

Research summaries 2017.2018 season

DTT Gibson farm.

Objective:

Living within the FEI – Biophysical & economic effects of supplementing grazing dairy cows with PKE or locally grown kibble maize / barley grain.

Trial design:

Two hundred and twenty-seven Friesian cows were split into three treatment groups in June 2017, Pasture only (All Grass; 69 cows - 2.9 cows/ha), PKE (79 cows - 3.3 cows/ha) and kibble maize / barley (Grain; 79 cows - 3.3 cows/ha).

The season:

The season included a very wet / cold spring, followed by an early hot / dry summer which resulted in prolonged period of feed deficits. Autumn rains arrived early which resulted in good autumn growth.

The All Grass treatment was self-contained with only pasture, and pasture silage made from spring surplus, available for the treatment. The cows were milked 1 x day from late December to drying off due to summer dry. 10% of cows were culled pre-Christmas.

The PKE herd was fed PKE from the start of lactation through to drying off apart from a period 23 March to 12 April when pasture supply was adequate. The amount of PKE fed varied between 1 & 5 kg/cow/day depending on estimated pasture intakes.

The grain herd was fed kibble maize from early lactation through to 1 October. Feeding resumed from the 1st December till drying off apart from a period 26 March till 10 April when pasture intakes were adequate. Kibble maize was replaced by barley from 14th March until drying off. The amount fed varied between 1 & 6 kg/cow/day. Culls (4%) were removed from the All Grass herd in December, with further culling in February (14% All Grass, 10% PKE and Grain herd) & remaining culls in April. Remaining cows were milked through to early – mid May and were dried off according to feed budget and Body condition Score.

Results

Milk production

	Litres/cow/day	Fat %	Protein%	Kg MS/cow/day	Days in milk	Kg MS/ha
All Grass	4298	4.51	3.80	357	260	1028
PKE	4924	4.59	3.74	410	256	1349
Grain	4821	4.45	3.83	398	256	1309

The PKE herd produced 53 & 12 kg MS/cow, & 321 & 49 kg MS/ha more than the All Grass and Grain herd, respectively. Days in milk were similar for all herds.

Supplements fed (kg DM)

	Total	Per cow	Per ha
All Grass	0	0	0
PKE	56,577	716	2,357
Grain	49,986	633	2,083

Supplement fed per cow and per ha was higher for the PKE herd mainly due to the feeding of PKE through the October / November period. Cost of PKE averaged \$231/tonne = 25.6 cents/kg DM. Cost of Grain = \$504/tonne = 58.6 cents/kg DM delivered on farm.

Pasture harvested as silage (kg DM)

	Total	Per cow	Per ha
All Grass	25,036	363	1,043
PKE	23,845	302	994
Grain	17,545	222	731

Pasture silage harvested was highest for the All Grass herd due to the lower stocking rate. The PKE herd had higher silage harvested due to PKE been fed over the surplus period creating a higher pasture surplus.

Pasture grown. Feed conversion efficiency & MS response to supplements

	Pasture growth (kg DM/ha)	Feed conversion efficiency (kg MS/kg DM)	Response to supplement (kg MS/kg DM)
All Grass	15,464	15.0	0
PKE	15,470	13.2	137
Grain	15,070	13.1	136

Pasture grown on the Grain farmlet was 400 kg DM/ha lower than the All Grass and PKE. Feed conversion efficiency was lower in the supplemented herds. Total season Milksolids response to supplement in the PKE and Grain herds was high due to the higher stocking rate and a difficult season climatically resulting in lengthy periods of pasture deficits, once a day milking from Christmas and earlier drying off in the All Grass herd.

Mating results (%)

	Submission rate	6 week in calf rate	Empty rate
All Grass	88	71	10
PKE	90	73	9
Grain	87	71	10

There was no difference in mating results between the herds.

Cow Liveweight and Condition score

Cow Liveweight and condition score at the start of the trial in June 2017 was similar for all herds (503 kg LWT and 4.5 condition score). At drying off cows in the All Grass herd were 522 kg vs 518 kg for the PKE herd and 490 kg for the Grain herd.

FEI results

The FEI of the All Grass varied between 3 & 5.2 (Fonterra A level). The FEI of the PKE herd was generally below the Fonterra grading level of 7.5 apart from a period in late January when PKE feeding per cow was at 5 kg/cow/day. The FEI of the Grain herd varied between 4.1 and 6.4.

Economics (\$/ha)

	All grass	PKE	Grain
Total income	7,430	9,657	9,389
Expenses	4,143	5,365	5,918
EFS/ha	3,287	4,292	3,471

Summary

The feeding of Grain in-shed to lactating dairy cows was not economic due to the high cost of the grain (kibbled maize/barley) at 58.6 cents/kg DM. Feeding of PKE during periods of feed deficit and through spring to harvest extra pasture silage was profitable at a cost of \$231/T delivered and a payout of \$6.69/kg MS. Mating performance of an All Grass / lower stocked system was the same as the supplemented herds at a higher stocking rate.

