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‘Exploiting the Freedom to Milk’

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The Effect of Milk Quota 'Expansion' on EU/Ireland Production

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Introduction

This paper addresses prospects for Ireland of the impact of expanding the milk quota system in advance of its planned elimination in 2014/15. If quotas end in 2015 then it is unlikely that we will move from the present quota regime to a no quota situation overnight. A sudden removal of the milk quota would change milk and dairy product prices and the level of milk production in the EU relatively quickly and this might lead to unnecessary pressures on both farmers and milk processors as they adapt to the rapidly changing environment. An alternative would be to allow the change in policy to take place over a number of years, which could be achieved in many different ways.

For example, at once extreme milk quotas could be increased just once between now and the elimination date. Another possibility would be to increase quotas and then assess the size of further annual milk quota increases depending on market conditions.

In this paper we examine just two milk quota scenarios. The first scenario involves a once off three percent increase in the milk quota in 2008/09, with no further quota changes up to the elimination date. The second scenario also increases the milk quota by three percent in 2008/09, but then follows that with a series of successive annual quota increases, totalling over 20 percent. First, we examine the impact of the change in quota on the EU dairy market and then we examine the impact at farm level in Ireland.

Background - What will the EU CAP Health Check contain?

Over the last 18 months EU Commission officials have been indicating that there is little prospect of milk quotas continuing beyond 2014/15. Reform of dairy policy may form a central plank of the 2008 review of EU agricultural policy, known as the CAP Health Check. Several mechanisms that would bring milk quota to an end have been proposed.

They include:

- Gradual quota expansion
- Overnight quota elimination
- Quota trading between EU MS
- Reduction in the rate of quota superlevy

Of these four options the one which seems most practical is the prospect of a gradual quota expansion (the so called 'soft landing' approach).

The developments in international dairy commodity prices from mid-2006 onwards has led to a debate about an immediate increase in EU milk quotas in the 2008/09 milk quota year. The issue was addressed at the Agriculture and Fisheries Council in Brussels in September 2007. Overall, the balance of opinion at the Council seemed to favour an increase in milk quotas of the order of three percent in 2008/09. At the time of writing (October 2007) it remains unclear whether an increase in the milk quotas from 1 April 2008 will be agreed. The CAP Health Check is likely to cover a range of other issues in addition to the Dairy Common Market Organisation (CMO). Other suggested elements of the CAP Health Check proposals are increased compulsory modulation of single farm payments, moves to end partially decoupled direct payments which still exist in other member states (MS), and a movement towards a flat area payment scheme across the EU. Proposals for the CAP Health Check will be published in Brussels on 21 November 21 2007. A decision in relation to the details of the CAP Health check is expected in 2008. It is very likely that the Health Check will allow for further milk quota increases, but the rate of increase is unlikely to be set in stone and instead may depend on an on-going assessment of the EU dairy market.

How might milk quotas change before they are eliminated?

In this paper we examine the impact of milk quota scenarios developed through a process of consultation with a variety of stakeholders, taking account of the direction of the current policy debate on milk quotas at EU level. Ultimately, it was decided to examine the following scenarios set out in Table 1. It is planned to examine further scenarios is due course.

Table 1: Milk Quota Scenarios and Related Policy Assumptions

Scenario 1: Additional 3% increase in EU milk Quota in 2008/09

- Increase in 2008/09 EU milk quota as per Council Reg No 1788/2003
- Plus a further 3% increase from 1 April 2008
- Milk quotas are removed on 1 April 2015

Scenario 2: Series of 3% per annum increase in EU Milk Quota

- Increase in 2008/09 EU milk quota as per Council Reg No 1788/2003
- Plus a series of 3% annual increases from 2008/09 to 2014/15 (total quota increase of close to 20%)
- Milk quotas are removed on 1 April 2015

How milk quotas work

In an unregulated market prices for a commodity are determined by supply and demand. The price of a commodity can be altered by regulation. In the CAP, intervention and disposal schemes have been used in the past to remove commodities from the market in order to support prices and ultimately improve incomes. Policy makers may find that intervention and disposal measures are an expensive way to regulate the price of a commodity and for the dairy sector this was the case in the 1970s. A cheaper alternative is to regulate supply by imposing a quota on production. Milk quotas transfer some of the cost of supporting the milk price away from the CAP budget and onto the consumers of the products, as they have to pay higher prices for dairy products than would be the case if the milk quota did not exist. Since dairy products could be imported from outside the EU at lower cost, import tariffs are required to limit the amount of these imports, otherwise the milk quota system would be ineffective in maintaining milk and dairy product prices in the EU.

Generally, the lower the level of the milk quota compared with what could be produced in an unregulated (or less regulated) market, the greater will be the boost in prices provided by the milk quota. It follows that if the milk quota is set at a level which is above the production potential, then it will have no effect as a price and income support tool. In the EU at present quotas limit milk production. Their removal would allow some increase in milk production and this study quantifies the increase in production and the resulting decrease in milk prices.

Since the milk quota is implemented at EU MS level we actually have 27 milk quotas in operation. In these countries producers face differing milk prices and production costs, which means that changes in quota will have different impacts in MS across the EU. At the same time it can be said that much of the effect of changes in EU milk quotas will depend on the impact arising in just five MS (France, Germany UK, Italy and Poland) producing over half the entire EU milk production. Each country has its own peculiarities as to how the milk quota system is implemented and this may complicate the assessment of whether more milk would be produced if the milk quota was increased or removed. Full details of how this is modelled are available from Binfield et al (2007b).

EU milk quota scenario results

The analysis of the impact of the milk quota scenarios begins with the generation of a baseline outlook for the next ten years. Full details of that baseline outlook are contained in Binfield et al. (2007a). The baseline assumes no policy changes. A brief summary is provided below to provide a frame of reference for the Scenario outcomes.

Key points of the Baseline dairy outlook

Compared to 2006, EU and Irish agricultural commodity prices generally increase over the Baseline projection period which ends in 2016. Dairy commodity and meat prices are all projected to increase between 2006 and 2016 under the Baseline. However, the milk prices achieved in 2007 were exceptional and are not projected to be sustained over the medium term. Cereal prices will decline from the high prices observed in 2007, but by the end of the projection period would be well above the intervention price levels experienced in the early years of this decade. With quota remaining in place, the projected Irish milk price increase of 12 percent over the period 2006 to 2016 leads to an increase in the value of the output of the Irish dairy sector to € 1,426m.

Quota expansion Scenario 1 (3 percent increase in 2008/09)

Under this scenario the increase in the quota prior to elimination is very modest and therefore the impact on production prior to quota removal is small. The expansion of quota has two effects. In the first instance it relaxes the constraint on low cost MS and there is an increase in their overall milk production. However, the expansion in milk production reduces the price. Lower prices lead some higher cost MS to reduce overall production.

EU level

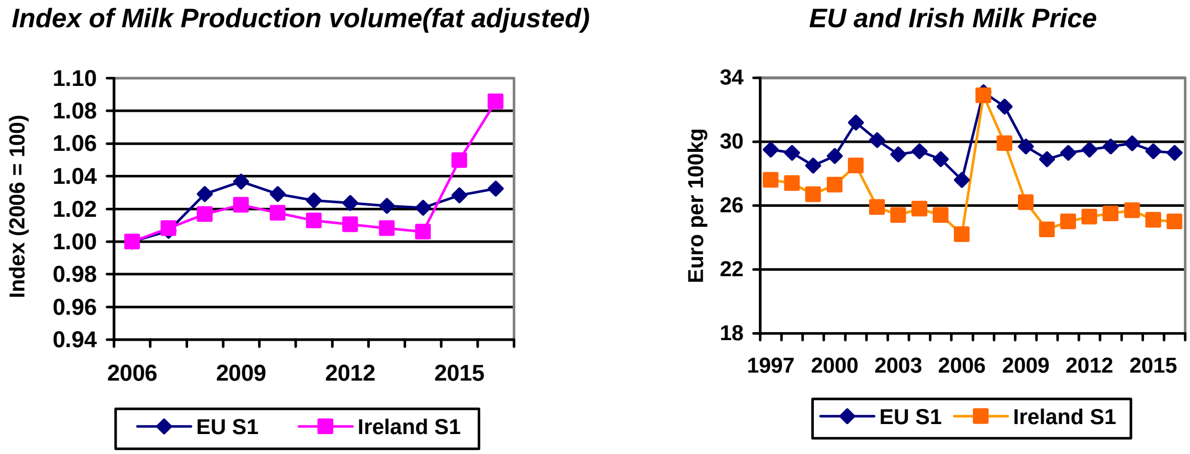
Many EU MS have the capacity to produce a small increase in milk production. In many cases the quota increase is required to keep pace with the increase in dairy product consumption which is largely driven by cheese consumption growth. In recent years some EU MS have had difficulty in filling their existing milk quota and thus the three percent quota expansion is not filled in a number of MS. At an aggregate EU level the three percent quota increase provides only a two percent increase in milk production by the 2014/15 milk year. Relative to the 2015 baseline milk price, the milk price in Scenario 1 in 2015 is down about five percent at EU level. Overall, Scenario 1 means little change in the location of EU milk production across the MS.

Ireland

Ireland takes up the full three percent increase in milk quota, although in the early years of the projection period the increase in Irish milk production may appear to be below the three percent quota increase. This is due to a projected continuation of the increase in milk fat content (which requires a butter fat adjustment), as well and a slight decrease in imports of milk from Northern Ireland.[1] Of greater interest is that Irish milk production expands by six percent in the two years after milk quota elimination. By 2016 the Irish milk price is just under €25 per 100kg or 26 cent per litre, which is eight percent below the corresponding baseline level. The price reduction that takes place in the last couple of years of the projection period is due to the expansion in EU milk production post quotas and it reflects the fact that Irish milk production is still increasing by the end of the projection period and has not reached its long run equilibrium level. Figure 1 illustrates the path of milk production and milk prices under Scenario 1.

[1] For statistical purposes imports of milk are included in Irish milk production although they are not part of the milk quota for Ireland.

Figure 1: EU and Irish Dairy Production and Milk Prices under Scenario 1



FAPRI-Ireland Model (2007)

Milk prices decline over the projection period in both the EU and Ireland. The decrease in Ireland over the short term is quite pronounced, but it should be understood that, relative to 2006, the Irish milk price increase in 2007 far exceeds the increase in the EU average milk price. Overall the value of the milk sector in Ireland increases relative to the baseline. Lower milk prices are offset by higher production so that the value of the Irish milk sector at €1,533m is up eight per cent relative to the baseline by 2016.

Quota Scenario 2 (3 percent annual increase 2008/09-2014/15)

Compared with Scenario 1, a series of annual milk quota increases might better achieve the 'soft landing' sought by policy makers and Scenario 2 provides one of many options in this regard. In Scenario 2 the milk quota is increased by an additional three percent each year against the base 2008/09 level up to the assumed point of elimination in 2015. This would represent an increase in milk quotas of about 20 percent in advance of quota elimination.

EU level

While most MS take up the increase in quota in the first couple of years of expansion, in successive years, the annual increase in milk quota in Scenario 2 is taken up by fewer MS. Across the EU only Ireland takes up the full increase in quota offered up to 2014/15. Over the projection period, the larger milk producing countries in the EU do not increase production in line with the quota increases and hence, at an aggregate EU level, the expansion in milk production is relatively limited. Overall EU milk production increases by just four percent by 2014 and the average EU milk price is projected to be almost seven percent lower than the 2014 baseline milk price. A key feature of Scenario 2 is the negligible impact of quota removal in 2015, given that much of the EU in aggregate will have achieved its productive capacity in the quota expansion phase preceding the elimination. In other words, in Scenario 2 the soft landing is achieved.

It is notable that relatively little change in price or production occurs at aggregate EU level beyond 2009/10; as subsequent production increases in some MS tend to be offset by production contractions in others. As a consequence, when the milk quota is removed, aggregate EU milk production is more of less unchanged on the preceding couple of years. Accordingly, milk prices in Scenario 2 are changed relatively little between 2010 and 2016.

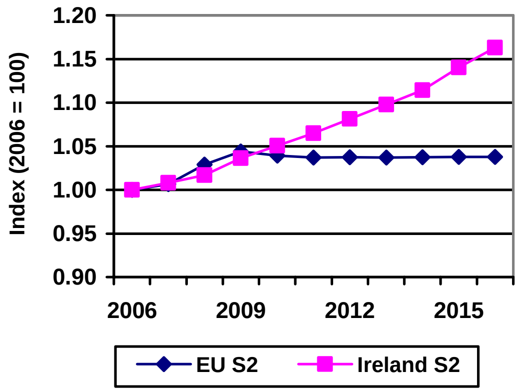
Ireland

Irish milk production continues to increase once quotas are removed, while milk prices at this point remain stable at approximately €25/100kg. The increase in Irish milk production is achieved though a combination of increased milk yields, which grow at a higher rate than under the baseline, and an increase in dairy cow numbers (this is discussed in more detail below). Overall by 2016 the Irish milk sector is projected to be worth €1,686m, up over 18 percent on the value under the baseline. Figure 2 illustrates the path of milk production and milk prices under Scenario 2.

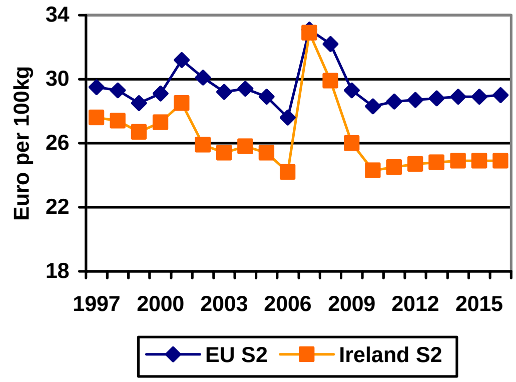
The additional milk produced in Ireland is mostly absorbed in butter and SMP production, with some small additional volume of cheese produced. The projected price for Irish milk in the Scenario reflects this product mix. Ultimately it will be for Irish processors to decide how the additional milk should be processed. Additional processing capacity will be required to handle the additional one million tonnes of milk that would be available. It is possible that export opportunities might arise in other MS markets that cannot be anticipated through this analysis. Therefore, it is conceivable that the product mix could be different to that projected here.

Figure 2: EU and Irish dairy production and milk prices under Scenario 2

Index of Milk Production Volume (fat adjusted)



EU and Irish Milk Price



FAPRI-Ireland Model (2007)

Under Scenario 2 dairy cow numbers in Ireland in 2016, are up two percent on the 2006 level. Yields grow at a rate close to two percent per year, compared with just one percent per year in the Baseline and Scenario 1. This additional rate of yield increase in Scenario 2 represents an extra 300kg of milk per cow by 2016 (compared with the Baseline yield in 2016) and is achieved through the exploitation of improved overall herd genetics, a modest increase in feed grain usage of the order of 100kg per head and a decrease in the amount of milk fed on farms. The positive post quota outlook for the dairy sector in Ireland under Scenario 2 can be attributed to a number of factors and these are detailed in Table 2.

Table 2: Factors facilitating the expansion of Irish milk production

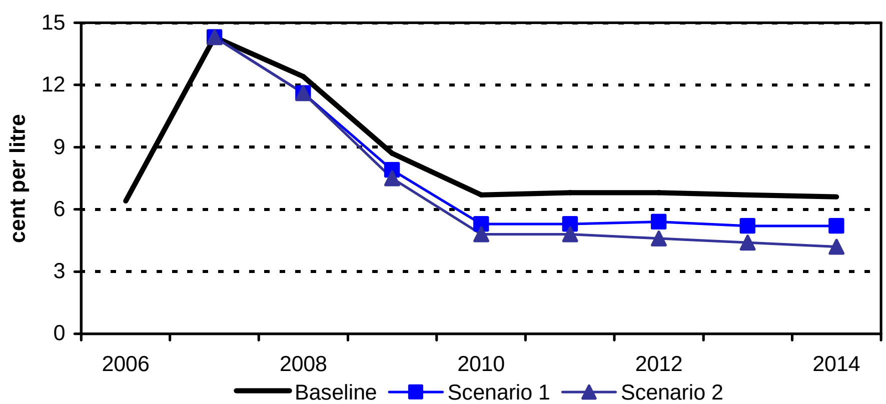
- Over the projection period there is an increase in the cost of producing milk from feed grains relative to pasture.
- For continental EU producers, higher feed costs erode much of the improvement in the milk/feed ratio and thus reduces the expansion capacity of feed grain dairy producers.
- By contrast Ireland benefits from its grass based system of production and from the improved outlook for international dairy commodity prices, without incurring the significant cost increases of grain based dairy producers.
- Increased fertiliser and energy costs increases grass production costs, but high feed grain prices mean that the competitiveness of Irish producers improves relative to those in feed grain systems.

- Ireland's milk production (and exports) are small relative to total EU dairy market, which means that increases in Irish milk production represent a small addition to the overall EU milk supply
- With only limited expansion in milk production in much of the EU, large expansion in Irish production is possible with minimal impact on the EU dairy market or the Irish milk price.
- Increases in national milk output of the scale projected to occur in Ireland, would have a greater impact on the EU dairy market were they to come from one of the large EU MS, like France or Germany. A large scale expansion in France or Germany would increase EU milk production by a greater percentage and would have a more depressing impact on prices.

The outlook at farm level

It is interesting to consider the effects of the two milk quota expansion scenarios at the farm level, full details of this analysis are available from Hennessy (2007). Figure 3 presents projections of net margin per litre produced for the average creamery milk producer from the National Farm Survey (NFS) (Connolly et al 2007).

Figure 3: Net margin cent per litre for the average creamery milk farm under Baseline and milk quota scenarios



Source: FAPRI-Ireland Farm-Level Model (2007).

In line with milk price projections, net margins are projected to fall more rapidly in the two quota expansion scenarios. By 2010 net margin per litre on average cost farms is approximately 7c/l in the Baseline, it is just over 5c/l in Scenario 1 and just under 5c/l in Scenario 2. The potential benefit of the quota expansion scenarios is the ability to increase milk production, albeit at a lower milk price than would be available under the current milk quota. Whether the net effect of producing more milk at lower prices is negative or positive depends on expansion costs.

The cost of producing more milk

Whether or not Ireland will fill the increased milk quota is a function of the willingness and ability of farmers to increase milk production. For the purposes of this analysis we assume that farmers will follow a phased expansion plan; by first increasing deliveries per cow, second increasing cow numbers using existing resources and finally acquiring additional resources. The costs associated with each stage of expansion are taken from the Moorepark Dairy Systems Model (Shalloo et al 2004) and are derived from production research at Teagasc Moorepark Research Centre. The cost involved in such expansion is detailed below.

Stage 1 Expansion

This involves increasing deliveries per cow. The costs related to this are as follows:

- Farmers increase deliveries per cow by 10 percent, comprising a six to seven percent increase through longer lactation and less retention of milk (for feed) on farms, and a three to four percent increase through better feeding/management.
- Additional milk is produced at a total cost of 5c/l, reflecting increased expenditure on concentrate feeds.
- There are no other expansion costs as cow numbers are unchanged.

Stage 2 Expansion

Stage 2 expansion involves replacing beef animals with dairy cows and replacements. The extent of this expansion may be constrained by land fragmentation. In the absence of data on fragmentation, it is assumed that only half of all beef animals can be replaced by dairy stock. It is assumed that farmers breed all their own replacements by retaining more female calves. The costs of this stage of expansion are detailed below:

- Replacing a livestock unit of beef with dairy causes a net increase in labour of 23 hours per cow. Labour rates are assumed to be €12/hour in 2006 and increasing thereafter in line with wage rate inflation.
- The conversion of beef housing to dairy use is a once-off cost of €300/ cow.

- Upgrading of the milk bulk tank is once-off cost of €406/cow.
- Housing and bulk tank costs are borrowed and repaid over 10 years at an interest rate of six percent. Repayment of principal and interest is factored into the analysis.
- The foregone beef profit is estimated for each farm from NFS data, excluding the decoupled payment. In 2006 the average gross margin for all creamery milk producing farms was €103 per livestock unit of beef.

The annual recurring cost of this expansion is €467/cow, or 9.4c/l on a cow yielding 5,000 litres, or 8.5c/l on a 5,500 litres cow. The extent to which Stage 2 expansion is possible varies across farms, depending on the current level of specialisation in milk production, the profitability of beef production and the yield per cow.

Stage 3 Expansion

This is the most costly stage of expansion as it involves acquiring additional land and facilities. The costs associated with this expansion are as follows:

- Land rental values are estimated to be €268 per year hectare. Stocking rates are assumed to be 1.8 livestock units per hectare.
- Full labour costs are assumed in this expansion scenario at 35 hours per cow at €12/hour and increasing thereafter in line with wage rate inflation.
- Milking facilities are expanded at a cost of €9,600 for every additional seven cows.
- Low cost housing as assumed in the Moorepark Blueprint is €262/cow
- Milking parlour and housing cost facilities are financed over 20 years at six percent. The full annual repayment cost is factored into the analysis.
- All additional cows are purchased for €1,320 financed over five years at six percent. The full annual repayment cost is factored into the analysis.

The annual recurring cost of this expansion is €996/cow or 18c/l on a 5,500 litre cow. When one considers that the total costs of production on moderate cost farms in 2006 was 20c/l, this would bring the total cost for milk produced in this stage of expansion to 38c/l assuming a 5,500 litre cow. In most cases expansion would need to be achieved more efficiently than is assumed here, if Stage 3 expansion is to be viable.

It is interesting to consider what capacity exists to increase milk supply. If all existing creamery milk suppliers increase yields per cow by 10 percent and convert half of their beef livestock to dairy cows, then the national milk supply would increase by 50 percent. It is important to realise however, that this increase in production would only occur if it were profitable for all farmers to expand. If we assume that the poorest performing one-third of farmers exit production, i.e., the high cost farms, and that the remaining two thirds follow Stage 1 and Stage 2 expansion, i.e., expansion within own resources, then national production would increase by 18 percent. This suggests that two-thirds of existing farmers may be able to fill the national increase in milk quota between 2008 and 2014 as implemented in Scenario 2 without any major expansion outside of existing farm resources. The FAPRI-Ireland farm level model is now used to examine this question in more detail.

The impact of milk quota expansion: a case study

Table 3 presents estimates of dairy enterprise net margin under the Baseline and the two scenarios for a case study farm selected from the NFS. This is a typical 300,000 litres farm with an enterprise net margin of €19,250. We first examine the circumstances of this farm in 2010.

In the Baseline, in 2010, it is assumed that the farm has not increased in size and 300,000 litres are produced at a net margin of €19,642. In Scenario 1 production on the farm increases by three percent in 2010 to 309,000 litres. The additional litres are supplied by increased feed, lengthening lactation and retaining less milk on the farm at a total cost of €450 (5c/l). Despite the increase in milk production, profit declines relative to the Baseline. The three percent increase in quota is insufficient to offset the decline in gross output. Under Scenario 2 production increases by three percent each year from 2008 to 2010 bringing production in 2010 to 327,000 litres. Gross output per litre falls further under Scenario 2 than in Scenario 1, reflecting the more rapid decrease in milk price. The increased production offsets the lower milk price with enterprise net margin approximately €1,000 (five percent) higher than in the Baseline.

Table 3: Case study analysis of a farm currently producing 300,000 litres of milk and expanding in line with national quota increase

	Baseline 2010	Scenario 1 2010	Scenario 2 2010	Baseline 2012	Scenario 1 2012	Scenario 2 2012
Quota (litres)	300,000	309,000	327,000	300,000	309,000	345,000
Additional Quota (expansion Stage 1) (expansion Stage 2)		9,000 (9,000)	27,000 (27,000)		9,000 (9,000)	45,000 (30,000) (15,000)
Gross Output CPL	28	26.8	26.4	28.9	27.7	27
Total Output €	84,000	82,812	86,328	86,328	86,700	85,593
Costs on Base Quota CPL	11.1	11.1	11.1	11.1	11.5	11.6
Total Direct Costs €	33,300	33,300	33,300	33,300	34,500	34,800
Expansion Costs CPL (Stage 1 costs cpl) (Stage 2 costs cpl)		5 -	5 -		5.1 -	5.1 8.5
Expansion Costs € additional direct costs €		450	1,350		459	2,805 1,740
Fixed Costs €	31,058	31,058	31,058	32,165	32,165	32,165
Dairy Net Margin €	19,642	18,004	20,620	20,035	18,169	21,640

Source: Own calculations

In Scenario 2 milk production on the farm has increased by 45,000 litres by 2012. It is assumed that 30,000 litres is Phase 1 low cost expansion, i.e., 5c/l, and that for the other 15,000 litres additional housing, labour and bulk tank capacity must be purchased and the value of heifer sales and profit on beef enterprise is foregone. As outlined above, this Phase 2 expansion costs approximately 8.5c/l. Total expansion costs, including low and high cost expansion, are €4,545, which includes the cost of production on the additional milk of €1,740. These expansion costs are smaller than the increase in the value of gross output of €7,140 and so Scenario 2 is preferable to the Baseline as profit is eight percent higher. This example assumes that farmers only increase production by the national increases. In Table 4 it is assumed the farmer produces the same amount of milk in both scenarios. The farmer receives the milk quota increases free in Scenario 2, but the additional quota must be purchased in the Baseline.

