Animal & Grassland Research and Innovation Programme

Teagasc National Dairy Conference

Technologies for Success

6th December, 2016 - Rochestown Park Hotel, Cork

7th December, 2016 - Mullingar Park Hotel, Co. Westmeath

Teagasc

Agriculture and Food Development Authority

Teagasc National Dairy Conference 2016

Technologies for Success

Proceedings

Tuesday 6th December, 2016

Rochestown Park Hotel, Cork

Wednesday 7th December, 2016

Mullingar Park Hotel, Co. Westmeath

teagasc

Agriculture and Food Development Authority

Conference Programme Rochestown Park Hotel, Cork

"Technologies for Success"

9:00 am **Registration**

9:45 am **Welcome**
Brendan Smiddy, Dairy Advisor, Teagasc

SESSION 1

Chaired by Professor Gerry Boyle, Director Teagasc

10:00 am **Irish dairying: well positioned for the upturn**
Prof. Pat Dillon, Teagasc, Moorepark

10:40 am **Staying focussed on what matters - a New Zealand perspective**
Pete and Anne Morgan, Dairy farmers, New Zealand

SESSION 2

Facilitated by Anne Marie Butler, Ulster Bank

11:20 am **Staying focussed on what matters - an Irish perspective**
Michael Gowen, Dairy Farmer
Donald Bateman, Dairy Farmer
John Phelan, Dairy Farmer

12:15 pm **Lunch**

AFTERNOON WORKSHOPS (1:30 pm - 4:45 pm)

Workshop 1 **What has clover to offer to Irish dairy farmers?**
Mike Egan, Brian McCarthy and John Maher, Teagasc

Workshop 2 **How can you retain more cash in your business in 2017?**
Laurence Shalloo and Patrick Gowing, Teagasc

Workshop 3 **What AI bulls should you use in 2017?**
Adrian O'Callaghan and George Ramsbottom, Teagasc; Kevin Downing, ICBF

Workshop 4 **What steps can you take to reduce calf scour in Spring 2017?**
Riona Sayers and Emer Kennedy, Teagasc

Workshop 5 **What are the causes and solutions to a herd lameness problem?**
Ger Cusack, XL Vets and Joe Patton, Teagasc

Workshop 6 **"Your health is your wealth…are you looking after yourself?**
Noel Richardson, IT Carlow, Katherine O'Leary, Irish Country Living Columnist and John McNamara, Teagasc

Conference Programme Mullingar Park Hotel, Mullingar

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Foreword

Tom O'Dwyer

Welcome to the Teagasc National Dairy Conference 2016 and our event proceedings.

Earlier this year, Teagasc launched its Dairy Roadmap 2025. It highlighted both the current and the anticipated future performance levels of the Irish dairy sector. While much progress has been made in certain areas, there remains a fantastic opportunity for Irish dairy farmers to improve performance in other areas. Consequently, this year's conference focuses on "Technologies for Success" - those technologies which will allow Irish dairy farmers to remain profitable and sustainable in future years. Today's event provides an opportunity to learn about new ideas, share information, get answers to questions and, probably most importantly, be inspired to take action.

We have planned a farmer focussed, practical conference and have invited a stellar line-up of speakers to take part. Speakers from Teagasc combined with both Irish and New Zealand dairy farmers will highlight the relevant technologies as well as identifying how you can adopt these technologies for your farm.

While change is always challenging, Teagasc will continue to support innovation by dairy farmers through our world class dairy production research centre at Moorepark and our network of Advisory offices, advisers and discussion groups.

Once again, the National Dairy Conference combines lectures with workshops. This innovative arrangement was well received by delegates in 2015, particularly the opportunity for interaction with the workshop presenters. This year's workshops focus on six topics: clover, EBI changes, herd lameness, calf scour, retaining cash in the dairy business and looking after yourself. Hopefully, you will take the opportunity to engage in a number of these workshops.

Finally, information on a number of Teagasc services, including PastureBaseIreland, Dairy Expansion Service and Professional Diploma in Dairy Farm Management and other Education Courses will be available on the day. Take the time to find out what these services can offer you.

Tom O'Dwyer

Head of Dairy Knowledge Transfer

Irish dairying: well positioned for the upturn

Pat Dillon[1], Liam Hanrahan[1], Fiona Thorne[2], Paidi Kelly[1], Laurence Shalloo[1] and Brian Moran[3]

[1]Teagasc, Animal & Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork; [2]Teagasc, Agricultural Economics & Farm Surveys Department, Ashtown, Dublin 15; [3]Teagasc, Agricultural Economics & Farm Surveys Department, Athenry, Co. Galway,

Summary

- The current increase in milk price is largely a result of decrease in global milk production rather than a lift in demand; this reduction in supply is likely to continue over the next six months.
- The best strategy for Irish dairy farmers to overcome volatile milk price is to develop low cost grass-based systems of milk production.
- In the future, comparisons should be made a per kg of milk solids rather than per litre basis; this better reflects the milk payment system, is more closely related to costs of production and can compare milk of different composition.
- Based on NFS 2015, the top 20% of dairy farmers ranked on profit per hectare had higher stocking rates, lower concentrate feed input per cow, longer grazing season, higher milk solids production per cow and a higher proportion of the farm in the grazing platform compared to the average dairy farm.
- Ireland's competitiveness in milk production has been maintained or increased with the abolition of milk quotas; milk production costs have decreased as a result of greater milk production.
- Current economic weightings in the EBI are suitable for the current milk production environment; significant genetic gain can be expected over the coming years in both milk and fertility traits.
- Significant gains are still to be obtained in grass utilisation on dairy farms; the financial benefits at farm level are significant.
- A national increase in milk production will require a simultaneous increase in sustainability on dairy farms; sustainability in the future will be broadened to not only include economic and environment but also animal welfare, milk quality, and working conditions.
- There is a requirement for an increased supply of highly skilled labour to support on-going expansion in milk production; similarly there is a requirement for existing dairy farmers to up-skill themselves as employers of people.

Introduction

Since the mid-2000's there has been a marked upswing in demand for dairy products, especially across Asia, and projections are that this will continue into the future. However, given that only a small proportion of milk globally is traded, any small imbalance in supply/demand will have a profound effect on dairy commodity prices, resulting in large volatility in milk price at farm level. In a scenario of large volatility in milk price, maximum profit may not be the sole focus, but a balance between risk and profit, i.e. an optimum profit with an accepted amount of risk. In an Irish dairy production system this will entail maximising grass utilised per hectare, which generally results in a decreased costs of production. Future challenges will require systems that result in increased environmental sustainability, higher quality milk to produce products of greater added value and increased emphasis on 'people in dairying' with the objective of an adequate supply of well-trained young people entering the industry.

The large increase in milk production in Ireland forecasted with the abolition of milk quotas on the 1st of April 2015 has materialised. This has been associated with an increase in herd size as well as an increase in milk yields per cow. In the first year after milk quota abolition, milk production increased by almost 19% in Ireland. Over this period milk production also increased significantly in the EU28 (4.2%) and the USA (2.4%), but decreased marginally in New Zealand (-1.5%). The corresponding increase in demand over this period has been lower than that predicted due to lower than expected demand from China, low oil prices and Russia remaining largely out of the market. This provided the prefect storm in terms of global dairy commodity prices, with milk prices bottoming out in June 2016. In the second half of 2016 there has been a significant correction to the supply-demand imbalance, with milk prices recovering in autumn 2016.

The objective of this paper is to outline how the Irish dairy industry should respond to the current challenges facing the industry. The paper is divided into three sections: (1) structural changes in global dairying; (2) analysis of current efficiency, competitiveness and resilience of Irish dairying; and (3) key drivers of future gains in efficiency and competitiveness.

Structural changes in global dairying

Supply/Demand

Since the mid-2000's a strong upswing in demand for milk products across Asia, largely on the back of rising middle-income wealth, led to the complete depletion of intervention stores in the EU and the USA. This change to the supply-demand equilibrium resulted in a sea-change in dairy commodity markets because demand growth outpaced supply growth by between 50 and 100% on an annual basis. Only a few export nations competed in this market (EU, New Zealand, US, Australia and South America), and resulted historically high average dairy prices in global markets.

Approximately 7% of globally produced milk was traded in 2015 (72 billion milk-equivalent litres) (Figure 1). The largest supplier to this market is the EU and NZ, followed by the US, Australia and Argentina. Therefore, a small proportional change in global supply will have a profound effect on the global dairy's market equilibrium.

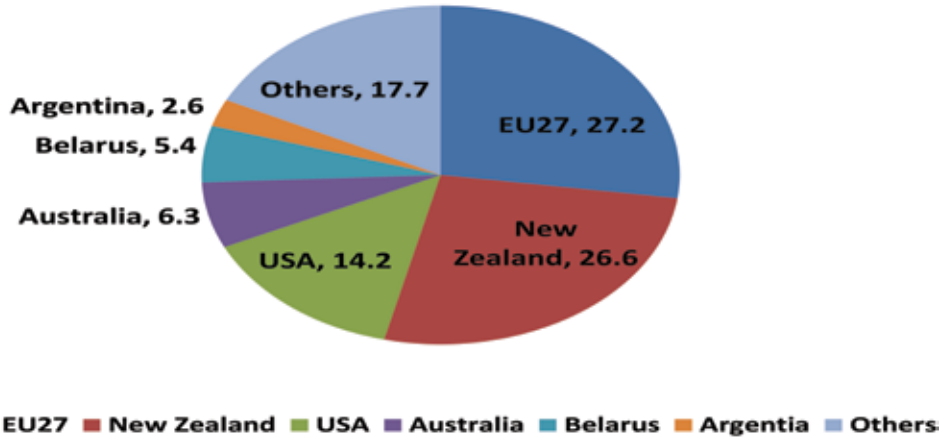

Figure 1. Position of countries dairy exports on the world market 2015 (%) (72 billion kg milk equivalent)
Source: Eurostat

The EU is the largest milk producer (150 billion litres annually); followed by the US (93 billion litres), NZ (21 billion litres) with both Argentina and Australia approximately 9 billion litres (Table 1). Based on these selected countries, milk production increased on average by 1.9% per year over the last nine years; however in the final year (2015/16) the increase was 2.7%. The current growth in demand for dairy products is less than 2%, and this has been reduced in recent times due to the decline in Chinese demand, low oil prices in key importing countries and the continued Russian ban on imports.

Table 1. Milk production of selected countries: 2007/08 to 2015/16- million litres									
	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
EU28	130,886	130,747	130,373	133,422	136,297	135,203	139,472	143,691	149,673
Ireland	5,091	4,979	4,732	5,295	5,407	5,198	5,432	5,616	6,664
United States	81,974	83,555	83,412	85,421	87,587	88,025	88,848	91,169	93,392
New Zealand	14,793	16,105	16,522	17,379	19,173	18,916	20,689	21,277	20,946
Australia	9,223	9,388	9,023	9,100	9,480	9,201	9,239	9,732	9,539
Argentina	8,980	9,370	9,138	9,996	10,716	10,267	10,369	10,177	9,996

Source: AHDB

Milk price volatility

Figure 2 illustrates how Irish milk prices have become increasingly volatile due mainly to dramatically fluctuating supply/demand conditions. In the decade before 2004, the average annual milk price received by farmers was 30 cents/litre with little year-to-year variation (+/- 2 cents/litre). In contrast, during the decade since 2004, average milk price averaged 31.2 cents/litre, but with much greater variation (+/- 8 cents/litre). While milk price volatility provides a competitive advantage for the lower production cost, grass-based farm systems that are traditional to Ireland, turbulent markets result in highly unstable family farm incomes and necessitate increased financial management discipline by dairy farmers.

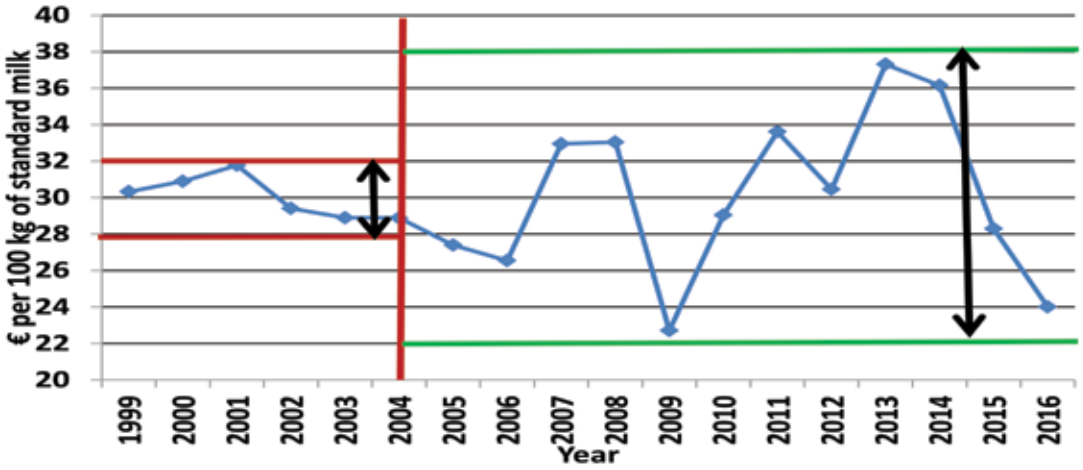

Figure 2. Kerry Agribusiness milk price 1999 to 2016 (LTO-Milk Price Comparison, 4.2% Fat; 3.4% protein; exclusive of VAT)

Milk production 2013-2016

From mid-2013, milk production in the main exporting countries increased significantly boosted by the high farm gate milk prices. Milk production in the EU has increased by over 10 billion litres over the last three milk production seasons. In the first year after milk quota abolition, milk production in the EU increased by 4.2%; this included an 18.7% increase in Ireland, 14.2% in Luxembourg, 12.4% Belgium and 11.9% in Netherlands. The largest volume increase was in the Netherlands followed by Germany and Ireland. This increase in milk production of approximately 6 billion litres, equates to over a quarter of the total NZ supply.

Over the last two years, milk production in the US has increased by 2.5%. Current dairy production is being stimulated by low feed prices, which were driven by record yield seasons in 2014, 2015 and 2016 (Table 2). Eighty percent of US dairy farm costs are feed (Newton,

2015). Further stimulus for US dairy production is expected from the introduction of the Dairy Margin Protection Program in 2014 (Orden and Zulauf, 2015), whereby farmers can insure against falling milk-to-feed price ratios and, in effect, protect margins against drops in milk price or against increases in their greatest cost. This policy is likely to affect supply-demand equilibrium in two ways. Firstly, it will encourage the production of milk when global market signals suggest that supply should stop. Further, it will reduce the need for a reduction in the size of the national herd when margins decline, a strategy used effectively in the past (Simon, 2011) to reduce domestic supply and allow a market price correction.

Milk production in NZ increased by approximately 9% and 3% in 2013/14 and 2014/15 seasons respectively. In 2015/16 milk production decreased by 1.6% due to low milk price. A larger reduction in milk supply was expected in 2015/16; however the favorable weather conditions strongly supported milk production in the second half of the season. Growth in milk production over the coming years in New Zealand will be limited because of the low milk price over the last two seasons, which has resulted in the average farmer generating a cash loss of around NZD 2.60/kg MS.

Milk production in both Australia and Argentina has not changed significantly. Milk production in Australia has been limited by environmental constraints, adverse weather conditions and milk price reductions. Milk production from Argentina continues to be reduced due to adverse weather conditions (flooding), high costs of production and years of under investment and poor infrastructure at farm level.

Table 2. US Corn: Planted acreage, harvested acreage, production, yield, and farm price

Market Year	Planted acreage (Million acres)	Harvested for grain (Million acres)	Production (Million bushels)	Yield per harvested acre (Bushels per acre)	Weighted-average farm price (dollars per bushel)*
2009/10	86.38	79.49	13,067	164.4	3.55
2010/11	88.19	81.45	12,425	152.6	5.18
2011/12	91.94	83.88	12,313	146.8	6.22
2012/13	97.29	87.37	10,755	123.1	6.89
2013/14	95.37	87.45	13,828	158.1	4.46
2014/15	90.60	83.14	14,215	171.0	3.70
2015/16	88.00	80.75	13,601	168.4	3.60
2016/17	94.15	86.55	15,092	174.4	2.90-3.50

*U.S. season-average price based on monthly price received by farmers weighted by monthly marketings. Prices do not include an allowance for loans outstanding and government purchases. Latest data are from World Agricultural Supply and Demand Estimates.

Source: USDA, National Agricultural Statistics Service, Crop Production and Agricultural Prices; and USDA, World Agricultural Outlook Board, World Agricultural Supply and Demand Estimates

Current milk supply/demand

In the second half of 2016 milk production in the main milk exporting countries has fallen sharply due to the protracted period of low farm gate milk prices (with the exception of US) (Figure 3). This reduction in milk supply has resulted in an increase in milk price. The greatest reduction has occured in Australia, where milk production has reduced by 10.3% for the months of July to October in 2016 compared to 2015. This has not been surprising given the reduction in stocking rates at farm level in a bid to reduce costs. The climate outlook is

favorable with most key dairying areas receiving normal spring rainfalls. However given the poor start to the milk production season, a sizeable reduction in milk production is expected for the remainder of the season.

In the EU milk production was above 2015/16 levels for the months of April (+1.7%) and May (+1.2%); however production for June (-1.6%), July (-1.4%), August (-1.9%) and September (-1.8%) were below 2015/16. This equates to a total reduction in milk production of 0.5% (387 million litres) in April to September 2016 compared to 2015. The greatest reductions in milk production were in Slovakia (-6.5%), Portugal (-5.5%) and the UK (-6.3%); while the country with the greatest increase in milk production was the Netherlands (+6.2%). It is anticipated that milk production in the Netherlands will be reduced over the coming years due to environmental constraints. In Ireland milk production from April to September 2016 is 1.4% greater than the corresponding period in 2015; this increase could be reduced by year end due to reduced milk supply for the remainder of the year. Continued reduction in EU milk supply over the next 6-months is expected due to reduce herd size and the voluntary milk reduction scheme. It is estimated that the voluntary reduction scheme will reduce EU milk supply by 1% in 2016.

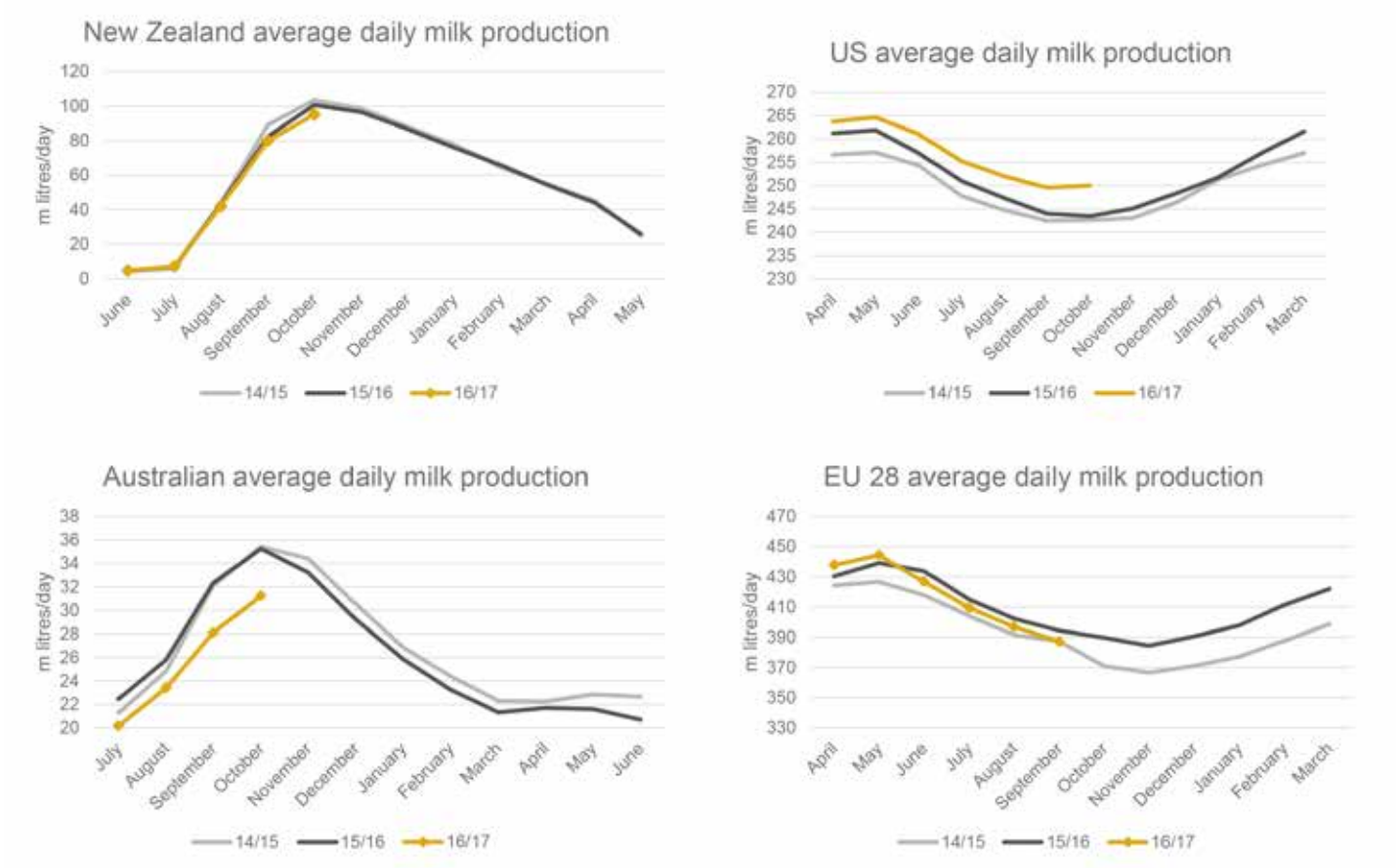

Figure 3. Daily milk supply pattern for 20014/15, 20015/16 and 2016/17 for Australia, New Zealand, US and EU 28

Milk production in the US increased for each month from April to October 2016 compared to 2015; this equates to an increase of 664 million litres or +1.7%. The majority of the growth is in the Midwest region with Wisconsin and Michigan accounting for 45% of the growth. The US will see continued modest growth over the next 6-months due mainly to the low feed prices. Also demand is positive driven by a strengthening economy, and continued low fuel prices have led to an increased demand for butter and cheese.