DTT Kavanagh farm

Objective: Production and profitability of autumn vs spring calving.

The Autumn/Spring calving trial was established in October 2017. 604 mixed aged Friesian-cross cows were randomly allocated into 2 herds with 104 ha/farmlet to give a stocking rate of 2.9 cows/ha. The spring calving cows were mated from 4 October to 20 December (11-week mating period). Autumn calving cows weren't mated in spring with mating period 10 June to 27 August 2018 (11-week mating). Spring calving cows were dried off from 12 May according to a feed budget and BCS with calving starting 10 July. Autumn calving cows were milked through the winter of 2018 and will be dried off based on BCS, expected calving date and feed budget starting December 2018.

Culls from both herds were progressively dropped out from December 2017 and empties removed from the spring calving herd in April.

First lactation results (to 31 May 2018)

	Autumn	Spring
Litres/cow	5,038	4,536
MS%	8.87	8.92
Kg MS/cow	444	402
Kg MS/ha	1,243	1,126
Days in milk	296	264
LWT Dec (kg)	497	492
LWT May	498	501

Per cow production was similar for both herds until April. Days in milk for the autumn herd were 32 days longer due to the cows been milked through May. Cow liveweight was similar for both herds through to early May.

DTT Waimate West farm

Objective

To determine under autumn calving the production and profitability of forage cropping.

Trial design

The trial is a two-herd, both herds autumn calving, with 63 Jersey cows with 17.2 ha/farmlet, stocked at 3.6 cows/ha. One farmlet is self-contained with a cropping programme, and the second farmlet having purchased supplementary feed. The season was a transition year to autumn calving. The cows calved in the late winter but were not mated in spring and were due to be mated in the winter of 2018 and will calve again in the autumn of 2019.

The season

Winter was very wet but was managed by feeding maize and pasture silage to the purchased herd, and maize silage and oats and annual crop to the cropping herd.

Towards the end of September surpluses arrived and supplementary feeding ceased until it became dry in late November/early December, when maize silage and pasture silage was fed to both herds.

Supplementary feeding of palm kernel started at the end of December to both herds, and maize silage feeding continued through the dry spell of January/February.

Once the drought broke, there was a period of good pasture growth, which allowed pasture only feeding to continue until drying off in mid-May.

Cropping

For the cropping treatment, 25% of the farmlet was planted in crops, of which 20% was maize for silage, and 5% into kale for winter feed.

The initial kale sowing was a failure, and the paddock was re-sown again late January. This yielded an estimated 11 tonnes per hectare by grazing in winter.

The maize was harvested in mid-March for an average crop of around 18 tonnes per hectare.

The cropping herd consumed 1544 kg DM/cow over the season. This was made up of 211 kg/cow of pasture silage, 910 kg/cow of maize silage, and 423 kg/cow palm kernel.

The purchased herd consumed 1099 kg DM/cow over the season. This was made up of 146 kg/cow of pasture silage, 630 kg/cow of maize silage, and 324 kg/cow palm kernel.

Milksolids Production

The cropping herd produced 370 kg MS/cow and 1354 kg MS/ha.

The purchased herd produced 395 kg MS/cow during the season, and 1448 kg MS/ha during the season.

An economic evaluation of the transition year will be done when this trial is fully written up.

	Cropping	Purchased
MS/cow	370	395
MS/ha	1354	1448
Cow LWT June 2018 (kg)	395	393
Cow CS June 2018	4.6	4.6
Pasture silage conserved (kg DM/cow)	97	150
PKE fed (kg DM/cow)	423	324
Total supplement fed (kg DM/cow)	1544	1099
N Applied (kg N/ha)	258	264

DTT Stratford farm

Objective

To determine system performance, (cow, pasture, economic and environment) of extensive winter use of a covered wood-chip stand-off pad.

Method & Results

Herd and feed management

In June 2017, two randomised herds of 83 Jersey cows were assigned to two 25 ha farmlets (stocking rate 3.25 cow/ha). Feed inputs and management were the same for each farmlet except cows in the Winter Pad herd had access to the covered wood-chip stand-off pad when required. Dry cows were fed grass silage and milking cows were fed PKE. Cows in the Winter Pad herd were stood off on the covered pad every evening during winter. Cows were on the pad for around 17 hrs most days and up to 21 hours on very wet days. Cows continued using the pad during calving, and the herd were stood off in early spring and late autumn when soils were very wet. All supplements (grass silage for dry cows and PKE for milkers) were fed in the shed.

Cows in the control herd were wintered on pasture and dry cows received grass silage in the paddock. The Control herd were only stood off pasture on races/yards on very wet nights. PKE was fed to the control herd in troughs on the milking shed exit race.

