Individualised grain feeding in a grazing dairy system

First 100 days - Factsheet 6

Key points

Feeding a mix containing wheat grain, barley grain and canola meal was more profitable than feeding wheat grain alone at the same rate in early lactation.

Feeding groups within the herd different amounts of grain in early lactation, based on their nutritional requirements as estimated during the fresh cow period, did not result in higher overall herd milk yield or profit.

Substitution of grazed pasture is an important consideration for farmers feeding high amounts of grain to dairy cows in early lactation.

It was not profitable to feed 9kg DM instead of 7kg DM of the grain mix in early lactation in this experiment, as the extra milk produced did not cover the additional costs.

Introduction

Factsheet 1 and 2 in this series described the importance of feeding cows correctly in the fresh cow period (defined as the first three weeks post-calving). Feeding strategies in the fresh period can be used to 'program' the cow to a certain degree, setting her up to produce more milk throughout her lactation. Feeding maize grain rather than wheat grain in this three-week period is worthwhile in most circumstances, particularly if a grain mix containing wheat grain, barley grain and canola meal is fed to cows in the subsequent early lactation period from 22 days in milk onwards.

The use of canola meal in the supplementary grain mix stimulates increased intake of grazed pasture and increases overall milk production, and this effect has been demonstrated in several experiments.

Differential feeding has become a widespread option on many modern dairies and refers to strategies where individual cows, or groups of cows within a herd, are fed different amounts of supplementary grain.

Methods of differentially feeding grain supplements in early lactation to try and improve milk production and overall profitability have also been investigated in the DairyFeedbase – First 100 Days project. Supplementary grain allocations have been varied based on triggers such as when cows are losing body condition (typically the first 70 days in milk), or their weekly individual cow income over feed costs. But no clear evidence to support implementing these strategies has emerged from the experiments. Indeed, feeding a flat rate of the grain mix containing wheat grain, barley grain and canola meal from 22–130 days in milk has been shown to be equally profitable and is simpler to implement on-farm.

However, there is still interest in differentially feeding grazing cows, given the feeding infrastructure available in modern dairies. Anecdotally, some Australian dairy farmers are 'feeding to production' whereby the higher yielding cows are offered higher amounts of concentrate supplements. This is despite mounting evidence that feeding to yield does not improve overall herd level milk yield or profitability in grazing-based systems.

This experiment tested a variation to the differential feeding approach, whereby cows were fed differentially in early lactation based on their nutritional needs in the fresh period (the first three weeks post calving).

Experiment outline

Six treatments were tested in this experiment. The first treatment was a control treatment where cows were fed 7kg DM of wheat from 5–100 days in milk (Figure 1).

All remaining cows received a maize grain and canola meal mix in the fresh period - from 5–21 days in milk - and were allocated to early lactation treatments based on their nutritional requirements. The nutritional requirements of each individual cow were calculated using information collected within the fresh period, including milk yield, milk composition, age, body weight and body condition score. These cows then received the same wheat grain, barley grain and canola meal mix that has been most profitable in earlier experiments for the early lactation period.

All the control groups (low, medium and high nutritional requirement cows) were given 7kg DM of the wheat grain, barley grain and canola meal mix from 22–100 days in milk. Cows in the high nutritional requirements treatment were fed 9kg DM/cow and cows allocated to the low nutritional requirements treatment received 5kg DM/cow from 22–100 days in milk.