Table 4: Case study analysis of a farm currently producing 300,000 litres of milk and expanding in line with national quota increase and quota purchase

	Baseline	Scenario 2	Baseline	Scenario 2	Baseline	Scenario 2
	2008		2010		2012	
Quota (litres)	309,000	309,000	327,000	327,000	345,000	345,000
Purchased quota	9,000	-	18,000	-	18,000	-
Additional quota	9,000	9,000	27,000	27,000	45,000	45,000
(expansion Stage 1) (expansion Stage 2)	9,000	9,000	27,000	27,000	30,000 15,000	30,000 15,000
Gross output CPL	33.4	32.6	28	26.4	28.9	26.9
Total output €	103,206	100,734	91,560	86,328	99,705	93,150
Costs on base quota CPL	11.1	11.1	11.1	11.1	11.5	11.6
Total Direct Costs €	33,300	33,300	33,300	33,300	34,500	34,800
Expansion Costs CPL (Stage 1 costs cpl) (Stage 2 costs cpl)	5	5 -	5	5 -	5.1 8.5	5.1 8.5
Expansion Costs €	450	450	1350	1350	2805	2805
Additional direct costs €					1,725	1,740
Fixed Costs €	29,819	29,819	31,058	31,058	32,165	32,165
Net Margin €	39,637	37,165	25,852	20,620	28,510	21,640
Surplus for Quota Purchase €	2,472		5,232		6,870	

Source: Own calculations

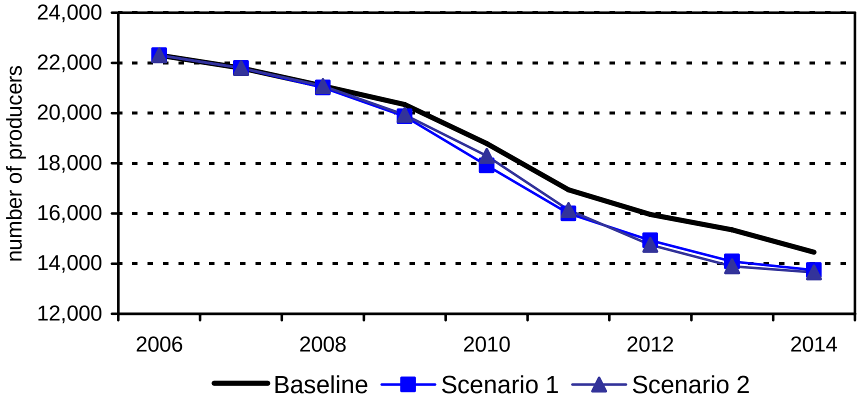
Enterprise net margin is €2,472 higher in the Baseline in 2008 than on Scenario 2. It follows then that if the farmer could purchase 9,000 litres for 27c/l or less in 2008 the Baseline is preferable. Similarly, in 2010, the farmer would be better off if 18,000 litres could be purchased for 29c/l or less and finally in 2012 the Baseline is preferable if a further 18,000 litres of quota could be purchased at 38 c/l or less. It follows then that if farmers have access to sufficient quota to allow them to increase their farm size by at least three percent per year at reasonable quota prices then they are better off under current policies. The likelihood of farmers having access to this amount of quota, in the baseline depends on (i) current farm size, as small farmers will find it easier to access three percent of their current quota and (ii) the milk quota exchange in which they operate, i.e., if supply of quota is plentiful relative to demand.

The net effect of the two milk quota expansion scenarios is not straightforward. The national milk quota increases come at a reduced milk price relative to the Baseline and farmers must increase production to offset the price decline. Farmers locked into a high cost structure will not find the additional expansion profitable and profits on their existing production will be squeezed. Low cost farmers, especially those with large capacity to expand, can increase production profitably. However, if low cost farmers can increase their quota by at least three percent per year through the milk quota exchange at reasonable quota prices, then the Baseline is preferable. However, this will not be possible for all farmers, as major restructuring would be required to facilitate such expansion for all farmers. It seems then that there will be both winners and losers under Scenario 2. Those that are likely to benefit most from quota expansion are those operating in regions where quota is difficult and costly to access. To determine the effect of milk quota expansion on all existing creamery milk producers, the FAPRI-Ireland farm level model is used.

Projecting the national effect of milk quota expansion

The methodology used to project future farm numbers is outlined in Breen et al (2007). Here the same methodology is employed to assess the effect of the two milk quota expansion scenarios on farm numbers. Figure 4 presents projections of changes in dairy farm numbers from 2006 to 2014 under the Baseline and milk quota scenarios.

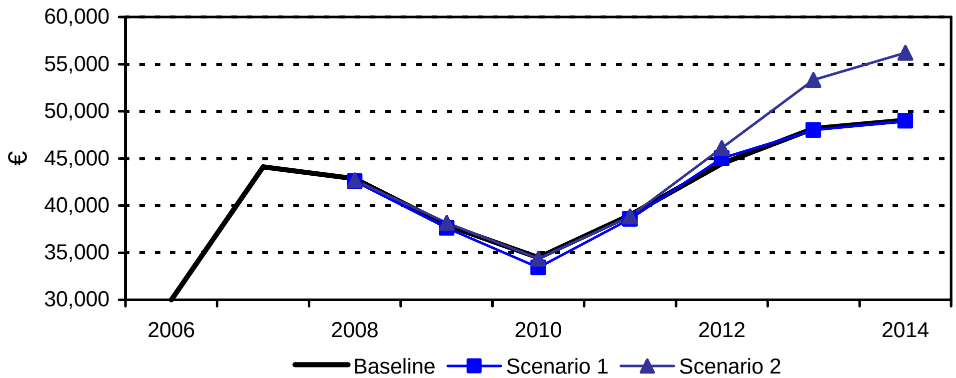
Figure 4: Baseline and scenario projections of dairy producer numbers 2006 to 2014



Source: FAPRI-Ireland Farm-Level Model (2007).

There is little difference in the rate of structural change in the baseline and the two scenarios in the early part of the projection period with farm numbers declining slowly from 2006 to 2010. Farm numbers decline marginally faster in the two milk quota expansion scenarios as high cost farmers feel the price cost squeeze and exit the sector. By 2014 farm numbers are approximately 14,500 in the Baseline and 13,750 in Scenario 1 and 13,650 in Scenario 2. Figure 5 presents the projected average family farm income across all creamery milk suppliers that remain in production in the three scenarios.

Figure 5: Baseline and scenario projections of average family farm income for creamery milk producers 2006 to 2014



Source: FAPRI-Ireland Farm-Level Model (2007).

Figure 5 shows that farm incomes are projected to be considerably higher in 2007, 2008 and 2009 relative to 2006 levels under the baseline and the two scenarios. This increase in incomes is almost entirely from the market as there is very little increase in farm scale over this period due to slow exit rates. Farm incomes decline in 2010 as net margins per litre fall. This decrease in profitability leads to restructuring in the sector, with less profitable and less efficient farmers exiting the sector, while those that remain increase in scale. Average farm incomes then increase faster under Scenario 2 than in the Baseline or Scenario 1. By 2014 farm incomes are projected to be almost 15 percent higher in Scenario 2 than in the Baseline and over 80 percent higher, in nominal terms, than 2006 levels. Despite farm numbers being lower in Scenario 1 than in the Baseline, average farm incomes are more or less the same in both scenarios by 2014, this is due to the lower milk price. As a result of the increase in farm incomes, the proportion of farmers that are economically viable also increases as the least profitable farms exit production and the remaining farms increase supply.

Conclusions

The balance of opinion suggests that the EU milk quota will not persist beyond 2015. This report has examined just two options relating to the removal of the EU milk quota, varying the rate of quota increase in advance of its removal. It is possible to draw a number of conclusions that would also apply even in the case of other rates of quota removal. These points are summarised below.

- Aggregate EU milk production will not expand in line with a large quota increase
- Expansion of production in some MS tends to be offset by contraction elsewhere
- Other than Poland, large MS will not increase production significantly
- Ireland is well positioned to expand production when quotas are relaxed or removed
- High feed costs have improved the competitive position of Ireland relative to feed grain based milk producers in the EU
- A slow rate of increase in the milk quota will depress milk prices while still constraining Irish milk production over the short term.

- A more rapid rate of quota increase will make the milk quota largely redundant (even before its abolition) in much of the EU and will allow Ireland the scope to increase production and reach its potential more quickly

The caveats set out in our baseline analysis (Binfield et al 2007a) relating to WTO reform, exchange rates and the impact of weather events on agricultural markets, apply equally to the scenarios analysed.

The main conclusions on the farm-level implications of quota expansion are as follows;

- Considerable capacity exists at the farm level to increase milk production even on existing resources.
- The most profitable two thirds of could alone, assuming the least profitable one-third exit production, could increase the national supply by 20 percent on existing farm resources.
- The results show that an annual three percent increase in the national quota (Scenario 2) would be sufficient to offset the negative effect on price and that farm incomes would be higher than a no policy change situation.
- However, farmers that can access at least three percent of their existing quota through the milk quota exchange at reasonable quota prices will not benefit from an expansion of the national quota.
- Given that the future rate of structural change is unlikely to be sufficient to allow all farmers to grow by three percent each year, the majority of farmers are better off with the quota expansion scenario.

This paper has analysed two possible “soft-landing” policies. The results show that faster and larger increases in quota would benefit Ireland more than other EU member states. While some individual farmers may be better off under current policies, it should be borne in mind that quotas will be removed in 2015 and that these farmers may be ill-prepared at that stage to survive in a post-quota environment. A gradual expansion of quotas, however, would allow farmers the opportunity to grow their farm business gradually and would give them more scope to prepare for the abolition of quotas in 2015.

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Profitable Dairying in an Increased EU Milk Quota Scenario

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Summary

- Significant potential exists for expansion in output and profit on Irish dairy farms.
- Successful systems while profitable, must also be sustainable in terms of staff, animals and the environment, and allow for a quality lifestyle and time-off.
- Profitable future farm systems must be simple, based on higher stocking rates, an appropriate mean calving date, high EBI genetics, proactive grassland management and effective use of supplements.
- The imposition of the technologies discussed herein has the potential to increase the profitability of milk production on Irish dairy farms by €1,800 per hectare.

Introduction

"It is not the strongest or most intelligent which survive change, but those species which are most adaptable" – Charles Darwin

The Common Agricultural Policy (CAP) was introduced in Europe to ensure EU food security in a recovering post war EU economy by delivering higher less volatile prices to producers. By the late 1970s, milk production, driven by high prices, outstripped milk consumption and on that basis, in April 1984 a dissuasive super levy quota was introduced on individual producers which penalised supply beyond a fixed quota. Recent analysis carried out within the EU has suggested that milk quotas are now constraining the development of an efficient European dairy industry (van Berkum and Helming, 2006). Dairy farming in Ireland is now at a crossroads. Behind us lies a farming environment where all farmers received a similar price for milk, milk prices were high and stable and emphasis was on maximising profit per litre of milk quota (Shalloo *et al.*, 2004). Ahead of us lies a quota free more volatile milk price environment, differentiated multiple component pricing, continued reform of EU agricultural policy and increased environmental regulation. A study by Lips and Rieder (2005) projected that quota abolition would allow production to move to areas of competitive advantage within Europe such as Denmark, Ireland and the Netherlands, predicting that milk production in Ireland could increase by up to 39 percent post-quota.

Change will create opportunities for farmers to grow and redesign their businesses. Quota removal will require new innovative blueprints of milk production for dairy farmers capable of expanding milk production and taking cognisance of stronger international market forecasts for dairy products (OECD, 2007). The most profitable system of production will be that which gives the highest profit per unit of the most limiting input. When milk quotas are removed, other factors will become limiting such as land, stock, supplementary feed or labour availability thereby becoming the new quota. In such a scenario, technical innovation will be required as producers focus on achieving higher profit per hectare of farm land, per labour unit employed, per milking cow or per other farm specific factor. The challenge for Irish dairy farmers is to increase the competitiveness of their business through innovation, productivity gain and increased operational scale as the industry evolves.

Similar agricultural reforms have occurred in many other countries. The deregulation of the Australian industry began in 1999 and has resulted in a reduction in dairy farm numbers with international prices now determining the price received by farmers for their milk. In New Zealand, the subsidy system was removed in 1984 and stimulated an expansion in production with increases in cow numbers and land conversions from other enterprises to dairying (Davison, 1996), reductions in input costs (Blandford and Dewbre, 1994) and increases in productivity as farmers reduced expenditure and redistributed resources to areas of comparative advantage (Philpott, 1995). The detailed information necessary to accurately estimate the capacity for increased milk production on Irish dairy farms is not readily available, however, based on National Farm Survey statistics (NFS, 2006) the current average herd size is 52 cows out of a total of 80 grazing livestock, on 40 hectares of land.

The objective of this paper is to explore and quantify the potential for expansion on Irish dairy farms based on survey analysis, to describe the characteristics of profitable farm systems in future and explain the required changes to the system in preparation for an environment free from the constraints of milk quota.

The potential for expansion on Irish dairy farms

A survey was carried out on over 1,430 dairy farmers supplying Glanbia, Connacht Gold, Lakeland and Donegal throughout 2007. The Glanbia survey was carried out in January and February while Connacht Gold, Lakeland and Donegal surveys were carried out from July to October. The surveys were completed by telephone with the farmers receiving the survey by post prior to the telephone call, explaining the process and the requirement for information. Seventy-eight percent of the farmers contacted completed the survey. There were four objectives to the survey:

1. Determine the potential for expansion on dairy farms based on land areas around the milking platform, as well as including other land parcels.
2. Determine the current labour availability and potential for a successor.
3. Determine the current status of milking and winter housing facilities.
4. Determine the future intentions of respondents.

Table 1 shows some of the biological and attitudinal responses to the survey. Average milk quota size and area around the grazing platform were larger for the Glanbia suppliers when compared to the combination of Connacht Gold, Lakeland Dairies and Donegal Co-op suppliers. Stocking rates were similar and, on average, low for the two groups at 1.78 and 1.79 cows/ha. Milk production per cow and per hectare was also similar in the two regions. The number of suppliers planning to expand was similar at 50 percent with slightly more stating that they planned to exit in the Glanbia region (however, this may be due to Glanbia suppliers being surveyed earlier in the year when milk prices were lower). When the total increase in output from the expanding farms is calculated and adjusted for those planning to exit, total milk supply based on the surveyed farmers' intentions would increase by nine per cent for Glanbia and 14 percent for Connacht Gold/Donegal/Lakeland.

Table1. Biological results and attitudinal responses of a survey of 1,430 regionally distributed dairy farmers across four co-operative areas carried out during 2007.

	Glanbia	**Connacht Gold/ Donegal/ Lakeland**
Quota size (000, litres)	305,503	247,283
Grazing platform area (ha)	38.9	30.5
Stocking rate (LU/ha)	1.78	1.79
Milking cows (No.)	64.6	52.7
Dairy specialisation (%)	0.63	0.70
Milk production (kg/cow)	4,808	5,194
(kg/ha)	8,346	9,212
Proportion expanding (%)	49	50
Proportion exiting (%)	14	9
Stated expansion (%)	9	14.5
Potential expansion (%)	70	60
Without successor (%)	25	29

As indicated in the survey and based on best practice technologies, it can be anticipated that significant increases in dairy cow numbers could be accommodated on the existing land base with further increases in productivity achievable through improved animal genetics, compact calving, lengthened lactations and the provision of increased quantities of higher quality feed. When the potential expansion in production, based on the current land areas of surveyed farms incorporating an optimum stocking rate and level of milk production in a no-quota scenario (2.7LU/ha and 15,000l/ha, respectively) is quantified and accounting for those planning to exit milk production, the potential increase in milk supply to these processors could be up to 60 - 70 percent on the surveyed farms.

Profitable farm systems for the future

Future farm systems will take the form of above average farmers leveraging debt to finance expansion and backing their ability and farming skills to generate the cash returns necessary to service the debt and deliver a satisfactory rate of return on their time and capital investment. The system must be sustainable in terms of staff, animals and the environment allowing for a quality lifestyle and providing for sufficient time-off for all staff. The system must therefore be simple and flexible allowing for increased operational scale to be achieved without requiring large amounts of additional labour. Future systems will require new industry targets for a non-quota environment with targets set with respect to profitability, productivity and labour efficiency (Table 2).

Table 2. Key Performance Indicators (KPI) for the Irish dairy industry.

Indicators	Current average**	Target
Milk solids per ha (kg)	660	1,250
Labour (cows/LU)	44	100
Labour cost/ha (€)	1,700	750
Profit per ha* (€)	1,030	2,500
Margin per kg milk solids (€)	1.56	2.00

*KPI's based on milk price projection of 26c/l, **based on National farm survey data (NFS, 2006)

In future, most of the costs of milk production will be directly associated with the area of land being farmed, the number of cows in the herd and the number of people employed. Therefore, consistently high cash surpluses will be generated by ensuring that high levels of milk production are achieved per hectare, per cow and per labour unit. Successful dairy farms will optimise output/hectare and the profit margin per unit of output. Output per hectare will in future be measured in kg milk solids (MS) i.e., kg of fat and protein, as that is what is required and paid for by the dairy processor with 1,250 kg MS/ha a realistic target for an efficient grass based milk production system.

A key economic principle, irrelevant of enterprise, is to optimise economic performance by capturing maximum profit per unit of the most limiting factor of production. In the intermediate term, land will become the most limiting factor of production on most farms, hence profit per hectare will be a key performance indicator of a successful dairy business with a realistic target of €2,500/ha based on a milk price of 26c/l. The second major variable determining profitability on a successful dairy farm will be margin per kg of milk solid (MS) produced. This is the margin available to pay for all of the unpaid resources employed, i.e., land, labour and capital. As MS yield per hectare and per cow increase, initially there will be an increase in margin per kg MS because of a dilution in fixed costs and benefits in efficiency from scale. However, as MS output per ha approaches the optimum the margin will reduce due to a reducing proportion of the diet from grazed grass. A realistic target margin per kg of MS is approximately €2.00 where MS per hectare is relatively high (>1,250kg). A higher target margin would be realistic at milk prices in excess of 26c/l or where input costs can be reduced further.

The availability of skilled labour capable of managing high performing dairy herds will also be a limitation in future and therefore dairy farms must adequately remunerate this skilled labour to compete with other sectors of the economy in sourcing and retaining staff. To achieve a high level of labour remuneration, a high output per labour unit is essential. A realistic target labour efficiency should be 22 hours per cow per year (O'Donovan *et al.*, 2007) thereby allowing one operator to manage 100 cows. The overall labour cost target should therefore be €900 per hectare with an average labour cost of €15/hr worked for both skilled and unskilled labour. The realisation of labour performance targets will depend on the simplicity of the overall system and the introduction of new technologies to reduce labour input.

The changing face of farm systems

The realisation of key performance parameters outlined above will be determined by the ability of dairy farmers to employ technologies which deliver the desired performance for the future. Prior to the introduction of milk quotas in Ireland in the mid-1980s, the optimum system of milk production was based on spring calving, a stocking rate of 2.5 - 3.0 cows/ha, a concentrate input of 500 to 750 kg/cow and a nitrogen application rate of 270 to 300 kg N/ha. Five key factors will determine if key performance indicators are achieved and will provide the solutions for managing and capturing benefits of the changing production environment.

1. Stocking rate

"No more important force exists for good or evil than the control of stocking rate in grassland farming" ***Dr C. P. McMeekan, New Zealand (1961)***

In the previous section we have discussed the importance of milk productivity and why milk production from dairy farms will in future be limited by the land base available for the grazing dairy herd. Pasture is the main source of feed on a dairy farm therefore, the hectare of pasture is a crude measure of feed supply on the farm. The choice of stocking rate remains the most important single decision which influences the pastoral dairy farms productivity. The optimum stocking rate is achieved where a balance is found between the amount of feed grown on the farm, the quality of the feed and the feed requirements of the herd. McMeekan (1956) and Rattray (1987) highlighted stocking rate as the major factor governing animal productivity from pasture due to its dominant effect on animal demand and hence pasture use. Maximum productivity of milk solids will be realised by achieving high milk solids yield per cow at relatively high stocking rates. A number of studies were carried out at Moorepark from 1978 to 1982 to measure milk production and stock carrying capacity. The results showed that increasing stocking rate from 2.5 to 2.7 cows/ha resulted in a reduction in milk yield per cow from 4,717kg to 4,611kg, but in an increase in production per hectare from 11,651kg to 12,678kg. Table 3 summarises a range of experiments carried out in New Zealand between 1982 and 1985 showing that as stocking rate is increased, milk solids production per cow declines but milk solids production per hectare increases. Other experiments show generally similar results with one additional cow/ha reducing MS by 31 kg/cow and increasing MS by 122kg/ha (Holmes and MacMillan, 1982). Consistent with these results, a review of stocking rate experiments by Delaby *et al.* (per comm., 2007) has concluded that for each additional cow per hectare increase in stocking rate, milk production per hectare will be increased by 29, 24, 19 and 14 percent, going from two cows per hectare up to five cows per hectare.

Table 3. The effect of stocking rate on pasture eaten and milk produced per cow and per hectare (where pasture growth is 16 tonnes per ha per annum).

Cows per hectare		2.75	3.26	3.75	4.28
Pasture eaten	per cow (t DM/cow/yr)	3.9	3.7	3.5	3.2
	per hectare (t DM/ha/yr)	10.8	11.9	13.0	13.9
Milk solids produced (kg/cow)		359	328	300	269
	(kg/ha)	991	1069	1128	1152
Pasture Utilisation (%)		68	77	81	87
Feed Conversion Efficiency (kg MS/t DM eaten)		92	88	86	84

(Holmes *et al.*, 2002)

Increased farm stocking rates result in increased farm profitability on Irish dairy farms in the absence of milk quotas by increasing the utilisation of grass grown on the dairy farm. A recent analysis by Horan and Shalloo (2007) of Irish pasture-based systems using the production data from the five-year strain comparison studies from Curtins

Farm, Moorepark (Horan *et al.* 2005; McCarthy *et al.*, 2007) looked at the effects of increased stocking rate on milk production, feed requirement, land and labour utilisation and overall farm economic performance for a 40 hectare dairy farm in the absence of milk quotas. This analysis showed that increasing stocking rate (from 2.41LU/ha to 2.65LU/ha) increased pasture utilisation from 75 percent to 85 percent, increased milk solids output from the 40 hectares (from 34,676kg to 38,191kg) and increased overall farm profitability. When pasture growth remains static, a 10 percent increase in pasture utilisation resulted in €6,294 (€157/ha) and €10,224 (€255/ha) additional farm profit at a milk price of 22.3 and 30.0c/l, respectively (Table 4). Similar to previous studies (Penno *et al.*, 1996; McCarthy *et al.*, 2007), this analysis shows that based on various milk price projections in future years, higher stocking rate systems will be more profitable. Such systems will be characterised by their capability for low-cost high milk productivity per hectare with lesser milk production per cow.

Table 4. The effect of herbage production per hectare and grass utilisation on key herd parameters in a fixed land scenario using anticipated future costs and prices (Horan and Shalloo, 2007).

Herbage utilisation (%)		**75**			**85**	
Herbage roduction (t DM/ha)	**12**	**14**	**16**	**12**	**14**	**16**
Utilisable herbage (t DM/ha)	9	10.5	12.0	10.2	11.9	13.6
Total hectares (ha)	40.0	40.0	40.0	40.0	40.0	40.0
Cows calving (No.)	77.2	87.3	96.9	85.4	96.2	106.4
Stocking rate (LU/ha)	2.14	2.42	2.68	2.36	2.66	2.94
Labour units (h)	1.38	1.48	1.57	1.46	1.57	1.67
Milk produced (kg)	452,794	512,044	567,764	500,486	564,153	623,653
Milk sales (kg)	438,588	495,979	549,951	484,784	546,453	604,087
Milk Solids sales (kg)	30,735	34,756	38,538	33,972	38,293	42,332
Fat sales (kg)	16,123	18,232	20,216	17,821	20,088	22,207
Protein sales (kg)	14,612	16,524	18,322	16,151	18,205	20,125
Labour costs (€)	31,466	33,778	35,952	33,327	35,811	38,133
Feed costs /kg milk (c)	5.4	5.1	4.8	5.1	4.8	4.5
Total costs (€)	100,519	108,018	115,062	106,317	114,348	121,851
Milk Price at 22.3c/litre						
Milk returns (€)	96,763	109,425	121,322	106,955	120,561	133,276
Margin per cow (€)	151	216	265	205	262	305
Margin per kg milk (c)	2.58	3.69	4.51	3.49	4.47	12.71
Total profit/farm (€)	11,683	18,871	25,629	17,469	25,192	32,406
Milk Price at 30c/litre						
Milk returns (€)	131,458	147,654	163,721	145,304	162,680	179,837
Margin per cow (€)	603	656	705	657	702	745
Margin per kg milk (c)	10.29	11.20	12.03	11.20	11.98	12.71
Total profit/farm (€)	46,590	57,333	68,277	56,052	67,568	79,252

Increased utilisation of pasture through increased stocking rates will be one avenue to increased productivity on Irish dairy farms in an expansion scenario. The maintenance of higher stocking rates requires flexible grazing management practices, feed demand management through stock movement, and feed supplementation and feed supply management through more efficient use of fertilisers and slurry to overcome the variability in pasture supply. The importance of supplementary feeds or strategic N fertiliser use to remove the constraints of pasture seasonality will depend on both the feed supply pattern, the price of supplementation and the price paid for additional milk product produced (Hodgson and Maxwell, 1988). Higher stocking rates can be facilitated on most farms by removing beef cattle, young stock and replacements from the grazing platform, reseeding pastures to increase grass growth rates, improving grassland budgeting, and making more strategic use of fertiliser and additional supplements. With the recent developments in grazing management technology on Irish dairy farms (O'Donovan *et al.*, 2000), Irish dairy farmers who have acquired grass measurement and budgeting skills are well positioned to effectively manage and capture the economic benefits of higher stocking rates.

2. Calving date and rate

Systems of production based on a high proportion of in situ pasture utilisation are constrained by the seasonality of pasture production (Heitschmidt, 1993), thereby requiring that animal production be fit within the cycle of annual grass supply (Dillon, 1995). Within the confines of milk quotas where the total volume supplied is limited, the optimum mean calving date tends to be later thereby sacrificing overall farm milk production in order to use more cheap grazed grass to produce the fixed milk quota based on achieving a high profit per litre. While this principle is still important, the ability to increase overall production in a non-quota scenario, coupled with recent advances in grazing research showing that lower grass allocation levels in early lactation are sufficient to fully feed the dairy herd and achieve high animal performance (Kennedy *et al.*, 2007; McEvoy *et al.*, 2007), may have implications for the optimum calving date in a non-quota scenario. In such a scenario, it will be possible to achieve greater production levels through earlier calving without reducing the proportion of grazed grass in the herd feed budget.

