National Dairy Conference 2011

The Irish Dairy Industry: To 2015 and Beyond

Rochestown Park Hotel, Cork
Tuesday, 15 November

Hodson Bay Hotel, Athlone
Wednesday, 16 November

teagasc
Agriculture and Food Development Authority

Conference Programme: Rochestown Park Hotel, Cork
The Irish Dairy Industry: to 2015 and Beyond

10:00 AM	**Future Outlook: Opportunities and Challenges** Chair: Professor Gerry Boyle, Director Teagasc
	Pat Dillon, Teagasc
	Funding Dairy Expansion: A Bankers' View Seán Farrell, Bank of Ireland
11.25 am	**Expansion: The Importance of Planning and Cash Flow** Chair: Jim Woulfe, Chief Executive Dairygold
	Business Renewal, Growth and Transition: Opportunities and Challenges James Allen, AgFirst, NZ
	Planning for Expansion on a Family Farm Denis Finnegan, Dairy Farmer
	Farm Planning to Achieve Success Billy Kelleher, Teagasc
12.25 pm	**Launch of Teagasc Dairy Manual** Mark Moore, Teagasc
12.35 pm	**LUNCH**
02.00 pm	**Technologies for Profitable Dairying** Chair: Brian Wickham, ICBF
	The Robots are Coming Stephen Walsh & Bernie O'Brien, Teagasc
	Feeding the Dairy Cow in Spring: supplementation requirements and responses Eva Lewis, Teagasc
	Drying Off Cows Don Crowley, Teagasc
	Fertilizer value of dairy soiled water Paul Murphy, Teagasc
	Cheese – A Strategy for an expanded milk pool Tom Beresford, Teagasc
	Control of Liver Fluke and Rumen Fluke in 2011 Ríona Sayers, Moorepark
	Lessons Learned from Teagasc Energy Audits John Upton, Teagasc
	BVD – a national eradication programme for 2012 David Graham, AHI
3.30 pm	**Business Operating Models for the Future** Chair: Matt Dempsey, Irish Farmers Journal
	Panel Discussion: Ben Roche, Milk Production Partnerships, Teagasc Pay Ryan, Dairy Farmer James Byrne, Accountant Alan Jagoe, Dairy Farmer & President Macra Paul Savage, DAFM
4.30	**Conference Close**

Conference Programme: Hodson Bay Hotel, Athlone
The Irish Dairy Industry: to 2015 and Beyond

10:00 AM	**Future Outlook: Opportunities and Challenges** Chair: Noel Cawley, Chairman Teagasc Authority
	Pat Dillon, Teagasc
	Opportunities & Challenges. Accessing Finance to Support your plans. John Trethowan, Credit Review Office
11.25 am	**Expansion: The Importance of Planning and Cash Flow** Michael Hanley, Chief Executive Officer, Lakeland Dairies
	Business Renewal, Growth and Transition: Opportunities and Challenges James Allen, AgFirst, NZ
	Growing my dairy business Jim Delahunty, Dairy Farmer
	Planning for Expansion Michael Hogan, Dairy Advisor, Teagasc
12.25 pm	**Launch of Teagasc Dairy Manual** Mark Moore, Teagasc
12.35 pm	**LUNCH**
02.00 pm	**Technologies for Profitable Dairying** Chair: Tom O'Dwyer, Teagasc
	The Robots are Coming Stephen Walsh & Bernie O'Brien, Teagasc
	Feeding the Dairy Cow in Spring: supplementation requirements and responses Eva Lewis, Teagasc
	Drying Off Cows Don Crowley, Teagasc
	Fertilizer value of dairy soiled water Paul Murphy, Teagasc
	Cheese – A Strategy for an expanded milk pool Tom Beresford, Teagasc
	Control of Liver Fluke and Rumen Fluke in 2011 Ríona Sayers, Moorepark
	BVD – a national eradication programme for 2012 Joe O'Flaherty, AHI
3.30 pm	**Business Operating Models for the Future** Chair: Matt Dempsey, Irish Farmers Journal
	Panel Discussion: Ben Roche, Milk Production Partnerships, Teagasc Ger Mernagh, Dairy Farmer Declan McEvoy, IFAC Aisling Meehan, Solicitor Paul Savage, DAFM
4.30	**Conference Close**

The Irish dairy industry-Planning for 2020

Pat Dillon,

Teagasc, Animal & Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork

Summary

- In Ireland milk production increased by 5.7% per year from 1975 to 1985; this was associated with a 49% increase in milk yield per cow, an 11% increase in cow numbers; while at the same time dairy farm numbers reduced by 47%.
- Milk solids (fat plus protein; kg) processed by the New Zealand dairy industry grew by 4.4% per year between 1986 and 2010; this was associated with a doubling of cow numbers, a 30% increase in milk yield/cow ad a 55% increase in area used for dairy production
- On average approximately 6.6 t DM/ha of grass were utilised on the average dairy farm in Ireland in 2010; each additional one tonne of grass utilised was associated with an increase in net profit of €162/ha.
- In a no quota scenario Ireland should plan for an annual increase of 5% in milk production; achieved by an annual increase of 3% in dairy cow numbers and a 2% increase in milk yield per cow.
- At farm level there will be an ongoing requirement to increase production efficiency; improve milk quality and increase operational scale

Introduction

The Food Harvest 2020 report proposes a 50% increase in milk output for the Irish dairy industry using smart green technologies by 2020. There is general agreement within the industry that these targets can be achieved provided certain action is taken between now and 2020. This will be made possible with the abolition of EU milk quotas in 2015. The abolition of quotas creates both exciting and challenging opportunities for the Irish dairy industry. The anticipated 50 per cent increase in national milk production post EU milk quota abolition can only be realised through a combination of increased scale of production and productivity improvement on existing dairy farms in combination with an increased influx of new dairy farm businesses to the Irish dairy industry. For the first time in 30-years, farmers will now expand their businesses within a market environment where there is little supply chain management and greater price volatility- albeit around a higher average price.

The expansion in output will also exert challenges to both the processing and marketing sectors to process the increased milk supply and market increased volumes of dairy products. A 50% increase in milk production will require milk deliveries to increase from an average of 5.1 billion litres over the 2007 to 2009 period to 7.66 billion litres by 2020. The expansion in Irish milk production will increase the profitability of Irish dairy farms, create valuable new jobs within the national dairy industry and combined with value add at processing level; will be worth in excess of €1 billion to the Irish agri-economy in the next decade.

The immediate challenge facing many dairy farmers is how best to plan between now and milk quota abolition in 2015. Milk quotas are still in place while at the same time dairy cow numbers are increasing. Between now and 2015 dairy farmers must focus on cost reduction to allow profitability to be maximised while at the same time plan to expand milk production once milk quotas are abolished. This should include investing in areas that will increase farm productivity for the longer term e.g. increase number of breeding stock and grazing farm infrastructure and milking facilities. However the objective of this paper is to outline how best the Irish Dairy Industry should respond to a unique opportunity to increase the export of dairy products in a scenario of the abolition of EU milk quotas and increase world demand for dairy products. The paper is divided into three sections: (1) Lessons from expansion in milk production; (2) Avenues to increase milk production on Irish dairy farms and (3) Challenges to sustainable increases in milk production.

Section 1: Lessons from expansion in milk production

Lessons from Ireland in the 1970/80's

Table 1 shows some key statistics of the Irish dairy industry from 1975 to 2010. In the period 1975 to 1985 milk production in Ireland increase from 3.2 billion litres to 5.5 billion litres or a 72% increase over the 10-year period. This is equivalent to an increase of 219,000 litres per year or an average increase of 5.7% per year between 1975 and 1985 (Figure 1). The increase in milk production was accelerated with Ireland's accession to the EEC in 1973 which greatly increased the value of milk and dairy products.

Table 1: Structure and key statistics of the Irish Dairy Industry 1975-2010

	1975	1985	1995	2005	2010
Dairy farm numbers ('000)	144.0	76.8	40.8	26.8	18.5
Dairy cow numbers ('000)	1,379	1,528	1,221	1,101	1,117
Milk delivered (million litres)	3,212	5,518	5,135	4,915	5,173
Milk yield (litres/cow)	2,631	3,910	4,206	4,464	4,631
Milk price (cent/litre)	9.0	21.5	30.1	27.3	30.2
Dairy concentrate cost (€/tonne)	129	232	217	208	247
Nitrogen (CAN) costs (€/tonne)		179	154	218	253
Average herd size (cows/farm)	9.6	19.9	29.9	41.1	60.3

Source: Based on CSO data various years

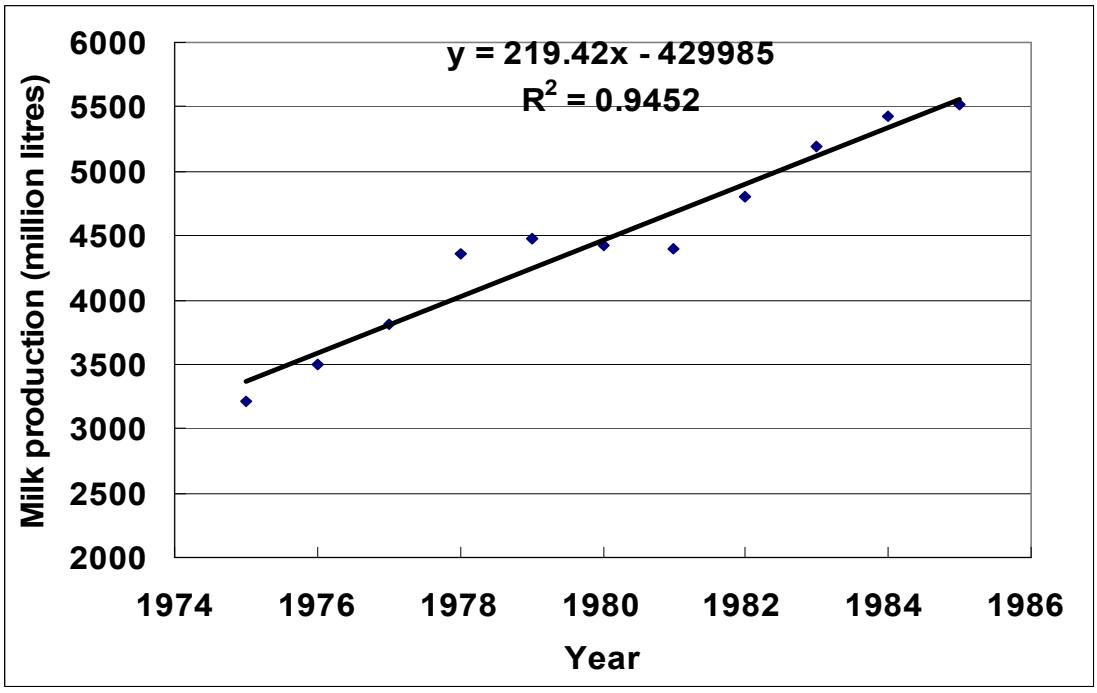


Figure 1: Delivery of milk to creameries and pasteurisers in Ireland 1975-1985

Source: Based on CSO data various years

The increase in milk production was associated with a 49% increase in milk yield per cow (2,631 to 3.910 litres/cow) and an 11% increase in cow numbers; while at the same time dairy farm numbers reduced by 47%. This is equivalent to an annual increase of 1.1% in cow numbers and a 4.1% in milk yield per cow. The reduction in dairy cow numbers in the late 70's and early 80's was mostly associated with the compulsory slaughtering of Brucellosis positive cows over that period (Figure 2).

There is also a very similar trend in milk deliveries to both creameries and pasteurisers and that of cow numbers over the 1974 to 1985 period (Figure 1 and Figure 2).

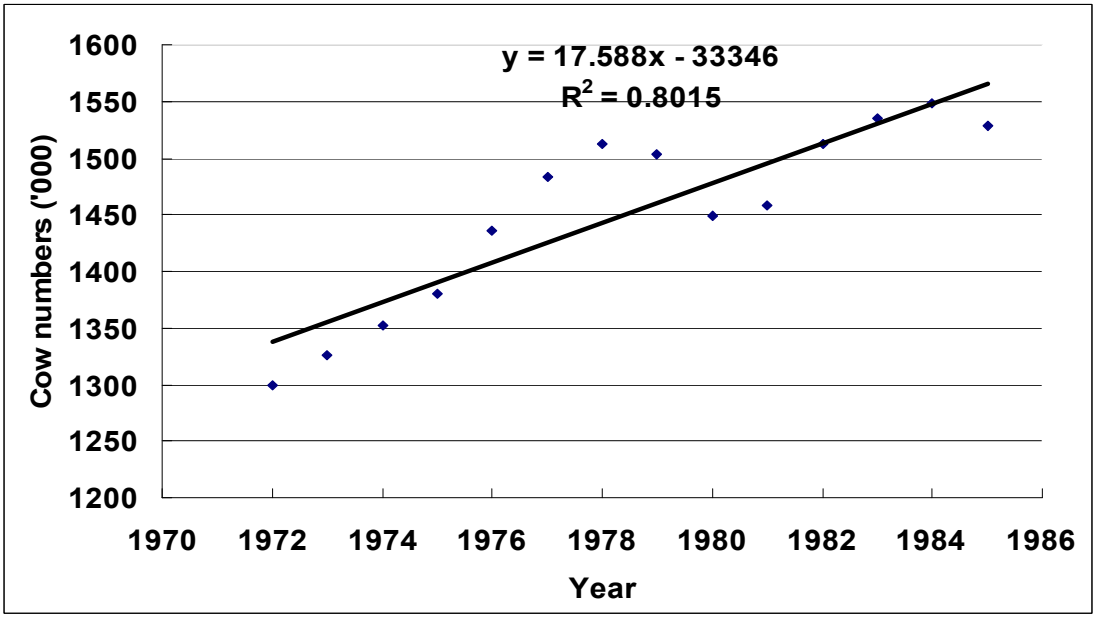


Figure 2: Dairy cow numbers in Ireland 1975-1985 (*Source: Based on CSO data various years)*

The New Zealand Dairy Industry (1986-2010)

New Zealand has historically depended on the agricultural sector for its economic growth and current projections suggest that the pastoral and related food industries will remain at the core of the New Zealand economy. Within the sector, dairy farming is the single most important economic activity and accounts for 25-30% of the nation's total merchandise exports and with approximately 95% of milk production exported, the New Zealand dairy industry is the world's single largest exporter of milk and milk products. Milk production in New Zealand increased from 5,222 to 7,326 million litres between 1974 and 1985 or by 3.3% per year. Between 1986 and 2009 milk production increased from 6,385 to 16,483 million litres or 3.6% per year. This increase in milk production was associated with an increase of approximately 1% per year in cow numbers between 1975 and 1985 (2.1 to 2.3 million cows); and a 2.7% increase between 1985 and 2009 (2.3 to 4.4 million cows).

Since 1985 when the New Zealand government withdrew subsidies and almost all other forms of support from agriculture, New Zealand dairy farmers have been fully

exposed to market competition in the global marketplace. The New Zealand dairy industry underwent dramatic restructuring during the following 25 or so resulting in massive industry growth. New Zealand dairy production has risen 77% over the past 20 years from three million dairy cattle in 1989 to six million dairy cattle in 2009. Milk solids (fat plus protein; kg) processed by the New Zealand industry has grown by 4.4% per year from 609 million kg in 1986 to 1.4 billion kg in 2010 (Figure 3). The large increase in milk production is a consequence of changes in the location, number, size, and organization of dairy farms since the mid-eighties while the changes which resulted in industry growth has many lessons for Ireland post EU milk quotas.

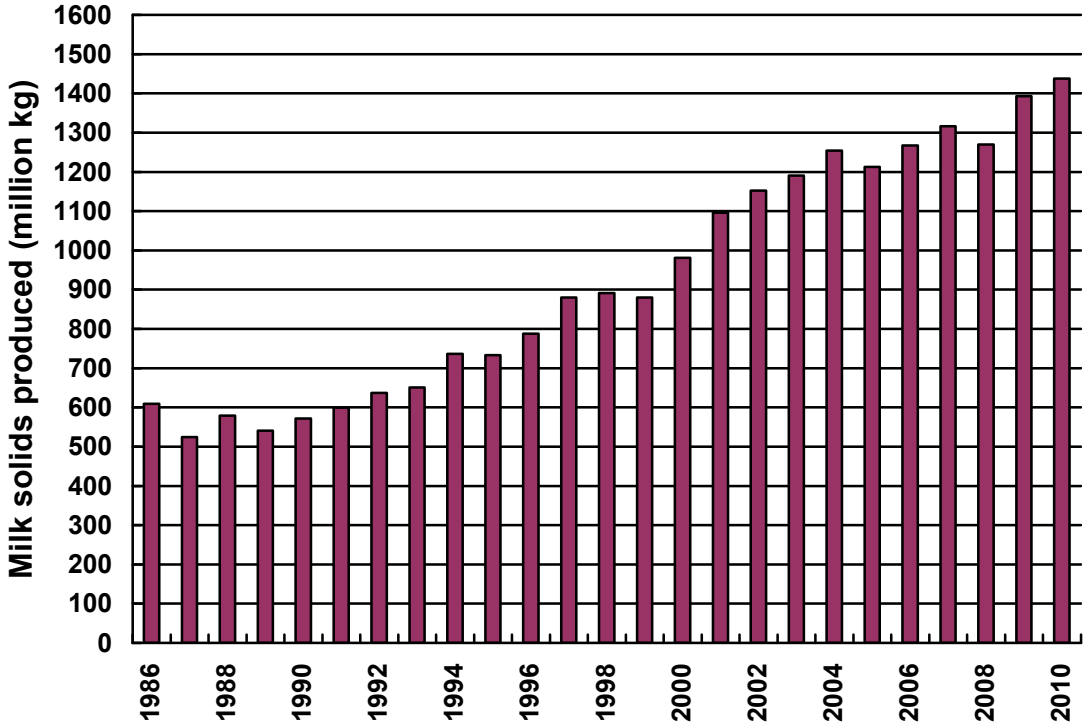


Figure 3: Growth in milk production (milk solids) in New Zealand (1986-2010) (Source: NZ Dairy Statistics, 2010)

Farm land use and the origins of milk production

Over time, the contribution of dairy farming to the New Zealand economy and agribusiness has been steadily increasing. Agricultural land has been increasing used for dairy farming instead of sheep and beef production (Figure 4) due to the superior financial returns from dairying.

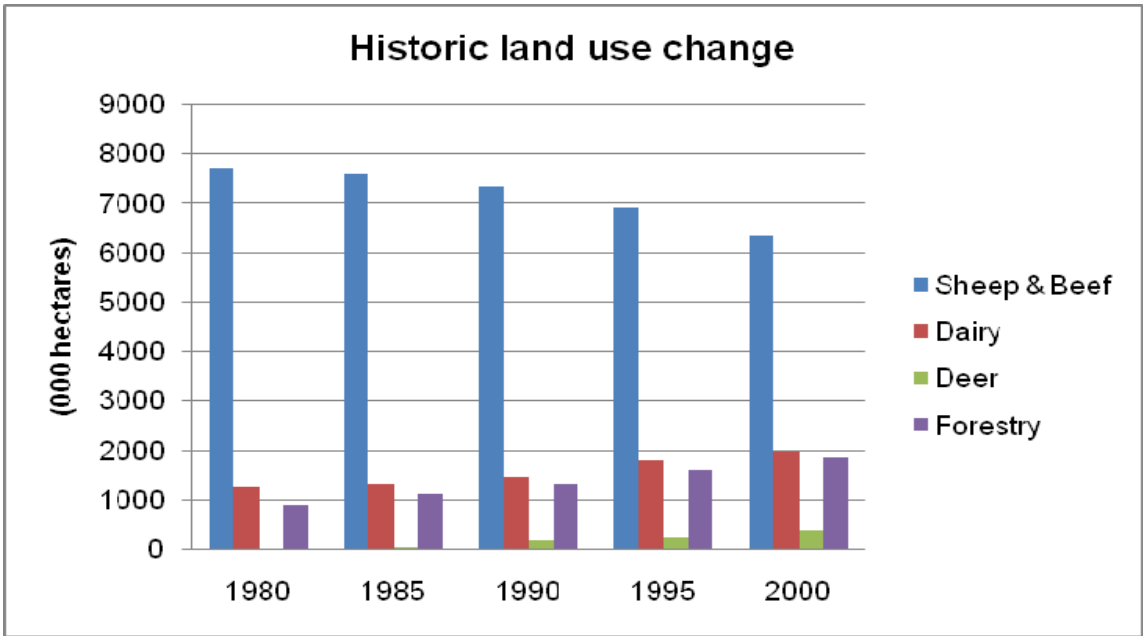


Figure 4: Historic use of agricultural land in New Zealand.

The growth of the dairy industry has been facilitated to a large degree by new dairy farm land particularly on the south island over the last 25 years. Traditionally, dairy farming was restricted to 'summer safe' flat to rolling land in the west of the North Island. From a position where 85% of total milk production originated on the North Island in 2000, Figure 5 illustrates that 35% of all New Zealand milk originated from the South Island in 2010. Drivers of this land use change were the development of irrigation, lower land prices relative to elsewhere in New Zealand, the adoption of new technologies and reduced profitability of some aspects of traditional beef and sheep farming systems. Between 1980 and 2009 the land used for dairying in Canterbury alone increased from about 20,000 ha to nearly 190,000 ha. On a national basis Canterbury produced 15% of New Zealand's milk in 2009 compared to 2% in 1982-83. It is suggested that, given the current price relativities and some further irrigation developments, the Canterbury land area involved in dairy farming could double in the next 20 years.

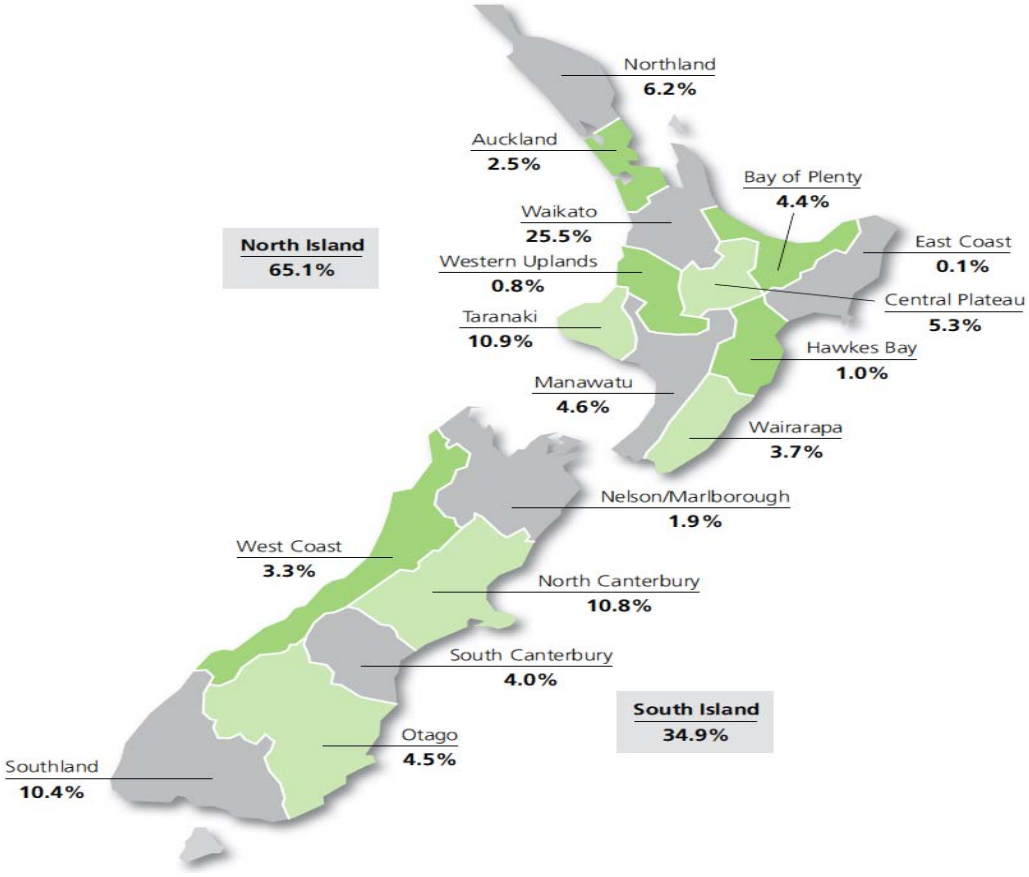


Figure 5: The geographical origins of New Zealand milk production in 2010 (Source: NZ Dairy Statistics, 2010)

Scale and Intensity of Operation

The growth in the industry has been achieved with fewer herds of increased size. Over the period 1974 to 2009 dairy herd umbers reduced from 18,540 to 11,691 or o average 1.3% per year. Between 1985 and 2010 average herd size has grown from 147 to 376 cows per herd (Figure 6). At a national level, it is evident from Figure 7 that the increase in cow numbers within the New Zealand industry has increased at a greater rate than the area in dairy production and consequently average stocking rate has increased from 2.30 cows per hectare in 1986 to 2.80 cows per hectare in 2010.

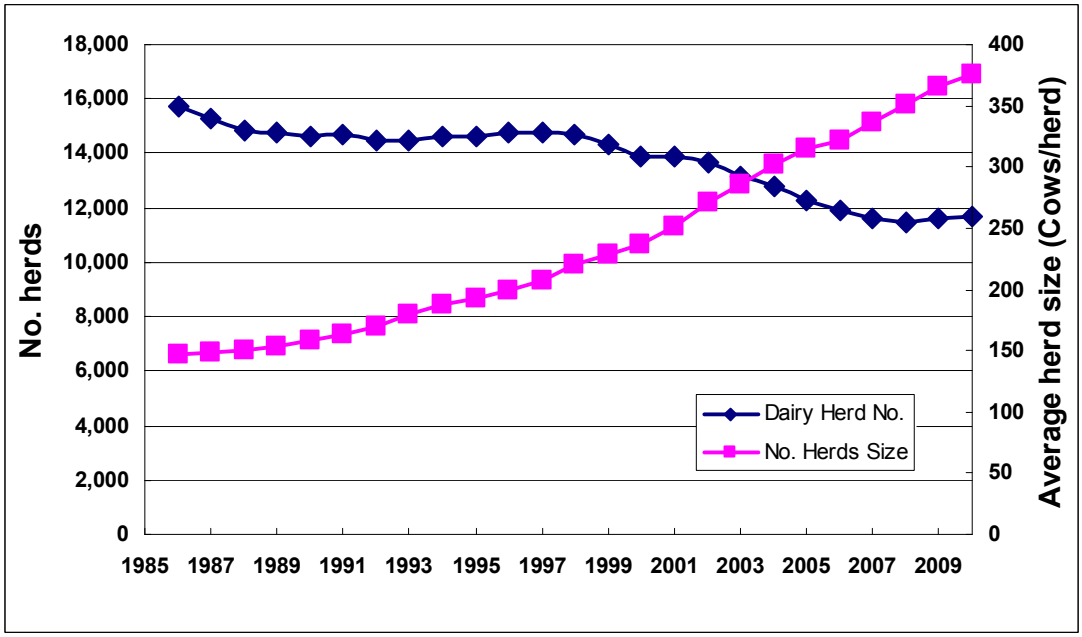


Figure 6: Total number of dairy herds and herd size (1985 -2010) *(Source: NZ Dairy Statistics, 2010)*

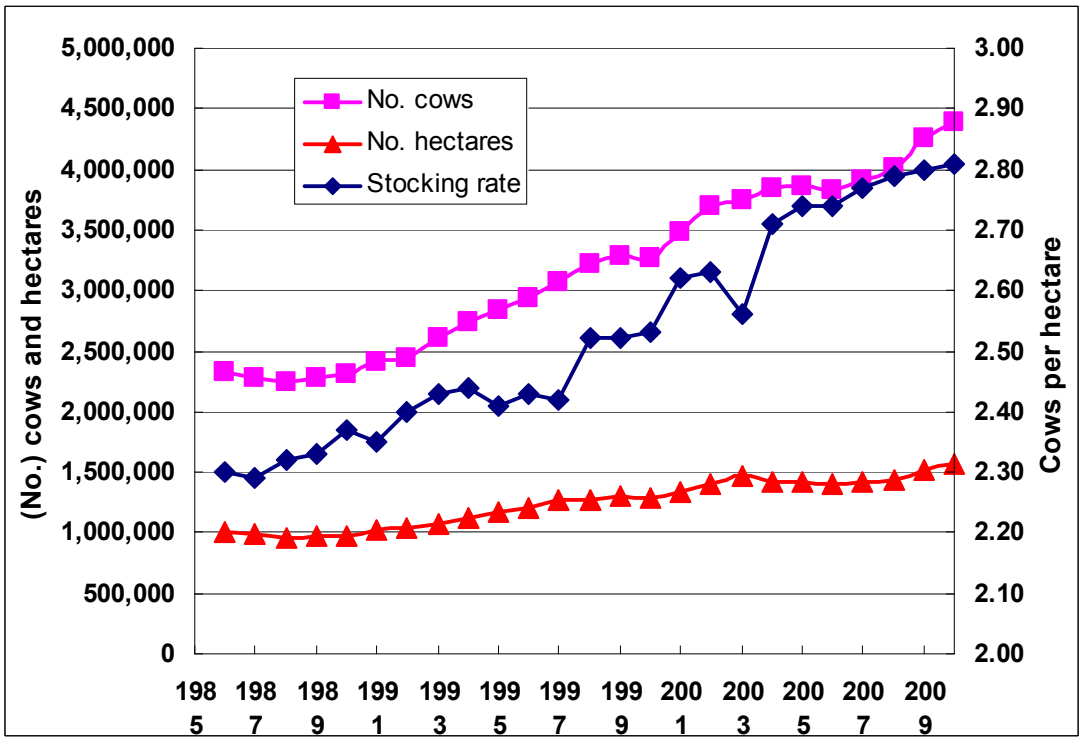


Figure 7: National herd size, land area and stocking intensity (1985-2010) *(Source: NZ Dairy Statistics, 2010)*

Productivity gain

At farm level, the period since 1985 has been particularly successful for individual dairy farmers with profitability of the average dairy farm increasing on average, by $83/ha/year (MAF, 2010). It is remarkable that the industry was able to grow productivity at this rate as the same time as increasing its size. Increases in dairy productivity has been achieved due to a combination of economies of scale (larger herds), increased productivity per head and per hectare. The increased production per hectare has been due to equal contributions from higher stocking rates and higher production per cow. Milk production per cow increased by 1.2% per year (33 litres/cow) between 1975 and 1985; while between 1986 and 2009 milk yield increased by 2.1 % per year (53 litres/cow). Between 1990 and 2009 milk solids yield per cow increased by 3.9 kg/year. As can be seen in Figure 8, milk solids production per cow has increased by 25% between 1986 and 2010 (from 255kg to 318 kg). On a per hectare basis, improvement in efficiency is even more evident as MS production per hectare of dairy farm land has increased by 51% (from 604 kg to 912 kg MS/ha) during the same period.

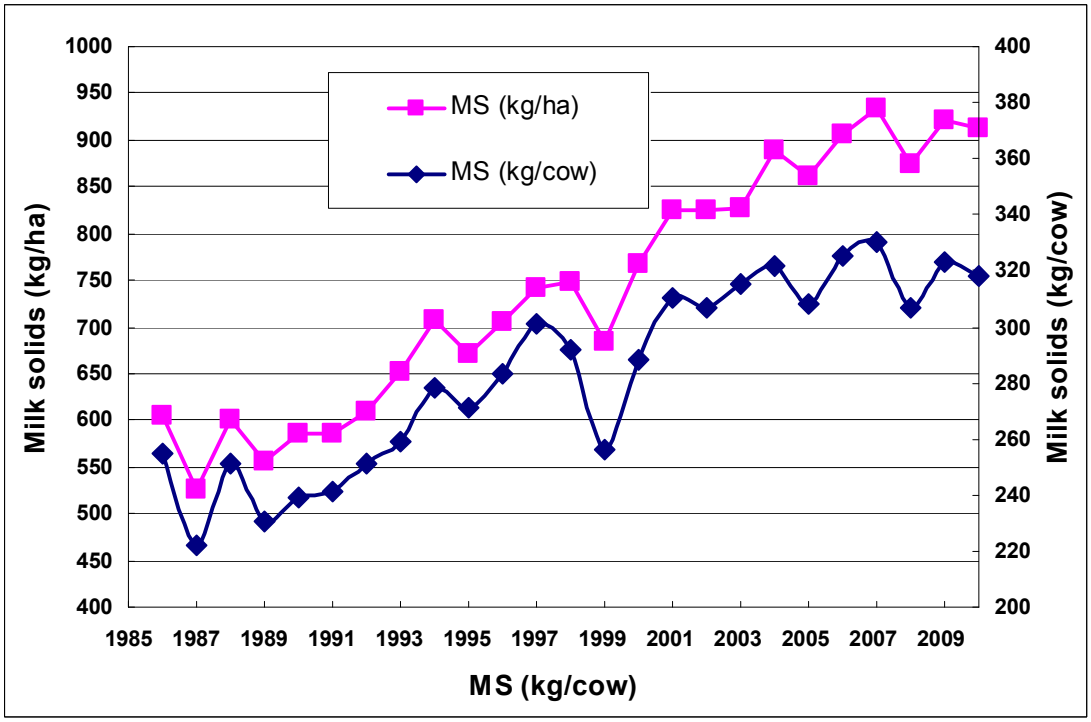


Figure 8: Trends in milk solids production per cow and per hectare on New Dairy Farms (1986-2010) *(Source: NZ Dairy Statistics, 2010)*

Section 2: Avenues to increase milk production on Irish dairy farms

1. Increase cow numbers

Increase cow numbers will play a significant role in increased milk production. This will only be possible by developing an AI bred high EBI Holstein Friesian and Holstein Friesian crossbred dairy herd. Figure 9 shows the trends in female calves born to dairy bulls from 2002 to 2010. The proportion of dairy dams bred to dairy sires has increased from 52% in 2006 to 66% in 2010; likewise the proportion of Friesian cows bred to Friesian sires has increased from 44% to 59% over the same period. Ideally in a no milk quota scenario, cow numbers should increase by 3% per year; present indications are that this is already in place based on the increase in dairy female calves being born.

