Factors affecting the profitability of supplementary feed use

Key Messages

- **The cost of extra milksolids from supplement can be higher than face value**
- **For every $1 spent on supplements, farm working expenses (FWE) can increase by up to $0.95 effectively doubling the cost of the supplement**
- **Milksolids responses generally decrease with increasing supplement amounts**
- **Profit is more sensitive to the milksolids response than supplement price**
    - **Focus management efforts accordingly, i.e. monitor residuals for efficient use of supplements rather than chasing supplement price deals**

Maximising milk responses to supplements

- **Minimise supplement wastage**
- **Monitor pasture residuals and be prepared to pull supplement out when residuals rise**
- **Use pasture residuals, rather than milk production, to drive supplementary feeding decisions**
- **Be aware of the impact of inshed feeding on supplement responses i.e. feeding for cow flow, not pasture deficit, could have a high marginal cost if pasture is being wasted or topped**

Background

Supplement feeding to boost milk production has increased significantly over the last twenty years, particularly since the introduction of Palm Kernel Expeller (PKE) into the dairy sector. Farmers generally monitor their milksolids production to assess the return on this supplement, but it can be difficult to determine this at a system level. A 3-year farm systems supplementary feeding trial conducted by Northland Dairy Development Trust in 2018-2021 showed that not all milk responses are profitable, due to the relatively high cost of the extra milk produced.

The trial compared three farmlets to assess milk response. The base farm (Pasture only) imported no supplementary feed, while the other two farms used varying levels of supplement, primarily PKE (PKE only) or with some extra DDG (PKE Plus) when the fat evaluation index (FEI) was limiting milk quality. Milk production on the supplemented farms was compared with the Pasture Only farm to calculate a milk response in grams of MS per kgDM fed. The Pasture only farmlet was stocked at 2.7 cows/ha compared to 3.1 cows/ha for the two supplement farmlets.

Results

The milksolids responses to increased stocking rate and supplementary feed were relatively high but decreased with increasing levels of supplement (Table 1). Pasture residuals were monitored closely, and supplement levels were altered frequently as residuals rose above or fell below the target of 1600 kgDM/ha. There was no effect of treatment on reproductive performance over the

three years, noting that 6 week in-calf rates and empty rates were all at industry target, indicating cows were well fed in all herds.

Table 1: 3-year average milksolids production, supplementary feed use, and milksolids response

	Milksolids yield (kgMS/ha)	Milksolids yield (kgMS/cow)	Supplement Purchased (kgDM/cow)	Milksolids Response (gMS/kgDM)
Pasture Only	916	342		
PKE Only	1209	389	837	113
PKE Plus	1328	426	1253	91

Income and expenses were recorded on each farmlet, with machinery use and staff hours recorded separately allowing the hidden costs (additional farm working expenses: FWE) associated with supplement feeding, primarily in the areas of staff time, machinery and extra milking costs, to be captured. The figures were then adjusted for inflation into 2024 dollars.

For each $1 spent on supplement, other farm expenses rose by $0.95, effectively doubling the cost of the supplement.

This had a significant impact on the profitability of supplement use. Comparing the extra cost with the extra milk production allowed the marginal cost of extra milk to be calculated.

Table 2: 3-year average financial results (adjusted into 2024 $)

	Farm Working Expenses ($/kgMS)	Marginal cost extra milk ($/kg MS)	Operating Profit @$8.50/kgMS	Operating Profit @$9.00/kgMS	Operating Profit @$9.50/kgMS
Pasture Only	$6.70		$1,821	$2,279	$2,737
PKE Only	$6.85	$7.68	$2,131	$2,735	$3,339
PKE Plus	$7.02	$9.38	$2,032	$2,696	$3,360

Profit decreases when the marginal cost of producing the extra milk is above the milk price. Care must be taken when using average farm working expenses to assess supplement profitability because the marginal cost of the extra milk produced may be significantly higher.

Profit was more sensitive to milk responses than supplement price, and decreased by:

- $620/ha for every 25 gMS/kgDM lower response
- $274/ha for every $100/t extra PKE price

Results suggest more time should be spent monitoring pasture residuals and adjusting feeding than chasing cheaper supplement prices.

Principles of Marginal Milk

The marginal milk price is calculated by taking the additional costs associated with producing more milk from supplementary feed and dividing it by the additional milksolids produced from that supplement. Marginal milk is based on the principle that the increase in MS production associated with supplementary feed inputs is large to begin with but gets smaller and eventually flattens with increasing input i.e. the law of diminishing returns.

Example calculation

	Production (MS/ha)	Extra milksolids (kg/ha)	Total Cost ($/ha)	Extra cost ($)	Marginal cost of extra milk ($/kg MS)
Pasture Only	916		$6,455		
PKE Only	1209	293	$8,704	$2,249	$7.68 ($2,249/293)
PKE Plus	1328	119*	$9,820	$1,116*	$9.38 ($1,116/119)

*Difference between PKE only and PKE plus farmlets

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