Horan and Shalloo (2007) looked at the influence of variation in mean calving date on the profitability of Irish pasture-based production systems in a no quota scenario. In this analysis, grazed grass constituted 70, 75, 72 and 71 percent of the dietary intake of cows with a mean calving date of 31 January, 14 February, 1 March and 15 March , respectively (Table 5). Earlier calving increases overall milk sales, milk revenues and costs of production. Feed costs are highest with 31 January calving, intermediate for 1 March and 15 March calving and lowest with a mean calving date of 14 February. The highest farm profit was observed with a mean calving date of 14 February with the lowest profitability observed with a 15 March calving date. With a mean calving date of 14 February, feed costs are lowest and margin per cow and per kg milk produced is maximised. Where the mean calving date is earlier than 14 February, the gains in milk receipts are outweighed by the increased feed costs incurred through increased silage and concentrate use in the diet. Where the mean calving date is later than 14 February, the losses in production and increased feed costs incurred result in a reduction in farm profitability. The economic optimum calving date in this analysis did not change with milk price variation however the relative advantage of achieving the optimum calving date is much greater in a low milk price scenario.

Table 5. Key herd parameters in a fixed land base scenario using anticipated future costs and prices for four differing mean calving dates.

Mean calving date	31 January	14 February	1 March	15 March
Grass (kg DM/cow)	3,598	3,716	3,492	3,384
Grass Silage (kg DM/cow)	1,034	935	1,071	1,131
Concentrate (kg DM/cow)	477	334	322	265
Cows calving (No.)	91.4	90.9	92.2	92.9
Milk produced (kg)	546,095	533,080	517,772	503,175
Milk sales (kg)	529,292	516,355	500,814	486,090
Milk solids sales (kg)	37,113	36,184	34,977	33,859
Fat sales (kg)	19,499	18,981	18,320	17,708
Protein sales (kg)	17,614	17,203	16,657	16,151
Livestock sales (€)	18,262	18,177	18,431	18,570
Total costs (€)	115,547	110,674	111,333	110,618
Feed costs /kg milk (c)	5.5	5.0	5.2	5.30
Labour costs (€)	36,163	34,599	34,477	33,921
Milk Price at 22.3 c/litre				
Milk returns (€)	116,782	113,920	110,091	106,562
Margin per cow (€)	213	236	184	156
Margin per kg milk (c)	3.57	4.02	3.28	2.88
Total profit/farm (€)	19,497	21,423	16,966	14,514
Milk Price at 30 c/litre				
Milk returns (€)	157,580	153,719	148,583	143,844
Margin per cow (€)	663	676	604	560
Margin per kg milk (c)	11.09	11.53	10.75	10.33
Total profit/farm (€)	60,563	61,465	55,680	51,996

Horan and Shalloo (2007) also looked at the influence of variability in calving rate on farm performance and profitability. Table 6 illustrates the influence of four alternative 42-day calving rates with the same mean calving date. As calving rate is reduced, the proportion of grazed grass in the diet reduces with little effect on total milk or milk solids production. The total costs of production and feed costs per kg milk sales both increase as calving rate is reduced. The overall economic impact on the production system is to reduce total farm income by approximately €590 per 10 percent reduction in calving rate due to the higher associated costs of production. In this analysis calving date remained static, in reality on Irish dairy farms a lower calving rate results in a later mean calving date and therefore has more deleterious effects on overall farm profitability.

Table 6. Key herd parameters in a fixed land base scenario using anticipated future costs and prices for four differing calving patterns with the same mean calving date.

Six-week Calving Rate	**90**	**75**	**60**	**45**
Grass (kg DM/cow)	3,624	3,586	3,552	3,496
Grass silage (kg DM/cow)	983	1,007	1,030	1,067
Concentrate (kg DM/cow)	285	281	295	321
Cows calving (No.)	91.5	91.7	91.9	92.2
Milk produced (kg)	520,982	518,515	518,586	517,294
Milk sales (kg)	504,150	501,645	501,686	500,337
Milk solid sales (kg)	398	395	394	392
Fat sales (kg)	18,466	18,355	18,353	18,306
Protein sales (kg)	16,786	16,698	16,695	16,641
Livestock sales (€)	18,294	18,335	18,368	18,430
Total costs (€)	109,636	109,940	110,377	111,665
Feed costs /kg milk (c)	5.0	5.0	5.1	5.3
Labour costs (€)	34,087	34,043	34,192	34,469
Milk Price at 22.3 c/litre				
Milk returns (€)	110,988	110,361	110,338	109,994
Margin per cow (€)	212	204	197	182
Margin per kg milk (c)	3.73	3.62	3.49	3.24
Total profit/farm (€)	19,421	18,756	18,108	16,758
Milk Price at 30 c/litre				
Milk returns (€)	149,781	148,941	148,913	148,452
Margin per cow (€)	639	627	619	601
Margin per kg milk (c)	11.22	11.10	10.97	10.72
Total profit/farm (€)	58,438	57,557	56,903	55,438

The optimum calving date for the herd will greatly depend on the grass growth characteristics of the farm. Ideally, the optimum date is the earliest possible date to allow a herd lactation length of 300 days while still preventing grass silage use in the milking cow diet. In the current analysis on a Moorepark type soil, the optimum mean calving date for the herd should be 14 February with calving commencing in late January. Also evident from this analysis, late January calving is preferable to March or April calving. The optimum mean calving date for a more northerly wetter soil will be later with calving commencing mid-February. While calving date will be very much dependant on soil type and location, achieving a high calving rate of 90 percent in 42 days will be economically proficient regardless of geographic location. The average mean calving date of Irish spring-calving dairy cows is 16 March based on CMMS data (Table 7) with an average calving rate of 53 percent in 42 days (ICBF, 2006). While considerably later than the optimum as described above, these statistics show that the national mean calving date is now eight days later than 2002. On the basis of the results obtained from Table 4, it can be hypothesised that the average spring milk producer could increase total farm profitability by 18 percent by achieving a mid-February mean calving date.

Table 7. Trends in the mean calving date and proportion of cows calving by month within Irish spring-calving dairy herds (2002-2006).

Calving Month	2002	2004	2006
January	0.10	0.11	0.10
February	0.37	0.29	0.28
March	0.30	0.28	0.29
April	0.13	0.19	0.19
May	0.07	0.11	0.10
June	0.03	0.03	0.05
Mean Calving Date	8-Mar	14-Mar	16-Mar

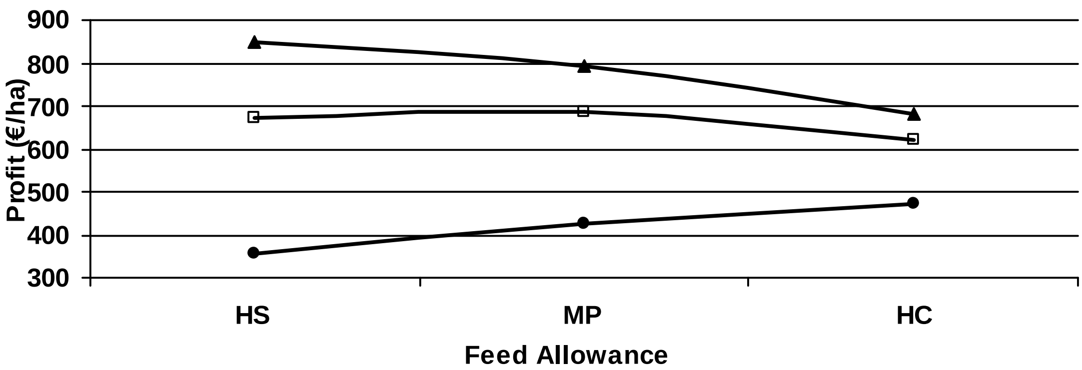
Dept. Agriculture and Food CMMS Statistic Reports (2002-2006)

3. Breeding Profitable Animals for the Future

The dynamics of dairy farm expansion are far reaching. Among the factors that will limit the potential expansion of any dairy farm business, sourcing additional cows or incalf heifers will be a major limitation. Irish dairy farmers currently generate approximately 240,000 replacement heifers each year (CMMS, 2007). This level of heifer rearing is insufficient to grow the national herd once quotas are removed. Currently, only approximately 30 percent of in-calf heifers entering Irish dairy herds originate from AI, with the vast majority sired by stock bulls of inferior genetic potential. For those producers preparing to expand, purchasing additional cows is both expensive and has associated herd health risks. On that basis, the generation of additional quality replacements from within the herd is critical to fund future expansion on Irish dairy farms.

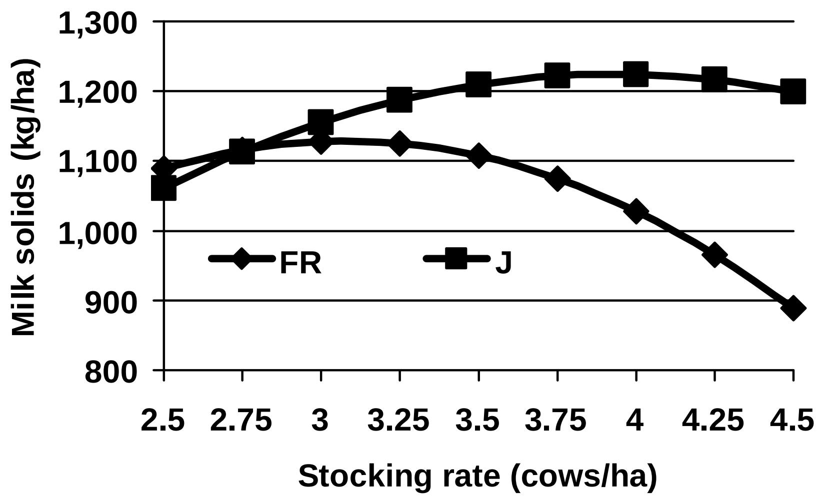
Future farm systems will require a dairy cow of considerably higher economic value than the current average dairy cow. Compared to the current population, tomorrows herd will produce more milk solids through increased intake and energetic efficiency, achieve a 365-day calving interval and require less labour per cow to survive in a larger herd. The performance potential of higher EBI sires has been well documented in recent years. For over ten years now, research comparing alternative strains of Holstein-Friesian dairy cattle on contrasting systems of milk production based predominantly on grazed grass have been underway at Moorepark (Buckley *et al.*, 2000; Kennedy *et al.*, 2003; Horan *et al.*, 2005; McCarthy *et al.*, 2007; Coleman *et al.*, 2007). The most recently completed of these, a five-year study consisting of 585 lactations on 240 cows compared three strains of Holstein-Friesian. The three strains compared were high production North American (HP; EBI= €51), selected entirely for milk production, high durability North American (HD; EBI= €58), selected based on milk production, fertility and muscularity traits, and New Zealand (NZ; EBI= €58) selected from a seasonal calving pasture-based system. The three feed systems compared were a high grass allowance feed system typical of spring calving herds in Ireland (MP); a higher stocking rate system (HS) and an increased concentrate supplementation system (HC). The HP cows produced the highest yield of milk, the NZ the lowest, and the HD animals were intermediate. Milk fat and protein content were higher for the NZ strain than for the HP and HD strains. The milk production response to increased concentrate supplementation (MP v. HC) was greater with both the HP and HD strains (1.10kg of milk/kg of concentrate for HP; 1.00kg of milk/kg of concentrate for HD) compared to the NZ strain (0.55 kg of milk/kg of concentrate). The NZ strain had an earlier calving date, higher 24-day submission rate, higher pregnancy rate to first service, higher 42-day in-calf rate and lower 13-week empty rate than the HP strain. Figure 1 shows the profitability for the three strains across the three feed systems in a scenario where no milk quota existed and the 40ha land block was the limitation with a projected milk price of 22c/l and full labour costs included in the analysis. In this scenario, the NZ strain achieved the highest farm profit in all three feeding systems. The highest farm profit with the NZ strain was achieved in the high stocking rate feed system (€849/ha), the highest farm profit with the HD strain was achieved in the Moorepark feed system (€687/ha) while the HP strain achieved the highest farm profit in the high concentrate feed system (€471/ha). The results demonstrate how genetic selection for increased milk production (HP strain) results in reduced profitability in future years relative to selection on a combination of production and reproductive traits (HD and NZ strains).

Figure 1. The Influence of strain of Holstein-Friesian and pasture-based feed system on farm profitability (McCarthy et al., 2007). [NZ (▲), HD (□) and HP (●)]



The efficiency of conversion of home-grown feed to milk will be an important determinant of farm productivity especially considering the recent forecasts for supplementary feeds (Binfield *et al.*, 2006). In a pasture-based system the amount of milk produced from a given amount of feed is a measure of the efficiency of the system with many studies observing differences in feed efficiency among breeds of dairy cows. Improvements in the genetic ability of cows to produce more milk product from existing feed resources have contributed to the improved performance of grazing dairy systems in other countries (Holmes, 1988; Bryant, 1984). Ahlborn and Bryant (1992) compared the performance of Jersey and Friesian cows at low and high stocking rates (Figure 2). The Jersey cows produced similar or slightly lower yields of milk solids per cow but higher yields per hectare compared to the Friesian. While initially the milk production per hectare increased with the Friesian breed, there was a reduction in milk production per hectare at the higher stocking rates, while milk production per hectare increased with increasing stocking rate with the Jersey breed. Mackle *et al.* (1996) and Oldenbroek (1988) showed that Jersey cows were more efficient converters of grass DM into milk than the Holstein-Friesian. In a review of 11 experiments by Grainger and Goddard (2004), Jersey cows had higher DM intake per 100 kg liveweight and in eight of the experiments the Jersey had higher feed conversion efficiency (g milk solids per kg of DM intake).

Figure 2. The influence of cow breed on milk solids production per hectare of home grown feed at various stocking rates (Ahlborn and Bryant, 1992).



A new long-term study commenced in 2006 at Moorepark to evaluate the role of Jersey dairy cows and crossbreeds across two seasonal Irish grass-based milk production systems. The study included a total of 87 cows; 30 Holstein-Friesian, 28 Jersey and 29 crossbreds (Prendiville *et al.*, 2007) on a low supplementation grass-based production system. Milk production data to date for year two of the study and reproductive performance data from year one and two are shown in Table 7 below. Large differences in milk yield, fat content and protein content are evident. The Jersey has the lowest milk yield and highest fat and protein content, the Holstein-Friesian has the highest milk yield and lowest fat and protein content while the crossbreds are intermediate for both milk production and composition. The Holstein-Friesian has the lowest reproductive performance; the crossbred has the best reproductive performance while the Jersey is intermediate.

Table 7. Effect of Breed group on milk production and reproductive performance (Prendiville et al., 2007 per comm.).

	Holstein-Friesian	Holstein x Jersey	Jersey
Milk production (up to 28 October 2007)			
Milk yield (kg/cow)	4,984	4,660	3,874
Butterfat composition (%)	3.98	4.69	5.23
Protein composition (%)	3.42	3.74	3.93
Lactose composition (%)	4.55	4.62	4.60
Milk Solids (kg/cow)	370	392	354
Reproductive performance			
42-day pregnancy rate (%)	58	73	70
13-week empty rate (%)	15	5	13

N.B. These are raw data that have not been statistically analysed, therefore no definitive conclusions can be drawn

4. Grass production, quality and grazing management

Animal productivity from grassland is determined by the amount of pasture grown, level of pasture utilisation and overall feed quality. Horan and Shalloo (2007) have shown that as pasture growth increased from 12 to 16 tonnes DM per hectare, the stock carrying capacity of the 40 hectares increases (from 2.25LU/ha to 2.81LU/ha) resulting in a proportional increase in milk solids produced (from 32,353kg to 40,435kg) (Table 4). While total costs increase due to the extra animals, feed costs per kg milk is reduced (from 5.3c/kg to 4.5c/kg) as additional grass is now grown for the same overall land rental and maintenance costs and the overall profitability of the system is increased. When pasture utilization is maintained, increasing total pasture growth increases farm profit by €3,610 (€90/ha) and €5,611 (€140/ha) where milk price is 22.3 and 30.0c/l, respectively. Similarly, as pasture quality increased from 75 to 87 percent organic matter digestibility (OMD), the stock carrying capacity of the 40 hectares increased resulting in a proportional increase in milk solids sales (Table 8). While total costs increase due to the extra animals, feed costs per kg milk are reduced. When pasture utilisation is maintained, each one percent increase in OMD results in an increase in overall farm profit by €759 (€19/ha) and €1,229 (€31/ha) where milk price is 22.3 and 30.0c/l, respectively.

Pasture growth will be increased on dairy farms by rejuvenating old swards through reseeding and ensuring that soil fertility is adequate for maximum plant growth. Grass breeding has increased DM yield by 0.5 percent per year in the Netherlands from 1965 to 1990 (Van Wijk and Reheul, 1991). Gately (1984) compared an early perennial (Cropper) with a late perennial ryegrass (Vigour) for milk production at two stocking rates. At a low stocking rate, the improved digestibility of the Vigour gave 8.8 percent more milk yield than Cropper. However, at the higher stocking rates, Cropper gave 6.6 percent more milk than Vigour, because of the greater pasture production in early spring at the time of peak milk yield.

Table 8. The effect of herbage Organic Matter Digestibility (OMD) on key herd parameters in a fixed land scenario using anticipated future costs and prices.

Grass quality (% OMD)	75	78	81	84	87
Total hectares (ha)	40.0	40.0	40.0	40.0	40.0
Cows calving (No.)	78.7	82.0	85.3	88.5	91.6
Stocking rate(LU/ha)	1.18	2.27	2.36	2.45	2.53
Labour units (No.)	1.39	1.42	1.46	1.49	1.52
Milk produced (kg)	461,069	480,958	500,266	519,018	537,238
Milk sales (kg)	446,604	465,868	484,571	502,735	520,383
Milk solids sales (kg)	31,296	32,647	33,957	35,230	36,467
Fat sales (kg)	16,417	17,126	17,813	18,481	19,130
Protein sales (kg)	14,879	15,521	16,144	16,749	17,337
Feed costs /kg milk (c)	5.30	5.20	5.10	5.00	4.90
Labour costs (€)	31,789	32,565	33,318	34,050	34,761
Total costs (€)	101,355	104,081	106,295	108,895	110,995
Milk Price at 22.3 c/litre					
Milk returns (€)	98,532	102,782	106,908	110,915	114,809
Margin per cow (€)	161	184	204	223	239
Margin per kg milk (c)	2.75	3.14	3.49	3.80	4.08
Total profit/farm (€)	12,687	15,100	17,443	19,717	21,927
Milk Price at 30 c/litre					
Milk returns (€)	132,955	138,690	144,257	149,665	154,919
Margin per cow (€)	602	624	645	663	680
Margin per kg milk (c)	10.26	10.65	11.00	11.31	11.59
Total profit/farm (€)	47,320	51,227	55,020	58,703	62,282

Pasture quality can be improved through grazing management practice and the selection of higher quality grass varieties. During mid-season, Hurley *et al.* (2007) observed variability of up to three units in OMD between perennial ryegrass varieties of similar heading date. Thomson (1985) has shown that lax grazing reduces subsequent animal production performance, through a decline in feed quality. Tighter spring grazing has been shown to increase the milk production of dairy cows (Holmes and Hoogendoorn, 1983; Hoogendoorn *et al.,* 1985) in the following summer. Stakelum and Dillon, (1990) and Kennedy *et al*., (2006) have shown under Irish conditions that tightly grazed pastures in spring/early summer produced swards with a higher proportion of green leaf and lower proportion of grass stem and dead material compared to swards with low grazing pressure. Increasing post grazing sward surface height above 5 cm has been shown to result in a deterioration of sward quality in mid and late grazing season (Stakelum and Dillon, 1990).

5. The role of supplementation in future systems

The ability to avail of the increased profitability of pasture-based systems may be curtailed by land costs (both rental and purchase). Access to land at economically feasible prices is crucial to the future success of pasture based dairy systems. Increased feed supplementation may be an alternative expansion strategy for some producers where land availability is limited and therefore the development of efficient profitable pasture-based systems incorporating greater proportions of supplementary feeds also merits consideration. The use of imported supplementary feeds on many farms has introduced greater flexibility into the management of feeding, as pasture deficits caused by slower than expected growth can be filled by these other feeds thus meeting the requirements of both animals and pastures.

Table 9 illustrates the influence of increased concentrate supplementation on farm profitability at various concentrate prices and levels of milk production response where stocking rate is not increased in comparison to a base system at a similar concentrate purchase price. When stocking rate is held constant, increased concentrate supplementation relative to the base system results in reduced grass DM intake, increased milk production per cow and increased feed costs. At a low milk price (22.3c/l), increased concentrate supplementation results in a reduction in farm profit at concentrate prices of €250/t or greater, regardless of the level of milk production response to concentrate supplementation (between 0.6 and 1kg milk per kg concentrate). At a high milk price (30c/l), increased concentrate supplementation relative to the base system results in an overall increase in farm profitability only where a response to concentrate of 1kg additional milk per kg additional concentrate fed is achieved and concentrate is purchased at €250 per tonne. Where a response of 0.6 to 0.8kg milk per kilogram additional concentrate is achieved or at a concentrate purchase price of €300/t, increased concentrate supplementation will reduce overall farm profitability.

Table 10 illustrates the effect of increased concentrate supplementation on farm profitability at various concentrate prices and levels of milk production response where stocking rate is increased in comparison to a base system at a similar concentrate purchase price. In this scenario, increased concentrate supplementation results in reduced grass DM intake per cow, increased milk production per cow, increased cow numbers on the 40 hectares (i.e., an increase in stocking rate), increased labour input and costs, increased feed costs and increased total costs of production.

Table 9. The effect of milk production response rate and concentrate price on the key herd parameters and farm profitability using anticipated future costs and milk prices where stocking does not increase.

Concentrate costs €/tonne	**€250**				**€300**			
Response to concentrate	Base	0.60	0.80	1.00	Base	0.60	0.80	1.00
Grass kg DM/ cow	3,716	3,292	3,357	3,422	3,716	3,292	3,357	3,422
Grass Silage kg DM/cow	935	789	792	795	935	789	792	795
Concentrate kg DM/cow	334	1,240	1,240	1,240	334	1,240	1,240	1,240
Total hectares (ha)	40	40	40	40	40	40	40	40
Milk yield per cow (Kg)	5,862	6,340	6,500	6,659	5,862	6,340	6,500	6,659
# Cows calving (no.)	90.9	90.9	90.9	90.9	90.9	90.9	90.9	90.9
Stocking rate(LU/ha)	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51
Herbage utilised Kg DM/Ha	11,056	9,589	9,765	9,943	11,056	9,589	9,765	9,943
Labour units (h)	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51
Milk produced (kg)	533,080	576,323	590,805	605,286	533,080	576,323	590,805	605,286
Milk sales (kg)	516,355	559,605	574,086	588,568	516,355	559,605	574,086	588,568
Fat sales (kg)	18,981	20,573	21,105	21,638	18,981	20,573	21,105	21,638
Protein sales (kg)	17,203	18,640	19,122	19,603	17,203	18,640	19,122	19,603
Labour costs (€)	34,599	34,591	34,591	34,591	34,599	34,591	34,591	34,591
Feed costs /kg milk (c)	5.0	7.8	7.5	7.3	5.3	8.5	8.3	8.1
Total costs (€)	110,674	129,149	128,333	128,642	112,319	133,438	133,739	133,500
Milk Price at 22.3 c/litre								
Milk returns (€)	113,920	123,449	126,639	129,829	113,920	123,449	126,639	129,829
Margin per cow (€)	236	137	178	213	218	87	122	156
Margin per kg milk (c)	4.02	2.16	2.74	3.20	3.71	1.37	1.87	2.35
Total profit/farm (€)	21,423	12,470	16,205	19,357	19,797	7,917	11,069	14,221
Milk Price at 30 c/litre								
Milk returns (€)	153,720	166,578	170,883	175,188	153,720	166,578	170,883	175,188
Margin per cow (€)	676	615	668	715	658	564	611	659
Margin per kg milk (c)	11.53	9.69	10.28	10.74	11.23	8.90	9.41	9.89
Total profit/farm (€)	61,465	55,862	60,720	64,994	59,839	51,310	55,584	59,858

At a low milk price (22.3 c/l), additional concentrate supplementation will only result in increased farm profitability where concentrate is purchased at €250/t and a milk production response of greater than 0.8kg of additional milk is realised per kg additional concentrate fed above the base level. At a milk production response of 0.6kg/kg or where concentrate purchase price is €300/t, increased concentrate supplementation will result in a reduction in farm profitability. Where a milk price of 30c/l is achieved, additional concentrate supplementation results in increased farm profitability for all milk production responses and for concentrate purchase prices of €250 and €300/t.

Table 10. The effect of milk production response rate and concentrate price on the key herd parameters using anticipated future costs and milk prices where stocking rate increases.

Concentrate costs €/tonne		**€250**				**€300**		
Response to concentrate	**Base**	**0.60**	**0.80**	**1.00**	**Base**	**0.60**	**0.80**	**1.00**
Grass kg DM/ cow	3,716	3,292	3,357	3,422	3,716	3,292	3,357	3,422
Grass Silage kg DM/cow	935	1,240	792	795	935	1,240	792	795
Concentrate kg DM/cow	334	789	1,240	1,240	334	789	1,240	1,240
Total hectares (ha)	40	40	40	40	40	40	40	40
Milk yield per cow (Kg)	5,862	6,340	6,500	6,659	5,862	6,340	6,500	6,659
Cows calving (No.)	90.9	101.8	100.3	98.9	90.9	101.8	100.3	98.9
Stocking rate(LU/ha)	2.51	2.81	2.77	2.73	2.51	2.81	2.77	2.73
Labour units (h)	1.51	1.62	1.61	1.59	1.51	1.62	1.61	1.59
Milk produced (kg)	533,080	645,159	651,937	658,478	533,080	645,159	651,937	658,478
Milk sales (kg)	516,355	626,444	633,488	640,291	516,355	626,444	633,488	640,291
Fat sales (kg)	18,981	23,030	23,289	23,540	18,981	23,030	23,289	23,540
Protein sales (kg)	17,203	20,867	21,100	21,326	17,203	20,867	21,100	21,326
Labour costs (€)	34,599	37,074	36,742	36,418	34,599	37,074	36,742	36,418
Feed costs /kg milk (c)	5.0	7.5	7.30	7.10	5.3	8.4	8.10	8.00
Total costs (€)	110,674	139,114	137,435	135,844	112,319	145,289	142,804	141,431
Milk Price at 22.3 c/litre								
Milk returns (€)	113,920	138,193	139,743	141,239	113,920	138,193	139,743	141,239
Margin per cow (€)	236	188	223	251	218	130	166	195
Margin per kg milk (c)	4.02	2.96	3.43	3.78	3.71	2.05	2.56	2.93
Total profit/farm (€)	21,423	19,124	22,357	24,859	19,797	13,244	16,689	19,272
Milk Price at 30 c/litre								
Milk returns (€)	153,720	186,473	188,564	190,584	153,720	186,473	139,743	141,239
Margin per cow (€)	676	665	713	753	658	608	656	697
Margin per kg milk (c)	11.53	10.49	10.96	11.31	11.23	9.58	10.09	10.47
Total profit/farm (€)	61,465	67,699	71,478	74,506	59,839	61,819	65,810	68,919

Systems of production based on supplementation at pasture must be clearly defined to ensure that supplementation is efficient and does not lead to a reduction in pasture utilization on the dairy farm. It is envisaged that the cost of external supplements will continue to increase due mainly to increases in contractor charges associated with inflation in labour, energy and machinery costs. The profitability of supplement inclusion will be determined by the milk to concentrate price ratio and the level of additional milk production achieved in response to supplementation. If the market value of the additional milk achieved outweighs the costs of supplement inclusion and pasture utilisation is not compromised, higher supplementation levels may yield greater farm profit. However, if milk price reduces, the economic feasibility of concentrate use within the dairy feed budget declines as the marginal benefit of increased milk output is outweighed by the cost of the additional supplementation.