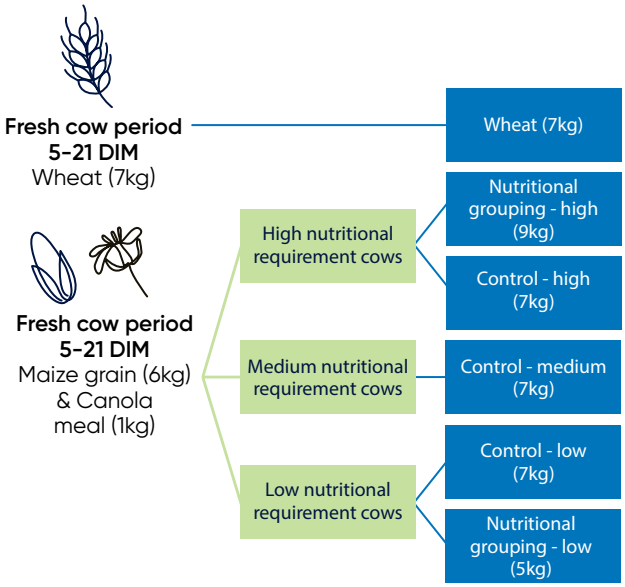

Figure 1 Outline of feeding strategies based on nutritional requirements of cows between 7-14 days in milk. All amounts shown are daily kg of grain supplement offered, blue panels represent the early lactation treatment period from 22-100 days in milk.

Results

There was no difference in milk yield between cows fed wheat grain or maize grain and canola meal from 5–21 days in milk during the fresh period. Specific treatment comparisons of interest within the overall experiment are highlighted in Figures 2 and 3.

Figure 2 reinforces findings from earlier First 100 Days experiments where cows offered the grain mix containing wheat grain, barley grain and canola meal produced more milk than cows offered wheat alone, at the same 7kg DM rate of grain feeding.

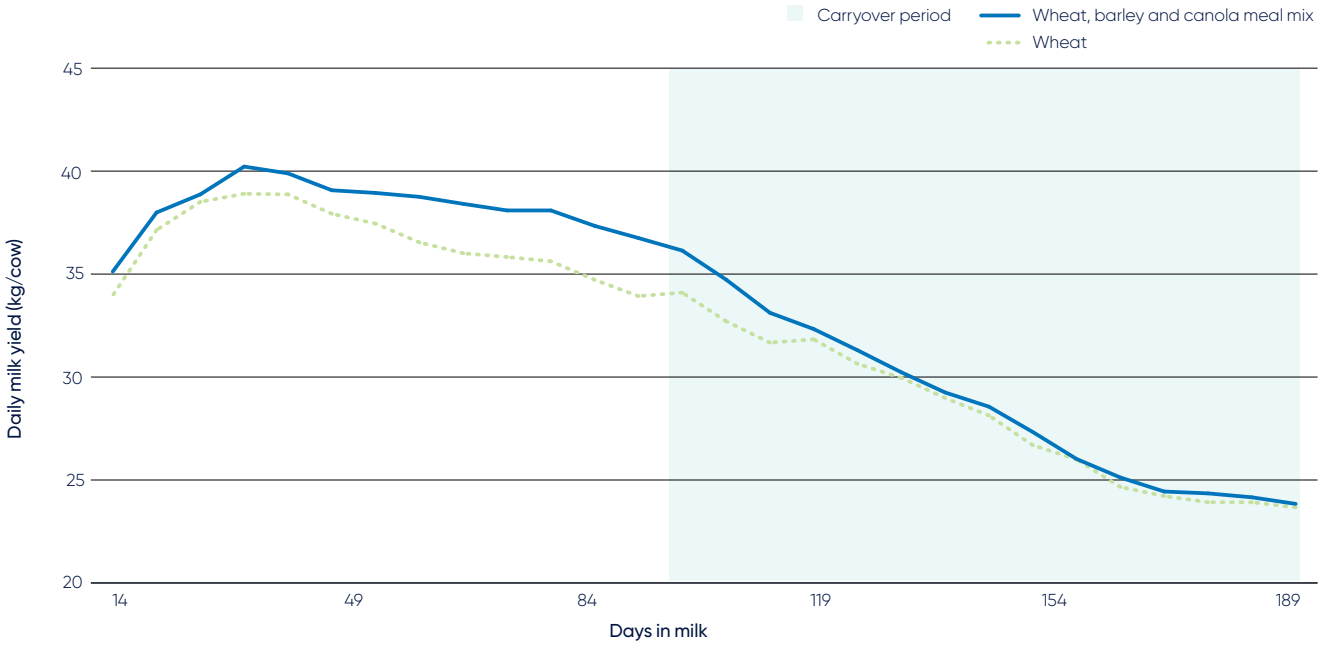

Figure 2 Daily milk yield of wheat only vs the combined low, medium and high control treatments of wheat grain, barley grain and canola meal mix. All cows compared here were fed at the same rate of 7kg DM/cow per day.