The start of the season in New Zealand has been mixed, with high rainfall in the North Island resulting in grazing conditions less than optimum, while in the South Island milk outputs match last year's levels. Milk production for October 2016 is 6% lower than the corresponding month in 2015. The theme for this season will be one of recovery rather than growth. Expansion

will be limited because of the low payout over the last two seasons, with the average farmer generating a cash loss of around 2.60 NZD per kg of MS.

In Argentina milk production for June, July and August 2016 is 15.5% lower that the corresponding months in 2015, making it the worst performance since 1970. A combination of negative margins, widespread flooding and years of underinvestment plus poor infrastructure all contribute to the reduction in output.

Global milk production in the second half of 2016 reduced sharply (with the exception of US) resulting in a lift in farmgate milk prices. In the short term, dairy farmers will struggle to grow production in response to increased milk prices, pointing to a sustained price recovery into 2017. This may be subdued somewhat due to stocks of milk powder in the EU and cheese in the US.

Efficiency, competitiveness and resilience of Irish dairying

Given that Irish dairying is now competing in an increasingly globalised market place, efficiency, competitiveness and financial stability is very important. Firstly, for a farm business increased costs or/and lower product prices can lead to a significant reduction in dairy farm profitability. Therefore, minimising costs should be an important objective. Secondly, if Ireland is going to secure a greater share of global dairy trade in the future, the competitiveness of the sector will be crucial. Thirdly, the level of debt and the financial status of Irish dairy farms are important in terms of resilience (i.e. not servicing high debt in extreme volatile markets).

Efficiency

In the future dairy farmers will be required to develop systems of milk production capable of delivering sustainable returns within in a volatile milk price scenario. In Ireland this will be best achieved through the development of low cost grass-based systems of milk production.

Table 3 shows the trends in costs of milk production from 2008 to 2015 in nominal terms, using data from the National Farm Survey database. In grass-based systems of milk production there is always going to be some variation between years due to variation in climatic condition. Without taking into account any increases in agriculture prices over this period costs/litre has remained relatively static. This indicates a real decrease in unit costs of production over the period 2008 to 2015. The high costs in 2013 were caused by a feed shortage in that spring. The higher costs in 2014 reflect the last year of milk quota, when dairy farmers had higher than required dairy stock numbers in anticipation of quota abolition in April 2015. The lower costs in 2015 were a reflection of both the large increase in milk production with the abolition of quotas (dilution of costs) and the very good grass growing season. The per unit costs of production are also shown based on milk solids production. There is a strong case to be made that all comparisons should be shown on milk solids basis. Milk solids are more closely related to milk price and costs of production, much closer to accounting for differences in milk composition and you can compare milk of different composition. The disadvantage on a litre basis is that dairy farmers are no longer paid for litres (volume is a cost); not as well related to cost of production; does not take account of differences in milk composition and you can't compare milks of different composition.

Table 4 shows the physical and financial performance for the average, top 20% and bottom 20% of dairy farmers ranked on profit per hectare from the National Farm Survey in 2015. The average, top 20% and bottom 20% of dairy farms had 1.93; 2.23 and 1.69 cows/ha; 7.8; 9.3 and 6.4 tonnes of grass utilised per hectare; 242, 255 and 229 days grazing season length and 926; 800 and 1,091 kg of concentrate input per cow, respectively. The milk solids per cow for the average, top 20% and bottom 20% of dairy farmers was 402, 432 and 365 kg respectively; 887, 1,019 and 774 kg of milk solids per hectare from the grazing platform respectively. The total cost per kg of milk solids was €3.03, €2.48 and €3.78 for the average, top 20% and bottom 20%, respectively. The proportion of the total farm area on the milking platform was 64%, 71% and 60% for the average, top 20% and bottom 20% of dairy farms, respectively. Therefore the

dairy farmers that achieved the highest profit per hectare had higher stocking rates, fed less concentrates per cow, achieved a higher milk production per cow, had longer grazing season length, had a greater proportion of the total farm area with the grazing platform and achieved higher grass utilisation per hectare.

Table 3. Average output, costs and profit per litre 2008 to 2015

Year	2015	2014	2013	2012	2011	2010	2009	2008
Milk price	**30.9**	**39.5**	**39.6**	**32.3**	**35.3**	**30.8**	**23.5**	**34.2**
Total gross output	32.2	38.9	39.5	33.3	35.4	30.6	23.4	34.0
Concentrate costs	4.6	5.5	7.1	6.0	4.4	4.1	4.2	5.1
Pasture and forage costs	4.4	4.9	5.1	4.8	4.2	4.1	4.6	4.3
Other direct costs	3.7	4.3	3.9	4.1	3.7	3.5	3.6	3.6
Total direct costs	**12.7**	**14.7**	**16.2**	**14.9**	**12.3**	**11.7**	**12.5**	**13.0**
Gross margin	19.5	24.1	23.4	18.4	23.0	18.9	10.9	21.0
Energy and fuel	1.9	2.4	2.4	2.3	2.3	2.2	2.1	2.4
Hired labour	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.5
Other fixed costs	7.3	8.3	8.4	7.8	7.5	8.2	7.5	9.1
Total fixed costs	**9.7**	**11.2**	**11.3**	**10.6**	**10.3**	**10.7**	**10.0**	**12.0**
Total costs	**22.4**	**25.9**	**27.4**	**25.5**	**22.6**	**22.5**	**22.5**	**25.0**
Total costs (€/kg MS)	**2.97**	**3.50**	**3.74**	**3.49**	**3.11**	**3.12**	**3.14**	**3.49**
Net margin	**9.8**	**13.0**	**12.1**	**7.8**	**12.8**	**8.1**	**1.0**	**9.0**

Source: National Farm Survey

Table 4. The performance of the average, top 20% and bottom 20% of specialists dairy farmers ranked on profit per hectare: 2015			
	Average	Top 20%	Bottom 20%
Grass Utilised (t/ha)	7,796	9,378	6,359
Stocking rate (cows/ha)	1.93	2.23	1.69
Proportion bought in feed (%)	0.17	0.15	0.19
Grazing season length (days)	242	255	229
Concentrates (kg/cow)	926	800	1,091
Nitrogen grassland (kg/ha)	169	192	160
Gross output (€)	127,677	151,621	102,959
Total costs (€)	87,820	83,404	91,368
Gross margin (€)	77,423	102,696	50,971
Net profit (€)	39,857	68,216	11,591
Gross output (€/ha)	3,655	4,706	2,708
Total costs (€/ha)	2,490	2,580	2,430
Gross margin (€/ha)	2,224	3,196	1,319
Net profit (€/ha)	1,165	2,126	278
Gross output (€/kg MS)	4.40	4.53	4.29
Total costs(€/kg MS)	3.03	2.48	3.78
Gross margin (€/kg MS)	2.66	3.08	2.14
Net profit (€/kg MS)	1.37	2.06	0.51
Gross output (cent/l)	34.1	35.3	32.6
Total costs (cent/l)	23.4	19.3	28.9
Gross margin (cent/l)	20.6	24.0	16.4
Net profit (cent/l)	10.7	16.0	3.9
Milk yield (litres/cow)	5,191	5,542	4,781
Protein %	3.5	3.53	3.44
Fat %	4.03	4.06	3.98
Kg MS/cow	402	432	365
Whole farm (kg MS/ha)	562	693	448
Milking platform(kg MS/ha)	887	1,019	774
Cow numbers	70	78	62
Total area (ha)	53	51	53
Milking platform area (ha)	34	36	32

Source: National Farm Survey Results 2015

Competitiveness of the Irish dairy sector at farm level

For the purpose of this study, profitability was used as the main measure of competitiveness, hence both costs and returns are considered important in determining the competitive position. The focus of the analysis was at the farm level. While there are also issues of competitiveness further along the production chain, these are not considered in this study. Understanding the different measures of cost is vital in assessing competitiveness. While it is possible to focus on the cash costs of production alone, the wider definition of economic costs, which also includes an estimated value for own land, family labour and non-land assets, is important. Economic costs reflect the long term measures of industry competitiveness while the cash costs are more reflective of an industries ability to deal with price volatility.

Within the EU, the EU Commissions' Farm Accountancy Data Network (FADN) is the main source of the data used for inter country comparative farm financial performance. Within this analysis, the sample was confined to specialist dairy farms. The countries examined are those with a strong tradition in dairy production, namely: Ireland, France, Netherlands, Germany and Denmark and only 2015 were considered.

The first measure of comparative costs of production for 2015, was costs as a percentage of total milk output. This measure indicates how well placed farms would be if prices or costs moved unfavourably relative to each other, especially in the short to medium term.

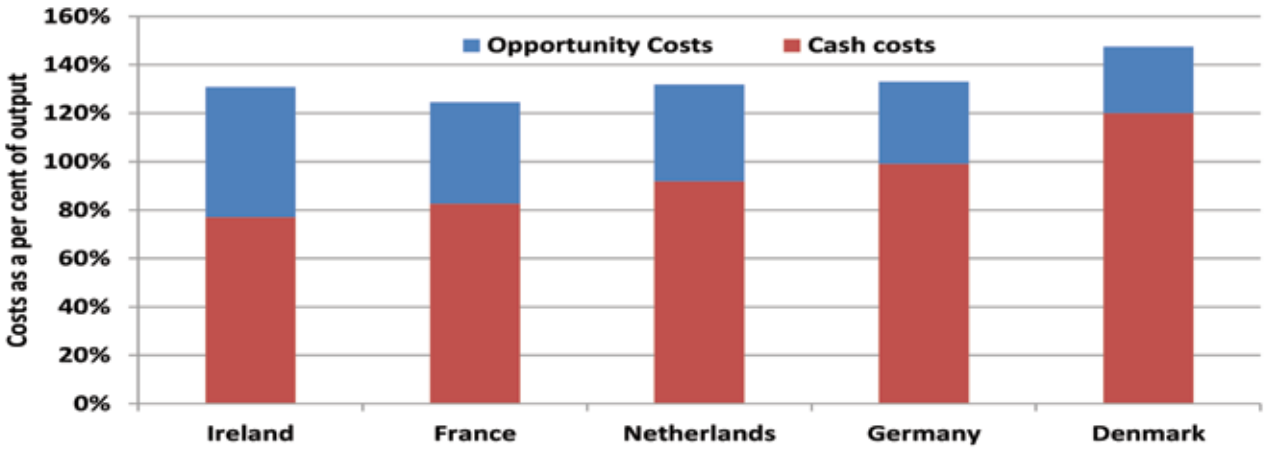

Figure 4. Estimated cash and economic costs as a per cent of milk output for specialist milk producers in EU (2015)
Source: Thorne *et al.* (2016)

Figure 4 shows that Ireland had the lowest cash costs as a percentage of output (77%), followed by France (83%), Netherlands (92%), Germany (99%), with the highest cash costs as a percentage of output was Denmark (120%). However, when total economic costs were considered, the competitive position of the countries examined in the study changed. Notably, the competitive advantage of grass based Irish producers deteriorates when all imputed charges for owned resources are taken into consideration. The most significant imputed costs that contributed to the relatively high total economic costs experienced by grass based production in Ireland, was the imputed charge for owned land and labour.

Whilst the distribution of costs across farm sizes was not examined in this most recent analysis, previous studies such as Donnellan *et al.* (2011) did examine how larger Irish farms compared against larger farms across the EU. This previous analysis showed the competitive position of larger Irish dairy farms on a total economic costs basis improved. This could be considered a positive factor now that farms have the ability to increase herd size and consequently reduce costs per kg of milk due to economies of scale on fixed costs items in particular.

The second measure of comparative costs and returns used in this analysis was costs per kg of milk solids produced. On a cash costs basis, per unit of milk solids, Ireland had the lowest cash costs per kg of milk solids produced in 2015 (€2.87) followed by Belgium (€2.88), Italy (€3.43), France (€3.47), Netherlands (€3.61), Germany (€3.71) and Denmark (€4.83).

Competitiveness of the Irish dairy farm sector internationally

The IFCN (International Farm Comparison Network) data network is a world-wide partnership that links agricultural researchers, advisors and farmers to create a better understanding of milk production and the costs and returns of production worldwide. The cost calculations within the IFCN network are based on individual representative farms. When looking at these countries the latest IFCN results for 2015 have confirmed that cash costs as a per cent of dairy output increased in all regions in 2015. Furthermore, due to very significant declines in milk prices, the report has also shown that some regions experienced greater reductions in profitability than Ireland.

Figure 5 shows cash costs as a percentage of milk output for the typical Irish dairy farm (IE-77), larger Irish dairy farms (IE-133) with other regions internationally that are considered important from a market and trading perspective. The results show that the typical Irish dairy farm compares similarly to Australia, New Zealand and Wisconsin dairy farmers. The larger size represented Irish dairy farms with over 130 dairy cows illustrated the strongest short term competitive measures amongst the countries examined.

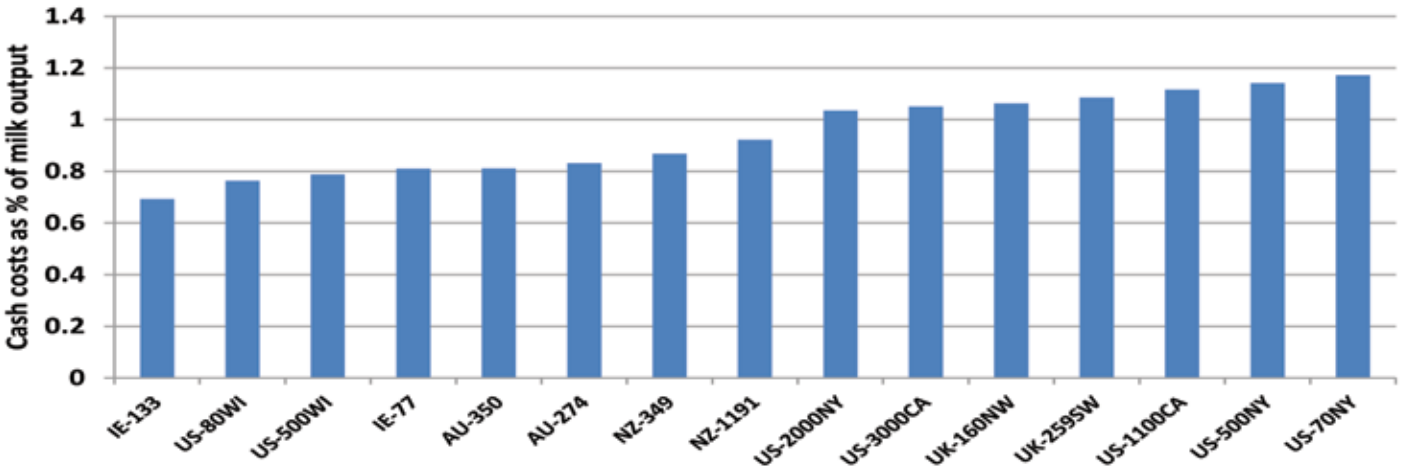

Figure 5. Cash Costs and Returns of the Dairy Enterprise: Ireland v other on-Eurozone countries (2015)
Source: IFCN 2015

In conclusion, it could be said that whilst milk prices and margins have been relatively depressed in Ireland over the last 24 months, it must be recognised that dairy farmers in Ireland were fortunate that the outcome was not worse. Weather and exchange rate movements were favourable during this time period. This meant that the reduction in profitability at farm level was a lot less than was potentially possible based on market conditions.

Resilience

In the context of a dairy farm, Lien et al (2007) defined resilience as 'the capacity of a farm business to survive various risks and other shocks'. Resilience denotes the capacity of a system to absorb shocks and thrive in a changing environment. These businesses are technically and financially efficient, generate surplus cash, consistently achieve financial expectations and are simple to operate. In Ireland, resilient dairy farm systems must have a low cost base to insulate the business from price shocks and allow family based farms to generate sufficient funds in higher milk price times to meet family commitments and finance expansion. Key performance indicators of dairy farm resilience will be measured in terms of efficiency, liquidity and solvency. Key elements of biological (stocking rate, milk solids per cow and per hectare, grass utilized per hectare, concentrate fed per cow) and financial efficiency (costs per kg MS, profit per kg MS and profit per hectare) have already been highlighted. Other biological factors that are important include herd EBI, 6-week calving rate, cows per labour unit and environmental parameters such as nitrogen efficiency and carbon equivalent per kg MS. Liquidity measurements will include discretionary cash per hectare; cash surplus/deficit per hectare or household drawings

per hectare.

The solvency of the dairy farm business will also be an important measurement of resilience. Based on the 2015 NFS the average debt on Irish dairy farms was €63,000 or approximately €100,000 on dairy farms with borrowing. This level of debt compares favourably to other EU countries such as Netherlands (€862,547) and Denmark (€2,826,214) (Thorne *et al.*, 2015). Likewise it compares favourably with New Zealand owner operators farms where interest debt servicing per farm was $218,248 or $1.22 per kg MS. in 2014/15; total debt servicing per farm is greater than $3.4 million.

Importance of innovation at farm level

Innovation is defined as 'renewing, changing or creating more effective processes, products or ways of doing things'. In dairy farming, Ireland has a comparative advantage to grow grass; innovation can give us a competitive advantage. In the Irish Agrifood sector this comprises of: those that create knowledge (Teagasc research, UCD, UCC etc.); those that facilitate its use (Teagasc Advisory, Private Agriculture Consultants etc.) and those who use the knowledge directly (dairy farmers, agribusiness). There is a requirement for innovation in the four main pillars of the dairy farming system: (1) high genetic merit herd, (2) high pasture productivity, (3) sustainable production system and (4) highly skilled work force.

High genetic merit herd i.e. high EBI

Dairy breeding programmes globally were traditionally based almost solely on aggressive selection for milk production potential. While intense selection for production has resulted in large increases in yield of milk, fat and protein, it has also had unfavourable effects on traits such as fertility and longevity. This is because of an unfavourable genetic relationship between yield and fertility traits; higher producing cows, in general, have poorer fertility and subsequently less chance of survival. Selecting for greater milk yield also resulted in a taller, more angular dairy cow. These cows tend to enter negative energy balance during early lactation resulting in mobilisation of excessive levels of body reserves, body condition loss and a greater risk of metabolic disorders and infertility. To address these problems, the Economic Breeding Index (EBI) was launched in 2001. The aim of the index is to provide farmers with a tool to help them maximise their farm profit by exploiting genetic variation that exists for key drivers of profitability. The main traits in the EBI are milk, fat, and protein yield (milk sub-index) and calving interval and survival (fertility sub-index). The advent of genomic selection accelerated this rate of genetic progress.

Both national statistics and research conducted at Teagasc Moorepark have demonstrated that the introduction of the EBI has been hugely effective. The results from the Next Generation Herd clearly demonstrate the benefit in a research setting; higher milk solids, superior reproductive performance, lower SCC and mean live weight and higher body condition score (Table 5). Figure 6 shows the genetic trends at national level in EBI, milk production and fertility performance. Figure 7 shows the national trend in both 6-week calving rate and mean calving for the top 10% cows in EBI and national average EBI. Over the period 2011 to 2015 the national average six week calving rate increased from 60% to 65%; the corresponding increase for the top 10% EBI cows increased from 67% to 73%. Similarly, mean calving date reduced from the 11th of March to the 5th of March nationally, while for the top 10% EBI cows reduced from the 6th of March to the 28th of February over the period 2011 to 2015.