Ultimately, future farm systems must be based on achieving consistently high profit margins regardless of the wider financial climate, and therefore within a volatile milk price environment, it is our recommendation from this analysis that producers should focus on achieving high performance from high margin low cost systems based on the maximum utilisation of grazed grass and limited use of alternative feeds. Only when this base system is developed and managed to a consistently high standard should greater supplementation be considered in a favourable economic climate.

Financial implications of high performance technology on surveyed farms

Based on survey data outlined earlier (Table 1), it is possible to estimate the financial implications of technical improvement on Irish dairy farms. Through a combination of removing non-dairy stock, increasing the overall stocking rate on the grazing platform to 2.8 dairy cows/ha, achieving the optimum calving date, breeding better quality animals and better feed management (grass and purchased supplement), it is estimated that the profitability of the surveyed farms could be increased by €1,800 per ha (Table 11). This jump in profit could be further enhanced by continued genetic improvement of the herd, superior grazing management and making more strategic use of supplements.

Table 11. Biological and financial implications* of technological improvement on surveyed dairy farms.

	Survey Average	**Potential**	**Profit Differential (€)/Ha**
Milk yield (kg/ha)	8,684	13,000	870
Mean calving date	March 17th	Feb 15th	250
Breeding (Herd EBI; €)	42	80	400
Feed costs (c/kg DM grown)	8	5.5	300

* based on milk price of 30c/l

Taking steps to prepare for the future

The development of improved systems requires not only science but a process to convert the knowledge generated into farmer practice. In this regard, progress will depend on both relevant technology and effective action on dairy farms. The economic benefits of the technology discussed in this paper and indeed at this conference are considerable and will secure the future for Irish farmers. However in general terms, mass awareness exercises such as a conference will do little to improve farm incomes unless farmers act to make changes based on the available information. Discuss what you've heard today at your next discussion group meeting and decide what actions the group needs to take to prepare for the future. We would encourage each farmer to write out a one page plan outlining what changes he/she will make, putting a time limit on each action.

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Challenges to the Adoption of High Profit Dairy Systems

George Ramsbottom and Pat Clarke
Teagasc Advisory service

Summary

- Dairy farming is not the same as it was 50 years ago. Why? Because new practices and systems have had to be adopted over this period. Changes in the breed type (Shorthorn to Friesian), technologies for managing larger herds of cows were embraced (hand milking to bucket plant to cow byres to milking parlours, cubicle houses, small field to paddock grazing systems) and winter feed (hay to silage) were the key technologies that were widely adopted on dairy farms.
- There are clear reasons why these new technologies were adopted. Successful adoption of new technologies must be clearly beneficial (improve income or reduce workload), relatively cheap to implement and simple to use. Innovations or technologies that fit these three criteria must be widely adopted. But the adoption of proven profit making techniques/systems and labour saving innovations is far too slow. Every day's delay is money or labour saving time lost.
- A key characteristic of high profit dairy systems is grass utilized per hectare. Every one additional tonne utilised delivers €200 extra profit per hectare. The technologies are available to achieve this e.g., AI, EBI, grass budgeting, milk solids output per hectare but we have not seen their widespread use yet.
- The challenges facing all sectors of the dairy industry in the adoption of high profit dairy systems are different. That facing researchers is to identify and evaluate technologies that may be easily adopted. The challenge facing advisers is to actively promote them while the challenge facing dairy farmers is to quickly adopt them. We all must work together, hear each others concerns/requirements and MOVE FORWARD.
- High profit dairy systems – ARE YOU READY TO ADOPT THE TECHNOLOGIES TO GET THERE?

Background

It is hard to imagine a company that could survive, let alone grow, by doing the same thing forever. Companies are constantly making changes to their manufacturing or business processes. The dairy industry is no different. Over the last 50 years for example, such changes include the introduction of the Friesian as the principal dairy breed, the application of nitrogenous fertilisers and the move into the milking parlour. Other innovations such as artificial insemination, while also proven to be profitable innovations have been less widely adopted. In this paper we will first examine the challenges facing researchers, advisors and farmers in the process of developing high profit dairy systems for the future. We will then identify the key technologies that need to be adopted and finally address the challenges facing the industry in their adoption.

The challenges faced by research are to develop innovations that while relevant, applicable and simple, improve profits on dairy farms. Continued and on-going interfacing between research and advisory staff and farmers is a vital component of this process.

The challenges faced by the advisory service centre around the delivery of such innovations to their farmer clients. Clearly the current restructuring of the advisory service will improve the rate at which this process takes place. Key elements include:

- The introduction of a specialised technical and business service (specialised advisers divested of virtually all of their former scheme work load).
- The enlargement of our joint industry programmes with a large number of the countries co-operatives.
- The recent initiatives to launch an industry-supported grass budgeting service.

Farmers too face challenges in the adoption of high profit systems. Irish farmers are not unique in this regard. Stantiall and Parker (1998) listed the reasons for adoption and non-adoption of a technology by dairy farmers in New Zealand. The main reasons for the adoption or non-adoption of new technologies are outlined in Table 1.

Table 1. Reasons for the adoption or non-adoption of technologies by New Zealand dairy farmers.

Reasons for adoption	Reasons for non-adoption
Clearly identifiable benefits	No immediate/direct/perceived benefits
Cheap/affordable/perceived value for money	Costs money
Saves time/convenient	Requires too much time or hassle
Simple easy to adopt/use	Complex/complicated/difficult to fit into an existing system

The authors identified cost, simplicity of use, matching the technology to a clearly identified farmer need and effective promotion and marketing as key elements in the successful adoption of technology by farmers. Economic models fail to recognise that the decision making of farmers is driven by many psychological and sociological factors (Massey *et al.*, 2002). Personal, family and farm business objectives are inter-dependent and they need to be considered together (Perkin and Rehman, 1994).

The rapid increase in the market place for milk means that the majority of spring milk producers will experience a very profitable year in 2007. Reductions in the supports paid for the export of commodities from the EU means however that in future the price paid for milk could fluctuate significantly from year to year. The challenge facing dairy farmers is to identify and adopt systems of milk production that are profitable in the long term while remaining compliant with the environmental legislation.

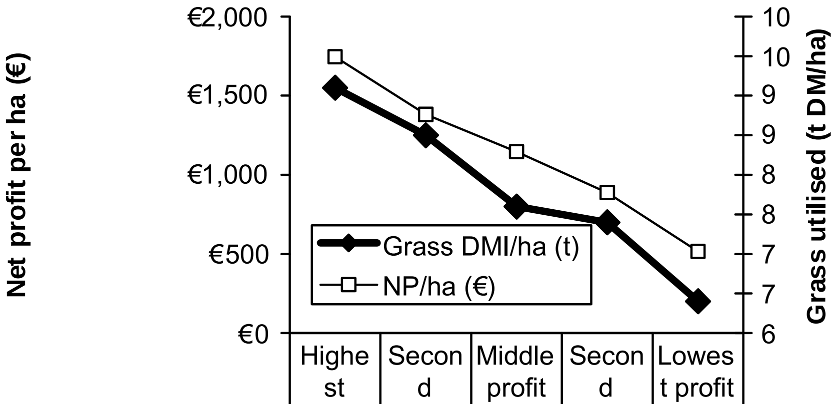
The key characteristic of high profit dairy systems

Defining 'high profit' dairy systems depends on what is considered to be the limiting factor on farm. While milk quotas were considered the primary limiting constraint, the focus was on profit per litre. Projecting forward, it is expected that quota will become less restrictive in the future and that the focus will shift towards profit per hectare (on the milking platform[1]). This change has already happened in areas where milk quota was more freely available over the last number of years. We will use kg milk solids[2] as the main measure of output.

Our analysis of Profit Monitor data for both spring and winter milk producers has identified one key characteristic of high profit dairy systems – they tend to consume the most grass per hectare. The data presented in

Figure 1 shows the estimated grass consumption per hectare for 544 spring-calving dairy farms for 2006 ranked in quintiles by net profit per hectare.

Figure 1. Grass consumed per hectare (tonnes DM/ha) ranked in quintiles by net profit per hectare (€/ha).



	Highest	Second	Middle profit	Second	Lowest profit
Grass DMI/ha (t)	9.1	8.5	7.6	7.4	6.4
NP/ha (€)	€1,746	€1,382	€1,146	€888	€516

The data presented in figure 1 shows a clear association between net profit per hectare and grass consumption per hectare. This analysis showed that each additional tonne of grass DM consumed per hectare is associated with an increase of

[1] **'Milking platform' is the term used to refer to area available for grazing the dairy herd.**

[2] **'Milk solids' is the term used to refer to a quantity of milk fat and protein, normally measured in kilos. One kg of milk solids is obtained from approximately 14 litres of milk of 3.7% fat and 3.3% protein.**

€200 per hectare per tonne of dry matter consumed. To put this in context, for a 40 ha dairy farm, an increase of one tonne of grass dry matter utilised per hectare is expected to result in an increase in net profit of €8,000.

Grass growth records from Moorepark and Ballyhaise show total grass dry matter yields of 14.0 tonnes per hectare per annum are obtained on average using 200kg nitrogen per hectare. Such yields of grass dry matter have the potential to produce up to 1,150 kg milk solids per hectare (without supplementation) assuming a grass utilisation rate of approximately 85 percent i.e., 12.6 tonnes dry matter per hectare. This is substantially higher than the average for the data presented in
Figure 1. The average yield of grass harvested equated to an average of approximately 7.8 tonnes dry matter per hectare and an average milk solids yield of 802kg per hectare – well below the potential identified at Moorepark for free-draining mineral soils.

Key technologies that need to be adopted

Increasing the tonnage of grass consumed on the grazing platform is clearly profitable. This is the challenge facing the industry as opportunities emerge to increase milk production over the next number of years. Three key areas must be addressed in the pursuit of higher grass utilisation per hectare:

1. Stocking rate
2. Milk yield
3. Concentrate use

Using the data from the spring milk farms analysed above, it is possible to estimate the potential contributions of each of the three factors in the pursuit of higher grass utilisation as outlined in
Table 2.

Table 2. Change in tonnage of grass utilised per hectare to changes in stocking rate, milk yield per cow and concentrate input.

	Stocking rate	**Milk yield**	**Meals fed**	**Grass utilised**
Current	2.0 LU/ha	400 kg MS/cow	805 kg/cow	7.8t DM/ha
Potential	2.5 LU/ha	500 kg MS/cow	350 kg/cow	12.0t DM/ha
Change in grass utilisation	2.0t DM/ha	1.5t DM/ha	0.7 t DM/ha	+ 4.2t DM/ha

1. Stocking rate

Increases in stocking rate are associated with increases in net profit per hectare as outlined in Table 3.

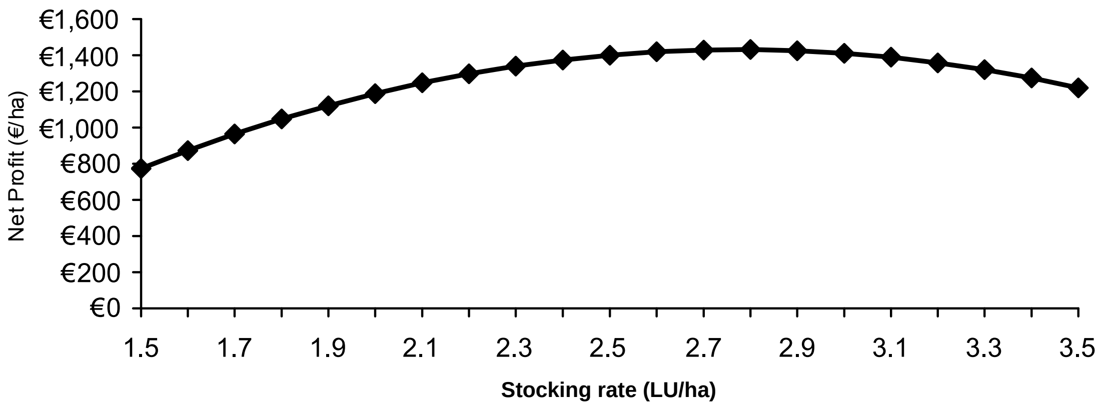
Table 3. Stocking rate (LU/ha), net profit and grass DM consumed (tonnes/ha) for the top 10%, average and bottom 10% of spring milk farms (n=544) ranked by stocking rate.

	Top 10%	Average	Bottom 10%
Stocking rate (LU/ha)	2.6	2.0	1.4
Grass DM consumed (tonnes/ha)	**10.0**	**7.8**	**5.4**
Net profit (€/ha)	1,375	1,136	666

The stocking rate on the average spring milk producer's farm was 2.0 LU/ha in 2006 while on average 7.8 tonnes of grass DM/ha was utilised and a net profit of €1,136 was obtained. The 10 percent most highly stocked farms had a stocking rate of 0.6 LU/ha higher, consumed an extra 2.2 tonnes grass DM/ha and a net profit of €239 per hectare higher than the average farm. The lowest stocked farms were stocked an average of 0.6 LU/ha lower, consumed 2.4 tonnes less grass DM/ha and made an average of €470 less per hectare than the average spring milk producer.

The strength of the link between stocking rate and net profit per hectare is lower than for grass utilised per hectare (r^2 of 0.24 and 0.55 respectively). However, the data suggests that an increase in stocking rate of 0.1 LU/ha is associated with an increase of €61 per hectare in net profit. What then is the upper limit in terms of optimum stocking rate on dairy farms?

Figure 2. The association between net profit (€/ha) and stocking rate (LU/ha) for a range of stocking rates (2006 Profit Monitor data).

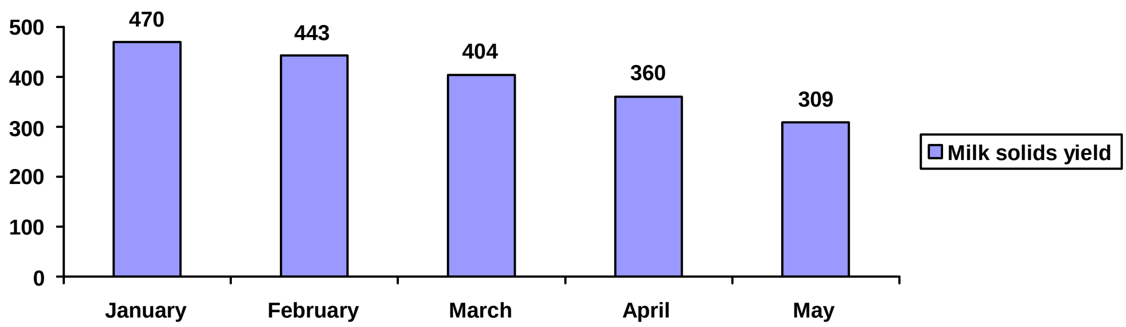


The data in Figure 2 suggests that the highest net profit per hectare in 2006 was obtained on farms with a <u>whole farm</u> stocking rate of between 2.6 and 3.0 LU/ha on the 'average' farm.

2. Milk solids production

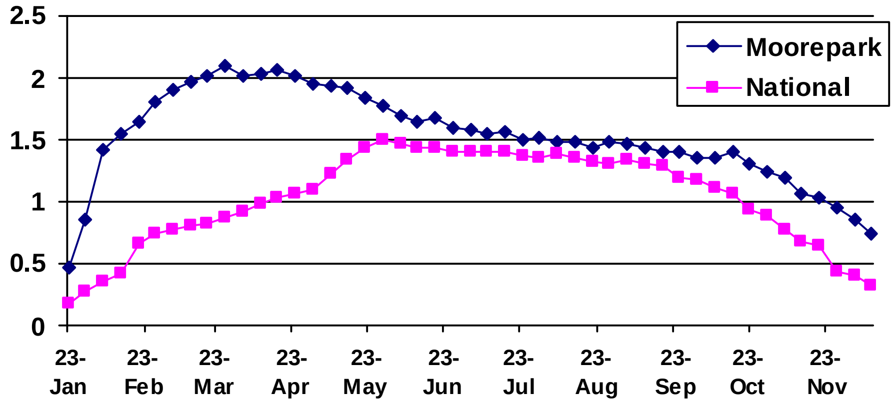
The production of high milk solids yields per cow is underpinned as much if not more by excellent reproductive performance as cow genetic merit for milk production. Previous analysis using data from Profit Monitor and ICBF for spring milk farms showed that as herd predicted difference for milk yield increased so also did average yield per cow (1kg PD milk was associated with an increase of two litres in average milk yield per cow). This is however complicated by the negative link that exists between the genetics for milk yield and fertility. In other words cows of higher genetic merit for milk production tend to have poorer fertility. Because they tend to calve later each year, they fail to produce to their 'full milk yield potential'. The importance of month of calving on milk solids yield is highlighted in Figure 3.

Figure 3. Milk solids yield by month of calving for milk recorded cows (2004 milk recording results).



The data in Figure 3 shows that on average later calving cows produce less milk. The main reason for this is a decline in the number of days spent in milk. On average milk solids production declined by approximately 40kg per month later calving. The result of a combination of later mean calving date and a more scattered calving pattern are highlighted in terms of milk solids production profile in Figure 4.

Figure 4. Average daily milk solids deliveries for the Moorepark and national herds (2005).



In Figure 4 average daily herd milk solids yield for the Moorepark and national herds are compared. The average cow at Moorepark and nationally delivered 489 and 337 kg milk solids respectively to the milk processor in 2005. Approximately three-quarters of the difference (111kg milk solids/cow) occurred in the first half of the year. The principal reasons for the difference centre on (a) calving pattern and (b) median calving date. At the end of March, 90 percent and 68 percent of the Moorepark and national herds were calved. Median calving date for the Moorepark herd is 10 February which compares with 18 March for the national herd.

3. Concentrate input (cost of milk production)

Likely fluctuations in the price paid for creamery milk will challenge high cost systems of milk production at times when the market price is at the lower end of the cycle. Similarly very extensive low cost systems of milk production will not allow farmers to capitalise on the higher per hectare profits accruing during periods of high milk price. Common ground benchmarks are required when establishing long term financial and physical targets for spring milk producers. One such benchmark is the cost per unit of milk production, changing payment systems are focusing on costs per kg of milk solids (€/kg). Purchased feedstuffs (both concentrates and to a lesser extent forages) accounted for an average of 35 percent of total variable costs in the spring calving herds analysed in this study.

On farms where land is a limiting constraint, as herd size expands, more and more grazing land is required within walking distance of the milking parlour. The Teagasc Moorepark blueprint indicates that approximately 1,250kg milk solids/hectare may be produced in grass based milk production systems. Analysis of data from Teagasc Dairy Profit Monitor for 2006 is outlined in Table 4.

Table 4. Total production costs (€/kg MS) and net profit (€/ha) for top 10%, average and bottom 10% of spring milk farms (n=544) ranked by net profit (€/ha).

	Top 10%	Average	Bottom 10%
Production costs (€/kg MS)	1.86	2.26	2.94
Net profit (€/ha)	1,906	1,136	379

The average spring milk farmer produced milk at an average cost of €2.26/kg milk solids and produced made an average net profit of €1,136 per hectare. Compared with the average, the top performers had lower production costs (€0.40/kg MS) and higher profit (€770/ha). In contrast the high cost farms had higher than average milk production costs (€0.68/kg MS) and earned far less per hectare (€757/ha).

This analysis shows that an increase of 10c/kg milk solids in the cost of production was associated with a decline of €81/ha in net profit. Such a finding is not surprising because of the contributory role of production costs to profit. The application of the latest research from Teagasc on dairy farms has the potential to reduce milk production costs below €2 per kg milk solids in tandem with the production of 1,250 kg milk solids per hectare. The top five percent ranked by net profit (€/ha) produced 1,045 kg milk solids per hectare in 2006 and achieved a net profit of €2,074/ha.

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Lessons for an Expanding Dairy Industry – an International Perspective

Jim Van Der Poel, Director, Fonterra Co-operative Group

Good afternoon and thanks for the opportunity to talk to you today.

Summary

The strategy for the New Zealand dairy industry today has four platforms. First, we must ensure that our farmers and Fonterra remain one of the lowest-cost, sustainable suppliers of milk in the world.

Second, we are building truly powerful partnerships with our customers. I will talk about supplying from multiple origins. We are also working in other areas such as supply chain integration, or the opportunity to work with their scientists and marketing people to develop much higher value dairy solutions.

Our third platform aims to increase returns to our shareholders from markets where we cannot supply from New Zealand because of high tariffs or where the demand is for fresh milk. These markets include China, the United States, and Brazil.

To take advantage of these opportunities, Fonterra is investing internationally. In China, for example, we have a 43 percent interest in San Lu, one of China's top three dairy companies. Our aim is to become an integrated business in the Chinese market, collecting milk and moving it up the value chain to consumer products in hundreds of cities in China.

China is our most recent investment in the fresh dairy market, but it is by no means our only investment. We have a partnership with Nestlé in Brazil, Argentina, Venezuela, Colombia, and Ecuador, meeting local demand with local products.

Introduction

Change is very much on the agenda at your conference. You are asking how can Ireland gear up for growth, increase your processing capacity, manage shifts in EU agricultural policy and secure a profitable future for your farmers. What I can contribute today is some thoughts from the New Zealand perspective.

Change is something we know a lot about in the New Zealand dairy industry. We have gone through loss of subsidies, consolidation and deregulation in the space of 20 years.

Through our position in the Australian industry, Fonterra is contributing to change there, as too much capacity chases too little production and the industry acknowledges the need for consolidation.

Many of the challenges facing you are challenges we have successfully faced ourselves. Conversely, you have embraced change that we are only now beginning to think about, such as opening the door to external capital. So I am sure we can learn from one another.

Fonterra's creation is pretty well documented, so I don't propose to take you through the process today. It's enough to say it didn't happen overnight – so don't be frustrated if you feel Ireland is not making headway towards the "mega co-op" that the Prospectus Report proposed five years ago.

It also took the threat of deregulation and removal of our Dairy Board's monopoly to really push the pace of change, but an important point to make here is that the industry had a choice – fight deregulation or engage and control the process. We did the latter, taking the time to construct an industry strategy and vision. We then set about implementing that vision.

Then we saw rapid consolidation of the remaining 14 co-operatives, with many of the mergers based on a strategic end-game.

The process quickly brought the number of co-ops to four – two small and two large with the two large co-operatives, Dairy Group and Kiwi, accounting for 96 percent of New Zealand's milk. It took almost two years of negotiation to broker the final merger among the two large players, as well as legislative change to create Fonterra.

So my advice is this. Change takes time. It also takes leadership and from time to time, it takes a boot firmly applied to speed up the process. But it is important for the industry to remain in control, have a vision for the future and be clear about the outcome it wants.

The question you will want answered is, was it worth it? The answer is a definite yes. Fonterra is now the largest supplier to the globally traded market for dairy.

But this isn't just about size. The vote for change back in 2001 has put Fonterra in the box seat to take advantage of the rapid changes in today's global market – and I will touch on those shortly.

When we created Fonterra we created a unique advantage. Fonterra now has what we call a cow to consumer integrated business. We've got an advantage because Fonterra's business starts at the farm vat and covers every step in the supply chain. Milk sourcing and collection, manufacturing, inventory management, demand and supply forecasting, commodity sales, consumer marketing, we do it all.

Pre-merger, our co-ops made product and the Dairy Board tried to find a home for it. Often there was a disconnection between what the market wanted and what co-ops wanted to produce.

Post-merger, everything starts with the customer. We have invested heavily in technology and processes which ensure all of our customers are serviced in the way which makes the most sense for them and the most returns for us. For example in core commodity markets like South East Asia, buyers want the right product at the best price. That's all they are interested in. To deliver, we have a simple core commodities sales model supported by manufacturing plants which produce just one or two specifications with very long production runs.

At the other end of the scale, we have very large customers who are interested in more than core products. They want other services such as technical support, specialist products, security of supply and help with R&D. Again, our model meets their needs. We have manufacturing sites dedicated to technically challenging products and multiple short runs and we also have plants aligned to making a limited range of specifications.

Our investments in supply chain planning and inventory processes mean we can match demand signals with manufacturing plans which decide what is produced at our sites and when. In many cases, we can now hot ship from our manufacturing sites and last season, for example, we were moving an average 200,000 MT a month across NZ ports.

In addition to streamlining supply from New Zealand, we can now deliver the best match between customer demand and the most advantageous supply source in our global supply network. We are sourcing increasing volumes of product from around the world, bringing customer security of supply while increasing returns for our farmers. Where in the past, a large customer might take 30 percent of their supply needs from Fonterra, our ability to supply from multiple geographies means we are getting orders for some 70 percent of our very large customers' needs. None of this would have been possible pre-merger and has contributed significantly to Fonterra's place as the leading supplier to the globally traded market.

It has taken time to build this model. Remember, we merged three organisations into one, so we began life with mismatched legacy systems in every area from milk collection to marketing. It was a four year project alone to get our planning, supply chain, ordering and payment processes streamlined and fully operational.