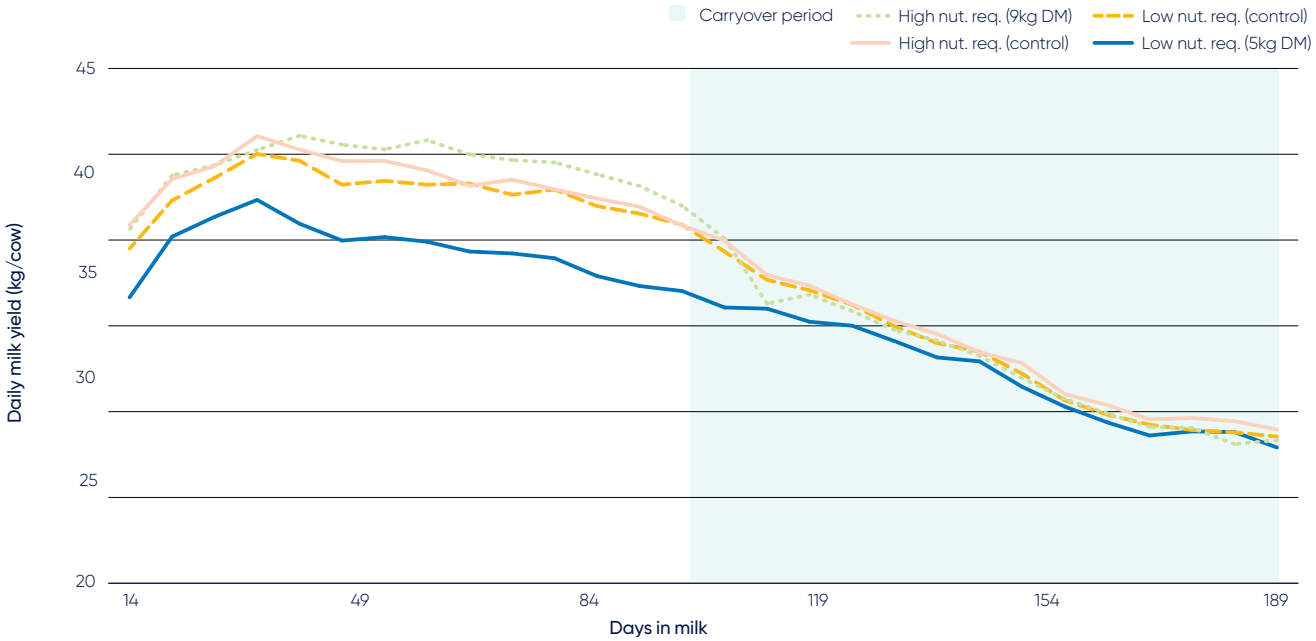

Figure 3 Daily milk yield of cows allocated to high or low nutritional requirement groups and fed 5kg DM, 7kg DM (both control groups) or 9kg DM of wheat grain, barley grain and canola meal mix.

Another key comparison was whether the differential feeding strategy employed had any impact on overall milk yield. Figure 3 shows the high and low nutritional requirement groups that received 9kg DM and 5kg DM respectively from 22–100 days in milk. The control cows from the same high and low nutritional groups that were fed 7kg DM are also displayed.

These results are clear in that differentially feeding cows based on their nutritional requirements did not improve milk production when the average performance of cows in the high group, fed 9kg DM, was combined with cows in the low group, fed 5kg DM, and compared to the average of the cows that received a flat rate of 7kg DM.

Pasture intake

Pasture intake was estimated for a period of five days from 49 days in milk and is shown for all treatments in Figure 4. Notably, cows that were fed wheat grain alone consumed the least pasture, reinforcing findings from earlier experiments.