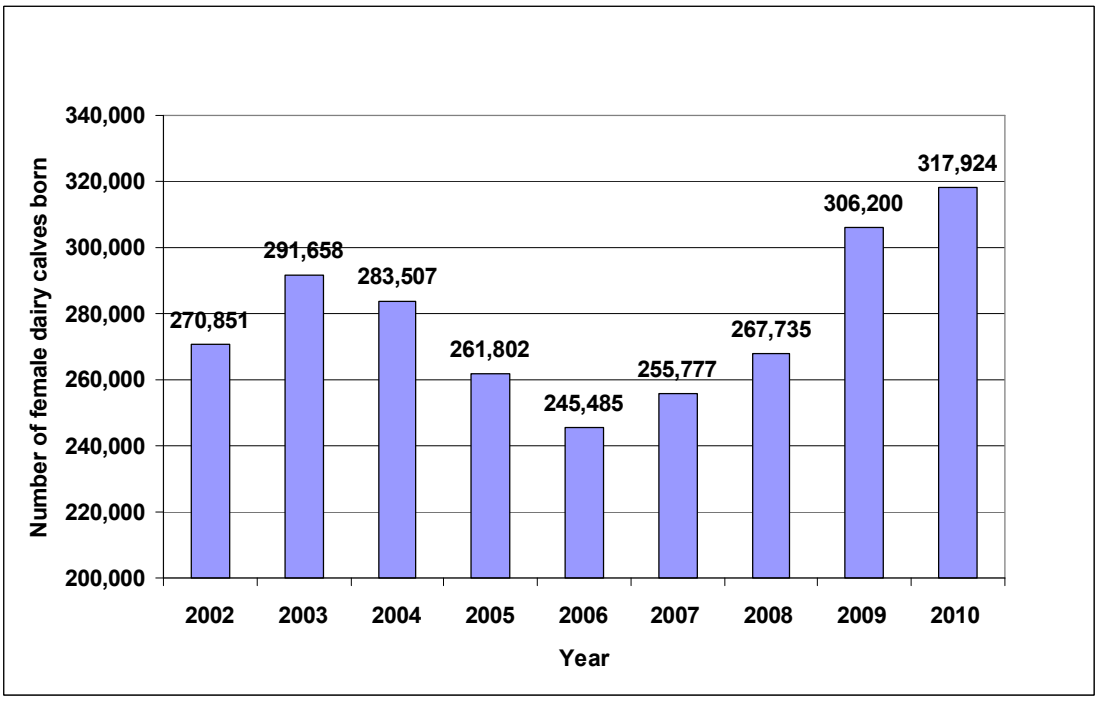


Figure 9: Number of female calves born to dairy bulls 2002-2010 *(Source: CMMS statistics report 2003-2008 and AIM statistics Report 2009-10)*

2. Increase grass utilisation

Dairy farming post quota abolition will require farmers to withstand the challenge of price volatility of both inputs and outputs in a free market situation. To that end, low

cost grass-based systems that can cope with this volatility are likely to be the most profitable systems. Grass utilisation is one of the key drivers of productivity and profitability in grass-based systems. The amount of grass utilised per hectare and the efficiency with which that grass, together with supplementary feeds, is converted into milk will determine the productivity and profitability of the farm.

The Grass Calculator (McCarthy et al., 2011) which was launched at the Moorepark Open Day this year is a model that can be used to back calculate the quantity of grass harvested or utilised on farm in terms of UFL's. Data from the National Farm Survey (NFS) in 2010 was entered into the Grass Calculator to obtain an estimate of the quantity of grass utilised per hectare on the average dairy farm in Ireland (Figure 10). On average approximately 6.6 t DM/ha (UFL's) were utilised on the average dairy farm in Ireland in 2010 at a stocking rate of 1.85 cows/ha. Figure 10 shows the relationship between grass utilised per hectare and net profit for the 316 dairy farms in the NFS database for 2010. Approximately 42% of the variation in net profit per hectare can be explained by the level of grass utilised per hectare. Additionally this relationship showed that net profit increased by €162/hectare for every additional one tonne of grass utilised. Analysis was also carried out on the National Farm Survey data from 2008 and 2009. The proportion of the variation in net profit/ha accounted for by the level of grass utilized/hectare was similar to that for 2010.

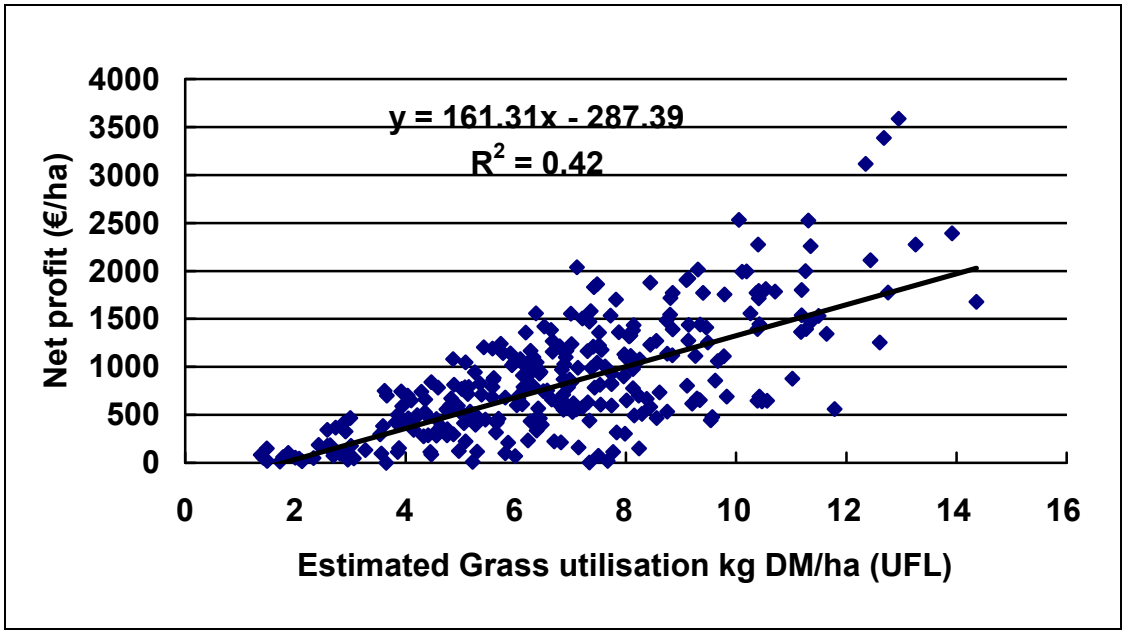


Figure 10: The relationship between estimated grass utilised per hectare and net profit per hectare in 2010 *(Source: Authors Estimates based on NFS 2011)*

.

Table 2 shows an estimate of the average grass utilised/ha for 2008, 2009 and 2010 plus some performance data from the National Farm Survey 2008-10. The analysis includes 2009 which was a very difficult year in terms of grass growth and utilisation because of higher than normal rainfall in the months of July to November. Grass utilised per hectare was highest for 2010 supported by both the higher milk production per cow and per hectare. Grass utilised per hectare is a function of grass grown per hectare, stocking rate, grassland management and the level of supplementary feeding. The main factors influencing grass utilisation per hectare on farms are:

Table 2 : Average grass utilised per hectare per year from 2008 to 2010.

	2008	2009	2010
Grass Utilisation (t DM/ha)	6.35	6.30	6.61
Stocking rate (cows/ha)	1.80	1.82	1.86
Concentrate/cow (kg)	954	868	945
Milk yield/cow (litres)	4945	4715	5018
Milk yield/ha (litres)	8981	8736	9508
Milk solids yield/cow (kg)	323	303	350
Milk solids yield/ha (kg)	582	561	667

Source: Authors Estimates based on NFS (2009, 2010 and 2011)

1. Stocking rate

Stocking rate is one of the major factors affecting the amount of grass utilised per hectare and striking a balance between the amount of grass grown and herd demand for that grass, through the appropriate stocking rate, is the key to maximise productivity within grazing systems. In both Irish and international studies of grazing systems, increasing stocking rate has been observed as the main method to increase productivity from grassland with more milk being produced through increased grass utilisation at higher stocking rates. A recent study examining the impact of stocking rate on milk production found that increasing stocking rate by one cow/ha results in an increase in milk production per hectare of 20% (McCarthy et al., 2011). However, excellent grazing management is a key component of increasing stocking rate and without first increasing the amount of grass grown and improving grazing management, increased stocking rate could expose the business to risk when the

milk price drops due to an increased requirement for supplementary feed (Shalloo, 2009).

2. Calving date

In seasonal grazing dairy systems, the planned start of calving, the calving pattern and the mean calving date are critical in terms of matching feed supply and herd feed demand in early spring (Clark et al., 2009). Calving should be concentrated just before the start of the grass growing season to ensure that feed supply is aligned with herd demand. Matching herd demand to grass growth in spring through the correct timing and pattern of calving facilitates increased grass utilisation by allowing cows to be turned out to grass earlier and will create the ideal demand for a predominantly grazing diet with little need for expensive supplements.

3. Supplementation

The use of supplement adds a degree of flexibility to the feeding management of the herd on occasions when grass supply is inadequate. It will reduce the animals' requirement for grass and buffers animal intake in times of feed deficit. Supplementation can therefore be an efficient short term management strategy to overcome feed shortages while maintaining herd performance when grass supply is in a deficit situation. The variability in the milk production response to supplementation depends on many factors such as the type of cow, grass availability, weather conditions and the type and level of supplementary feeding. When grass supply is adequate and supplements (either concentrate or forage) are fed to grazing dairy cows, the intake of grass is usually reduced (Holmes, 2008) and this will have a negative impact on grass utilisation. Research studies have shown that where grass supply is plentiful and the cows are receiving adequate amounts of grass, introducing supplements tends to increase milk production per cow but substantially reduces the grass intake of the herd. In this case, high cost supplements mainly replaces relatively cheap grazed grass in the animal diet and reduces grass utilisation.

Currently research herds in Moorepark are utilising between 11 to 12 t DM/ha at stocking rates of between 2.5 to 3.0 cows/ha. The objective of Irish dairy farmers should be to increase the quantity of grass utilised on their farms from the average of 6.5 t DM/ha up to a target of between 11 and 12 t DM/ha through a combination of increased grass production, better grazing management and higher stocking rates at farm level.

3. Increase EBI- genetic potential

The Economic Breeding Index (EBI), launched in 2001, has changed the emphasis dairy farmers place on milk production relative to functional traits, such as fertility and health. The predecessor to the EBI, the Relative Breeding Index (RBI), was solely comprised of milk production traits with the direct impact of deterioration in fertility and survival. For example, between 1990 and 2001 the breeding value for calving interval increased by 5.6 days whilst the breeding value for survival decreased by 0.56 units. A large proportion of this deterioration was simply due to the aggressive selection for milk production alone. Today, breeding decisions are based on the EBI comprising the six sub-indices of milk production, fertility, calving performance, beef production, health and maintenance, with 38.1% of the overall emphasis attributed to milk production. Higher milk production is achieved through improved genetic merit for milk production but also through longer lactation length via earlier calving and a more mature herd through greater survival.

In 2010, milk recorded cows on average yielded 490 kg of fat and protein from 6,681 kg of milk. In predicting the future milk production of the national herd, factors such as the usage of high EBI genetics to breed replacements and the level of exploitation of crossbreed genetics in the national herd must be accounted for. Although past genetic trends can be used to extrapolate future trends, exploitation of developing technologies makes extrapolation more difficult. In addition, the true ability of animals to produce milk when not restricted by quotas must be considered.

The use of AI to breed dairy replacements in Ireland is increasing; currently 54% of dairy replacements are bred to AI. Part of the increase in AI usage may be attributed to the increased attractiveness of AI since the launch of genomic selection into the Irish national breeding programme in Spring 2009. Genomic selection offers more accurate and intensive selection of sires than young bulls. The average EBI of bulls used in AI in Ireland increased from €118 in 2008 to €198 in 2010. However this is likely to be a once off as bulls in layoff (i.e. an accumulation of at least four years of genetic gain) was exploited in one year. The heterosis effect obtained through crossbreeding will also impact the milk production of the future national herd. The predominant choice of sire for dairy replacements remains the Holstein-Friesian and overall, the use of sires alternative to the Holstein-Friesian to breed replacements has not increased over the past five years. However, the choice of alternative sire breed has switched from using predominantly Red breeds to predominantly Jersey

sires. In 2010/2011, 3.6% of heifer replacements (calf registrations) were bred from a Jersey sire, while 2.5% were bred to a Red sire.

Using past genetic and phenotypic trends it is expected that milk production/cow will increase by 3 to 4 kg of milk solids annually. This will be the result of increase breeding values for fat and protein yield as well as shorter calving interval translating into longer lactation length. Additionally it is estimated that there will be a once off 5% increase in milk yield per cow with the cessation of EU milk quotas.

4. Increase land area allocated to dairying

Increased milk production on existing dairy farms will be achieved through a combination of greater specialisation in dairying, moving replacement heifer rearing to outside the milking platform and increased stocking rates. Laepple and Hennessy (2010), using the 2008 National Farm Survey database, examined the capacity to expand milk production on existing dairy farms. The analysis showed that, given the infrastructure that exists on farms in 2008 and expected gains in productivity per cow, that the existing population of dairy farmers could increase national milk production by 72% by 2020. However, when anticipated farm exits from milk production and costs of expansion are considered, this falls to between 10 and 50% depending on future milk price, increases in productivity per cow and declines in dairy farm numbers.

As we approach quota removal, the Irish government has decided to allocate one quarter of the annual 1% increase in EU milk quota to new entrants between now and 2015 as part of the Irish milk quota expansion policy. Approximately 230 new stand alone dairy farm businesses have successfully received 200,000 litres of milk quota from the scheme in it's first 3 years, while the superior profitability of dairying, has made this an attractive opportunity for farmers in other low margin enterprises and the number of applications to the scheme increased significantly each year; exceeding 200 applications for the first time in 2011. This group of new dairy producers represent the initial evolution of the dairy industry in Ireland post EU milk quotas, and provide a unique opportunity to examine the characteristics of new dairy producers entering the industry in Ireland post-EU milk quotas. The geographic distribution of these new dairy farms in relation to the existing specialist dairying areas is highlighted in Figure 11 using GIS mapping. The map shows that the majority (81%) of new dairy farm units are being set-up in the southern half of the country within the traditional dairy areas. Longer term, and given the significant

geographical redistribution of milk production in New Zealand, we can expect to see a greater distribution of new dairy enterprises throughout Ireland as milk production increases and farmers move outside the traditional milk production areas to secure larger land block for new dairy enterprises.

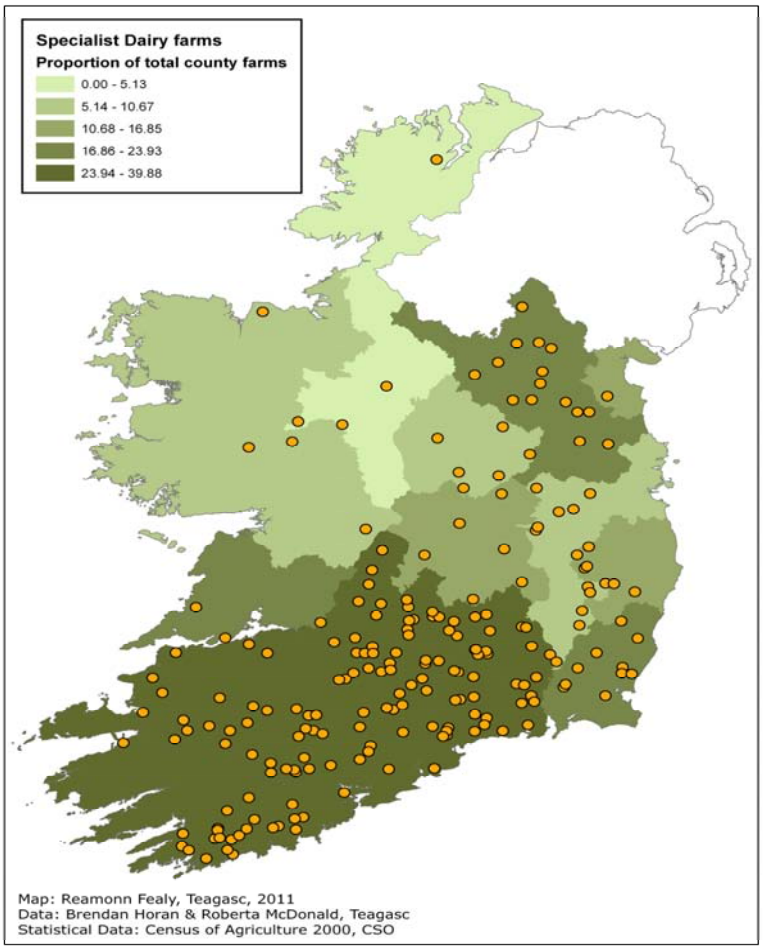


Figure 11: Geographic Distribution of new entrant dairy farms in Ireland during 2009, 2010 and 2011in relation to the proportion of national specialist dairy farms *(Source: McDonald et al., 2011)*.

Section 3: Challenges to sustainable increases in milk production

1. Continued increases in farm efficiency

Due to reduced EU market support for dairy products, milk price volatility will be a key component of the industry in the future. This fluctuation in world market price will be driven by small changes in the overall supply demand balance. The business strategy adopted at farm level to maintain a viable farm business in this scenario will require dairy farmers to develop systems of milk production capable of delivering sustainable returns within these constraints. In Ireland this will be best achieved through the development of low cost grass-based systems of milk production.

Figure 12 shows the trends in costs of milk production from 1996 to 2010 in nominal terms, using data from the National Farm Survey database while Figure 13 shows the trends in cost of milk production adjusted for inflation using the CSO Agriculture Price Index for agriculture inputs **(**www.cso.ie/statistics/**)**.

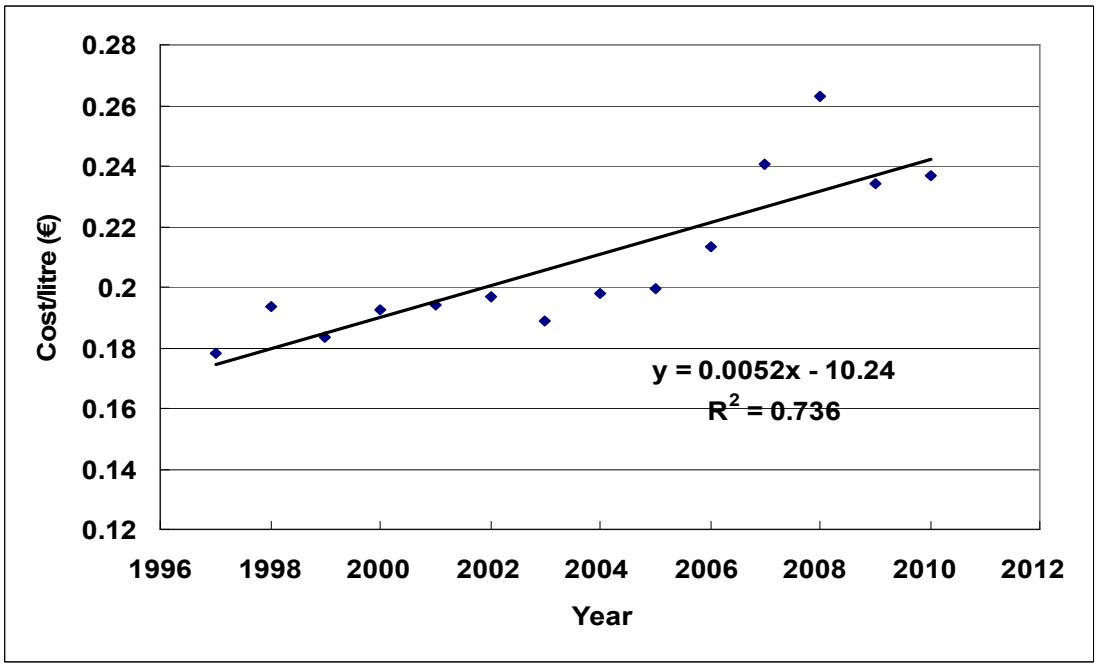


Figure 12: Trends in the cost of milk production 1997 to 2010

Source: Authors Estimates based on data from NFS database (1996-2010)

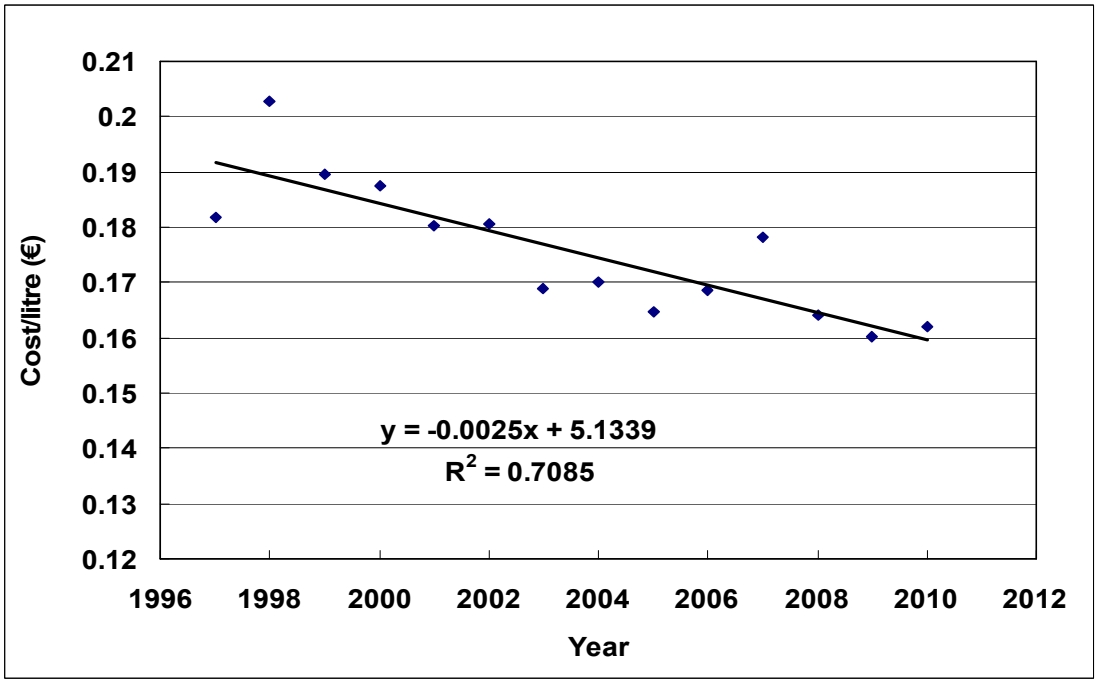


Figure 13: Trends in the cost of milk production using 1996 as the base year adjusted for CSO Agriculture Price Index

Source: Authors Estimates based on data from NFS database (1996-2010)

The analysis shows that on average the costs of milk production increased by 0.52 cent/litre per year over this period (Figure 12). However when cost are adjusted to take into account increases in agriculture prices over this period costs/litre reduced by 0.25 cent/litre (Figure 13). This indicates a real decrease in unit costs of production of 0.25 cent per litre over the period 2007 to 2010. When a similar analysis was carried using the top third of producers ranked on profit per litre the analysis showed that costs of production increased by 0.28 cent/litre and when adjusted for inflation reduced by 0.36 cent/litre. Continued increase in efficiency will be essential in the future to improve overall competitiveness of Irish milk production.

2. Increase grass DM production per hectare

In Europe, grass breeders have increased DM yield by 0.5% per year over the last 40-years as tested in cutting trials (Van Wijk and Reheul, 1991; Camlin, 1997; Chaves et al., 2009). However there is little evidence that new grass cultivars have made any significant contribution to increased animal production from grazed grass other than in situations where the availability of grass is the limiting factor for production. A recent study carried out in New Zealand showed no advantage in milk solids production to more recent cultivars of both perennial ryegrass and white clover

compared to older cultivars (Crush et al., 2010). This study compared perennial ryegrass cultivars from the1980's to those of the 1990's plus white clover cultivars of 1990's to those of 1960's with grazing dairy cows over 4-years.

Results from research farms indicate that under optimal management conditions grass utilisation is maximised at between 12 to 13 tonne DM/ha, based on grass production of between 14.5 to 15.5 tonnes DM/ha. This level of grass production and utilisation is capable of carrying a stocking rate of 2.7 to 2.9 cows/ha with a concentrate input of 300 to 600 kg/cow producing approximately 1,300 kg of milk solids/ha. Over the coming years there will be a requirement for research to improve grass production, utilisation and consequently animal performance through application of plant breeding technologies. This will be achieved by selecting grass and white clover cultivars with improved DM production, canopy structure, quality characteristics and persistence. The continued development of the grass economic index and on-farm evaluation of cultivars will be important in achieving these objectives. To date in grass breeding and evaluation, the requirement of the grazing animal and the effect of grazing per se has not been satisfactorily incorporated in either breeding or evaluation programs.

3. Milk Quality

The Irish dairy industry will require milk with higher quality standards in the future given that 85% of milk produced is exported as dairy products and with greater trade liberalization will result in greater competition in the market place. Similarly higher quality milk will be required as milk processors increase the proportion of output into higher value-added products. This is exemplified in Danone Baby Nutrition €50 million investment in its manufacturing facility in Macroom Co. Cork. This will be the largest and most technologically advanced centre in Danone Baby Nutrition's Global Network. This development will require improvements in milk quality, especially in relation to levels of termoduric bacteria.

In recent years most milk processors have introduced tiered milk payment systems paying a bonus for milk that meets premium standards across all the critical parameters i.e. TBC, SCC, Thermoduric Bacteria, lactose and is free of inhibitors and sediment. With the exception of extremely early and late periods of lactation, milk from healthy dairy cows that have been provided with a well-balanced diet and a

suitable living environment is essentially free of contamination. However, there are many opportunities along the milk pipeline from producer to consumer where contamination can occur.

Quality is important to the processor as it impacts on product yield and consistency, thus affecting profit margins and market access. Excessive levels of chemical residues are also a concern i.e. iodine and trichloromethane (TCM). Teagasc in collaboration with Irish Dairy Board and the five Irish butter manufactures have been involved in a programme to reduce TCM levels in Irish butter destined for the German market for the last three years. The results of this programme have been highly successful with levels being reduced by greater than 50% over the three years. If levels had not been reduced it would have seriously jeopardised the sale of Irish Kerrygold butter in the German market where it's sold as a premium product. These reduction in TCM levels were achieved at farm level without any extra cost; only adherence to correct milking machine and bulk tank washing procedures.

Likewise milk with elevated SCC will result in reduced profitability at farm level but also in reduction in cheese yield and product quality at processing. The launch of the 'CellCheck' programme by AHI this year which is a collaborative venture involving the majority of dairy industry stakeholders should increase the focus on milk quality. Dairy farmers should be aware that in most situations improvements in milk quality do not necessitate increase in cost of production and more than often increase profit e.g. reduced cell count.

4. Labour efficiency

Increasing herd size will demand increases in labour efficiency. Data from the Moorepark labour study, albeit 10 years old now, showed that when herd size was divided into three size categories, herds of under 50 cows required 48 hours per cow per year, between 50 and 80 cows required 42 hours per cow per year and over 80 cows required 29 hours per cow per year. Adoption and investment in technologies that will allow more cows to be handled with less labour will be key to maximising the potential of increased cow numbers. Contract rearing of heifers, maximising the use of the contractor and running a simple grass based system will feature as the most important factors affecting whether additional cows can be handled without increased labour costs.

5. Land Mobility

Nationally, while there is potential for substantial increases in stocking rates from the current levels there will be a requirement to increase the land area under dairying. Increasing stocking rates beyond where grass utilisation is being maximised will result in higher input systems which will be vulnerable in situations of extreme milk price volatility. All potential barriers that are currently impeding the movement of land must be investigated. Models must be set up to facilitate both the increased transfer of land through sales and through land rentals and partnerships. In land rental situations, a model that allows the sharing of risk between the lessee and lesser must be investigated. Currently most long term lease agreements involve the lessee taking all of the risks, through investments on the farm etc, which will be a barrier to increased farm scale through leasing.

6. Low cost housing

The main focus of an expanding dairy business must be on aspects of the business that directly increase profitability, such as increasing stock numbers, increasing pasture performance, increasing the genetic merit of the dairy herd and reducing the risk of a herd health outbreak. Expansion will put a significant drain on cash flow within the farm. Therefore investment in housing should centre on low cost capital expenditure and labour efficient structures. This may be in the form of stand off pads and earthen bank tanks or low cost concrete structures. The design of the milking parlour and collecting yard layout should focus on reducing labour requirement while at the same time providing good cow flow and good cow traffic speed through the milking facilities. The parlour should be designed with an adequate number of units for the cow numbers that are expected in the future.

7. Education and training

A vibrant dairy industry is very much dependent on a continuous flow of well trained young people into dairy farming. This year there are greater than 600 students participating in Level 5 Certificate in Agriculture courses and approximately 70 in Level 6 Advanced Certificate in Dairy Herd Management courses in Agricultural Colleges in Ireland. This, combined with a large number of other Higher Level Agriculture and part-time courses, is an immense resource. The dairy business requires a vast array of skills in order to be successful. The key skills include business management, monitoring and budgeting, grassland management and stock management. The farmer must use all of these skills together to run the farm. There

is a requirement for a high level of education among farmers now. Good training courses are needed that provide dairy farmers with the skills to become business managers.

8. Environment

Environmental polices both at national and EU level are continually evolving. Over the past number of years agriculture has seen the introduction of the nitrates directive, water framework directive and the setting of a target reduction of 20% in emissions from the non emissions trading sector (ETS). Ireland has the potential to produce high quality food in a sustainable manor. In November 2010, the EU Commission approved a renewal of derogation for Ireland which allows individual farms to operate above this statutory livestock manure limit, up to a maximum limit of 250 kgs Nitrogen/hectare/year, subject to conditions. The derogation will now run to the end of 2013, coinciding with the next review of Ireland's Nitrates Action Programme. The future success of the Irish dairy industry is very much dependent on Ireland maintaining this derogation. In order to maintain this derogation there is a requirement to improve water quality; especially in relation to nitrate concentration in groundwater. Recent research has demonstrated that it is possible to achieve both objectives i.e. high water quality and high productivity from grass-based dairying by increasing N use efficiency.

Teagasc research has also shown that when grass based systems are compared to high input Total Mixed Ration (TMR) systems, that the grass based system produces milk with 18% less greenhouse emissions per kg of milk solids. Complying with greenhouse gas emissions targets may present a challenge in meeting Ireland's expansion potential. However, increased nutrient efficiency should be a key objective of any dairy farmer.

9. Availability of finance

Considering world wide economic conditions, the availability of finance will continue to impinge upon producers and expansion plans. While such factors are outside the farm gate and beyond the producer's control, there is tremendous potential for improved farm management and financial planning inside the farm gate. It is imperative that all producers are acutely aware of their costs of production. Producers need to produce and revisit their farm plans in line with changes in both

technical and financial performance. Producers should work closely with their financial institution to ensure that business plans are communicated clearly and appropriate financial facilities are drawn. Plans must be clear and specific with allowances for unknown events/costs (stress testing). Producers need to plan for the future of their farm business while understanding their current efficiencies and weaknesses. Planning must be in a step wise fashion with clear direction, ambition and knowledge. Farmers need to put their best foot forward when seeking finance.

Acknowledgements

I would like to acknowledge the significant assistance that I obtained from my colleagues in Teagasc namely Brendan Horan; Laurence Shalloo, Owen Kelly, Brian McCarthy, Sinead McParland and Brian Moran.

References

Animal Identification and Movement Bovine Statistic Report 2009/2010: Department of Agriculture, Fisheries and Food

Camlin, M.S. 1997. Plant breeding-Achievements and prospects- Grass, Seeds of Progress. Occasional Symposium No. 31. British Grassland Society (ed. Weddell, J.R.): 2-14.

Chavers, B., De Vliegher, A., Van Waes, L., Casler, L. and Marynissen, B. 2009. Changes in agronomic performances of Lolium perenne and Lolium multiflorium varieties in the past 40 years based on data from Belgium VCU trials. Plant Breeding, 128: 680-690

Clark, C., K. Macdonald and D. Dalley 2009. Stocking rate and calving date decisions for dairy farms. South Island Dairy Event. 11: 9-19

CMMS Statistic Report 2006-2008: Department of Agriculture, Fisheries and Food

Crush, J. R., Woodward, S.L., Eerens, J.P.J. and K.A. MacDonald 2006. Growth and milksolids production in pasture of older and more recent ryegrasses and white clover cultivars under dairy grazing. New Zealand Journal of Agriculture Research 49: 119-135.

Laepple D, and Hennessy T, (2010). The capacity to expand milk production: evidence from the National Farm Survey

Livestock Improvement DairyNZ 2010: New Zealand Dairy Statistics 2009-2010. Livestock Improvement Corporation. Hamilton, New Zealand

National Farm Survey Report 2010 (2011) Agricultural Economics & Farm Surveys Department, Teagasc, Athenry, Co. Galway

McCarthy, B., Shalloo, L., and U. Geary 2011. The Grass €alculator. Moorepark Animal & Grassland Research and Innovation Centre, Teagasc, Fermoy, Co. Cork.