When you collect more than 14 billion litres of milk in your home market and convert it into more than two million tonnes of export product, you have to keep thinking one step ahead. Change created Fonterra and change will always be with us if we want to keep growing.

Today we're in a market where overall growth in dairy demand is running at 2.7 percent a year. We're in a strong position, but there's no room for complacency. Other countries are ramping up production and it is likely at least one new major low cost supplier will emerge – possible from Latin America or Eastern Europe. There's room for new supply. The globally traded market, our traditional stamping ground, is expected to grow by 1.2 percent a year over the next decade.

But we see real opportunities to grow beyond our traditional markets. There are good opportunities for Fonterra to complement our dairy commodities trading with businesses that meet demand for fresh milk in these countries. We are already doing this in Australia, the US and some parts of Latin America and we have recently invested in China.

Fresh liquid dairy is expected to grow by around 3.0 percent annually and this is something that we cannot export from New Zealand. So what we are doing is targeting the money that's to be made in both segments. This means our farmers here will always have a market for their milk – so long as we remain competitive. But it also means our growth won't be limited to production growth – an important consideration as the dairy sector in New Zealand is maturing and there are growth constraints such as land and water.

We can move into the fresh market in other parts of the world because Fonterra has that unique advantage in our cow to consumer business. That puts us in the ideal position to take this expertise and apply part or all of it in any market.

The final platform of our strategy is to make Fonterra products the first choice of customers and consumers wherever we do business, increasing our profits from value added products. We have international household names like ANCHOR, ANLENE and MAINLAND.

The Fonterra strategy is designed to optimise the milk price we pay our farmers, grow profits and grow farmer shareholder wealth. Our strategy takes us beyond processing NZ milk and getting it to market for the highest returns. But let's be clear. We are not getting out of our traditional business into a new business – we are adding a new business to the one we are already in.

Strategy and structure go hand in hand which is why we are now examining Fonterra's capital structure. In the past we have raised capital in line with milk production and our investment strategy has tended to keep pace with production growth. But to take advantage of the opportunities in the global market, more capital will be needed.

This month we began talking to shareholders about changes many of you will be familiar with – the option to bring external investors into Fonterra. It is very early days and there is not time today to go into the full detail of the proposal. What I can say though, is that retaining farmer control is our prime consideration, so farmers have the security of co-operative membership and all the benefits that entails.

With so much change on the horizon farmers views about their own businesses must also change. Irish farmers are in a very good position to benefit from less regulation and a much more open policy. Production will move to the most efficient farmers and regions. Cost of production will become a competitive advantage or a threat depending on your farming system. Irish farmers have the opportunity to produce high quality milk at a more competitive price than large parts of Europe based on their natural competitiveness of producing milk from pasture. Those that grasp this concept will be the beneficiaries of the new environment going forward.

A competitive milk production system will in itself not guarantee prosperity. There is a lot of revenue in milk but most of the value is created outside the farm, between the farm gate and the consumer. Who creates and captures that value is always defining. Ireland is well placed, it has a natural competitive advantage in its production systems, it is on the door step of 400 million consumers who are relatively wealthy and natural consumers of dairy products. If the Irish dairy Industry is to be a beneficiary of the new environment then it will take vision, leadership and commitment.

Your future prosperity is in your hands.
Thank you.

Planning for an Increased Milk Quota

Pat Ryan, Waterford Dairy Farmer

Summary

- Dairy farming has huge potential in this country both for the greater economy and for the dairy farmer.
- To exploit this potential we must examine where we are, where we want to be, and how we get there.
- With land prices unrelated to earning capacity and strong emotional ties to land, access to farm the land profitability is the key to our success.
- We need a ladder of opportunity to promote good people in dairying, education for all (young and old) is the key to achieving this.

Introduction

Three crucial areas to forward planning:

1. Where are we?
2. Where do we want to be in 2015?
3. How can we get there?

Where are we?

I have looked at this under the following headings:

Climate and profitability

We have a climate in this country that is very suitable for grass-based farming enterprises. At present there are three-and-a-half times as many specialist beef producers as specialist dairy farmers. There are more suckler cows than dairy cows in the country

- Profit on beef farms 2006 -€22/ha.
- Profit on dairy farms 2006 - €854/ha.
  (Excludes premia)

Land values at circa €50,000/ha bear no relevance to the above profitability levels.

Demographics

Family Farmers by Age Group	
Under 35	11%
35-44	26%
45-54	27%
55-64	23%
65+	13%

All Farm Workers	Male	Female
Under 35	15%	3%
35-44	15%	3%
45-54	17%	6%
55-64	16%	6%
65+	15%	4%

Average no. parcels of land per farm = 3.4

Skills score card

Job		AGE	<30	30-44	45-54	55-64	65+
Description	% of Importance	GENDER	M	M	M	M	M
			F	F	F	F	F
Strategic Planning							
[finance, stock, grass	40%		22	30	32	30	26
infrastructure]			22	30	32	30	26
Farm management of stock, grass, labour etc.	40%		25	30	28	28	18
			30	34	32	32	18
Heavy duty physical work							
[cleaning silage pits,			15	15	12	10	6
stone picking etc.]	20%		10	11	8	6	6
	Total		62%	75%	72%	64%	50%
			62%	75%	72%	64%	50%

Comments on skills scorecard and demographics
Forty-one percent of all farm workers are over 55 years.
Women under 45 years are seriously under represented in farming.

Other comments on where we are
CPA (Certified Public Accountants)

Farming like all family businesses, operates from an emotionally based platform. With emotions come conflict – conflict management is therefore critical to the survival of a family business.
Family businesses often awaken to the reality that they have built themselves traps by having such a large percentage of their total net worth tied up in their illiquid businesses.
Good communications and structured coherent planning are the keys to the success and survivability of a family business.

Where we want to be in 2015 – views of stakeholders in the industry

The first reply from a regional office organiser was "That is a very interesting question that I would not even know where to start on."

Macra

Exploit our competitive advantage.

Proper rewards for young people committed to the sector.

ICMSA

Stable prices.

Regulations to be scientifically based.

IFA

Increased efficiency for both processors and producers

Able to cope with quotas going without compensation.

Viable income for family farm unit.

Glanbia

Thirty percent less suppliers supplying 20 percent more milk

A + B – C milk pricing will be standard.

More value added products.

Increased efficiency for both processors and producers.

Profile of suppliers will be:

Family farm units of circa 80-100 cows.

Partnerships of circa 250+ cows.

Large scale business type units of 400+ cows.

Minister Mary Coughlan T.D.

Increased efficiency for both processors and producers.

Milk quota in the hands of active and committed producers.

Increased scale.

Good standard of living.

Teagasc

World class advisory service giving excellent support to committed dairy producers.

Pat Dillon, "Successful dairy farmers marry the objectives of profitability, provide for a good lifestyle and allow all participants the opportunity for personal development."

How to get there?

Macra

- World class dairy education.
- Ladder of opportunity for young people.
- One national milk quota exchange.

ICMSA
Aid to help farm consolidation.

IFA
Researchers lead with solutions to practical on-farm obstacles.
World class dairy education.
Have tax efficient land leasing promoted by Teagasc thus avoiding the limitations long associated with partnerships.

Minister Mary Coughlan T.D.
We must be prepared and we must be willing to change.
Think tank for the dairy industry.

My own view
I thoroughly agree with the theme of today's conference that we are all going to have to 'learn to earn' and that learning is a lifelong activity. It is crucial that we have a world class educational service to facilitate this lifelong learning.
I am conscious that presently emotions play a large part in the grassland based industry. Good communication and coherent planning are essential for the overall success of the industry. Succession planning must focus on education and sharing the wealth of experience of today's farmers both nationally and globally.

The big question is how we get around the social and economic engineering effects of the present structure for REPS and SFP so that we do not hit the wall in 2015.
I absolutely agree on taxation incentives for land leasing but it is a disgrace that partnerships which are a logical expansion route for some farmers are so discriminated against – for example the dairy improvement grant can only be claimed by one partner.
In our case if we had stayed independent my partner could have built a milking parlour plus facilities on a green field site, I could have installed a parlour and we could have both claimed full grant aid. In this scenario we would both be less profitable, both have a poorer life style and both have decreased opportunity for personal development.
I believe that partnerships, joint ventures and attractive land leasing are the way forward for dairy production driving the industry forward while still keeping a direct tie to the land for many people.

Where I am now
I am involved in a dairy partnership milking 280 cows producing 1.5 million litres of milk. I keep the milking cows on my farm and John keeps all replacement stock. Calves go to John at 8-10 weeks of age and return a month before calving. Decisions are made jointly and both units are run independently.

SWOT test on our business

Strengths –

I have to be more business like in my dealings as they have to be justified to someone else. John has strengths in areas that I am weak in and vice versa which allows the sum be greater than the individual parts. Our farm has only one group of stock to look after which makes life very straight forward.

Weaknesses – I have not got the same level of independence as a sole trader. Discrimination against partnerships as already outlined – increased amounts of 'red tape'

Opportunities-

It frees up time (my time)

As a result of the partnership I am involved in dairy herd contract management on another dairy farm. That other farm will be better off this year – and I will be better off and Linda the farm manager has got a great opportunity, the kind of opportunity that needs to be available to young people of ability to keep the industry moving forward. This is very much a win/win scenario that I believe I can replicate.

Threats-

Dangers of emotions and conflict entering the partnership. Lack of forward planning to cover events e.g. sickness to one of the partners (to overcome these threats I must stay learning).

Acknowledgements

Finally, thanks to Matt Ryan for giving me the opportunity to speak here and to Owen Power for his help in preparing this paper.

Using Grass to Reduce Feed Costs

Michael O'Donovan and Emer Kennedy
Teagasc, Moorepark Dairy Production Research Centre

Summary

1. Compared to grazed grass in relative cost terms first-cut silage is 2.5 times more expensive, second-cut silage 2.9 and concentrates 4.2. Cost relativity between these feeds is likely to increase further in the years ahead.
2. Profitable milk production in Ireland must be based on the provision of sufficient quantities of high quality pasture to produce quality milk at lowest cost.
3. Spring grazing management must focus on efficient use of grass to substitute grass silage and concentrate from the lactating cow's diet. Spring grazing has a large carryover effect on grass quality in subsequent rotations.
4. In spring, the first rotation must last until mid-April, excessive pasture damage must be avoided and post-grazing height must be maintained at 4-5cm to ensure pasture quality is high during subsequent rotations.
5. 0.8 - 1.0t grass DM/cow consumed from turnout until the end of the first rotation should be achievable on farms practising early spring grazing. Grazed grass and concentrate can be the sole feeds with such a system.
6. Mid-season management must aim to maximise animal performance while maintaining pasture quality. High pre-grazing yields (>1,800kg DM/ha) should be avoided. Topping and silage conservation should be used as tools to correct poor pasture quality.
7. Large differences between grass cultivars exist, choosing the correct cultivar for the system has a major effect on milk output and profitability of the system.
8. Future grass breeding and evaluation needs to focus more on characteristics that influence animal performance under grazing rather than under conservation.
9. Grass measurement has a large influence on overall farm profitability and is vital for efficient grassland management.

Introduction

The production and utilisation of grass has a central role in maintaining the competitiveness of the Irish dairy industry. Economic analysis (Shalloo et al., 2004) shows that maximum profitability within Irish milk production systems can only be achieved through the optimum management of pasture both within the current quota regime and within future scenarios where additional quota may be available to Irish dairy farmers. The ability of dairy farmers to maximise the performance of their herds from grazed grass produced within the farm gate will be a significant factor deciding their future business success. Dillon et al. (2005) suggests that regardless of country or quota existence, a 10 percent increase in grazed grass in the feeding system will reduce the cost of milk produced by 2.5c/l. One strategy to increase our competitiveness, irrespective of milk price, is to continue to increase the grazed grass proportion of the diet. Irish dairy farmers can reap greater benefits from improved pasture management compared to any of our main competitors on world markets through the uptake of better grassland management techniques.

The objective of this paper is to discuss:

- The cost of alternative feeds relative to grazed grass
- The evolution of best grazing management practices in recent years
- The potential performance from pasture from research findings
- Grassland guidelines and challenges facing grassland production systems
- Future grass selection criteria and strategies

The cost of alternative feeds to grazed grass

Table 1 shows the relative cost of grazed grass, grass silage, maize silage and concentrate feeds on a DM basis (with and without land costs) and on a UFL basis at land rental charges of €250, €350 and €450/ha. Grazed grass was costed using both good grassland management (stocking rate of 2.47cows/ha, 300kg concentrate fed/cow, nitrogen application rate of 255kg/ha and a milk output of 1,240kg milk solids/ha) and the average of that being achieved by specialist dairy farmers in the National Farm Survey (NFS) (stocking rate 1.90cows/ha, 700kg of concentrate fed/cow, nitrogen application rate of 170kg/ha and a milk output of 650kg milk solids/ha). This difference in efficiency represents a difference of almost €130/cow in feed costs based on an annual intake/cow of 3.5 tonnes at a rental charge of €350/ha.

Using a land rental charge of €350/ha, first-cut silage is 2.5 times as expensive as grazed grass, second-cut silage 2.9 and concentrates at €240/t is 4.2 times more expensive. Maize silage was of similar cost as first cut silage but less expensive than second cut silage. The results illustrate that grass should be the base feed on the grazing platform, first cut silage used as the winter feed with concentrate and second cut silage kept at a minimum. Maize silage shouldn't be grown on the grazing platform, to produce feed. In a situation where the grazing platform is not adequate to produce feed then maize silage is the best alternative based on Table 1.
The relative competitive advantage of grazed grass is expected to improve over the next number of years due to higher concentrate price and continued increase in the cost of grass silage. Reduced production and increased demand for grain around the world is causing prices to increase, grain consumption will outweigh supply for the foreseeable future. For cereals, weather related shortfalls in production have occurred in a number of producing countries and regions such as the US, EU, Canada, Russia, Ukraine and most notably Australia, where production fell by more than 50%. In a global context low global cereal stocks in recent years have been a strong factor underpinning world prices. The demand for cereals for bio-fuel production is placing additional demand for an already tight supply situation and has contributed to further strengthening of world cereal prices. It is noteworthy, however, that the combined cereal supply shortfall in North America, Europe and Australia in 2006 of over 60 million tonnes (MT) was nearly four times larger than the 17MT increase in cereal use for ethanol in these countries. In real terms we will continue to

be exposed to high cereal prices for the medium term. Conserved feed costs (both grass silage and maize) will continue to increase relative to grazed grass due to increases in contractor charges associated with inflation in labour, energy and machinery costs.

Recent trends in grassland management practice

There have been many changes to grassland management in the past decade. Rising costs have required increased production efficiency on Irish dairy farms to resist the fall in farm income. More emphasis is now placed on technology to extend the grazing season earlier into spring and later into autumn to reduce the requirements for alternative higher cost feeds. Early turnout (post-calving) is now normal practise on many farms with clear benefits (Dillon et al., 2002; Kennedy et al., 2005). Autumn management has also evolved with higher farm grass covers built to provide a grass supply into November and some pastures closed to store grass over the winter to have herbage available for spring grazing.

The evolution of management practice within Moorepark since the mid-1980s is summarised in Table 2. Over the 23 years, mean calving date has been delayed, and stocking rate has been reduced to facilitate the incorporation of a greater proportion of grazed grass in the diet of the dairy herd. The current grazing season length is 300 days, with the main increase in the number of grazing days realised through earlier spring turnout. The grass growth potential of the sward has increased, achieved mainly through reseeding of older pasture and through the more efficient use of artificial and organic fertiliser. There has been a consistent reduction in the proportion of second cut grass silage taken, as the demand for grass silage has been substantially reduced with a longer grazing season.

Due to the extension of the grazing season the feed budget of the dairy cow has also changed over the past 23 years – grass allowance has increased by 40 percent coupled with a 30 percent decrease in grass silage input along with a 50 percent reduction in concentrate offered. In the future a further increase in the quantity of grass in the overall feed budget is likely.

In the following section the grazing season will be broken down into the spring and main grazing season. Each of the periods will be discussed and the most recent grassland research results will be applied.

Table 1. The relative cost of grass, silage and concentrate feed.

	Good Grassland management	**Grass NFS**	**First-cut silage**	**Second-cut silage**	**Conc €160/t**	**Conc €200/t**	**Conc €240/t**	**Maize silage No-plastic**	**Maize silage with plastic**
No Land Cost									
No land cost ((€/ton DM)	33	47	92	112	-	-	-	94	96
Land Cost (€250/ha)									
Total costs (€/ton DM)	47	85	117	133	187	234	281	119	115
€/1000 UFL	54	84	146	173	177	221	265	150	140
Relative to grass (total cost/UFL)	1	1.6	2.7	3.2	3.3	4.1	4.9	2.8	2.6
Land Cost (€350/ha)									
Total costs (€/ton DM)	63	100	127	142	187	234	281	128	123
€/1000 UFL	63	99	158	184	177	221	265	160	150
Relative to grass (total cost/UFL)	1	1.6	2.5	2.9	2.8	3.5	4.2	2.5	2.4
Land Cost (€450/ha)									
Total costs (€/ton DM)	72	116	136	150	187	234	281	138	131
€/1000 UFL	71	114	170	195	177	221	265	180	160
Relative to grass (total cost/UFL)	1	1.6	2.4	2.7	2.5	3.1	3.7	2.5	2.3

Table 2. Changes in the Moorepark Blueprint System for spring milk production between 1984 and 2007.

	1984	2007	Difference
Mean calving date	2/2	24/2	+22 days
Stocking rate (LU/ha)	2.91	2.5	-0.41
N input (kg N/ha)	423	255	-168 kg
Grazing season length	250	300	+50 days
Turnout by day	10/3	1/2	+37 days
Turnout full time	1/4	1/2	+59 days
Housing date	15/11	28/11	+13 days
Silage area - first cut (%)	43	40	-3%
Silage area - second cut (%)	33	15	-18%
Annual Dairy Cow Feed Budget			
Grass (t DM/ cow)	2.8	3.9	+1.1
Silage (t DM/ cow)	1.5	1.0	-0.5
Concentrate (t DM/ cow)	0.75	0.35	-0.4

Benefit of early turnout to animal performance

Table 3 shows the results of a study comparing spring-calving cows that had access to grazed grass full time from calving in early February with a group of cows that remained indoors until early April. The 'indoor' cows were offered a high concentrate diet containing 40 percent grass silage (8.6kg DM/cow/day) and 60 percent concentrate (11.1kg DM/cow/day), while the outdoor cows were offered a daily grass allowance of 15kg dry matter and 3kg of concentrate. There was no difference in milk yield (28.3 vs. 27.3kg/day) between the two systems but the early spring grazing system cows produced milk of lower fat content (3.86 vs. 4.16%) and higher protein content (3.36 vs. 3.07%) compared to the indoor cows. Cows from both feeding systems achieved similar total DM intakes of approximately 15.5kg DM/cow/day. Significantly, the cows on the early spring grazing system continued to maintain a higher milk protein concentration and higher grass dry matter intake than their indoor counterparts up to July.

Table 3. The effect of system (Early Spring Grazing; Indoor Feeding) on the milk production characteristics of spring-calving dairy cows from February to April

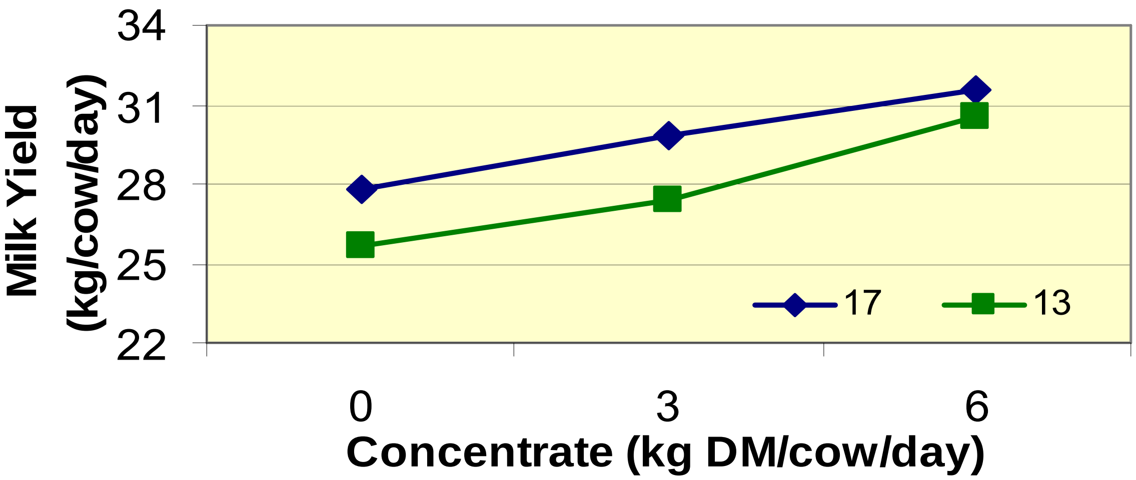
	Early Spring Gazing	**Indoor Feeding**
Milk yield (kg/day)	28.3	27.3
Milk fat concentration (%)	3.86	4.16
Milk protein concentration (%)	3.36	3.07
SCM yield (kg/day)	26.6	25.9
Bodyweight (kg)	499	517
Bodyweight gain (kg/day)	+0.20	+0.03
Body condition score	2.87	2.92
Intake (kg DM/cow/day)		
Grass	12.9	-
Silage	-	5.7
Concentrates	2.8	9.6
Total intake	15.7	15.3

The results of this study highlight the large benefits (both nutritionally and financially) of including grazed grass in the diet of spring-calving dairy cows in early lactation. When modelled on a whole farm basis, early grazing will generate an increased profitability of €2.70/cow/day for each extra day at grass, through higher animal performance and lower feed costs.

Management of cows in early lactation

A series of experiments have been undertaken at Moorepark to establish the optimum level of grass allowance and concentrate feeding level that should be offered during the first and second grazing rotations (early February to mid-May). In the course of these experiments cows were offered varying grass allowances (13 – 19kg DM/cow/day) in conjunction with differing concentrate levels (0 to 6kg DM/cow/day). From these investigations it is clear that a grass allowance of 15 kg DM/cow/day should be allocated to spring-calving dairy cows during the first grazing rotation. A high response to concentrate (on average 1.1kg milk/kg concentrate) was also achieved by these cows in early lactation. The positive effect on milk yield, of supplementing cows with concentrate in the early lactation period persisted into mid-lactation and resulted in higher total lactation milk yields. Figure 1 synopsises the experiments undertaken to determine optimum herbage and concentrate allowances in early spring. From this graph it is clear that if farm cover at turnout is low then cows offered a low grass allowance (13kg DM/cow/day) and 3kg DM of concentrate will attain the same level of milk production as those offered 17kg DM/cow/day and no concentrate.

Figure 1. Effect of grass allowance level (13 or 17kg DM/cow/day) and concentrate level on the milk production of spring-calving dairy cows.



Thus the recommendations for early spring are to turnout cows directly post calving and offer a grass allowance of 15kg DM/cow/day and 3kg DM concentrate during the first grazing rotation. By adhering to these principles the dual objectives of early spring grazing can be achieved, i.e., maximising the proportion of grazed grass in the diet of the dairy cow while simultaneously conditioning swards for subsequent grazing rotations. This essentially means obtaining a balance where cows are adequately fed yet paddocks are well grazed (to a post-grazing height of approximately 4 - 4.5cm).

Benefit of early turnout on grass quality

Pastures that are grazed in early spring (February and March) produce swards of higher quality and of higher milk production potential in the mid-April to early July period than swards initially grazed in mid-April (Table 4). High quality grass is achievable by grazing pastures to low grazing residuals (4-4.5cm) early in spring. Two swards were established, one was grazed once between February and mid April; the other remained ungrazed since the previous October/November. This study commenced in mid-April and continued until early July during which four 21-day rotations were completed. Grazed grass was the sole feed for the duration of the experiment. Each of the swards was grazed at two stocking rates, 5.5 and 4.5 cows/ha on the early grazed swards, and 5.9 and 5.5 cows/ha on the late grazed swards.

Table 4. Effect of initial grazing date and stocking rate on milk yield and composition from mid-April to early July

	Early Grazed Swards		Late Grazed Swards	
Stocking rate (cows/ha)	**5.5**	**4.5**	**5.9**	**5.5**
Grass intake (kg DM/cow/day)	16.3	17.5	15.2	16.7
Milk production				
Milk yield (kg/day)	22.7	24.5	20.9	22.4
Fat (%)	3.89	3.78	4.00	3.78
Protein (%)	3.29	3.41	3.21	3.27

The cows on the early grazed swards at a stocking rate of 4.5 cows/ha achieved the highest yield of milk, fat and protein; highest protein content and grass dry matter intake. There was no difference in animal performance between the cows grazing the early and late grazed swards stocked at 5.5 cows/ha, even though the early grazed swards had already been grazed once that spring. The results of this study suggest that swards grazed early in spring have increased milk production potential, grass DM intake and herbage utilisation in early summer. The production benefits of swards grazed in early spring are due to a higher leaf proportion and hence greater digestibility than later grazed swards during the main grazing season. Leaf proportion is directly related to grass digestibility; a 5.5 percent change in leaf content is equal to a one-unit change in digestibility. For each one-unit increase in organic matter digestibility (OMD) grass dry matter intake (GDMI) is increased by 0.20kg and milk yield is increased by 0.24kg milk/cow/day.

Achieving high cow performance in mid-season

During the main grazing season the objective is to achieve high cow performance from an all grass diet. This will be achieved by allocating an adequate quantity of high quality pasture. With good grassland management the nutritive value of grass can be sustained at a high level during this time (Table 5).

