Understanding the profitability of grain feeding

In dairy systems the profitability of grain feeding is measured as the additional milk produced for each kilogram of grain that is fed. This is expressed as the additional grams of milksolids (MS) produced per kilogram of dry matter (DM) of grain fed - and is expressed as **gMS/kgDM.** This response is described as the **short-term** or **immediate** response - because it is measured within a few days following the commencement of feeding.

Grain feeding will also produce a **long-term** response. This response can be measured as an increase in the average body condition score of a herd over time, or as improved in calf rates in a herd. Long- term responses to grain feeding are not typically acknowledged by farmers as it may be several months, or even years, before these benefits are turned into cash flow. However, the long-term response to grain feeding can be just as profitable. As an example, one condition score put on in one season could produce an additional 15 kg of milksolids the following season - if it was milked off the cows back.

Two on-farm factors will have the greatest impact on the milksolids (MS) response to grain, wastage and pasture substitution.

- **Wastage** - Has limited impact where grain is fed through an in-shed feeding system. Wastage through an in-shed system is typically less than 2-3%. This compares with wastage rates of 20% or more typical of silage and hay when fed in the paddock.

- **Pasture substitution** - In a pasture based dairy system every kilogram DM of grain fed will substitute some demand for pasture. Substitution may vary from less than 10% - in situations where cows eat all the grain offered in the shed and almost all pasture that is offered in the paddock to 100% substitution when cows eat all of the grain offered and leave the equivalent weight of pasture behind in the paddock.

Low substitution rates are common early in the season when cows are on long grazing rounds and the amount of pasture on offer is both limited and tightly controlled. High substitution rates occur where cows leave pasture DM in the paddock when they are being fed grain.

An example of 100% substitution would be a situation where cows are being offered 17 kg pasture DM in the paddock and 2 kgDM of grain in the shed. If the cows ate all the grain but only ate 15 kgDM of pasture, 2 kgDM of pasture offered will be wasted. High substitution rates are more typical in spring once pasture supply is exceeding demand. In this situation the farmer can still feed grain but needs to control substitution by closely managing grazing rounds, by shutting areas of surplus pasture up for silage and/or taking areas out of the grazing round for cropping or regrassing.

The variability in substitution rates between farms and pasture management systems means the response to grain feeding can be extremely variable. Response rates can range from as low as **30g** MS/kgDM where substitution rates are high, up to **120g** MS/kgDM where pasture substitution rates are low. Dairy NZ generally talk about a typical response of 50g MS/kgDM and this is the response typically quoted by farmers. In practice in well managed systems a more appropriate figure is 80g MS/kgDM.

To help calculate the break-even cost of grain feeding to a customer use the table 'Expected Milksolids Payout'. Break-even means the maximum price you'd pay for one tonne of grain to simply break-even. That is, the value of the marginal milksolids produced just covers the marginal price of additional grain fed. Noting however that when grain is fed to cows, not all of the benefits are seen immediately in the vat as extra MS, rather some of the cereal grain MJME contributes to improved gain of body condition by milking cows. Therefore this break-even price doesn't include additional benefits from grain feeding such as better body condition score and/or improved reproductive performance the following season.

The figures in the table on page 44 represent the maximum the client can afford to pay per tonne of grain at a range of milksolids payouts and milksolids responses.

The calculations assume that the expected DM% of the cereal grain is 86% DM.

An example from the table indicates that at a $6.50 payout and a 70g MS/kgDM response it is profitable for the customer to pay up to $391/tonne for grain. The cereal grain pricing needs to include on a per tonne basis: a) Purchase price of grain plus; b) Cartage of the grain to the farm plus; c) Processing cost to roll or hammermill the grain prior to offering to cows.

Table 4. Maximum price per tonne of grain to pay based on a range of milksolid responses (gMS/KgDM) and milksolids payout.

Expected milksolids payout ($/kgMS)

Response	$5.00	$5.50	$6.00	$6.50	$7.00	$7.50	$8.00	$8.50
30 g MS/kgDM	$129	$142	$155	$168	$181	$194	$206	$219
40 g MS/kgDM	$172	$189	$206	$224	$241	$258	$275	$292
50 g MS/kgDM	$215	$237	$258	$280	$301	$323	$344	$366
60 g MS/kgDM	$258	$284	$310	$335	$361	$387	$413	$439
70 g MS/kgDM	$301	$331	$361	$391	$421	$452	$482	$512
80 g MS/kgDM	$344	$378	$413	$447	$482	$516	$550	$585
90 g MS/kgDM	$387	$426	$464	$503	$542	$581	$619	$658
100 g MS/kgDM	$430	$473	$516	$559	$602	$645	$688	$731
100 g MS/kgDM	$473	$473	$565	$615	$662	$710	$757	$804
120 g MS/kgDM	$516	$568	$619	$671	$722	$774	$826	$877

Expected milksolid response per KgDM of grain offered