Shalloo, L. 2009. Pushing the barriers on milk costs/outputs. Teagasc, National Dairy Conference.

Van Wijk A.J.P. and Reheul d., 1991. Achievements in fodder crops breeding in maritime Europe. In: den Nijs, A.P.M. and Elgersma, A. (eds). Proceedings of the 16th meeting of Eucarpia Fooder Crops Section, Wageningen, 1990, pp. 13-18.

Funding Dairy Expansion: A Banker's View

Seán Farrell
Head of Agriculture
Bank of Ireland Business Banking.

The Opportunity

The abolition of milk quota's in 2015 will present obvious opportunities for Irish dairy farmers to increase milk production from present levels. Whether or not the increases will be as forecast in the *Food Harvest 2020* report remains to be seen, however Bank of Ireland anticipates a significant increase in Irish dairy output post 2015 supported by:

- Growing world population
- Increasing urbanisation and westernisation of developing countries dietary requirement
- Supply deficits in key dairy importing regions, e.g. China, India
- Ireland's grass based system of milk production supports lower costs of production per litre of milk produced than more intensive grain based systems
- Dairying offers consistently higher income levels than most other farming enterprises

While the discussion is ongoing about who will process, market and sell the additional milk produced by Irish dairy farmers, for the purposes of this paper we are assuming that additional milk produced will be purchased and delivered to market by the Irish dairy processing industry.

Similarly, we expect to see instances of new large scale green field farms; however the Bank of Ireland view is that the bulk of additional production will come from dairy farmers who upscale their existing levels of output; perhaps at the expense of discontinuing another less profitable enterprise. This paper will focus on the options available to those existing dairy farmers who plan to grow their businesses.

Measurement and Planning:

Before considering expansion, we recommend that you first of all appraise your farming operation to identify the existing strengths and weaknesses, and then make whatever changes are necessary to become as efficient as possible at present production levels. Completing Teagasc's E-profit monitor will quantify historical

output and production costs in €c per litre and is a good way of measuring efficiency levels relative to the average and the most profitable farmers who complete profit monitors.

Once you make the decision to grow your business, we recommend that the expansion is well planned before you start out. Development plans can take many forms and the extent of the development will likely determine how detailed a plan will need to be. Regardless of the scale of growth proposed, you always need to consider what needs to happen, when it needs to happen, who will make it happen and how the development will be funded.
Expansion may typically be funded from a combination of savings, grant aid, cash-flow and bank loans.

When a development is being funded using grant aid a bridging loan can be provided which is repayable once the development is complete and the grant has issued from the Department of Agriculture. Though less common in recent times, bridging loans were prevalent when the department of agriculture offered grant aid through the farm waste management scheme; and can be made available to fund grant supported developments.

Cash-flow should rarely be used to fund an expansion program, and certainly should not be used as a permanent source of funding for capital development. Doing so will reduce your farm's available working capital and will likely result in increased reliance on your overdraft facility.

Loan Application Requirements
When you approach your bank for a loan, the main consideration the bank will have will be your future repayment capability. Security is also usually required to support a loan application however it is a secondary consideration to repayment capacity.

Security to cover farm development loans generally takes the form of a first legal charge over farmland (provided through your solicitor) plus an appropriate level of life insurance cover.

Financial track record (as evidenced through the operation of the farm current account) and your management ability are also considered when determining how likely you are to have the capability to repay loans issued to you.

Standard information which you are likely to be asked to provide will include:

- Details of the development which you are planning; if it involves a building project, then what type and extent of building is proposed. Have planning permission requirements been met and are costings* available for the expansion as proposed?
- An up to date stock listing.
- An overview of your land base; the number of hectares owned, leased, rented, etc. and the proportion of each allocated to the dairy grazing platform.
- Confirmation of your existing milk quota and direct payments receivable, i.e. Single Farm Payment, REPS, Area based Compensation, etc.
- Confirmation of any off-farm income receivable, (P60 and wage slips if available)
- Certified financial accounts and profit monitor reports where available.

* Farm Development Costings typically are underestimated with additional building works to what was initially planned often taking place. Stock required to produce additional volumes of milk are often not considered as a cost as they may already be in the herd. Where this surplus stock would usually be sold, the opportunity cost to the farm cash-flow of this sale not taking place needs to be considered.

Repayment Capacity

Repayment capacity on a dairy farm can be determined as follows:

	Net income from milk sales: Perm. milk quota x margin, e.g. €0.12	(1)
+ (plus)	Income from other farm enterprises	(2)
+	Single Farm Payment	(3)
+	Area based compensation	
+	REPS / AEOS Payments	(4)
-(minus)	Rented / Leased Land expense	
-	Hired Labour charge	
=(equals)	**Total Farm Income**	
+	Non Farm Income	(5)
-	Taxation Liability / Pension Payments	
-	Living Expenses	(6)
=	**Total Available for all Repayments**	(7)

Repayments:

	Existing Annual Farm Loan Repayments	(8)
+	New Farm Loan Projected Annual Repayments	
+	Annual Hire Purchase / Leasing Repayments	
+	Annual Home Loan / Personal Loan Repayments	
=	**Total Projected Loan Repayments**	

Total Available for Repayments

÷

Total Projected Loan Repayments

=

Repayment Cover

Repayment Cover must be > 1.

(1) The margin will vary depending on your efficiency. This will be determined by assessing historical farm accounts, profit monitors and in some cases by a farm inspection.

(2) As with the margin, income from other enterprises, e.g. beef, tillage, etc is generally verified through financial accounts.

(3) Single Farm Payment is assessed for sustainability beyond 2013.

(4) REPS / AEOS payments are included for the confirmed period of either the REPS or AEOS contract.

(5) Income included here will typically be net PAYE income from a farmer and his / her spouse. Rental income from a Residential Investment Property, Share Portfolio dividends, etc. will also be considered.

(6) Living expenses will vary depending on family circumstances, standard of living, etc. Historical financial accounts will be used as a guide to estimate projected living expenses.

(7) This amount is assumed as available to service all loans, both existing and proposed.

(8) All loan repayments are stress tested to take future interest rate increases into account.

When the existing farm business combined with the other sources of income listed above has sufficient profitability to support the repayment of all debts, (both existing and proposed), then it is likely that you will be able to secure bank support for your expansion project without submitting further information.

Farm Business Planning:
If repayment capacity will be reliant on additional income from your expanded farm business; then your bank is likely to want to see a more detailed business plan including projected cash–flows as provided by the Teagasc 5 Year Farm Planning program.

We would typically expect the medium term profitability levels projected in the farm plan to be comparable (on a per litre basis) with what has been achieved in the past. Significant increases in projected profitability above what has been achieved historically are likely to be queried. If the development proposed is an aggressive large scale expansion, then past experience tells us that profit per litre in the early years of the development may actually reduce until the expanded farm becomes fully established. New stock, additional grazing ground, the introduction of new workers to the farm and new buildings or accommodation facilities all have the potential to impact on herd performance and farm profitability.

The following are general areas which you should consider addressing within a business plan:

- Your experience and track record to date; How long are you farming? How have you previously invested in your farm? (Land purchase, increased stock numbers and quality, prior farm development, etc).

- Provide a summary of the project proposed; including a breakdown of the bank support sought and additional sources of funding available; savings, grant, etc. Your bank will like to see some personal equity commitment. An accrual of savings from historical farm profitability reflects positively on your ability to repay any borrowings proposed. This is not always a requirement however, and the extent of your recent farm investment will be taken into account.

- How realistic are projected cash flows in the business plan? Are they based on historical performance levels averaged over a number of years?

- What land base will be available? Specific detail on the extent of the grazing platform and its reliance on rented and leased land should be commented on. If a significant portion of the grazing block comprises rented land, then how likely is it that this rented land will continue to be available in future?

- Projected stock numbers and breeding policy. If stock are to be purchased as a means of growing the herd, is there a health screening and vaccination policy in place?

- As mentioned earlier, your business plan should detail the infrastructural developments proposed, i.e.
  - Accommodation: new build / conversion / alternatives
  - Milking Facilities
  - Machinery
  - Roadways, Water system, etc.

- Milk Quota availability and purchase plans if applicable. How will you manage the super levy risk between now and 2015?

- Labour Requirement; will there be additional farm labour employed and if so have you identified the person whom you intend recruiting?

The provision of such a business should help you and your bank to identify the key risks which you will be exposed to by undertaking your proposed expansion program.

Debt per Cow

How much debt should a typical cow be expected to service??? In reality, there's no simple answer to this question. Is there such an animal as a typical cow? Output per cow, efficiency levels on farm, rented land, labour and family living expenses all majorly impact on the debt levels which a dairy herd can service. Take the following two examples. In the case of Cow A and Cow B, assume that both come from a 100 cow herd, that the rented land expense for A's herd is €10,000 and B's is €15,000,

and that family drawings (including taxation) from A's herd were €40,000 and from B's herd were €60,000.

	Cow A	Cow B
Output per cow (litres)	6,000	7,000
Net margin per litre (€)	0.16	0.12
Net dairy cash flow per cow (€)	960	840
LESS:		
Rented land per cow	(100)	(150)
Hired Labour per cow	0	0
Family Drawings and taxation per cow	(400)	(600)
Available to service debt per cow €	460	90
Debt per cow over a 15 year loan term (6% interest rate)	c. €4,500	c. €890
Debt per cow over a 10 year loan term (6% interest rate)	c. €3,400	c. €670

When considering these "debt per cow" figures, we should take into account that most farms will have more than one loan in place, that these loans will be over varying loan terms and that most farms will also have an overdraft or seasonal loan which will make interest demands on the farm's cash flow. No hired labour charge was included in either of the above cases and is likely to be a consideration on many farms.

The variability in debt servicing per cow in the above example proves the point that each case has to be assessed on its own merits and that each individual case is different. Additional income from other farm enterprises, off farm employment, single farm payment, etc will also affect overall repayment capacity.

Milk Price – The Big Variable:

The key variable which is largely beyond the control of individual farmers is the future prevailing milk price. Globalisation, reduced market supports, extreme weather conditions all have the potential to increase milk price volatility. While international dairy commodity prices should be expected to support production costs in excess of those which will prevail on efficient Irish farms, there will be times when international supply and demand trends will force farm gate milk price downwards towards the cost of production. Conversely, there should also be periods of expected profitability when demand surges for dairy commodities cannot be immediately met from existing supply channels. Managing this volatile market and the prices which volatility will bring will in itself be one of the biggest challenges for Irish dairy farmers, processors and their banks in future. As bankers who are committed to supporting the dairy industry, we will need to work with our clients to support farm cash-flow during times of low milk prices, as well as encouraging our customers to build up some reserves during times when high profit margins are available.

In conclusion, Bank of Ireland welcomes the expansion of the Irish Dairy Industry. We are very much open for business. We look forward to supporting efficient and viable dairy farmers who want to expand output, grow their farm business and secure their future in the dairy industry of tomorrow.

Business Renewal, Growth and Transition:
Opportunities and Challenges

James Allen, AgFirst, NZ

Introduction

There have, and always will be, opportunities for growth in the Dairy Industry. Sometimes these opportunities are merely a gentle tap on the door, while at other times a sledge hammer is breaking the door down. Growing a farming business can be highly rewarding, however, it is not without risks and not for the faint hearted. Above all, there needs to be clarity on the reason for growth and the desired outcomes. Throughout my experience as a farm advisor in the New Zealand Dairy Industry, I have seen several cycles of growth, consolidation and even recession. In fact, most of my daily work involves working with farming businesses in each of these various phases. I am very cautious about not wanting to say this is how things should be done, but more to highlight some of our experiences in New Zealand dealing with growth opportunities. The presentation will cover seven key points regarding business growth and transition based on these experiences.

Background

To provide some context, it is useful to understand the history of farm growth in New Zealand. Over the last 30 years the number of dairy farm suppliers in New Zealand has decreased from 16,000 to around 11,000 today. However, the average herd size has increased from 120 to 380. This equates to an average increase of just under 10 cows per annum for the average herd. In this 30 year time span, total stock numbers have risen from 2 million to 4.4 million milking cows. The area being farmed for dairy has risen from 1 million ha to 1.5 million ha. Thus, there are several factors at play here, i.e.:

- Growth in farm area (conversion from sheep and beef or forestry land into dairy land;
- Intensification of existing area, i.e. higher MS production per ha, through use of N, maize, better stock genetics and better management;
- Amalgamation of farm units, meaning the average farm has increased in size from 63 ha, running 2 cows per ha, to 134 ha, running 2.8 cows per ha.

Rather than looking at the issues surrounding green field conversions, this presentation is focused more on the issues surrounding organic growth of the

farming business. In other words, how does the typical family farm approach issues of expanding their current business, complete with challenges such as old or tired infrastructure, land locked situations, existing farm systems and debt levels, and existing family dynamics which are a major influence in any farming business. Today, I have focused on 7 key points which I will now run through, and where possible, illustrate these point with real life examples.

1. Strategic Planning

"If you do what you have always done, you will get what you have always got". In other words, if you are happy with your current situation and have no desire to change, there is little point in having a plan for your business. However, if there is a desire to grow and seize opportunities, having a basic Strategic Plan for your farm business is an absolute essential. Firstly, there are several key questions that must be answered:

1. What are your drivers or reasons for growth?

2. Do you need to grow your farm business?

3. Do other members of your farm business share the same views as you?

4. Are there intergenerational issues that need addressing? In other words, are your sons or daughters going to be a part of your farming business in the future?

It has often been reported that around 70% of small businesses do not have any form of business plan and I have seen no evidence to suggest that this is any different for farming businesses in New Zealand. When the CEO, company chairman, financial administrator, herd manager and tractor driver are all the same person, it is harder to put forward an argument for having a written business plan. However, like it or not, farm businesses will continue to grow in size, meaning an increase in complexity and more importantly, an increase in the number of parties involved in the farming operation. This includes fellow business partners, staff members, the team of rural professionals supporting the business, and the Bank Manager who has a significant interest in ensuring that the business is performing. The point being that a simple

plan will help communicate your direction with all parties involved. This ensures you are all working towards a common goal, and those involved in the business will help to achieve that goal. If we think of our business as a bus driving down the road, a simple, clearly written plan will help to ensure the bus is going in the right direction, and everyone is looking the right way.

From my experience, the most important question to answer is, "Why you are growing the farm business?" In the short-term, growing the farm business will mean more debt, additional workload, more staff management, additional compliance costs, and more risk. Thus, in the short-term, expanding the business will mean less free time and not necessarily greater profit. If you are at an earlier stage in your farming career, or have pressing issues with regard to farm succession, then this may be justifiable. However, growing your business just because the neighbour has grown theirs would seem an unusual business strategy. Be clear on your drivers for growth.

2. Financial Planning

History clearly shows that the number one reason for failure of any small business start-up is poor cash-flow management. In recent years we have seen this issue repeated many times in the dairy industry in New Zealand. This has been highly exacerbated by over-valued land prices, which has resulted in too much of the milk cheque being directed at interest and debt principal repayments. In fact, the level of debt servicing as a proportion of farm income in New Zealand has risen from 13% to 26% in the last decade. This over-valuation of farm land, based on speculation of increases in land values, along with the global recession and associated tightening of monetary conditions has resulted in a fundamental shift in the way banks are looking at lending on farm businesses. There has been a return back to fundamentals. By this I mean:

1. They need to be cash-flow positive on an annual basis;

2. They need to have realistic levels of leverage or debt to equity;

3. A need for the farmers to have ownership of the cash flow management. No longer will banks prepare budgets for the farmers – it is now the responsibility of the farmer and the business team around them to present a proposal to the bank. I see this as a positive move, as it should always be the business

owner making the ultimate decision on borrowing, not just because the bank thinks it is a feasible proposition.

As the business grows, there has been an increased need to streamline the financial management process. I also believe it is important to understand your own strengths and weaknesses. This may mean outsourcing the day to day administration tasks of bookkeeping. However, this does not absolve the farm owner from undertaking ownership and understanding and responsibility of the financial position. In fact, as a business grows, it becomes crucial that the business owner has a comprehensive understanding of the financial position.

3. Human Resource Management

As previously discussed, history would suggest that the size of the average farm will grow over time. While allowing for some advances in efficiency, it is inevitable that this will result in more people being employed in work in each farming business. In fact, the comment is often made back at home that farming today is as much about farming people as it is about farming cows. This has been one area where we have found our skill sets lacking. Only a tiny handful of today's farm owners will have ever undertaken any form of staff management training. Challenges include:

1. Understanding the legal requirements regarding staff employment;

2. How to manage the transition from being a 'hands on' farmer to becoming 'hands off'? As well as understanding the need for being clear on delegation and accountability form staff members, there is a psychological adjustment needed when a farmer who has often spent most of their life being physically involved with the farm business changing to a position of managing the farm business. This also means getting over the perceived need to be always leading from the front or the perception that the boss is not doing anything because he is spending all day on his computer.

3. How to motivate staff members. While the level of cash payment is usually a key determinant in staff recruitment, it is well down the list on what keeps a staff member in the job. Other factors include the feeling they are making a difference on the farm, that their opinions are valued, and they truly feel part of the team. Note that these factors do not cost any more to implement.

4. How to incentivise young staff to help them develop their career. If the dairy industry is viewed as a collective herd, the young staff are your replacement stock. How do you encourage them to become a long term player in the industry?

   With any farm business, there is usually some issue of farm succession to deal with. At a management level, this involves having a clear understanding from the senior generation to the next generation as to who will make key decisions, who is accountable, and how each generation will be financially rewarded for their efforts.

4. Self Management

As touched on at the beginning of this presentation, expanding the farming business may ultimately result in greater financial reward, but in the short-term, can result in more stress and less free time available. Be clear on your reasons for growth and your ability to handle this. For some farmers, the concept of growth is exciting, and is a key motivating factor for their decision to grow. In other words, it is the thrill of the chase and the excitement of the development itself which keeps them going. The key point here is knowing when enough is enough, not only for yourself, but for the sake of your family. In my experience in New Zealand, the typical level of drawings from a farm owner of 2,000 cows is actually not much different to a farm owner of 200 cows. Although their net wealth may be many times greater, and their next generation of family will be sure to benefit, their rewards for themselves are no different.

Be honest with yourself as to what your strengths and weaknesses are. If you are growing your business, do you need to up-skill yourself, or alternatively outsource these skills through additional staff employment or by using outside professionals? In most cases my role as a farm business consultant is being part of the management team on the farm, which includes the farm owners, farm manager, consultant, bank manager, accountant, and technical specialists where required.

A family owned business has both unique advantages and disadvantages, as shown below. Compare this list with your own business. What issues will you need to address in the coming years with regard to your family business if you are to move forward?

Bivalent Attributes of the Family Firm

DISADVANTAGES (-)	ATTRIBUTE	ADVANTAGES (+)
Norm confusion & anxiety. Family business & ownership issues can get mixed up. Lack of business objectivity.	Simultaneous Roles	Heightened family & company loyalty. Quick & effective decision making.
A stifling sense of being overwatched. Resentment toward family & business.	Shared Identity	Heightened family & company loyalty. A strong sense of mission. More objective business decisions.
Family members can point out weaknesses. Early disappointments can reduce trust in work interactions.	Lifelong Common History	Relatives can draw out relatives strengths and complement their weaknesses. A strong foundation can encourage a family to weather adversity.
Lack of objectivity in communication. Resentment and guilt can complicate work interactions. Covert hostility can appear.	Emotional Involvement and Ambivalence	Expression of positive feelings creates loyalty and promotes trust.
Can trigger sensitive reactions that can distort communication and encourage conditions for conflict.	Private Language	Allows for more efficient communication with greater privacy.
Can lead relatives to feel overwatched and trapped.	Mutual Awareness and Privacy	Improved communication and business decisions that support the business, owners and family.
Fierce rivalries can develop between relatives.	Meaning of the Family Company	Company symbolism can develop a strong sense of mission for employees.

Tagiuri & Davis (1996)

Tall Poppy Syndrome

Unfortunately, in most cultures there is tendency to lay criticism on those who have put their head out above others as they strive to move forwards. However, it is often these leaders who are developing new ideas and systems which will ultimately benefit the entire industry, and such individuals should be applauded for taking on risk.

Ultimately, as a business grows, the influence of the farm owner will lessen as their time is spread amongst a larger operation. Unless they are a dynamic leader, their influence on performance is diminished, and hence, it becomes absolutely vital that only the best are employed in the business.

5. Infrastructure Changes

On a green field dairy conversion site, the task of establishing the correct infrastructure is relatively easy. In this situation, there is a one off opportunity to install new milking parlours, nice wide races for stock, new water systems, and new houses for staff. The paddock sizes and layouts can be predetermined and of optimal size for good grazing management. However, when expanding an existing dairy farm unit there is not usually the same level of opportunity to make a fresh start. Additionally, such changes are usually made alongside the continuing operation of the dairy unit, adding complications in both time management and logistical challenges. When such expansion occurs, the key focus is usually the dairy shed or milking parlour. However, the key issues which are usually overlooked and which will cause frustrations in future years are condition and width of stock races, upgrading the water supply, both with regard to pipe size and pumping capacity, and thirdly, the need to redesign paddock sizes to ensure consistent grazing management. The changes required will of course be an individual decision based on the resources and issues at hand, but do not underestimate the time and costs that can be incurred.

6. Economies of Scale?

It is often touted that by expanding the size of your business, there will be greater levels of profitability through capturing economies of scale. While this is certainly possible, these gains are not automatic, and in fact there can be diseconomies of scale if care is not taken. So what are the key economies of scale that need to be considered and captured?

1. Spreading fixed costs over greater levels of output, e.g. administration costs.

2. Increased purchasing power, enabling some discounting of input prices.

3. Division of labour, i.e. the ability to employ specialists within your farming team.

4. Designing good systems to transfer experience and skills of the farm owner or manager across the rest of the team.

What are the diseconomies to watch out for?

1. Losing control over staff.

2. Losing the ability to optimise production per cow in a large herd setting.

3. Lack of attention to detail in any of the key management areas, e.g. financial management, stock management, machinery management. Retaining this attention to detail and high levels of performance will only come about through creating a culture of high expectations lead from the top, and creating strong levels of accountability within the farming team.

7. Risks About Rapid Growth

This could be considered a sub-set of the previous points. When a business undertakes rapid expansion, there are specific issues that must be addressed. These include:

1. Cash flow limitations;

2. Administration limitations;

3. Resistance towards change by the team members;

4. Lack of personal ability;

5. Imbalance of debt to equity ratios;

6. Rapid changes in levels of authority and delegation in the business.

Case Study

Ian and Pamela are dairy farmers in the North Waikato area of the North Island of New Zealand. They are in their early forties, and recently bought the neighbouring dairy farm. This increased their effective farming area from 70 ha to 110 ha, and increased cow numbers from 240 to 340. Physical changes needed to run the expanded unit included:

1. New dairy shed (50 bale rotary);

2. New effluent system;

3. New water supply;

4. Re-development of farm races;

5. Re-design of paddock sizes, which will be done over a number of years.

Management and organisational changes included:

1. Employment of a new staff member;

2. Streamlining of pasture management process, given the increased area that needed to be monitored;

3. Significant re-financing to purchase additional land and build new infrastructure;

4. Managing high levels of debt, and dealing with the Bank Manager in tough times;

5. Strict adherence to cash flow and sticking to the plan;

6. Learning to delegate some responsibilities, but also having good systems and accountabilities in place.

7. Re-visiting the Strategic Plan to ensure the development we had in mind was going to accommodate plans for the next 10 years;

8. Managing the stresses of farm development, along with running the existing dairy unit. The development resulted in increased stress levels and

decreased personal time for a period of approximately 2 years until the development phase was complete.

Have Ian & Pamela enjoyed the process? At times it has been very challenging, coping with high debt levels, development on the farm and staff issues. However now they are through the toughest time, they are in a very strong position to purchase additional small dairy farms nearby, and eventually milk up to 800 cows through their shed. This will in turn increase their cash flow, net wealth, and provide an exit strategy so Ian does not have to be in the milk shed beyond the age of 45. Has the process been worthwhile? Absolutely.

Summary and Conclusions

For many people, the opportunity to grow their farming business is hugely motivating and exciting, and the financial rewards significant. However, it is not without risk, nor sacrifice. Thus, I return to my opening point and re-emphasise the need for clarity on reasons for expansion of the business, and the need to be clear with your planning of expansion well before execution occurs.

References

- Tagiuri R & Davis J. (1996) *Bivalent Attributes of the family firm*. Family Business Review, v9 (2), p199
- Allen J. (2005). *Managing the transition from the single family farm to multiple property ownership: pitfalls and recommendations.*

Planning for Expansion on a Family Farm

Denis and Dan Finnegan, Nadrid, Coachford, Co. Cork

Introduction

My father Dan and I farm in Coachford Co. Cork on the banks of the river Lee. Dan started farming in Coachford in the late 60s on 65 acres with 20 cows. By 1998, when I had completed Agricultural College he was milking 82 cows with a calf to beef system. He was farming over two hundred acres of which, 136 acres were rented. He had a milk quota of 482,000 litres of which 255,000 litres were rented. In 1999, a 54 acre adjoining farm was purchased and this increased the home farm to 119acres (47.5Ha).

From 1998-2006, I worked on the farm and worked part time with AgriNet. At that time the farm was unable to support two full incomes. In 2006 we questioned ourselves on how we could create and sustain two full time incomes from the farm. We examined the 2005 profit monitor where we carefully spilt beef income and expenditure versus the dairy income and expenditure. The results of our analysis gave us a clear vision for the future of the farm. Dairying was eight times more profitable per Ha than beef. As a result, we decided to set up a partnership in 2006 and write down clear and achievable goals to attain our vision by 2010.

Our Vision

"***To maximize quality grass growth on the grazing platform, to breed the right type of cow to efficiently convert grass into milk solids, create and sustain two incomes and to enjoy doing it"***.

The farm goals we decided upon were the following:-

- Change the farm from a Dairy/Beef to a Dairy/Heifer replacement farm
- Milk at least 150 cows
- Build housing, slurry storage, milking parlour, handling facilities, improve roadways and water system to accommodate at least 150 cows
- Create a business to sustain two livelihoods
- Have an organized working week and time off
- Create a better lifestyle and good income for all partners

We knew if our farm goals were achieved it would be a win/win situation for everyone involved. For my parents, this would mean:-

- They receive a full time commitment from me to achieve the farm goals.
- They saw the partnership as an opportunity to gradually hand over responsibility to me for the everyday operations of the farm.
- My father saw the opportunity of a better lifestyle. i.e. flexible work time, every second weekend off.
- More choices at the end of the partnership if farm goals were achieved e.g. continue on, modify the partnership or retire with a yearly *"management fee".*

Equally, I saw the following opportunities:

- A new exciting challenge for me to prove myself, improve my skills and take on new responsibility.
- Better lifestyle for all partners when two working on the farm.
- Opportunity of an improved income if farm goals where achieved.
- The partnership agreement had clear and achievable written goals and targets which motivated me to work harder to meet these targets. In return I would enjoy my work, the challenge and life.

Partnership Structure

The farm goals and targets were clearly defined for the partnership. It was important to define and assign roles and responsibilities to each partner with their strengths in mind. Dan is an excellent stockman and likes machinery and he took full responsibility for rearing young stock and all required machinery work. I enjoy dealing with cows and grass and also have a keen interest in record-keeping and financial management, so I took on full responsibility for these duties. We encourage input and feedback from each other into all areas of the farm but the person who has taken on the responsibility has the final say. We defined the difference between farm income and personal income, or more importantly farm expenses vs. personal expenses. We have a farm current A/C, from this A/C we both receive a monthly wage transferred into our personal current A/C. Because of this there has never been an argument over the financials of the farm. To demonstrate equal trust, cheques need one signature. With the structures we have put in place, following careful planning, there has never been a need to look at the partnership agreement document since it was signed.

Overview of the farm

We have 46 Ha of a milking platform(MP) without any possibility for expansion. In 2006, we were milking 86 cows and all dairy replacement stock was on the grazing platform. Outside land was used for silage and for the beef enterprise. By 2010, the grazing platform was used solely for milking cows and the outside land blocks were used for silage production and dairy replacements. In 2006, the stocking rate on MP was 1.9 cows/Ha with Milk Solids (MS) at 922 kg/Ha. This increased to a stocking rate of 3.3 cows/Ha with MS of 1400kg in 2010. We plan to milk 180 cows in 2015 with an average MS/cow of 450kg. This would increase our MS/Ha production to 1760kg(Table 1). At a S/R of 3.9 we will have to increase the level of grass grown and utilised. We will have to bring in extra feed at the start and end of the year.

Year	*Cows*	*0-1 Stock*	*1-2 Stock*	*Grazing Platform Ha*	*Outside Land Ha*	*SR On Grazing Platform cow/ha*	*MS/ha (kg)*	*Total MS Sales (kg)*	*Owned Milk Quota (litres)*
2006	*86*	*30*	*23*	*46*	*40*	*1.9*	*922*	*42K*	*450K*
2010	*153*	*53*	*50*	*46*	*35*	*3.3*	*1400*	*64K*	*728k*
2015	*180*	*130*	*110*	*46*	*73*	*3.9*	*1760*	*81K*	
% Change 2006-10	*+78%*	*+ 77%*	*+54%*	*-*	*-13%*	*+74%*	*+52%*	*+52%*	

Table 1: Increase in stock and milk solids sales.

Farm Investment

The majority of the farm investment took place in 2007 (77%) (See figure 1). We built housing and slurry storage for an extra 100 cows costing €91,000 after grant and VAT refund. We also built a new 20 unit milking parlour, a crush, drafting facilities and purchased a new bulk tank at a total cost €122,000. In 2009, we converted a beef unit to dairy housing costing €5,500. We also extended roadways and improved the farm water system at a cost of €16,000. From 2006 to 2011 we purchased 325,000 litres of milk quota at an average cost of 19c/L. Between 2008 and 2009, we purchased 28 cows and 6 maiden heifers.

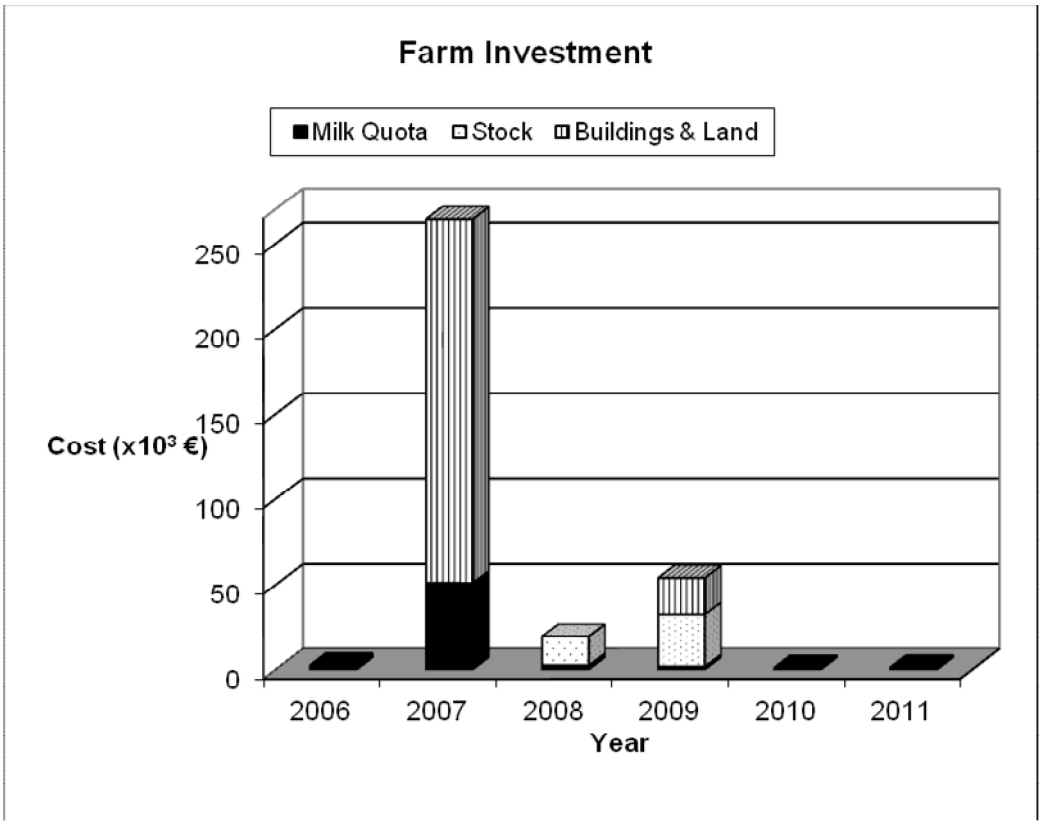


Figure 1: Cost of investment since 2006.

Breeding & Fertility

In 2006 we recognised that the fertility performance of our herd needed to improve and that we also needed to produce more replacements. In 2006 our % calved in six weeks was only 60%. We knew we had to improve our fertility sub Index (EBI) which was only €16 (see table 2). As a result, we had to breed aggressively for increased fertility using high EBI bulls. At present the cows have a fertility sub index of €56. The team of bulls we selected for the 2011 breeding season had an average EBI €228 of which fertility sub-index was €130 and milk sub-index of €85.

