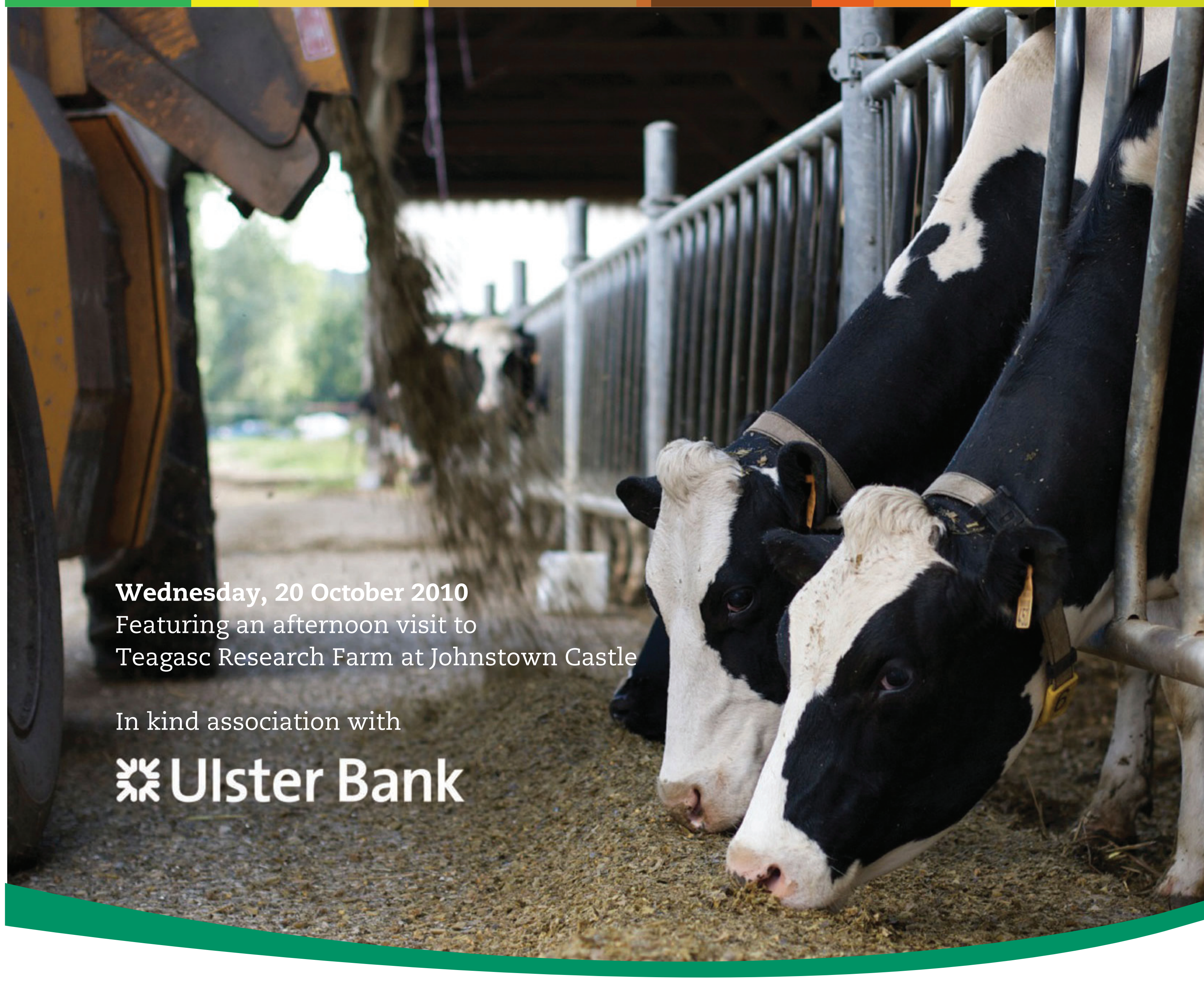
# National Liquid Milk Conference

## Focus on Feed Costs

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# Teagasc National Liquid Milk Conference 2010

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# What is driving feed costs on Liquid Milk Farms?

Joe Patton, Teagasc

## Summary

- Winter milk production adds expense for liquid milk farms but there is also large variation in feed cost within the sector that is independent of supply pattern
- Liquid milk herds with high feed cost incur much of the extra expense during the grazing season, not just over the winter period.
- Make feeding decisions based on demand per hectare rather than solely on yield per cow to increases the efficiency of forage use.
- Margin over feed is a poor measure of farm profit. Focus on tackling feed cost per litre by improving the quality and quantity of forage in the lactating diet

## Introduction

Recent price rises for purchased concentrate have brought renewed attention to the cost of liquid milk production. Feed cost per litre of milk output is, however, a long-standing and continual issue for liquid milk farms. Teagasc eProfit Monitor data for the years 2006-09 consistently show a gap of over 3 cents per litre between the annual feed bill for spring and winter milk production. This is equivalent to almost €12,000 greater spend on feed at the average scale for liquid milk herds. Teagasc analysis also reveals that feed is responsible for over 55% of variable expenses on liquid milk farms, and accounts for practically 100% of the difference in variable expenses between the spring and winter milk systems. Accordingly, there is a definite requirement to focus on feed and related costs when looking to improve margins at farm level.

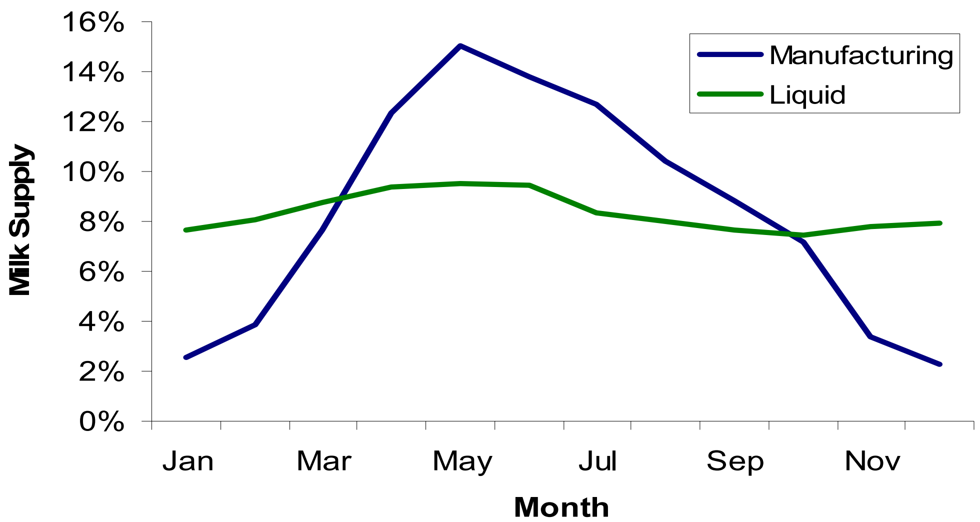



**Figure 1. Milk supply pattern as monthly percentage of total for liquid and manufacturing milk production systems *(Source National Milk Agency, 2009)***

Production on liquid milk farms follows a characteristic non-seasonal pattern (Figure 1). Peak to trough ratio is 1.7 - 1 compared to 8.1 - 1 for manufacturing milk farms, while on average 31% of the annual milk pool is supplied from November to February inclusive. This milk is invariably more expensive to produce and contributes significantly to the higher cost relative to spring calving systems. On the other hand, there is also large variation in feed costs within the liquid milk sector, between herds with similar supply curves and milk contracts. Such variation indicates that factors independent of winter milk supply proportion are driving feed costs at farm level. Identifying the management practices associated these differences is one of the main objectives of the Teagasc BETTER Liquid milk project

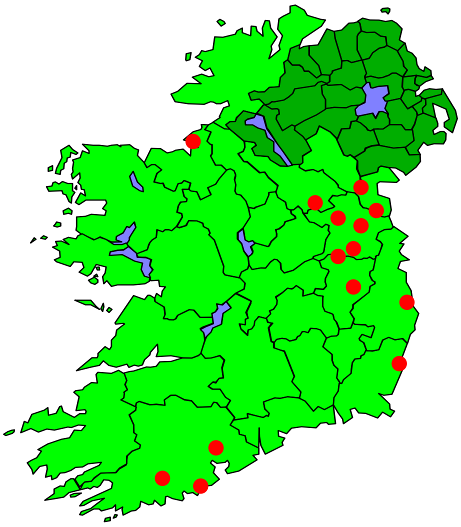
## Teagasc BETTER Liquid Milk Programme

The BETTER Liquid milk project was established in 2009 with the objective of benchmarking milk production, breeding, feed management and economics for liquid milk herds. Fourteen farms were selected in consultation with Teagasc B&T dairy advisors. These met the criteria of having:

- Greater than 30% autumn-calving
- Recorded milk yield of >6500 litres
- Profit Monitor data available
- Membership of ICBF HerdPlus

The location and details of the BETTER farms are shown in Figure 2. Each farmer submits a monthly summary of milk yield, feeding rates and grazing management. This provides information on the pattern of yield and supplementation across the year, which can then be related back to annual costs and profitability through eProfit Monitor data.

## BETTER Liquid Milk Project



- 14 Liquid Milk Farms
- > 30% Autumn Calving

- Average:
  - Stocking Rate 2.4
  - Milk Yield (rec.) 7600kg
  - EBI €45

- Data:
  - Milk supply
  - Fertility and breeding
  - Feed and grazing
  - Costs & Financial

**Figure 2.** Location and details of BETTER Liquid Milk participants

### What are the main findings on the BETTER farms to date?

After almost two years' data have been collected on the 14 farms in the project, some clear trends have emerged in relation to feed management and its effect on total feed costs.

- **High feed cost farms incur greater feed cost all year round**

An interesting finding arising from the monthly feed inputs is that the herds with the highest feed cost per litre (eProfit Monitor) are incurring this expense all year round. This is illustrated in Figure 2, which charts the average feed inputs for the three highest (8.7cpl) and lowest (3.1cpl) farms in terms of feed cost per litre.

