more closely monitored and manipulated at various stages of lactation where drops in cow productivity were observed through the quality of the supplements offered whilst being housed.

Through protecting pastures from treading damage in the wet period, pasture utilisation was improved. Weekly pasture covers measured using the C-Dax pasture meter improved pasture management and decisions made on paddock rotations.