Year	Cows				1-2 yo				0-1 yo		
	EBI (€)	MILK (€)	FERT (€)		EBI (€)	MILK (€)	FERT (€)		EBI (€)	MILK (€)	FERT (€)
2006	41	21	16		56	26	27		61	31	25
2011	101	35	55		126	45	74		157	53	91

Table 2: EBI data for 2006 and 2011

However, in 2009, we encountered serious herd health and fertility issues on the farm. Despite a huge effort on breeding and grassland management, almost 30% of the herd were not in calf. This was very disappointing and I had to question myself and assess my management of the herd. From there, I decided to analyse what went wrong so I split the herd into 2 groups for this purpose, those in calf and not in calf. I used farm management software to do this. The key areas where there was a differential was: firstly, fertility sub-index of €48 for those in calf and only €24 for not in calf. Secondly the condition score was 3 for the in calf animals and only 2.6 for not in calf. Lastly the weight of the first lactation animals was 50kgs heavier for those in calf than not in calf. Based on the findings, I knew that I had control over the 3 factors that caused the issue which meant that I could take action to improve the situation immediately. We also vaccinated the herd for IBR.
To improve condition score, I dried off cows according to condition score instead of due to calf date. I bought weighing scales and we now group young stock according to weight and ensure that they meet target weights before calving. As outlined earlier, we also used AI bulls with a higher fertility sub-index. Since I implemented these actions, there was a major improvement in the herd fertility rate. In 2011, we had 84% of the herd calved in six weeks and were in a position to sell surplus stock, which benefitted our cash flow.

Grassland management

A critical element to increase profit on the farm has been the grassland management effort over the last 5 years. Higher grass utilisation, more cows carried, reseeding 10%/year and farm layout improvements have all contributed to more grass being grown, from 9.8 tonne/DM in 2006 to 13.7 tonne/DM in 2011, and converted into milk solids. The big issue facing farms such as this, with a high stocking rate is to improve the quantity and quality of grass grown and grazed on the farm. We use the AgriNet on-line grass package to measure and to budget grass. This information is then shared and benchmarked with other farmers. The grass wedge is used to assess the overall position on the farm after each grass walk and decisions are made on the need to feed extra supplements or to take out surplus grass. If I don’t measure grass, I can’t manage grass.

Milk Production

Milk Supply has expanded with increasing cow numbers, but milk production per cow has declined due to more heifers and more cows being carried on the farm (from 493kg MS/cow in 2006 to 421kg MS/cow in 2010 (-15%)). Milk solids per Ha(MS/Ha) has increased with higher stocking rates(S/R) from 922kg MS/Ha with a S/R of 1.9 cows/Ha in 2006 to 1400kg MS/Ha with a S/R of 3.3 cows/Ha in 2010, an increase of 52% (see figure 2). SCC has been reduced to 150,000.

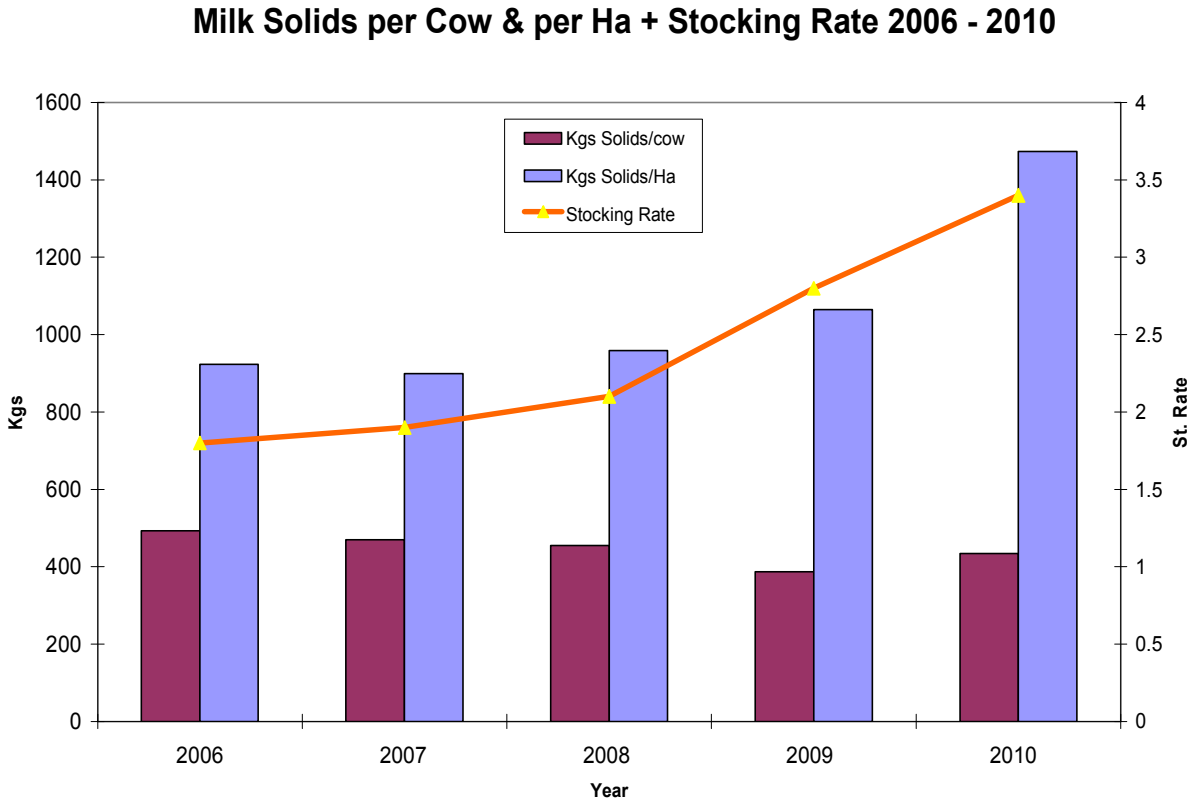


Figure 2: Milk solids per cow and per Ha

Farm Profit

From table 3 below it is clear that our profit/Ha has improved over time adjusting for milk price. This is largely due to an increase in grass utilisation and an increase in the level of milk solids produced from the farm. However costs per litre increased by 24% in 2008 compared to 2006. This is because we incurred the cost of the farmyard developments before the increase of stock and milk sales. This was major mistake. My advice is to have the stock on the ground and increase milk sales before any major capital investment is carried out. Then in 2009 we got our costs of milk production back under control. We knew milk price forecast was poor, so we completed an upside down budget at the start of the year. In this budget you start

with total receipts and the first expenses to be deducted are funds required for example taxation, bank interest, capital repayments and living expenses. The next expenses to be deducted are priority expenses such as fertilizer, feed, ESB. Finally to be deducted are the discretionary expenses such as maintenance and reseeding. By the end of the budget process we had to slash the feed budget by 39%, there was no budget for reseeding or maintenance (postponed to the following year) but we had a plan in place to survive 2009.

Table 3. Progress on Production & Costs

Year	Milk Solids Sold kg	MS/ha Sold kg	Total Costs/L	Profit Ha €
2006	42,412	922	18.4c	1143
2007	41,304	910	22.2c	1966
2008	44,119	958	22.8c	2040
2009	47,923	1042	18.3c	800
2010	64,000	1400	18c	2374

Conclusions

In 2006, we realised that, by 2010 the farm had to be in a position to provide two good incomes to accommodate our stages of life. Financially, I would have different priorities in 2010 than in 2006. My father was entering a new stage of life too. He wanted the farm to be in a position where he would have options in 2010, such as continue working either full-time or part-time or retire with a management fee. We clearly defined achievable goals and targets for the farm and ourselves. We knew that cash flow would be extremely difficult for us during the expansion years, but if we met our goals and targets it would be a win/win situation for everyone involved. The farm business also would be in a stronger position to take full advantage of a non-quota era.

What have we learnt?

- Clearly define achievable goals and targets for the farm and yourself. Have a vision.
- Measure performance; benchmark yourself against the very best.
- Farm profit is boosted by higher stocking rates; therefore an increase in the level of grass utilisation is achieved, converting grass into milk solids.
- Learn from mistakes, correct them, move on and reap the rewards.

- Allow for 15-20% in reduced performance in a herd when expanding.
- Vaccination programme and herd health is vital in an expanding herd.
- Surround yourself with excellent people; you will become the average of these.

What would we change if it was 2015?

- Have at least 40% replacements ready to calve down in 2015. The planning for this starts in the next AI season i.e. April/May 2012. We had only 26% in 2006 so we had to buy stock which put pressure on cash flow.
- Invest in your land first; invest in roadways, water system, reseeding, P, K and lime. This investment will improve output and cash flow in a short period of time.
- Don't invest in buildings until you have the stock first to fill them and high milk output and cash flow. We made this big mistake to comply with the nitrates directive. I propose, if you signed up to a dairy expansion scheme that you would get 3 years exemption from the nitrates directive to give you an opportunity to build your business and cash flow. As you can see from my experiences, if 2009 came a year earlier when our fixed costs were extremely high we would have been extremely vulnerable.

In conclusion, think outside the box. Maybe you can rent land to grow out wintering crops or rent a shed.

Future plans

In 2015 we plan to milk 180 cows at a stocking rate of 3.9LU/Ha and produce 1760kgMS/Ha from the grazing platform. Long term I plan to have 100 surplus in-calf heifers for the home herd which will give me options for expanding cow numbers outside the home block. Why? My father started with 20 cows. He needed 7 times that to justify the next generation to go farming. How many cows will I need? A lot more than 180.

Have targets and apply your plans to the following;

T. Target - clearly defined, sensible, achievable i.e. 150 cows, better lifestyle

A. Action Plan- 2006 sign partnership, buy milk quota, change breeding strategy.

2007 start building new housing, slurry storage and milking facilities for cow expansion, 2008 buy milk quota and finish off buildings.

2009 expand milking cows, extend and widen cow roadways and improve water system

R. Realize the plan- More cows milking, dairy replacements stock to sell, improve cash flow and profit

G. Gather information- knowledge is power.

E. Examine information- review and correct

T. Transfer information- reading, readjust and refocus

If you can imagine it, you can achieve it; if you can dream it, you can become it. *(William Arthur Ward).*

Introducing the Teagasc Dairy Manual

Mark Moore, Teagasc, Oak Park, Carlow

As farmers plan and prepare for the world 'post quotas' Teagasc has produced a comprehensive manual for existing and potential dairy farmers: the 'Teagasc Dairy Manual' (TDM). The manual is a practical resource for any farmer who plans a future in dairying.

The TDM extends to over 320 pages and addresses the full range of issues facing existing and potential dairy farmers: Business Management, Dairy Facilities, the Environment, Milk Quality, Feeding Dairy Animals, Dairy Breeding and Animal Health etc.

These subject areas are sub-divided into a total of 49 chapters dealing with everything from Taxation and Keeping Track of Dairy Business Finances to the benefits of Project Management for a new dairy enterprise or expansion of an existing business. Operational issues such as Feeding, Breeding and Animal Health are also cover in detail.

The TDM is designed to be 'dipped-into' by the reader to address issues as they arise during the year. Checklists, Key Risks and 'How to' sections increase the 'ease-of-use' for the reader. Ease of 'navigation' was one of the key requests from leading dairy farmers consulted about what the TDM should contain and how it should be laid out.

Team effort

The manual brings together input from front line Teagasc dairy advisers, Teagasc dairy specialists, Teagasc college dairy lecturers and also Teagasc research scientists, vets and economists. The TDM also includes material from the Department of Agriculture, Food, and the Marine and Animal Health Ireland.

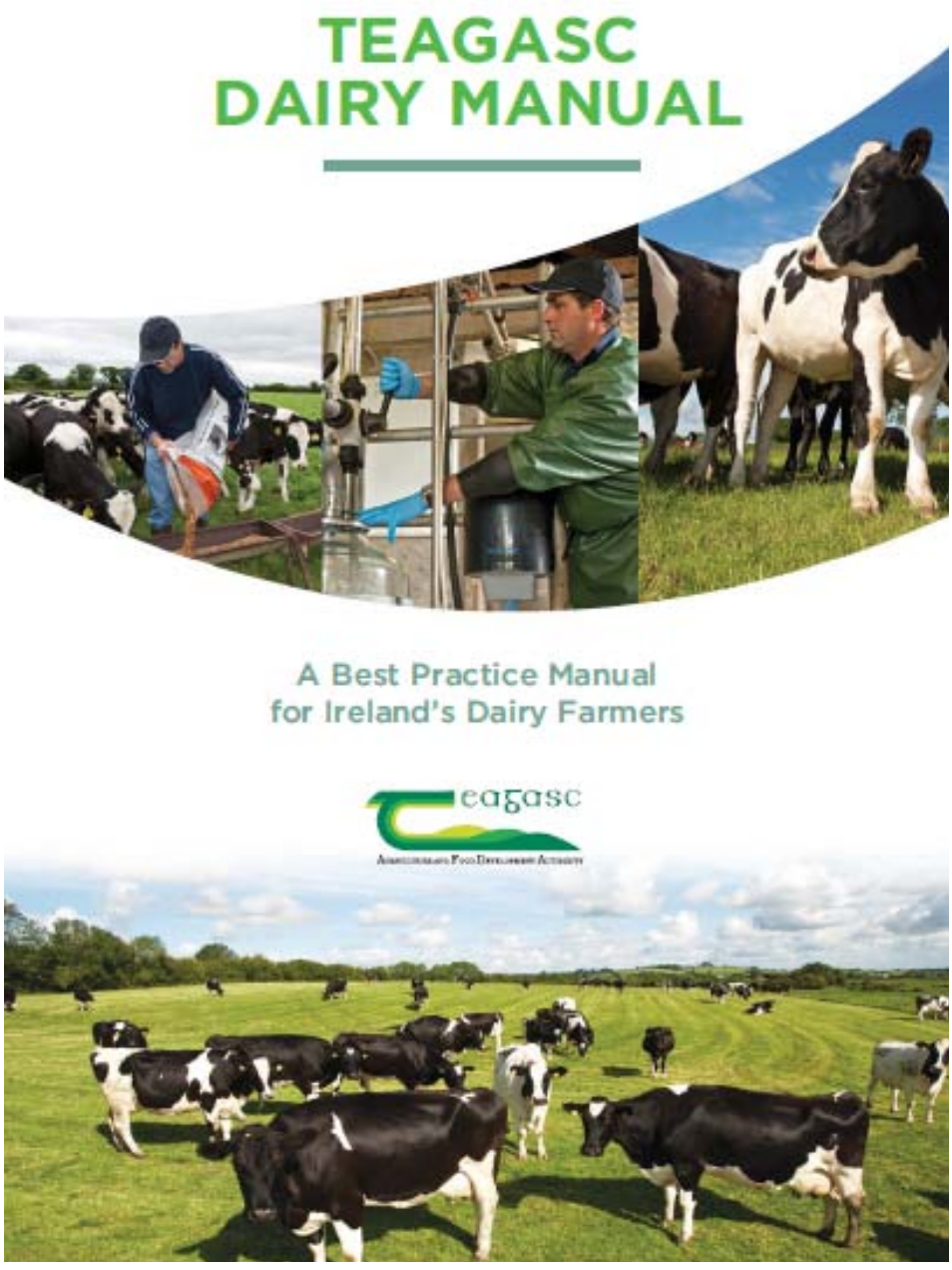
Combining the knowledge and experience of all sectors of Teagasc has yielded comprehensive and 'user-friendly' answers to questions which face every farmer with an interest in dairying. A total of more than 200 questions are addressed within 49 chapters. We believe the manual will be of benefit to even the most experienced dairy farmers but also students and professionals serving the dairy industry.

The manual has been produced in water proof tear-proof paper with strong ring binding so it can be taken out of the office or kitchen without fear of wear and tear in the parlour or even the field. The Teagasc Dairy Manual is available at the Teagasc Dairy Conferences at the Teagasc client price.

From November 20th The Teagasc Dairy Manual will be available at €50 plus postage and packing. The price for Teagasc clients is €25 plus p&p (€7.50).

How to order:

Contact Teagasc on 059 9170200 and pay by credit card



Farm Planning to Achieve Success

Billy Kelleher, Teagasc/Dairygold Joint Programme Co-ordinator, Advisory Office, Moorepark, Fermoy

The Farm Plan should be a written document that directs business decision making and is based on goals and achievable expectations for the farm.

Farm planning for the majority of dairy farms will be for the development and expansion of existing enterprises. It will involve expansion, technical and efficiency improvements as well as aiming for sound financial returns.

Planning for new entrants will be a much more extensive exercise requiring more physical and financial planning. New entrants should be guided by the two Greenfield farms and adapt the technology to their own requirements.

The farm plan should allow you to establish a framework for profitable dairying by:

- Establishing a clear direction for the farm and farm family to follow.
- Defining clearly what the system of dairying will be and set up a strategy to focus management on that system.
- Calculating the likely returns and cash flows for the farm.
- Setting production targets to be achieved over the time frame of the plan.
- Setting efficiency targets for the major key performance indicators.
- Anticipating problems and taking steps to eliminate them.
- Developing a frame of mind that will allow quick responses to changing conditions.
- Establish a basis for evaluating management and financial performance.

What is the Purpose of a Farm Business Plan?

It is essential to drive the business forward and to communicate with stakeholder's e.g.

- Communicate your business internally; – To family members & employees
- Communicate your business externally; – To lenders, bankers, processors and group members.
- Help the Farmer/Manager to think through where the business is at and where they want it to go.

Developing a farm plan?

The farmer who operates the farm business should lead the initial planning, the operator/manager and other family members should be involved in the planning. On some farms the process of inclusion may be as important as the final product. Farm planning with typically close-knit farm families cannot be done in isolation from other family members. This is particularly so when goals are set for the business, the profit from which affects their future life stage options and lifestyle. In such circumstances, business and family considerations are often so interwoven that it becomes very difficult to try to separate the two. But without a viable farm business, no considerable income will accrue to any party.

Setting Goals to give direction to a plan

A written goal states in clearly understandable language what an individual or family wants to achieve. Through goals, each person, family or business unit sets its direction for the future. You are more likely to achieve things you want if you identify what you are trying to accomplish, specify how you're going to accomplish it and set a target date to complete it. Goals are not final and unchanging. Goals change with circumstances. Over time, they may need to be re-evaluated and updated. Setting goals provides focus and direction for management; attaining high-priority goals takes precedence in management decisions. Goals also serve as a reference point so that you can monitor how well you are doing. Goals can help motivate. They can also help you make a decision in the face of uncertainty because you can weigh up alternatives in the decision making process, more weigh can be put on options that help you move toward your goals. Finally, goals can serve as a rallying point for the farm family. Family members are generally more willing to support and work on achieving goals if they are involved in identifying and setting them.

How do farmers go about determining what scale and system of dairying to operate on their farms post 2015? The best way to make those decisions is to analyze the alternatives systematically. This is one of the first steps in farm planning. The planning list that follows will provide the steps to follow and questions to answer in developing your written farm plan.

Farm Planning Checklist

1. **Mission Statement: list where you are, what you do well and what you want to improve.**
2. **Goals: aims and objectives (SMART – Specific, Measureable, Attainable, Rewarding and Timed)**

3. **Strengths, Weaknesses, Opportunities and Threats (SWOT)**
4. **Financial budgets and records**
5. **Contingency plans and stress test of the plan.**

In setting out to do a farm plan at present, all existing dairy farmers will have a lot of basic data in the form of accounts, physical records and a milk quota statement. These sources of data need to be analysed to give a picture of where the farm is at in terms of income, use of resources, production and efficiency. Some of the following will be available on all farms:-

1. Profit Monitor analysis. (See Appendix 1)
2. Balance sheet.
3. EBI Summary report. (See Appendix 2)
4. Fertility and calving reports.
5. Co-op performance Report (See Appendix 3)
6. Farm map
7. Five year physical plan. (See Appendix 4)

If the data in these reports is judged to be reliable and the farmer has a vision for where he wants to be, the planning exercise will have a good starting point and expansion can be often be "bolted on" to existing performance and facilities. Financing developments depends on the track record with the farmer's bank and how they see you in terms of a reliable location to place their funds.

Where data on paper is scarce or doesn't translate to what is actually visible on the ground then a deep exploration of the system needs to be undertaken and any "leakage" has to be indentified. The realisation that assets may come under pressure from continuous over spending on living expenses or farm inputs or under performing stock, may be difficult to reconcile for families that have always derived a good living from farming.

Planning on Dairygold/Teagasc Monitor farms 2000 – 2011

I have found that having good examples of successful systems available are good method of outlining how planning and plans work. Farms that operate at low levels of efficiency need to seriously improve efficiency before embarking on substantial expansion plans. The following tables may help you to set some goals for your farm.

1. **Establishing the ideal stocking rate**, on the farm and the milking platform. Targets stocking rates should be established and worked on to achieve projected cow numbers. Land quality, location, elevation, fragmentation will all impact on the ideal stocking rate on a farm. Nitrates directive sets the maximum farm stocking rate at 250 Kgs organic N/Ha for the whole farm i.e. 2.92 Cows/Ha. During the period of milk quota and prior to quota abolition planning will probably mean stabilising or reducing yields and building milk protein %. Holding stock numbers to retain the expansion capacity should go hand in hand with working really hard to improve the value of milk through quality improvements and maintaining as long a lactation as possible. Poor herd fertility and high replacement rates, reduce numbers of productive cows on a farm.

   Table1 gives examples of the effect of stocking rate on stock numbers at 18% replacement rate.

Table 1. Effect of stocking rate on cow and replacement numbers.

Ha	Farm Stocking Rate	Total LU	Replacement Rate (%)	Cows	Replacement Units
40	2.0	80	18	66	14
	2.25	90	18	74	16
	2.5	100	18	82	18
	2.9	116	18	95	21
60	2.0	120	18	98	22
	2.25	135	18	111	24
	2.5	150	18	123	27
	2.9	174	18	143	31
100	2.0	200	18	164	36
	2.25	225	18	185	41
	2.5	250	18	205	45
	2.9	290	18	238	52

If the replacement rate on the above farm examples was to dis-improve to 25% the number of cows carried is reduced dramatically as shown in table 2 below for the 40 Ha example, similar reductions will apply across the other Ha examples.

Table 2, Effect of a high replacement rate on cow numbers carried.

Ha	Farm Stocking Rate	Total LU	Replacement Rate (%)	Cows	Replacement Units
	2.0	80	25	60	20
	2.25	90	25	68	23
	2.5	100	25	75	25
40	2.9	116	25	87	29

2. **Herd improvement and attempting to find the ideal cow.** What type of cow does the farmer want to milk and how can her milk solids production and profitability be maximised. Moorepark has carried out a lot of research on different cow types, from different strains of Holsteins to Jersey and Norwegian red crosses. A recent review published by the research team, gave some really useful indicators of the traits of efficient cows for grass based systems. Their main findings are that EBI and cow fertility is the main driver of cow productivity. Achieving compact calving drives milk solids production. How to improve compact calving on a farm should therefore occupy the minds of the farmer and Advisor when drawing up any farm plan.

   We have many years of analyzing profit monitor data across different systems, trends have emerged which show higher yields involve higher costs. However lower costs does not always deliver higher margins, mainly because of low production per cow and poor stock sales. In table 3 below a range of yields and solids percentages are compared, these figures are for good production levels and using stocking rates appropriate to the cow type. By applying the current Dairygold A+B-C pricing system to the output some interesting figures are arrived at. One of these is that the value of a Kg of milk solids does not vary significantly from one system to another. What does vary widely is the quantity of milk required to produce one kg of solids, (11.22 – 13.67 litres). The A+B-C system does penalise low solids milk by charging a flat 4 cent/litre for each litre supplied. Milk protein is clearly the most valuable component of milk and suppliers that take no action to improve protein% are missing opportunities to improve milk value.

Costs used are known averages of the different systems and converted from cent/litre to €/Kg. This table is a guide as to the likely outcome of using different breeds and strains. However as herd management is such a variable factor in determining farm profitability, you can assume that profitability can vary within all dairy systems. Own labour is not factored into the costs, neither is any extra labour included for extra cow numbers or labour intensive systems.

Table 3. Comparison of dairy systems, output, costs and returns.

Yield (L)	**4000**	**4500**	**5000**	**5500**	**6500**	**7500**
Fat%	4.8	4.4	4.25	4.1	3.9	3.8
Pr%	3.85	3.65	3.6	3.5	3.4	3.3
kgs Solids/Cow	356	373	404	431	489	548
kgs Solids/Ha	1032	1086	1132	1162	1222	1371
Litres of milk to produce 1 kg solids	11.22	12.06	12.37	12.77	13.30	13.67
Value/kg solids (€)	4.72	4.73	4.74	4.73	4.73	4.71
Cost/kg Solids (€)	1.68	1.93	2.10	2.30	2.65	2.87
Margin/kg Solids (€)	3.04	2.80	2.64	2.43	2.08	1.84
Margin/Cow (€)	1083	1043	1066	1046	1017	1009
Stocking Rate	2.91	2.91	2.8	2.7	2.5	2.5
Margin/Ha (€)	3153	3036	2985	2823	2541	2523
Stock Return/Ha (€)	55	261	284	306	239	190
Stock Return C/L	0.47	1.99	2.03	2.06	1.47	1.01
Breed	JerX	NZ Fr/JX	NZ/HF/NR	NR/HF	HF	HF

3. **Demonstrating the profitability and costs of production**, through use of examples in profit monitors reports. These reports can be used to pinpoint low cost possibilities and high profit farming operations. Cross referencing of milk solids production, EBI, costs and margins will show patterns across large number of farms. I selected 4 farms with differing systems and used their data to compile

Table 4 below. This table gives a comparison of margins achieved on four diverse systems.

Table 4. Example Profit Monitor Group report.

eProfit Monitor 2010							**Group Conference 11**			
Farm	EBI	Kgs Solids/ Cow	Kgs Solids/ Ha	Gross Output c/litre	Feed c/litre	Total V costs c/litre	Gross Margin c/litre	Total F costs c/litre	Total Costs c/litre	Net Profit c/litre
Average	**94**	**497**	**888**	**33.33**	**3.66**	**10.13**	**23.20**	**10.30**	**20.43**	**12.90**
High EBI	130	382	816	34.20	3.59	11.86	22.34	8.67	20.53	13.67
High Solids	100	537	1,040	34.48	2.99	8.29	26.20	14.23	22.52	11.97
Low Cost	82	442	680	32.05	2.60	8.26	23.79	6.27	14.53	17.52
High Cost	63	626	1,016	32.57	5.44	12.11	20.46	12.04	24.15	8.42

The data shows different performance levels for farms in diverse systems all making a good living from farming. Focussing on key efficiencies helps all farmers to improve profitability and herd performance.

The three areas highlighted above should help a farmer to set goals for;

a. Stocking Rate

b. Cow type and production levels.

c. Costs and Profitability targets.

When the goals are set and a clear direction is established some other key considerations need to be assessed, such as.

1. Risk assessment and mitigation measures that may be necessary.

2. Assessing the external environment and market for your milk and stock.

3. Labour requirements and management changes needed.

4. Communicating your financial requirements and progress to banks.

5. Physical and Financial Planning.

6. Feed Planning.

1. **Risk Assessment.** I recently discussed this issue with a number of Discussion groups, questioning them about what they saw as the greatest risk going forward.

They were quite unequivocal in their responses as listed below, falling milk price is seen as the greatest risk.

A. Milk price.

B. Supply rights after 2015.

C. Land availability and danger of lost leases.

D. CAP reform – reduction in SFP.

E. Input Costs

F. Animal Disease.

G. Environmental regulations.

When asked about factors that would help mitigate against falling milk prices, responses were fewer, but some suggestions were;

- Pushing up constituents to maximise price per litre.
- Achieving all bonuses and avoiding quality penalties.
- Getting the longest lactation possible to spread cash flow.
- Cost reductions in inputs and services.
- Compact calving to drive more efficiency from the system.

Another big concern was the availability of processing facilities to handle the anticipated increase in production post 2015. Dairy farmers are looking for very strong signals and evidence to build their confidence in a dairy industry that is ripe for expansion.

2. **Assessing the external environment**. Every farm business faces uncertainties, threats and opportunities that are beyond its control. Market forces may cause prices to fall, either in the long-run or short-run. Input costs and energy prices rarely go down. Milk quota restrictions, declining consumer demand, world market prices, currency fluctuations, high interest rates, changing EU policies and environmental regulations are all external threats that can cut profits or make business more difficult. New market opportunities are created by demographic changes, changing consumer demand and product innovation.

3. **Labour use and productivity.** Many expanding enterprises will need either extra labour or more technology. How many cows can one man handle? Will technology solve all problems or just one? If you invest say €250,000 in a new milking parlour will it release enough time to manage calving and calves or would

an extra labour unit for a short time be a better option. Labour management is important on farms, imparting your ideas and plans to hired labour may be difficult. You can buy their time and attendance at work, but getting labour to buy into your goals may be more difficult.

Management changes will always be necessary in the face of changing circumstances. A good example is evident in 2011. How many dairy farmers were able to adjust their management to cope with the super levy threat? Was once a day milking seen as a solution or a big NO NO?

4. **Communicating your financial requirements and progress to banks.**
   Banks are in a very different place in 2011 compared to four years ago. They now require detailed plans and cash flows and some require regular reviews. Some banks have bought into the idea that Profit Monitor is a good starting point for analyzing the business. Do your profit monitor, keep your cash flow planner up to date and review your financial budget regularly. Keep a tight hand on your money and keep a positive credit rating.

5. **Physical and Financial planning,** have received much attention at Greenfield and Moorepark open days in recent years. Physical planning of a farm layout or adjustments to existing layout's, requires a lot of detailed calculations of costs, to prevent over runs. Use as much own labour and resources as possible. Try to visualise the outcomes and do a job that will require low levels of annual maintenance.

   Financial planning requires detailed 5 -10 year plans and high borrowings carry many risks and may promise high returns. Cash flow is the life of any business and farms that pay for investments from cash flow or have difficulty with repayments will find it difficult to survive if prices fall sharply. Budgeting is vital, where farm output is at reasonable levels, budgeting can help retain a margin. The Teagasc 6 year financial and physical planner and detailed examination of returns over the period of a plan need to be evaluated.

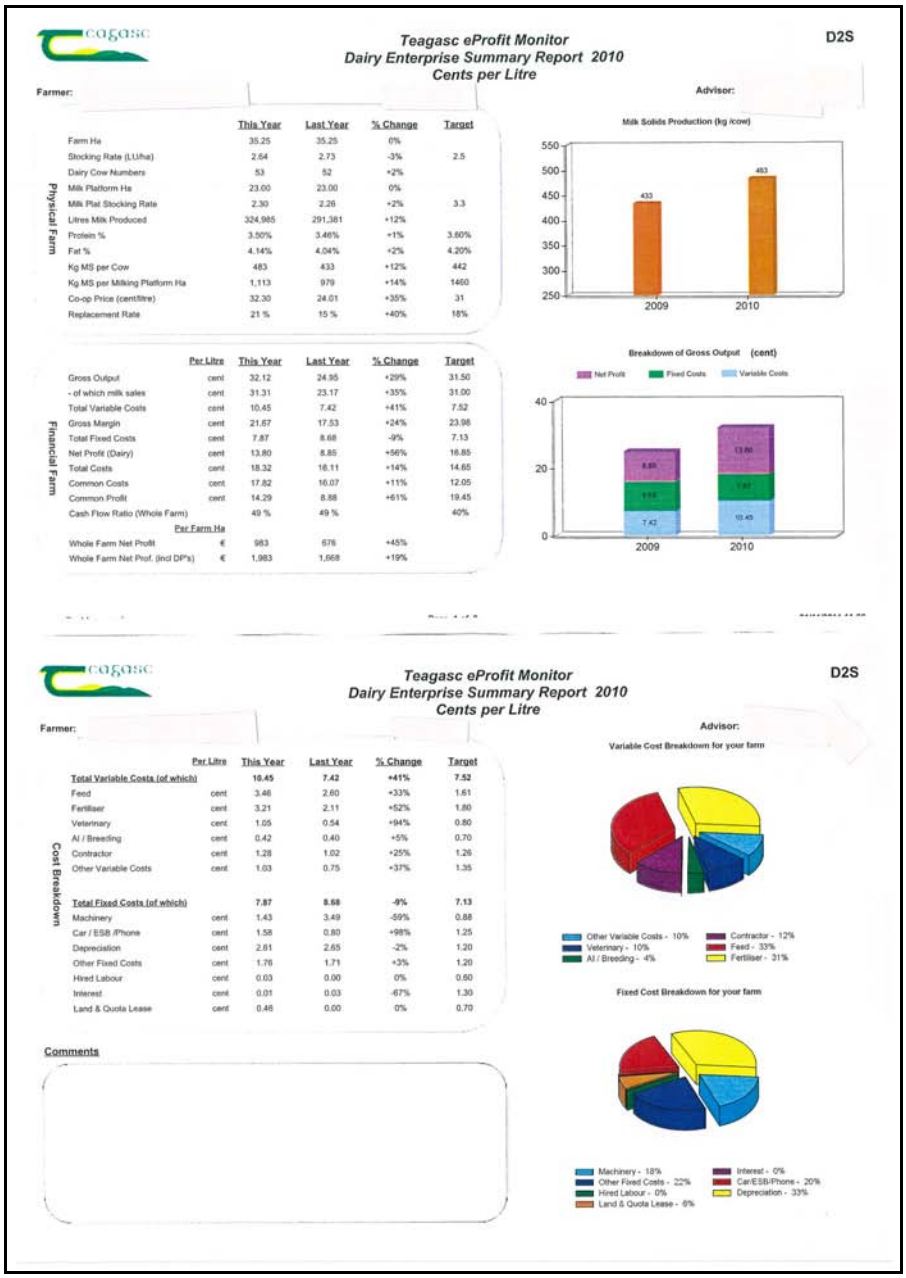
6. **Feed Planning** should be for a 'normal' year, deficits and surpluses will occur at different times. Deficits can increase costs substantially. Surpluses if harvested properly build valuable reserves. At high stocking rates and on wet land 'feed banks' are a must to overcome grass scarcity or weather events. Depending on cow weight,

budget for 5 – 6 tonnes dry matter for a year and for 75 -85% of this to come from grazed grass.