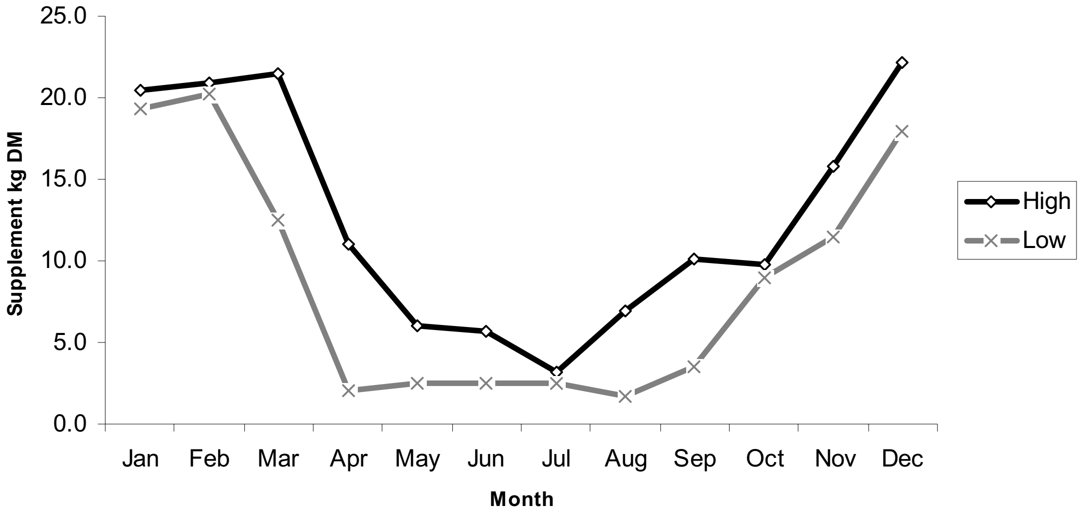



**Figure 2. Feed supplement profiles for high and low feed cost BETTER liquid milk farms**

The data illustrate three main points: i) daily feeding rates per cow in milk are similar during the winter period. This is an important observation because it is sometimes assumed that the source of extra cost on these farms is the winter feed programme; ii) high feed cost farms offer much higher levels of supplement during the March-May period iii) high cost herds commence buffer feeding earlier in autumn.

These results overall suggest that feeding management during the early grazing season and in early autumn need to be highlighted as areas for cutting high feed costs. Pasture budgeting techniques such as the spring rotation planner are equally applicable in a liquid milk situation as for spring calving herds. The grazing planner helps to ensure the correct quantity and quality of pasture from early spring and is easily adapted to work for a high spring grass demand. Correctly used it has the potential to markedly reduce costs.

The earlier increase in autumn supplementation on high cost farms is coincident with the start of calving. Freshly calved cows tend to be buffer fed irrespective of pasture covers on these units, particularly where there is a perception of high milk yield potential. In contrast, the lower cost farms maintain a moderate level of feeding through early autumn but use supplement to the same extent from October onwards. The main reasons for this difference are a later, more controlled autumn calving season and a more moderate peak milk yield target on lower cost farms. Use of high fertility EBI genetics is important to achieve this control of calving pattern.

- **Lower cost BETTER farms budget feed according to stocking rate**

Increasing stocking rate creates potential for more efficient use of forage, but it can also create a greater requirement for purchased feed. The optimum stocking rate may be defined as that which maximises forage utilised at the lowest imported feed cost.

Previous Teagasc trial results from Moorepark, Johnstown Castle and Ballyhaise showed that intensive stocking rate systems (>4.0 cows per ha) have higher feed cost per litre because a sizeable percentage of the feed budget must be imported to balance herd demand. The average stocking rate on the milking platform for the 14 BETTER liquid milk farms is 3.16 cows per ha, ranging from 2.1 to 4.6 cows per ha. There is however no clear association between stocking rate and feed cost among these farms (Figure 3).

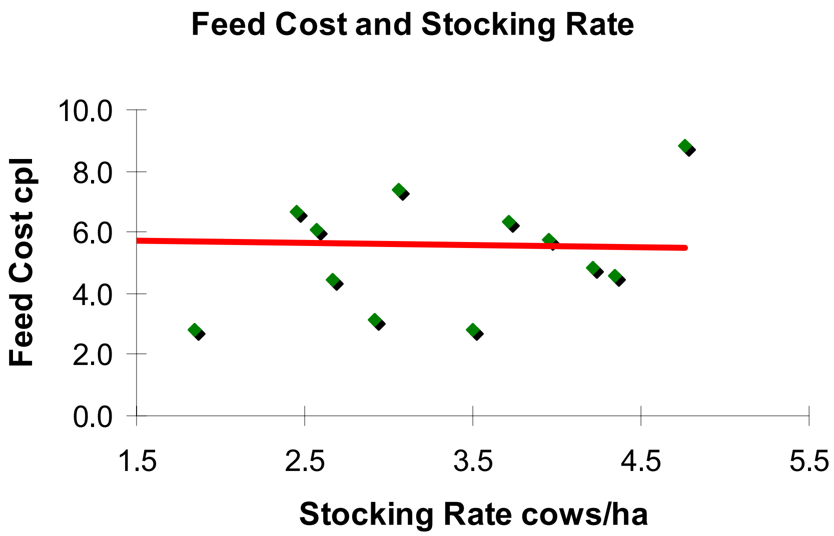



**Figure 3. Association between feed cost and stocking rate on BETTER liquid milk farms**

In practical terms, the results show that unlike the research herds, stocking rate (i.e. feed demand per hectare) has not been a main factor influencing supplement feeding on some farms. Instead, decisions are based on achieving a target milk yield, or meeting the nutrient requirements of the individual cow etc. While adequate nutrition of the lactating cow is important, offering supplementary feed without reference to available grass is a recipe for expense. Also, it is often the case is that pasture efficiency is poor at high stocking rates despite a high feed demand, so feed budgeting is essential across the spectrum of systems. Interestingly, the BETTER farms with the lowest feed cost (and highest milk output per hectare) tend to make their feeding decisions as a combination of pasture budgeting and cow requirements.

**Margin over feed per cow and profit on BETTER liquid milk farms**

Margin over feed (MOF) is an economic measure of milk production efficiency, defined as milk revenue minus the total cost of purchased feed per cow. For example, milk sales are €1800 per cow, purchased feed costs €300 per cow, so the resulting margin over feed amounts to €1500 per cow. It seems logical that a higher MOF would translate into more farm profit. For this reason, an improved MOF is regularly quoted as a reason to buy a particular feed, additive etc. Many products are included in diets on this basis, often at considerable cost.

But what is the relationship between MOF and overall farm profit? Depicted in Figure 4, margin over feed as measured on the BETTER farms, is actually a poor measure of farm profit. It explains less than 5% of the variation in margin per litre or per hectare. Indeed, it is also a poor predictor of feed cost per litre. In contrast, feed cost per litre has a significant negative association with profit, explaining around 25% of the variation in net margin per litre.

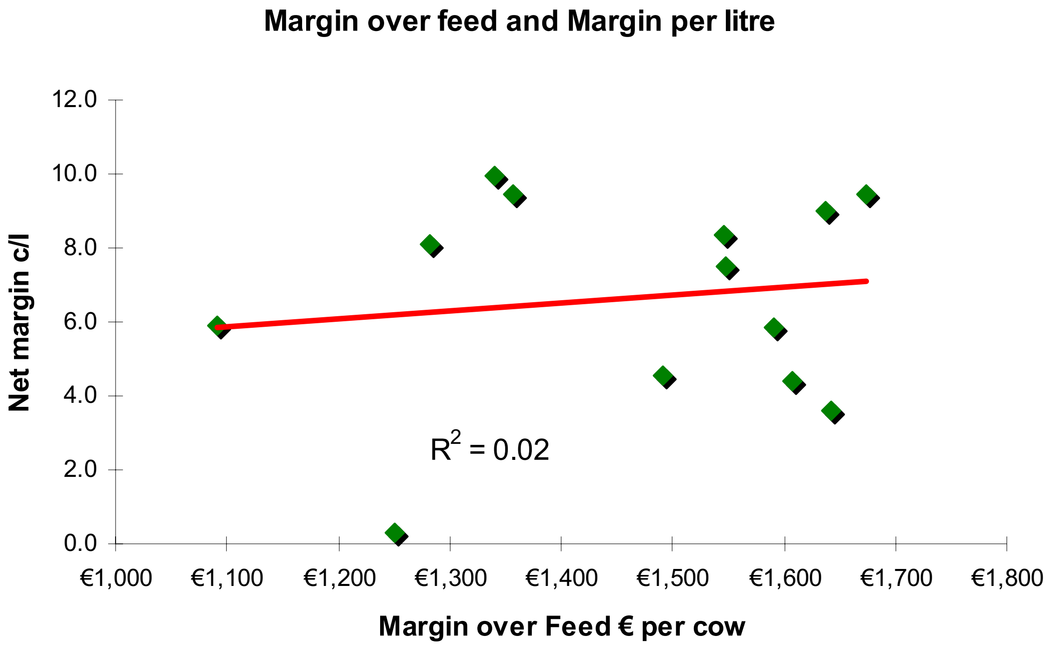



**Figure 4. Margin over feed is a poor measure of net margin on BETTER liquid milk farms**

In summary, the data indicate that making decisions based on simple margin over feed figures is unlikely to yield any consistent benefit for farm profit. In fact, too much focus on MOF can result in over-use of expensive products, each claiming to further enhance feed efficiency. A more beneficial policy is to concentrate on tackling feed cost per litre by improving the quantity and quality of forage in the lactating cow diet.

## Conclusions

Addressing the annual cost of feeding the milking herd should be a priority for liquid milk producers. There is a wide range of cost per litre between individual herds, and much of this variation arises from management practices in early spring and autumn. Modest changes to winter diet composition will have a relatively minor effect. Maximising milk yield from forage is essential for profit, so supplement feeding policy needs to take account of stocking rate and grass availability. Breeding a high fertility cow with the capacity to perform on high forage systems is an absolute requirement for liquid milk systems.


## *Acknowledgements*

The author would like to sincerely thank the participants in the BETTER Liquid milk programme for their diligence in submitting monthly performance figures. Also thanks to P. O'Connor Teagasc Grange for compiling and managing the data.

# Value and Cost of Diets for Winter Milk Production 2010

*Siobhán Kavanagh, Teagasc Specialist Service*

## Introduction

In 2009, Patton outlined a systems approach to feeding the liquid milk herd for profit, involving a structured analysis of the main factors affecting the balance between feed supply and demand on the farm, including stocking rate and calving pattern. While the focus of this paper is a partial analysis of the feed budget for the winter period only, it is important to remember that the choice of feeds over the winter is a relatively small component of the total annual feed budget.

## Valuing feedstuffs

Forage used per hectare is one of the most important indicators of the profitability of any dairy system. Once forage utilisation has been optimised, buffer feeds such as compounds, wet feeds and alternative forages have a role to play in filling the deficit in the forage supply on the farm. The importation of these buffers must be based their economic value in the system, relative to alternative sources of feed.

It is important to distinguish between the value of purchased feed and the cost of a purchased feed. The cost of a home grown feedstuff includes costs such as land charge, fertilizer, contract charges handling and storage but the value of that feedstuff to the dairy farmer is determined by its price relative to the alternative energy and protein sources available (e.g., barley and soya or a balanced compound feed).