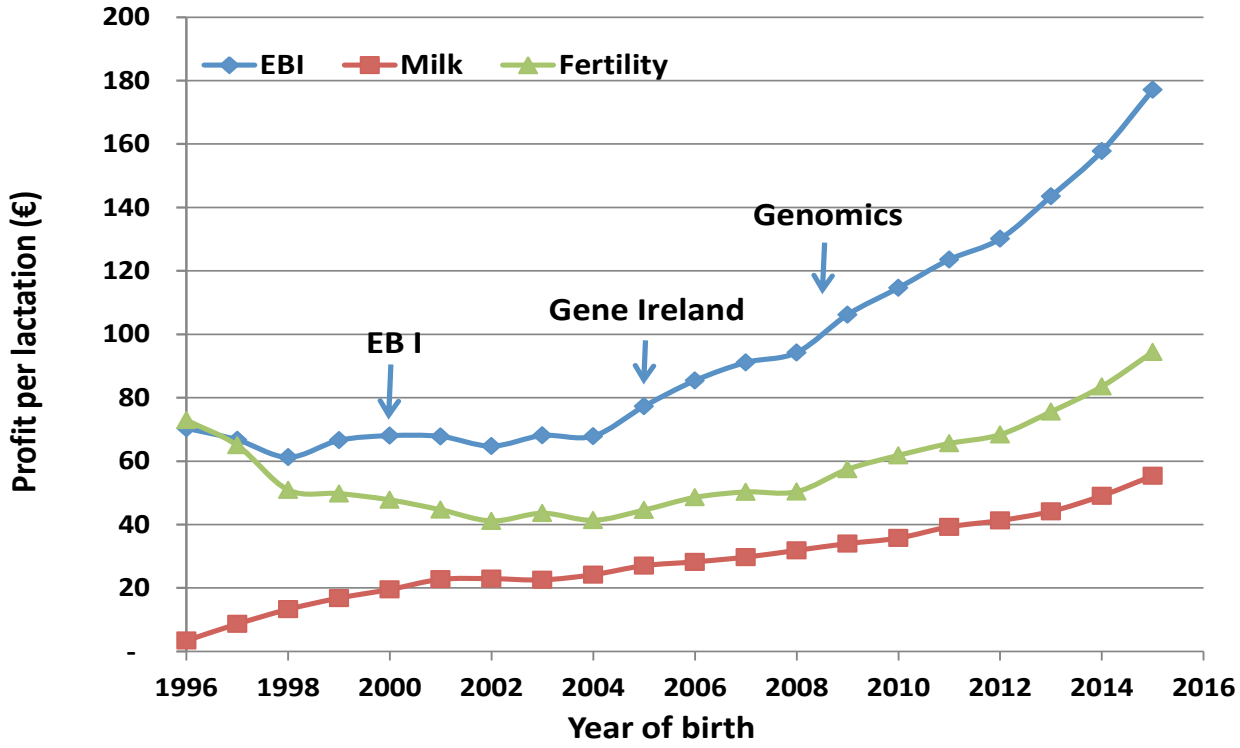

Figure 6. Trends in EBI, milk and fertility traits 1996-2014

Table 5. Performance of Next Generation Herd 2013-2016		
	ELITE (180)	Nat. Av. (67)
Milk yield (kg/cow)	5,499	5,704
Milk solids (kg)	448	442
Protein (%)	3.75	3.58
SCC ('000 cells/ml)	108	126
3 week submission rate (%)	92	86
Pregnancy rate to 1st service (%)	60	46
6-week pregnancy rate (%)	73	58
In calf rate 12 weeks (%)	92	81
Mean body condition	2.94	2.77
Mature live weight (kg)	560	570

An independent financial assessment has calculated this increase in EBI which has delivered a total benefit of €631 millon (net present value in 2015 using a discount rate of 5%) to the Irish dairy industry. Continuing [the current] rate of genetic gain and the current projected rate of increase in herd size, the net present value of benefits from genetic improvement over the next five years will be €1.13 billion (AbacusBio Agribusiness Consulting).

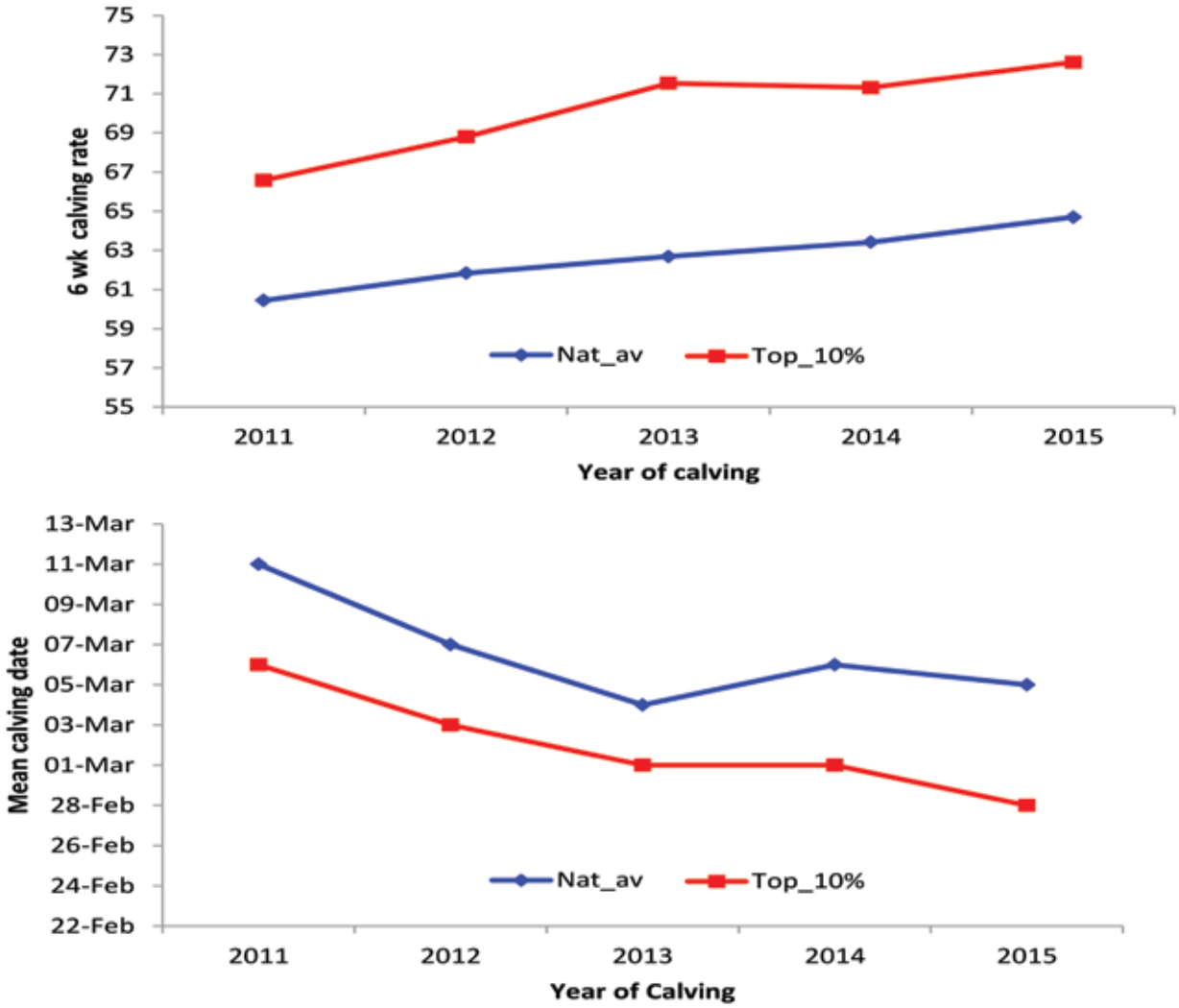

Figure 7. Shows the trends for 6-week calving rate and mean calving date for cows in the top 10% and national average EBI

With the recent abolition of milk quotas the question is often asked is the EBI suitable for a non-quota environment. There are a number of reasons why the EBI in its current format is suitable for a non-quota environment:

- The farm bio economic model used to calculate the economic values of the individual traits is based on a non-quota situation i.e. land is the limiting factor.
- The economic values placed on the individual traits is a reflection of current/future milk price and costs of milk production. The only way that greater emphasis could be put on the milk production traits is that future milk price will be higher than is currently used (29.5 cent per litre) or average costs of milk production is going to be lower; both unlikely to occur.
- Table 6 shows the average genetic merit of the G€N€ IR€lAND Holstein Friesian test bulls entering the programme between 2008 and 2016. Over this period the average genetic merit for kg of fat and protein has increased from 21 kg in 2008 to 36 kg in 2016; this will result in significant increase in milk fat and protein production at farm level.
- Over the coming years, greater emphasis will be placed on incorporating traits in relation to animal health, environment (greenhouse gas and N efficiency) and detailed milk composition into the EBI. The incorporation of these traits will strengthen Ireland's ability to cope with milk price volatility.

Table 6. G€N€ IR€LAND Holstein Friesian test bulls 2008 to 2016								
Year	Milk (kg)	Fat (kg)	Protein (kg)	Fat (%)	Protein (%)	Calving Interval (days)	Survival (%)	No.
2016	195	19.5	16.5	0.22	0.19	-11.2	5.6	53
2015	258	19.6	16.6	0.18	0.15	-9.1	4.8	54
2014	138	16.7	12.9	0.21	0.16	-9.0	4.6	24
2013	163	16.3	12.6	0.19	0.14	-8.6	4.3	44
2012	128	14.2	10.5	0.17	0.12	-8.0	3.5	54
2011	143	14.3	10.0	0.17	0.10	-4.8	3.4	34
2010	201	11.3	9.3	0.07	0.05	-2.7	2.6	15
2009	192	12.8	10.9	0.11	0.09	-4.0	2.1	56
2008	157	11.2	9.7	0.10	0.09	-3.1	1.6	85

Source: Irish Cattle Breeding Federation

High Pasture Productivity

There have been significant improvements in grazing management practices on Irish dairy farms in recent years; however, research studies indicated that there is potential for further significant improvements. Analysis has shown that profit per hectare is closely linked to the quantity of grass utilised per hectare on Irish farms. An analysis of National Farm Survey data over the period 2008 to 2015 has shown that for every extra tonne of grass DM utilised per hectare, profit per hectare is increased by €180. Table 7 shows the grass utilised per hectare from 2008 to 2015 for the average farm from the NFS compared to both Curtins Research Farm at Moorepark and Ballyhaise Agriculture Collage, Co. Cavan. Although grass utilisation within the NFS has increased by almost 1 tonne DM/ha between 2008 and 2015, the overall level of utilisation remains low at 54% and 70% of that achieved at Curtins and Ballyhaise, respectively.

Table 7. Grass utilised kg DM/ha on the whole farm			
Year	NFS	Curtins	Ballyhaise
2015	7,879	14,543	10,869
2014	7,314	13,759	11,895
2013	6,887	13,206	9,911
2012	6,896	13,506	8,161
2011	7,223	13,590	11,143
2010	6,845	12,457	10,054
2009	6,971	12,489	10,209
2008	6,789	10,894	9,103
Average	7,101	13,056	10,168

To maintain Ireland's competitive advantage in grass-based systems of animal production it is essential that the following grassland technologies are adopted more widely on dairy farms:

- Increased emphasis on measurement and feed budgeting
  - » Greater adoption of pasture measurement and budgeting will be essential to lift grass utilisation from its current level. Recent research has shown that at higher stocking rates,

both grass production and utilisation can be increased. The development of web-based grassland management decision support tools such as PastureBase Ireland (PBI) will be critical in increasing the adoption of best grazing management practices at farm level. The weekly use of such reliable, easy to use decision support tools will be essential to increase grass utilisation at farm level.

- Reseeding underproductive swards with appropriate varieties
  - » In Europe, grass breeders have increased DM yield by 0.5% per year as tested in cutting trials in the Netherlands and Northern Ireland. However, there is little evidence that new grass cultivars have made a significant contribution to increased animal production from grazed pasture. Considerably greater gain has been achieved in breeding other crops such as maize. There is considerable potential to increase the rate of genetic gain in perennial ryegrass, not only in annual yield but also in other traits such as improved winter/spring growth, increased nutritional value especially in mid-season and persistency. The development of the Pasture Profit Index (PPI) is a significant step towards linking breeding objectives, evaluation programmes and farmer's needs. PBI provides a mechanism for new cultivars to be evaluated at farm level thereby increasing the rate of genetic gain. Selecting grass varieties based on the PPI will result in increased profit at farm level. Additionally, there is the possibility that biotechnologies similar to those used in dairy cattle breeding could increase the rate of genetic progress in grass breeding in the near future.

- Raising soil fertility to maximise pasture productivity
  - » Since the late 1990's the levels of phosphorus (P), potassium (K) and lime being applied to grassland in Ireland has reduced significantly. As a result only 10% of the soils tested on dairy farms were optimal for soil pH, P, and K in 2015. It is not possible to have optimum grass production with this level of soil fertility. Recent research has shown that a soil with optimum pH has a replacement value of 72 kg/ha of N fertilizer. Similarly, soils with optimum P can deliver an additional 1 t/ha of DM in spring period. While it costs money to increase fertility levels in low fertility soils, the return in grass production more than doubles the annual investment in fertilizer costs.

- Management of marginal lands
  - » Marginal land occupies a large proportion (approx. 50%) of Ireland's total land area. This land is limited principally by its poor drainage status and farm profitability on such land is highly weather dependent. The Heavy Soils Research Programme has demonstrated site-specific land drainage design methods to ensure efficient drainage can be achieved, regardless of variations in soil/site conditions. Land drainage and infrastructure improvement strategies will be critical in reducing income volatility and sustaining viable farm enterprises on heavy soils. Additionally, there is a requirement to develop specific additional management strategies in order to maximise profitability on these heavy soils.

- Incorporating clover in grazing swards
  - » There is renewed interest in forage legumes, particularly white clover, as it offers important opportunities for sustainable grass-based animal production systems by increasing herbage yield, increasing herbage nutritive value and raising the efficiency of conversion of herbage to product. Results from research carried both at Moorepark and Clonakilty Agriculture Collage (Table 8) show a significant advantage to including white clover into perennial dominated ryegrass pastures. Despite the clear advantages of incorporating white clover into ryegrass pastures, its adoption on Irish grassland farms is low. This requires significant research allowing greater adoption at farm level over the coming years.

Table 8. Comparison of diploid and tetraploid ryegrass, with and without white clover on DM production and animal performance 2014-2015				
	Tetraploid	Diploid	Tetraploid + clover	Diploid + clover
Pasture DM production (t DM/ha)	15.5	15.5	17.5	17.2
Sward clover content (%)	-	-	28%	31%
Milk yield (kg/cow)	4,972	4,994	5,783	5,750
Milk fat (%)	4.69	4.64	4.62	4.61
Milk protein (%)	3.82	3.74	3.74	3.74
Milk solids (kg/cow)	420	423	481	478
Milk solids (kg/ha)	1,162	1,145	1,328	1,316

Sustainable Production System

Interest in the concept of 'sustainable' farming has grown as a result of continuous pressure on farm incomes, concerns about animal welfare, environmental problems caused by agriculture and climate change. Four key aspects of sustainability have been identified: economic, internal social, external social and ecological sustainability. Economic sustainability is the ability of the farmer to continue his farming business. Internal social sustainability relates to the working conditions for the farmer operator and employees. External social sustainability has to do with the impact of agriculture on the well-being of both people and animals. Ecological sustainability concerns threats or benefits of agriculture on soil, water, climate, flora and fauna.

Ireland exports more than 85% of its dairy products. A sustainable Irish dairy industry is important for two reasons:

- The dairy industry is a significant employer and valuable income stream for the Irish economy. To promote continued success and growth targets, the dairy sector needs to base itself around sustainable practices that will allow it to thrive;
- Sustainable practices throughout the dairy production supply chain, from field to fork, are of increasing importance to governments and global food companies that buy our dairy produce.

Although Ireland produces less than 1% of the world's milk, Ireland supplies the dairy ingredients for more than 15% of the infant formula produced globally. The highest standards of quality and traceability are imperative for this market.

The following will be critical metrics of sustainability in pasture-based systems of milk production:

- Economic
  - Cost per kg of milk solids
  - Cash surplus per kg of milk solids
  - Discretionary cash per farm household
  - Interest and rent per kg of milk solids
  - Return on assets and return on equity
- Social-internal
  - Intergeneration succession
  - Hours worked per labour unit per week
  - Labour hours per cow per year
  - Skill set of work force
  - Opportunity for personal development
- Social-external
  - Animal welfare status of herd
  - Level of antimicrobial and anthelmintic use
  - Milk quality standards- bacteriological and residues
  - Cow grazing days per year
- Environmental
  - Kg of Carbon equivalent per kg of milk solids
  - Biodiversity
  - Kg of Nitrogen leached per hectare per year
  - Energy and water use efficiency

Highly Skilled Workforce

The most important resource available to any industry is its people. Hence it is crucial for the success of Irish dairy farming that there is an adequate supply of highly skilled people to inherit, manage and work on dairy farm businesses in the future. Recent rapid expansion has created a new and growing demand for people. From 2000 to 2014 there was a dramatical change in the structure of Irish dairy farms with much more of the national milk pool coming from larger scale herds (Figure 8). This change will be even more dramatical over the next five years, when herd size is likely to average over 100 cows by 2020. Up to now, most Irish farms have been 'one person' farms with help from family labour to manage the annual workload.

Becoming an employer and working with short and long term hired non-family help is an immediate challenge facing many farmers. With this in mind, the culture of employment on farm must be modernised to reflect the requirements of employees within modern labour markets. The farmer must develop additional skills to manage non-family labour and at the same time get the best outcomes from the farm business. Farming systems need to be redesigned with an increased focus on efficient work organisation and system simplicity, subcontracting non-essential workload and developing the increasingly specialised skillset of employees working on the farm. Farm businesses must develop effective communication skills to clarify expectations and provide essential feedback (both owners and employees). There must be an overall vision and plan for the farm business, which incorporates the role of employed labour. As a mentor, the farmer must invest time in building the employees skills and experience, sharing sensitive farm information, setting goals, benchmarking performance and delegating important tasks. So too, the business must provide continued personal development for the farm owner. Previous studies have observed that developing human capital through continuing training may increase the productive output from each employee, either through improvement in skill level or through improvement in morale and job satisfaction (Dessler, 2003).

Expansion in milk production is creating huge opportunity for skilled people in a variety of different career positions – from farm assistants (full or part time), herd managers, farm managers or potentially in collaborative farming arrangements. In future, a greater proportion

of milk will be produced on dairy farms within collaborative farming arrangements involving land owners, managers and equity partners. These arrangements will become much more common place in Irish dairying going forward, especially with many existing older farmers not having a successor.

Demand for people is increasing and there are many opportunities, but supply of people to dairy farming could be a challenge. While there has been a huge increase in the number of people studying agriculture in recent years, this trend seems to be reducing as the wider Irish economy improves. There is also no guarantee that those who are studying agriculture will choose a career in dairy farming. Hence Irish dairy farming needs to ensure it is an attractive career to compete with other career opportunities inside and outside of agriculture.

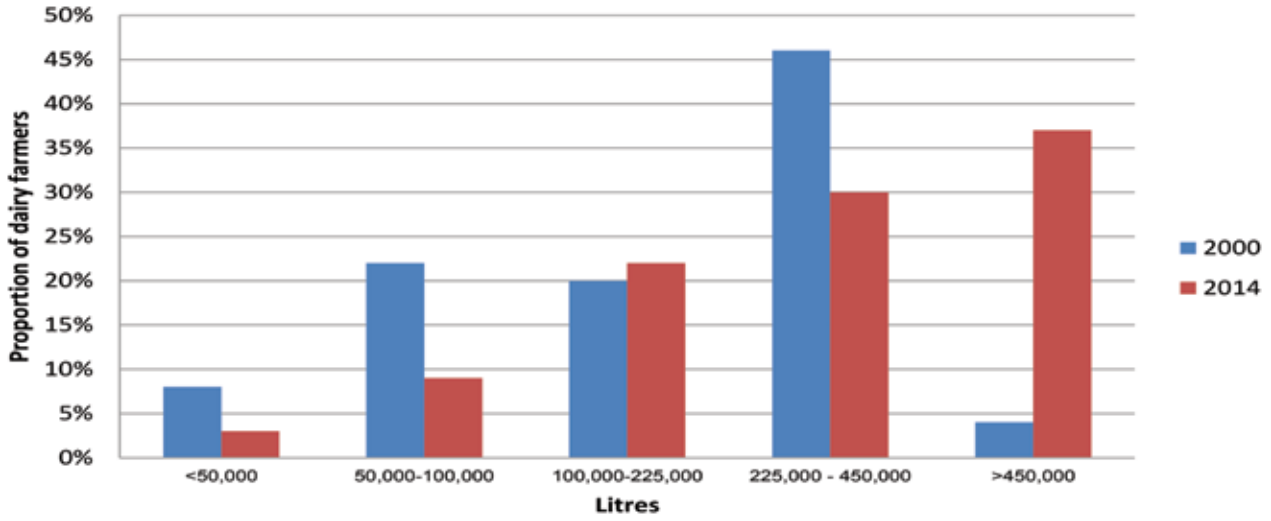

Figure 8. The proportion of dairy farms with <50,000; 50,000 to 100,000; 100,000 to 225,000; 225,000 to 450,000 and >450,000 litres per farm in 2010 and 2014

There will be a number of key aspects to achieving this:

- Farms must be enjoyable places to work. As an industry we must have a keen focus on improving labour efficiency to make working on farms enjoyable. Work life balance must be prioritised more. The next generation of young people will be more interested than farming to live, rather than living to farm.
- Responding to the recommendations of Food Harvest 2020, Teagasc in conjunction with UCD and other stakeholders created the Professional Diploma award in Dairy Farm Management (PDDFM) in 2012. This diploma provides the next generation of dairy farmers with the additional skills and knowledge to meet the challenges of an expanding industry in the future. The programme provides students with a combination of supervised experiential placement-based learning on commercial dairy farms with registered elite mentor host farmers combined with course work supplied by dairy research, knowledge transfer and education specialists. More people completing this course annually are needed to ensure a supply of trained managers to dairy farms
- Dairy farmers must improve their skills as employers to effectively manage different people working in their business. Education and training is not just for young people. The environment in which we farm is becoming increasingly volatile, and farmers must focus on up-skilling themselves to improve their ability to manage their farming business. Improving financial management and strategic planning skills are particularly important. Every farmer should be a member of a discussion group and attend a number of up-skilling events/ courses and training days during the year to hone current skills and learn new ones.

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Staying focussed on what matters - New Zealand perspective

Pete Morgan

Morlands Farm, Waikato, New Zealand

Summary

- Farm systems must fit our lives and deliver outcomes
- We focus on pasture, profit, people and making progress
- We must all collaborate to meet challenges

Introduction

Ireland and New Zealand share more farming characteristics than most agricultural countries. Climate, latitude, soils, stock breeds as well as culture, history and values. We also share the challenges that world economics create. There is immense benefit from sharing our relative experiences as we look to remain profitable, progress both our industry and ourselves while facing these challenges.