Summary

Businesses across all sectors succeed or fail based on the people that manage and work in them. Farming is no different, except it usually combines a workplace, a family home and a business all in one location. The Irish dairy farmer is poised to reclaim 30 years of lost opportunity and they need to be among the best in the world to achieve the harvest 2020 target of a 50% increase by 2020.

Appendix 1. Example of Teagasc Eprofit Monitor Summary Report.



Teagasc eProfit Monitor
Dairy Enterprise Summary Report 2010
Cents per Litre

D2S

Farmer:

Advisor:

	This Year	Last Year	% Change	Target
Farm Ha	35.25	35.25	0%	
Stocking Rate (LU/ha)	2.64	2.73	-3%	2.5
Dairy Cow Numbers	53	52	+2%	
Milk Platform Ha	23.00	23.00	0%	
Milk Plat Stocking Rate	2.30	2.26	+2%	3.3
Litres Milk Produced	324,985	291,381	+12%	
Protein %	3.50%	3.46%	+1%	3.60%
Fat %	4.14%	4.04%	+2%	4.20%
Kg MS per Cow	483	433	+12%	442
Kg MS per Milking Platform Ha	1,113	979	+14%	1460
Co-op Price (cent/litre)	32.30	24.01	+35%	31
Replacement Rate	21 %	15 %	+40%	18%

Physical Farm

Milk Solids Production (kg /cow)

	Per Litre	This Year	Last Year	% Change	Target
Gross Output	cent	32.12	24.95	+29%	31.50
- of which milk sales	cent	31.31	23.17	+35%	31.00
Total Variable Costs	cent	10.45	7.42	+41%	7.52
Gross Margin	cent	21.67	17.53	+24%	23.98
Total Fixed Costs	cent	7.87	8.68	-9%	7.13
Net Profit (Dairy)	cent	13.80	8.85	+56%	16.85
Total Costs	cent	18.32	16.11	+14%	14.65
Common Costs	cent	17.82	16.07	+11%	12.05
Common Profit	cent	14.29	8.88	+61%	19.45
Cash Flow Ratio (Whole Farm)		49 %	49 %		40%
	Per Farm Ha				
Whole Farm Net Profit	€	983	678	+45%	
Whole Farm Net Prof. (incl DP's)	€	1,983	1,668	+19%	

Financial Farm

Breakdown of Gross Output (cent)

Teagasc eProfit Monitor
Dairy Enterprise Summary Report 2010
Cents per Litre

D2S

Farmer:

Advisor:

	Per Litre	This Year	Last Year	% Change	Target
Total Variable Costs (of which)		10.45	7.42	+41%	7.52
Feed	cent	3.46	2.60	+33%	1.61
Fertiliser	cent	3.21	2.11	+52%	1.80
Veterinary	cent	1.05	0.54	+94%	0.80
AI / Breeding	cent	0.42	0.40	+5%	0.70
Contractor	cent	1.28	1.02	+25%	1.26
Other Variable Costs	cent	1.03	0.75	+37%	1.35
Total Fixed Costs (of which)		7.87	8.68	-9%	7.13
Machinery	cent	1.43	3.49	-59%	0.88
Car / ESB /Phone	cent	1.58	0.80	+98%	1.25
Depreciation	cent	2.61	2.65	-2%	1.20
Other Fixed Costs	cent	1.76	1.71	+3%	1.20
Hired Labour	cent	0.03	0.00	0%	0.60
Interest	cent	0.01	0.03	-67%	1.30
Land & Quota Lease	cent	0.46	0.00	0%	0.70

Cost Breakdown

Variable Cost Breakdown for your farm

Fixed Cost Breakdown for your farm

Comments

Appendix 2. Example of ICBF, EBI report.

HerdPlus
rofit through Science

Economic Breeding Index (EBI) Herd Summary August 2011

.oCall 1850 600 900

Herd Owner:
Herd Number:
Data Extracted:

1. EBI Herd Summary

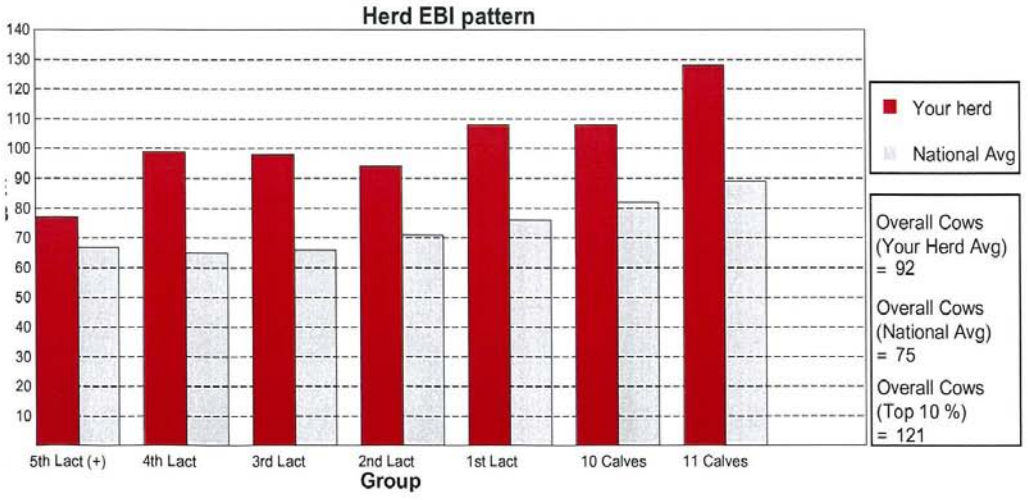
Average EBI for all dairy cows with; (i) a known sire (or milk recorded progeny with a known sire) and (ii) are currently on your farm.

* Missing Sires can be added through the 'Record Events' section of the HerdPlus website or by contacting the HerdPlus office - 1850 600 900

Animal Group	Num of Cows	Milk Kg	Fat %	Prot %	Surv%	CI Days	Milk % Contrib	Fertility % Contrib	Calving % Contrib	Beef % Contrib	Mainten. % Contrib	Health % Contrib	EBI €
Cows with EBI	55	19					€ 24.9	€ 56.6	€ 17	€ -11.6	€ 6.7	€ -1.4	€ 92
Missing a Sire*	3	4.1	0.07		1.8		21.1%	47.9%	14.4%	-9.8%	5.7%	-1.2%	
Total Cows	58	3.6	0.06		-3.0								
1st Lactation	11	-8					€ 33.2	€ 65.9	€ 20.8	€ -12.7	€ 4.7	€ -3.5	€ 108
		6.8	0.14		2.2		23.6%	46.8%	14.8%	-9%	3.3%	-2.5%	
		4.1	0.09		-3.3								
2nd Lactation	11	-47					€ 19.9	€ 62.9	€ 17.8	€ -12.3	€ 7	€ -1.4	€ 94
		1.7	0.07		1.8		16.4%	51.9%	14.7%	-10.1%	5.8%	-1.2%	
		2.2	0.08		-3.4								
3rd Lactation	10	50					€ 26.9	€ 57.4	€ 20.2	€ -10.7	€ 6	€ -1.6	€ 98
		5.4	0.07		1.9		21.9%	46.7%	16.4%	-8.7%	4.9%	-1.3%	
		4.2	0.05		-3.0								
4th Lactation	4	46					€ 30	€ 59.3	€ 13.3	€ -17.1	€ 11.4	€ 1.9	€ 99
		4.4	0.05		2.0		22.6%	44.6%	10%	-12.9%	8.6%	1.4%	
		4.8	0.06		-3.0								
5th Lactation (+)	19	52					€ 20.9	€ 46.7	€ 13.5	€ -9.8	€ 7	€ -0.9	€ 77
		3.2	0.03		1.4		21.2%	47.3%	13.7%	-9.9%	7.1%	-0.9%	
		3.6	0.04		-2.5								

2. Dairy Youngstock

11 Calves	25	80					€ 32	€ 80.4	€ 22.3	€ -10.8	€ 3.6	€ 0.2	€ 128
Missing a Sire*	1	6.3	0.07		2.4		21.4%	53.9%	14.9%	-7.2%	2.4%	0.1%	
Total Calves	26	5.2	0.05		-4.3								
10 Calves	11	26					€ 35.8	€ 62.2	€ 19.7	€ -17.6	€ 9.1	€ -1.3	€ 108
Missing a Sire*	0	7.8	0.14		1.8		24.6%	42.7%	13.5%	-12.1%	6.2%	-0.9%	
Total Calves	11	4.8	0.08		-3.4								



Appendix 3. Example of ICBF/Co-op report.

Dairygold

Dairy Herd Performance Report

Jan - Jun 2011

ICBF.com

Herd Owner:

Designator:

Supplier Number:

LoCall 1850 600 900

Table 3: Dairygold/ICBF Performance Score Card

	Your Herd	Dairygold Average	Dairygold Top 10%	Your Rank out of 100	[1] Your Star Rating
Milk performance for 2011 (Jan - Jun) based on Dairygold data					
Fat + Protein (Kg/cow) Average Fat and Protein yield per cow for your herd	214	186	232	78%	* * * *
Litres per Cow per Day Avg litres of Milk per cow from Jan - Jun 2011	15.91	14.01	17.4	76%	* * * *
Fat % to end June 2011 Weighted average Fat % from Jan - Jun 2011	3.92	3.82	4.02	77%	* * * *
Protein % to end June 2011 Weighted average Protein % from Jan - Jun 2011	3.31	3.31	3.42	51%	* * *
Average Milk Price (cpl) Incl. VAT Average milk price received from Jan - Jun 2011, (Includes Bonuses/Penalties, Excludes Levies)	34.5	34	35.3	69%	* * * *
SCC (,000 cells/ml) The weighted average Somatic Cell Count for Jan - Jun 2011	194	n/a	130	52%	* * *
Fertility & Calving data based on HerdPlus 2011 Calving Report					
Calving Interval (days) Average number of days between successive calvings for cows calved during the period	392	394	368	44%	* * *
Days to calve 50% of herd Start **26/01/2011** - Median **21/02/2011**	27	38	21	78%	* * * *
Total Dairy Replacements Dairy Females born in the period **(25)** as a proportion of eligible cows **(57)**	44%	30%	46%	87%	* * * * *
%AI bred replacements %female calves born in the period from dairy AI **(13)** as a proportion of eligible cows **(57)**	23%	20%	38%	57%	* * *
EBI Statistics based on the latest HerdPlus EBI report 2011					
Herd EBI (2011) Average EBI for Cows **(57)** with EBI data	€88	€78	€97	73%	* * * *
Yearly EBI Gain (2011-2012) Gain in Herd EBI based on; 0-1yr old, 1-2yr old & 22% replacement rate	€6	€6	€9	54%	* * *
EBI of 2011 Inseminations Weighted Average EBI of dairy AI bulls recorded in Spring 2011	€198	€189	€216	59%	* * *

Table of Terms	
Dairygold Average	The average performance of Participating Dairygold Manufacturing Suppliers
Dairygold Top 10%	The top 10% cut off point of Participating Dairygold Manufacturing Suppliers
Your Rank out of 100	Your performance expressed across all Dairygold herds eg. 1% = Bottom Supplier, 50% = Average Supplier 100% = Top Supplier
Your Star Rating	Your performance is displayed in stars e.g. 1 star is bottom 20% and 5 stars = top 20%
Eligible Cows	Number of dairy cows in the herd on June 2011

[1] * = 0 - 20% ** = 21 - 40% *** = 41 - 60% **** = 61 - 80% ***** = 81 - 100%

Appendix 4. Five Year Physical Planner

Farmer Physical 5 Year Targets (Achieved). *v13 Oct 2010*

(This physical plan may result in a financial plan being necessary)

Name:						**Adviser:**									
Short Term Goals						**Long Term Goals -**									
1	Assess Winter Milk production.					1	Increase Milking Platform to 41 Ha.								
2	Complete Farm Development of Roads and Paddocks.					2	Increase Cow No's to 105.								
3	Reseed 10% per year					3	Increase Solids% in Milk.								
Complete all white cells			2009	2010		2011		2012		2013	2014				
Characteristic			**Actual**	**Targt/Achd**		**Targt/Achd**		**Targt/Achd**		**Target**	**Target**				
Physical data	Farm Size (Ha)		81	81		81		81		83	83				
	Milking Platform (Ha)		22.5	22.5		22.5		22.5		41	41				
	No. of Cows (to 2017)		**82**	**87**		**90**		**95**		**100**	**105**				
	Replacements 0-1 yr old	*Rep. rate 10 %*		9		10		10		11	11				
		Expansion		5		5		5		0	0				
		Planned heifer sales													
		Total 0-1 yr heifers	12	16		15		15		11	11				
	Replacements 1-2		14	12		16		15		15	11				
	No. Cattle 0-1		77	60		60		50		60	60				
	No. Cattle 1-2		50	55		55		55		55	55				
	Other Livestock units		1	1		1		2		2	2				
	Total Forage purchased (tDM)														
	Dairy Forage transfer to MP (tDM)		12	12		20		20		10	10				
	Cows/ha on milking platform		**3.64**	**3.87**		**4.00**		**4.22**		**2.44**	**2.56**				
	Farm stocking rate		1.91	1.95		2.01		2.04		2.07	2.10				
Breeding	**% Cows calved in 6 weeks** (+ 5%/yr)		**50**	**53**		**55**		**58**		**61**	**64**				
	Median Calving Date Target (-1 days/yr)		**20-Feb**	**19-Feb**		**18-Feb**		**17-Feb**		**16-Feb**	**15-Feb**				
	EBI : Cows (summer) Target (+ €10/yr)		**76**	**76**		**79**		**91**		**101**	**111**				
	EBI : 0-1(calves born)		91	138		146		149		161	171				
	A.I. Straws Required			**80**		**83**		**58**		**58**	**58**				
	Straws per cow + heifer			**0.8**		**0.8**		**0.5**		**0.5**	**0.5**				
	EBI of bull team required		**200**	**216**		**219**		**231**		**241**	**251**				
Performance	Kgs MS (sold from farm)		31,102	33,763		35,755		38,621		41,585	44,649				
	Kgs MS/cow		**379**	**388**		**397**		**407**		**416**	**425**				
	Meals / Cow		650	750		750		750		750	750				
	% Fat (+ 0.01 /yr)		3.94	3.95		3.96		3.97		3.98	3.99				
	% Protein (+ 0.02 /yr)		3.39	3.41		3.43		3.45		3.47	3.49				
	Yield (litres sold) (100 lts/yr)		5,019	5,119		5,219		5,319		5,419	5,519				
Financial	**Kgs MS / Ha (Milking Platform (MP))**		**1,382**	**1,501**		**1,589**		**1,716**		**1,014**	**1,089**				
	Total Costs / Kg MS % Change (-2%/yr)		**€2.40**	**€2.35**		**€2.30**		**€2.26**		**€2.21**	**€2.17**				
	Profit/ha at €3.60 /kg MS (26 cpl)		€1,659	€1,873		€2,058		€2,302		€1,406	€1,558				
	Dairy forage utilised/ha (MP)		**13.7**	**14.4**		**14.8**		**15.9**		**9.6**	**10.2**				
Inves	Cows/heifers/Bulls														
	Milk shed/ Infra/houing.					10,000									
Other	Variable costs per litre					9		9		10	10				

Warnings Your plan must take into account the existance of milk quota until 31th March 2015

The Robots are Coming

Stephen Fitzgerald and Bernadette O'Brien
Teagasc, Animal & Grassland Research & Innovation Centre
Moorepark, Fermoy, Co. Cork

Background

The principle of an automatic milking system (AMS) requires a significant change in approach to herd and farm management (from that in a conventional system) for two main reasons: (i) cows volunteer themselves for milking and (ii) milking is distributed over a 24h period. Since commercialisation in 1992, the AMS has become an established management system, particularly in North Western Europe, and recent figures indicate approximately 10,000 commercial farms using one or more AMS to milk their cows. The technology was originally developed with a focus on small family farms with 50 to 150 dairy cows using indoor-based production systems and year-round milking and targeted countries with milk production systems involving high-yielding cows, high milk prices, and high labour costs.

AMS description

The AMS unit consists of a stall with separate entry and exit gates, a feed delivery hopper at the head end, and a robotic arm carrying the teat cleaning device and the milking cups. The AMS can perform the tasks of cow identification, supplementary feeding, teat washing, establishing teat location, milking cup attachment, milking and cup removal all without human intervention. Most cows present themselves for milking by walking to the milking unit and entering the stall, again without direct human involvement. Ideally, cows will come in a steady stream throughout the day and night resulting in almost continual use of the AMS. Instead of being a "batch" process involving a high level of farmer input twice daily, milking can become a continuous "background" activity, where management of the system becomes the primary task and manual tasks are minimized.

Is AMS technology relevant to Irish dairy farms?

The concept of automatic milking could be very relevant to dairy farming in Ireland. There is an anticipated increase in national milk production by 50% in the coming years. However, at the same time, land as a resource is limiting and the quantity and quality of skilled labour are in increasingly short supply. There are a number of fundamental questions being asked on dairy farms at present, e.g. how to expand a

dairy herd on a fragmented land base, farm organisation in order to maintain a simple production system and choice of personnel versus automation.

Integration of cow grazing with automatic milking

If automatic milking is to be considered as a serious alternative to conventional milking in Ireland, then it has to operate with a similar cow nutritional strategy and focus on cow utilization of grass. This is the key challenge. However, research on AMS in New Zealand in recent years has indicated that automatic milking is applicable in a pastoral, seasonal system of milk production, particularly with smaller herds and a small number of commercial farms in both Australia and New Zealand have already employed AMS units.

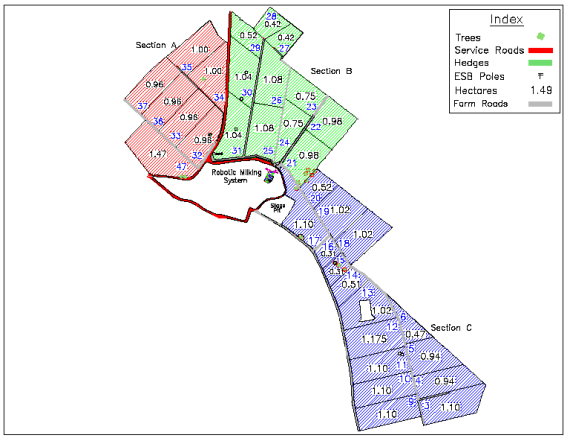
AMS project start-up at Moorepark

The farmlet associated with the AMS consists of a 24 ha milking platform. During the lactation of 2011 (start-up year) there were 63 cows in the system (target 80 cows) with a mean calving date of 15th February (range 1st February-15th March). This herd comprised 25 Friesian, 16 Jersey Friesian cross and 20 Norwegian Red cows as well as 2 of mixed breed. The land area was divided into 3 grazing sections of 8 ha each (A, B, C) which are further divided into 1 ha paddocks. Four main roadways radiate from the centrally located dairy. Water is located at the dairy. Maximum distance to furthest paddock is ~750m. The dairy features one Merlin AMS unit installed adjacent to the existing shed. The infrastructure incorporates a pre-milking waiting and post-milking area. There are three drafting units, two positioned at the entrance to the dairy that draft cows to the pre- or post- milking area depending on readiness for milking, a third positioned at the dairy exit which drafts cows to the holding yard (for treatment or inspection) or to grazing (Section A, B, C). Automatic milk diversion (colostrum, antibiotic) is included and extensive milking and cow information recorded at each milking (e.g. milk yield, milking time, milk flowrate, SCC, concentrate dispensed).

Grassland management

The grass allocation is critical to optimal cow visits to the AMS unit (it can influence too frequent or infrequent cow visits). Cows graze defined areas or portions of each of the 3 grazing sections during each 24 h period. Cows are allocated 5 kg DM in each of the 3 grazing sections (A, B and C) over each 24 h period. Cows move between the grazing Sections A, B and C at 1:00 am, 11:00 am and 6:30 pm, respectively. During the May/ June period cows go into grazing areas with grass

covers of 1400-1500 kg DM/ha. Pasture mass was estimated twice weekly. Covers greater than 1500 kg DM/ha would discourage cow movement to the AMS unit and may reduce milking frequency. Cows grazed to a post-grazing height of 3.5-4.0 cm. Cows were stocked at an average target of 3.5 cows/ha. All cows received 1 kg concentrate feed per 24 h period during most of the lactation.



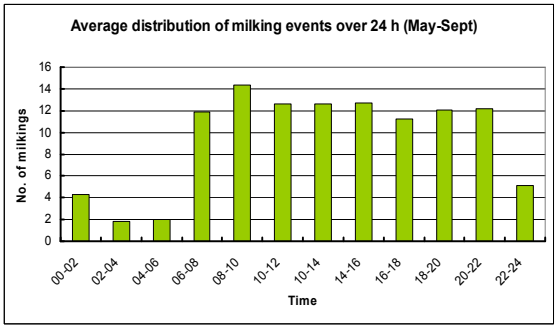
Production data

Month	milk yield (kg) per cow per day
Mar	21.5
Apr	21.9
May	21.4
Jun	23.9
Jul	20.9
Aug	16.4
Sep	14.3
Oct	8.5

- Milk protein % ranged from 3.26% in May to 3.95% in September
- Milk fat % ranged from 3.93% in June to 4.66% in September
- Milk lactose % was 4.54% in September
- Milk SCC was consistently < 200x10^3 cells/ml between May and August, and increased to 210x10^3 cells/ml during September

- There are on average 113 milkings per day, with 6 milkings per hour between 06:00 and 22:00.

Breed	No. milkings per cow per day
Friesian	1.8
Jersey x Friesian	1.6
Norwegian Red	2.0
All	1.8



Critical start-up issues and cost of outlay

(a) cow selection on udder and teat conformation, (b) cow training takes approximately 4 days, (c) 0.5 h and 0.25 h to be set aside for routine maintenance checks at morning and evening time every day, (d) liners have to be replaced at 3-weekly intervals early/mid stage of lactation, (e) a daily data check to ensure milking of all cows, udder health and overall cow health and (f) good backup service

Cost of AMS unit = 120,000 euro

Cost of yard and roadway infrastructure = 70,000 euro

Maintenance and running costs = 2,500 euro per year

Future research objectives

All of the following objectives assume that the AMS will be operating within a grass based production system:

- Define the optimum cow feeding strategy (including periods of grass inadequacy in spring and autumn) in order to maximise milk output from the AMS
- Measure the impact of nutritional inputs, milking frequency, number of cows per unit and stage of lactation on milk output from the AMS
- Establish the optimum cow breed/ type for the AMS
- Measure the sustainability of the AMS with respect to energy usage, environmental impact, cow well-being and milk quality. Economic sustainability of the AMS will also be determined both in its own right and in comparison with a conventional (batch herringbone) milking system.

Conclusion

A main challenge with automatic milking currently is the high capital cost but the concept of combining automatic milking and cow grazing has potential advantages which could have a positive impact on the dairy industry in the long term. These include reduced labour input, management as opposed to manual labour, ability to expand cow numbers on fragmented land bases, increased knowledge of cow data to use as a management tool and finally, but importantly, happy cows. However, considerable research needs to be conducted to establish if the concept presents a realistic alternative to conventional milking systems on Irish dairy farms.

Feeding the Dairy Cow in Spring: supplementation requirements and responses

Eva Lewis, Michael O'Donovan, Emer Kennedy, Brendan O'Neill and Laurence Shalloo

Animal & Grassland Research and Innovation Centre, Teagasc, Moorepark, Fermoy, Co. Cork

Summary

- The grass intake of dairy cows in early lactation is low but increases by ~1 kg grass DM per week for the first 2 months, then intake levels off
- Measurements of grass intake in early lactation indicate that, apart from the first month post-calving, the correct allowance of high quality grazed grass can supply sufficient energy to meet requirements
- On a herd basis, the demand for grass in early lactation is dependent on stocking rate and calving pattern
- In general across the herd the energy requirement is low in spring because freshly calved cows with a low energy requirement are entering the milking herd daily
- Supplementation required on a herd basis should be calculated by comparing the herd requirement to grass availability in order to identify if a feed deficit is present
- The milk solids response to supplementation is a function of a number of different factors, but the primary factor is the feed deficit – the greater the feed deficit, the smaller the substitution rate and the greater the response to supplementation

Introduction

Dry matter intake is possibly the single most important factor influencing milk production in dairy cows. Meeting the requirements of the animal by achieving the correct intake is crucial to ensuring good performance and health. Animals who experience a deficit in energy intake can reduce their energy output (milk production performance or weight gain) or attempt to bridge the energy deficit by mobilising body tissue (resulting in BCS loss). Both of these options are undesirable. The objective is to provide the animal with adequate nutrition to meet requirements, in the

cheapest way possible. In Ireland the grass-based system is the most profitable system. In this system grazed grass is the largest part of the feed budget. With variable grass growth conditions, grass intake and weather conditions in the spring it is possible that there may be an energy deficit at this time. The objective of this paper is to describe feeding the dairy cow in spring. Data from studies conducted at Teagasc Moorepark over the last number of years will be examined in order to identify the energy requirements and energy taken in, in order to ascertain if an energy deficit exists, and if so, how to bridge it. The size of the feed deficit is the primary factor affecting the substitution rate and the response to supplementary feeding. However, a number of other factors are also involved, including stage of lactation, genetic potential for milk production, grass availability and quality, and the quantity and quality of supplementary feed.

Dairy Cow Dry Matter Intake in Early Lactation

Figure 1 illustrates the grass dry matter intake of a cow in early lactation. These data are from measurements made at Teagasc Moorepark over the last 5 years (2007 to 2011 inclusive) on cows offered a grass-only diet. The data indicate the capacity of cows to consume grass in early lactation. The graph illustrates the low grass intake of a cow in early lactation, as shown by the low intake in weeks 1 and 2, and then the increase of approximately 1 kg per week up to week 8. Intake then levels off. The graph also shows the greater intake of mature cows compared to first lactation animals. The first lactation animals consume on average 75% the quantity of feed of their mature cow counterparts. Of course, most farms have a mix of mature and first lactation animals in the herd. The graph illustrates the average intake of cows in a herd with a 25% replacement rate (i.e. 25% first lactation animals and 75% mature cows).

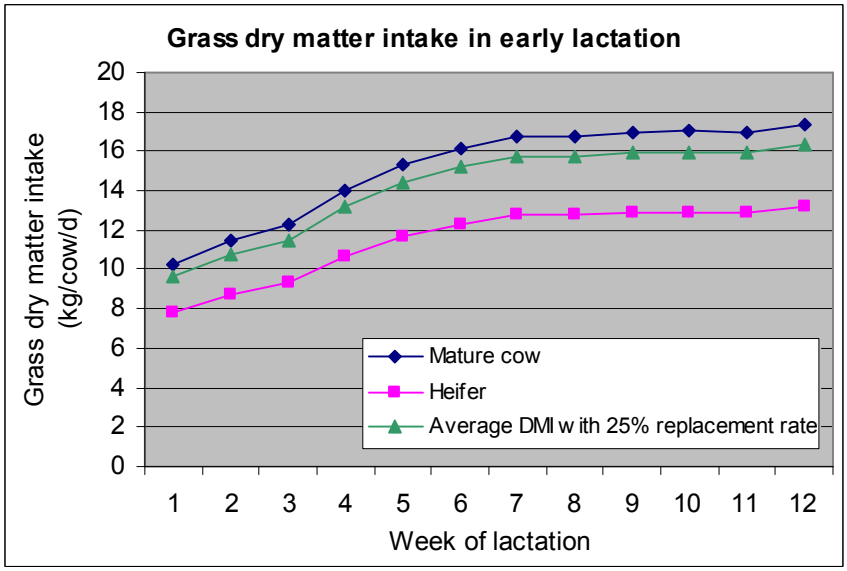


Figure 1. The grass dry matter intake of cows in early lactation.

The energy value of feeds in Ireland is presented in the units UFL. One UFL is defined as the energy contained in 1 kg of air dry standard barley. Data from studies carried out at Teagasc Moorepark over the past 10 years (89 samples) indicate that the average UFL value of spring grass is 1.04 UFL/kg grass DM. This grass has a high feed value. So an intake of 10 kg DM grass is equivalent to 10.4 UFL, and an intake of 15 kg DM grass is equivalent to 15.6 UFL. There is variation around this value. The same dataset from Teagasc Moorepark indicates that the UFL value of spring grass can be as high as 1.13 UFL, but can also be as low as 0.84 UFL.

Dairy Cow Energy Requirements in Early Lactation

The energy requirement of a dairy cow in early lactation is composed of the energy required for milk production and the energy required for maintenance. In later lactation energy is also required to support pregnancy, to replenish any lost bodyweight and for growth. Energy requirements are also expressed in the units UFL. In early lactation the majority of the energy required comes from what is eaten by the cow, but a small proportion can also come from body fat mobilisation, which we see as bodyweight and body condition score loss. In early lactation the energy requirements of the cow change on an almost daily basis, due to the rapidly changing milk yield and milk composition. Figure 2 illustrates the energy requirement of cows in early lactation. As in Figure 1, data are presented for a mature cow, a first lactation animal, and for the average cow in a herd with a 25% replacement rate. In

this case the mature cow is a 550 kg cow who loses 20 kg bodyweight between calving and week 11 and then from week 12 to 22 puts on 20 kg of bodyweight. This cow achieves a peak milk solids yield of 1.93 kg/d during week 8 of lactation. The first lactation animal is 450 kg bodyweight and achieves a peak milk solids yield of 1.46 kg/d.

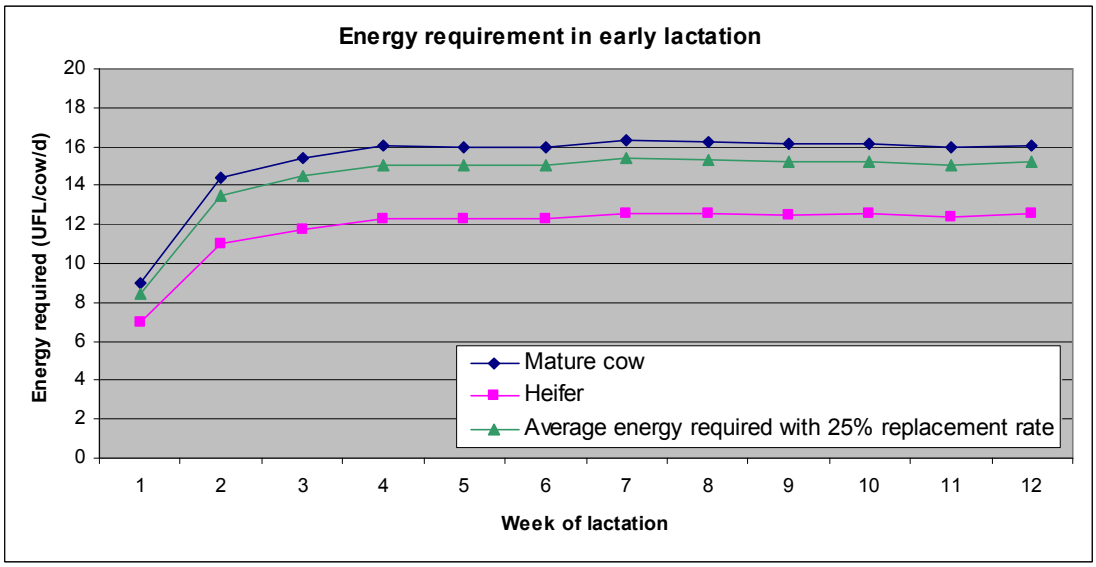


Figure 2. The energy requirements of cows in early lactation.

Comparing the energy required in Figure 2 with the intake in Figure 1 it can be seen that a deficit exists in the first month of lactation. This indicates that the cow is consuming insufficient grass to fulfil her energy requirements. As a result, in the example shown in Figures 1 and 2, supplement should be offered to the cow for the first month of lactation. It's also clear from the graphs that the decision on whether to supplement or not will be influenced by both the grass intake (intake capacity of the cow) (Figure 1) and the energy requirements (milk production of the cow) (Figure 2). Typically, as the milk production increases so too does the deficit between energy supply and energy demand, increasing the requirement for supplementary feeding. Similarly, as the milk production decreases, so too does the deficit between energy supply and energy demand, reducing the requirement for supplementary feeding.

Supplementary Feeding

The quantity and type of supplement to be offered depends on the grass intake and the energy requirements. If high quality grass is available to meet the intake levels shown in Figure 1, then up to 3 kg of a high energy supplement (e.g. a high quality

concentrate with a minimum of 0.94 UFL (fresh weight)) should be offered to meet the energy requirements shown in Figure 2. In general the crude protein concentration of grass is high and it is not necessary to offer a high crude protein supplement.

If there is insufficient grass available to meet the intake shown in Figure 1, then a higher level of supplementary feeding is required to meet the requirements shown in Figure 2. If grass is making up a very small proportion of the total diet then it is necessary to make up the feed deficit using a forage as well as concentrate (e.g. grass silage, maize silage, whole-crop). This maintains adequate fibre levels in the diet. This fibre must come from forage. The type of concentrate required depends on the levels of grass available. For example, if grass silage is being offered, in association with low levels of grass, it is necessary to offer a higher crude protein concentrate in order to maintain the total diet crude protein at an acceptable level.