## Relative value of feed ingredients

Using barley and soya prices at any point in time, a value can be attributed to a unit of energy and a unit of protein, this is then used to value other energy and protein feeds. Teagasc has an interactive calculator called "Relative Value of Feeds" on the Teagasc client site @ www.client.teagasc.ie. It is important that individuals do this exercise at a local level because of the variation in ingredient price and the volatility in the market.

Cereals are expensive this year and while the inclusion levels used in 2009 were high, there will be greater blend of starch and digestible sources used in compounds this year. Maize grain (flaked, ground or rolled) is expensive this year with prices of

€250-270/t being quoted. It is valued at 5-8% higher than barley or wheat and is therefore poor value this year.

There are three basic options in terms of digestible fibre sources – citrus pulp, beet pulp and soya hulls. Both unmolasses beet pulp and soya hulls are valued slightly higher than citrus pulp because of their higher PDIE (protein) content. Soya hulls is a moderate energy feed, and while it is reasonable value, its inclusion should be limited where a high energy diet is required.

Protein feeds are expensive with soyabean meal at €360 – 380/tonne. Distillers grains represents the best value in terms of protein feeds this year but will require the addition of a second protein source for compound feeds with 16% CP or greater. Relying on soya only as a protein source is adding significantly to the cost of a compound feed. Rapeseed meal is poor value as a protein feed this year and will not feature a lot in compound feeds.

### Relative value of forages/west feed

While the value of alternative forages and wet feeds will track the price of dry ingredients in any given year, there is a limit to their value. When cereal prices are high, the value of alternative forages will match exceed their cost of production. But when cereal prices are low the value of alternative forages will, at best, match the cost of production and in many cases be valued less than cost of production.

**Table 1. Value of ingredients relative to barley and soybean at €195 and €370/t.**

| | Energy | Protein | | | Relative Value |
|---|---|---|---|---|---|
| | UFL | Crude Protein | PDIN | PDIE | €/t |
| Barley | 1.00 | 9.7 | 64 | 89 | 195 |
| Wheat | 1.00 | 9.7 | 67 | 92 | 198 |
| Crimped barley/wheat | 0.75 | 7.3 | 50 | 68 | 146 |
| Maize | 1.05 | 8.7 | 71 | 103 | 217 |
| Unmolassed beet pulp | 1.00 | 9.0 | 56 | 97 | 204 |
| Citrus pulp | 1.00 | 6.0 | 40 | 80 | 184 |
| Molasses cane | 0.74 | 4.5 | 24 | 50 | 120 |
| Soya hulls | 0.88 | 10.5 | 68 | 94 | 191 |
| Maize distillers | 1.03 | 26.6 | 178 | 119 | 234 |
| Maize gluten feed | 0.90 | 20.3 | 137 | 108 | 209 |
| Rapeseed meal | 0.91 | 33.8 | 219 | 130 | 236 |
| Soyabean meal 48% CP | 1.02 | 48.1 | 342 | 232 | 370 |

At a concentrate price of €270/t delivered, forage maize is worth maximum €48/t delivered, while fodder beet is worth maximum €38/t delivered. Wet feeds and forages will incur significantly greater storage losses and handling costs than dried ingredients and these costs have been built into these values. Buy forages on a cost per tonne basis, not per acre. Ideally all trailers should be weighed but this is not practical, therefore weigh a representative number of samples.

**Table 2. Maximum value of maize, fodder beet and brewers grains, relative to high energy 18% crude protein ration across a range of prices.**

| | Concentrate Price €/t | | | |
|---|---|---|---|---|
| | €230 | €250 | €270 | €290 |
| Maize silage | 41 | 44 | 48 | 52 |
| Fodder beet | 32 | 35 | 38 | 41 |
| Brewers grains | 45 | 49 | 53 | 58 |

*The value of feeds relative to the balanced concentrate feed taking in-silo losses into account*

## Liquid milk herd at Johnstown Castle

The objective of the liquid milk herd at Johnstown Castle is to define the most suitable feeding and grazing management practices for autumn calving herds. The stocking rate on the TMR group of cows is 4.0 cows per ha on the grazing platform, with little winter forage produced on the grazing area, feedstuffs including forages must be imported at least cost.

What effect will the current peak in feed prices have on the cost of feeding the liquid milk herd this winter? For the winter 2009/2010, the cost per tonne of DM of finished diet (Diet A) was €163 (Table 3). Assuming the same diet is used for the winter 2010 /2011, as was fed in 2009/2010, but using current prices, the cost per tonne of DM of finished diet (Diet B) is €185/t DM. Assuming a 4 month winter, the additional feed cost per cow is €53/cow.

Is there scope to reduce this? There is some scope to reduce the cost of the winter feed budget for 2010/2011 by making greater use of forages, and replacing expensive protein feeds like rapeseed meal with better value protein feeds such as maize distillers grains and limiting the use of expensive supplements. But the effect that this will have on the cost of the winter diet is marginal. In the context of the total feed budget this is even smaller. Using Diet C will reduce the cost per tonne of DM of finished diet by €4/t DM or €10/cow over a 4 month winter. Where the diet is reasonably cost effective to begin with, the savings are limited this year as ingredient prices track one another. But where an overly elaborate diet is being used, there is scope to reduce costs.

Much time is spent making minor alterations to the diet of a dairy cow but with limited effect on subsequent profitability in liquid milk production. If the basics of feeding the cow are not being done correctly then the addition of an expensive supplement will not give the responses often promised. Maximising feed intake through good feeding management, adequate feeding space, good feed barrier design as well as conserving good quality forages will all yield significantly greater results than small changes in diet composition. Calving 50% of the herd in the Autumn when only 25% is needed to fill the winter contract will have a greater bearing on the profitability of winter milk than minor changes in diet composition.

**Table 3. Dietary options for the Johnstown Castle herd.**

| | **Diet A** | **Diet B** | **Diet C** |
|---|---|---|---|
| kg DM | | | |
| Grass silage | 4.5 | 4.5 | 6.25 |
| Maize silage | 7.0 | 7.0 | 6.25 |
| Barley straw | 0.5 | 0.5 | 0.5 |
| Trafford gold | 2.2 | 2.2 | 2.2 |
| Dairy 18% | 0.9 | 0.9 | 0.9 |
| Barley | 1.4 | 1.4 | 0.7 |
| Citrus pulp | 1.3 | 1.3 | |
| Soya hulls | | | 1.3 |
| Rapeseed meal | 0.8 | 0.8 | |
| Maize distillers grains | | | 1.1 |
| Soyabean meal | 1.5 | 1.5 | 1.3 |
| Fat | 0.13 | 0.13 | 0.13 |
| Mineral | 0.13 | 0.13 | 0.13 |
| **Total DMI** | **20.3** | **20.3** | **20.4** |
| **Cost of Finished Diet** | **€163/t DM** | **€185/t DM** | **€181** |

## Buying concentrate feeds

- ***Shop around*** – there is a lot of variation in concentrate ingredient prices this year.
- ***Request nutritional information*** – typically, compound feeds in this country are purchased on the basis of their crude protein content, when energy is the most limiting nutrient, not protein. Request information on the energy content of the compound feed. Target a UFL (energy content) of 0.94/kg as fed or greater. As of the 1 September, a purchaser of feed is entitled to request information on the quantitative composition of the feed within a range of +/- 15% of the value according to the feed formulation. For example, if citrus pulp is included at 20% in the compound feed, you will be told that citrus pulp is included at 18-23% of the compound feed.
- ***Compound feed specification.*** At present, the spot price for straight ingredients is high, which may result in specials and home mixing being non competitive. Focus on the nutrient specification of a diet, not the individual ingredient inclusion rates.
- **Ensure that you are comparing like with like**. Additional costs/ savings including bulk, credit terms, coarse vs pellet, as well as transport costs should not be ignored. It concentrate feeds can be bought for cash this year there is potential to save money. Buying compound feeds ex the yard may seem cheaper but there is a cost attached to your time and wear and tear on the tractor and trailer collecting feed.

# Managing soil fertility to increase milk from forage

Stan Lalor, Teagasc, Johnstown Castle.

## In summary


- Fertilizer costs account for approximately 15-20% of variable costs on dairy farms.
- Soil testing is essential to establish background soil fertility levels.
- Soil testing is pointless if results are not put to good use.
- Optimum soil pH should be prioritised.
- Use soil test result to plan P and K applications each year.
- Aim to have all soils in Target Index 3 for both P and K.
- Slurry application should be based on the soil test results.
- Ensure that the right balance of P and K is applied.


## Introduction

Good productive soils are the foundation of any successful farm system. The ability of soils to supply nutrients at a time, and in appropriate quantities for grass growth is a key determining factor of how productive a field or farm can be. Therefore, the management of soil fertility levels should be a primary objective on any farm.

Fertilizer costs account for approximately 15-20% of the total variable costs on dairy farms. Fertilizer costs represent good value for money when used correctly. However, fertilizer application rates that are either too low, too high, or not in balance with other soil fertility factors will yield lower returns on your investment. With fertilizers becoming more expensive, it is vital that each kg of fertilizer is managed as efficiently as possible with maximum return in grass growth and milk production. Two steps are required in order to achieve this:

1. Taking soil tests
2. Using the results to plan fertilizer and lime applications

Both of these steps are equally important.

## Why soil test ?

A soil test is an indicator of the background soil fertility levels of pH, P and K and also Mg and trace elements where required. Soil sampling and analysis is not a new technology. However, the role of soil analysis has taken on a new dimension in recent years within the Nitrates regulations. These regulations have adopted what were agronomic advice guidelines as maximum application rates for nitrogen (N) and phosphorus (P) fertilizers. In the case of P, the soil test has become a critical component in calculating the maximum P levels that are permitted on the farm.

The new role of soil testing within the regulations has resulted in soil testing being associated more with bureaucracy and regulation than with good farming practice. Soil testing every four years is a compulsory requirement for farms applying for a

Nitrates derogation. However, even within the regulations, it is important to remember that the primary function of soil testing on the farm should be to inform a farmer of the soil fertility status and to plan fertilizer applications. This is particularly true in the case of lime and potassium (K), which are not included in the Nitrates regulations.

## Taking a representative sample

Soil sampling and analysis costs money. Therefore, it is critical to ensure that the samples are taken correctly so that the results are accurate and usable. Critical steps to ensuring that soil samples are taken correctly include:

- ***Area-*** Take one sample per 2-4 ha (maximum of 5 ha with derogation). Sample areas should be as uniform as possible regarding soil type; slope; drainage; and cropping history. Sample areas should reflect practical management units of the farm.