Winter/Spring

Winter, 2017 was dry in June but very wet from July to mid-October with around 300 mm rainfall per month (50% above average levels). Pasture was not well utilised in the wet conditions. Over the winter the Winter Pad herd had greater liveweight (+7 kg) and condition score (+ 0.3) than the control herd most probably due to better feed utilisation and potentially less energy requirements from these cows. At the start of calving, average pasture cover for the Winter Pad farmlet was 67 kg DM/ha greater than the Control, mainly due to higher residual grazing levels at times. PKE feeding to milkers was planned to finish in late September but with the wet conditions it was continued to late October for both herds.

The Winter Pad herd produced 5% more MS/cow by the end of October. Surplus pasture shut for silage was low and late with only 11% and 18% of the Control and Winter Pad farmlets harvested respectively and only 45 and 88 kg DM/cow made.

Spring/mating

Wet conditions ended in mid-October and the next two months were relatively dry with only 40% of average rainfall and below average pasture growth. This resulted in milkers being fed PKE again in December, and further PKE contracted for the summer-autumn. Hay was purchased to ensure a minimum feeding level in the winter. Milk production continued at a reasonable level. Three- and four-week submission rates were slightly higher in the Winter Pad herd, but overall six week in-calf and final empty rate were the same for both groups. The higher early submission rates mean the Winter Pad herd will have a quicker predicted early calving.

Summer/Autumn

Good rain fell in early January and the rest of the summer and early autumn had 60% above average rainfall levels and pasture growth rates were well above average. PKE feeding stopped until the late autumn and extra silage was made, although totals were still only 40% of standard desirable wintering levels (92 and 129 kg DM/cow for the Control and Winter Pad herds, respectively).

Despite having plenty of grass on offer, autumn milk production was poor, and cows struggled to maintain 1 kg MS/cow/day or gain BCS so were put on once-a-day milking in mid-March. The Control herd was dried off on May 1st and the Winter Pad herd 6 days later (due to the extra silage available in their feed budget). Cows were fed grass and PKE to gain BCS but did not reach target BCS by June. The Winter Pad herd were 0.1 BCS units less than the Control herd.

Overall performance

Cow

Final milk production was 1063 kg MS/ha and 1115 kg MS/ha for the Control and Winter Pad herds with the Winter Pad herd producing 5% or 16 kg MS/cow and 52 kg MS/ha more than the Control herd. There were no detectable differences in animal health or calving losses between the herds.

Pasture

Pasture grown was 15 and 15.5 tonne DM/ha for the Control and Winter Pad farmlets respectively. Pasture pugging was scored through the winter to end of calving. This was done on a 1 to 5 basis for each winter break with 1 being slight pugging to 4 being bad pugging and 5 being severe pugging where re-grassing is required. The Control farmlet had 43% of the farmlet pugged to some degree compared to 21% on the Winter Pad farmlet, 6.3% and 2.1% of the Control and Winter Pad farmlets, respectively being bad or severe. Severely pugged areas did not regrow much pasture other than weeds unless re-seeded and this occurred in 0.3% of the control and 0.1% of the Winter Pad farmlet area.

Environment

The winter pad was cleaned out and cleanings spread on the winter pad farmlet in the autumn. An interim nutrient budget using OVERSEERFM assuming cow shed effluent spread evenly across the farm calculated root zone nitrogen losses of 74 kg N/ha and 69 kg N/ha and Phosphorous losses of 0.4 and 0.3 kg P/ha for the Control and Winter Pad farmlets respectively.

Economics

The extra milk production from the Winter Pad herd resulted in an extra \$107/cow and \$355/ha income at the \$6.70 milk payout. An interim analysis indicated that the extra cost of running the covered pad such as wood chips, cleaning and Repairs & Maintenance etc was a similar amount. However, the Control farmlet required extra re-grassing and rolling, and the Winter Pad herd had extra silage harvesting costs, so net running cost were \$16/cow gain to the Winter Pad group.

However annual capital costs of the covered pad are around \$100/cow which resulted in an overall loss in the Winter Pad farmlet of \$84/cow. Labour input is still to be analysed but is expected to be similar between the groups. The Winter Pad herd had quicker expected calving rate and less previous pasture pugging damage so there are some expected benefits for the current season.

Summary

At the end of the first season of the Winter Pad trial on the DTT Stratford Demonstration Farm, milk production was 5% greater in cows that used the Winter Pad extensively during winter, and when

required during spring and autumn. When the running costs of the covered wood-chip stand-off pad and re-grassing costs for the Control herd were considered the increased milk revenue (milk price \$6.70) resulted in a net gain of \$16/cow. However, annual capital costs of the covered stand-off pad were approximately \$100/cow, which resulted in a net loss of \$84/cow for season 1. Season 2 will determine if there are any positive carry-over effects of a tighter calving spread and less pugging damage in the Winter Pad herd.

	Control	Winter pad
MS/cow	320	336
MS/ha	1063	1115
Days in milk	247	251
Cow LWT June 2017 (kg)	398	398
Cow LWT May 2018 (kg)	404	401
3-week submission rate (%)	84	89
Empty rate (%)	11	11
Silage made (kg DM/ha)	305	428
Pasture grown (t DM/ha)	15.0	15.5
N Applied (kg N/ha)	161	163