If concentrate is being offered as a feed on its own (e.g. in the milking parlour at milking) then lower levels can be offered in equal proportions at the morning and evening milking. However, if greater than 6 to 8 kg concentrate per cow per day is being offered in this way it is necessary to introduce a third feed. This is because large quantities of concentrate being eaten in a short amount of time can give rise to problems in the rumen (rapid drop in rumen pH). Special attention must be paid to heifers and early lactation animals being offered high levels of concentrate. This is because their total intake is low and the concentrate could be making up a greater proportion of the total diet than anticipated. This can lead to problems with low rumen pH and low gut fill. Concentrate feeding levels should be stepped up gradually over time to allow the rumen to adjust.

The Herd Energy Requirements in Spring in Early Lactation

Research from Teagasc Moorepark shows the importance of getting grass into the dairy cow early lactation spring diet. Maximising the amount of grazed grass in the diet boosts milk solids concentration and increases profitability while setting up the farm for subsequent rotations. The availability of grass should be the first consideration in the feed budget. In general across the herd the energy requirement is low in spring due to freshly calved cows with low energy requirements entering the milking herd daily. Calving pattern and stocking rate have an important influence on the herd requirement for grass in early spring.

Figures 3 and 4 illustrate the energy requirements of herds with different mean calving dates (21st Feb and 8th Mar) and at different stocking rates (1.6, 2.4 and 3.2 cows/ha). The herd has a 25% replacement rate. The demand reflects the mix of animals in the herd – from those just calved to those calved a longer period of time. The data are expressed on an energy requirements per hectare basis for each week. As stocking rate increases there is an increase in the energy requirement. For example, on 25th Feb, in the early mean calving date scenario, the low stocking rate has a requirement of 15 UFL/ha and the high stocking rate has a requirement of 29 UFL/ha. For the late mean calving date scenario, on 25th Mar, the low stocking rate has a requirement of 17 UFL/ha while the high stocking rate has a requirement of 34 UFL/ha. It's also clear from the graphs that the earlier the mean calving date the earlier and greater the demand. This is because the earlier calving herd has a greater proportion of cows calved for a longer amount of time. This is illustrated by taking the example of the date on which the requirement of the high stocking rate reaches 40 UFL/ha. This occurs on 18th March for the early mean calving date, but not until 8th Apr for the late mean calving date.

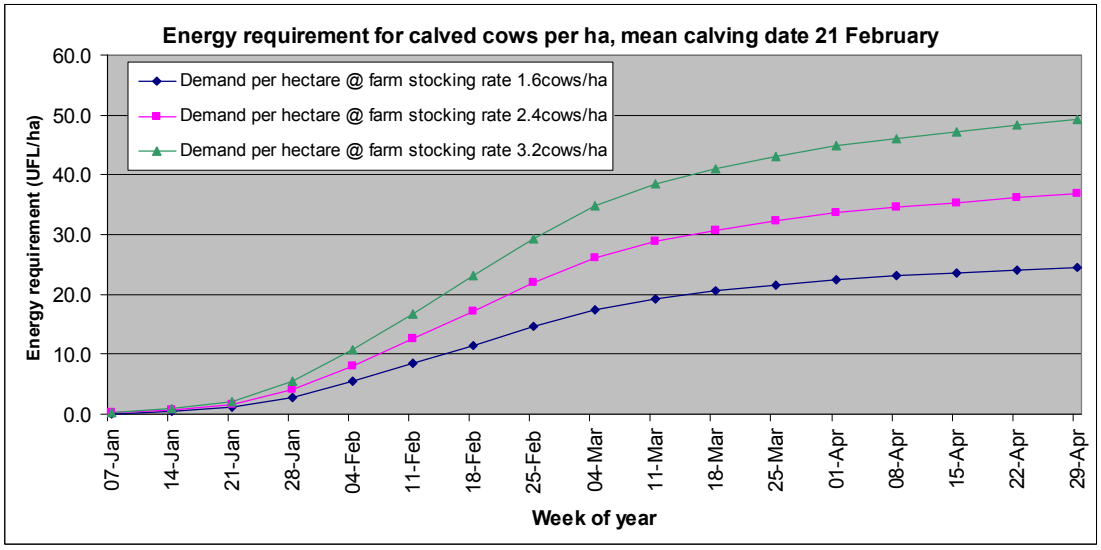


Figure 3. The energy requirement per ha of the calved cows in the herd, depending on stocking rate, for a herd with a mean calving date of 21st February (herd composed of 25% heifers and 75% mature cows).

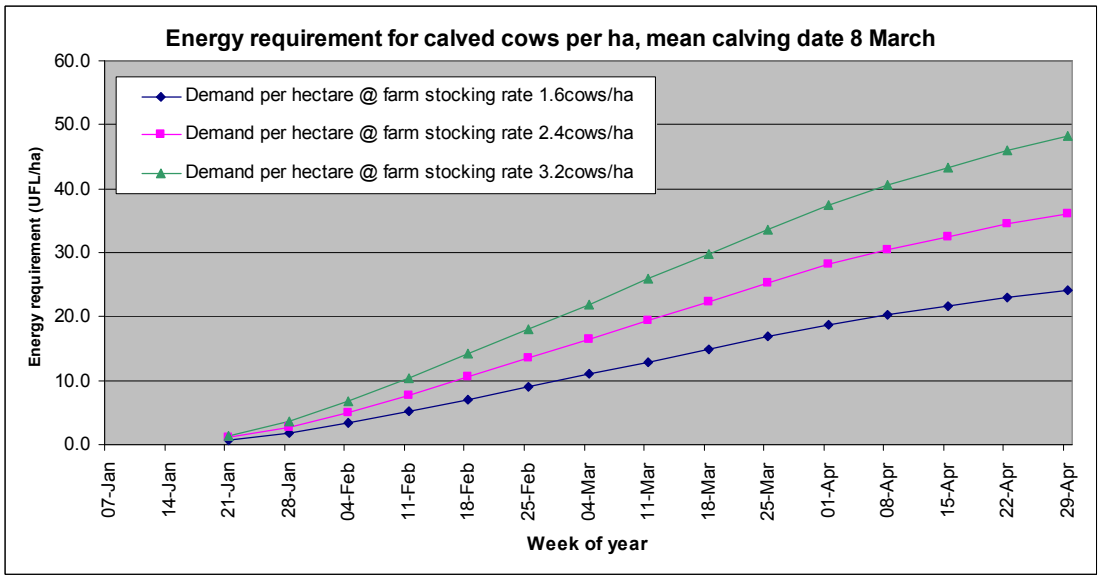


Figure 4. The energy requirement per ha of the calved cows in the herd, depending on stocking rate, for a herd with a mean calving date of 8th March (herd composed of 25% heifers and 75% mature cows).

Meeting the Herd Energy Requirements in Spring in Early Lactation

It's desirable to meet as much of the herd energy requirements as possible from grazed grass due to the benefits on milk solids concentration and increasing the grass quality for future grazing rotations. The herd energy requirements (Figures 3 and 4) should be compared to grass availability on the farm. The availability of grass is a function of the farm grass cover and the current grass growth rate. Figure 5 illustrates 2 early spring grass growth rates, one high and one low. The high grass growth rate average from 5th to 19th Mar was 28 kg DM/ha/d. This is greater than both the low stocking rate requirement (15 UFL/ha) and medium stocking rate requirement (22 UFL/ha) in the late mean calving date system. This means that after the herd requirements are met, grass is still accumulating on the farm and farm grass cover is increasing. During the same time period, the low grass growth rate average was 12 kg DM/ha/d. This is less than the low stocking rate requirement (15 UFL/ha) and medium stocking rate requirement (22 UFL/ha) in the late mean calving date system. This means that if all the herd requirements are met from grass, then farm grass cover will reduce. Where farm grass cover and current grass growth rate can sustain the energy requirement per hectare, supplementary feeding above that required for the individual animal is not recommended. Indeed it could be detrimental as higher levels of supplementary feeding will cause a decrease in grass consumed

giving rise to poor utilisation and Spring Rotation Planner targets not being met. Both of these could lead to reduced grass quality in subsequent rotations, with negative effects on animal performance. On the other hand, if the farm grass cover and current grass growth rate cannot sustain the energy requirement per hectare, then supplementary feed may have to be introduced in order to avoid a greater feed deficit in the future.

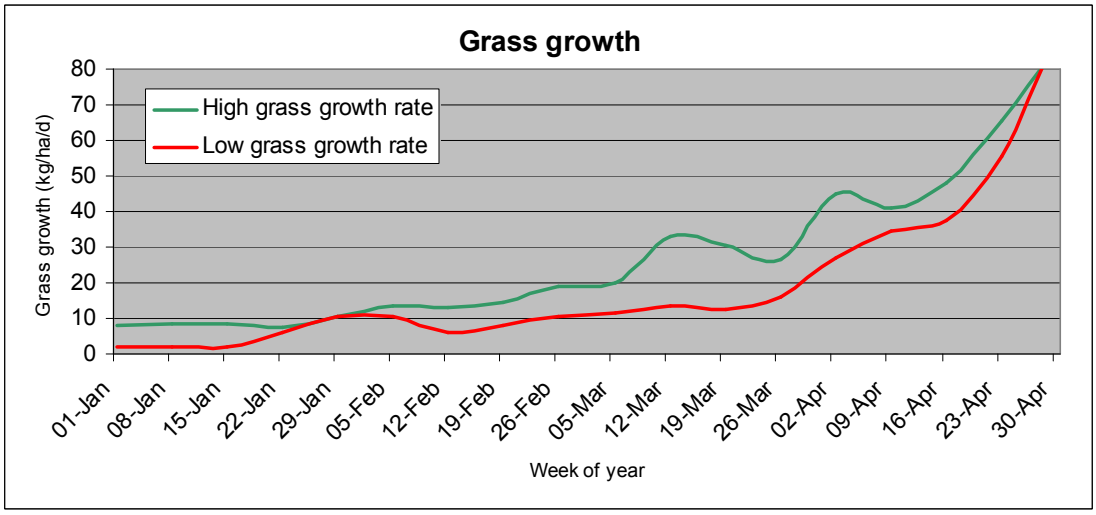


Figure 5. Grass growth in a good and poor year.

Supplementary Feeding

Substitution Rate

When grass intake does not meet energy requirements, supplementary feed, often taking the form of concentrate, is offered. However, when supplementary feed is offered grass intake is reduced. This effect is known as "substitution", because the supplement is substituting for grass. The substitution rate is primarily a function of the feed deficit - as the quantity of grass offered to the cow increases, the feed deficit is reduced and the substitution rate increases. On the other hand, if a low quantity of grass is offered, then there is a large feed deficit, and so there is a smaller substitution rate. Analysis of a large database of studies in Teagasc Moorepark (39 herds) was undertaken to establish the substitution rate observed with different herbage allowances. The results took into account studies conducted over the past 6 years and revealed that on average a cow offered a low herbage allowance (< 14 kg grass DM/cow/d) in spring had a substitution rate of 0.28 kg. But cows offered a higher herbage allowance (> 18 kg grass DM/cow/d) had a much higher substitution

rate of 0.69 kg. Supplementing grazed grass leads to a reduction in time spent grazing, which reduces grass intake. The substitution associated with offering forages such as grass silage is much higher than with offering concentrate. Some studies suggest a substitution rate greater than 1 kg with grass silage. Forages are usually less digestible than concentrate and are slowly degraded in the rumen leading to greater gut fill. This leads to reduced time spent grazing and lower grass intake.

Milk Solids Response to Supplementation

The milk solids response to supplementation is defined as the increase in milk solids yield per kg supplement offered. There is a negative relationship between substitution rate and milk solids response to supplementation. A small feed deficit is associated with a high substitution rate and a low response to supplementation. A large feed deficit is associated with a low substitution rate and a high response to supplementation. In addition to feed deficit, the milk solids response is also dependent on a number of other factors including stage of lactation, genetic potential for milk production, pasture availability and quality, and quantity and quality of supplementary feeds. Analysis of a large database of studies in Teagasc Moorepark (39 herds) was undertaken to establish the immediate milk solids response to supplementation with different herbage allowances. The results took into account studies conducted over the past 6 years and revealed that on average a cow offered a low herbage allowance (< 14 kg grass DM/cow/d) in spring had a response of 0.046 kg milk solids per kg concentrate offered. But cows offered a higher herbage allowance (> 18 kg grass DM/cow/d) had a much lower response of 0.007 kg milk solids per kg concentrate offered. Another set of analysis (1200 individual cow records over 11 years) was undertaken to establish the immediate milk solids response to supplementation by cows with different milk yield potential. The results showed that when cows were offered up to 3 kg concentrate, a cow with a peak milk yield of < 25 kg will produce 0.036 kg milk solids for every kg concentrate fed, but a cow with a higher peak milk yield of 25 to 30 kg will produce 0.041 kg milk solids for every kg concentrate fed. This indicates that cows with a higher genetic potential for milk production respond more to supplementary concentrate feeding. This is partly due to the fact that these cows have a greater feed deficit than lower milk production potential cows. When higher concentrate levels were offered the response decreased. There can be a carryover effect associated with concentrate feeding. The duration of this carryover effect depends on a number of factors including duration of concentrate feeding, quantity of concentrate fed and stage of lactation.

References

BAUDRACCO J., LOPEZ-VILLALOBOS N., HOLMES C.W. and MACDONALD K.A. (2010) Effects of stocking rate, supplementation, genotype and their interactions on grazing dairy systems: a review. *New Zealand Journal of Agricultural Research,* **53,** 109-133.

BERRY D.P., BUCKLEY F., DILLON P., EVANS R.D., RATH M., VEERKAMP R.F. (2003) Genetic relationships among body condititon score, body weight, milk yield and fertility in dairy cows. *Journal of Dairy Science,* **86,** 2193-2204.

BRAMLEY E., LEAN I.J., FULKERSON W.J., STEVENSON M.A., RABIEE A.R. and COSTA N.D. (2008) The definition of acidosis in dairy herds predominantly fed on pasture and concentrates. *Journal of Dairy Science,* **91,** 308-321.

BUCKLEY F., DILLON P., RATH M., VEERKAMP R.F. (2000) The relationship between genetic merit for yield and liveweight, condition score, and energy balance of spring calving Holstein Friesian dairy cows on grass based systems of milk production. *Journal of Dairy Science,* **83,** 1878-1886.

COLEMAN J., PIERCE K.M., BERRY D.P., BRENNAN A. and HORAN B. (2010) Increasing milk solids production across lactation through genetic selection and intensive pasture-based feed system. *Journal of Dairy Science*, **93**, 4302-4317.

KENNEDY E., O'DONOVAN M., DELABY L. and O'MARA F.P. (2008) Effect of herbage allowance and concentrate supplementation on dry matter intake, milk production and energy balance of early lactating dairy cows. *Livestock Science*, **117**, 275-286.

KENNEDY E., O'DONOVAN M., MURPHY J.P. O'MARA F.P. and L. DELABY (2006) The effect of initial spring grazing date and subsequent stocking rate on the grazing management, grass dry matter intake and milk production of dairy cows in summer. *Grass and Forage Science,* **61,** 375-384.

KLEEN J.L., HOOIJER G.A., REHAGE J. and NOORDHUIZEN J.P. (2003) Subacute ruminal acidosis (SARA): a review. *Journal of Veterinary Medicine Series,* **50,** 406-414.

MCCARTHY S., HORAN B., RATH M., LINNANE M., O'CONOR P. and DILLON P. (2007) The influence of strain of Holstein-Friesian dairy cow and pasture-based feeding system on grazing behaviour, intake and milk production. *Grass and Forage Science*, **62**, 13-26.

MCEVOY M., KENNEDY E., MURPHY J.P., BOLAND T.M., DELABY L. and M. O'DONOVAN (2008) The effect of herbage allowance and concentrate

supplementation on milk production performance and dry matter intake of spring-calving dairy cows in early lactation. *Journal of Dairy Science*, **91**, 1258-1269.

MCEVOY M., O'DONOVAN M., KENNEDY E., MURPHY J.P., DELABY L. and BOLAND T.M. (2009) Effect of pre grazing herbage mass and pasture allowance on the lactation performance of Holstein-Friesian dairy cows. *Journal of Dairy Science*, **92**, 414-422.

MURPHY J.J., KAVANAGH S., PATTON J. and MAHER J. (2008) Factors affecting mid season milk protein content. In: *Proceedings of the Teagasc National Dairy Conference*, Cork and Athlone, Ireland, 26-27 November, pg. 80-85.

O'NEILL B.F., DEIGHTON M.H., O'LOUGHLIN B.M., MULLIGAN F.J., BOLAND T.M., O'DONOVAN M. and LEWIS E. (2011a) Effects of a perennial ryegrass diet or total mixed ration diet offered to spring-calving Holstein-Friesian dairy cows on methane emissions, dry matter intake and milk production. *Journal of Dairy Science*, **94**, 1941 – 1951.

PRENDIVILLE R., LEWIS E., PIERCE K.M. and BUCKLEY F. (2010) Comparative grazing behaviour of lactating Holstein-Friesian, Jersey, and Jersey cross Holstein-Friesian dairy cows and its association with intake capacity and production efficiency. *Journal of Dairy Science*, **93**, 764-774.

ROCHE J.R., FRIGGENS N.C., KAY J.K., FISHER M.W., STAFFORD K.J., BERRY D.P. (2009) Body condition score and its association with dairy cow productivity, health and welfare. *Journal of Dairy Science,* **92,** 5769-5801.

SHALLOO L., DILLON P., O'LOUGHLIN J., RATH M. and WALLACE M. (2004) Comparison of a pasture-based system of milk production on a high rainfall, heavy-clay soil with that on a lower rainfall, free-draining soil. *Grass and Forage Science,* **59**, 157-168.

THORNE F. and FINGELTON B. (2005) Irish dairy farming – can we compete. In: *Proceedings of the National Dairy Conference*, Wexford and Cavan, Ireland, 16-17 November, pg. 10-24.

WILKINS R.J. (2004) In: PENNING P.D. (ed) *Herbage Intake handbook. Second edition*, pp. 13–14. British Grassland Society, Reading, UK.

WIMS C.M., DEIGHTON M.H., LEWIS E., O'LOUGHLIN B., DELABY L., BOLAND T.M. and O'DONOVAN M. (2010) Effect of pre grazing herbage mass on methane production, dry matter intake, and milk production of grazing dairy cows during the mid-season period. *Journal of Dairy Science***, 93**, 4976-4985.

Drying Off Cows

Don Crowley, Dairy B & T Advisor, Teagasc, Skibbereen, Co. Cork

This procedure is often taken for granted. On many farms it is not given the care and attention it deserves, resulting in poor cure rates during the dry period and in cows calving down with a higher cell count than at time of drying off. It pays to execute the procedure properly. The following routine should be carried out:

1. Abrupt drying off is crucial.
2. Dry off in batches of 10 cows. If drying off more at one time, organise help. Remember if using sealer, 80 tubes will be applied to these 10 cows.
3. Draft out the group of cows, and leave them until the end of milking.
4. Clean out parlour and organise tubes +/- sealer plus methylated spirits plus cotton wool.
5. Go and have some breakfast!!!!
6. Turn off your mobile phone.
7. Use a new set of gloves for drying off.
8. Start with front teats - clean with cotton wool and methylated spirits.
9. Always start with front left teat, administer dry cow tube and teat sealer to front teats.
10. Clean back teats with methlyated spirits and cotton wool.
11. Administer dry cow tubes and teat sealer and post spray all cows.
12. Continue procedure for remainder of cows.
13. If possible, cows milking more than 15 litres/day and cows that are likely to leak after drying off should be left out in a bare paddock for 7 to 10 days after drying off.
14. Always mark with spray marker.
15. Record the tag number and dry off date of each cow.

Mastitis problems originating in the Dry Period

a. When more than 10% of cows calve with a somatic cell count of over 200,000 cells/ml.
b. Where more than 10% of cows have a positive CMT at 4 days in milk.
c. If more than 1 in 12 cows develop mastitis in the first 30 days.

When the above issues arise, a big impact can be made in productivity and profitability by improving dry cow management.

Fertilizer value of dairy soiled water

Paul Murphy[1], Denis Minogue[2], Andy Boland[3] & Pádraig French[2]

[1] Teagasc, Agricultural Catchments Programme

[2] Teagasc, Livestock Systems Research Department

[3] Teagasc, Advisory, Moorepark

Summary

- Dairy soiled water offers a substitute for synthetic fertilizers that can cut costs and reduce environmental impacts.
- Soiled water can achieve 80% of the grass DM yield response of CAN fertilizer at equivalent rates of total N application.
- Apply soiled water from May to August at 30,000l/ha (20kgN/ha) to get the optimal grass yield response.
- Soiled water also contains significant P and K and can be considered as a more balanced 15-2-14 NPK compound fertilizer.
- Managing soiled water effectively to replace synthetic fertilizer N, P and K could potentially save €1300 a year on a 100-cow farm.

Introduction

Fertilizer N prices, having decreased in 2009 and 2010, increased again in 2011. Fertilizer accounts for roughly 15-20% of the total variable costs on dairy farms. With prices being closely linked to the price of oil, and global fertilizer demand set to increase, it can be expected that fertilizer prices will increase further. The price instability seen in recent times also poses a challenge to farmers as it adds to uncertainty in costs. For these reasons, we need to make the best of all available nutrient sources on-farm.

Low-cost, high return substitutes for fertilizer can help decrease fertilizer use, offering cost savings to farmers and reducing environmental impacts. One such substitute that is widely available on dairy farms is soiled water. Dairy soiled water is a dilute mixture of dung, urine, spilt milk and detergents produced from the washing down of parlours and holding areas. It contains N, P and K that can be used as a fertilizer to increase grass yield. However, soiled water is often seen as a problem rather than an opportunity and is often applied to land as a waste, without trying to get the most out of the nutrients contained in it.

Nutrient content of soiled water

As part of a research programme funded by the Research Stimulus Fund of the DAFM, a survey of 60 dairy farms over a 12 month period was carried out to assess the volumes of soiled water produced and its nutrient content. Approximately 10,000l (10m^3) of soiled water were produced per cow per year. On average, this contained around 590mg/l N (0.6kg/m^3) (Table 1). For comparison, cattle slurry is assumed to have a N content of 5kg/m^3. Roughly a third of the N in soiled water is rapidly plant-available ammonium-N and the balance is mostly organic N. This organic N would probably not be immediately plant-available but can become available over a growing season following mineralisation. Soiled water also contains significant quantities of P and K. The average P content of soiled water was 80mg/l and the K content was 570mg/l. Therefore, soiled water can also meet some of the P and K requirements on-farm.

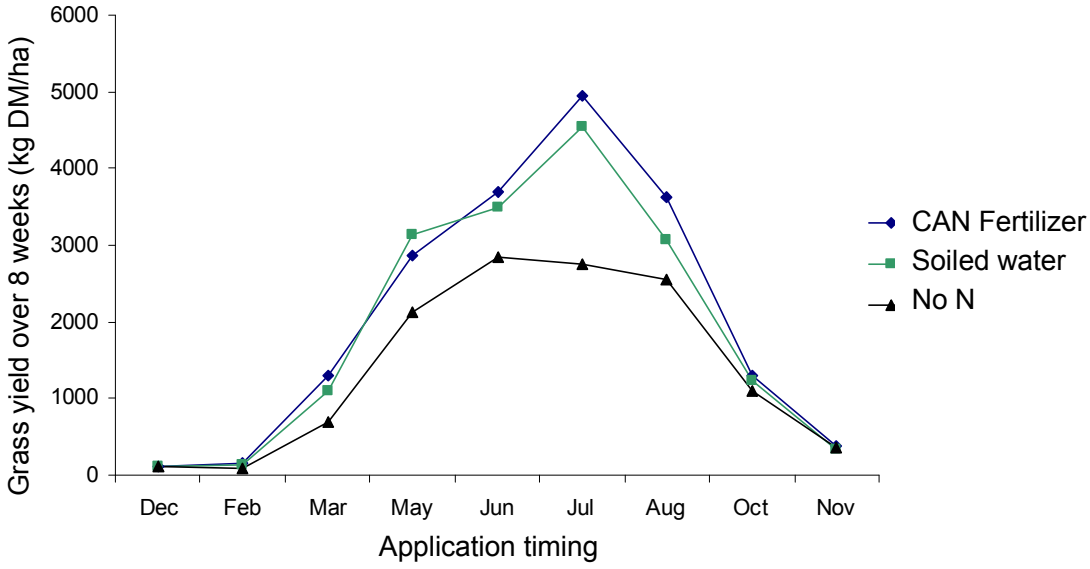
Table 1. Average nutrient content of dairy soiled water from 60 farms.

	kg/m3	Units/1000 gallons
Total N	0.6	5.4
Rapidly Available N	0.2	1.8
P	0.08	0.7
K	0.6	5.4

Fertilizer replacement value

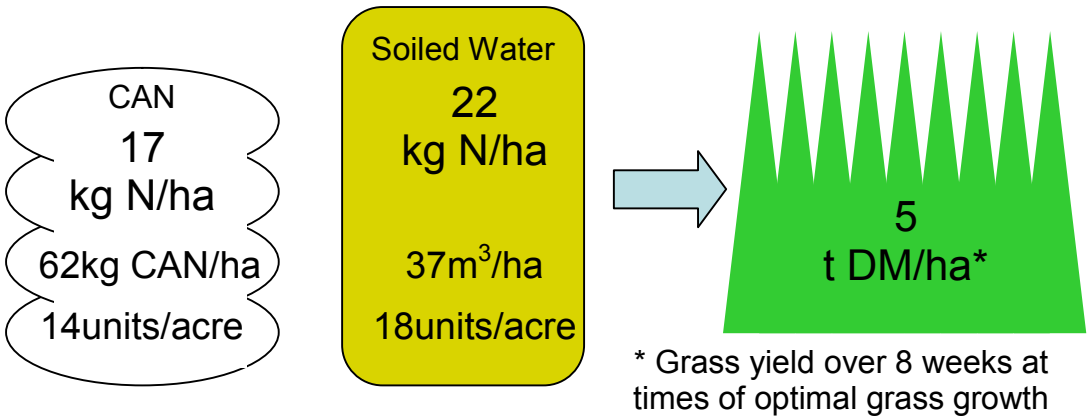
So dairy soiled water contains significant quantities of N. But, is it effective as a fertilizer to increase grass yield? And how much soiled water is needed to replace a given amount of fertilizer N? To answer these questions, plot experiments were carried out with soiled water and fertilizer N (CAN) applied at different rates (0, 15, 22, 30kg total N/ha) to two different soils (poorly drained and well drained).

Figure 1. Grass yield response to soiled water and CAN fertilizer N (average of soiled water or CAN at 15, 22 and 30kg N/ha).



On average, soiled water applied during the growing season (February-September) gave 80% of the grass DM yield response of CAN applied at the same level of total N content (Figure 1). Soiled water applied at 22kg N per ha (roughly 35m^3/ha) could replace 17kg N per ha of CAN fertilizer while maintaining the same grass production (Figure 2). The soiled water produced on a dairy farm of 100 cows could replace 480 kg of fertilizer N, or 1.7 tonnes of CAN, 570 kg of K and 80 kg of P. Assuming costs of €330 a tonne for CAN, €450 a tonne for muriate of potash (50 %) and €425 a tonne for superphosphate (16 %), this gives cost savings of €575 per year in N, €513 in K and €212 in P; a total cost saving of €1300 per year. In recent years, P and K fertilizer usage has decreased markedly and high N, low P and K compound fertilizers such as 27-2.5-5 NPK have come to dominate, causing concerns about P and K deficiencies. Soiled water can be considered as equivalent to a more balanced 15-2-14 NPK compound fertilizer.

Figure 2. The fertilizer value of soiled water compared to CAN and the grass yield over 8 weeks from soiled water applied under optimal grass growth conditions.



Soiled water had a high N fertilizer replacement value on both a well-drained acid brown earth soil and a poorly drained gley soil, so soiled water should have a high N fertilizer replacement value across a range of soil types. Soiled water also maintains high replacement values through the summer and autumn. In contrast, slurry has typically been found to have a replacement value of only 15 to 50%, decreasing through the growing season. What makes soiled water a more effective substitute for fertilizer N? Soiled water is more dilute than slurry and infiltrates better into the soil. This means that less N is lost as ammonia emitted to the air and that N is delivered effectively to the grass roots.

Roughly two thirds of the N in soiled water is in the organic form and not immediately available to plants. It was surprising, then, to find such high N fertilizer replacement values. This may be because soiled water spreads N more evenly compared to fertilizer pellets which concentrate N in the area around the fertilizer pellet. Soiled water delivers N to a larger area of the sward. Soiled water application may also cause additional plant-available N to be released form the soil.

Strategies to maximise value

The best yield response to both soiled water and fertilizer N can be got from May to August- the time of peak grass growth potential and N requirement. To get the most out of the N in soiled water, it should be applied during this period. This is also a period when soil moisture deficits and water stress can become an issue and soiled water can be used to alleviate that.

Because two thirds of the N in soiled water is in the organic form and not immediately available to plants, it is better to apply soiled water early in the growing season so that this organic N can be mineralised and become available to the grass over the

growing season. If you have the capacity to store soiled water through the winter period for application in the spring or early summer, in a clay- or plastic-lined lagoon for example, this can help you get the most out of the N in your soiled water.
Rates of application are limited by the Nitrate Regulations to 50,000l/ha (4,500gallons/acre or 5mm with an irrigator) every six weeks. This amounts to roughly 30kgN/ha. In this experiment, soiled water was applied at 15, 22 and 30kgN/ha but there was little difference in yield between the two higher rates. Application at approximately 20kgN/ha (approximately 30,000l/ha or 2,700gallons/acre) may be optimum.

At present, most dairy farmers use a vacuum tanker to spread their soiled water. A pump and irrigation system or an umbilical system can save on spreading costs and time. If fertilizer N is to be applied to a paddock in the same rotation, we recommend applying soiled water before the fertilizer N. This is to avoid the risk of leaching of N from the fertilizer when soiled water is applied.

Care should be taken to avoid over-application of P and K, which can have environmental and herd health impacts (e.g. milk fever, grass tetany). As always, the correct balance of nutrient supply is what is needed. The composition of soiled water on dairy farms varies a lot. This presents a challenge for effective nutrient management. We recommend sampling and analysing your soiled water to get an idea of its N content. When sampling the soiled water tank, it is important to sample from the liquid part and not the crust at the surface or the sediment at the bottom.

Conclusions

Dairy soiled water is a valuable source of nutrients on dairy farms with surprisingly high N availability and N fertilizer replacement value and significant P and K content. If managed correctly, soiled water can help to replace some of the synthetic fertilizer use on-farm, improving nutrient use efficiency, saving on costs and reducing environmental impacts.

Cheese – A Strategy for an expanded milk pool

Tom Beresford

Teagasc Food Research Centre, Moorepark

Summary

- Cheese production offers the Irish dairy industry a value added route to market
- Moorepark is working closely with the Irish industry to assist it in adding value to cheese and cheese products

Introduction

Food Harvest 2020 proposes a 50% increase in milk production in Ireland by 2020 based on the 2009 base line. While the capacity of Ireland to respond to this production challenge is accepted, the key to the overall success of the industry will be our capacity to process the milk into value added products that can be readily sold on global markets.

Cheese is a key product for the Irish dairy industry, with six of the major companies involved in its production. National cheese output is steadily increasing and production is now over 170,000 tonnes per annum. Cheese markets are expanding globally but in particular there will be significant opportunities in markets such as the UK, Europe and the USA where the Irish dairy industry already has an established marketing infrastructure and where products from Ireland command a premium position in the eyes of consumers. For example, it is estimated that cheese consumption in Europe will increase by 300,000 tonnes per annum during the period 2010 to 2020, thus offering Ireland a unique opportunity to increase our market share in this value added market.

However, there has been an overdependence on Cheddar output and if the industry is to maximise the return on cheese there is a need to expand the product portfolio while identifying novel approaches to adding value to Cheddar. It is well recognised that production of a diverse range of cheeses in Ireland is hampered by our seasonal milk supply. Therefore the need to support research in cheese, with particular emphasis on addressing the factors impacting on cheese quality, and diversification of the product range, has become increasingly important. The research strategy being undertaken at the Teagasc Food Research Centre, Moorepark to achieve this is based on development of scientific understanding of the impact of milk composition

and quality, processing parameters, novel ingredients, starter bacteria and enzyme systems on product flavour, textural, nutritional and functional attributes and to apply such knowledge to providing solutions with commercial potential to industry.

Cheese diversification

To address the opportunities of expanding cheese markets in Europe and North America Moorepark has worked on a strategy for cheese type diversification for many years. Based on the vast experience developed we have recently embarked on a major collaboration with the Irish industry to assist them in the development of new cheese types. Based on market intelligence, the industry identifies particular cheeses where opportunities exist. Moorepark is then provided with samples of such cheeses which are “mapped” in fine detail based on the extensive analytical capability available at the centre. This information is then used to derive manufacturing processes that are likely to lead to cheeses with the desired sensory and functional attributes. Cheeses manufactured based on these recipes are then analysed during ripening in collaboration with industry personnel and products demonstrating commercial potential move on to a scale up phase. Based on this model a continuous pipeline of cheeses are under development with new concepts added as existing ones either move on to industrial evaluation or are terminated if the information collected suggest that they will be too difficult to manufacture under Irish conditions.