- ***Sampling pattern***- Take a representative sample from the entire field, following a 'W' sampling pattern. Avoid unusual spots such as gateways; sites of feeders or manure heaps; old fences or ditches; and dung or urine patches. Take a minimum of 20 soil cores per sample.

- ***Timing-*** Allow 3-6 months after previous P, K or manure application. Allow two years after lime application for accurate lime requirement assessment. For comparison, sample at the same time of year as previous sampling. Avoid dry or wet extremes of weather.

- ***Depth-*** This is particularly critical for P analysis, as P tends to accumulate in the top few cm of grassland soils. Samples not taken from the full depth of 10 cm will usually overestimate the soil P level. Wear on the end of the soil corer and soil moisture conditions at sampling can have an impact on sampling depth. Where grassland is being ploughed, soil at the surface that is high in P can be moved to deeper in the soil, and replaced at the surface by soil with lower P content. Therefore, it is advised to soil test after ploughing.

## Soil pH and lime

Soil pH is the first thing to get right. Due to the relatively high rainfall in Ireland, it is a natural process for soils to become acid and for soil pH to drop. Regular applications of lime are required to counteract this natural process. Lime use in Ireland in 2009 was just below 700,000 tonnes. This is less than half that used in the mid 1980s. Therefore, it is no surprise that the average soil pH of Irish mineral soils is low, being only 5.5.

The optimum soil pH for grassland is at or above 6.3. It is recommended to apply lime to raise the soil pH to 6.5, so that the lime application will maintain soil pH for a number of years. Where soils have a risk of having high molybdenum (Mo) content, it is advised not to raise the soil pH above 6.2 to reduce the risk of copper deficiency. Normal advice on soils with high Mo is to reduce the lime requirement by 5 t/ha.

The release of nutrients from the soil and the response to applied fertilizers will be reduced where the soil pH is low (or high). In the case of P, soils with low pH will tend to lock up P and make it unavailable. Applying additional P fertilizers in this case is poor value for money for two reasons, as firstly, the low pH means that the potential of the soil to release P is not fully realised, and secondly, the availability of the P fertilizer applied will be reduced. There is no point applying additional fertilizer to soils where the underlying problem is soil pH. Therefore, correcting and maintaining the soil pH should be first consideration in soil fertility management.

## Phosphorus and potassium

Soil analysis is designed to estimate the proportion of P and K that is present in the soil in a form available to plants. The long-term objective should be to have all the soils in Index 3 for both P and K. Fertilizer P and K advice has been derived based on the following principles:

- Index 3 is the target level required for optimum grass production. The fertilization rate should replace the nutrients removed in product, be that milk or meat, or in losses such as leaching in the case of K. Only approximately 30% of soils are in Index 3 for P and K.

- At low soil P levels (Index 1 and Index 2), additional nutrients are required to build up the soil reserves to Index 3 levels. This normally takes a number of years to achieve, and can be monitored with regular soil testing.

- When soil P levels are high (Index 4), responses to fertilizer applications to Index 4 soils are rare. Soils with fertility levels in Index 4 will be productive without fertilizer applications until the soil fertility reverts to Index 3 levels, at which time, nutrient applications to replace offtakes should recommence. The speed with which soils will return from Index 4 to Index 3 will depend on land use and the soil type. Regular soil testing is essential for monitoring.

## P and K advice

The nutrient advice for P and K for dairy grassland are shown in Tables 2 and 3. Note that both P and K advice shown includes P and K from both chemical fertilizer and slurry. The P advice rates should also be adjusted to account for the P coming onto the farm in concentrate feeds.

**Table 1. Simplified P requirements (kg/ha) of grazed and cut swards for dairy farms. (Rates shown are total P requirements, before deductions for concentrate feeds or organic fertilizers).**

| Soil P Index | Grazed Swards | | | | Silage Swards | |
|---|---|---|---|---|---|---|
| | Stocking Rate (kg/ha Org N) | | | | | |
| | < 130 | 131-170 | 171-210 | >210 | Cut Once | Cut Twice |
| 1 | 30 | 34 | 39 | 43 | +20 | +30 |
| 2 | 20 | 24 | 29 | 33 | +20 | +30 |
| 3 | 10 | 14 | 19 | 23 | +20 | +30 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 |

**Table 2. Simplified K requirements (kg/ha) of grazed and cut swards for dairy farms. (Rates shown are total K requirements, before deductions for organic fertilizers).**

| Soil K Index | Grazed Swards | | | | Silage Swards | |
|---|---|---|---|---|---|---|
| | Stocking Rate (kg/ha Org N) | | | | | |
| | < 130 | 131-170 | 171-210 | >210 | Cut Once | Cut Twice |
| 1 | 85 | 90 | 95 | 100 | +120 | +155 |
| 2 | 55 | 60 | 65 | 70 | +120 | +155 |
| 3 | 25 | 30 | 35 | 40 | +120 | +155 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 |

## P and K in cattle slurry

Slurry is a valuable source of P and K. On many farms, chemical P fertilizer is not permitted within the nitrates regulations, resulting in slurry being the only source of P available to the farmer for distribution. The P and K fertilizer values of slurry can be highly variable, usually due to dilution with water. Where slurry is diluted with soiled water (or rainwater in the case of unroofed tanks), it is important to consider the level of dilution when allocating slurry to fields. Guideline estimates of the P and K concentration of slurry based on estimated dilution rates are shown in Table 4. The distribution of slurry around the farm should be based on soil testing and P and K requirements.

**Table 3. Typical P and K content of slurries with varied levels of dilution.**

| Dry Matter % | Approximate Dilution | P Fertilizer Value | | K Fertilizer Value | |
|---|---|---|---|---|---|
| | | kg / $m^3$ | Units / 1000 gallons | kg / $m^3$ | Units / 1000 gallons |
| 7 % | None | 0.6 | 5 | 4.3 | 39 |
| 5 % | 1/3 water; 2/3 slurry | 0.4 | 4 | 3.1 | 28 |
| 3 % | 2/3 water; 1/3 slurry | 0.3 | 3 | 1.8 | 16 |

## Separating P and K

The nitrates regulations place no restrictions on K fertilization rates or timing. The application of potassium (K) fertilizer has declined inline with P usage in recent years. This is because P and K are normally applied together as compound fertilizer products. The requirements for K fertilizer should still be considered even where no P fertilizer is required or permitted. The requirements for K are particularly crucial on silage crops.  On fields with no P requirement, the use of either straight K fertilizer or N:K fertilizer compounds should be considered where there is a requirement for K.

Slurry is a very good source of K, reflecting the high K contents of grass silage. The K content of slurry is typically 4.3 kg/t (39 units per 1000 gallons), but as in the case of P, this will vary with dilution. The P and K balance in slurry usually makes it a more efficient fertilizer for silage swards than for grazing.

## Conclusions

Lime application for soil pH correction is the first step in soil fertility management. Trying to plan fertilizer application without information on the soil fertility levels is impossible. Approximately 30% of the soils in Ireland are in Index 3 for P or K. Therefore, in the absence of accurate and representative soil analysis results, fertilizer plans assuming Index 3 will be incorrect in 70% of cases, resulting in either reduced performance on Index 1 and 2 soils, or unnecessary and expensive fertilizer application on Index 4 soils. The balance of P and K applications relative to requirements is also critical. Soil analysis results should be checked every year in the fertilizer planning process. Slurry can play a vital role in controlling fertilizer costs and maintaining and building balanced soil fertility on the farm.

# Maximising the potential of grazed grass during the autumn

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## Summary

- Compared with grass silage as the sole forage, inclusion of grazed grass by day in winter and spring reduced grass silage intake and increased milk yield by an average of 2.5kg/day and improved milk protein concentration by 0.6 g/kg.
- Last rotation should commence on October 5 - 10$^{th}$ with all paddocks grazed out to 100 to 150kg DM/ha residual during the last round. At least 70% of the farm should be closed by the end of the first week of November.
- Closing farm cover target is 600 - 650kg/DM/ha (250kg DM/cow) in late November.
- Similar milk solids yield during the first six-weeks of lactation can be achieved by offering grazed grass and 8kg concentrate compared to a TMR.
- Restricting cows by offering grass and 1 kg concentrate during the first 6 weeks of lactation does not impact on their subsequent milk production performance.
- For early spring grazing, a farm cover of 900kg DM/ha should be targeted at turnout, the available grass cover should be budgeted to finish the first rotation on April 10 with a farm cover of >600kg DM/ha .
- A feed budget (grazing strategy) should be planned and updated regularly to control grass demand (grazing stocking rate and daily herbage allowance) and supply (farm cover and grass growth) throughout the spring period.

The autumn-calving cow's diet in early lactation can be made up of grazed grass, grass silage, maize silage and concentrate. Grazed grass is currently the cheapest of these feeds. In recent years the cost of grass silage has increased relative to grazed grass. A number of studies have shown that grazed grass is superior in feeding value compared to grass silage in terms of milk production and protein content. Generally, in autumn, most farms have a plentiful supply of grass, and the aim should be to maximise this home grown feed in the diet of autumn calving cows. Therefore, the primary grazing management objectives up until late November should be to provide access to grazed grass for lactating cows, to budget the available grass to maximise its proportion in the cows diet and to maximise grass utilisation.

## Target farm covers during the late autumn to early spring period

Spring and autumn are the two key periods during the grazing season when target farm covers differ between spring and autumn calving herds. Many winter milk herds are split calving and will have to prioritise higher quality grass for different groups at different times during the year. For example, freshly calved cows in the autumn would benefit from grazing paddocks with lower herbage mass (i.e. 1200-2000 kg

DM/ha) while the same is true for spring-calving cows in the early February period. Unlike spring calving herds autumn calving herds have a high demand in early spring as all cows are calved and have reached peak intake. This will necessitate different target farm covers than those outlined for a 100% spring-calving herd. The farm specific factors requiring consideration when identifying target farm covers include: grazing platform stocking rate, growth rates, calving pattern and expected length of the grazing season.

## Eight objectives for successful autumn grazing

i. Target grazing the freshly calved cows on pre-grazing covers between 1200-2000kg DM/ha. If covers are >2200kg DM/ha, it maybe possible to graze these with dry cows or spring calved animals.
ii. The first paddock stopped for the spring should be closed on October 10th, in later regions closing may begin earlier as this will compensate for lower subsequent autumn and spring growth. Most of the herbage available for grazing next spring will be the grown once these paddocks have been closed.
iii. Each one-day delay in closing from October 15th to December 11th reduces spring herbage mass by 15 kg DM/ha.
iv. Aim to have at least 70% of the farm closed by the end of the first week of November in an autumn-calving grazing scenario.
v. All paddocks should be grazed to a post-grazing residual cover of 100 – 150kg DM/ha during the last rotation to encourage winter tillering.
vi. Avoid reducing the farm cover below 600kg per hectare in autumn .
vii. Try not to re-graze pastures that have been closed.