Figure 4 also provides an insight into one probable reason why the differential feeding approach did not result in higher overall profitability (see economic analysis section below) – cows in the high nutritional requirement treatment ate 1.2kg DM less pasture when 9kg DM of concentrate was offered compared to the control group for the high nutritional requirement cows where 7kg DM of concentrate was fed. This is a clear example of substitution of grazed pasture occurring when high levels of supplements are being fed.

By contrast, in the low nutritional group, it was notable that pasture intake was identical in the cows that received 5kg DM or 7kg DM of grain mix. This is a good example of no pasture substitution occurring, as the extra 2kg of concentrate fed, from 5kg DM to 7kg DM, did not result in a decrease in pasture intake and both groups consumed 17.3kg DM of pasture.

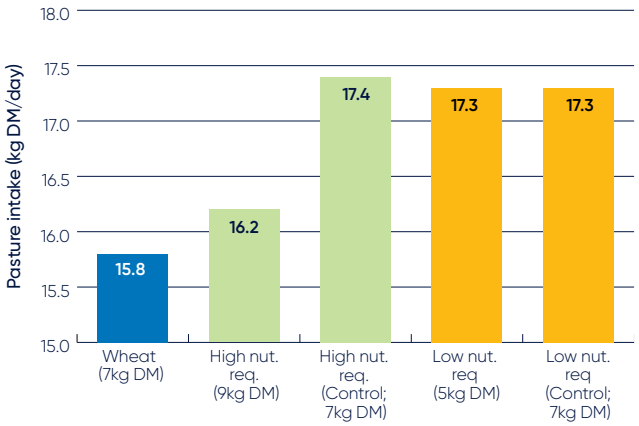

Figure 4 Average pasture DM intake over a five-day measurement period from 49-53 days in milk. Cows in the high and low nutritional treatments received a grain mix comprising wheat grain, barley grain and canola meal at the rates indicated in the graph.

Economic analysis

- An economic analysis was conducted using long term average prices of milk and feed components. It was found that feeding a flat rate of the grain mix was more profitable than feeding wheat. Cows fed 7kg DM/cow of the wheat grain, barley grain and canola meal mix in early lactation were $0.23/cow per day more profitable than cows fed the same amount of wheat.
- Cows in the high nutritional requirements group that received 9kg DM/day of concentrate were less profitable than the control group that received 7kg DM/day of concentrate. Despite milk yield and energy corrected milk yield being numerically higher, the additional milk income was not sufficient to justify the extra feed cost.
- The low nutritional requirement group that received 5kg DM of concentrate were more profitable than the control cows in the group that received 7kg DM.
- While the average profitability of all cows in the high and low nutritional requirement groups combined, was marginally higher than the average profit of all cows in the high and low nutritional requirement control groups combined, the difference was very small, so there was no meaningful advantage in differentially feeding in this experiment.

Summary and implications

The three main lessons from this experiment are that:

1 Feeding a flat rate of 7kg DM of a wheat grain, barley grain and canola meal mix from 22–100 days in milk resulted in greater dry matter intake and milk yield, and higher estimated profit per cow. This is when compared to feeding 7kg DM of wheat alone.

2 Differentially feeding cows in early lactation based on classifying cows as having high or low nutritional requirements in the fresh period, did not improve milk yield or profitability. It was equally profitable to feed a flat rate of 7kg DM/cow of the same grain mix. More broadly, several variations of differential feeding in the early lactation period have been tested in the First 100 Days project and none have shown to provide much advantage over feeding based on the nutritional requirements of the average cow in the herd.

The type of concentrate fed appears to be more influential than feeding different amounts to various subgroups within the herd with mixes including canola meal consistently performing better.

3 The importance of pasture substitution was clearly demonstrated in this experiment. Farmers need to be aware of the point at which feeding an extra kilogram of supplement begins to result in reduced intake of grazed pasture. The fundamental aim of concentrate supplementation on pasture-based farms is to add supplement up to a point where additional profit is being generated by each marginal kilogram of concentrate, but not beyond this point.

In this experiment, feeding 9kg DM of grain instead of 7kg DM resulted in significant pasture substitution such that it was less profitable to feed 9kg DM, despite these cows producing marginally more milk than the cows that received 7kg DM.

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