Adding value to Cheddar

Over 80% of the cheese currently produced in Ireland falls into the Cheddar category, much of which undergoes secondary processing for ingredient applications and most finds it way to market via a “business to business (B2B) route. Even with an expanding milk pool and a greater drive for diversification of cheese type, Cheddar will continue to be the dominant cheese produced in Ireland over the coming years. The focus of the industry in this area will be to improve manufacturing efficiency and to add value through various approaches such as enhancing flavour, nutrition or technological functionality. Moorepark is very active in this area and is working closely with industry on topics such as fat and salt reduction, accelerated ripening and enhanced flavour development, modified technological functionality and manufacturing efficiency. An industry based Cheese Forum is operated where many of these issues are addressed in collaboration with industry.

New approaches to cheese manufacture

The conventional approach to cheese manufacture is dependent on a supply of fresh milk. However, new approaches to manufacture cheese from novel dairy ingredients are being investigated at Moorepark. While still at an experimental and pilot plant level, the process is demonstrating promise and its progress is being closely followed by industry. If successful, this novel technology will provide an opportunity for the Irish industry to greatly expand its cheese range, in particular in the ingredient cheese sector and will also free this sector from the constraints currently experienced due to seasonal milk production.

Conclusions

The full benefits of expanded milk production will only be realized if the milk is manufactured into value added products. Such added value can be achieved through cheese; however, the full benefits will only be achieved from a more diverse range of cheeses that meet consumer expectations and Cheddar cheese with added functionality will have to be produced. The cheese science and technology platform at Moorepark will be an important partner with industry is achieving this strategy.

Control of Liver Fluke and Rumen Fluke in 2011

Ríona Sayers[1], Yris Bloemhoff[1], Clare Power[2], Noel Byrne[1]
[1]Animal & Grassland Research and Innovation Centre, Teagasc, Moorepark, Fermoy, Co. Cork
[2]Food Research Centre, Teagasc, Moorepark, Fermoy, Co. Cork

Summary

- Liver fluke can result in significant economic losses on Irish dairy farms and a control programme should be implemented on all dairy farms irrespective of soil type (i.e. 'wet' or 'dry' farm). If clinical signs are present and/or diagnostic tests are positive then appropriate control programme with flukicides should be implemented.
- Rumen fluke has emerged as a clinical syndrome on a number of farms over the past two to three years. Fundamental research is lacking on the actual prevalence and the likely significance of this parasite in Ireland long term. However, widespread economic losses from this parasite are unlikely, although its presence in a herd should be investigated as part of an overall diagnosis.
- The number of flukicides currently permitted for inclusion in a fluke control programme in an Irish dairy herd has narrowed considerably since 2010 and dairy farmers must not dose with an unlicensed product. The products remaining are only active against mature liver fluke and therefore a minimum of two doses will be required.
- Unlicensed flukicides can be detected in milk, and more importantly, in milk-derived products and must not be used in dairy cows and dairy in-calf heifers.

Introduction

Parasitic diseases are known to result in serious economic losses globally, none more so than the losses attributable to fluke infestations (Corwin, 1997; AHI, 2011). A recent study of cattle livers in Irish slaughter plants (MacGillivray et al., 2011) showed that 99% of those examined between August and December 2010 had a liver fluke burden, while mortalities due to rumen fluke have been reported in Ireland over the past number of years (Anon, 2010). Control of these parasites is necessary

and the following sections seek to provide information on how to choose and decide upon an appropriate fluke control programme, be it liver or rumen fluke.

Liver Fluke

Liver fluke (*Fasciola hepatica*) are leaflike trematode parasites and clinical signs of an infestation include bottle jaw, oedema, anaemia, diarrhoea, poor coat and poor appetite. A liver fluke infestation may not always be obvious and subclinical effects such as lowered milk production, poor fertility, poor condition and increased susceptibility to other diseases such as salmonellosis and tuberculosis may occur (AHI, 2011).

The Liver Fluke Life-Cycle

The adult fluke lays its eggs in the liver of the animal. These are subsequently excreted in the faeces. On the ground, the eggs hatch into tiny larvae, which subsequently attach to and invade snails in the surrounding area. The larva then continues its development and multiplies within the snail, with a single larva capable of yielding 600 more. On leaving the snail, the larvae cement themselves onto the grass as 'encysted metacercariae' which can then be eaten by a grazing animal. This encysted stage can survive on pastures for at least a year (Anon, 2011). Disease arises when animals ingest metacercariae which penetrate the gut wall and enter the liver where, as they mature to the adult stage can cause severe liver damage. It takes 10 to 12 weeks from the time of ingestion to maturation of the flukes (Urquhart et al., 1996). Once mature, they can lay as many as 20,000 eggs as the cycle continues (Urquhart et al., 1996; Borgsteede, 2002; AHI, 2011).

Liver Fluke Control on Irish Dairy Farms

Liver fluke control programmes in Spring-calving dairy herds have traditionally centred on dosing cows during the dry period with a suitable product. Flukicides differ in their ability to kill different stages of liver fluke, some active against both mature and immature fluke, and others only effective against mature adult flukes. Dosing strategies differ based on the activity of a particular product, and it is essential for dairy farmers to note that all products now legally available for use in dairy cows and heifers destined to produce milk (listed in Table 1) are active against ADULT fluke only. A dosing strategy with these products, therefore, requires that at

least two doses of a particular product are used, separated by a specified time interval.

Table 1. Flukicidal medicines that <u>CAN</u> be administered to dairy cows and in-calf heifers

<u>MEDICINES THAT CAN CONTINUE TO BE USED WITH STRICT ADHERENCE TO WITHDRAWAL PERIODS INDICATED</u> *(source : www.imb.ie)*	
Name of product	**Active ingredient**
Albex 10%	Albendazole
Albex 2.5%	Albendazole
Endospec 10% SC	Albendazole
Endospec 2.5% SC	Albendazole
Keelogane SC	Albendazole
Osmonds Flexiben 10% SC	Albendazole
Tramazole 10%	Albendazole
Tramazole 2.5%	Albendazole
Valbazen 10%	Albendazole
Zanil	Oxyclozanide

An appropriate dosing strategy for the majority of Spring-calving dairy farms would be to dose at drying-off (housing) and dose again before calving. Those farms where fluke are known to be a particular problem could consider adding a third dose in the dry period. It is important to ensure that withdrawal times are adhered to especially in cases where a cow calves down early. Liver fluke control in Autumn-calving herds is more complex, with dosing during the dry period often ineffective, as Autumn-calving cows are grazing at this time, leading to re-infestation following dosing. The housing period will remain the most effective period in which to dose Autumn cows, and so milk withholding times will have to be adhered to.

It should be noted that all the products listed in Table 2 are currently illegal for use in a cow or heifer destined to produced milk for human consumption.

Table 2. Flukicidal medicines <u>NOT</u> to be administered to cows and in-calf heifers

MEDICINES NOT TO BE ADMINISTERED TO COWS/IN-CALF HEIFERS			
Name of product	**Active substance**	**Name of product**	**Active substance**
Virbamec super	Clorsulon	Rafazole Oral	Rafoxanide
Ivomec super	Clorsulon	Ridafluke 3%	Rafoxanide
Flukiver 5 Injection	Closantel	Univet Multidose	Rafoxanide
Closamectin	Closantel	Flukex 3%	Rafoxanide
Closiver for cattle	Closantel	Flukex 9%	Rafoxanide
Closamectin Pour	Closantel	Curafluke 5%	Rafoxanide
Trodax 34%	Nitroxynil	Curafluke 10%	Rafoxanide
Deldrax 34%	Nitroxynil	Panafluke Oral	Rafoxanide
Flukinex 9%	Rafoxanide	Fasinex 24%	Triclabendazole
Orafluke 5%	Rafoxanide	Endex 19.5%	Triclabendazole
Orafluke 10%	Rafoxanide	Fasinex 10%	Triclabendazole
Fluken worm	Rafoxanide	Fasinex Super	Triclabendazole
Levafluke	Rafoxanide	Fasifree 10%	Triclabendazole
Triazole	Rafoxanide	Endofluke 10	Triclabendazole
Fenafluke 5%	Rafoxanide	Triclaben 10% for	Triclabendazole
Chan Broad Spec	Rafoxanide	Tribex 10% for	Triclabendazole

(source: www.imb.ie)

Regular consultation with a veterinary surgeon or the Irish Medicines Board website will provide up-dates on the status of flukicides and their use in lactating animals. Should a product not be listed in either Table 1 or 2, it is advisable to seek clarification from your veterinary surgeon and/or the Irish Medicines Board.

[Veterinary surgeons do have an opportunity to prescribe unlicensed drugs in cases where an equivalent drug is not already available on the market (e.g. a drug that can effectively control immature stages of liver fluke), should a clinical situation require such action. However, as some of these unlicensed drugs, if present in raw milk, have the capability to be detected in milk and milk-derived products (Takeshita et al., 1980; Imperiale et al., 2011), judicious use of such prescribing, and seeking clarification from the Irish Medicines Board, is advised.]

In terms of establishing your farm's liver fluke status, bulk milk samples coupled with faecal (dung) sampling prove highly useful in this regard. It is important to check that the bulk milk test being used by the laboratory yields current liver fluke status rather than historical status. A number of laboratories offer testing for bulk milk samples, faecal samples, or both, and are listed by Animal Health Ireland at

www.animalhealthireland.ie. Additional testing laboratories may be available through your veterinary surgeon. Bulk milk sampling is best conducted on a quarterly basis over the entire lactation to monitor changing fluke levels; while many farms experience the traditional Autumn/Winter rise in liver fluke levels, many other farms record unacceptably high fluke levels all year round and stricter liver fluke control measures are required. Additional measures that can be implemented along with dosing are listed in AHI, 2011.

'Wet' versus 'Dry' farm

It should be noted that a dry farm is no longer an assurance against a liver fluke burden, and that a recent study conducted by Teagasc, Moorepark, has shown that the absence of a fluke control programme on any farm, wet or dry, can lead to unacceptable fluke levels. A total of 29 farms were investigated for liver fluke using bulk milk analysis and each was characterised as a 'wet' or 'dry' farm. Samples were collected from each of the herds monthly over the 2009 lactation and results for each of the farms is included in Figure 1. Statistical analysis showed that there was no difference between farms classified as 'wet' or 'dry' in terms of liver fluke levels present and that the herds with the optimal fluke results were those that routinely implemented an effective liver fluke control programme which did include annual dosing of animals at housing.

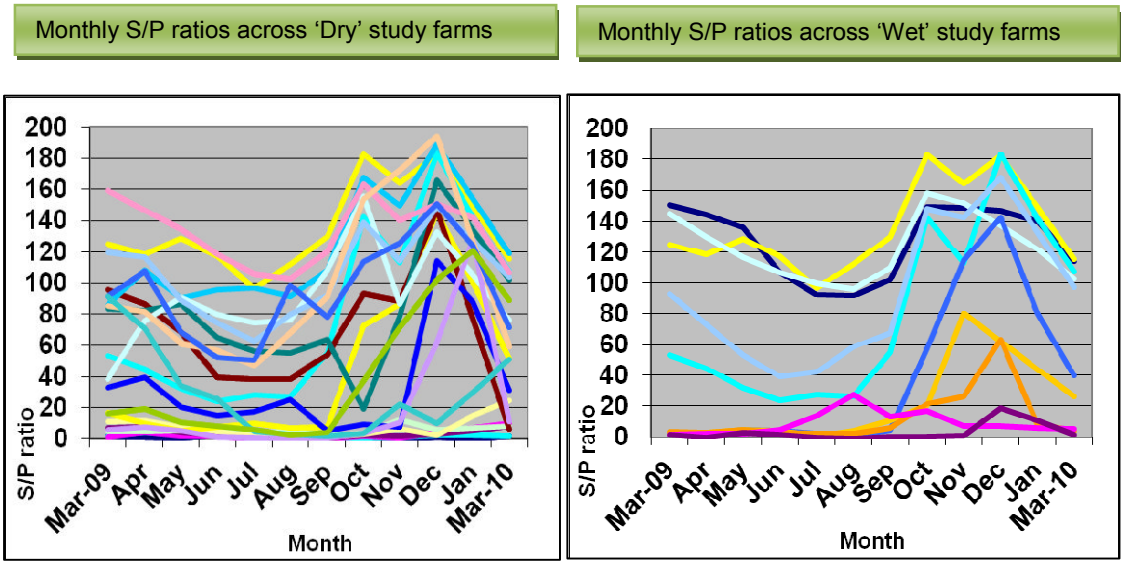


Figure: 1 Comparison of liver fluke bulk milk analysis for 'Dry' and 'Wet' study farms over the 2009 lactation.

Rumen Fluke

Rumen fluke (*Paramphistomum cervi; Paramphistomum microbothrium etc.*), similar to liver fluke, are trematode parasites. Clinical disease due to rumen fluke is not common but infected animals can lose weight rapidly, have a bottle jaw, be dull, anaemic, dehydrated and have watery or even bloody scour. For years, rumen fluke were considered an incidental finding during routine parasite screening in temperate climates (Urquhart et al., 1996). However, more recently a few severe outbreaks have been reported and rumen fluke should now be added to the diagnostic regime on a dairy farm (AHI, 2010). Based on current knowledge, the potential losses from liver fluke far outweigh the losses that may be incurred from rumen fluke, although some individual farms may experience poor performance and mortality due to rumen fluke.

The Rumen Fluke Life Cycle

The life cycle of rumen fluke shares many similarities with liver fluke with both using a snail intermediate host to complete their life cycles. Adult rumen fluke live in the rumen of cattle where mature flukes lay eggs, which are passed in faeces. The rumen fluke eggs hatch and small larvae infect a watersnail (the aquatic nature of the rumen fluke snail is important to control measures for this parasite). Once multiplication has occurred within the snail, they leave this host, and attach to pasture until eaten by a grazing animal. Once inside the bovine host, the immature flukes attach themselves to the walls of the small intestine and quickly grow. It is during this phase that the immature rumen fluke can cause intestinal damage which may result in mortality (Radostits et al., 2000). After 3-6 weeks the immature fluke travel to the rumen where they attach to the ruminal wall, mature and produce eggs.

Rumen Fluke Control on Dairy Farms

Existing research has identified a single flukicide, oxyclozanide, which is active against rumen fluke. Animals should be treated with an oxyclozanide product on the basis of obvious clinical signs and/or the presence of immature rumen fluke or very large amounts of rumen fluke eggs in faecal samples (Radostits et al., 2000). An additional method which is useful in breaking the rumen fluke life cycle is to ensure dairy cattle do not have access to aquatic snail habitat e.g. by fencing areas prone to flooding. It is also important to ensure that infected animals are not brought onto a farm resulting in pasture contamination. This can be avoided by checking purchases

for rumen fluke using dung samples and dosing all positives with oxyclozanide during the quarantine period on farm before introduction to the herd. It is important not to dose for rumen fluke irresponsibly, as unnecessary and overuse can lead to resistance which would be disastrous in the case of rumen fluke where only a single active ingredient is available. It should also be noted that the majority of products effective against liver fluke are not effective against rumen fluke.

On-going Moorepark Research: Residues migrating from Milk to Product

Strict adherence to milk withdrawal periods following administration of a medicine to a lactating animal is critical to maintaining high quality raw milk and milk-derived products and Ireland's reputation as a producer of safe food. In this regard, Teagasc Moorepark initiated a research programme in conjunction with Teagasc Ashtown and Cork Institute of Technology, to examine migration of drug residues into milk products. In a fully licensed trial, animals were dosed with veterinary drugs, milk samples taken and products manufactured. The withdrawal period in milk samples was monitored as was the migration of the drug residue into product.
The active ingredients specifically administered were as follows:

- Triclabendazole (flukicide)
- Closantel (flukicide)
- Rafoxanide (flukicide)
- Imidocarb (anti-protozoal)
- Florfenicol (antibiotic)

The milk gathered from each veterinary drug trial was pooled into two groups each group having a pasteurised and unpasteurised quantity where products such as cheese, curd, whey, butter, buttermilk, skim milk, powder and cream were manufactured.

It was found in all cases that the veterinary drug residues, if present in the raw milk, did migrate into each product, both pasteurised and unpasteurised and remained stable within these products for many weeks. It is critical therefore, that only licenced drugs (especially flukicides) are used in animals producing milk for human consumption, as if residues are present in the raw milk, the residues will also migrate to subsequent product and may be detected by purchasers of Irish dairy products. A certificate of the absence of drug residues in milk must currently accompany many dairy product sale/export arrangements (O'Brien et al., 2010), thus it is absolutely

vital that milk is produced free of such residues. Detailed research papers on this work will be published over the next 12 to 18 months.

Animal Health Ireland Information Leaflets

Detailed documents on both Liver and Rumen fluke are available at www.animalhealthireland.ie and should be consulted regularly to access the most current information regarding these parasites and their control.

Acknowledgements

This paper is an output from a Teagasc research programme funded by the Irish Dairy Levy. The authors also wish to gratefully acknowledge Merial and Eugene O'Doherty, Teagasc, whose assistance contributed greatly to the successful completion of liver fluke research. The authors also wish to acknowledge farmers participating in the DairyMIS programme who supply milk samples on a regular basis for liver fluke analysis.

References

AHI. (2011). Liver fluke - the facts. Animal Health Ireland, Carrick on Shannon, Co. Leitrim, Ireland. http://www.animalhealthireland.ie/pdf/AHI-LiverFluke-July2011.pdf

AHI. (2010). Rumen fluke - the facts: For Irish farmers and their vets. Animal Health Ireland, Carrick on Shannon, Co. Leitrim, Ireland. http://www.animalhealthireland.ie/pdf/AHI-RumenFluke-Aug2011.pdf

Anon. (2010). How to control fluke in your herd. *Irish Farmers Journal*, 11/9/2010.

Anon, (2011). Fluke Facts. http://uk.merial.com/producers/dairy/fluke_facts.asp

Borgsteede, F. (2002). Parasites Internal. In *Encyclopedia of Dairy Sciences*. pp. 2220-2225. Oxford: Elsevier.

Corwin, R. (1997). Economics of gastrointestinal parasitism of cattle. *Veterinary Parasitology* , 72 (3-4), 451-460.

Imperiale, F., Ortiz, P., Cabrera, M., Farias, C., Sallovitz, J.M., Iezzi, S., Perez, J., Alvarez, L., Lanusse, C. (2011). Residual concentrations of the flukicidal compound triclabendazole in dairy cows' milk and cheese. *Food Additives and Contaminants.* 28, 438-445.

MacGillivray, F., de Waal, T., Taylor, M.A., Boughtflower, V., Daniel, R., Jenkins, T., Rice, B., Forbes, A.B. (2011). A survey to determine the population characteristics of *Fasciola hepatica* in cattle livers in Autumn and Winter in the United Kingdom and Ireland. Proceedings 23rd. International; Conference of the World Association for the Advancement of Veterinary Parasitology, WAAVP Buenos Aires, Argentina p 85.

O'Brien, B., Sayers, R., Jordan, K. (2010). Caution required in the use of Flukicides. *Irish Farmers Journal*, 9/12/10.

Radostits, O.M., Gay, C.C., Blood, D.C., Hinchcliff, K.W. (2000). Veterinary Medicine: A textbook of the Diseases of Cattle, Sheep, Pigs, Goats and Horses. Ninth Edition. W.B. Saunders (pubs).

Takeshita, Y., Kishi, T., Seki, M., Fujiyama, K., Otsuka, G., Ahiko, K. (1980). Analysis of nitroxynil (fasciolicide) in milk and dairy products. *Milchwissenschaft*, 35, 133-135.

Urquhart, G.M., Armour, J., Duncan, J.L., Dunn, A.M., Jennings, F.W. (1996). Veterinary Parasitology, Second Edition. Blackwell Publishing (pubs).

Lessons Learned from Teagasc Energy Audits

John Upton, Michael Murphy & Padraig French Livestock Systems Department, Animal & Grassland Research and Innovation Centre, Teagasc Moorepark, Fermoy, Co. Cork

Key Points

- The average cost of electricity measured on 21 commercial dairy farms in 2010 was 0.43 cent per litre. There is large variation in energy costs on dairy farms, from 0.23 cent per litre up to 0.76 cent per litre. This is a variation of €1880 to €5900 per 100 cows.
- The main drivers of energy consumption on dairy farms are milk cooling equipment, the requirement for hot water and vacuum pump size and type.
- Plate cooling milk to within 3°C of incoming water temperature will reduce cooling times. As a result it can be possible to cool a higher percentage of the mornings milking on night rate electricity
- Approximating current energy costs is recommended when calculating payback periods on new equipment.

Introduction

This paper will discuss the results of Teagasc energy audits on commercial dairy farms and advise how to avoid some of the most common problems that lead to excessive energy consumption. Costs and savings associated with upgrading to more energy efficient equipment are discussed in detail.

Government initiatives have set ambitious goals for the expansion of the dairy sector up to the year 2020 (DAFF). Milk production and farm size will expand together at a time when energy prices will continue to increase. The cost implications for energy consumers will be heightened by the integration of the electricity smart grid by the year 2020. New pricing structures will mean that electricity consumers will be charged according to load on the grid, exact information on the new tariffs are not yet available. Dairy farms will be confronted with higher energy bills unless action is taken to employ more energy efficient equipment and work practices. This is particularly important where new facilities are being constructed. Recent electricity price increases of 12% will impact on profitability for every dairy farmer and could amount to €700 per annum for a 100 cow farm.

Drivers of Energy Consumption

A summary of data collected from 21 commercial dairy farms in 2010 as part of the DairyMan project is given below in *Figure 1*. Detailed energy audits were carried out on these farms from May to October 2010 to quantify the electricity consumption attributed to the dairy and milking operations. There was a large variety within the group in terms of herd size (46 to170 cows) the average herd size was 106. Milking parlour size varied from 8 units to 20 units with contrasting levels of automation and management practices. These variations inevitably led to a wide range in both energy consumed per litre of milk produced (from 53 to 108 Watts per litre produced) and cost per litre (from 0.23 to 0.76 Cent per litre produced). This is a variation of €1880 to €5900 per 100 cows, all figures quoted are exclusive of VAT and standing charges.

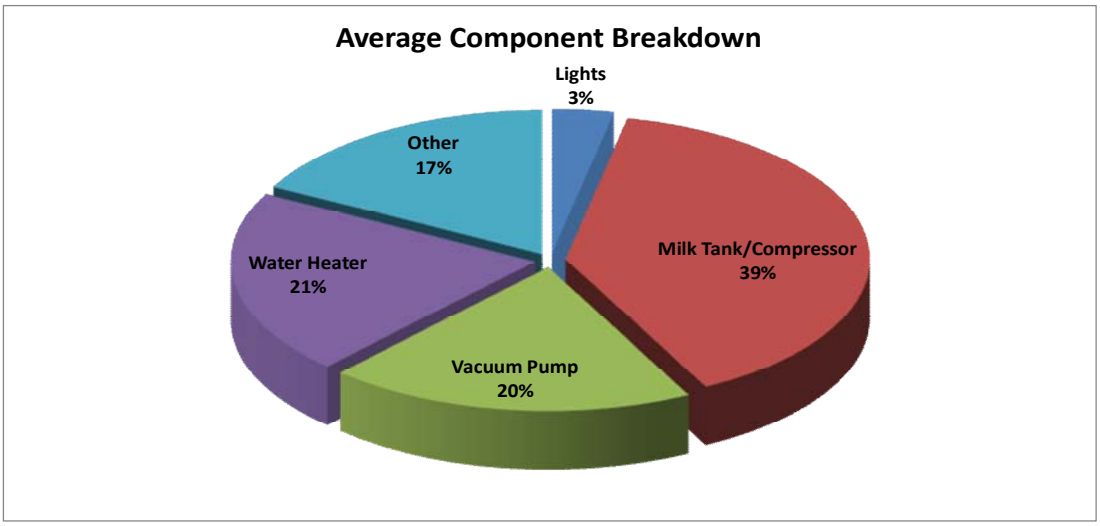


Figure 1; Average component consumption on 21 commercial dairy farms

Calculating energy costs

To accurately determine if energy costs are high or low on a given farm requires considerable investment in energy monitoring equipment. However simple calculations can be made by every farmer to approximately gauge electricity costs. Firstly sum the total electricity charges over the year excluding VAT and standing charges. Next sum the total number of litres sold to the processor over the same period. Dividing the cost by the number litres will give the cost per litre. This will be quite accurate if the bills relate to the farm yard only. However if the domestic house is on the same electricity meter the costs will be overestimated. Consumption of a domestic house depends on occupancy levels and heating type. A figure of 10-15% could be deducted to account for domestic usage.

Drivers of Energy Costs

Energy costs in turn are governed by the rate at which that energy is charged. Night rate electricity is charged at €0.0855 per kWh and day rate is charged at €0.1729 per kWh (prices excluding taxes and standing charges). Therefore it is strongly recommended to use night rate electricity as much as possible. Night rate hours are from 11pm to 8am during winter time and 12 midnight to 9am for summer time.

Areas for further attention;

1. **Milk cooling is the largest consumer of energy on a dairy farm. There is significant potential to improve the cooling performance and reduce the running costs of your system**.

   Milk exits the cow at approximately 35^0C. The goal of the milk cooling system is to chill the milk below 4^0C as quickly as possible to curtail bacterial growth in the milk. Plate cooling is an effective method of removing heat quickly which reduces the amount of energy consumed by the bulk tank. Effective plate cooling relies on adequate supplies of cold water. Water temperature can vary from 7^oc to 14^0c depending on the time of year and the depth of the water supply. Effective plate cooling can be defined as cooling milk to within 3°C of incoming water temperature. The recommended ratio of milk to water in the plate cooler is 1:2. This is rarely achieved at farm level due to poor water infrastructure or unsuitable milk pumps. Sub-standard plate cooling means that the bulk tank will consume more electricity.

   To achieve the correct ratio a full bore connection from plate cooler to main water supply pipe is required. A variable speed milk pump to smooth the flow of milk through the plate cooler is also recommended. A solenoid valve on the water supply which is linked to the milk pump will limit water wastage. The power consumed during the refrigeration stage can be reduced by up to 30% if a plate cooler is sized correctly in relation to the output of the milk pump and the correct ratio of water is supplied.

   Improving cooling performance will typically require investment in improved milk pumps and water infrastructure. *Table 1* presents the return on investment for varying levels of expenditure. These calculations are for a 100 cow farm of varying levels of efficiency, Efficient, Average and Inefficient. Efficient

corresponds to 0.23 cent per litre, average is 0.43 cent per litre and inefficient is 0.76 cent per litre. Calculations assume capital is borrowed at 6.74% APR over a 5 year term. A 30% increase in electricity price from 2010 to 2020 is assumed. All figures are excluding VAT and standing charges.

Investment	Monthly savings Efficient	Monthly savings Average	Monthly savings Inefficient	Payback Efficient (Years)	Payback Average (Years)	Payback Inefficient (Years)
€2,000	€27	€58	€89	7.4	3.4	2.2
€3,000	€27	€58	€89	11.0	5.1	3.3
€4,000	€27	€58	€89	14.7	6.8	4.4

Table 1; Return on investment for plate cooling improvements for varying levels of farm efficiency

Table 1 illustrates the importance of computing on farm energy costs before embarking on investment as payback periods vary considerably with level of efficiency. These calculations assume the investment has achieved an improvement in plate cooling performance of 30%. A range of investment figures are presented as some farms may require only small modifications, whereas others may require extra equipment including variable speed drive milk pumps or larger diameter water pipes.

1. **Water heating is a significant cost on dairy farms, some simple measures can be taken to improve the system efficiency**
   - All electrical water heating should be controlled by a timer. The intention with using a timer is to ensure that water is heated when night rate electricity is available. A power cut can throw the timers out. Timers with battery backup are available to eliminate this problem. *Table 2* illustrates the impact of moving from electrical water heating on day rate electricity to night rate electricity assuming 170 litre hot water consumption per day. Investment is required to install a time clock. An extra standing charge of €10 per month is included in the calculations. Calculations exclude VAT.

Investment	Monthly savings	Payback Average (Years)
€500	€111	0.4

Table 2; return on investment for installing night rate electricity for water heating

- Hot water pipes not insulated is an easy fix and reduces system standing losses while ensuring that water maintains the required temperature en-route to the wash trough.

- Limescale forms in water heating systems in areas of hard water. Over time this reduces system efficiency and can lead to failure of elements. It is easy to have water tested for hardness and a water softener should be installed to eliminate problems where hard water is present.

- Using night rate electricity instead of day rate electricity will reduce the price of producing 100 litres of hot water from €2.03 to €1.00. Oil fired boilers have the advantage of quick recovery times and are an option where hot water usage exceeds 300 litres per day. Oil fired boilers can produce 100 litres of hot water at €0.77 (all costs ex VAT & standing charges correct on 20/10/2011).

2. Milking machine running costs

International and Irish Milk Quality Co-operative Society standards are a basis for installing new milking machines. New revisions of these standards were introduced in 1989, 2004 and 2008. Changes that have been implemented include an increase in recommended vacuum pump capacity for a given size of milking machine. This is because modern milking machines require a large vacuum reserve for washing. However during milking the plant consumption is a fraction of the vacuum pump capacity resulting in large amounts of air being drawn in through the regulator. Addition of a variable speed drive (VSD) to the vacuum pumps of these large modern milking machines can result in savings of over 60% on vacuum pump running costs. The VSD is able to adjust the rate of air removal from the milking system by changing the speed of the vacuum pump motor. Most milking machine manufacturers offer VSD vacuum pumps as an optional extra.

Table 3 presents the return on investment for varying levels of expenditure. These calculations are for a 100 cow farm of varying levels of efficiency, Efficient, Average and Inefficient. Efficient corresponds to 0.23 cent per litre, average is 0.43 cent per litre and inefficient is 0.76 cent per litre. Calculations assume capital is borrowed at 6.74% APR over a 5 year term. A 30% increase in electricity price from 2010 to 2020 is assumed. All figures are excluding VAT and standing charges.

Investment	Monthly savings Efficient	Monthly savings Average	Monthly savings Inefficient	Payback Efficient (Years)	Payback Average (Years)	Payback Inefficient (Years)
€2,000	€24	€51	€78	8.4	3.8	2.5
€3,000	€24	€51	€78	12.5	5.8	3.8
€4,000	€24	€51	€78	16.7	7.7	5.1

Table 3; Return on investment for VSD vacuum pumps for varying levels of farm efficiency

A range of investment levels are presented as capital cost can vary considerably depending on vacuum pump type, size and power supply on the farm. These savings figures assume the VSD will save 60% on energy consumption by the vacuum pump. The importance of computing farm energy costs prior to investment is significant as payback periods will vary accordingly.

Acknowledgements

The support of the Dairy Levy Research fund and INTERREG IVB North-West Europe through the DairyMan project is gratefully acknowledged. The cooperation of the farmers involved in the study is greatly appreciated.

References

CER (2011). "Second Consultation on Possible National Rollout Scenarios for the Smart Metering Cost Benefit Analysis."

DAFF Food harvest 2020 – A vision for Irish agri-food and fisheries 2010.

E.C. (2007). " Commission to the European Council and the European Parliament, An energy policy for Europe."

SEAI (2010). Energy Conversion Factors. S. E. A.I.

Teagasc (2007). Teagasc Moorepark Dairy Levy Research Update, Milk Quality Handbook, Practical Steps to Improve Milk Quality

Teagasc/IMQCS (1989). "Standards for the design and testing of milking machines."

Teagasc/IMQCS (2008). "Recommendations for the installation and testing of milking machines."

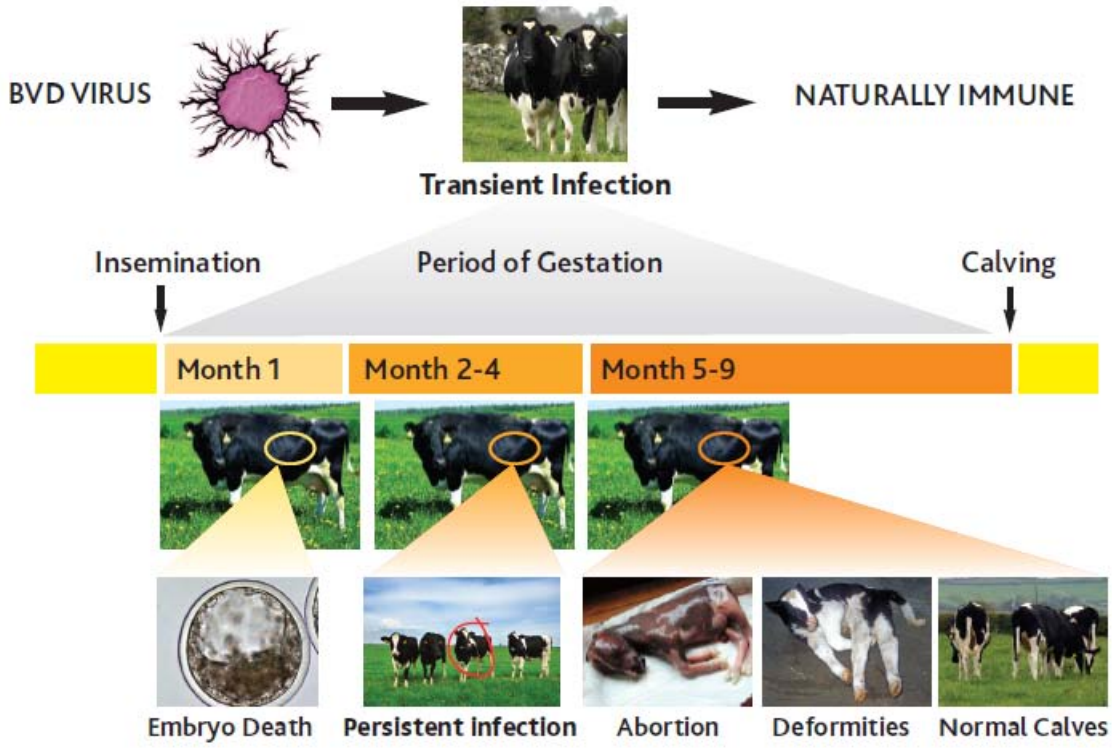
Upton, J., Murphy, M., French P. and Dillon P (2010). Energy Use on Dairy Farms Teagasc National Dairy Conference. Mullingar, Teagasc**:** 87-97

BVD- a national eradication programme for 2012

David Graham, Animal Health Ireland

What is BVD?