## Effect of grazed grass in the diet with grass silage

Studies completed at Teagasc Moorepark from a number of winter feed systems for autumn calving dairy cows examined the role of partially including grass in the diet of autumn calved cows. The control system had grass silage as the sole forage which was compared with a grass silage diet supplemented with grazed grass in late autumn and early spring. The cows given access to grass were allocated a daily allowance of 6 - 8 kg DM/cow/day and grazed between morning and evening milking. Table 1 gives a summary of the experimental treatments.

**Table 1: Summary of experimental treatments.**

| Experiment | Treatment A | Treatment B |
|---|---|---|
| I | 1.6t GS,<br>1.0t Concentrate | 1.3t GS<br>0.35t GG,<br>1.0t Concentrate |
| II | 1.48t GS<br>0.96t Concentrate | 0.81t GS,<br>0.36t GG,<br>0.74t Maize<br>0.95 t Concentrate |

**GS – Grass silage; GG – Grazed grass**

The objectives of the feeding systems examined in this study were to determine the benefits of providing grazed grass in the diet of autumn calving cows supplemented with grass silage in late autumn (Nov-Dec) and early spring (Feb-March) compared with cows housed all winter (Nov-March) and fed on grass silage as the main forage. There were three common periods where the grazing cows (Treatment B) were subjected to the following:

- Pre full-time housing. Early winter (mid-October to December) - cows grazed grass by day and indoors fed grass silage by night.
- Full-time housing. Mid-late winter (mid-December – mid/late February) - cows indoors day and night fed on grass silage.
- Spring. Early spring (late Feb/early March) - cows grazed grass by day and indoors fed grass silage by night.
-

The control cows (Treatment A) were indoors during all of these periods.In the pre ful- time housing period grass intake averaged 4.5kg DM/cow/day over the two experiments, reducing grass silage intake by 3.1kg DM/day. Including grass in the diet up to December increased milk yield by an average of 2.0kg/day (28.4 vs 26.5kg day) and milk solids yield by 0.16kg/day (2.1 vs 2.0kg/day). The average milk production response per kg grass DM intake (DMI) in pre-housing period was 0.5kg milk.

In spring grass, intake averaged 4.3kg DM/day, silage intake was reduced by 3.8kg DM/day. Provision of spring grass made a bigger contribution to milk production than late autumn grass. Milk yield was increased by an average of 3.0kg/day (26 vs 23kg/day) and milk solids yield by an average of 0.21kg/day. The better response from spring grass is likely to be due to higher quality from swards with a lower grass cover.

Milk protein concentration was also improved by including grazed grass in the diet. The increase averaged 0.4g/kg milk in pre housing period. Milk protein concentration was increased to a greater extent when grass was included in the diet after turnout compared to pre housing, by an average of 0.85g/kg (33.3 vs 32.4g/kg).

## Grazed grass for early lactation autumn cows – a recent Moorepark study

A study was undertaken recently at Teagasc Moorepark to investigate the effect of offering grass to autumn-calving cows in early lactation on milk production performance. Freshly calved cows were offered grass for a six-week period after which they were housed full-time, offered a TMR diet and monitored for a 13-week carryover period. Four treatments were compared in the study i) outdoors full-time offered fresh grass + 1kg DM concentrate (G1); outdoors full-time offered fresh grass + 4kg DM concentrate (G4); outdoors full-time offered fresh grass + 8kg DM concentrate (G8); indoors full-time offered a total mixed ration (TMR). The composition of the TMR was on average 4kg DM/cow/day grass silage, 8 kg DM/cow/day maize silage, 0.7kg DM/cow/day straw, 10kg DM/cow/day concentrate and 2kg DM/cow/day molasses.

Average pre-grazing yield was 1,700kg/DM/ha (12.5 cm height) and all groups grazed to 6cm. There were large differences in total dry matter intake; cows offered grass and 1 kg concentrate consumed 14.7kg DM/cow/day, total dry matter intake increased to 18.2kg DM/cow/day when 4 kg of concentrate were offered. There was little difference in the intake of the grass and 8kg concentrate group (G8) and the TMR group (20.1 vs 21.0kg DM/cow/day, respectively). Although the milk yield of the cows offered TMR fulltime was higher than all other groups (Table 2) milk solids yield was not significantly different between the G8 and TMR groups (1.80 kg/cow/day). Increasing the concentrate allowance of grazing cows from 1 - 4kg DM concentrate resulted in a response of 0.90kg milk for each extra kg of concentrate offered. When supplementation level was increased from 4 - 8kg DM concentrate the response was 0.4kg milk/kg concentrate. Although the milk production response to concentrate is poor when moving from 4 to 8kg of supplementation the feed costs associated with the grass and 8kg concentrate system (approx. €2.63/cow/day) are considerably lower than the feed costs associated with the TMR system (approx. €4.35/cow/day).

Interestingly, during the carryover period of this study when all cows were offered a TMR diet for a 13-week period there was no significant difference in milk production. The group of cows that were offered grass and 1kg of concentrate (G1) in early lactation increased their milk production and compensated for the loss in early lactation. This study has shown that offering autumn calving dairy cows a TMR diet in early lactation increases milk yield compared to cows offered grazed grass and different levels of concentrate. However, similar milk solids yield can be achieved by offering grazed grass and 8kg concentrate or TMR. This study also established that restricting cows (G1) during the first six weeks of lactation does not impact on their subsequent milk production performance.

**Table 2. Milk production performance of autumn calving cows assigned to one of four early lactation experimental treatments and the production performance during the 13-week carryover period.**

| ***Experimental Period*** | **G1** | **G4** | **G8** | **TMR** |
|---|---|---|---|---|
| Milk Yield (kg/day) | 20.7 | 23.4 | 25.0 | 26.9 |
| Milk Fat Content (g/kg) | 39.9 | 37.5 | 36.0 | 37.1 |
| Milk Protein Content (g/kg) | 32.1 | 32.3 | 33.2 | 32.4 |
| Milk Solids Yield (kg/day) | 1.50 | 1.63 | 1.72 | 1.87 |
| End Bodyweight (kg) | 498 | 505 | 524 | 525 |
| End Body Condition Score | 2.52 | 2.66 | 2.56 | 2.68 |
| *Carryover Period* | | | | |
| Milk Yield (kg/day) | 23.8 | 23.9 | 23.4 | 24.6 |
| Milk Fat Content (g/kg) | 38.3 | 37.2 | 37.1 | 38.1 |
| Milk Protein Content (g/kg) | 32.5 | 31.5 | 33.1 | 32.7 |
| Milk Solids Yield (kg/day) | 1.68 | 1.64 | 1.64 | 1.74 |
| End Bodyweight (kg) | 552 | 540 | 569 | 542 |
| End Body Condition Score | 2.57 | 2.62 | 2.70 | 2.75 |

## What herbage allowance to allocate to autumn calved cows in spring?

As autumn calved cows are much further in lactation (130-150 days) when turned out to pasture in spring compared to spring calved cows, the question arises what level of daily herbage allowance (DHA) is sufficient to offer these cows. This was the focus of an experiment, which investigated the relationship between DHA and dairy cow performance of autumn calving dairy cows in spring/summer**.** A herd of 42 spring-calving Holstein-Friesian dairy cows (mean calving date, 22nd September) were randomised and assigned to one of three daily herbage allowances (15, 18 and 21kg grass DM/cow/day) which represented low, medium and high DHAs. The treatments were imposed from mid-April to early June.

Table 3 shows the milk production/composition and intake of the three herds during this period. Mean pre-grazing herbage mass was 1,700kg DM/ha, mean sward pre grazing heights were 16.8cm, post-grazing heights were 4.7, 5.6 and 6.5cm for low, medium and high herbage allowances, respectively.

There was a marked improvement in milk yield, milk protein yield and average bodyweight of the cows offered the medium DHA compared to those of the low DHA. However when the performance of the medium DHA cows was compared to that of the high DHA herd, there was no benefit in milk production to offering the extra grass DM. Therefore, the optimum DHA to offer autumn calved cows during this period is 18kg DM/cow/day.

| **Table 3: Effect of offering three daily herbage allowance to autumn calved cows in spring/summer (April to June).** | | | |
|---|---|---|---|
| **Daily herbage allowance (kg DM/cow)** | **Low (15)** | **Medium (18)** | **High (21)** |
| Milk yield (kg/day) | 17.3 | 18.2 | 18.4 |
| Milk fat concentration (g/kg) | 4.38 | 4.33 | 4.38 |
| Milk protein concentration (g/kg) | 3.73 | 3.76 | 3.79 |
| Milk solids (kg/cow) | 1.40 | 1.47 | 1.50 |
| Live weight (kg) | 581 | 591 | 591 |
| Live weight gain (kg/day) | 0.49 | 0.64 | 0.67 |
| Intake (kg OM/cow/day) | 13.3 | 13.8 | 14.9 |

## The management of early spring grass

Farm specific factors requiring consideration when making grazing decisions at this time of the year include: grass cover, stocking rate, spring growth rates, calving pattern. The aim at this period is to maximise the amount of grazed grass in the cows diet while at the same time having a farm grass cover of >600kg DM/ha by late April. With autumn-calving herds the grass demand is very much set by the allowance of grass that can be allocated. With a spring-calving herd demand increases as the cows extend further into early lactation; however, autumn herds in spring have a set grass demand. With very variable spring grass growth rates, weekly monitoring will be required and decisive action must be taken in order to achieve these targets. Early grazing is further facilitated by grazing a proportion of silage ground twice (immediately at turnout and again in early April) before closing. During the first rotation, paddocks must be grazed out to a target post-grazing height of 4.0cm. This grazing severity can be achieved comfortably without detriment to animal performance when cows are supplemented with 2- 4 kg of concentrate. This ensures high quality re-growth will be available for the subsequent rotations.

## The following key targets should be used during the spring:

- A farm cover >900 kg DM/ha in mid-January (with paddocks closed in rotation from early October the previous autumn).
- A feed budget (grazing strategy) should be planned and updated regularly to control **grass demand** (grazing stocking rate and daily herbage allowance) and **supply** (farm cover and grass growth) throughout the spring period.
- The available grass supply should be budgeted with the first grazing rotation finishing on 10 April.
- Target post-grazing height of 4.0cm ensuring high grass utilisation.
- Good grazing management practises such as block grazing and a good farm road network will reduce the risk of soil damage during this period.
- Grazing management must be flexible during this period, on/off grazing can be successfully used as a method of reducing soil damage during periods of excessive rainfall.