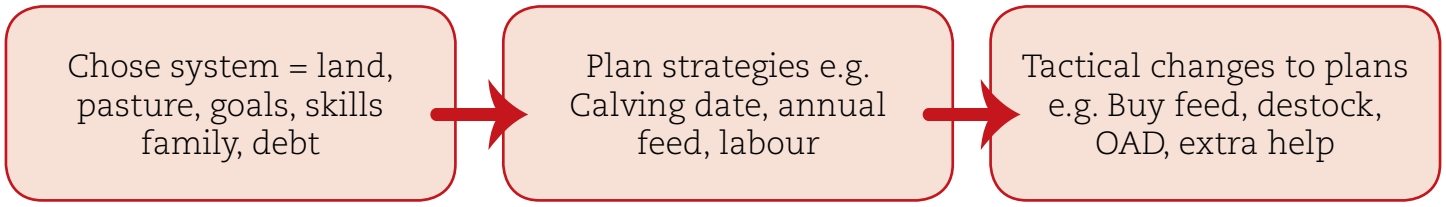
Our farming business then is not much different to yours. This is an outline of how we developed our farming system and some lessons we have learnt within our four focus areas. Pasture. Profit. People. Progress.

System

Dairy farm systems reflect the degree of intensity, (stocking rate and bought-in feed) a farm has. At system 1, all feed is grown, and all young and supporting stock are grazed on-farm so it is typically stocked at two cows per ha. At system 4 this stocking rate would be 4.5 cows per ha and the farm would buy in 1t/cow of feed, typically maize silage and palm kernel extract (PKE) and all young stock would be grazed off farm. System 5 is a feedlot farm.

We run a simple and efficient system 2 running 520 crossbred cows on 200 ha (175 effective) so stocked at 2.9 cows/ha buying in 200kg per cow as hay and some PKE. We grow 10 ha of maize for silage as part of a 5% annual regressing programme and young stock are grazed off. Ann and I run Morlands Farm with the help of two staff.

We chose to run this system as it allows us to utilize our land, feed and stock resources and incorporate our skills and interests to best achieve our goals while maintaining a lifestyle we enjoy.



Knowing our system creates a check on “system slip” where drifting to a higher or lower intensity can happen without adequate planning. These changes in farming practices can create stresses on parts of the farming operation and ultimately the whole business. In NZ we have seen farmers respond to milk price lift in 2008 by introducing 50% more feed, often without adapting stocking rate, pasture management or infrastructure resulting in no change in profitability. Building feed pads, buying machinery and more land increased debt levels leaving people vulnerable to the drop in milk price that followed.

Moving between systems needs to be a conscious and driven, change balancing all parts of the operation, whereas, adjustments within a system are simple responses to season, market or inputs. We liken it to gearing in a car where you have a range of revs within each gear but need a big movement to move up or down.

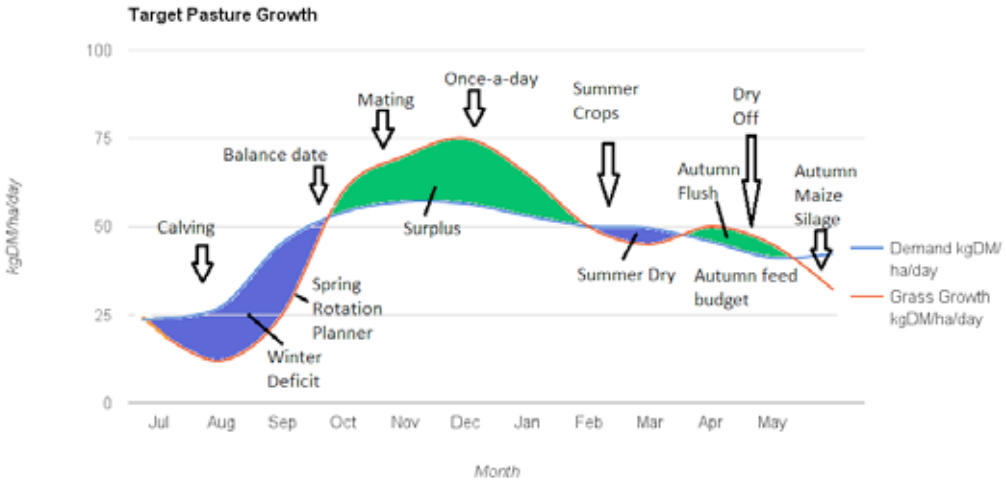
These big changes are the basis of the principles that we must stay focused on to keep our business in the zone that best enables us to achieve our goals.

Working hard without balancing your system is dangerous. System drift, poor profitability, burnout, depression and suicides are all associated with the loss of focus on steering the farming business. We've experienced all of these first or second hand in NZ and the consequences on individuals, families and communities are severe.

So what do we do? We try and balance all we do in our lives to get the work done well and efficiently, manage with flexibility and rigor and always check against our personal and business goals.

Pasture

Pasture provides the clear majority of feed supplied in NZ. Maximising both the amount grown and utilized underpins our industry regardless of the farm system being run. When it is easy to buy in feeds like PKE we risk losing our focus on pasture management. The daily attention to growth rates, allowances, residuals and forecasting need to be core to feed management. We need to understand the impact of any management decision e.g. culling, using other feeds, changing mating date etc. on the dynamics of pasture supply and stock demand.



Seasonal Management

Dairy farming in NZ is very seasonal. 95% of us calve all cows in the spring and dry off in the autumn. The seasons then can be thought of as distinct periods that each have critical management targets. Consistently reliable performance relies on these periods having targets that are monitored to set us up for the next period.

Autumn

As we near the end of the season, all focus is on drying off and the two targets that will most define the next season. These are Body Condition Score (BCS) and Average Pasture Cover (APC). Achieving our targets in these areas is a much higher priority than any further production in the current season. It's tough to over-ride the "milking on a bit longer" instinct especially when you know the milk price is higher this season than the next will be but we have it hard-wired in through good information and bad experience.

We walk the farm regularly, update the feed budget, use supplements accordingly and dry off on time, enjoying the sleep-ins knowing we made the right decision.

Winter

The next goal is APC and BCS at calving so we monitor and adjust feeding levels according to how wet and cold the winter is. We are on a long round (120 days) so changes take time to have an effect but tracking carefully enables us to have confidence that the farm, the cows and ourselves arrive at calving fat, rested and ready to go.

Spring

This is where the supply and demand curves are most closely watched up to the balance date where grass growth exceeds demand. The Spring Rotation Planner is vital to ensure we feed as much pasture as we can afford to until balance date. Post balance date we concentrate on maximising pasture intakes and achieve the right residuals. This period, through to early summer when growth slows, is where our peak production occurs and our feed costs are the least. Critical here then is that we maximise intakes while maintaining residuals to <1600kgDM/ha. This tension between feeding the cow and controlling regrowth quality is a constant challenge.

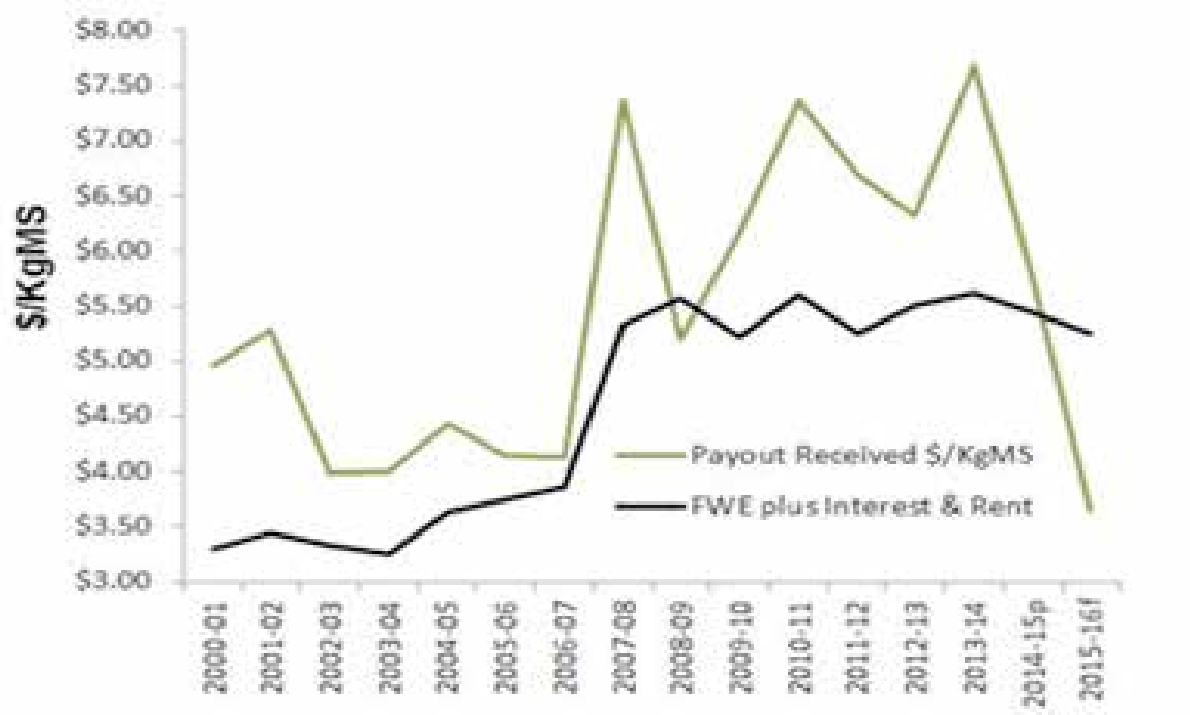
Summer

This is the most straight forward period, where we manage feed supply by using supplement and crops, and manage demand by drying off lighter cows and culling. We use once-a-day (OAD) milking for the second half of the season.

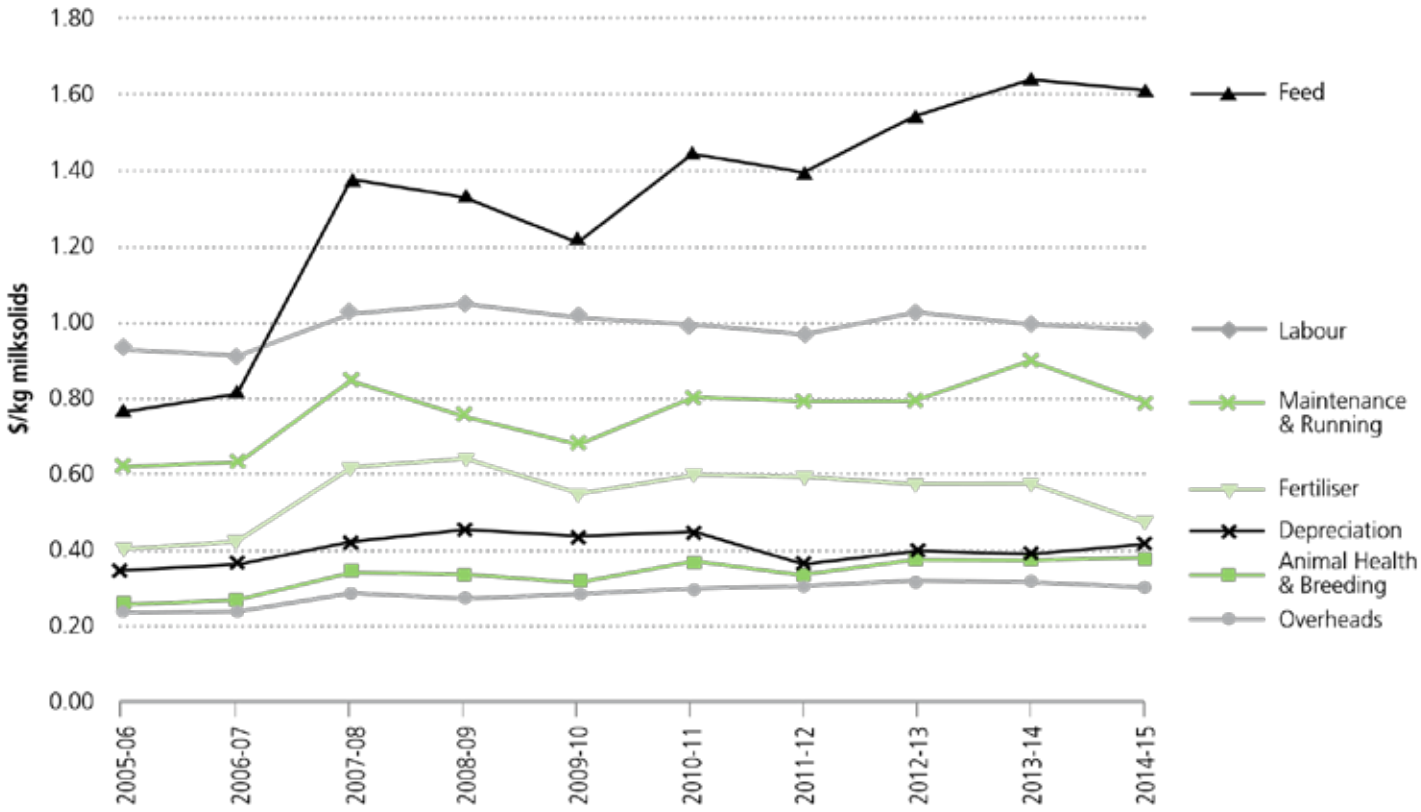
Our system works best if we can move seamlessly from one season to the next always looking to achieve our management targets.

Profit

The following two graphs show how the volatility of the milk price has increased over the last 10 years. The increase in farm expenses that occurred in response to the first big jump in milk price in 2007/8 was largely made up of increases in feed costs and debt servicing. These expenses have stayed high despite the volatility although feed costs are starting to drop now following two years of very low milk price, and cost of debt servicing has increased as farmers have had to borrow to stay afloat.



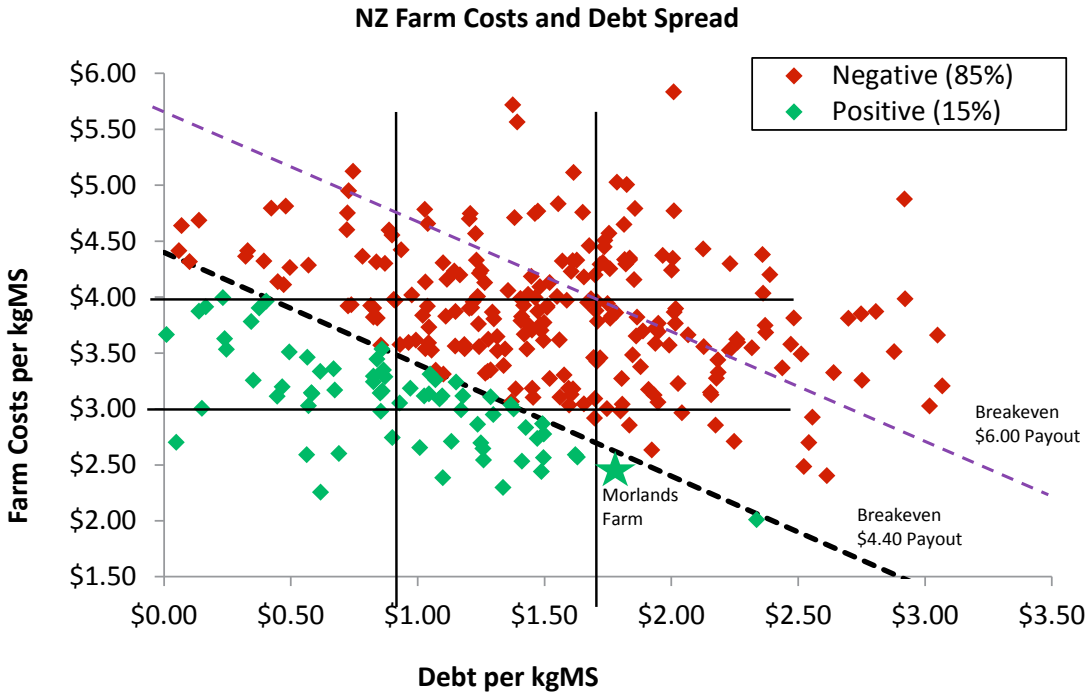
Income and Expenses over 15 years



Breakdown of Farm Expenses over 10 years

Source: DairyNZ Economics Group

The following liquidity graph shows the impact of changes in milk price. Each of the dots on this graph represents an individual farm business. Our position on the graph, marked by the star, indicates that we have maintained our liquidity despite quite high debt as we have a very low cost structure.



Source: DairyNZ Economics Group

Ensuring we are profitable creates a tension that all businesses feel. In our own low cost system, how do we control costs without restricting production and compromising capital? NZ is pasture based and so production, and therefore income will be linked to what growth

we get in a season and how efficiently we use that feed. So, we constantly use pasture growth, utilization and cost of production as the biggest drivers of profit. We are fortunate to have access to Dairybase, a comprehensive database of pooled and standardised accounts and performance data from our industry allowing us to benchmark our own farm for financial as well as production, reproduction and feed information.

We make extensive use of budgeting and cashflow information to keep track of our financial performance. Updating the accounts monthly enables us to maintain a very good understanding of where our money is going and allows us to plan for tax and manage debt and capital expenditure as required.

As a response to the drop in milk price our industry actioned a range of initiatives aimed at helping farmers to understand their business and find strategies to survive. Cashflow workshops were held all over the country and each farmer who had not had recent contact with DairyNZ was visited and offered support if required. The three areas of assistance offered were in financial budgeting, farm management and counselling.

People

There is a limit to solving problems by yourselves on-farm. Among the range of courses, conferences and social media we have, the discussion group stands out as the essence of networking support for us. We have regional regular monthly groups as well as specialist groups like the one we've been a part of for 15 years which has added a huge amount to our farm and lives. The sharing of information and experiences, input from invited specialists, facilitation by good consultants, the social contact with respected friends but most of all, the opportunity to focus on one farm and examine the challenges it has in achieving important goals. For example, our next major change will bring a couple to our business as minor equity partners and while we know it will be a significant and positive change, it also has potential to be problematic. Our recent meeting gave us the chance to lay out our plans and pool the group's ideas and experiences.

What makes a group work well? For the day's host farm, we re-establish the goals of the business and where it is on their pathway in life. We use objective data from the farm and benchmark it against industry as well as the rest of the group. We try and stick to the agenda but allow time to properly explore the issues and then formulate a possible plan of action. They are always stimulating, challenging and fun

The discussion group then is an integral part of NZ farming culture. Sharing information. assisting progress, examining challenges and coming up with creative solutions. To be successful however it does need respect for each other, honesty, a structure and it needs to be outcome focused.

Ever since we began our farming careers, we have been careful in our choice of accountant, banker, lawyer and technical sales reps. Our accountant has contributed greatly to the business over the years. These advisors are a part of our wider team along with family and staff.

Progress

Progress in any business is dependent on not only having sound daily practices and good management plans but also on the wider environment. NZ being a relatively small economy on a relatively small Island, we are buffeted by global events and opinion as well as climate. In recent years, there has been a lift in awareness of climate change, environmental issues, animal welfare and increased financial volatility and compliance, all attuned by social media, making progress more challenging.

Our fates are also tied to the success of newer farmers who will be great managers, sharemilkers and investors in our farms. Teaching and providing training for staff should be considered an obligation to us all. Continual training for us keeps us sharp, challenged and helps us adapt to inevitable change.

With the steady continual rise in farm prices over the years and the drop in milk price over the last few years, it is becoming increasingly difficult for young people to follow the traditional NZ path to farm ownership of progressing from management to variable order sharemilking and herd ownership. It is less affordable for farm owners to take on sharemilkers and with the increased volatility a significant number of sharemilkers have been forced to break their contracts over the last few years as they were going backwards financially with the unexpectedly low income. Budgeting is becoming increasingly challenging.

Our idea of progress within our business and personally is of course partially to do with the financial side of the business - it is important to us to continue to increase our equity which we have managed to do fairly consistently. We also consider it important to continually improve our environment - we have planted a lot of trees and fenced off all of our waterways and are gradually improving our infrastructure with respect to effluent management in particular. Perhaps one of our biggest goals has been to raise our children to be good people and we do consider we are making good progress there too!

Conclusion

We count ourselves fortunate to be a part of an industry that provides a high quality food and gives us an amazing lifestyle with all its challenges and rewards. In NZ, we have learnt some hard lessons from failing to be disciplined, especially with buying feed at the expense of pasture. By matching the components of our system with all that we are and working together with other farmers and wider industry we can maximise the benefits of dairy farming and ensure we remain profitable and adaptable.

Staying focussed on what matters: five critical success factors for my business

Michael and Marian Gowan

Dowing, Kilworth, Co. Cork

Farming History

I am the third generation of the Gowan family farming this farm. I inherited this farm from my father, Michael (senior) in 1990. At that time, we were milking 83 cows with a milk quota of 327,000 litres. Over the subsequent years we were limited by land area, so technical efficiency was important. I started measuring grass in 1997; at the time we were growing 10 tDM/ha. Through improving soil fertility, grazing infrastructure and grassland management, we have progressed to growing 15+ t/ha in 2015. As a result we have increased cow numbers to 118 on the same milking platform area (33 ha) and we are now producing 600,000 litres (or 53 tonnes milk solids from this platform).

Brief description of current farming operations

- Currently milking 118 Friesian Jersey cross cows
  - » EBI €118, Milk €35, Fertility €44, Calving €30, Beef €-21 & Maintenance €29
- Farming 62 ha - milking platform 33 ha - milking platform stocking rate 3.5 LU/ha - with an overall stocking rate of 2.6 LU/ha
- Grass growth 15.5 t/ha in 2016
- Milk solids production - 445 kg/cow in 2016 (1,557 kg MS/ha)
- Supplements fed - 230 kg DM/cow

Discussion group member

- Member of the Dairy MIS Discussion Group since 1986
- Member of the Kilworth Discussion Group since 2004

Each of the groups has had a significant role in the development of the farm and for that I am very thankful. Both groups help me to focus on farming practices to achieve the highest level of efficiency.

Farming influences

My parents, Michael (senior) and Gretta have been a hugely positive influence both inside and outside of my farming career.