Table 5. Chemical composition of well managed grass (>4cm) from March to November

	Mar	Apr	May	June	July	Aug	Sept	Oct/Nov
Dry matter (g/kg)	179	182	184	182	177	191	165	137
Crude protein	223	222	166	176	169	189	203	228
OM digestibility	838	830	832	816	799	763	794	793

All swards 90-100% *Lolium perenne* pasture (late heading cultivars) managed under 250kg N/ha/yr
March pasture received 60kg N/ha in mid-January; October pasture received last N in mid- September
Mid-season grazing rotations April – July (18-22 days); August- Sept (24-30 days); Oct/Nov (30days+)

Table 6 shows the results of a study carried out in 2007 at Moorepark comparing two different pre-grazing yields grazed at two DM allowances by dairy cows during the April to October period. Cows which grazed daily herbage allowances of 16 and 20 kg DM/cow/day (> 4cm) had resulting post- grazing sward surface heights of 4.2 and 5.0 (low mass) and 4.2 and 5.4cm (high mass), respectively. Highest milk production/cow and milk protein content was achieved with cows grazing the low pre-grazing yield sward and high grass allowance. Mean grazing stocking rates were 4.5 (low pre-grazing yield) and 4.0 (high pre-grazing yield), milk solids production/ha were 13 percent (1,340 *vs.* 1,170) higher for the herds grazing the lower pre-grazing yields compared to the herds grazing the high pre-grazing yields. Grazing swards with lower pre grazing yields resulted in higher grass utilisation, better sward quality and higher leaf content throughout the grazing season, which is reflected in higher overall production.

Previous research at Moorepark has shown that pastures with high grazing pressure in spring/early summer produced swards of lower herbage mass, lower post-grazing height, higher proportion of green leaf and lower proportion of grass stem and dead material compared to swards with low grazing pressure. Increasing post grazing sward surface height above 5 to 6 cm has been shown to result in a deterioration of sward quality in mid and late grazing season. Milk production results showed that pastures grazed to a post-grazing sward surface height of 5.5 to 6.5cm in the May to June period compared to 8 to 8.5cm achieved a higher DM intake (+0.8kg per day) and higher milk production (+1.2kg per day) in the July to September period. Additionally, in the May to June period, there was no difference in milk production per cow from both swards, with the lower post-grazing swards achieving greater grass utilisation through higher stocking rates. Pasture topping can also be used to attain leafy swards and maximise animal performance. On average one round of topping, to a height of 4 to 4.5 cm (to remove the tall grass around dung pads), should suffice from mid-May to late June. Swards mechanically topped to 4-5cm will support higher milk yields (up to 2 kg/cow/day).

Table 6. The effect of pre-grazing yield mass and daily herbage allowance on the performance of spring-calving dairy cows (April to October).

Pre- grazing yield (kg DM/ha)	**1600**		**2200**	
Grass allowance (kg DM/cow)	**16**	**20**	**16**	**20**
Milk yield (kg/cow)	20.0	21.0	20.1	20.8
Milk fat %	4.04	3.94	4.01	3.85
Milk protein %	3.37	3.44	3.37	3.41
Milk solids (kg cow)	1.46	1.57	1.50	1.50
Grazing stocking rate (cows/ha)	4.84	4.5	4.55	4.01
Pre grazing height (cm)	12.5	13.0	15.2	15.7
Post grazing height (cm)	4.2	5.0	4.2	5.4

Autumn grazing management

Generally, in autumn grass supply is not limiting and the aim should be to maximise its proportion in the diet of the cow. The primary objective, up until late November, should be to provide access to grazed grass for lactating dairy cows as a number of studies at Moorepark have shown that grazed grass is superior in feeding value compared to grass silage as no milk production benefit (Table 7) is observed when low or moderate levels of good quality grass silage (72 percent DMD) are added to the diet of the late lactation dairy cow (mid-September to late November).

Table 7. Effects of supplementing grazed grass with silage or concentrates on milk production performance of spring-calving cows in late lactation.

	Grass only	Grass + 2kg Silage	Grass + 4kg silage	Grass + 2kg Conc	Grass + 4kg Conc
Milk yield (kg)	11.3	11.2	10.5	12.9	13.9
Fat (%)	4.18	4.17	3.98	4.15	3.94
Protein (%)	3.77	3.73	3.69	3.64	3.84
Lactose (%)	4.43	4.37	4.36	4.46	4.51
Weight gain (kg/day)	0.08	-0.006	0.29	0.38	0.42

A more recent study has shown that if sufficient grass is available a high grass allowance (approximately 20-22kg DM/cow/day) should be offered, this sustained a milk yield of 15.5kg (1.24kg milk solids). In a limited grass supply scenario, a lower grass allowance of 17kg DM/cow/day in combination with 4kg DM/cow of concentrate resulted in cows yielding 18.3kg milk (1.4kg milk solids). The recommendation for autumn grazing management is to target grazing by day and night until grazing ceases in late November. If grass supply or quality is low concentrate is an ideal supplementary feed.

Ryegrass cultivars

Grass variety also has a large effect on sward quality. Early and intermediate heading varieties, which produce seed heads from May onwards, result in greater proportions of stem in the sward than later heading varieties, this ultimately reduces grass digestibility. Recent research has shown that some varieties have a greater propensity to produce seed heads regardless of management when compared to varieties of similar heading date. Thus caution should be exercised when choosing a seed mixture. In an experiment comparing diploid and tetraploid varieties from both intermediate and late heading maturity groups the later heading varieties produced on average 190kg/cow (40 gallons/cow) more milk than their intermediate heading counterparts. Most of this extra production came from swards which had higher intake potential, better sward quality and utilisation characteristics (Table 8). Tetraploid varieties have high DM yields and a large leaf, however they have an upright, open growth habit and therefore they should be combined with high density and highly digestible diploids to avoid invasion from weed grasses which will result in a decline in sward quality. In general, tetraploids should not comprise greater than 35 percent of a seed mixture.

Table 8. Effect of heading date and grass ploidy on milk production and grass dry matter intake over a two-year period.

	Inter Diploid	**Inter Tetraploid**	**Late Diploid**	**Late Tetraploid**
Milk yield (kg)	24.8	25.2	25.7	26.8
Fat content (g/kg)	37.6	39.2	38.5	37.4
Protein content (g/kg)	33.6	34.9	34.1	33.7
Bodyweight (kg)	580	575	581	584
GDMI	18.3	18.2	18.1	19.4

Moorepark pasture management system guidelines

For the purposes of describing grassland measurement guidelines, the grazing season can be divided into three critical management periods.

Autumn/Winter (1 August to housing)

Spring – first rotation (turnout to 15 April)

Main grazing season (20 April to 1 August)

For the purposes of making use and putting into practice this section of the paper, every dairy farmer needs to walk their grazing area frequently (at least weekly) and estimate the amount of DM on the farm. This is a skill, and like every skill, is developed over time. The farmers who have developed this skill are now reaping the rewards of sustained progress with efficient grassland management and measurement. Looking to the future, the skill of grassland measurement is crucial for dairy farmers committed to profitable futures.

Autumn/Winter (late August to December)

This is the start of the grassland season. The aim of this period is to maximise the amount of grass utilised in the period September to December, while at the same time finish the grazing season with the desired farm grass cover. The decisions made on the farm during autumn will have a major impact on the success of the farmer at extending the grazing season into the autumn as well as increasing grass availability next spring and deciding when the herd can be turned out to pasture. It is essential that a grass budget be prepared to set the targets for the amount of grass that is required on the farm from August through to April of the subsequent year.

The farm specific factors requiring consideration when making such decisions at this time of the year include: the stocking rate, growth rates, calving pattern and expected length of the grazing season. As a guide for dairy farmers, Table 9 illustrates key target grass covers for a farm stocked at 2.5 cows per hectare, growing 15.5 tonnes of grass DM per year, with a mean calving date of 10 February and a grazing season extending from early February until late November. The targets described are based on the entire grazing area being available in late autumn and early spring with first cut silage taken on 40 percent of the farm on 25 May from silage ground closed since 10 April.

Table 9. Target grass covers for autumn and spring.

Date	Stocking rate	Target average farm cover	Target cover per cow	Event
	(LU/ha)	kg DM/ha	kg DM/cow	
09/08	2.5	848	342	
27/09	2.5	1232	492	Peak cover- demand passes supply
15/10	2.5	1100	440	First paddock closed for winter
15/11	2.5	650	262	Supplement introduced
22/11	2.5	560	224	House by day and night
07/02	2.5	661	264	Cows out to grass by day
14/03	2.6	880	342	Cows out full time
09/05	4.2	900	215	Supply exceeds demand

For those operating under different conditions (stocking rates, growth rates, calving pattern and grazing season lengths), it will be necessary to adjust the feed budgets and target covers. The realisation of these targets may require feed supplementation in years of poor growth or at times of poor grazing conditions. For those operating on calving patterns that are more spread out through February, March and April, or at lower overall stocking rates, an earlier spring turnout date than that shown will be achievable. It will also be possible at lower stocking rates to maintain the herd at grass for a longer period in autumn. The objective of budgeting grass in this manner is to provide adequate grass to the herd, while having sufficient grass to maintain the herd at pasture late into the autumn.

The following key objectives should be used during the Autumn/Winter:

- Rotation length should be increased from 24 days in mid-August to 40 days in mid-September to build the farm cover.
- Highest farm cover should be achieved in mid to late September at which point a cover of up to 1,250kg DM/ha is manageable. (On wetter soils this target needs to be adjusted downward based on the length of the grazing season).
- The first paddock stopped for the spring should be closed on 15 October, in later regions closing may begin earlier as this will compensate for lower subsequent autumn and spring growth. Isolate some suitable dry paddocks for early grazing. Most of the herbage available for grazing next spring will be the grown once these paddocks have been closed.
- Each one day delay in closing from 10 October to 11 December reduces spring herbage mass by 15kg DM/ha.
- Aim to have at least 60-65 percent of the farm closed by the end of the first week of November.
- All paddocks should be grazed to a post-grazing residual cover of 100 - 200kg DM per ha during the last rotation to encourage winter tillering.
- Avoid reducing the farm cover below 500 kg/ha in autumn or re-grazing pastures that have been closed.
- Budget for 5-10kg of over winter growth from the time the farm is completely closed in December once all the above have been completed.

Spring (February to late April)

The provision of early spring grass

Closing date in the autumn, timing and level of spring nitrogen are the two most important management factors influencing the supply of grass in early spring. Date of first spring nitrogen application will largely depend on location and soil type. On free draining soils in the south of Ireland initial spring nitrogen application should commence from mid to late January. The optimum date for initial spring nitrogen in the central half of the country is early/mid-February, while in the northern region will be late February. A recent three-year study at Moorepark obtained a response of 16 kg DM/kg N in early March to nitrogen applied in mid-January. The initial application should be applied at a rate of 30kg N/ha, with a second application of 30 to 50kg N/ha in early March depending on grass requirement. Urea is just as effective as CAN for early grass, with the advantage that it is less prone to leaching and has a lower cost per unit of nitrogen.

The aim at this period is to achieve equilibrium between the objectives of maximising the amount of grazed grass in the cows diet while at the same time having a farm grass cover of >850 kg DM/ha by late April. The management factors that will have the largest influence on the quantity of grazed grass consumed/cow over this period are stocking rate, calving pattern, autumn closing cover, silage ground availability and spring nitrogen. With very variable spring grass growth rate, weekly monitoring will be required and actions must be taken quickly to achieve targets. Preparing a budget to ration grass supply to the dairy herd during the first rotation will facilitate early grazing. Early grazing is further facilitated by grazing a proportion of silage ground twice (immediately at turnout and again in early April) before closing this area for silage. During the first rotation, it is desirable that paddocks be grazed out to a target post-grazing height of 4 – 4.5cm during the first rotation.

The following key targets should be used during the spring:

- A farm cover >650 kg DM/ha in mid-January (with paddocks closed in rotation from mid-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 between the 10 and 20 April.
- Target post-grazing height of 4.5cm 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.

Main grazing season (May to August)
The objective over this period is to achieve high cow performance from almost a complete grass diet. Animals must be supplied with adequate allowances of high quality pasture during the breeding season to achieve good conception rates. In general, grass supply is not restricted on farms from late April onwards with good management.

Grassland management guidelines for this period are:

- Farm grass cover should be maintained at 180 to 200kg DM/cow on the grazing area during the main grazing season.
- Using normal grass growth rates, a stocking rate of 4.2 cows/ha from mid-April to early June is sufficient to adequately feed cows at pasture.
- Pre-grazing yields should be maintained at 1,400-1,700kg DM/ha to ensure that post grazing height targets are achieved.
- Where pasture quality is good, post-grazing heights of 4.5 - 5.0cm are achievable without detriment to animal performance
- Pastures with high post grazing residues (>350kg DM/ha)/high post-grazing height (>7.5 cm) should be topped.
- Avoid grazing excessively low pre-grazing heights as this will result in inadequate animal intake and reduced animal performance.
- Use grass measurements to identify grass surpluses and deficits.

Future grass selection criteria and strategies
The parameters which grass breeders select on today will determine the nature of the material available for grazing in future years. Plant testing has the capability to drive plant breeding towards specific objectives, by introducing new test parameters or shifting importance from one parameter to another. Changes to the methodology of assessment should continuously be considered in view of new research findings and changes in economic environment. With this in view there is a requirement to now rank grass cultivars with an economic evaluation index. To assign economic values to the traits of importance and let these traits come to the fore front in the compilation of a recommended list.

A major objective of grassland research is to develop a grass selection index for grass varieties. Existing grass variety evaluation protocols (i.e., recommended lists) rank varieties on the basis of yield and ground cover score. This provides farmers with limited information with which to make economically important decisions. For example, sufficient grass in early spring is best achieved with varieties that have good over-winter growth, however these varieties may be of poor quality mid-season. The objective of this work is to derive economic values for grass varieties based on yield (seasonal and total) and quality, appropriate for the grazing and silage production needs of dairy production systems. These values will be used to rank the relative economic merit of different varieties. Similar to the EBI for bulls, this grass selection index will allow farmers to choose the varieties most suited to their system and ones which will have the most economic impact. The study has just been initiated at Moorepark; the work is being carried out in collaboration with the Department of Agriculture, Fisheries and Food and will be of major importance in the pursuit of increasing productivity from grazed grass.

Animal performance characteristics

The nutritive value of herbage gives an indication of its potential value to grazing animals but its feeding value (nutritive value × intake) is of most importance. Grass based systems in the future will be required to achieve higher animal performance from grazed grass over a longer grazing season. This will result in increased importance in characteristics such as high DM intake, maintenance of digestibility during primary growth, high nitrogen use efficiency and high nutritive value.

Sward structure

Sward structure is an important quality aspect of grass in relation to DM intake. Sward structure includes herbage mass, sward surface height, bulk density, tiller density, morphological and botanical composition and textural characteristics such as shear and tensile strength. Differences in sward structural characteristics and subsequent animal performance between grass species are well recognised, but more recently differences have also been found among perennial ryegrass varieties (Gately, 1984; Gowen et al., 2003). Wade et al., (1989) first concluded that herbage availability increased with higher proportions of green leaf in the bottom of sward when animals cease grazing. Peyraud et al., (2004) showed daily allowance of green leaf to be a better predictor of DM intake than daily herbage allowance. In a study currently being carried out at Moorepark, Melle an old outclassed variety, out performed all current newly bred varieties in the production of green leaf during the main growing season. Similarly, Melle achieved the lowest extended tiller height and pseudostem height, which are sward characteristics that promote high DM intake. The challenge for the future will be to develop swards through grass breeding that will maintain high DM intake (high leaf swards) while at the same time result in low residual sward height.

Nutritional factors

Assuming perfect herbage allowance and management conditions, feed intake in ruminants is most likely controlled by both physical and physiological factors. Physical factors include the cow's rumen capacity for DM or fibre. Physiological factors include end products of rumen fermentation and intestinal digestion. It is generally believed that as energy density increases and fibre content decreases, physical factors pose less constraint on feed intake and physiological factors become more important. The digestibility of forages and rumen fill are strongly related to the cell wall content and lignification of the cell wall. A perennial ryegrass cultivar with lower cell wall content and higher WSC content will result in a higher digestible DMI and milk production.

Seasonality of DM production

High peak DM production in May/June with little emphasis on early spring/late autumn DM production was an essential characteristic of systems of animal production based on high requirement of conserved grass silage. However, in recent years with the advent of earlier grazing in spring and later grazing in the autumn characteristics such as early spring and late autumn DM production have become much more important with reduced requirement for high peak DM production in May/June. The feed budget in the Moorepark Blueprint for efficient milk production in the south of Ireland now consists of approximately 75 percent grazed grass, 20 percent grass silage and five percent concentrate. This indicates that characteristics that are important for breeding grass for grazing are much more important than that for silage production. High peak DM production in mid-season may only result in sward quality problems resulting in reduced animal performance i.e., low milk protein content. This was evident in recent years with a large increase in use of late heading varieties in preference to both early and mid-season heading varieties. In 1998/99 late, intermediate and early heading varieties comprised of 65 percent, 30 percent and five per cent of total sales; while in 2004/05 late, intermediate and early heading varieties comprised of 80 percent, 20 percent and less than one percent of total sales. Winter and early spring DM production provide the opportunity to increase the grass feed budget further. A recent study in Moorepark compared the over winter growth of a range of grass cultivars which were closed in autumn and harvested the following spring. A New Zealand bred cultivar Bealey recorded on average 30 percent higher out of season production than many European bred cultivars, the next best cultivars were Greengold and two new cultivars Dunluce and Tyrella. The question remains whether these cultivars compromise mid season quality because of this out of season growth. We are currently processing these samples for chemical quality at Moorepark.

Table 10. Effect of variety on winter and spring grass growth

	Bealey	Dunluce	Greengold	Lismore	Navan	Tyrella
DM yield Feb (kg)	1,114	532	667	369	569	566
Winter growth to Feb(kg/day)	9.8	4.5	5.5	3.2	4.7	4.8
DM Yield Mar (kg)	1,954	1,304	1,226	1,206	1,214	1,262
Winter growth to Mar (kg/day)	13.8	9.0	9.2	8.5	8.3	8.8
DM yield Apr (kg)	1,407	1,208	1,194	1,157	1,043	1,266
Spring Growth (kg/day)	32.1	27.6	26.4	26.9	23.8	28.6

Conclusion

There is considerable scope to improve animal performance from grass-based systems. Efficient exploitation of grass by grazing will require the development of grazing systems designed to maximise daily herbage intake per cow while simultaneously maintaining a large quantity of high quality pasture over the grazing season. Grazing systems will not be limited during the two to three months of peak DM production as high animal performance from pasture will supersede high animal performance per hectare. Daily grass intake will be maximised by adhering to important sward characteristics such as maintaining a high proportion of green leaf within the grazing horizon and allocating an adequate daily herbage allowance. The challenge for the future will be to develop swards through management and grass breeding that will maintain high DM intake while at the same time result in low residual sward height. Likewise in the future the cow genotype must be compatible with the milk production system. The development of reliable easy to use decision support tools that facilitate increased reliance on grazed grass to be used by farmers and extension services will contribute to optimising grazed grass based systems of milk production.

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Grass Budgeting – Driving Profit

Richard O'Brien, Teagasc, Kilkenny

Summary and conclusion

- The analysis of 2006 Profit Monitors in Kilkenny indicated that one tonne of extra grass dry matter utilised was associated with €187 extra profit.
- Preliminary analysis for the grass group members suggests that grass dry matter utilised increased by an average of 0.4 tonnes DM/ha in 2007 and this could be worth an extra €3,400 per farm.
- The opportunity exists for many other dairy farmers to learn how to measure grass and budget with the help of Teagasc advisors, Discussion Groups and other farmers.
- Further improvements are possible. Stocking rate increase facilitated by REPS4 may fast track grass dry matter utilisation. Further milk solids yield increase will continue as opportunities to increase milk production arise over the next number of years.

Introduction

Grass, the cheapest feed available to Irish dairy farmers, grows well in Ireland. Research shows that potentially 12 to 16 tonnes of dry matter (DM) can be grown on well fertilised pasture over a long growing season. With the trend towards even higher silage and feed costs, it makes sense to maximise the role of grazed grass in the diet of the dairy cow to reduce feed costs and improve profit. However, grass is not without its own challenges centring on its variable growth pattern and the speed with which its quality declines if not grazed at the optimum stage. National Farm Survey data suggests that only seven tonnes of grass DM/ha are utilised on the average farm – well short of the potential 11 to12 tonnes of grass DM/ha utilisation being recorded at Moorepark.

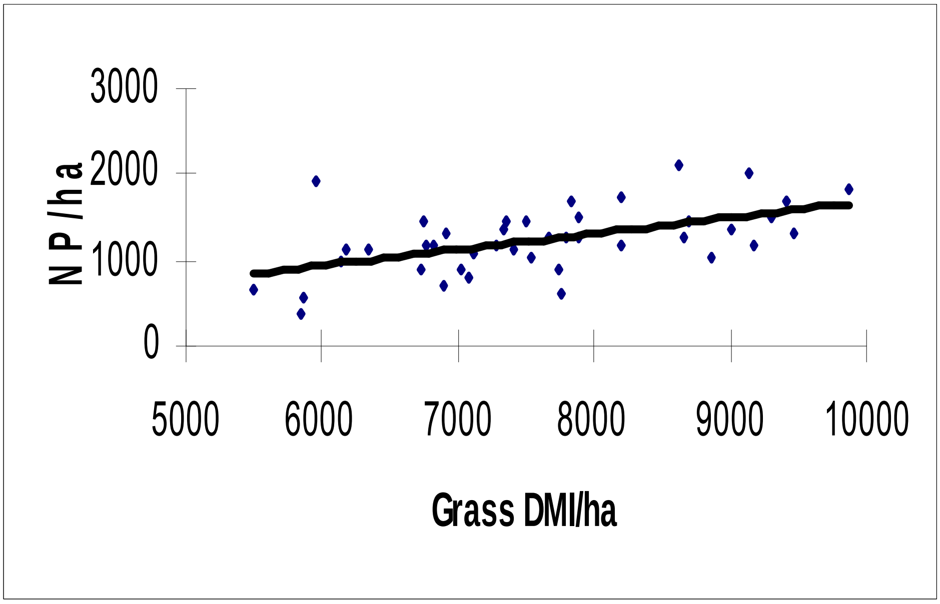
A key technology identified to take the guesswork out of grassland management on dairy farms is grass budgeting. Grass budgeting is the name given to the process of calculating the grass demand and supply balance on a farm over a period of time. Grass budgeting gives you the opportunity to promptly identify emerging grass surpluses or deficits, to optimise utilisation and to reduce meal and fertiliser costs.

In this paper, I discuss why Kilkenny advisors initially became involved in grass budgeting, what we did, and review some of the preliminary results emerging from our endeavours. In a companion paper, Fabian Jacob, a member of the Power Grazers group, a group I established to train farmers in grass budgeting, will outline the benefits of grass budgeting to him.

Why we became interested in improving grass utilisation in Kilkenny

Over 40 Profit Monitor reports for 2006 from spring calving County Kilkenny dairy farms were assembled. Using the milk production, concentrate input and stocking rate information contained in the reports we were able to calculate grass DM utilisation per hectare. The data presented in Figure 1 presents the results for the 42 spring milk producers involved in the study. Each dot in Figure 1 represents one farm and shows the net profit per hectare (€) and grass dry matter intake (kg DM/ha) per dairy hectare on that farm.

Figure 1. Relationship between net profit per hectare (€) and grass dry matter utilisation (kg DM/ha) on 42 County Kilkenny spring milk farms.



Statistical analysis of the data in Figure 1 suggests that a one tonne increase in grass DM utilised per hectare is associated with an increase in net profit of €187. The trend is evident from Figure 1. The black line in the graph is the trend line and shows a constant and linear rise as grass DM utilised per hectare increases between approximately 5.5 and 10 tonnes of grass DM on the County Kilkenny dairy farms. This finding was the evidence my colleagues and I needed to initiate a number of grass budgeting courses in the county.

The 'Power Grazers' Group

In May 2007, I set up a grass budgeting group called the Power Grazers. A second grass budgeting group was established by other advisors in the county. My group comprises of 15 members from different dairy discussion groups in North Kilkenny. The purpose of this group was to train members to become familiar with grass measurement and budgeting. Ultimately such knowledge would help them to improve grass utilisation on their own farms. The target covers the group used over the year are set out below in Table 1 and used as our targets for each meeting during the year.

Table 1: Target farm cover (kg DM/cow) used by the group in different periods of the year.

	Target Cover/Cow
August	350
September	500
November	250
February	250
March	350
April - July	180-200

The group met every two weeks on the host farm. The management decisions taken on this farm were typical for all farmers in the group. The key figures discussed at each meeting were:

- Average farm cover
- Cover/LU
- Pre grazing yield
- Demand/ha
- Growth/ha
- Rotation length

The growth rate was calculated on the host farm for every week and we also used the data from the monitor farms in Kilkenny. It took us 35 minutes to walk the farm and 25 minutes to calculate the figures. The grassland data emerging from the two monitor farms in Kilkenny were published weekly in our local newspaper, the 'Kilkenny People'. This information proved useful for the county's dairy farmers for comparison with their own grass position.

Results

We analysed the data from 16 of the participants in the grass groups to establish what changes, if any, had occurred in grassland utilisation during the year. In doing so, we compared 2007 performance with milk production and grass utilisation data for 2005 and 2006. Glanbia facilitated the milk solids information for the January 2005 to September 2007 period. Meal input levels and stocking rates were obtained from either Profit Monitor reports or from the farmers' own records. Estimates of milk solids production for the October to December period were derived using the average milk solids yields for the same period in 2005 and 2006. Concentrate use for 2007 was obtained from the members own records and projections. A summary of the key trends over the 2005 to 2007 period is presented in table 2

Table 2: Farm physical, milk production and grass utilisation trends for the 2005-2007 period on the 'average' farm of 16 County Kilkenny participants in the grass budgeting course.

	2005	2006	2007 est.
Stocking rate (LU/ha)	2.16	2.09	2.09
Meal input (kg/cow)	439	652	366
Milk solids (kg/cow)	**326**	**361**	**359**
Total DMI (t/ha)	9.0	9.1	9.1
Grass DMI (t/ha)	**8.1**	**7.8**	**8.4**

Stocking rate declined slightly between 2005 and 2006 by 0.07 LU/ha and is likely to remain the same in 2007. A number of group members joined REPS, hence the decline in stocking rate. Meal input rose substantially in 2006 compared to 2005. Kilkenny experienced a severe drought during the summer of 2006. The group reported a decline in meal input again to more 'normal' levels in 2007 despite a wet June and July. Compared to 2005, milk solids yield increased by approximately 30kg/cow between 2005 and 2006. This yield increase is likely to be sustained in 2007 despite a decline of approximately 300kg/cow in meal input. Grass utilised per hectare declined by 0.3 tonnes DM/ha between 2005 and 2006 but is expected to rise again to 8.4 tonnes DM/ha in 2007.