# Liquid milk herds should use high EBI bulls

George Ramsbottom, Teagasc & Andrew Cromie, ICBF

## In summary

- High EBI liquid milk herds are more profitable than lower EBI liquid milk herds.
- High EBI cows perform better than low EBI cows in liquid milk herds.
- Select a team of bull with an average EBI of at least €200 – in liquid milk herds ensure that the team average for milk index is at least €80.

## Introduction

Liquid milk herds generally have a low herd EBI. The perception persists that high EBI cows are low milk producers best suited to spring calving dairy farms. This is not the case. Linking 2006 Profit Monitor and EBI data from 150 liquid and winter milk farms showed that higher EBI herds made an average of €6 more profit per cow per €1 increase in herd EBI. Selecting AI sires on the basis of higher EBI is compatible with the breeding objectives of liquid milk herds. This was never more relevant than where surplus milk is valued on an A+B-C payment system.

## EBI works in liquid milk herds

Analysis of the spring-calving cows by EBI showed that higher EBI cows produced more milk and lasted longer than their lower EBI counterparts in the same herds. Ten liquid milk herds from Meath, Wicklow, Cork and Kildare were selected to determine if this trend was also evident on liquid milk farms. Cows calving for the first time between January 2004 and December 2007 were selected for this analysis. A total of 579 cows with EBI data available calved for the first time during this period on the study farms. The cows were ranked by EBI and divided into fifths. Results for milk production and fertility for the top, middle and lowest EBI groups are presented in the following table.

**Table 1. EBI, milk production and fertility data for cows in 10 liquid milk herds ranked by EBI.**

| | Top 20% (n=116) | Middle 20% (n=116) | Low 20% (n=116) |
|---|---|---|---|
| Average EBI | €104 | €38 | -€26 |
| Milk index/Fertility index | €43 / €51 | €34 / €3 | €26 / -€44 |
| Days in milk - 1-3 lactations | 919 | 843 | 812 |
| Milk production - 1-3 lactations (kg) | 21,921 | 20,477 | 19,881 |
| Milk solids yield – 1-3 lactations (kg) | 1,632 | 1,417 | 1,362 |
| Calving interval 1-4 (days) | 408 | 424 | 441 |
| Survival rate 1-4 (%) | 63% | 50% | 34% |
| Fat % / Protein % | 3.95%/3.51% | 3.55%/3.39% | 3.48%/3.35% |
| Milk value (c/litre)[1] | 31.1 | 29.1 | 28.6 |

The top fifth of cows based on EBI spent 919 days in milk (an average of 306 days per lactation) and produced 7,307 kg milk per lactation (544 kg milk solids per cow) between lactations one and three. In contrast, the bottom fifth of cows ranked by EBI spent an average of 107 days less in milk (36 days less per lactation) and produced 2,040 litres less milk (680 litres less per lactation) in part due to their shorter lactation length and 270kg less milk solids between lactation one and three. The middle fifth of cows were intermediate for milk production.

Part of the reason for the difference in milk production was the fertility of the top EBI group. They had an average calving interval of 408 days – they slipped by an average of 43 days per lactation. At the birth of their fourth calf, 63% of them remained in the herd. The lowest 20% ranked by EBI had a calving interval that average 33 days longer and only one third of them remained in the herd at the start of their fourth lactation.

Fat and protein % combined for the top fifth averaged 7.46% over the three lactations while that of the lowest fifth of cows averaged 6.83% fat and protein. Based on current values prevailing in A+B-C milking pricing systems, the price differential between the top and bottom fifth of cows is estimated at 2.5c/litre.

[1] Based on a milk payment of €2.8/kg fat; €6.40/kg protein; -€0.04/kg milk plus 5.2% VAT before levies are deducted.

## Sire selection advice for liquid milk producers

- Focus on high EBI bulls from ICBF Active Bull List. Our advice is to select bulls with an EBI of greater than €200. It should be possible to select bull teams with greater than €80 coming from milk index and at least €100 coming from fertility index.
- Pick teams of bulls. We suggest that you select a team of five sires because the reliability of the bulls chosen on the 'Active Bull List' is relatively low (currently averaging approximately 50% per bull). By selecting a team of 5 sires, you are making sure that you don't 'put all your eggs in one basket' - insuring against individual bull's EBI declining.
- Use enough AI. Conception rates in liquid milk herds tend to be low – we recommend that you use 1.5 high EBI AI straws per cow in the herd this winter. For example if you have 100 cows to breed this autumn, we recommend that you aim to use 150 straws (30 from each of five sires). Breeding maiden heifers to AI for at least the first round of breeding will help you to meet your target of 150 straws per 100 cows more quickly. Indeed breeding maiden heifers to AI is recommended as their EBI is generally higher than the cows and they tend to have a higher conception rate.
- Use one or a number of heat detection aids on the cows. We recommend that you at least tail paint the cows. Ideally vasectomised bulls should be run with the cows from the start of the second round of the breeding season. They make the job of heat detection easier.

## Impact of using high EBI on the 'typical' liquid milk herd

The 'typical' liquid milk herd has a herd EBI underpinned by a high milk index and low fertility index. The milk index typically has a high PTA for milk kg and low PTA for fat and protein % as outlined in the following table.

**Table 2. EBI, milk and fertility index, PTA for milk kg, fat and protein % of the 'typical' liquid milk herd, recommended sire team and predicted daughter average.**

| | Herd EBI | Milk index | Fertility index | PTA Milk | PTA Fat%/Pr% |
|---|---|---|---|---|---|
| 'Typical' liquid milk herd | €50 | €35 | €15 | +150 kg | +0.02 /0.00 |
| Possible AI sire team | €220 | €100 | €100 | + 250 kg | +0.10/+0.08 |
| 2011 daughter average | €135 | €68 | €58 | + 200 kg | +0.06/+0.04 |

A possible high EBI AI sire team can be selected from the active bull list with high milk index and high fertility index. Such a team can also have a high PTA for milk kg and currently such teams are available with high PTA for fat and protein %. Such daughters will have high EBI, milk and fertility index. They will perform similarly to the high EBI group in Table 1. Thus in addition to delivering high volumes of milk, they will produce high fat and protein % milk with superior fertility to their dams. You can determine the genetic indices for your herd by using the HerdPlus EBI report for your herd.

# Feeding the liquid milk herd- keeping it simple

David Wallis, Teagasc and Shane O'Loughlin dairy farmer, Monasterevin, County Kildare

## Introduction

Finding a balance between proper cow nutrition and a workable feeding plan is hard to achieve on liquid milk farms, especially where calving pattern is spread out. Nutrient demands of the cow vary greatly depending on stage of lactation, but it is not always practical to divide milking herds at farm level. Simplicity of feeding is an objective for Shane and Dermot O'Loughlin, who run 140 pedigree Holstein cows at Oghill, Monasterevin co. Kildare. Milk is supplied to Glanbia and 50% of production is sold under liquid contract. Shane participates in the Teagasc BETTER liquid milk project

The herd has an EBI of €103, of which €62 comes from fertility. The herd has a moderate genetic yield potential with a PD of 96kg milk, and recorded yield is 6900 litres. Around 25% of the total herd calve in autumn; this proportion was greater until recent expansion of spring calving numbers. The situation for autumn management is 30-35 autumn calving cows plus 100-105 late lactation animals

## Feeding management

Keeping the feeding regime relatively simple is important from both a cost and a labour point of view. The main aim for this farm is to use as much grass as possible to feed the milking cows. During the indoor period, the focus is on feeding an economic diet that is balanced for the target milk production using as few ingredients as possible. Some of the targets and outcomes are described below.

### Autumn grazing management

Autumn grass is well recognised as being more difficult to contend with for a split calving herd than spring management. On the one hand covers are being built up to stretch the grazing season, but the resulting heavy pre-grazing yields (>1900kg DM) are not well utilised by fresh calved cows. This autumn it was attempted to keep pre-grazing yields to 1,500kg DM max, and fresh calved cows were offered 5kg of concentrates at grass. The future plan is to push the median autumn calving date into late October. The fresh cows will be housed as conditions deteriorate, while stale spring cows will be used to clean out paddocks toward the end of the last rotation. Autumn pasture can then be managed to suit the majority of the herd and the need to buffer feed on autumn grass is reduced. Target closing cover is 550kg DM per ha at a full closing date of November 20$^{th}$.

**Feeding during the housing period**

It was decided in autumn of 2009 to review indoor feeding of the herd. This had become complicated by too many TMR ingredients and too much time spent mixing various formulas for different groups of animals. The first step, as always, was to test forage quality before deciding on meal feeding. Next, the milk genetic proofs of the herd were looked at and a reasonable target yield of 30 litres was set. Last, a basic diet of maize, grass silage, parlour concentrate and soybean to balance was formulated (Table 1).

**Table 1.** Ingredients and composition of winter diet 2009.

| Diet Composition | | Ingredients | |
|---|---|---|---|
| DM % | 45.5 | | kgDM |
| UFL | 0.92 | Maize Silage | 5.0 |
| Crude protein % | 16.2 | Grass Silage | 7.0 |
| PDIN, g | 105 | Soybean Meal | 1.3 |
| PDIE, g | 98 | | |
| Starch % | 13.1 | *Parlour conc.* | |
| Sugar % | 6.7 | Fresh cows | 5-7 |
| Oil % | 3.4 | Stale cows | 1-2 |
| Crude fibre % | 19.4 | | |
| NDF % | 42.8 | | |
| ADF % | 23.7 | | |
| Ash % | 4.2 | | |

The crude protein content of the diet was 16.2%, which is lower than the target for maximum milk yield (17.5 - 18%). However, the PDIN and PDIE protein supply from the diet was judged sufficient for the milk yield, and it was attempted to match these values as closely as possible to further reduce protein cost and balance protein and energy supply.

Parlour concentrate was a standard 16% CP ration with high cereal content. There was no feeding to yield beyond 7kg of concentrate in the parlour, as this presented a greater risk of digestive problems and driving high individual peak yield was not the objective. While it is difficult to conclude after one year's data, the milk yield curve for October-December calving cows in 2009 appears flatter and more persistent than for 2008, when more intensive feeding was practiced (Figure 1).