One of the biggest influences in my farming career comes from the discussion groups in which I am a member, from both current members and also past members. Discussion groups have played an invaluable role in where I am in my farming career, and more importantly, show me ways in which I can continue to improve my farm for the next generation.

Interests outside of farming

I want to afford my family the same opportunities as I was given, so I prioritise spending time with them.

I previously played hurling, and now am a passionate Kilworth and Cork hurling supporter.

Future outlook

I feel that dairy farming in Ireland presents excellent financial and lifestyle opportunities for anyone interested in pursuing farming as a career.

My five critical success factors

- Getting the grass right
  - » Measure, manage, respond - if I don't know what grass I have it's like driving a car blind folded, I don't know where I will be or where I'm going. It is one of the most important weekly jobs on our farm.
- Genetics
  - » I want an animal on the farm that will produce as much milk solids by converting as much grazed grass into milk as possible.
- Financial Planning
  - » Every year a whole farm full cost budget is completed in January, based on detailed analysis of Profit Monitor and full farm cost analysis from the previous year. This allows me to make informed decision for the coming year, particularly in a year like 2016.
- Lifestyle
  - » My farming system allows me to have the quality of life both on the farm and outside of the farm.
- Discussion groups
  - » Discussion groups offer both support and criticism, both of which are often required. It can be often too easy to become comfortable in your farming system.

Donald and Lucy Bateman

Ballylooby, Cahir, Co. Tipperary

Farming History

I finished Agricultural College in Clonakilty in 1992, after which I returned home to farm with my parents and brothers. At that time we had just bought more land and quota and by 1999 we were milking 280 cows, filling 1.6 million litres of quota in a split calving pattern. With three of us looking to farm we were looking for another farm and in 1999 we bought a farm in Cahir with 53 ha. My wife Lucy and I moved in April with 85 cows and 20 maidens. We rented another 21 ha in 2008, adjacent to the milking platform and in 2012 we bought an additional 8 ha on the bounds ditch. Cow numbers had increased by 2011 to 140, 160 in 2014, 200 in 2015 and 230 in 2016. As we wanted to maximise the milking platform area, we decided in 2010 to contract rear all replacement heifers; calves leave at 10 days old and come back again at 21 months.

Brief description of current farming operations

- Currently milking 230 Jersey cross cows
  - » EBI €107 - Milk €27 Fertility €41, Calving €29, Beef €-20 & Maintenance €27
- Farming 82 ha - with an overall stocking rate of 2.85 LU/ha
- Grass growth 14.5 t/ha in 2016
- Milk solids production: 440 kg/cow in 2016 (1,254 kg MS/ha)
- Supplements fed: 550 kg DM/cow in 2016

Discussion group member

- Member of the Dairy MIS Discussion Group since 2000
- Member of the Forge Discussion Group since 2001
- Member of the Cahir Discussion Group since 2008

Each of the groups has had a significant role in the development of the farm and for that I am very thankful.

Farming influences

My family; As a family we would have sat down and looked at and talked about all aspects of the business. I am in a unique situation in that myself, my two brothers and my sister are all milking cows with this all stemmed from my father Norman Bateman, who had a passion for dairy farming, which he passed to myself, my brothers and sister. He is still passionate about dairy farming!

Teagasc; Another big influence in my farming career is the research coming out of Teagasc Moorepark. I have been lucky enough to be part of the Dairy MIS discussion group which has put us on the frontline of the information. I feel this is an invaluable asset to myself and the entire farming community in the success of their farming business.

Interests outside of farming

Spending time with my family is extremely important and I am also involved in training and coaching a couple of underage sports teams.

Future outlook

We have a great industry with huge potential and we must portray it positively to the next generation.

My five critical success factors

- Grass
  - » Grass is the backbone of our farming business; measuring grass weekly allows us to make informed decisions on the day to day and week to week management of the farm.
- Fertility
  - » Low empty rates and as a result low involuntary replacement have played a crucial in allowing us to rapidly expand our cow numbers to where we are today.
  - » Increasing our fertility performance has allowed us to maximise our milk production from grazed grass.
- Financial
  - » Financial planning, recording and benchmarking are all critical parts in the success of any business. Every year our discussion groups hold a financial meeting in January. It allows us to look back on the year, plan for the forthcoming year and benchmark against each other in the group to allow continued improvement
- Lifestyle
  - » Spending time with my family is extremely important. I want a farming system that allows me to do this, while also providing a financially stable environment for them.
- Genetics
  - » Crossbreeding has given us a cow that now suits the type of system that we are running.
  - » As we increased our cow numbers easy care, low maintenance cows were more important to keep the workload at low and sustainable levels.

John and Tom Phelan

Carriganure, Kilmeaden, Co. Waterford

Farming History

I developed a passion for farming from a young age spending time on the farm with my father. In 1999 I attended Kildalton Agricultural College to complete the Green Cert; in 2000 I returned home and started farming with my father, Tom. At that time we had just got out of winter manufacturing milk contract and were milking 90 to 100 Holstein-Frisians cows. Over the next couple of years, we slowly began to remove the beef enterprise from the farm and replaced it with more dairy cows. From 2001 to 2003 I worked as an AI technician, from here I really began to see the value in fertility and breeding. In 2007, my father, Tom, and I formed a Milk Production Partnership. Consequently, I was no longer a labour unit on the farm, but was now a partner. In 2007 we started to use Jersey bulls on our heifers, and in 2008 we decided to use Jersey bulls across the full herd, and slowly began to increase cow numbers and move towards a Jersey cross herd. We are currently milking 180 cross-bred cows on a milking platform of 60 ha.

Brief description of farming operations

- Currently milking 180 Jersey cross cows
  - » EBI €110, Milk €29, Fertility €40, Calving €32, Beef €-24 & Maintenance €28
- Farming 94 ha with 60 ha on the milking platform; milking platform stocking rate 3.0 LU/ha; overall farm stocking rate 2.88 LU/ha
- Grass growth 14.8 tonnes DM/ha in 2016
- Milk solids production: 450 kg/cow in 2016 (1,350 kg MS/ha)
- Supplements fed: 450 kg DM/cow

Discussion group number

Member of Kildalton Discussion Group since 2003

Member of East Waterford Discussion Group since 2003

This is the most important day of every month as it is where you get to see how other farmers operate their system. It is great to focus your mind on the most important aspects of the business to achieve the highest level of efficiency. You also surround yourself with like-minded, positive thinking people.

Farming influences

My biggest farming influence are my parents, Tom and Mary. They gave me a start in the business at a young age and have taught me valuable lessons, as well as valuing my opinion and input.

After my parents, the discussion groups that I am involved in would have huge significance on our system of farming today.

Also I was on an insightful trip to New Zealand two years ago and learnt a lot on expanding and growing a business, i.e. shared milking, partnerships etc.

Interests outside farming

Spending time with my family and watching the kids play sport. Family has a huge part to play in my farming system and spending as much time with my wife Siobhan, and four children (Alan 8, Evan 7, Ella 4 and Jane 3) is a priority.

I am a huge Munster and Ireland rugby fan. I still play a little (for my troubles).

Future Outlook

Outlook for me is very positive now that the industry is growing and we are all part of it. I feel that we are now in a position to be able to attract young skilled people into the industry, and give them a part in an enjoyable and profitable industry.

My five critical success factors

- Put a system in place that allows you to get what you want out of your life in farming;
  - » Quality of life that allows me to spend plenty of time with my family
  - » A system that consistently achieves maximum profit
- Breed the right type of cow. The cows that you don't notice from one end of the year to the other are in the most case doing the business.
- Grow and feed as much grass as you can as it is the cheapest and best quality feed we have.
  - » Measure, Measure and Measure. If you can put a figure on it then you can act upon the results.
  - » Soil sample regularly and target paddocks individually to be collectively the same
- Budget and forecast your finances as often as you can. IT'S YOUR BUSINESS. You have to know your own business to be able to make sound financial decisions.
- Compact calving; this is the key to the success of the system. Target 90% calved in six weeks; we are currently calving 86% in six weeks. It is how to maximise days in milk and days at grass which will lead to a highly profitable system.

Eamonn Fagan

Glasson, Co. Westmeath.

Introduction

I farm with my son Padraig, near Glasson, outside Athlone in Co. Westmeath. We have one full time employee. We farm 120 ha. The milking block is made up of 63 ha and the rest is used for replacement stock and silage.

We milk 200 spring calving cows in a 22 unit parlour (extended from 16 units in 2016 and also now includes cluster removers and cluster flush).

Cows are housed in cubicle sheds during the winter and there's also a three hundred thousand gallon slurry lagoon.

Cross Breeding

The herd is crossbred, mainly Holstein X Norwegian Red. Kilograms of milk solids produced since 2012 have risen from 440 per cow to 480 last year. Fat has increased from 4.30 to 4.44% and protein increased from 3.52 to 3.65% in the same period. About 800 kg of meal is fed annually. Last spring we brought in 35 home bred three way crosses i.e. Hols X Norwegian red X Jersey. I am very happy with these stock; 70% of them went in calf to 1st service this year. I got involved in crossbreeding back in 2004 as part of a Teagasc trial. I like the crossbred cow; she's hardier and holds body condition better. These are important points as herds get bigger and they have further to walk. In our case the furthest paddock is 1.7km from the parlour. Bulls used this year were Maestro, Obsidian, Grand Theft Auto, EKE, on the cows and FR 2239 was used on the three way crosses. The EBI of the herd is €125 of which milk is €25 and fertility is €57. Calves born in 2015 and 2016 have EBI of €160 and €166 respectively.

Breeding Performance

Last year's six week calving rate was 75%. In 2015 it was 72% and in 2014 it was 78%. Median calving date for the last three years was 24/2/14, 25/2/15 and 22/2/16 for cows and 14/2/14, 18/2/15, and 15/2/16 for heifers. Calving interval for 2014 was 369 days, for 2015 it was 372 days and 365 days for 2016. Average number of calvings per cow stand at 3.5 for 2014, 3.6 for 2015 and 3.8 for 2016. Our empty rate this year is 10% in a 12.5 week breeding season; last year it was 7% in 14 weeks and 11% for 2014 in 17 weeks. Fertility sub-index is something I have been working on aggressively especially since genomically selected bulls became available. I am starting to see progress in my six week calving rate and calving interval due to this breeding strategy.

Grazing Performance

Cows go to grass as they calve in February by day and go out by night when weather permits and there's sufficient grass. Tonnes per ha grown over the last three years are 11 tonnes, 12.5 tonnes and 13 tonnes. We usually don't start measuring seriously until April. Up until then we are following the Spring Rotation Planner. We aim to finish grazing with a closing cover of about 600 kgDM/ha. The second round starts about the 4th April. Surplus grass is taken off as bales. Last summer we adjusted the size of paddocks to allow for three grazings. As cow numbers grew over the years the paddocks were too small and the cows were always under pressure. A new water system was also installed a few years ago, including bigger drinking troughs. We start the new grazing season with a half bag of urea in mid-February, followed by a bag in early March. Two bags of 18:6:12 is spread in the next round on paddocks that require P and K. Nitrogen containing sulphur is used for the next few rounds. The soil is light so sulphur is important. We now soil sample paddocks every two years. About 30 grass measuring walks are done per year. The measurements are put into the AgriNet system and decisions are made and the wedge is then printed and left in the parlour.

Gary Nolan introduced me to grass measuring some years ago under a programme called the Grass Buccaneers and from the time I started there was an improvement in protein and as a result an improvement in kgs of milk solids produced on the farm.

Monoculture Trials

I'm involved in monoculture trials run by Teagasc on a number of farms through-out the country. Varieties sown so far are Tyrella, Kintyre, Twymax and Abergain. This is a programme to help assess the properties of individual grasses and is an aid in ranking grass varieties on the new PPI index. It gives me access to the latest and best varieties of grass on the Department of Agriculture Recommended List. It is early days in this programme so far; but I have gained from trial work before and I'm sure there will be benefits to this programme over time.

On Farm Investment

As I said we extended the milking parlour to 22 units with cluster removers and cluster flush. A bigger bulk tank was also installed. This was done under the TAMS scheme. There are no more plans to expand as we are at our limit now stocked at 3.2 cows per hectare on the milking platform. We ran into problems with the ESB power when milking, cooling milk and heating water simultaneously and a CT meter has been installed and has improved things. The other decision I took at this juncture was to install a gas powered water heating system. This has reduced my overall energy costs and I'm told improved my carbon footprint.

Brian Reidy

Carrowreagh Cooper, Tubbercurry, Co. Sligo.

Introduction

My name is Brian Reidy and I farm with my wife, Caroline, in Carrowreagh Cooper, Tubbercurry, Co. Sligo. We have two daughters, Tori who's four and Rhona who's three.

We run a 125 cow spring calving, crossbred herd supplying Aurivo Dairy Ingredients. We focus on running a relatively low-cost system that is based around maximum utilization of grazed grass.

My pathway into dairying isn't unique but varies a little from the norm. In 2000, my father was 56 and was looking to take a step back from dairying, so I was given the opportunity to purchase all the stock, which comprised of 45 cows plus followers for £60,000 and to lease the farm of 32 hectares over 12 years for €15,000 per year… not your traditional hand over technique. The farm at the time had a sizeable liquid quota and for a number of years post taking over, the winter milk system was quite lucrative and breeding and management systems were centred on trying to maximize the winter element of our milk.

We gradually increased cow numbers over the following years and had started cross-breeding the herd in 2008 after Aurivo had implemented the A+B-C payment system. We hit that fictional "fork in the road" moment in 2013 when we were milking 100 crossbred cows in a management intensive 70/30 spring/winter calving system where profits margins from the liquid side of the business had been eroded away. We also had the wrong type of cow to convert concentrate to milk. This along with two children under two confirmed our decision to sell the winter portion of the herd and lease in spring calving cows over two years to go wholly spring calving.

So this carries us to where we are today, milking 125 cows of our own, on a milking platform of 42.3 hectares with a further 30 hectares for heifer rearing and silage. We will produce 355kg milk solids at 4.80% fat / 3.68% protein with 170kg concentrate fed (2016). The main factors which we feel, have been critical to us getting to where we are today are:

A clear definition of what we want from the business

From a very early stage we created a mission statement for the business which is, "our mission is to provide a profitable, sustainable and enjoyable working environment for our family, our stock and our staff". We believe that for our business to be successful and profitable not only must we like the cow type we are working with; it has to be a nice place to work, with reasonably good facilities provided.

Focus solely on a simple system based around land, cows and people

The old mantra of K.I.S.S "keep it simple stupid" rings very true on our farm. We try to develop systems that are very transferable and non-complicated that can be taken up by new staff relatively quickly.

We focus solely on land, cows and people (in equal measure) and tend to discount other deterrents such as machinery and the latest gadgets as they generally affect the bottom line in a negative way.

Land

The entire grazing platform is soil tested once a year with results acted on immediately. Soil compaction is an area that we take very seriously in an area that can receive up to 1,850mm of rain yearly (2015). Consequently, we have adapted our system to dealing with our environment.

Cows

We made a decision to crossbred the herd in 2008 in order to maximize on milk price but also we felt it was cheaper to change the cow type to suit the environment than to change the environment to suit the cow. With a relatively heavy farm with high rain fall it is fundamental that we have a cow that is able to take harsh weather in its stride and still convert our cheapest feed, grass, into milk.

People

People in relation to family, staff and services are critical to how our farm operates. We pride ourselves on being up-front and honest with all people that work for the business. We feel that it is important that staff have a buy in to the business so we show them every aspect of the business from all records, to loans and current account details.

Measure, budget and implement

One of the benefits of marrying a woman not from a farming background means that she doesn't understand the romantic sentiment associated with farming. You quickly learn that there is a big difference between what you want and what you need. The two areas that we put real emphasis on are grass measurement and financial measurement.

Grass measurement is probably one of the simplest things we do but the most important. Paddocks are walked every Monday morning and all data uploaded to Agrinet. We have a discussion with staff to what key decisions need to be made for that week and when and how we are going to implement them. This year, 2016, we have grown 13.5 tonnes grass DM/ha.

Financial measurement is critical to our business. Because of legacy capital debt in building the herd and putting in capital infrastructure, we feel that the Teagasc Profit Monitor analysis only tells part of the story of how our business operates. By doing our budgets to incorporate all financial cash-flow, it gives a far stricter view of the business. We do our budgets to find a breakeven base milk price allowing for payment of wages, taxes, all capital loan repayments, and all vital services and basic inputs that are required to sustain average production. This year that break-even base price was 23.45 cent per litre.

Good work/life balance

Over the last two and a half years, I have suffered from depression and severe anxiety. It is a very debilitating, stigmatised and restricting disease. I always say that if you have a broken leg it is very visible but if you have a broken head it not as visible and not as easy to fix. I would stress to anyone here today suffering with any form of mental illness to get help and to talk. Also I feel that it is important for discussion groups to talk about this issue and to support those members who need help.

We always say that our daughters will never say "do you remember the time you spent till 11 at night spreading slurry?" but they will say "do you remember when we went to the playground?" Good life/work balance is critical for our business. Cups are on in the morning at 6.00am and in the evening at 3.30pm and we try to be out of the yard at 5.30pm. We contract out nearly all machinery work, because we believe that the service is cheaper than the cost of depreciation, running costs, repairs and our labour/ time.

They say in life "all you need is food, heat and love" and one benefit having and dealing with depression is that it focuses the mind on what is important in life!

Brian Gilsenan

Virginia, Co. Cavan.

Introduction

My name is Brian Gilsenan. I'm 23 years old and I'm a dairy farmer from Virginia, Co. Cavan. I am currently farming in partnership with my parents, Hugh P. and Rosemary Gilsenan.

We run 140 spring calving cows on a 50 hectare milking platform with silage and heifer rearing done on a run-off block.

Over the last number of years, we have increased numbers significantly on the farm. We have done this through growing more grass, improving our calving pattern and taking silage and heifer rearing to outside blocks of ground. In the next five years, my parents and I hope to increase our herd numbers by taking on more land and starting up a second dairy enterprise on another farm.

In this paper I am going to outline what I believe are the five key factors for me in the success of my dairy career and how I feel these will influence me into the future.

These are:

- Cow type
- Grassland management
- Education
- Positive/influential people
- Land opportunities

Cow type

On our farm, our cow type originates from a British Friesian cow. We began cross breeding five years ago and we chose to cross our cows with high EBI Jersey sires. A small high EBI cow became invisible in our herd-meaning that she is very low maintenance. The crossbred cow is more fertile and long lasting. When expanding our herd having a fertile herd is even more important as the cost of rearing heifers is hard on cash flow. The cross bred cow has a higher percentage of protein and fat. We have increased our milk solids considerably from 380 to 450 kilograms of milk solids. This increase in kilograms of milk solids is done with less concentrates fed and a bigger focus on calving compactly in springtime. Heifer rearing is an important part of our mature cows reaching their full potential. This is achieved by focusing on hitting target weights and keeping replacement heifers growing well from when they are born.

Grassland management

Good grassland management in my eyes is a key factor to the future success of dairy farming in Ireland. It allows us to withstand the consistent volatile issue we now face on a yearly basis and ensures our business can be resilient. Over the last few years, I have learned that you can never know enough about grass, the way it grows and how to utilise it. In 2011, I started measuring grass. I realised that the lowest cost and best quality feed could be grown very simply. By growing more grass, I am able to increase the stocking rate on the farm. Every year, we reseed between 10 to 15% of the worst performing paddocks. Soil fertility is another important aspect of having the capability of growing a large proportion of grass. Using grassland management tools, such as the grass wedge, spring rotation planner and autumn budget, can help in making decisions. By constantly measuring, these decisions are easy and clear to be seen. It's like any business, if you don't measure, you can't manage, whether this is grass growth, milk output or money in the bank, the principle is identical.

Education

From a very early age, I had a great passion for dairy farming. When I finished school there was only one career I wanted to follow and so it began. In 2011, I went to Ballyhaise Agricultural College. From here, I progressed on to the Diploma in Professional Dairy Farm Management in Moorepark. This course allowed me to work on a number of top-class dairy farms across the country.

It was through this work experience I realised that dairy farming was to be my future and I wanted to milk my own herd of cows. I quickly realised I needed to develop a plan to allow me to do this.

I developed a plan clearly marking out on it where I was at present, where I wanted to be in ten years' time and how I was going to achieve this. The first step in this plan was to study hard, to develop a network of like-minded farmers and gain as much experience as possible.

Through my studies and work experience I have identified many of the key factors which I believe will lead to the success of my future dairy career. I really believe that all future dairy farmers need a similar foundation for their careers.

Positive / influencing people

The Professional Dairy Farm Management course in Moorepark gave me the chance to travel to New Zealand, where I worked on a large dairy farm. While I was there I learned about the progression ladder that many young dairy farmers take to fulfil their long term goals and dreams similar to the ones I had set out for myself. I found that most ambitious people engaged themselves with very high skilled people. The career ladder sets you up with a network of people who are there throughout your career. Completing my education, including the Farm Management course, has given me the confidence and ability to go on and chase my career path. I have learned and gained a huge amount of knowledge during the past couple of years.

At home, my father ran a successful dairy farm having completed a basic agricultural education course. He ran a profitable farm but due to the confines of quota he was limited in how far he could progress and develop the business. I suppose I completed my course at a good time with milk quota being abolished. By working on expanding dairy farms, I had the confidence to increase cow numbers. Not only have I confidence in myself, but my parents and the people I work with have more trust in me and are willing to give new ventures a chance. For me at the beginning of my career I can clearly see that the people I surround myself with are already having a massive influence on my success, and it is important to recognise this at an early age.

Land opportunities

Finally land opportunities/ availability I feel will be critical to the success of dairying in this country in the next 20-30 years, especially for young dairy farmers like me.