Financial reward

An average of 43 hectares was assigned to the dairy enterprise on members' farms in 2007. The data in Table estimates the increase in grass DM utilised per hectare against that used in 2005 and 2006 and the likely financial benefit accruing as a result.

Table 3: Additional grass utilised per farm and likely financial benefits accruing to group members in 2007 compared to 2005 and 2006.

	2005 vs. 2007	2006 vs. 2007	2 year average
Extra grass utilised (t DM/ha)	+ 0.3	+ 0.6	+ 0.4
Total tonnage (t DM/farm)	+ 13.1	+ 23.8	+ 18.4
Value (at €187/t DM)	+ €2,447	+ €4,443	+ €3,445

The data in Table shows that there was considerable variation in the amount of additional grass DM utilised/ha between the years. Compared to 2007, the average increase in grass DM utilised per hectare was 0.4 t DM/ha or 18 tonnes DM in total on the land assigned to the dairy enterprise. Assuming that each additional tonne of DM is associated with €187 additional net profit this suggests that the net profit improvement associated with the increase in grass utilisation could be worth an average of €3,445 per group participant. Possibly, some of this may be attributed to grass budgeting and consequent improvements in grassland management.

Benefits of Grass Measurement and Budgeting To Me

Fabian Jacob, Kilkenny Dairy Farmer

1. Farm Profile:

Thirty-three ha owned and 30 ha leased. The farm has a heavy clay soil and rises to 900ft above sea level.

Milk Quota is 336,400 litres. Fifty-six cows yielding 6,530 litres @ 3.82 percent fat and 3.45 percent protein giving a total of 489kg of solids per cow in 2006. All calves are reared with males now being sold at 19 months and heifers calved at two years. Surplus dairy stock are sold after calving. AI is used on all the herd and has been for the last 25 years. Herd EBI is €71.

Milk recording is done every six weeks. Calving begins the 1 February with 86 percent calved in six weeks in 2007 and the same is projected for 2008.

Grass Measurement began in September 2006.

Cost Control Planner has been used for the last four years.

The farm went into REPS 3 in October 2006.

2. Planning for early and late season grass

Using measurement and budgeting of grass has enabled our herd to go to grass as they calve from early February. We always aimed to have cows out early but without planning it did not always work out. A planned approach to autumn grazing that closes paddocks from the first week of October and finishes when you reach an average farm cover of at least 500kg DM/ha sets up the farm for early spring grazing. In the spring of 2007 the cows were out day and night two weeks earlier than 2006. Two reasons for this:

1. Better autumn plan in 2006.
2. Measurement of grass in the spring of 2007 gave confidence to let cows out day and night and not be afraid of running out of grass.

3. Mid-season management

Grass is like any perishable product, it has a best before date. However, unlike a product on a shop shelf it is not stamped on it. You must walk and measure to know when it is time to use it. It is the most difficult time of year to manage grass and as a result many of us have seen milk solids drop in June, July and August.

This year by using two target figures (1) ideal grazing cover = (Demand x Rotation + Residual) along with farm cover per LU. I maintained a better quality pasture resulting in better solids and at a reduced cost as less fertiliser was used.

Our ideal grazing cover works out at around 1,200kg DM/ha. (D = 48 x Rotation 22 days + 150 residual). A farm cover of between 180 – 200/LU seemed to be sufficient. By having these figures, surpluses and deficits could be identified and dealt with quicker.

4. Target covers

Target Covers make the measurements on your farm relevant.

Average Farm Cover (AFC) = total tonnage of dry matter of grass on your grazing area divided by the area in hectares.

Cover/LU = AFC divided by your stocking rate on the grazing area.

Demand/ha = the amount of grass DM that is required each day divided by the area being grazing e.g., 50 cows @ 18kg = 900kg divided by 15ha grazing area gives a daily demand of 60kg.

Ideal Grazing Cover = the amount of grass that should be on a paddock for grazing based on rotation length and what is left behind after grazing. For example D = 60, Rotation Length 22 days, Residual 150, gives an ideal grazing cover of 1,470kg DM/ha.

These are some of the terms relating to grass covers that I have found most useful and I have said previously having a target ideal grazing cover linked with cover per L.U. will help you make better decisions resulting in better quality grass, improved constituents, less topping and reduced inputs. Take the guess work out and apply the science to your grass management.

5. Join a grass based discussion group

Your commitment to grass measurement will be tested at different times during the year and this is where your discussion group meetings help. The meeting held every two weeks keeps you focused on making sure you stick with it. The practical side of dealing with surplus or deficits in grass or with poor grazing conditions will also be dealt with.

6. The Importance of the weekly walk

Walking the grazing area weekly gives a visual idea of grass supply. Measuring the grazing area gives the figures to make good decisions. A one hour walk plus 10–15 minutes on the computer gives the information needed to decide on N applications, meal feeding or not, taking out paddocks for silage etc. This year our farm spent €2,200 less on fertiliser and €2,300 less on meal for the cows. The majority of this saving has been achieved by making better decisions with the information gained from grass measurement. Other benefits from the weekly walk are spotting water leaks, broken stakes, grass varieties that under perform, etc.

7. The REPS challenge

One of my reasons for getting involved in grass measurement was joining REPS 3. Growing quality grass with reduced N especially in June, July and August needs constant monitoring. Having 'ideal grazing cover' targets, linked with a cover per LU has helped me to keep within the fertiliser limits and at the same time keep quality grass and therefore improved solids per cow. Measuring and budgeting will give confidence in working with lower grazing covers and this in turn results in a better quality grass and improved utilisation.

Planning for an Increased E.U milk Quota

Timothy and Colette Quinn
Castlecarra, Clogher, Claremorris, Co. Mayo

Summary

It is easy to say where I would like to be by the year 2015 in relation to dairying, but to get there will be a different story. By 2015, quota will not be a problem if all the predictions are right, but things can change and nobody can predict the future. Just look at milk price - from an all time low to an all time high in a few months. Farming is like any business. You are producing a product for the market place. Markets change so therefore we must not be afraid to change with them. If you keep doing the same thing the same way then expect the same results. My biggest fear is that I become set in my ways and hold the farm back. With the world's population growing and nature taking its toll on large food producing countries there will be strong demand for food in the future.

In the long term, I see myself milking 200 cows or maybe even more. In the short-term, I need to increase production from the existing herd and breed replacements that can be used when expansion opportunities arise. I think the outlook for dairying is bright and there will be a good living to be made from it. I look forward to a future in farming and to seeing where I will actually be in 2015.

Introduction

I farm on the shores of Lough Carra, Co. Mayo, which is located centrally between the towns of Castlebar, Ballinrobe and Claremorris. I am a full-time farmer, 33 years of age and married to Colette with one daughter, Sarah.

Farm size is 56.7 ha (140 acres) owned, and a further 61 ha (150 acres) is rented on long and short-term leases. The milking platform consists of 28.5 adjusted hectares (70 acres) in one block, which is owned. Herd size is 90 spring-calving cows. It is a very dry farm and ideal for early turnout, which has been on the 1 February by day for the last few years. The rest of the land, which is fragmented, is within a four mile radius. This is used to make silage, keep dairy replacements and a suckler herd of 40 cows.

History

Milk has been produced on this farm since the early sixties. In 1978 an eight-unit herring bone milking parlour was fitted to milk the 40-cow herd. My father milked this herd until he was tragically killed in 1990 by the stock bull. My mother, Maureen, kept the farm going until I finished school and was mature enough to make a decision on what I wanted to do. A farm manager, Barbara McNally, was taken on until I had finished my secondary education. I spent the following year in Mountbellew Agricultural Collage. I then completed a three-month work placement and finally a two-week management module after which I received my 'Green Cert' in 1993.

In 1994, I started as a full-time farmer, milking 45 cows with 205,000 litres (45,000 gallons) of milk quota. Calves were kept on and finished to beef; the premiums were in full swing at the time. Cows were self-fed and drystock were fed outside in a wood. Two cuts of silage were taken, the first in late June and the second in late September. Cows were let out at the end of April, as was typical of most dairy farms in this region. The first thing I did was sit down with my Teagasc advisor, John Lynn, and see what direction to take. It was obvious enough which way to go - increase cow numbers and buy milk quota. As cow numbers increased sheds were required, less silage was being cut around the parlour, land was rented for silage and reseeding was deemed necessary.

Expansion 1994-2007

- **1994** Built three bay double slatted house and silage slab for dry stock on the out farm.
- **1996** Leased 12 ha (30ac) long-term. Applied for second herd number and set up suckling herd.
- **1997** Purchased 32,000 litres (7,000gls) of milk quota.
- **1998** Built slatted house onto existing cubicle house, constructed silage slab.
- **1999** Purchased 45,000 litres (10,000gls) of milk quota and took on 16 ha (40 ac) of grazing.
- **2000** Constructed a new roofed collecting yard with slatted tank, also incorporated calving boxes. Purchased 19,000 litres (4,271gls) of milk quota.
- **2002** Leased 24ha (60ac) with an eight bay slated shed on a long-term lease
- **2003** Purchased 46,000 litres (10,099gls) of milk quota
- **2004** Purchased litres 149,000 (32,737gls) of milk quota.
- **2005** Purchased 46,000 litres 10,147gls of milk quota.
- **2007** Built a 16-unit milking parlour and drafting facility, also a slatted unit with 68 cubicles.

Current position

At present we milk 95 cows with 532,016 litres (117,000 gls) of quota. There are 100 dairy replacements between six months and two-and-a-half years. Suckler herd size is now 45 cows. As the dairy herd expanded we stopped taking silage from the milking platform. Stocking rate on the milking platform is currently 3.3 cows/ha.

Meal feeding level in 2006 was 810kg/cow. This year cows will be out until the 1 November. It has been a great year for grass on this farm as rain is needed all summer to keep the grass growing. I am a great believer in walking the paddocks every week. I walk and measure each paddock and calculate the farm cover, daily demand and growth rate. When I have all my information gathered I then make decisions on which is the next paddock to graze, should I take out a paddock for silage/bales or should I increase or decrease my meal – all depending on the availability of grass.

I start bulling on 25 April, finishing the second week in August. (15-week breeding season). All cows are bred to AI. Cows are injected for BVD and Lepto. Fertility is a major issue on the farm with a high number of empty cows each year. The herd is mainly inseminated to Holstein and for the first time New Zealand straws were used this year. Herd EBI is currently €24, with €19 from the milk sub index and €12 from fertility. Young stock have an EBI of €53, with €37 from milk and €25 from fertility. All male calves are sold. It is a one man operation and I try to keep things as simple as possible.

Table 1 outlines performance form my 2006 Profit monitor. Stocking rate on the milking platform is 3.3 cows per hectare producing 1, 328 kg milk solid per ha at a cost of €2.32/kg solids. Last year the farm produced 37,800 kg of milk solids.

Table 1. Dairy herd performance 2006

	2006
Milking platform (ha)	28.5
Cow stocking rate on milking platform (cows/ha)	3.3
Total Solids (%)	7.09 (3.32 Pr)
Milk Solids per cow (kg/cow)	398
Milk Solids per ha milking platform (kg/ha)	1,328
Cost/kg milk solids	€2.32

Where am I going in the future?

In the past 12 years I have doubled my output; in the next 10 years can I do the same? I am ready to take the next step. I can milk 96 cows/hour after installing a 16-unit parlour; this has been a great investment and has taken two hours off my working day. For the long term, I have set up accommodation for 150 cows. If cow numbers exceed 150, I will require extra slurry storage. I will look at an over ground silo or lagoon. If accommodation becomes limiting, I will look at the feasibility of a stand off pad. The one big hurdle in all of this is the land factor, you can't make it. At the moment all the land around me is being farmed. In the short-term I must concentrate on improvements in herd management. Some of the key areas that need to be addressed are:

- Fertility
- Compact calving
- Grassland management
- To zero graze or not to zero graze
- Labour and time

Fertility
Poor fertility on this farm is costing a lot of money. I am losing out on a lot of milk early in the year and have a high replacement rate. How do I reverse this? I probably focused too much on milk in the past. This year straws were selected on the fertility sub index of the EBI. Holsteins were used but we also introduced New Zealand straws into the system based on fertility sub index. What about Jerseys? I am not ruling them out in the future. I am open to change as more data becomes available.

Last winter during the dry period there was a shortage of head space at the feed barrier. I ran the dry cows through the parlour and gave them 1kg of meal to bring them to a condition score of 3.5. I think it is important to reach this score before calving as the cow's food intake is low for the first few weeks after calving. The cows will have a lot more room this winter so it will be interesting to see results.

In the past I haven't carried out a complete vaccination programme. Vaccines are a must because if you don't vaccinate you can never rule out Lepto or BVD as being a problem. A date will be marked on the calendar this winter and all cows will be vaccinated on that day. To correct fertility I will use high fertility bulls and have good cow condition at calving.

Compact calving
The amount of milk that can be gained early in the year from compact calving is huge. I have taken nine weeks off my breeding season in the past three years; it is now down to 15 weeks. This has resulted in very high empty rates, up to 30 percent. This is similar to the Ballyhaise experience in 2005-2007. This year my empty rate is lower. It is hard to stop bulling when so many cows are repeating and not going in calf. I have been the worst offender myself down through the years, but I am learning. You need sufficient replacements to shorten the breeding season each year; otherwise the temptation is to keep bulling. With a shorter calving period I find it is easier to focus on calving cows, otherwise interest is lost as calving drags on and you have more losses. My target is to start calving on 1 February, limit the calving season to 14 weeks and have 70 percent calved in a six-week period.

Grassland management
I have learned that you can never know enough about grass, the way it grows and how to utilise it. It is the cheapest and easiest feed to grow so why do we get it so wrong? Lack of understanding I think. You can never tell how much grass you have from the tractor seat. You have to get off and walk the paddocks. When I think back about what I used let the cows into I wonder how they milked at all. I was first shown how to measure grass eight years ago when I became a monitor farm by Teagasc. Three years ago Connaught Gold provided a grassland management programme through SWS, I signed up and have been measuring grass growth since on a weekly basis. I submit these figures to the Grass Watch section of the Irish Farmers Journal. I feel I have learned a lot and advise farmers to get involved in grass budgeting

courses and maybe to join a discussion group. When another farmer visits your farm he/she can see clearly what can be improved as an outsider sees things differently.

This is the first year I can see the effects of my grassland management on my milk solids. Now that the co-op tests milk at every collection you receive the results via mobile phone and you can link your proteins to your paddocks. I have found that going into lower covers, (1,400 to 1,600kg of DM/ha) have improved my solids. If I am to increase in numbers, I will have to learn more about budgeting and use grazing techniques such as strip grazing and back fencing, when appropriate. With this in mind I recently attended a Teagasc grass budgeting course. The farm is well laid out with roadways and tracks. This is particularly useful for early spring when ground is wet. Next year I will be able to graze the entire platform without entering in the same place twice. I think my stocking rate can be increased from 3.3 LU/ha on the milking platform up to 4LU/ha.

My target is to produce 450kg milk solids per cow from a grass based system at a stocking rate between 3.5 to 4.0 cows on the milking platform. This has the potential to increase sales of milk solids by over 10,000kgs from the existing milking platform.

Zero grazing

Is there a place for this type of activity in the west? If your back is to the wall regarding land and you want to increase the volume of milk leaving the farm gate, I would not rule it out. My average farm cover fell to 575kg DM/ha on the 1 October this year, it couldn't have happened at a worse time. There was only one solution and that was to bring in grass from outside. I had 10 acres of after grass a mile and a half away from the parlour. I made 10 round bales at a time, did not wrap them and brought them back to the farmyard. As the weather was mild we sacrificed an old paddock and fed the bales to the cows at night in round feeders. I was using five bales a night and found that by cutting any more than 10 bales at a time the grass began to heat. This exercise cut the daily demand by half and allowed me to build up covers again. The grass lasted for two and a half weeks and covers went back up to 800kg.

All our silage ground is within a three mile radius. In future I might plan for a third cut, but instead of pitting it, feed it fresh and extend my grazing. This would allow me to carry more cows and not be under as much pressure at the back end of the year when growth slows down. With the way milk price has increased it may well be a realistic way of bringing extra ground into the grazing rotation.

Over the next few months I will examine how cost effective and labour efficient this system could be for my dairy herd.

Labour and time

My farm at the moment is a one man operation and I am quite happy for it to remain so. If I am being realistic I think the sucklers will have to go because of poor margins. I would be a lot better off to concentrate on my dairy herd. I find it easer to calve the 90 dairy cows than the 40 sucklers. I have no doubt that I would manage 150 to 160 dairy cows on my own. We seem to have less time for jobs like fencing and reseeding these days so rather than take on labour, I will contract out these jobs. The work will be done faster, with no machinery to fix or maintain. I like to think of this as intelligent farming rather than lazy farming. Just a word about machinery, I was once machinery mad, but thank God I have made a full recovery. I don't think it's a great investment, with the cost of maintenance and replacement. You are better off getting a contractor and when he is finished wave goodbye to him and his troubles.

I try to keep my farming between 7.30am and 7.00pm or sometimes 6.30pm. These are the times that allow me spend most time with the family during the day. There will be times when this does not happen, but try to stick to your routine as much as possible. If dairying can be managed within reasonable hours, it is an attractive career for young people to enter and there is a better living to be made than ever before. The days of milking cows at nine or ten o'clock at night are gone; if dairying is to survive the hours kept will have to be adjusted.

I am a big fan of modern technology, especially if it means cutting out work e.g., calving cameras, automatic scrapers, auto drafting, auto wash on milking parlour, something that is working away while you are doing something else. These all help to save that precious resource known as time. I have been farming on my own now for 13 years and have enjoyed it all. I am 100 percent committed to dairying in the future and look forward to bright and prosperous years ahead.

Planning for an Increased EU Milk Quota

Seamus and Monica Quigley
Ballydoogan Estate, Loughrea, Co Galway

Summary

- Dairy farming will deliver a good living into the future for those who plan for it.
- The time to expand is now. We have a limited window of opportunity.
- Milk quotas should be removed now.
- Farmers must exploit our competitive pasture based system of farming. This offers the most sustainable profits going forward.
- A lot of grass can be grown and utilised in the midlands and west of Ireland.
- There are immediate opportunities for expansion in the west.
- High EBI dairy replacement stock will limit expansion due scarcity.
- Take home point - maximise high EBI replacements on the ground and you will be well paid for them in the coming years.

Introduction

Monica and I farm at Ballydoogan Estate, Loughrea, Co Galway. We have a 20-year lease agreement with the owners of the estate. We currently milk 350 cows and keep 270 replacement stock. The herd is 100 percent spring-calving to grass. We have four children Michael, Claire, Orlaith and James and live on our home farm in Tipperary.

My Background

- 1982 – 1986: Attended agricultural college and completed FAB Trainee farmer scheme. Worked on home farm.

- 1989: Inherited 26 hectares (ha) from my grandmother near Nenagh in Tipperary and started farming on my own. I started out with no stock, no quota, and no money.

- 1990: Borrowed heavily to finance transfer of farm, constructed a milking shed and calving facilities, purchased 30 spring-calving cows, and leased 28,500 gallons of milk quota. I started milking that spring. Joined Damer Discussion Group that year (17 good farmers and facilitator) – very significant for me for mentoring and bouncing ideas off others.

- 1991-93: Reseeded most of the farm and put in roadways and paddocks. Milked 85 cows in 1993 and relied on getting a lot of temporary leased milk.

- 1993: I visited New Zealand – it was very motivational and eye opening to see what could be achieved. My thought-process changed as a result of that trip.

- 1994-95: Leased two farms within a four mile radius (35ha with 70,000 gallons milk quota). Now milking 130 cows on 26ha (5 cows/ha on milking block) milking platform.

- I started to zero graze grass from outside blocks of land. I found this to be time consuming, hard on pasture quality, made the cleaning out of the grazing pasture more difficult, and was an added expense. I also joined the Blackwater Discussion Group; 20 very good farmers with close links to dairy research at Moorepark.

- 1996: Reduced cows to 110 (4.2 cows/ha on milking block) and started looking actively to lease a large block of land suitable to milk 200 plus cows.

- 1998: Negotiated a 20-year lease with the owners of Ballydoogan Estate, Loughrea, Co Galway (200ha gross area). This farm was described as a cold, late, wet farm. However, it was a large block of land with no public roadways dividing it. A joint capital package was agreed with the owners to develop the farm. (Note: commuting from home to farm was 50 km each way).

- 1999: In the spring Iinstalled a 26-unit milking shed, milk tank, roadways and paddocks. Milked 180 cows that year.

- 2000-2007: Reclaimed and reseeded most of the farm. Lifted cow numbers to 350 and purchased various milk leases totalling 1.2million litres. Became a member of The Grazing Musketeers this year (pasture management group with focus on grass production and utilisation).

Recent Production

Table 1 outlines recent production data for the farm. Milk solids produced last year were 435 kg/cow which was 922kg/ha. This figure has increased each year as drystock is removed from the 155 ha milking platform.

Table 1. Production data from the 155 hectare milking platform for 2003 to 2007 and target for 2010

		2004	2005	2006	2007	2010 target
		202	216	224	224	255
Milking platform (ha)	125	130	130	135	135	155
Cows	300	310	318	345	350	430
MS produced (kg)	106,000	115,000	116,000	143,000	152,000e	202,000
Cows/ha (on milking platform)	2.4	2.38	2.44	2.55	2.7	2.8
Milk Solids (kg/ha)	820	800	897	1084	1175	1300
Grass utilised on milking platform. (t/ha)	--	--	--	8.9t	10.7t	12.0
Milk Solids/cow	342	336	368	425	435	460
EBI (milk/fertility)	-	30	35 (17/19)	47 (22/29)	58 (23/46)	80+ (40/40)
Common cost/kg* MS	€1.50	1.26	1.40	1.57		1.50

*Common cost excludes labour, land leased and quota lease.

Future Plans

My plan is to develop a low cost pasture-based system with focus on profit/ha. My short-term target is to sell 1,300 kg of milk solids per hectare from the milking platform. I aim to achieve this within three years by working to my written five point plan.

Five point plan

1. **Grow 14 tonnes grass DM/ha.**
   - Lift soil fertility as recommended in latest test report
   - Reseed all remaining pastures within two years
   - Improve pasture management through continued measurement

2. **Increase hectares on milking platform**
   - Increase milking area by 20 hectares through reclamation (mostly completed 2007)

3. **Milk 430 cows**
   - Milk 410 cows 2008
   - Milk 430 cows 2009
   - On 155 ha platform this will be a stocking rate of 2.8 cows/ha
   - Use 2.5 paid labour units, efficient milk shed (44-unit herring bone planned 2008)

4. **Sell 460kg MS/cow**

- Target 460kg MS sold/cow over next three years on less than 500kg meal (410kg MS sold 2007 on 530kg meal)
- Use high EBI bulls with + 15kg PD for protein
- Improve mid-season production with better grassland management
- Sell lower milk solid cows as surplus stock
- Start calving 10 days earlier (1 Feb)
- Maintain tight calving pattern (86 percent calved in six weeks 2007)
- Reduce replacement rate to 18 percent

5. **Target of 200 (minimum) high quality replacements reared annually**

- 100% cows bred to AI sires (no stock bull used on cows since 2006)
- 100% cows bred to dairy sires (started 2007)
- Sell 120 high EBI surplus heifers or cows annually

I am confident that when I achieve these goals I will have a robust farm operation that will withstand a fluctuating milk price going forward. High MS/ha output with low cost, delivering a high profit with a good quality of life is what I am after.

Lessons learned along the way

- Failed to plan properly early on
- Bought the wrong type of cow
- Chased cows and milk rather than profit
- Didn't breed enough replacements early on
- Over capitalised on a small farm
- Didn't negotiate best deal with banks
- Treat people with respect and trust and it will be rewarded
- Knowledge is king - from groups, friends, travel, professionals - just go and get it
- Debt keeps you focused

Future dairy industry as I see it

I believe that not since I started farming 20 odd years ago have the opportunities for dairy farming been so good. This is not a conclusion I reached this year with the increased milk price, but one I've held for the last number of years.

Ireland has a major natural competitive advantage over most of the world. We can grow a lot of cheap feed in the form of grass and utilise this efficiently with proper cows and infrastructure. Now with quotas ending, there are huge opportunities for dairying in this country. As beef farmers incomes continue under pressure from declining farm gate prices and their single farm payments are eroded by inflation and cuts or abolishment, land will become available for dairying. With the possibility to expand in dairying I believe young people will take up the opportunity to do so. I believe most of this expansion will take place in the midlands and west of Ireland, where dairy farmers will have less competition from tillage farmers for land. This can have a major positive impact on rural Ireland. I heard somewhere lately that dairying is 25 times more profitable than beef farming. A greatly enlarged dairy sector would give a major boost to the local and national economy. Dairy farming will deliver a good income to those who plan properly and are technically adept.

While as dairy farmers we have had a very welcome increase in milk price, it is unlikely to remain at this high level on an ongoing basis. Dairy farms will have to operate on a larger scale with super efficiencies to prosper going forward. Remember the Single Farm Payment is only there for five more years. How do we replace that income? Also, our old enemy inflation is working against us all the time.

Since I started farming in 1990 I have effectively been farming without subsidy as I had to lease and then purchase all the milk quota and lease most of the land that I farm. In this situation margins have been tight. Therefore, it has been vital for me to keep production costs low and achieve a level of scale that provides an income which will meet our living expenses and allow repayment capacity for the future. Some farmers will switch off when they see the level of scale I now farm at. Most farmers will not want, for various reasons, to reach this level of scale. However, I believe my story is relevant for all farmers going forward. We all face a future without subsidy. We, as farmers, are now exposed to the world market and there will be large price fluctuations. If we want to maintain or improve our income from dairy farming we must be efficient low cost producers who achieve an increase in scale. A very good but limited opportunity exists while milk prices remain high and the Single Farm Payment is still with us to achieve this. We must plan properly and take this opportunity to set ourselves up for a bright future.