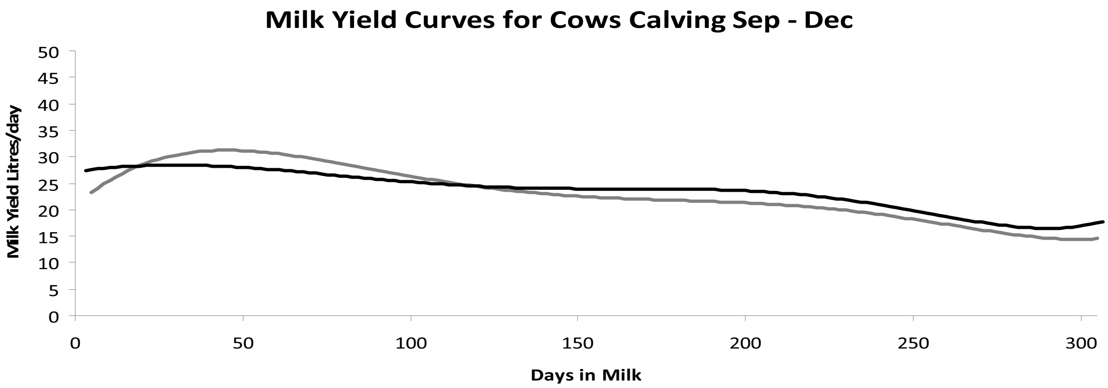


**Figure 1.** Lactation curves for autumn calving herd in 2008 ( —— ) and 2009 ( —— )

A long-term breeding target for the herd is to reduce the range in genetic potential for milk yield and bring more of the herd closer to an optimum 'centre' around +120kg milk in the proof. This reduced variability in cow type should make it more possible to feed to the average yield potential of the group.

**Spring grazing**

Target turnout for autumn calvers is February 1st. Cows calved in January and early February are turned out around three weeks later. All other cows are calved to grass. Grazing is by day only at first and full turnout is determined by farm covers and growth rates. Meal feeding levels are moderate at 3-4kg in the parlour, more if grass is scarce.  Percentage targets for platform grazed will be 30% on 01/02; 65% on 17/03 and 100% on 01/04.

**Feeding autumn-calving dry cows in late gestation**

The target for autumn calving cows is to have the correct body condition score of 3.25 at calving down. This has received greater attention on the farm in recent years. Cows are dried off at 2.75 to 3.0 and kept on restricted grass allowance for the early dry period. No other forage sources (straw etc) are included in the diet at this stage. From 4 weeks prior to the expected calving date, cows are moved to a bare paddock and offered stemmy baled silage ad-lib plus a high-spec (high vitamin E, selenium, magnesium) dry cow mineral. Cows receive 1kg of concentrate from one week pre-calving. No batching of dry cow groups or diets is used, but BCS is monitored from late lactation onward.

## Conclusions

The feeding practices on this farm are attempting to find a balance between performance, cost and labour. Managing grazed pasture to ensure quality milk is produced from the most economical feed source available is essential for reducing feed cost. High milk yields in early lactation are not targeted, and indoor diets are balanced for steady performance. Breeding a high durability cow should help simplify feeding of the herd.

# Summary of Johnstown winter milk study 2010

Joe Patton and Aidan Lawless

## Introduction

The current Johnstown Castle winter milk study is entering its third full season in autumn 2010. It was established in conjunction with the dairy research programme in Teagasc Moorepark, to address issues relevant to herds with an autumn calving component. Previous winter milk projects on the Johnstown site have researched options for reducing the cost of winter milk production, such as brassica crops and alternative housing. The present work concentrates on high input systems of milk production. In particular, milk production on a limited land base and TMR feeding feature in the experiment.

The farm systems being investigated are experimental in nature and no final conclusions are being drawn at this stage. However, some of the principles discussed should help inform decision making at farm level.

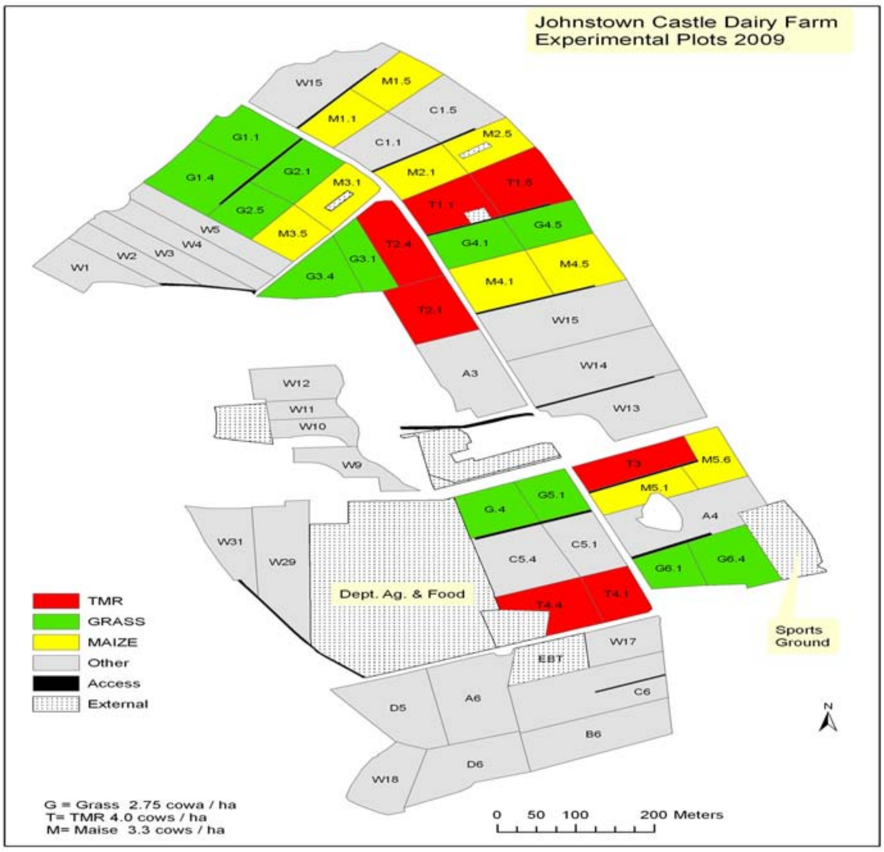


Figure 1. Map of Johnstown Castle experiment farmlets

**Farm systems on the Johnstown Castle experiment**

The current experiment consists of three feeding systems, which vary in stocking rate and feeding policy. Details of each treatment are outlined in Table 1. Each group is 100% calving. Calving commences around September 5th and continues for 14 weeks. A compact breeding season is imposed, and cows failing to become pregnant during this time are culled from the trial. Milk is supplied to Wexford Creamery under a bonus scheme, which pays a premium on all litres supplied October-February if 30% of annual milk is supplied during this time. The herds are managed as separate systems:

**Grass (GREEN):** Objective is to maximize grazed grass in the diet of the milking herd. Overall farm stocking rate is 2.74 cows/ha. The entire farm is available for grazing. Winter forage requirements are met by harvesting grass silage from the farm area. Concentrate fed in the milking parlour.

**Maize (YELLOW):** Objective is to maximize grazed grass in the diet of the milking herd, while using maize silage during the winter housing period. Grazing area stocking rate is 3.25 cows/ha, with the maize silage produced on an external block. Concentrate fed in the milking parlour.

**TMR (RED):** Objective is to maximize milk production per hectare by offering a total mixed ration (TMR) to supplement available pasture. Grazing area stocking rate is 4.0 cows/ha. Additional forage for winter/buffer feeding is imported onto farm at least cost. Concentrate is fed as part of the TMR.

**Table 1:** Experiment group details

| | **GRASS** | **Maize** | **TMR** |
|---|---|---|---|
| Band Colour | Green | Yellow | Red |
| Cows (% heifers) | 24 (*25*) | 24 (*25*) | 24 (*25*) |
| | | | |
| Farm Stocking Rate | 2.75 | 2.75 | 4.0 |
| Grazing Stocking Rate | 2.75 | 3.25 | 4.0 |
| | | | |
| Herd EBI | 92 | 94 | 93 |
| Mean Calving Date | 7th Oct | 9th Oct | 10th Oct |

**Breeding policy**

A summary of the herd genetic profile is presented in Table X. A strong emphasis is placed on breeding for fertility, survival, and milk solids (fat + protein) yield. This means using a balanced panel of the highest EBI genetics available. Herd EBI stands at €93, with a balance for milk and fertility. Herd sires include LBO, DEU, RMW, ETD, and RDU. Some Norwegian Red sires have been used in the past and the crossbred cows have performed well in the system. The average EBI of the sire panel last season was €218 (BYJ, UPH, TTY, and RXO). The standard is to use sires with >€100 for fertility and +0.10% for protein. These targets very much apply to liquid milk herds where surplus to contract milk is paid for on a solids (A+B-C) basis.

**Table 2.** Summary of genetic profile of the Johnstown Castle Herd

| | **Herd** | **Calves 09/10** | **Sires 09/10** |
|---|---|---|---|
| **EBI €** | **€93** | **€110** | **€218** |
| | | | |
| **Milk €** | **€39** | **€46** | **€86** |
| Milk kg | +165 | +156 | 220 |
| Protein % | +0.04 | +0.05 | +0.11 |
| Fat % | +0.02 | +0.07 | +0.14 |
| Fat + Pro kg | +14.4 | +16.6 | +32 |
| | | | |
| **Fertility €** | **€43** | **€56** | **€103** |
| Survival % | 1.4 | 2.0 | 3.9 |
| Calving Interval days | -2.3 | -2.9 | -4.7 |

**Herd performance and feed budgets 2009/2010**

The TMR and GRASS systems are the highest and lowest intensity systems on the trial, so for simplicity of comparison details of these treatments are presented (Table 3). The MAIZE system falls intermediate between the other systems with MAIZE intermediate. (Full details and updates of performance for all systems are available at www.teagasc.ie).