On my first placement, I worked with Brian Murphy. During my time with Brian, he introduced me to the whole grass based system. Working there I learned that cows and grass are the most important basics of being very successful in turning profit out of a simple system. The herd that I worked with initially was in the top 5% of EBI in Ireland and operated a very simple system with very little money tied up in machinery and other depreciating assets! Before working there I always thought that dairying was more profitable in southern parts of the country. I quickly realised that farming in my area was very rewarding with ability to grow 16 tonnes of grass a year on free draining soils. The fact that land is not as expensive in Cavan/Meath compared to other parts of the country is very attractive and the opportunities are here. After finishing with Brian, I went to New Zealand where I built on my experiences. When I returned from New Zealand, I finished my course working with the Mulligan's, in Nobber, Co. Meath.

I recently started a manager's job on a new conversion to dairying. The farm is leased with extremely good potential to grow a lot of grass with ground in the 3 and 4 soil index brackets.

The farm is being leased on very good conditions with the owner putting in the capital to fund a brand new dairy and topless cubicles. Brian Murphy saw great potential in this venture. Having a good personal and working relationship with the owner is a huge advantage. A farmer's reputation is everything when seeking an opportunity. A person who is honest and true to their word will have no problem attracting similar minded people. My plan is to enter an equity partnership on this farm. This I feel will help me to fulfil my long term goals of farm ownership.

Conclusion and Future Steps

To conclude, as I am at an early stage of my career ladder at present, I am aware of the long road ahead. I think it is fair to say that the five points I have mentioned above have already had a big influence on my success to date. I feel that it is important that a combined number of aspects should be taken into account in order to achieve my overall target. This can be seen already in how my education has led to me identifying the necessary tools for success and to meeting the right people who have in turn allowed me potential access to land.

What has clover to offer Irish dairy farmers?

Michael Egan[1], Deirdre Hennessy[1], John Maher[2] and Brian McCarthy[1]

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Summary

- Clover has the potential to increase pasture DM production (+7%) and milk production (+9%)
- Management practices for grass-clover swards are the same for grass-only swards
- Clover can be established either by direct reseeding or over-sowing into an established sward

Introduction

Recent research investigating the benefit of incorporating white clover into perennial ryegrass pastures for high stocking rate systems of milk production over the last number of years has shown the potential to increase pasture production, reduce costs (lower nitrogen (N) input), increase animal performance (increased milk production per cow) and improve environmental sustainability (reduced nitrous oxide emissions). Therefore, clover has huge potential to benefit Irish dairy farmers if it can be utilised correctly at farm level.

Why clover? Increased pasture growth and reduced nitrogen use

The pasture growth profile of grass-clover swards is different to that of grass-only swards. Pasture growth rates from February to May are similar for both sward types but grass-clover swards have higher growth rates from June to October and lower growth rates over the winter period compared with grass-only swards at similar N fertiliser inputs. This is reflective of the pattern of clover growth in the sward (Figure 1). Therefore, pasture DM production can be increased by approximately 7% on grass-clover swards (Table 1) where sward clover content is around 27%.

Table 1. Impact of grass-clover swards receiving 250 kg N/ha on pasture and milk production compared with grass-only swards receiving 250 kg N/ha (Moorepark and Clonakilty data)

	Grass-only	Grass-clover	% Difference
Pasture DM production (t DM/ha)	15.4	16.5	+ 7 %
Sward clover content (%)	-	27	
Clover DM yield (t DM/ha)	-	4.5	
Milk yield (kg/cow)	5316	5862	+ 9 %
Fat (%)	4.60	4.60	0 %
Protein (%)	3.70	3.70	0 %
Milk solids (kg/cow)	434	478	+ 9 %
Milk solids yield (kg/ha)	1190	1314	+ 9 %

Traditionally poor clover persistence in N fertilised swards was one of the main reasons why clover was not widely used on dairy farms. However, good grazing management (18 to 21 day rotations in mid-season; 4 cm post grazing sward height) will benefit clover persistence. In Moorepark, over three years, a grass-clover sward receiving 150 kg N/ha produced similar pasture DM to a grass-only sward receiving 250 kg N/ha (14.4 vs. 14.5 t DM/ha, respectively). This highlights the potential to reduce N fertiliser application and achieve similar pasture DM production with grass-clover swards.

Why clover? Increased animal performance

The biggest reason to include clover in perennial ryegrass swards is the potential to increase animal performance. Across the experiments conducted over the last number of years, milk and milk solids production have consistently been increased by 9% (approximately 546 and 44 kg of milk and milk solids per cow, respectively) when cows grazed grass-clover compared with grass-only swards. As can be seen in Figure 1, the increase in milk and milk solids production generally occurs towards the second half of the grazing season when sward clover content is reaching its peak. This highlights the huge potential to increase milk production by incorporating clover into perennial ryegrass swards.

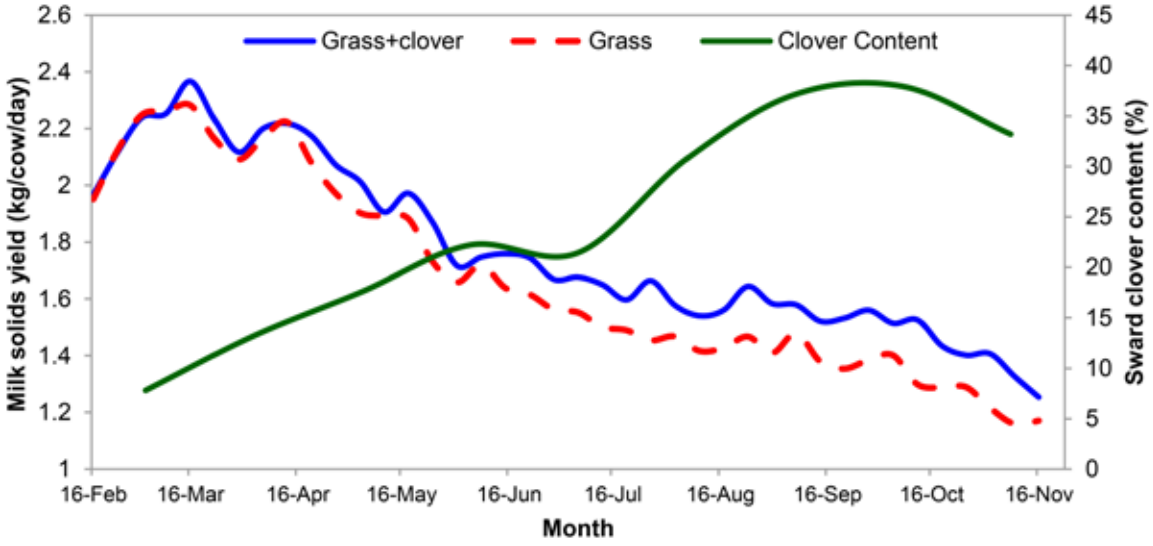

Figure 1. Daily milk solids production (kg MS/cow) from a grass-only and grass-clover swards and sward clover content

Management of grass-clover swards

Over-winter pasture growth in grass-clover swards can be lower than that of grass-only swards due to the lower growth rate of clover at temperatures below 10°C. This results in reduced pasture availability (i.e. reduced average farm cover (AFC)) in spring which can be an issue for compact spring calving herds, as a reduction in pasture supply means that extra supplement (silage or concentrate) will be required and cows may have to be housed for longer. Consequently, additional supplement (silage or concentrate) may have to be fed during the first rotation. Research results to date suggest that at similar stocking rates there will be a requirement to feed an additional 150 kg silage DM/cow (approximately one bale of silage/cow) for the grass-clover system compared to the grass-only system. The same grazing management practices developed for perennial ryegrass pastures (i.e. use of the spring rotation planner and early N fertiliser application in spring, the grass wedge during the main grazing season) are equally, if not more, important for grass-clover swards. The incidence of bloat can be higher on grass-clover swards and is associated with pastures with high clover contents (>50%), low sward dry matter content and cows with an excessively high appetite when introduced to new pastures. Adapting grazing management according to these factors can minimise the risk of bloat. A routine preventative measure is to add bloat oil to the water, usually between June and September.

Establishment of grass-clover swards

White clover can be incorporated in grassland either by direct reseeding (1.2 - 2.5 kg seed/ha) or over-sowing (3.75 - 5 kg seed/ha) using a recommended medium leaf size cultivar. When over-sowing, the clover seed can be broadcast onto the sward or stitched in using a suitable machine (e.g. Einbock pneumatic seeder). When over-sowing, best practice is to over-

sow directly after grazing (≤4 cm post-grazing sward height) or immediately after cutting the paddock for surplus bales in late April or early May before soil moisture declines and soils become too dry. Post-establishment, for both direct seeding and over-sowing, tight grazing for the first three grazing's (pre-grazing cover <1200 kg DM/ha and post-grazing sward height <4 cm) is critical to allow light to penetrate to the base of the sward which is essential for clover establishment. It is important that established perennial weeds are controlled prior to over-sowing clover into established swards and post-establishment in a direct reseed using a clover friendly herbicide to control seedling weeds.

Conclusions

White clover can significantly impact on Irish dairy productions systems through increased pasture production, reduced N fertiliser application and increased milk solids production per hectare. Clover has an important role to play in the future productivity and sustainability of Irish dairy farms.

How to retain cash in your business

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Introduction

Milk price volatility is a key feature of dairy farming today and this is likely to continue as the world market responds to changes in product supply and demand. In the past various levels of protection, operating mainly at EU level, provided market support at times when there was an in-balance in the Global supply/demand dynamic. However, this protection has not operated at the market level to a large extent since 2007 (except in exceptional circumstances), which has meant that the milk price received by farmers is much more volatile now than experienced in the past (See Figure 1). Currently, milk price is in a significant trough, which is causing many problems for virtually all dairy industries around the world. Ireland's milk production represents approximately 0.8% of global production and irrespective of our scale or how much we expand; in general we are price takers. Therefore, the focus at farm level must be based on putting the farm in the best possible position to deal with a volatile price while availing of tools and mechanisms to stabilise income. It must also be recognised that some dairy farmers in Ireland this year will experience a cash deficit when they combine the cash generated from the dairy farm with their drawings and tax from the business. The rest of this paper will focus on understanding how to calculate the amount of cash in the business, predicting freely available cash and to understand the sources and applications of that cash and finally to understand different ways to reduce cash flow exposure that are present on farm from time to time.

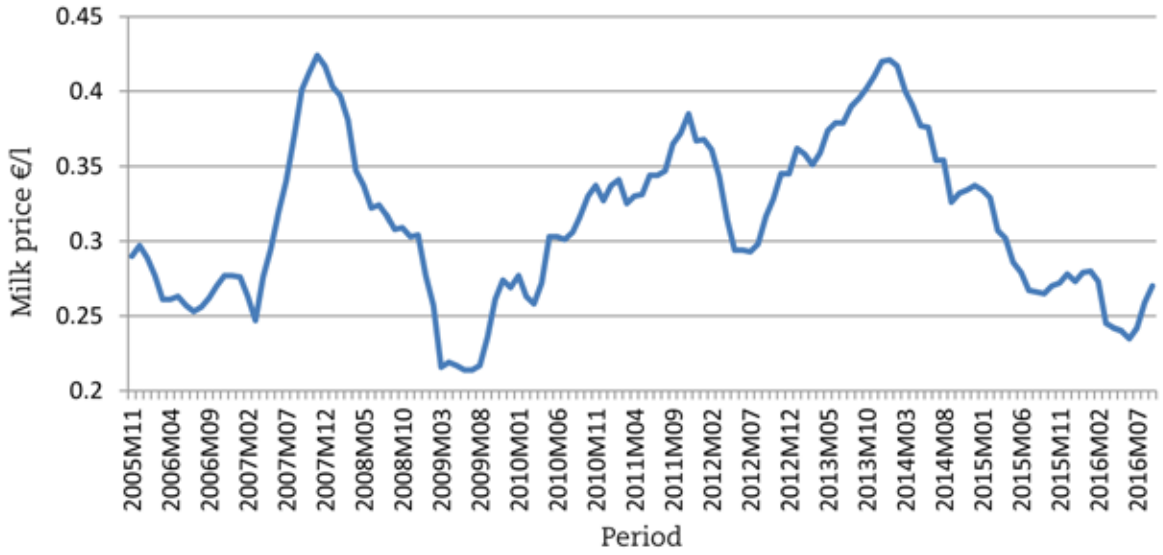

Figure 1. Base milk price received by Irish farmers between 2005 and 2016.

Understanding cash in the business

A key feature of any expanding business is the pressures on available cash. While a business may be profitable it may not necessarily be generating enough cash to meet the outlays. This can be for a number of reasons which can include relatively short term issues;

- Incorrect debt structure (level and length of the payback period)
- Rate of growth or expansion
  - » Livestock growth
  - » Funding farm infrastructure from cash flow
  - » Animal performance (herd age profile)
- Drawings due to family stage
- Milk price volatility
- Short term issues around productivity

Or it could be related to more long term issues in the business;

- Overall efficiency of the business
- Level of debt
- Drawings

Identifying and remedying the cash flow issue on the farm should first be based identifying the levels of the cash flow deficit and from there identifying the problem, which will facilitate the implementation of solutions in this space.

Calculating and predicting cash flow in the business

The first step in cash flow management centres on identifying the overall macro farm cash flow position. This essentially involves the completion of a farm source and application of funds for the business and involves the identification of the sources of cash in the business and the uses of that cash including for personal use. Once complete it allows a focus to be placed on areas to increase cash generated by the business or to reduce the outgoings. Table 1 presents a source and application of funds for the average national dairy farm over the period 2008 to 2015. It is completed on a whole farm basis and essentially details the money coming in and the money going out for the average dairy farmer in Ireland including their drawings, taxation, capital expenditure as well as money coming into the business in the form of loan drawdown and the money being paid out of the business in the form of capital repayments in order to meet loan requirements. Understanding the overall farm picture across the different cash inflows and outflows allows the farmer to target areas where they are potentially out of synch as well as having a strong overall picture of the farm finances. Table 1 shows that over the period 2008 to 2015, that there has been a gradual improvement on the overall cash flow situation on farms with the period 2008 to 2010 showing cash deficits. In these calculations there is a provision included for taxation and drawings but these will depend on individual family and business situations and could therefore be lower or higher than the figures included here. The analysis shows that depending on the year and on the milk price there is significant year to year variation in gross output and variable costs, but in particular in capital expenditure and the level of debt drawn down. While not included in this analysis, it is expected that there may also be significant year to year variation in the drawings also which could be described as not being ideal.

Table 1. Source and application of funds for the average farmer from the national farm survey over the period 2008 to 2015.								
	2008	2009	2010	2011	2012	2013	2014	2015
Gross Output	143,611	105,796	129,485	171,883	166,408	187,633	187,614	199,054
Variable costs	53,734	46,767	47,634	59,762	71,176	80,081	72,539	78,886
Fixed cash costs	29,281	25,515	28,281	34,678	34,850	36,197	35,529	39,777
Drawings €	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000
Tax €	6,900	3,098	6,270	12,748	7,635	10,200	14,100	13,980
Capital Expenditure €	40,695	-873	11,379	17,091	19,558	18,955	21,505	20,496
Surplus Cash €	**-21,999**	**-3,711**	**921**	**12,608**	**-1,811**	**7,200**	**8,941**	**1,601**
Capital repayments €	11,625	17,011	19,748	19,260	11,786	16,286	12,119	17,497
New Loan drawdown €	31,854	12,341	18,386	12,940	20,521	17,678	19,261	25,353
Free cash €	**-1,770**	**-8,381**	**-441**	**6,288**	**6,924**	**8,592**	**16,083**	**9,457**

The overall target on the farm should be to increase the resilience of the business through focusing on reducing the breakeven milk price point (base milk price (3.3%P and 3.6%F) below which the business generates a cash deficit). While the focus of any business is not to merely breakeven, reducing that breakeven point will ensure that the farm can survive down turns on price while at the same time be in a good position to capitalise when milk price increases. A breakeven analysis is common in the literature and the point at which the business breaks even is termed the breakeven point. In order to complete the breakeven analysis you need variables costs, fixed costs and the receipts. In business it is used to determine the number of units that need to be sold to breakeven.

In the scenario presented here we use it to determine the breakeven milk price that is required to meet all of the cash commitments of the business including drawings, taxation, capital development and capital repayments. Table 2 shows the change in overall business breakeven milk price for the average dairy farmer in the national farm survey over the period of 2008 to 2015 expressed on both a per kg MS and a litre basis. The analysis shows that there is significant year to year variation in the breakeven milk price point. It is clear from the analysis that one of the biggest determinants of the breakeven point is actually milk price itself. Both 2009 and 2015 resulted in the lowest base milk prices and corresponded to the lowest breakeven prices. There is a general reduction in capital expenditure or an increase in debt levels at lower milk prices. On average over the eight year period there was a requirement for a base milk price of €4.33/kg MS (29.9c/l) to breakeven (including a provision of €35,000 for family drawings plus taxation), while the base price received over this period was €4.48/kg MS or 31.4c/l. Over this same period on average there has been €158,334 drawn down in debt, €125,332 paid back and €148,806 been spent on average across the farms. The overall farm debt situation has increased from just over €68,000 to just over €75,000.

Table 2. The breakeven price required for the average Irish dairy farmer over the period 2008 to 2015 expressed in price per litre and per kg MS.

	2008	2009	2010	2011	2012	2013	2014	2015
Milk Output (L)	278,543	261,800	283,571	332,396	331,601	341,631	349,689	374,953
Milk Protein %	3.83	3.83	3.85	3.89	3.94	3.94	3.98	4.03
Milk Fat %	3.34	3.33	3.37	3.37	3.36	3.39	3.43	3.50
Milk Solids sold kgMS	20,565	19,302	21,082	24,849	24,926	25,785	26,682	29,073
Actual Base Milk price (3.3% P and 3.6% F) received cl	32.2	22.2	29.3	33.6	30.9	37.6	36.6	28.7
Actual Base Milk price €/kgMS received	4.60	3.17	4.19	4.80	4.41	5.37	5.23	4.10
Breakeven price (3.3% P and 3.6% F) c/l	32.5	25.2	29.2	31.5	28.6	34.8	31.8	26.1
Breakeven price €/kgMS	4.71	3.65	4.23	4.57	4.14	5.04	4.61	3.78

At farm level there has been a number of factors/strategies that have helped to increase the resilience of the business over the past number of years that has facilitated the overall industry to survive the dramatic milk price movements which includes increases in the value of milk sold, cost reductions and increases in output.

Reducing cash flow exposures

Reducing Costs

The first and key step in ensuring the resilience of any business during periods of low milk prices centres on having the right system in place. The overall system operated on farm will be a key determinant of business resilience. A focus on a high EBI/crossbred cow within a system that maximises grass growth, matching grass growth and demand while minimising capital investment will result in a business that has a low overall cost base and will be best placed to deal with price volatility. Based on the analysis of National Farm Survey data, maximising grazed grass utilisation and minimising purchased supplementary feed use will maximise farm profit per hectare and per kg MS produced. Nationally there is huge scope to increase grass utilisation and reduce the levels of bought in feed across the national dairy herd. Having the right type of robust cow capable of converting grass to milk in an efficient manner, producing high milk solids, with minimal supplementation and capable of withstanding short term fluctuations in feed supply, with a low replacement rate and associated with a reduced labour requirement are essential parts of a resilient business.

Increasing output

Most milk payment systems across the country are now based on the A+B-C system to reward farmers for higher milk solids concentrations. There has been significant progress made at farm level over the past 10 years based on investment in breeding and grassland management. Figure 2 shows the change in fat and protein concentration over the past 15 years on Irish dairy farms. It is evident that the annual increase in milk solids concentrations is higher now than it was in the past. At a base milk price of 29c/l and based on the 2015 milk volume output, the increase in solids concentrations between 2000 and 2015 is worth €161 million annually at farm level or 3.0c/l. While the benefits from increasing milk solids concentrations decline

with lower milk prices the relative benefit becomes more important at lower milk prices. A key strategy at farm level around volatility management must centre on the increasing the milk solids concentrations of the farm.

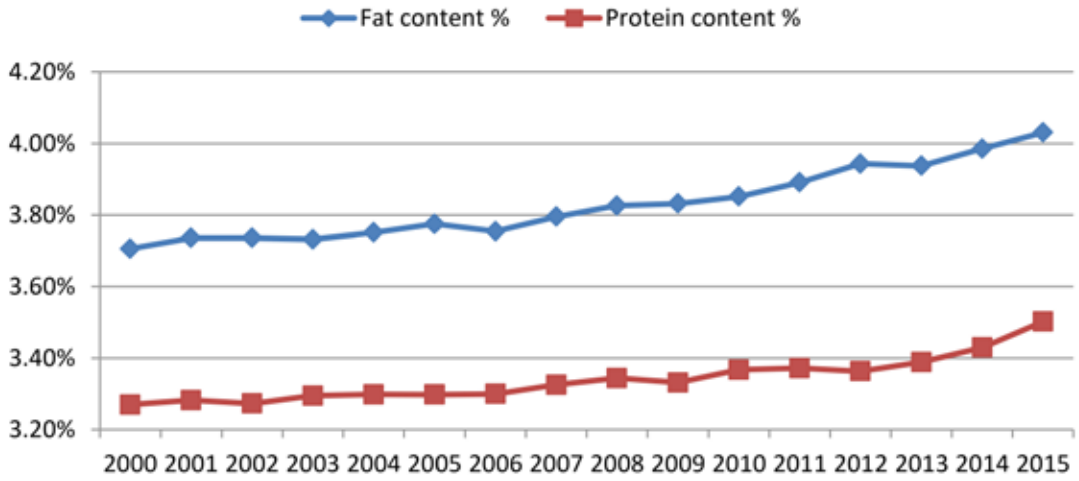

Figure 2. Fat and protein concentration changes between the year 2000 and 2015 on Irish dairy farms

Other strategies on farm

Creating a cash reserve

When milk price volatility is not managed on farm, periods of significant acute cash deficits are likely. If not managed correctly, these periods could result in increased costs at farm level coupled with increased stress for those working in the business. This will be exacerbated by the requirement to make tax returns potentially in periods of low prices based on profits generated when milk prices were higher. Therefore, a key strategy on farm to manage volatility should involve creating a cash reserve when prices are high. Ultimately this puts power back in the farmer's hands and creates a situation that the farmer is less vulnerable when price drops. While this strategy is possible at farm level, there is a requirement to have the taxation structure of the business set up in an efficient manor to allow the business to create cash reserves. Internationally there are taxation structures (Farm Management Deposit Scheme and Income Equalisation Scheme) operated in Australia and New Zealand that facilitate the creation of cash buffers in a tax efficient manner, with similar schemes required for Ireland and in reality right across the EU in order to manage the new reality of milk price volatility.