Opportunities in the west

I believe the opportunities for dairy farmers in the west of Ireland are massive.
Why?

Milk Quota

Milk quota is not and has not been a limiting factor in the west and midlands unlike for the rest of the country. This allows farmers to plan for expansion. They can invest in the appropriate infrastructure in the knowledge they can produce the milk to get a return on that investment. Would I buy quota even now? Yes.

Land

Like all counties in Ireland there is a mix of land types and farm size. Land is not a limiting factor for most farmers. Opportunities to rent land are greater in the West of Ireland. With extra farm roadways and improved management skills, and the right type of cow, wetter farms can grow and utilise a lot of grass. I believe farmers can grow as much grass in the west as in the south of Ireland.

Labour

Dairy farming is profitable and farmers have spending power in the local community generating employment in service sectors. With the slow down in the construction sector, there are opportunities for young people to work in their rural communities and have a quality of life they will not have in an urban environment.

Research and technology

Excellent relevant research has and is being carried out by Teagasc. This research will allow farmers make informed decisions, which in turn will have very positive effects on farmer profits and life style.

Attitude

I hope I will be forgiven for the next comment, but I believe it to be true. While there are some excellent farmers in every county, farmers in the west, in general, do not have a 'can do' attitude. They tend to look south and say 'that will not work where I am living'. It has been pointed out to me on more than one occasion since I started farming in Galway that 'I was not in Tipperary now' and 'that wouldn't work around here'. A lot can be achieved with a positive attitude.

Knowledge

'Knowledge is King'. Go out and acquire it. How? Join or form discussion groups with like minded people, demand a good service from your Teagasc advisory service, go to conferences, travel – seeing is believing. There are good farmers and good research farms such as Ballyhaise and Kilmaley in your area which demonstrate what can be achieved?

What would I do now if I was a young farmer with quota about to go and I was farming in this area?

- Project what income I would be satisfied with, going forward.
- Project the size of a milking platform required to deliver that income plus allow for repayment capacity to carry debt. I would then divide my answer by €1,800 to get the size of the milking platform required.

example

$$\frac{\textbf{income €60,000 + repayment capacity €30,000}}{\textbf{€1,800}} = \textbf{50 ha}$$

- Have I got this block of land available to me or can I acquire it?
- Work out cash flows and a financial plan and take advice on it.
- Buy high EBI maiden heifers suitable for a grass-based system.
- Put in the infrastructure roadways paddocks water etc.
- Put an aggressive reseeding programme in place.
- Build a simple milk shed (20 Units) with good cow flow.
- Construct low cost wintering facilities - pads, earth lined tanks.
- Breed all animals to dairy AI sires (Jersey crosses).
- Join a very good discussion group, attend relevant conferences, travel.
- Continually benchmark yourself against the best farmers out there.

If I was a young farmer with little or no land I would approach dry stock farmers with suitable land blocks and suggest partnership arrangements, or a share farming arrangement such as exists in New Zealand. This would be a 'win win' situation for both parties.

The future

- Profitable dairy farming systems for Ireland of the future – will be low cost grass-based production systems with high output per hectare.
- Dairy farms will be specialised milking platforms.
- Dairy replacements will be reared off milking blocks or contract reared.
- Expansion will take place through low cost capital methods i.e., wintering facilities/wintering crops.
- Labour will be skilled and handle large numbers of cows per man.
- Partnership arrangements will take place with dry stock farmers.

Challenges to be overcome

- Milk Quota – needs to be removed quickly.
- Land availability – a lot of land is now in the hands of part-time and hobby farmers. These land owners are in receipt of Single Farm Payments and environmental payments which limit land mobility for rent or purchase.
- Organic fertiliser – storage.
- Age profile of farmers and lack of entry of young people into the industry.
- Labour availability/lack of career opportunity for young people entering the sector – no ladder of opportunity.
- Lack of training scheme for foreign labour.
- Poor standard of agricultural training for young farmers.
- Bureaucracy and compliance driving people away from farming.
- Taxes: cost of expansion prohibitive – CGT, Stamp Duty.
- Banks need to be more open in their approach to lending i.e., taking stock as equity for lending.
- Teagasc – valuable scientific research needs to be aggressively communicated to dairy farmers.

Milk processors must continue to rationalise, take out costs and work together to return the highest price to its farmers.

Grass Budgeting – Driving Profit

Peter Comer, Teagasc Dairy Adviser, Mayo

Summary

Growing large quantities of grass in the west is not an issue. It can and is being done. Obtaining milk quota is not the obstacle that it is in other regions of the country.

The biggest challenge is converting this grass into milk solids. Grass never stops growing; it just speeds up and slows down. Walking the farm and anticipating these moves is what budgeting is all about. It gives you the confidence and belief that you can manage and adjust the grass that the cows get each week.

There are more and more farmers measuring and budgeting grass - I believe they are making the right move. Next year, I and my colleagues will hold more grass courses – I strongly recommend that you attend.

Introduction

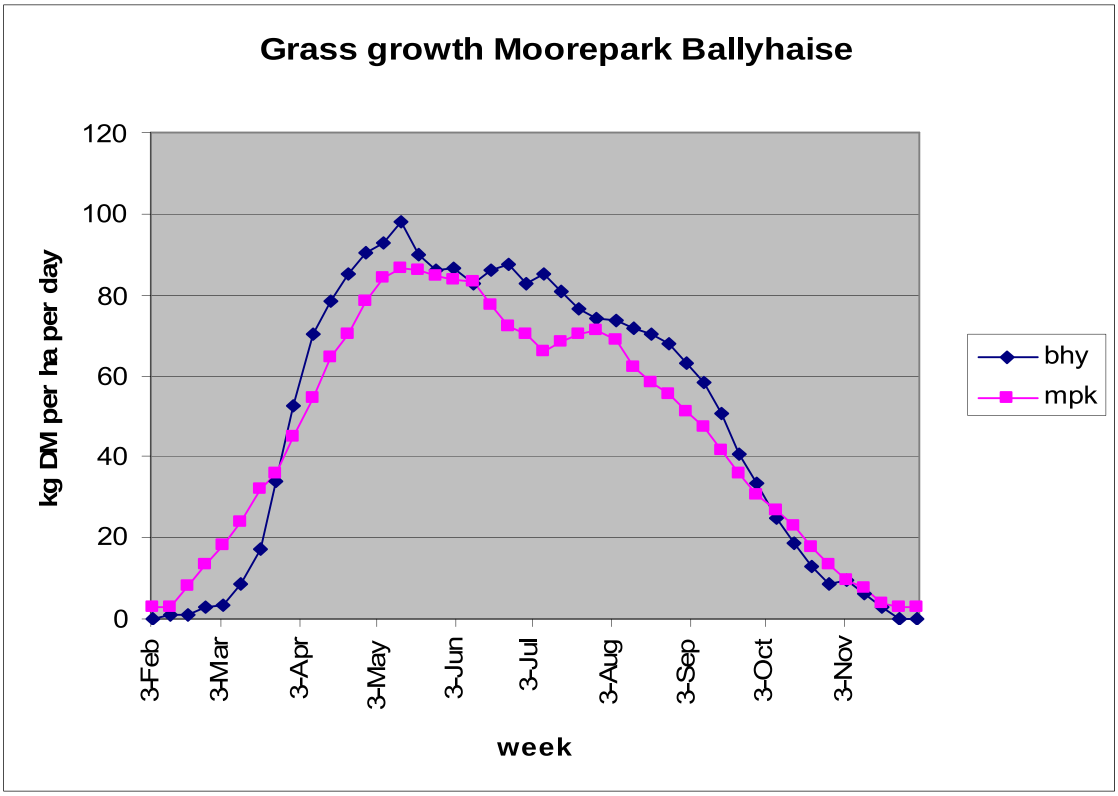
It is well accepted that one of the major competitive advantages that Ireland has over most EU countries is the potential to grow large volumes of grass (12 – 16t DM/ha) over a long growing season. It is also well accepted that this grass is most efficiently converted into milk solids by actually having cows out grazing in the paddocks. So why haven't Irish dairy farmers flooded world markets with cheap milk? Well apart from the obvious answer (quotas!), there is a gap between grass yield potential, actual grass yield and finally grass utilisation. It's all very well being able to grow 14t grass DM but when you consider that, on average, only around seven to eight tonnes of this ever gets utilised, you can see that there is a major job of work to be done in bridging this gap. Average grass utilisation would probably have been higher had output not been limited by quotas.

The benefits of maximising high quality grazed grass in the cow's diet has been well documented (Dillon, Horan, O'Donovan etc). One of these benefits is relative cost. Bought in ration at €280/t is almost five times more expensive than grazed grass on a net energy basis. First cut silage is around two-and-a-half times more expensive. It is envisaged that the cost of both concentrate feed and grass silage will remain high over the coming years. Concentrate feed due to increased world demand, lower supplies and rising production costs; conserved grass silage due to increases in contractor charges associated with rising labour, energy and machinery costs. With this relative cost advantage so strongly in favour of grazed grass, it would seem madness then not to take maximum benefit from it. So how do we get from seven to eight tonnes of grass DM/ha utilised to 11 or 12 t? The answer I believe lies in grass budgeting. I say this because to become proficient in grass budgeting one (almost by default) becomes proficient in most other aspects of good grassland management. Grass budgeting therefore can and must be used as a tool to drive farm profit.

Grass yield in this region

Grass growth data from Teagasc (Moorepark and Ballyhaise) shows that the same quantity of grass is produced from both sites over the growing season. Annual production is about 14 tonnes of grass dry matter per hectare from a well managed perennial ryegrass sward. There is, however, a difference when this grass is produced. Moorepark, which is a drier and more southerly based farm has a longer growing season but with lower mid-summer growth (see Figure 1). The Ballyhaise farm starts growing later but produces more grass during the summer months.

Figure 1: Weekly grass growth rates (kg/ha/day) for Ballyhaise and Moorepark



This growth pattern has implications for how we should use grass in these regions. In both regions, where possible, all silage ground should be grazed in the spring, but in the northern half of the country it should be grazed for longer (e.g., 15 April). This is to allow a reasonable grass allowance to cows while waiting for growth rates to improve. Stocking rate should be higher during the peak grass growing months to maintain grass quality.

Grass yield and profit

Data from Teagasc profit monitors in the northern region of Ireland (Table 1) show how much grass is being utilised on dairy farms. Average utilisation is 7.3t grass DM/ha. These farms are producing 740kg of milk solids per hectare returning a profit of €1,004.

Table 1: Forage utilised (t/ha), stocking rate (cows/ha) and milk solids (kg/ha) ranked on net profit (€/ha) for the average and top 20 percent of farms which completed a profit monitor in 2006 in the northern region.

	Average	**Top 20%**
Stocking rate (cows/ha)	1.94	2.44
Grass utilised (tonnes DM/ha)	7.3	9.4
Milk Solids output (kg/ha)	740	940
Net Profit (€/ha)	1,004	1,388

The top 20 percent are delivering 940kg MS/ha and utilising 9.4t grass DM/ha. Profit from these farms is €1,388/ha. It is clear to see that if forage utilised per hectare is increased then net profit per hectare will also increase. On average, for every additional tonne of grass DM utilised, there is additional profit of €200. Similar results were found from analysing profit monitor results in Kilkenny.

There is a big opportunity in this region to utilise more grass, even more so than in the south. Milk quota is relatively available and there is still plenty of scope to increase stocking rate on the milking platform (and still remain compliant within the Nitrates regulations).

Grass quality and milk output

There is a large body of research and farmer experience throughout the country (see Mark Mc Cormack's paper in these proceedings) to show the benefits of providing quality grass to cows. Moorepark data shows that over two litres per day (half a gallon) is lost during the summer months due to poor grass quality. Grass budgeting/ monitoring will recover this lost milk at almost no cost.

Table 2 shows the reduction in milk production as cows graze lower quality swards in summer. Dry Matter Intake (DMI) is reduced and 2.2 litres/cow/day is lost.

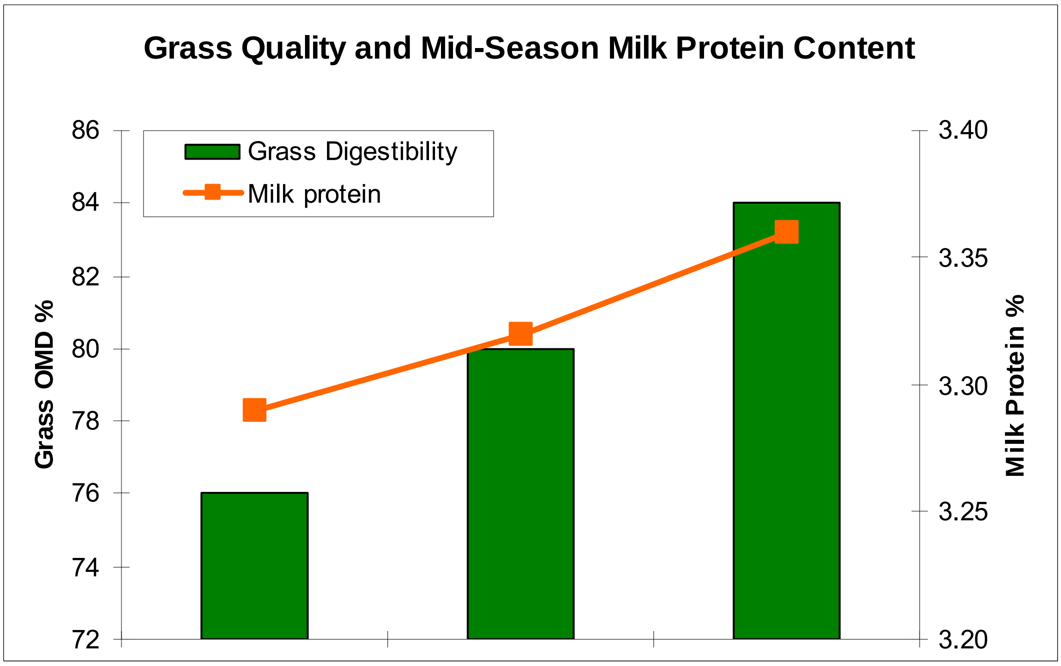
Table 2: Effect of grass quality in summer on grass dry matter intake (DMI) and net energy intake (NEI) on milk yield.

	High	*Medium*	**Low**
Digestibility (%)	**79.6**	**77.1**	**74.7**
Dry matter intake (DMI)	**17.8kg**	**14.3kg**	**12.6kg**
Milk yield	**19.5**	**18.3**	**17.2**

A more recent study in 2004 looked at mid-summer milk production. See Figure 2. It found that there were three factors which had a major impact on milk protein - calving date, genetics (EBI) and grass quality.

Again, Figure 2 shows there is a clear link between the quality of grass offered and milk protein. As digestibility increases so too does milk protein. An increase of 0.1 percent across three summer months is equivalent to an additional 100kg of protein produced by a 50 cow herd. This is currently worth over €700. There will also be the benefit of increased yield which will produce further kg of protein and fat.

Figure 2. Effect of grass quality on mid-season milk protein content (2004).



Grass quality in this region

Table 3 shows grass quality data from Moorepark (various years) and from farms in the northern region for 2006. Moorepark Dry Matter Digestibility (DMD) values from April to September are between 84 percent and 78 percent. This is the type of grass quality and management that is delivering 500kg MS/cow. This data is from swards of 1,500-2,000 kg grass DM/ha during summer and 2,500 kg/ha in September to October

Currently, Brendan Horan, Moorepark, is co-ordinating a project in the Northern region, researching the production potential of farms in this region. There are 16 commercial farms participating. One piece of data collected is grass quality throughout the growing season. Table 3 shows grass digestibility for 2006.

Table 3: Monthly Dry Matter Digestibility (DMD) of grass from Moorepark and 16 farms in the northern region research project.

	April	May	June	July	Aug	Sept.	Oct/Nov
Moorepark							
Dry matter digestibility (DMD)	83.7	85.5	83.1	81.2	77.8	81.4	81.3
Northern Research project 2006							
Dry matter digestibility (DMD)	85.4	83.6	80.9	75.7		77.2	76.6
Max. value	87.4	87.3	84.1	79.9		83.7	80.5
Min. value	81.8	77.2	76.9	70.2		72.6	70.1

Data from this project has not been fully analysed yet but two points can be made:

- Grass quality is similar to Moorepark early in the season but declines later.
- Second, some farmers are managing to produce excellent quality swards throughout the entire growing season. See maximum values in Table 3.

Grassland in this region has the potential to produce high yields of highly digestible grass – the challenge is to try and utilise this grass. This is where grass measurement and budgeting plays a major role.

Grass budgeting - tools of the trade

1. Set up infrastructure

A good, flexible paddock system with central roadway and adequate side tracks is a prerequisite for grass budgeting. Once you've got your paddock system laid out on the ground then you need to get it laid out on paper (Paddock Map). Your adviser will help if required or there are specialist mapping consultants who will only be too happy to oblige. Useful aids are your Area Aid photographs, or use the web (Google Earth, Co. Council website). Accuracy with your paddock map is important.

2. Learn the jargon

To get a handle on grass budgeting you've got to learn the jargon. You can pick this up from various sources of printed media or better still why not take part in a Teagasc grass budgeting course. You will need to understand:

Grass Dry Matter	Livestock Unit
Pasture Cover	Livestock Unit Equivalent
Residual Cover	Grass Growth Rates
Average Farm Cover	Daily Grass Demand
Pre-Grazing Yield	Cover per Livestock Unit
Post-Grazing Height	Grass Surplus/Deficit
Stocking Rate	Grass Allowance

3. Trial and error

Accurate grass measurement is the essential skill of grass budgeting. To become proficient at this you must do numerous 'cuttings & weighings' of various grass covers. This is to calibrate your eye. Once your eye is accurately calibrated you can then walk your paddocks, eyeballing them as you go. You should continue to cut & weigh every so often to make sure your eyeballing is accurate. The essential tools for this are a cutters, a quadrant (50cm x 50cm) and an accurate scales (1 kg).

4. Do the maths

So you've walked your farm and wrote down the covers. What next? Some would say that you have already achieved 90 percent of what can be achieved by just getting this far! But you may as well go for the last 10 percent. You must now work out various parameters such as Average Farm Cover (e.g., 950KgDM/Ha), Cover per cow or per LU (e.g., 210kg/LU), daily demand (e.g., 70kgDM/day), current grass growth rates, pre-grazing cover etc. Basically you're trying to establish if there's a surplus or deficit developing and if there is, the extent of that surplus/deficit. Knowing this information on time is one of the key factors in helping to keep quality grass in front of cows throughout the growing season. If for example a surplus has been identified immediate action should be taken such as removing a paddock or two for silage, bringing in extra stock, skipping a round of Nitrogen or topping. Grass budgeting gives you that vital edge in making these time critical decisions.

5. Grassland management targets

The following are the key dates and covers to maintain grass quality throughout the year and maximise the length on the grazing season.

- Mid to late September – 400 to 500 kg/LU
- Housing – 450 to 550 kg/ha
- Turnout – 500 to 550 kg /ha
- 1 May – 180 to 200 kg/LU
- Summer – maintain at 180 to 200 kg/LU

Grass budgeting is the only way to make sure that these targets are met at the critical times.

What's happening in the Connacht Gold region?

In the past year five specialist dairy advisors have been working closely with Connacht gold dairy suppliers. This is part of a Teagasc/Connacht Gold joint industry programme. Cutting costs and improving milk solids are key objectives of this programme. Getting more grass of higher quality into cows is seen as critical to achieving these objectives. For this to happen the up-skilling of farmers on the latest grassland management techniques is necessary. To this end the five Teagasc advisors have organised Grass Budgeting courses for interested dairy producers. Over 80 dairy farmers completed the first round of grass budgeting courses, which are FETAC approved. Further courses are planned for next year and on an ongoing basis as the need arises. Farmers who attend this course will learn how to measure and budget grass. By using this knowledge on their home farm it will translate into increased sales of milk solids at lower production cost.

Benefits of Grass and Budgeting to Me

Mark and Barbara McCormack
Springfield House, Kilmore lower, Clondra, Co. Longford

Summary

Grass is a key natural resource in this country. It is relatively cheap and we should use this to our advantage. My experience is that effective use of grass and a grassland management strategy results in a simple and profitable system that can over come reliance on high meal prices and the costs associated with many other systems.

Furthermore, a simple grass based dairying system allows me to spend time with my family and pursue off farm interests.

My aim is to produce as much milk solids from my milking platform as is economically viable. For me this is 1,600 – 1,800kg MS at a production cost of less than €2/kg.

I know this can be done and I'm up for the challenge. Grass is our competitive advantage – Use it!

Introduction

We farm at Kilmore lower which is three miles outside Longford town. We have two children, Ian, aged nine and Avril, aged six.

Our dairy herd is spring-calving. This year128 cows were milked at peak during the summer. Farm size is 91 hectares (66ha owned) and milking platform is 44.5 hectares (40.5ha owned).

Land quality is variable. I would describe one-third of the farm as very wet (peaty), one-third average and one-third dry. This has advantages and disadvantages. I must juggle the grazing of the wet paddocks throughout the year, a fixed grazing rotation of paddocks will not work for me. An advantage of wet paddocks is that they grow quite well during a dry summer. We have a good network of farm roadways which enables us make good use of the wetter land. We also practise on/off grazing in wet conditions, this year that included the months of July and August.

All cows are bred from AI. Herd EBI is €55 with €11 coming from milk and €44 from fertility. PD for milk is -36kg, with a fat percentage of 0.06% and protein percentage of 0.05%. Last year this herd delivered 464kg of milk solids. We need to get a more balanced EBI in the herd.

Overall, farm stocking rate is less than 150kg organic N/ha. Stocking rate on the milking platform is what I base my production on, this year it is 2.87 cows/ha.

Objectives of the farm

I would describe my long-term objectives as:

- The dairy farm must return a high cash surplus each year after all costs.
- To achieve a simple low labour and low cost system.
- To scale up further to meet the challenges that are ahead.
- To continue to enjoy what I do.

I feel that a simple grass-based system will allow me to achieve these objectives. I also believe that grass based farming takes less time per day than alternative systems. This is important to me as it allows me to spend more time with my family and to take time off for other interests we have away from the farm.

How am I striving to meet these objectives?

I aim to produce as much milk solids (MS) as is economically viable from grazed grass on the milking platform. In order to achieve this I need a high stocking rate on my milking platform and robust cows that convert this grass to milk solids efficiently. This is where I see the real benefits of grass and budgeting.

Utilised forage per hectare

My utilised forage (grass/silage) per hectare from the 44.5 hectare milking platform in 2006 was 9.8 tonnes. I feel there is a direct link between a high stocking rate, grass utilisation and profit. I will target 11 tonnes utilised per hectare on the farm going forward. See Table 1.

Table 1. Forage Utilised on Milking Platform in 2006 and Prediction for 2009

	2006	**2009 target**
Stocking rate on milking platform (cows/ha)	2.74	3.5
Milk Solids/cow (kg)	464	464
Milk Solids ha Milking platform. (kg)	1,272	1,624
Dry Matter (DM) for cow maintenance (tonnes) (1 cow requires 2,200kg DM)	6.0.	7.7
DM for MS production/ ha (tonnes) (1kg MS requires 6kg)	7.6	9.8t
Total DM required/ha above production	13.7	17.5t
Less inputs from outside milking platform: Meal purchased/silage from out farm	3.9	6.6
Forage utilised on milking platform (t/ha)	9.8t	10.9t

To achieve this output I need to grow more grass, calve compactly (69 percent calved in six weeks in 2007) and improve herd genetics for converting grass to kg of milk solids. Most of the silage required will be produced on the out farm. I need to revise my reseeding programme if this output is to be achieved.
Of course there is little point in pushing out kg MS/ha from the milking platform if costs are spiralling out of control. The target is to keep costs at under €2/kg MS. See Table 2. I am confident that this output can be achieved by careful meal supplementation (target 1,000kg meal at 3.5 cows/ha) at the shoulders of the year. Little to no meal will be fed in summer, grass quality will be the driver of MS output.

Table 2. Cost of Production (€/kg MS) for 2004, 2005 and 2006.

Year	**Cost/kg MS**
2004	€2.10
2005	€2.08
2006	€1.81

Grazing management

It is only in the last two years that I really see the benefits of measuring and monitoring grass. This year, Padraig O'Connor, Teagasc, Grange, visited the farm every three to four weeks as part of a Teagasc project. This has been an enormous help to me. By having growth rates, average farm cover and kg per livestock unit, we can then do a budget going forward. This has given me the courage to make decisions that I would not necessarily have taken in the past. I now do grass cover myself each week that Padraig is not on the farm.

When my summer grass wedge shows excessive covers, I cut there and then. This year, paddocks with over 1,700kg DM/ha were cut. I would not have had the confidence to take this action in the past. Also, this August when growth slowed, I had the information and measurements to allow me react very quickly to an impending shortage of grass. Cows were fed 6kg meal for a 10-day period to bring covers back to where I needed them to be after the poor summer. Some of my covers this year were:

11 April – 240kg DM/cow
24 May – 201kg/cow
30 July– 194kg/cow
16 Sept – 329kg/cow
8 Oct – 418kg/cow

Information/Data

The data I have available and use to manage the farm includes:

- Milk recording
- Herdplus reports
- Teagasc Profit Monitor
- Cash-flow reports
- Department website and
- Commercial farm package

I also discuss issues and experiences with friends who farm on a similar basis. For reference, international websites such as Dexcel and Lincoln University are very useful. Although the Farmers' Journal can be helpful, I find that it has lost its focus a little in recent times.

The weekly growth rates from Ballyhaise are useful, but I would find them more beneficial if they were more detailed and provided better analysis. Like the information that's available on some of the websites mentioned above, I would like to see weekly updates from research herds and grass monitor farms, on management issues, the decisions made, why the decision was made, and how that decision impacts on the farm business. I feel this would assist farmers in making decisions about their own grassland management strategy.

Where do I go from here?

To achieve my goals in terms of grassland management, my plans for the short-term are as follows:

- To improve paddock layout and roadways required for increased cow numbers.
- To devise a reseeding programme and to plan it into budget.
- To prepare an annual grass budget each autumn for 3.5 cows/ha on the milking platform.