**Table 3. Performance of Johnstown Castle Herd 2009-2010**

| | **TMR** | **GRASS** |
|---|---|---|
| Stocking rate | *4.0* | *2.75* |
| | | |
| Milk Yield (kg/cow) | 7313 | 6770 |
| -Fat % | 4.09 | 3.88 |
| -Protein % | 3.47 | 3.40 |
| | | |
| Litres per hectare | 29,252 | 18,617 |
| Milk Solids (kg per grazing hectare) | 2211 | 1355 |
| Empty Rate % | 17 | 8 |
| | | |
| Concentrate Fed (kg DM per cow) | 1313 | 1105 |
| Forage Utilised | 11.6 | 12.1 |
| Feed Imported (tonnes DM /ha) | 11.9 | 4.1 |

The TMR group produced approximately 8% more milk and 10% more milk solids per cow compared to GRASS. Much of this extra production arose during the winter housing period, when feeding the TMR yield maintained yield at 3.0 – 4.0 litres higher than for GRASS cows fed grass silage and concentrate (Figure 2). However, milk yields converged post turnout, such that average daily milk yield per cow at grass was similar for both groups

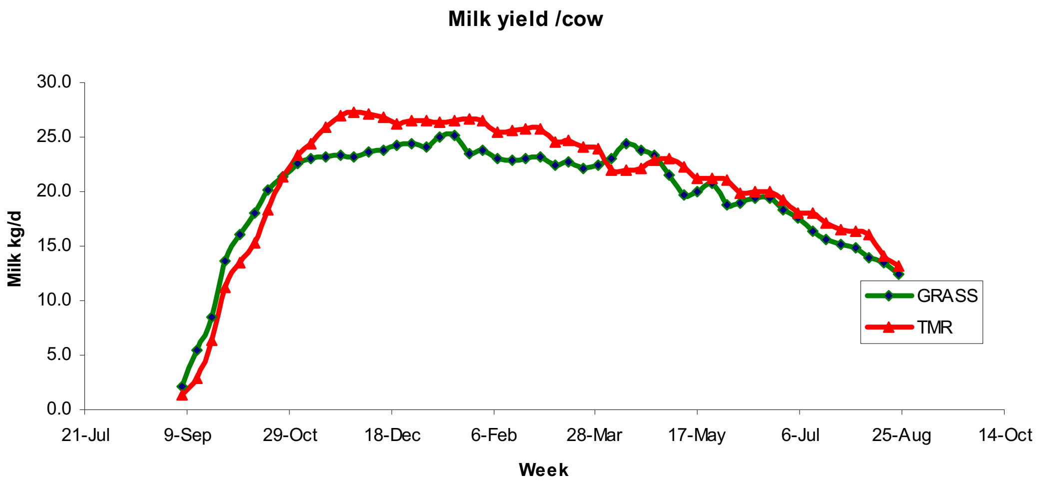


**Figure 2.** Milk yield profile for GRASS and TMR groups

Milk output per hectare for the TMR group was 29,252 litres per grazing hectare compared to 18,617 litres per hectare for GRASS. This differential was evidently driven by the stocking rate rather than by the 8% milk yield difference per cow.

In order to sustain a high stocking rate for the TMR group, 11.9 tonnes of feed DM were imported per grazing hectare. This was a combination of maize silage, grass silage, by-product feed (Trafford Gold) and concentrate (Figure 3a). In comparison, 4.1 tonnes of feed DM were imported for the GRASS group, 90% of which was parlour concentrate and 10% as baled grass silage (Figure 3b).

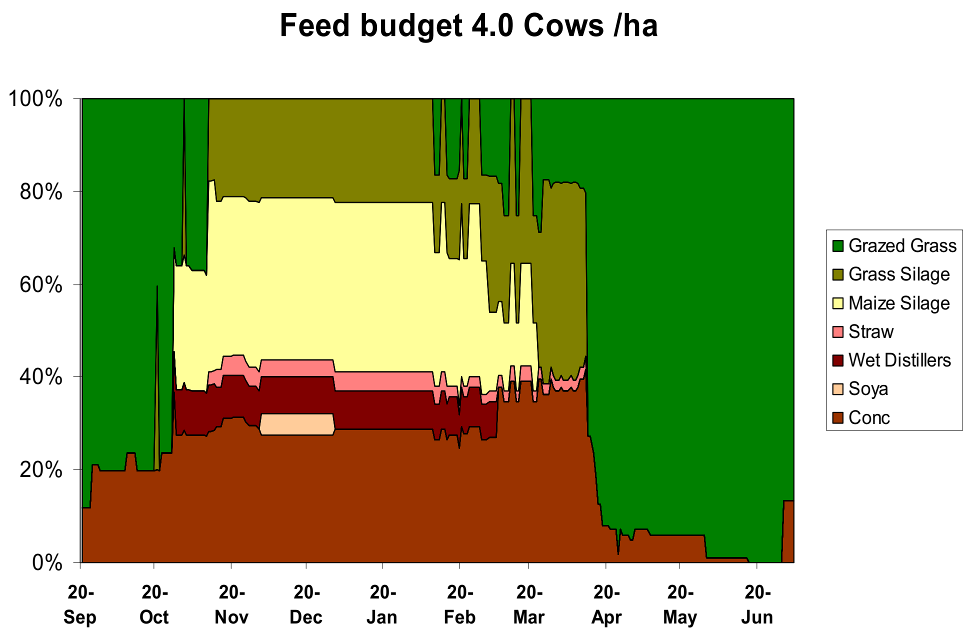


**Figure 3a.** Feed budget for the TMR treatment

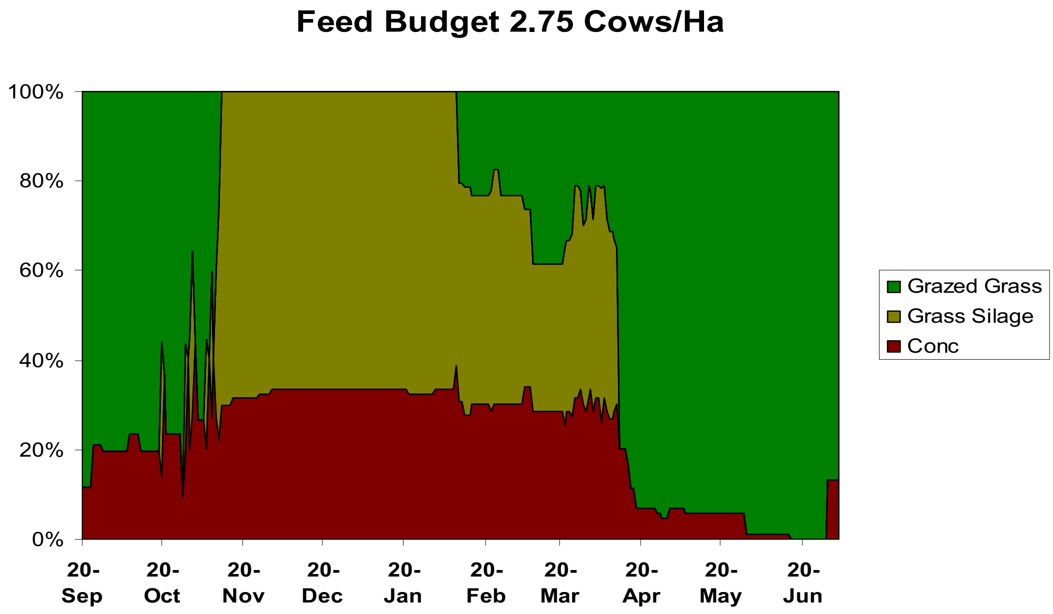


**Figure 3b.** Feed budget for the GRASS treatment.

A key objective for both systems is to maximise the proportion of grazed grass in the diet. A spring rotation planner is set out on each system to set the farm areas up for subsequent grazing rotations. Spring turnout is dictated by setting out to have 30% and 60% of the grazing areas grazed by March 1st and 17th, respectively. Similarly, separate autumn grass budgets are set out to cater for the different stocking rates. Across all treatments, autumn covers are managed to avoid excessive pre-grazing covers (>1900kgDM) for fresh calved cows. In mid-season, supplementation of the milking herd is based on maintaining weekly pasture covers at 160kgDM per cow and a pre-grazing yield of 1400kgDM. The GRASS group are stocked at similar density to TMR during this time with part of the grazing area closed for silage

The result of this approach is that both systems utilise a comparable tonnage of forage on the grazing block (Table 3). The relative economics of the systems on a fixed land base is therefore a function of additional milk revenue, compared to additional feed budget cost, corrected for the additional cost of greater herd size.

## Economics of GRASS and TMR feeding systems

The relative economics of the TMR and GRASS systems are most appropriately compared as a fixed land base situation - a 40ha grazing block is used in this analysis. The GRASS system would run 110 cows at this scale, while the TMR system has a herd size of 160 cows on the same 40ha area.

The TMR system imports additional feed from external sources while the GRASS system aims to be self sufficient for forage. Extra milk revenue from 11,000 litre per ha increased output must cover the extra feed, variable and fixed costs of carrying 50 extra cows on this block. Summary costings for the systems are presented in Table 4. These are modelled to 40ha farm scale, using Johnstown herd performance and an efficiency for other costs equivalent to the top 20% of winter milk herd in the Teagasc Profit Monitor. Milk price is set at 28cpl and purchased feed cost is set to a base of €210/t for 18% high energy concentrate. Additional hired labour and depreciation are included for TMR in line with extra cow numbers. Revenue from surplus stock sales is not included.

**Table 4. Revenue and cost projections for TMR and GRASS on a 40ha farm scale.**

| | **TMR** | **GRASS** | *Diff* |
|---|---|---|---|
| Milk Revenue | 327,025 | 210,672 | *116,950* |
| | | | |
| Feed Cost | 77,225 | 24,829 | *52,396* |
| Fert, Vet, AI, Contractor | 49,728 | 42,285 | *7,444* |
| Other Variable Costs | 16,381 | 9,781 | *6,600* |
| ***Gross Margin*** | ***184,288*** | ***133,777*** | ***50,511*** |
| | | | |
| Hired Labour | 33,347 | 14,296 | *19,052* |
| Depreciation | 25,617 | 14,101 | *10,861* |
| Other Fixed Costs | 58,153 | 41,758 | *16395* |
| ***Total Costs*** | ***259,992*** | ***143,483*** | ***116,509*** |
| **Farm Net Margin*** | **67,189** | **67,189** | ***441*** |

*Cost of own labour to be deducted

At this milk price and feed cost ratio, farm milk revenue is €116,950 greater for TMR but total costs are €116,509 greater also, leaving a negligible difference in farm net margin for the systems. This shows that at 28cpl milk price the systems return the same dairy profit. The TMR system is more sensitive to feed cost and milk price, so profitability will respond to a greater degree to changes in these external price factors (Figure 4). The input cost assumptions outlined in Table 4 were used to generate the margins in the graph. Also included on the graph is a 'TMR-HIGH' line, which projects the impact on profit of a 25% increase in feed input prices. This shifts the annualised cost of production on the system by approximately 1.4cpl, (*effect on the grass system is 0.5cpl extra cost, not shown*). The milk price at which the systems return the same farm profit therefore moves closer to 30cpl, and the TMR system will in fact generate a negative margin at below 22.5 cpl milk price


**Figure 4.** Milk price sensitivity of the GRASS and TMR feeding systems

## Conclusions

The Johnstown Castle Experiment aims to clarify some the feeding and profit issues surrounding high input dairy farming. Maintaining a high level of pasture utilisation is emphasised across all feeding systems. Use of high fertility genetics is a priority. Performance results show that a the highest output ‘TMR’ group delivers almost 30,000 litres of milk per grazing hectare and utilises over 11 tonnes of pasture DM. This high output comes at a cost however, with around half the herd’s diet coming from imported feed. The system is therefore very sensitive to external price changes.