In a low milk price year the price received for milk is likely to be less than the total cost of production including the farmers own drawings. As long as the industry maintains its competitiveness it is likely that the periods of low milk prices will be relatively short lived as the low milk price will cause a supply correction in the least competitive industries. In reality there is no magic bullet that will sort out the entire farm problems in a low milk price, the objectives of management in a low milk price year should be to generate adequate family drawings and to ensure the long term potential of the farm business is not significantly damaged.

Fixing milk price

The introduction of fixed price contracts has become much more common across most milk processors over the past five years. While these pricing mechanisms are new in Ireland, different formations have been available in other countries (particularly in the US) for a much longer period. A study completed by the United Farmers of America in 2014 showed that on average the milk price was 0.9% lower over a 14 year period when opting for the fixed price contract, but the same study noted that much of the extremes in price movement were avoided through fixing the price. Results from the Greenfield farm (Table 3) where the option to fix some of the milk price has been availed of since 2011 has shown that overall the milk price paid by the

fixed price schemes has been higher than the variable prices and the effect in any individual year was significant. It has had a significant impact on reducing the exposure of the Greenfield business to price volatility. While accepting that in good years there has been a cost.

Table 3. The effect of fixed milk price schemes as effecting the performance of the Greenfield dairy farm

Year	Total Supply (L)	Supply at Base (L)	Supply Fixed (L)	Supply Fixed (L)	Fat (%)	Protein (%)	Base Price c/l	Fixed Price c/l	Diff c/l	Diff €
2011	1,328,654	1,126,142	202,512	15.2	4.41	3.52	38.69	36.77	-1.92	-3,891
2012	1,316,477	958,669	357,808	27.2	4.61	3.57	34.89	37.71	2.82	10,099
2013	1,469,612	1,111,804	357,808	24.4	4.48	3.65	44.25	39.78	-4.47	-15,982
2014	1,413,359	1,062,413	350,946	24.8	4.67	3.69	41.96	41.31	-0.64	-2,257
2015	1,490,829	1,152,251	338,578	22.7	4.64	3.87	32.37	39.01	6.64	22,487
2011 - 2015	7,018,931	5,411,279	1,607,652	22.9	4.56	3.67	38.46	39.11	0.65	10,455
2016	1,574,097	1,217,264	356,833	22.7	4.64	3.87	28.14	35.44	7.30	26,003
2011 - 2016	8,593,028	6,628,543	1,964,485	22.9	4.57	3.71	36.58	38.44	1.86	36,457

Conclusion

Milk price volatility has put increased focus on cash flow and overall cash management in all dairy businesses. When a farm is expanding there are increased pressures on cash within the business. Coupling poor milk prices with and expanding business and potentially if there is not a focus on cost control, poor efficiency and productivity within the business can create severe pressures on the liquidity of the business. There is therefore a requirement for all dairy farmers to have a very good understanding of the sources and applications of cash in their businesses and to understand what the overall breakeven point of the business is. Obviously just to breakeven is not the focus of the business overall but understanding where that point is will allow a determination of how serious a potential issue may be when milk price drops. At farm level there is a requirement to have a plan in place to facilitate the overall sustainability of the business through the dips in milk prices. The plan in general will include one or all of the options identified in this paper, including (increasing the value of the output, reducing costs, creating a cash reserve, fixing milk prices, etc).

Bull selection guidelines for spring 2017

George Ramsbottom[1], Kevin Downing[2], Adrian O'Callaghan[3], Martina Gormley[4]

[1]*Teagasc, Oak Park;* [2]*ICBF, Bandon;* [3]*Teagasc, Mallow;* [4]*Teagasc, Tuam*

Summary

- The base cow against which EBI is measured has changed resulting in an average drop in EBI of €71.
- On-farm evidence from Southern and Western farms shows:
  - » A positive association between fertility sub index and measures of herd fertility;
  - » A positive association between milk sub index and milk solids production;
  - » PTA for milk volume from -100kg to +100 kg delivered 450-480 kg milk solids per cow on farms in the regions.
- It's essential to know your herd genetic averages and to set breeding goals that are appropriate to your herd.
- When selecting bulls use the latest Active Bull List; use teams of bulls; and use the ICBF Sire Advice programme to allocate them to the cows in the herd.
- When selecting alternative breeds, use the highest genetic merit sires available.
- Genetic targets for grass-based spring calving dairy herds should include: milk sub index €30-€50; fertility sub index €85-100.
- For the average farm it is possible to select teams of AI sires with average EBI, milk and fertility sub-indices of at least €260, €50-90 and €140-170 respectively.

Base change

The base cow against which EBI is measured changed this September with all EBI's dropping by €71. The previous base was a cow born in 1995 and in milk production in 2000. To reflect improvements made in milk production and fertility in the Irish dairy herd the base cow used to measure EBI changed to cows born in 2005 and milk recorded in 2007. As expected the average performance of the new base cows is better than the performance of the old base cows. In terms of actual performance, this is summarised in Table 1. This increase is a reflection of both the improvements in genetics as well as non-genetic factors such as feeding, grassland management, and improved animal husbandry.

Table 1. Base change in milk production and fertility for first calvers.

First lactation	Milk yield	Fat/protein yield	Calving interval	Survival
Old Base	5,192 kg	196 kg/171 kg	404 days	80.0%
New Base	5,743 kg	224 kg/195 kg	400 days	82.5%

The impact in terms of the genetic component is summarised in Table 2.

Table 2. Genetic changes to milk and fertility sub-indexes in the new base.				
	Milk sub index		Fertility sub index	
	Yield	Fat/protein	Calving interval	Survival
Change in PTA	-116 kg	-4.9 kg / -6.0 kg	+2.8 days	-0.65%
Value of sub-index change (€)	- €29		- €42	
Total value of EBI change (€)	- €71			

In the September evaluation run, every dairy animal was scaled back by €71 EBI as a result of the base change. If only the base was changing, the change would be the same for every animal in the country and there would be no re-ranking of bulls. However, as more data was included for animals in that evaluation, the exact change in EBI also depended on what new data was added for individual animals. In other words, the change in EBI seen in the September report may not be exactly €71.

The milk yield detailed in Table 1 refers to the average production for the 2005 born spring first calvers. The performance of the base cow comes with a health warning - it can be hugely variable between years and within systems of milk production. So for example, while the 2005 born heifers in spring milk herds produced 4,929 kg milk in their first lactation, those born in winter milk herds produced 8,421 kg.

It's also important to remember that the new base still refers to 2005 born cows - further genetic progress has been made nationally since then. The reason why 2005 was chosen as the new base year is because solid data is needed for the base cow - over 60,000 cows are included in the new base with data included from up to five subsequent calvings/ lactations.

How does the 'typical' base cow perform?

When we talk about the base cow, we all like to visualise what her performance is like, so we've summarised this in Table 3.

Table 3. Actual* milk production of base cows in spring calving herds.				
		Actual yield - spring calving herds only		
Lactation No.	% of herd	Milk yield (kg)	Milk solids (kg)	Days in milk
1	18	4,929	356	252
2	16	5,780	413	253
Mature cows	66	6,331	449	251
Herd average		5,991	427	252

*Based on the actual milk produced for first, second and third or greater lactation cows.

Factors affecting actual yield achieved

While the herd average for a stable herd of base cows is 427 kg milk solids in a 252 day lactation, the actual average milk solids yield produced by different herds will vary enormously. There are a number of reasons for this.

- **Greater number of days in milk** – the herd average in Table 3 is 252 days in milk. For a more typical 280 days in milk, herd average milk solids yield would be approximately 464 kg per cow.
- **More first and second calvers** – the herd detailed in Table 3 is a mature herd (5.5 lactation

average). In a younger herd (3.3 lactation average) with 30% first calvers and 25% second calvers and milking for an average of 252 days, milk solids yield is predicted to be 412 kg milk solids per cow.

- **Higher stocking rate** – Farming at a high stocking rate affects per cow milk solids yield. Typically a 1 cow/ha increase in stocking rate reduces milk yield per cow by 10% to approximately 384 kg milk solids per cow.
- **Higher meal feeding rate** – the level of meal fed to the base cows above was approximately 900 kg per head. Research and on-farm studies have shown that typical response rates to higher levels of meal feeding will result in a response of 0.6 kg milk (0.042 kg milk solids) per kg meal fed, so feeding 250 kg more meal would result in an increase in milk solids yield of approximately 11 kg per cow to 438 kg milk solids per cow.

Dairy farms in the southern region of Ireland

Ten dairy farmers participate in the Teagasc/Dairygold Development Programme as "Demo Farmers". They are supported by Adrian O'Callaghan, Teagasc Mallow and host farm walks on a regular basis. In 2015, their average herd size was 99 cows. The herds produced 506 kg milk solids per cow (3.66% protein / 4.22% fat) and the average six week calving rate for the farms was 76%. The changes seen in the herd EBI and its components for the ten Demo Farms between May 2016 and September 2016 are presented in Table 4.

Table 4. Change in herd average EBI for the Dairygold demo farms between May and September 2016.

	Herd EBI	Milk sub index	Fertility sub index	Fat and protein (kg)	Milk (kg)
May 2016	€171	€56	€86	19	113
September 2016	€97	€27	€41	9	-3
Change (September-May)	- €74	- €29	- €49	- 10	- 116

Most of the difference observed in the September EBI reports is due to the change in the base cow as outlined in the previous section. We estimate that for this year, these ten farms will on average have sold 475 kg milk solids per cow by the end of November with a 6-week calving rate averaging 78%.

Genetics and milk production

The data in Figure 1 shows the association between the expected milk solids sold in 2016 and current herd average milk sub index.

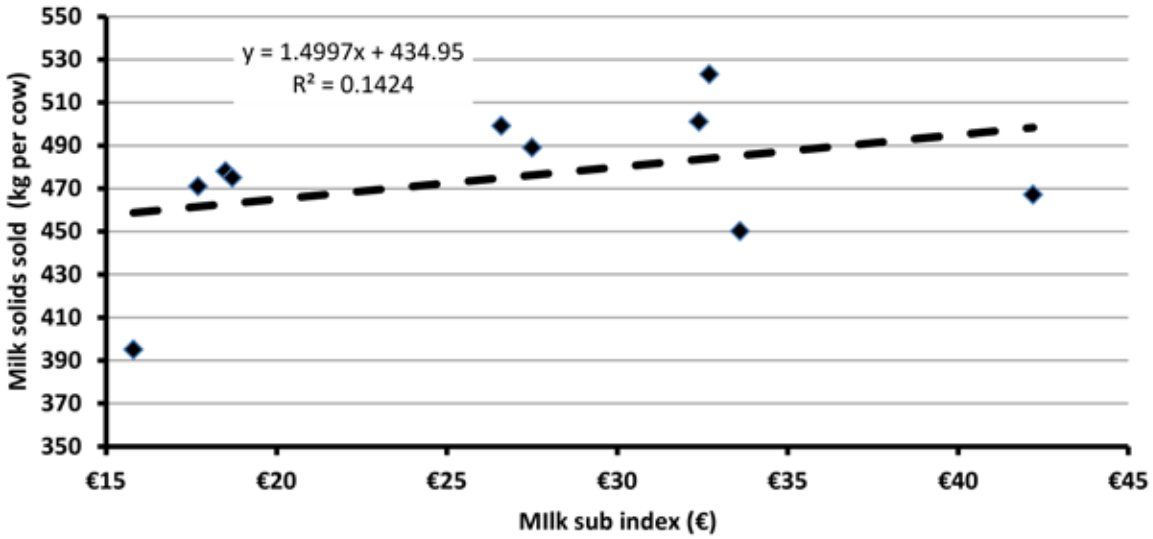

Figure 1. Association between milk sub index (€) and milk solids sold (kg per cow) in 2016 for the Dairygold Demo Farms

The data in Figure 1 shows that as milk sub index increases so too does milk sales per cow. However the association is weak, with only 14% of the variation in milk yield explained by genetics. Other factors such as level of meal fed, lactation length, average age of the herd and stocking rate also influence milk yield of these herds. In Figure 2 we examined the association between herd yield potential (milk PTA kg) and milk solids sold per cow.

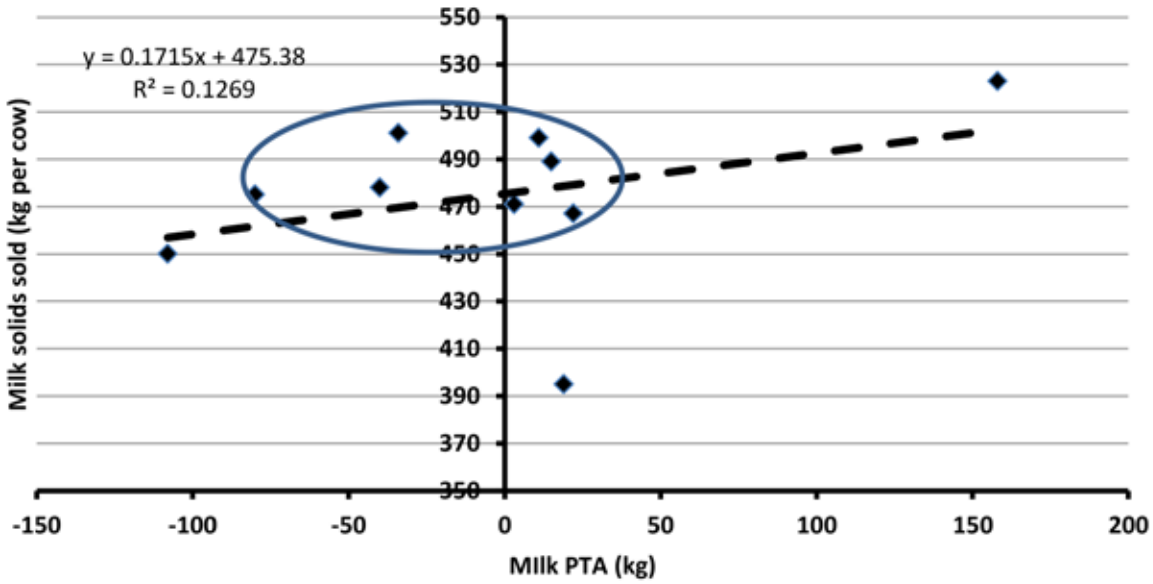

Figure 2. Association between milk yield PTA (kg) and milk solids sold (kg per cow) in 2016 for the Dairygold Demo Farms

The data in Figure 2 show that herd average PTA for milk is a poor indicator of milk solids production per cow. Herds with PTAs for milk yield ranging from -100kg to +30 kg milk produced similar yields per cow.

Genetics and fertility performance

In Figure 3 we examined the association between herd fertility sub index and 6-week calving rate on the demo farms.

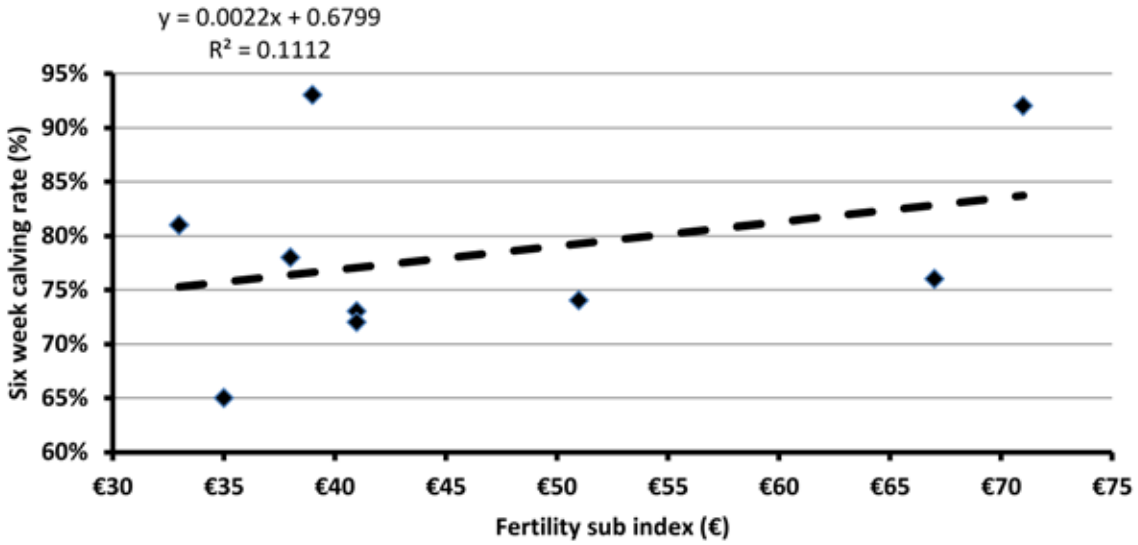

Figure 3. Association between fertility sub index (€) and 2016 6-week calving rate for the Dairygold Demo Farms

The data in Figure 3 show that there is also a positive association between fertility sub index and six week calving rate. In general farms with higher fertility sub index also had higher six week calving rate. However only two of the nine herds achieved a six week calving rate of greater than 90%. One of the herds had a fertility sub index of €39 (this was a crossbred herd) while the other farmer had a herd fertility sub index of €71 (a Holstein herd).

Dairy farms in the western region of Ireland

The data presented in Table 5, shows the September 2016 herd EBI; average 2015 milk production; and 2015/16 fertility performance for over 4,000 dairy farms from the co-operatives in the western region of Ireland.

Table 5. Summary of genetic, milk production and fertility data for dairy farms in the western region of Ireland

	Genetic	Milk production (2015)		Fertility (2015/2016)	
	Herd av. EBI	Milk solids (kg/cow)	Protein content (%)	Calv. Int. (days)	6 wk calv. Rate (%)
Average	€46	374	3.42	401	53

Genetics and milk production

The data show that there is considerable scope to improve milk production and fertility in the region. Hidden within the averages are huge variations in herd EBI, milk production and fertility performance at farm level. For example breeding for protein has yielded dividends among the dairy farmers in the region. An analysis of the PTA for milk protein content and actual milk protein content of the milk sold shows a close positive association between milk protein genetics and content as presented in Figure 4.

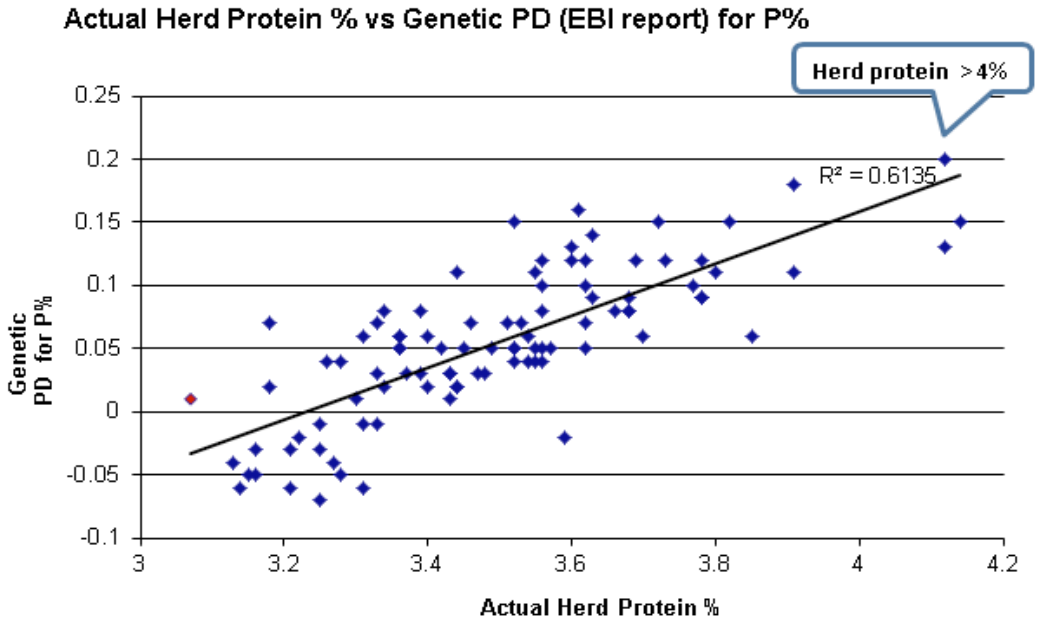

Figure 4. Association between herd average genetics for milk protein PTA (%) and actual average milk protein content for a group of dairy farmers in the western region of Ireland

The data in Figure 4 show the range in herd genetics for protein content - it ranges from -0.07% to +0.20% among a group of farmers in the region. The range in milk protein content similarly varies from 3.10% to 4.10%. The strength of the correlation (61%) suggests that breeding for milk protein content can influence the protein content of the milk supplied.

Genetics and fertility performance

In Table 6, we present the actual milk solids yields of two herds with contrasting PTA for milk volume and fertility sub index.

Table 6. Milk production and fertility performance of two contrasting herds of cows in the western region of the country.