BVD is a viral infection of cattle. The single biggest impact of the disease is on fertility, where infection of susceptible cattle can produce a range of negative outcomes depending on the stage of breeding or pregnancy, as shown below:



From 30 days through to between 90 and 120 days of pregnancy is a critical time. If an unborn calf becomes infected during this period and is born alive rather than aborted, it will inevitably be persistently infected (PI). These PI cattle have high levels of virus in their blood throughout their lives. They are highly infectious, with nasal discharges, saliva, faeces, urine, milk and semen all containing virus. These PI cattle are the key animals responsible for introduction and spread of infection.

PI cattle tend to die at a much younger age than healthy cattle. However, a proportion of PI cattle will survive to breeding age, with females always producing a PI calf.

How common is BVD in Ireland?

It is estimated that around 0.75% of cattle in the national herd is PI, with these being present in around 25% of herds. However surveys of bulk tank milk and blood samples have shown that almost all herds contain cattle that have been exposed to BVD virus, and that this has been the case for the last twenty years or more, suggesting that infection regularly cycles between herds.

How does infection get into a herd?

The single biggest risk for introducing infection is through purchase of PI animals. For this reason either animals of unknown status should not be purchased or alternatively all purchased stock should be screened to ensure that they are not PI prior to release into the main herd. Note that pregnant stock can be carrying PI calves- even though the cows or heifers themselves test negative for virus. Therefore purchase of pregnant stock represents an even greater risk of introducing BVD. It is necessary not only to test the animals themselves, but to isolate and test their calves when they are born prior to releasing them into the main herd.

There are of course other avenues of introduction for BVD virus. These include contact with cattle from other herds e.g. at boundaries, when animals break in or out of herds, at shows and sales, through visitors and shared equipment. All of these risks also need to be adequately addressed to prevent infection re-entering herds but the single biggest risk remains the purchase of PI animals or non-PI animals carrying PI calves. It is essential to put in place adequate pre- or post-purchase testing to ensure this does not happen.

Why a national programme?

Experience elsewhere in Europe has shown that the knowledge and techniques to eliminate BVDV at a national level are available, with identification and removal of PI animals being the key. A consultation process earlier in 2011 indicated strong support for an industry-led national eradication programme, and Animal Health Ireland is participating in a BVD implementation group (BVDIG) to take forward the planning and delivery of this programme.

How will the programme work?

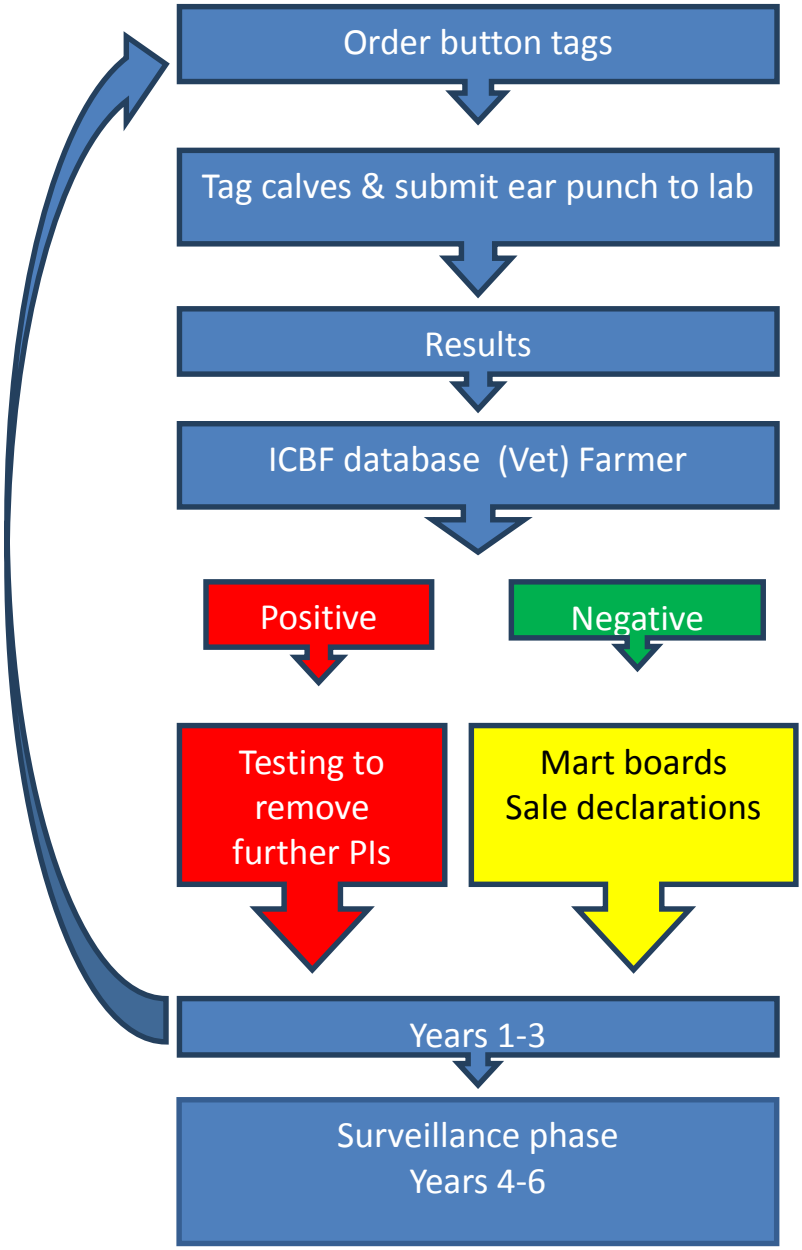
The consultation process identified a preference for a testing programme based on ear punch samples as part of an intensive programme to identify and remove PI animals. The programme will begin with a voluntary period on 1st January 2012, and

is intended to become compulsory in January 2013. An overview of the programme is given below.

Samples will be collected using a button tag labelled with the official identification number of the each animal. The first step to take to participate in the programme is to order the button tags for 2012. A set of button tags numbered to match your official tag order is available from Mullinahone Co-op and may be obtained by submitting an order form (available to download from www.Mullinahonecoop.ie or www.animalhealthireland.ie) or by telephone on 052 915 3102. A separate order form is also available to allow you to order button tags to match any official tags carried over from your previous order 2010.
Calves should be tagged as soon as possible after birth (certainly within 5 days) and the tissue punches sent to a laboratory for testing (the BVDIG has designated a number of laboratories for this purpose, and details, including costs, can be found on www.animalhealthireland.ie and will also be available in the farming press.

These laboratories will report results directly to the ICBF database which will inform herd owners each time new results are received. Results on the database will only be accessible to the herd owner, unless he or she specifically enables a third party (such as their veterinary surgeon) to access the results also.

Herds with negative tests for all calves in the first year will simply continue the process of tag testing of calves in the following years. Since a negative calf result also indicates that the dam of that calf is not PI, several rounds of negative tag testing of calves will give very strong evidence that the herd is free of infection. It is vital that each calf is correctly matched to its mother and that this is accurately recorded.



Since a negative virus result means that the animal is not PI (and cannot become PI later in life), this result can be used to show that cattle presented for sale are non-PI. Systems are currently being put in place to allow display boards at marts to confirm that animals have had a negative virus test. Also herd owners who may be selling animals directly off-farm will be able to generate health declarations from the ICBF website showing negative results for their animals.

Where virus positive results do occur, the option to re-test these animals to confirm that they are PI will be available. Additional testing will be required in the herds to identify and remove any other PI cattle, with an initial focus on the dam. PI cattle should be culled from the herd as quickly as possible.

A surveillance phase, based on targeted blood sampling of young stock (plus bulk tank milk in dairy herds) will be used in the second part of the programme to confirm that herds are remaining free of infection.

What are the costs and benefits of BVD eradication?

AHI recently commissioned the Scottish Agricultural Colleges to undertake a modelling study of losses due to BVD. The study estimated annual losses in Ireland of at least €102 million, consisting of €55, €27 and €20 million in the dairy, suckler and finishing sectors respectively. At the animal level this is equivalent to an average of €48/year for every dairy cow and €30/year for every suckler cow.

The study also modelled the costs of the anticipated eradication programme to determine the economic viability of the proposed approach. Calculations show the estimated total cost for the six year eradication programme to be €49 million with €21 million and €28 million attributed to the dairy and suckler sectors respectively.

Based on these figures, it is estimated that the annual losses due to BVD infection during the six year programme exceed the annual eradication costs by a factor of at least 10. When analysed in terms of pay-back period, the total costs of the programme in the suckler sector would be recouped by saving just over one year's losses, while the costs in the dairy sector would be recouped in around six months.

Animal Health Ireland in conjunction with the BVD Implementation Group is hosting a series of Information Meetings on the new national BVD Eradication Programme.

All meetings commence at 8.30pm

DATE	LOCATION	VENUE
16th November	Claremorris	McWilliams Park Hotel
17th November	Athenry	Raheen Woods Hotel
21st November	Blarney	Christy's Hotel
22nd November	Clonakilty	Clonakilty Agricultural College
23rd November	Ennis	West County Hotel
28th November	Kilkenny	Newpark Hotel
29th November	Navan	Ardboyne Hotel
30th November	Waterford	Lawlor's Hotel, Dungarvan
1st December	Wexford	Ferrycarraig Hotel
5th December	Tralee	Carlton Hotel

Please see www.animalhealthireland.ie for further details.

Opportunities and Challenges

Accessing Finance to Support Your Plans

John Trethowan, Credit Review Office

The subject of my presentation is to provide some help in the steps Farms can take to survive and grow in these challenging times, and to assist them in approaching their banks for credit.

Whilst I cannot claim to be an expert in farming or farm lending, I am ably assisted - formerly by Michael Joyce, and now by Brendan Stafford both of whom are highly experienced and well known farm lenders.

At the beginning of the credit crunch in 2008, the media widely proclaimed that this was the end of the era of cheap and easy credit – they were correct, and many of the subsequent headlines on bank lending are the manifestation of those initial comments.

If you haven't had any problems in receiving credit from your bank over the past couple of years, you might not have heard of the Credit Review Office; however you may have unknowingly benefited from its presence in that it is an independent monitor of standards of lending behaviour towards all borrowers in the two main banks.

Potentially any loan application up to €500K can be appealed to the Credit Review Office, if declined by AIB or Bank of Ireland. This means that these banks are applying a standard code of practice across all lending transactions to SMEs and Farms, and every borrower benefits from this.

The Credit Review Office has been established for 18 months and during that time has received over 100 formal appeals from SMEs and Farms who have had their credit applications declined by AIB and Bank of Ireland – which are the two banks covered by the NAMA legislation under which the Review Office was established. We have been able to secure credit for borrowers in just over half of these cases.

Much has, and no doubt will continue to be written on the supply of credit by the banks. The Credit Review Office will continue to assist viable borrowers in accessing credit for as long as we are needed.

When presented with a difficult lending situation our aim is to establish the FUTURE cash generating viability of the farm enterprise. This may mean disaggregating a secondary business's finances from the farm, and separately dealing with that debt over a number of years assisted by the cash flow from the farm.

From our observations of farms and SMEs in their credit appeals, the first piece of advice I would give to any Farm approaching a bank is to be well prepared to demonstrate the viability of their borrowing proposal. This means assembling recent financial accounts; your business plan, including supporting cash flow forecast; and a debtor and creditor listing. When I hear of enterprises being casually being turned away from bank counters, I wonder how many of these business promoters had made these preparations in advance of speaking with the bank?

It is interesting that all of the farming cases we have seen were not clients of Teagasc, and we will routinely recommend farmers to use its services to improve their farm management capabilities.

So as Farmers, and as clients of Teagasc, I would be more confident that I am preaching to the converted and that you all fully understand the need for tight financial monitoring and control, than I would be of some of your SME counterparts.

Brendan Stafford advises me that he cannot over emphasise the importance of getting *Farm efficiency improved before farm expansion*. Most farmers will tell you the number of cows they have, their average herd yield, and their milk quota; but very few of them will tell you their costs /litre, the fixed costs /head and net margin /litre. This is where the Teagasc profit monitor comes in.

I would commend those enterprises which have all of these preparations made and believe that they will stand an excellent chance of getting their requested lending, and certainly the Credit Review Office would be willing to help if this approach was declined by the bank.

The Credit Review Office however sees too many cases where the elapsed period on cashflow forecasts has not been tracked by the business promoter – the forecast being produced to apply for a loan in the past, but obviously only produced for the bank and not to proactively manage the business. This approach begs another key question, if you are not using cash flow monitoring – however rudimentary "how do you know what happens with your finances next month, or in six months down the road"?

The next key question, bearing in mind the newly rediscovered prudence of our banks as cashflow lenders, "if you don't know what happens next in your business, how do you expect a bank to say yes to a lending proposition"?

My acid test for any lending proposition is "if it was your own cash you were being asked to lend for this transaction, would you risk it"? – I will leave it with you to work out how likely it would be for a bank to say yes, if you can't answer this question in the affirmative?

The subject to today's session is Future Outlook: Opportunities and Challenges; and certainly your industry has a much more optimistic outlook and prospects than many other sectors in our troubled economy. Undoubtedly, the world demand for food will not be decreasing, due to population growth and the growing affluence and demand for better food in emerging economies; and one of Ireland's ongoing strategic ace cards is the rich land we live in, and the expertise you bring to production from it.

With the opportunities that are presenting themselves for the dairy industry, it will bring with them challenges in obtaining the financial supports, to realise growth potential from this increased global demand, and also from the changes in the EU agricultural polices and supports.

When the media announced the end of cheap and easy credit, it marked a change for enterprises from being asset backed (property backed) borrowers to being required to be 'cash flow borrowers' – perhaps the banks have not explained this clearly enough to their customers.

The deeds to the farm are no longer enough to ensure that a loan will be granted – the bank is now more interested to see that sufficient future cash will be generated to repay the loan.

Many of you here today will see opportunities to increase your herd size and infrastructure, or for new entrants to convert from other enterprises to dairy farming. Herein may lie one challenge, in matching the longish timeframe for investment in herds and infrastructure, to the cash this strategy will eventually generate; but also against the yet uncertain final outcome of the changes in EU farm policies and how these may translate into prices and cash returns to repay this borrowing.

The removal of EU market supports and the abolition of milk quota by April 2015 is anticipated to result in an increase in Irish milk production. This will be accompanied by a number of as yet unknown variables, such as the size and future payment of REPS, Single Farm Payments; and the efficiency of achieving a realistic market price for milk through Co-Ops and their end retailers with their purchasing power.

These uncertainties will influence the level of risk banks will take when looking at borrowing propositions going forward and the sooner a clear picture can be determined the better for everyone.

Example 1. A 50 cow herd expansion could have the following capital expenditure:

1.	Cows	€60,000
2.	Buildings	€45,000
3.	Parlour extension	€40,000
4.	Calving boxes	€10,000
5.	Infrastructure etc	€15,000
	Total	€170,000

Example 2. A 100 cow conversion from tillage to dairy farm could cost €350,000 for conversion and the repayment capacity will be different as full living expenses may have to be taken before there is a surplus for repayments

When making a loan application

- Prepare adequately. Know how much you want -avoid over runs add on 10% - 15% for overruns
- Cash flow = money in, money out.
  - avoids breaches of limits and surcharges maintains credit grade and rating

- Bankers don't like surprises; if you get the reputation for being unpredictable you will find it difficult to get new facilities.
- Have your paperwork done:
  – farm accounts;
  - cash flow-stock numbers;
  - debtors/creditors;
  - loans/lease repayments.
- Have accurate figures for living expenses and tax.
- Take a minimum 3 year view;
  -short term plans yield short term solutions.

Improper costs and overruns of costs and capital expenditure puts pressure on overdraft and leads to a build up of creditors and can lead to split lines of credit which is a major problem

Do's

- Take early intervention;
  -seek early advice.
- Face up to your debt problem.
- Inform and involve the spouse;
  –problem shared is a problem halved.
- Understand the problem;
  - it may not be product prices:
  – can be costs or efficiency; always get efficiency right before expansion
- Take independent advice;
  – not from bank or co-op you owe the debt to.
- Have up to date accounts;
  - a meaningful and timely proposal to the bank will be useless without up to date accounts.
- Take a minimum 3 year view
- Be up front with your banker;
  – make him aware of essential expenditure likely to arise in the short to medium term
- Check your credit bureau rating with the Irish Credit Bureau on an annual basis as you may be down graded for a technical error.
- Always correspond by letter or Email with your Bank.

Don't

- Don't accept the banks suggested remedy without seeking independent advice.
- Don't talk to the bank without having a well thought out and appraised set of proposals.
- Don't sign any document without seeking independent advice on what you are signing and the interest rate charged.
- Don't sign up for an interest only facility without being familiar with the length of the interest only period and the amount of the full interest plus principal repayment and the consequences of failing to meet the full repayment.
- Don't ignore correspondence from your banks and creditors – as maintaining your credit rating is vitally important.

Warning Signs of a Financial Problem

- Current account referrals.
- Current account hardcore.
- Build up of merchant credit.
- Borrow elsewhere 2nd bank; Credit Union.
- Refused in 1 bank; go else where Split Lines of Credits.
- When you have to sort the problem - a number of institutions to deal with.

Growing my dairy business

Jim Delahunty, Carrig, via Birr, County Tipperary

I farm at Carrig in County Tipperary on the Birr to Nenagh road. My farm consists of two almost equal sections of land approximately two miles apart. On the grazing platform of 30 hectares I milk a herd a 109 Holstein Friesian cows with an average EBI of €132. On the out farm approximately 46 livestock units of replacement heifers are reared and most of the winter fodder for cows and heifers is harvested. I'm farming on my own with student help in the busy spring period. Contractors are hired to make silage and spread slurry.

Expansion on my farm

Some of the changes that have taken place on my farm over the past eight years are outlined in Table 1.

Table 1: Changes in livestock numbers, stocking rate and size of milk quota on my farm between 2004 and 2011.

	'04	**'05**	**'06**	**'07**	**'08**	**'09**	**'10**	**'11**
Dairy Cows	**43**	**41**	**51**	**64**	**80**	**95**	**106**	**109**
Repl. (0-1)	23	31	29	30	28	57	48	50
Repl. (1-2)	16	20	23	25	28	24	46	46
Cattle (LU)	45.7	35.2	27.4	21.3	2.5	4.2	0	0
Stocking rate (LU/ha) MP SR[1]	1.82 (1.82)	1.70 (1.70)	1.76 (1.76)	1.90 (2.14)	1.88 (2.68)	2.27 (3.18)	2.60 (3.55)	2.66 (3.65)
Milk quota ('000 litres)	229	245	249	345	416	477	480	592

Over the past number of years I've developed the farm from a mixed dairy, cattle and tillage farm to a dairy farm rearing replacement heifers and selling surplus in-calf heifers. In doing so, cow numbers more than doubled and replacement heifers have

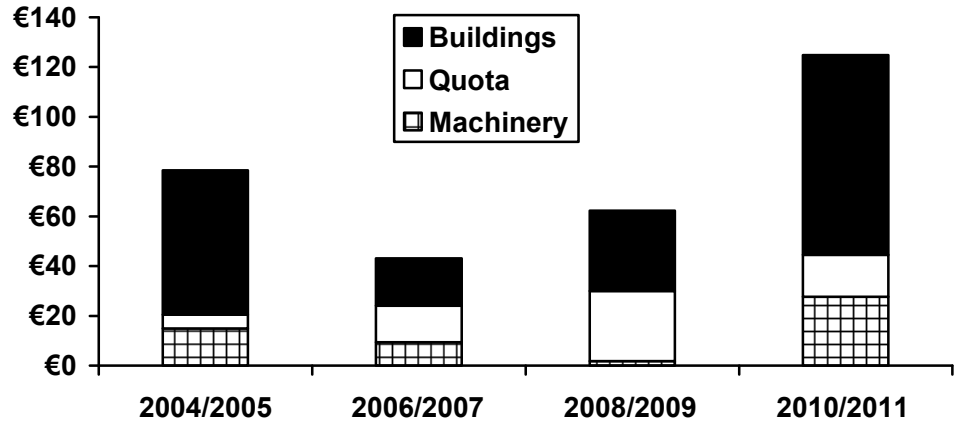
[1] Milking platform stocking rate (in LU/ha)

almost trebled in number. Cattle are no longer kept on the farm – Profit Monitor results showed that they were the least profitable enterprise. I completed a Five Year Plan with my Teagasc adviser Michael Hogan a number of years ago and the changes I've made were all set out in that plan. These changes have resulted in an increase in overall farm stocking rate of almost 1 LU per hectare to 2.66 LU/ha. The stocking rate on the milking platform has doubled and I now make no pit silage on the milking platform. This summer (2011) surplus grass was removed as baled silage and a total of 180 bales were harvested between May and July. I am not a risk taker and made the decision to buy milk quota from the trading scheme – since 2006 I've bought over 360,000 litres of milk quota and have 5,400 litres of milk quota per cow for my herd in 2011.

Investments made on the farm

Details of the investments made on my farm are presented in Figure 1.

Figure 1: Timing and value of the investments made from 2004 to 2011.

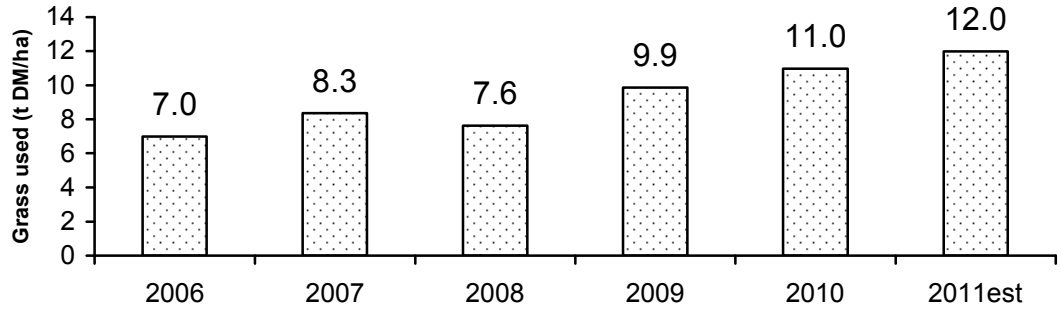


The buildings accounted for approximately 60% of the total investment made on my farm over the past eight years. I have extended and renovated the milking parlour to a 10 unit parlour and bought a new bulk tank. I have built and extended cubicle houses and converted slatted sheds to house the extra cows and heifers. The total amount invested was over €4,600 per extra cow on the farm (excluding the cost of the extra cows themselves). Some of this spending was to provide existing slurry storage facilities on the farm to comply with Nitrate regulations. As this is generally a one man farm, cubicle housing is my preferred cow housing option. Almost half of the money invested on my farm occurred in 2010/2011. At that stage I was milking over 100 cows.

Grassland

Estimates of the grass used on my farm over the period is presented in Figure 2.

Figure 2: Grass used (t DM/ha) between 2006 and 2011.



Over the last six years, grass used on the farm has increased by approximately 5 tonnes to an estimated 12 tonnes dry matter per hectare in 2011. I have reseeded approximately 60% of the milking platform over the past eight years. All of the farm is at index 3 for P and K and has a zero lime requirement. During the grazing season, I walk the farm weekly from March to October. In 2010 I walked the dairy platform 40 times and grew an average of 13.4 tonnes grass dry matter per hectare. Growing more grass is one thing – using it depended on increasing stocking rate in line with the increase in grass growth as shown in Table 1.

Expansion and milk yield

Figure 3 charts the trend in average milk yield over the 2004 to 2011 period as herd size increased.

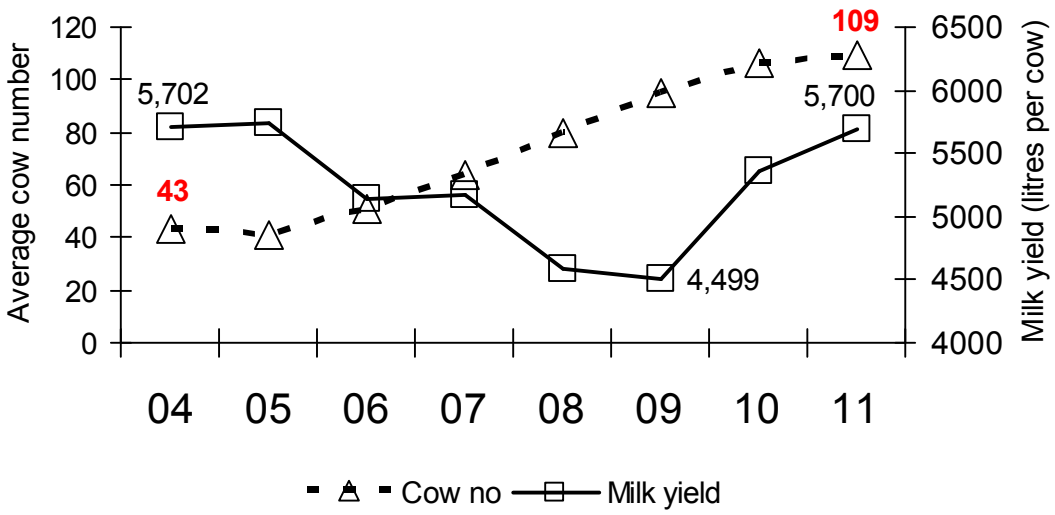


Figure 3. Trends in herd size and milk yield between 2004 and 2011.

As herd size increased between 2004 and 2009, the average age of the herd declined. Heifers have a lower milk yield than cows and milk yield declined from around 5,700 litres per cow to around 5,200 litres per cow in 2007. The decline to 4,500 litres per cow in 2008 and 2009 was due to a salmonella outbreak in late 2007 resulting in 'carry overs' milked in 2008 and a very difficult grazing season in 2009. The drop in milk yield per cow as herd size increased was 500 litres, this meant a reduction in milk sales of €150 per cow when the herd was growing.

The profit generated following expansion

The change in common costs and profit between 2004 and 2010 are presented in Table 2.

Table 2: Trend in common cost and profit, 2004 to 2010.

	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Milk price c/litre	29.9	30.0	28.6	38.0	36.1	25.4	33.3
Common Cost [2] €/cow	811	861	892	781	757	688	788
Common Profit [3] €/cow	984	976	629	1,215	940	548	981
Common Profit **€/ dairy ha**	**1,801**	**1,659**	**1,107**	**2,309**	**1,767**	**1,244**	**2,551**

Common costs per cow on my farm are very similar in both 2004 and 2010 with fluctuations from year to year. Common profit per cow has also fluctuated from year to year depending to some extent on milk price but is similar in both 2004 and 2010. Common profit per hectare has increased in 2010 by 50% due to the increase in stocking rate on my farm.

[2] Common cost – milk production costs excluding hired labour, interest and lease costs.
[3] Common profit – profit including hired labour, interest and lease costs.

Lessons learned

- Expansion is not free. You need to put a plan in place and outline when you want to make investments.
- Milk sales per cow are reduced as more heifers are introduced. Disease outbreak will also affect milk output and consequently cash flow. It will take a few years for milk yield to level out again
- Growing and utilising more grass is the key to profitable expansion

What motivated me

- Converting from a low profit enterprise to a higher profit enterprise in a planned fashion. This I have done using Profit Monitor to identify the two most profitable enterprises on my farm – cows and heifers.
- The challenge taking a business the next step.
- Leaving something worthwhile for the next generation.
- Personal satisfaction.

The future

- Short term – over the next couple of years I plan to reduce my farm borrowings. I would also like to achieve the target set in my physical plan of increasing milk solids to 1,800 kg per hectare on the milking platform.
- Longer term – looking further ahead I would like to put a contingency fund in place to help me to get through years like 2009. Focusing on cows and replacements mean that all of the eggs are in the one basket so I'm more vulnerable to a down turn in dairying than farmers on more mixed farms. With a young family I would also like to maintain my living standard while working less hours.

Planning for Expansion

Michael Hogan, Dairy Adviser, Teagasc, Nenagh.

Expansion in dairying will occur on many farms in future, mainly because of greater income potential from dairying compared with the non-dairy enterprises. The opportunity will arise on many existing dairy farms where there is land available to carry an expanded dairy herd when milk quotas are abolished in 2015.

There are two main elements to successful expansion

1. Planning and Preparing
2. Managing cash flow through out expansion

Planning and Preparing

Expansion must be carefully planned and I identify four key elements of dairying which must be corrected before any expansion should take place. If you are not strong in these areas then you are not maximising returns from the existing dairy farming enterprise. This should signal that there are improvements to be made before any expansion is considered.

Financial Analysis of current system

A detailed analysis of most recent financial returns for the farm is advisable before any expansion in dairying takes place. The following are very suitable –

a) Farm Accounts – prepared by Accountant.
b) Dairy Profit Monitor – prepared by Teagasc

Both of these will provide valuable information and identify the strengths and weaknesses of the present farming business.

The Teagasc Dairy Profit Monitor is a fantastic tool to analyse both the physical and financial performance of the farm. This information is essential for setting realistic targets for any forward planner. Teagasc can provide clients with the following prepared plans –

a) Cost Control Plan
b) Simple 5 Year Physical/Financial Plan
c) Options Plan

Grass Management

The feeding and management of the dairy stock need to at high levels of efficiency to achieve maximum output at economic levels. Grass management is of major importance to ensure maximum milk yields at least cost. The aim must be to graze cows for 280 days each year.

To facilitate grazing for a long season a good layout of farm roadways and paddocks is essential. The grazing season should commence in early February. Using a Spring Grazing Planner will help ensure grass in the diet until second rotation begins in early/mid April. During April to August the summer grass wedge must be prepared each week to guide good grassland management decisions. The aim is to graze grass during this summer period at 1,300-1,600 Kg Dm per hectare. This involves a weekly walk of the grazing area. An autumn grass planner is another essential guide in order to extend the grazing season to late November and ensure that the farm is well set up for early grazing in spring.

Breeding Policy

The aim must be to breed adequate numbers of high quality replacement heifers for the dairy herd. The target should be 45 dairy heifers reared for 100 cow herd. The team of bulls chosen should have an EBI of €200 plus. Compact calving is essential with 75% calving in first six weeks and 90% by 1st April. The breeding season should be 13 weeks long and begin in late April. Herd Plus from ICBF provides valuable information for dairy herds and will help guide future breeding decisions for all farmers. Milk recording is also essential information to dairy farmers and must be used in order to select cows according to individual cow performance.

Physical plan for expansion

The following will govern future dairy herd expansion:-

(a) Supply of dairy stock.
(b) Milk quota availability until 2015.
(c) Processing costs post 2015.
(d) Milking facilities.
(e) Winter housing.
(f) Infrastructure – roadways, paddocks and water.
(g) Availability of finance.
(h) Technical efficiencies.

Many farms have a limited milking platform area i.e. land available to graze cows. The target stocking level under good efficiency levels can be at 2.5-3.0 L.U./hectare. Some top dairy farmers are producing maximum returns at stocking levels in excess of 3.0 L.U. per hectare.

Managing cash flow

Sufficient cash flow is necessary for any successful business, and expansion will place extra demands on cash flow. While profit levels will increase with proper expansion, cash flow generally will be pressurised during early period of expansion. Careful planning and budgeting is essential to ensure sufficient cash flow in well organised expansion programmes.

Some expansion may be funded from surplus income generated in years leading up to expansion. However, borrowings will be required for most expansion programmes. The correct loans must be negotiated according to estimated amounts required for expansion which normally are term loan facilities. Also sufficient working capital or overdraft facility is usually necessary to meet the cash flow shortfall in the early period of expansion.

Teagasc – six year business planner

I have been a Dairy Adviser in North Tipperary since 1989 and during this period average dairy herd size has nearly doubled. Many herds are now over 100 cows. As dairy herds grow in size drystock is reduced and the only other enterprise is dairy replacement heifers. Expansion has been gradual in my region in most cases due to limited milk quota availability. However from 2015, I expect more rapid expansion compared to the last decade.

During the 1990's a number of discussion groups were formed and improvements in both the technical and financial areas became noticeable on the farms of these active members. The dairy profit monitor is used by many of our clients for the past 15 years and these are the farmers that have been most successful in their expansion. With more rapid expansion post 2015, planning and particularly cash flow planning will be more crucial. Teagasc can assist with the planning, completing a six year business plan will identify if cash flow will be an obstacle for your expansion plans.

Jim Delahunty, one of my clients will outline his expansion programme to you, which is a very successful one. He has been Teagasc/Arrabawn Co-op Monitor farm since 2003 and in many ways it is like having Moorepark in Tipperary. Jim began his carer in farming and attended Mountbellew Agricultural College and completed the Certificate in Farming Programme in 1989. He farmed with his father Tom for a few years until taking full responsibility in 1995. The Delahunty family have been long-term Teagasc clients and have worked closely with the Teagasc Service for many years.

Summary

Rapid expansion in dairy post 2015 will require planning in terms of goal setting, technical efficiency and physical planning of infrastructure. Some of those skills are well developed at farm level currently. However, cash flow projection and management will be the next major challenge for dairy farmers expanding post 2015

Notes

Notes

Published by
Teagasc,
Head Office,
Oak Park,
Carlow.
info@teagasc.ie

November 2011

Agriculture and Food Development Authority

National Development Plan 2007 - 2013
Transforming Ireland