	Farmer A	Farm B
EBI	€125	€51
Milk SI	€25	€35
PTA milk (kg)	- 65	+ 203
Milk solids delivered 2015 (kg/cow)	446	429
Meal fed (kg/cow)	600	850
Fertility SI	€57	€-7
Calving interval (days)	367	393
Six week calving rate (%)	73%	42%

The old adage, 'if you want milk, don't breed for it', comes to mind. In this example the two farmers, both members of the same discussion group, have bred contrasting herds of dairy cows. The cows on farm A are highly fertile, fed 600 kg per cow concentrate and delivered 17 kg more milk solids than the cows on farm B. What is affecting the cows in farm B is the more spread out calving pattern seen in the lower six week calving rate, higher culling rate and recycling of empty cows even though both farmers are in spring milk production. In fact for a herd with such a poor fertility sub index, farmer B has achieved a relatively high six week calving rate.

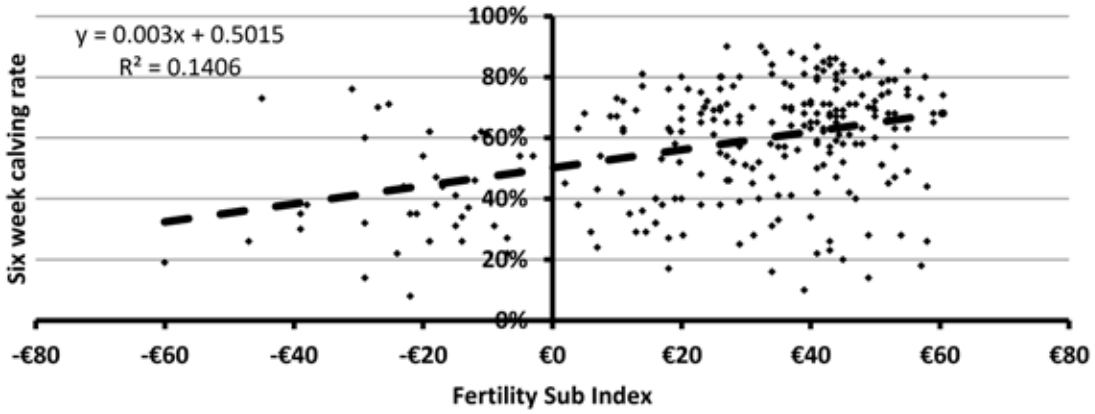

Figure 5. Association between fertility sub index (€) and six week calving rate on 270 dairy farms in the western region of the country

The data in Figure 5 show that range of herd average fertility sub-indices that prevail on dairy farms in the region. The trend line in terms of association between fertility sub index and six week calving rate is linear and positive. Higher fertility sub index is associated with higher six week calving rate. As illustrated in Table 5, some farmers in the region are achieving better than average calving rates with poor fertility sub index but the trend is for higher calving rate as fertility sub index increases.

Breeding targets

Milk sub index

Evidence from ICBF supported by on-farm data shows that the base cow has the capacity to produce ample quantities of milk solids. While increasing milk sub index may deliver greater milk yields, I do not believe that in grass based systems of milk production, there is justification for breeding herds of cows that are highly positive for milk volume. Figure 6 presents the PTAs for milk solids yield (kg) and milk yield (kg) from the Autumn 2016 Active Bull List.

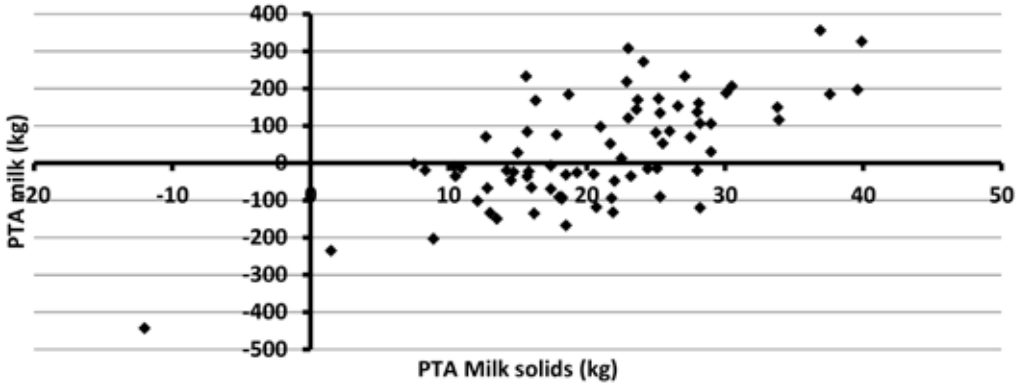

Figure 6. PTAs for milk solids yield (kg) and milk volume (kg) for all 75 AI sires on the Autumn 2016 active bull list

While the general trend is for an association between higher milk solids yield and higher milk volume, half of the AI sires on the Autumn 2016 Active Bull List are negative for milk volume but positive for milk solids yield (see Figure 6). Almost half (46%) have PTAs for milk solids of greater than +15 kg and PTAs for milk volume of less than 100 kg.

Fertility sub index

The farm data presented above shows that high fertility sub index supports higher fertility performance. In my opinion, a target of €85-€100 for fertility sub index is appropriate for black and white dairy herds producing 450-500 kg milk solids per lactation in spring calving grass based systems of milk production. I believe that an even greater target fertility sub index is

necessary to support higher milk solids yield in seasonal calving systems of milk production. As indicated in the farmer data in Figure 3, in cross bred herds a lower fertility sub index (approximately €30 lower) is appropriate because of heterosis for fertility in such herds.

National herd

The data presented in Table 7 shows the average top third, middle third and bottom third of dairy herds nationally.

Table 7. Average, top, middle and bottom thirds of herds ranked separately by EBI, milk sub index and fertility sub index

	EBI	Milk sub index	Fertility sub index	Fat and protein (kg)	Milk (kg)
Average	€60	€10	€28	3.3	-11
Top third	€90	€24	€50	8.7	87
Middle third	€65	€11	€33	4.1	-14
Bottom third	€28	-€5	€2	-2.8	-107

Source: ICBF, personal communication.

The data in Table 7 shows that on average for over 12,400 dairy herds, average EBI is €60. However substantial variation exists between herds with the top third averaging €62 higher EBI than the bottom third. Similarly the variation between herds for milk and fertility sub-indices is €29 and €48 respectively. Such variation implies that the choice of AI sires selected for an individual herd depends on the genetic merit for the main traits of importance.

Example of selecting AI sires for an individual herd

A base change should not influence a farmer's decision making process when it comes to breeding. As always, this process should be:

- Know which trait(s) you want to improve;
- Check your HerdPlus EBI report for the genetic indexes of these trait(s) you wish to improve;
- Select a team of bulls that are on average better than the genetic index for the trait(s) you wish to improve.

Table 8. Calculating target average AI sire team required to achieve replacement heifer targets detailed

	EBI	Milk sub index	Fertility sub index	Fat and protein (kg)	Milk (kg)
Herd average	€60	€10	€28	3.3	-11
Replacement heifer target	€160	€30	€100	10.0	0
AI sire team average required	€260	€50	€172	16.7	+11

When you set the replacement heifer target value that you require e.g. for EBI, double that number and subtract the herd value to calculate the average sire team value. In the example above, the relevant calculations are: €160 (the heifer EBI target) X 2 = €320 - €60 (the herd EBI average) = €260 (the AI sire team average needed). An example of a team of AI sires selected to meet the targets detailed in Table 9.

Table 9. Example of a team of AI sires selected from the Active Bull List Autumn 2016 to achieve the targets set in Table 8					
	EBI	Milk sub index	Fertility sub index	Fat and protein (kg)	Milk (kg)
Sire 1	€285	€49	€201	12.8	-68
Sire 2	€267	€39	€187	15.7	83
Sire 3	€283	€60	€183	21.5	-119
Sire 4	€241	€61	€141	21.0	97
Sire 5	€217	€39	€135	10.5	-36
Average	€259	€50	€169	16.3	-9

All five bulls chosen were selected from the Autumn 2016 Active Bull List. Some of the bulls selected are below the average of the team - not all have to be above the target to obtain the average. The average reliability of the five bulls selected was 60%. When used in equal numbers, the average team reliability is 92%. When used in equal numbers the data in Table 10 shows the predicted genetic outcomes for some of the traits of interest in the next generation of heifer calves born on the farm.

Table 10. Predicted heifer averages for EBI, milk and fertility sub indexes and milk solids and milk kg					
	EBI	Milk sub index	Fertility sub index	Fat and protein (kg)	Milk (kg)
Herd average	€60	€10	€28	3.3	-11
AI team average used	€259	€50	€169	16.3	-9
Predicted heifer average	€159	€30	€99	9.8	-10

Crossbreeding

The research evidence from Moorepark and elsewhere is categorical and consistently shows that high EBI crossbred dairy cattle outperform high EBI purebred contemporaries both within research studies and on commercial dairy farms because of lower replacement costs and greater herd productivity. On that basis, dairy herds which combine high EBI Holstein-Friesian and high EBI alternative breeds will continue to reap the added benefits of crossbreeding in addition to the benefits of genetic progress in EBI. If using alternative breeds, select the highest genetic merit sires available from those breeds.

The increasing differential in EBI between the top Holstein-Friesian and the top Jersey sires that currently exists is due to a combination of factors: (1) the success of Ireland's national breeding programme, the essential ingredient of which has been the incorporation of Genomic Selection; and (2) a lack of a national Jersey breeding programme. Based on the research findings presented, Teagasc and ICBF have embarked on a number of major joint strategic initiatives to evaluate the potential long term benefits of cross-breeding. These include the COW index; multi-breed genomics; G€N€ Ir€land cross breed evaluation; the next generation Jersey herd; and continual review and validation of the economic benefits of heterosis.

Conclusion

Despite the substantial progress that has been achieved within the Irish dairy herd since the introduction of EBI, national statistics reveal that there is considerable scope for improvement in both productivity and reproductive performance of Irish dairy herds. Regardless of whether choosing to crossbreed or remain with a black and white herd, a team of bulls of high overall EBI (in excess of €250) should be selected for the 2017 breeding season on every farm.

Healthy calves: the future of a herd

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Introduction

Rearing healthy calves is fundamental to a successful dairying enterprise. Heifer calves represent the future of the herd and high mortality rates amongst the calf cohort on a farm can be detrimental to herd progress, both in terms of any planned expansion and genetic gain. Neonatal calf diarrhoea is one of the most common causes of mortality in calves with calf pneumonia also a serious cause of both morbidity and mortality. Both can be prevented and treated successfully if appropriate measures are implemented.

Neonatal calf scour

A diarrhoeic calf becomes rapidly dehydrated, acidotic, and low in essential electrolytes such as Sodium (Na+), Potassium (K+), and Chloride (Cl-). Treatment, therefore, should involve rehydration, correction of acidosis, and replacement of electrolytes. Some electrolyte products on the market, while assisting with rehydration and replacement of electrolytes, often fail to effectively correct acidosis which is essential to recovery of the calf. This has led to the introduction of new legislation across the EU (Regulation No. 1123/2014) which dictates a number of requirements that all scour treatments must conform to. Products meeting these requirements will state that they are fit for the "stabilisation of water and electrolyte balance to support the physiological digestion". Products not conforming will state that they are "complementary feeds" only. It is important, therefore, for dairy farmers to ensure that a product is appropriate to their requirements i.e. it will treat a calf with scour.

Causes and prevention of scour

Scour in calves can result from inconsistent feeding regimes or it can be due to an infectious cause. Infectious causes of scour are most common and Table 1 outlines common causes and when clinical signs are most likely to occur.

Table 1. Common causes of calf scour on Irish dairy farms with approximate times of occurrence.

Cause of calf scour	Age clinical signs most commonly appear
Cryptosporidium parvum	First week of life
Escherschia coli	First week of life
Rotavirus	1-3 weeks of age
Coronavirus	1-3 week of life
Salmonella species	2 to 6 weeks of age
Coccidia	3 to 6 weeks of age

The most important means of preventing scour outbreaks are;

- ensuring an adequate volume (3 litres) of good quality colostrum is fed within two hours of birth. Aim for approximately 8.5% of birth body weight i.e. 3 litres for a 35kg calf. Use only the first milk from the freshly calved cow. Subsequent milkings (transition milk) do not contain enough antibodies to develop the calf's immune system adequately and consequently the calf cannot fight off infection. It should be noted that 60-70 % of neonatal calves undergoing post-mortem at Irish regional veterinary laboratories have inadequate absorption of protective

antibodies.

- optimal daily feed requirements post-colostrum and transition milk feeding are approximately 15% of calf body weight, i.e. 6 litres/day for a 40kg calf; below this will lead to reduced growth rates and increased susceptibility to disease.
- practicing excellent hygiene of calf pens and feeding utensils. Keep calf pens clean and freshly topped up with dry bedding. A damp, cold calf will be more susceptible to infectious pathogens in the environment. Feed buckets must be kept clean in order to prevent build-up of bacteria.

Treatment of calf scour

Initial treatment of diarrhoea using electrolyte solutions is predominantly carried out by farm personnel, often with little regard for the quality of the formulation or its acid buffering capacity. Correction of the metabolic acidosis that accompanies episodes of diarrhoea is essential in achieving calf recovery. Teagasc, Moorepark undertook an experiment in spring 2015 evaluating the effectiveness of a scour treatment that conforms to the new EU legislative requirements. Blood gas measurements were taken from both normal and scouring calves for comparative purposes. Treatment was only administrated to scouring calves. Treatment was also administered and monitored on a number of commercial farms experiencing scour outbreaks. In all, 99 dairy calves, aged between 0 and five weeks approximately, were studied. Calves were scored using the health chart in Appendix 1, and all calves were tested using rapid blood gas analysis. The more severe the acidosis recorded by blood gas analysis, the worse the clinical calf score. Calves with poorer health scores also have lower feed intake which continues the cycle of dehydration and acidosis. Blood pH and base excess, (a measure of the acid buffering capacity of the blood), pre-and post-treatment were measured, the results of which are outlined in Figure 1. The product was administered by stomach tube to ensure that calves received the full dose required. Additionally, as the majority of sick calves in this study were incapable of independent milk feeding, mixing the product with milk served no additional advantage. It is important to note that withholding milk during a diarrhoeic episode is no longer best practice and fresh milk should continue to be offered to calves throughout the diarrhoeic episode.

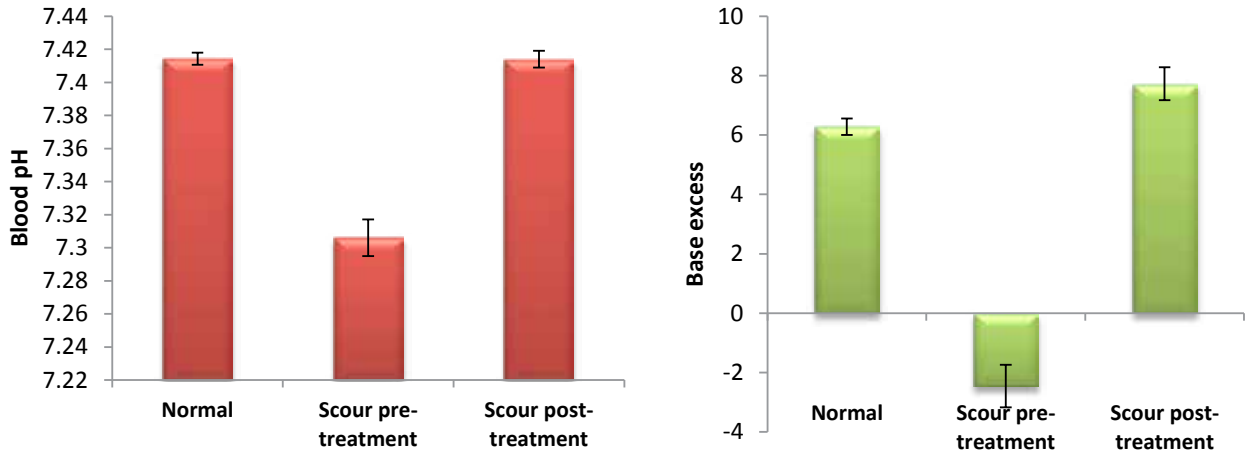

Figure 1. Blood pH (a) and base excess (b) comparison across normal and scouring calves pre- and post-scour treatment.

Neonatal calf pneumonia

Many of the underlying contributors to calf scour such as poor hygiene and inadequate colostrum intake are also implicated in outbreaks of calf pneumonia. Additionally inadequate housing with poor or excessive ventilation leads to increased susceptibility of dairy calves to pneumonic pathogens. Good husbandry will greatly assist in preventing outbreaks and housing/management inadequacies should be corrected prior to taking any further preventative action.

Causes and prevention of calf pneumonia

Calf pneumonia is a highly complex and multifaceted condition, so much so, that in veterinary circles, it is referred to as Calf Pneumonia Complex. Often, multiple viral and bacterial pathogens are involved which leads to a worsening of the condition. Causative pathogens of calf pneumonia complex are included in Table 2.

Table 2. Pathogens of Calf Pneumonia Complex.

Causative agent	Type of pathogen	Likely contributor	Vaccine available*
Bovine respiratory syncytial virus (BRSV)	Virus	Very likely	Yes
Parainfluenza 3 (PI3)	Virus	Very likely	Yes
Coronavirus	Virus	Likely	Yes
Bovine viral diarrhoea virus (BVD)	Virus	Unlikely**	Yes
Bovine herpesvirus-1 (IBR)	Virus	Likely	Yes
Pasteurella multocida	Bacterium	Very likely	Yes
Mannheima haemolytica	Bacterium	Likely	Yes
Mycoplasma bovis	Bacterium	Likely	No
Haemophilus somnus	Bacterium	Unlikely	Yes

* Based on Irish licensing by the HPRA **(www.HPRA.ie)**
**Due to implementation of the Irish national BVD eradication scheme

Prevention of calf pneumonia is greatly assisted by the provision of good housing. Good ventilation must be provided and this can be judged by the odour level in housing. Very strong odours often indicate a build-up of ammonia (from urine) in the calf's environment. Ammonia will damage the protective mechanisms in the calf's trachea (windpipe) which prevent the infectious pathogens listed in Table 2 from reaching the lungs. Achieving good ventilation is a balance, however, and calves should not be held in a draughty environment. Provision of a deep straw bed and partial pen-roofing to prevent down-draughts, will ensure calves can employ avoidance mechanisms to keep themselves warm and dry, essential elements in decreasing the susceptibility of calves to pneumonia. It is not recommended that calves share the same air space as adult cows, as this increases the risk of viral transmission from carrier cows to susceptible calves. As calves get older and weather permitting, outdoor rearing is very useful in producing healthy calves and reducing the incidence of calf pneumonia. Shelter should be provided however, where calves can avoid muddy and wet conditions.

Probably, more so than calf scour, good biosecurity plays an important role in the prevention of calf pneumonia. A closed herd policy will assist in reducing the risk of disease introduction to the herd as a whole, particularly in preventing viral introduction. Vaccines have a very important role to play in preventing and controlling calf pneumonia complex. These vaccines boost the immunity provided to the calf from colostrum and ensure protection should the colostrum provided not contain the required protective antibodies. Future work at Teagasc,

Moorepark aims to examine the persistence of maternally derived antibodies from colostrum in designing pneumonia control programmes and determining timing of optimal vaccination.

Multivalent vaccines are available for many of the pathogens involved in the calf pneumonia complex e.g. PI3+BVD+BRSV or PI3+BRSV+Pasteurella, but it should be noted that licensed vaccines differ between Ireland and the UK. All IBR vaccines in Ireland are marker vaccines and are not included in multivalent calf pneumonia vaccines. This facilitates herd-level IBR control programmes based on vaccination and diagnostics. IBR-inclusive vaccines remain available in the UK but are not marker vaccines.

Treatment of calf pneumonia

If a case of calf pneumonia is suspected, the calf should be immediately isolated in a warm and dry environment. Calf pneumonia will always require veterinary intervention and the sooner the intervention takes place the better the prognosis for both the sick calf and the remainder of the calf cohort. Pneumonias resulting from viral infections will not be susceptible to antibiotics. However, it is always prudent to administer antibiotics as secondary bacterial pneumonias often follow an initial viral infection. These secondary infections are more severe and the prognosis in such cases is poorer. Finally, it should be remembered that pneumonia is a painful condition. Calves in pain will reduce their feed intake which will contribute to a worsening of the overall condition. Pain-relief (e.g. an anti-inflammatory) should always, therefore, be administered with antibiotic treatment.

If feed intake is reduced during the pneumonic episode, an electrolyte supplement will be required. Unlike calf scour, a formulation which corrects acidosis is not required in this case, and correction of any dehydration is most important. If it is necessary to assist the calf with feeding, it is essential to remember that these calves may have difficulty swallowing which may lead to milk/fluids entering the lungs, again detrimental to the calf's condition. If required, feed sick calves slowly and carefully to avoid/minimise aspiration of fluids into the lungs. A quick resolution to the infection, using appropriate antibiotics and pain relief, provides the best chance for the calf. It will reduce the period of reduced feed intake which will benefit the calf in fighting the infection.

Conclusion

Good calf husbandry (clean, warm, dry, ventilation, vaccination) will go a long way in preventing serious outbreaks of calf scour and pneumonia. If treatment is required, ensure appropriate products are administered and try to maintain feed intake throughout the period of illness if possible.

APPENDIX 1

Score	0	1	2	3	4
		 	 	 	
Demeanour	Bright, alert, responsive	Dull, possibly depressed, less responsive	Dull, depressed, less responsive	Dull, markedly depressed, markedly unresponsive	Unresponsive to any stimulation
Ears	Alert and mobile	Slightly drooped	Drooped	Drooped and limp	Drooped and limp
Mobility	Actively mobile and able to stand without assistance or intensive encouragement	Capable of standing and walking independently with a little encouragement	Capable of standing and walking independently but encouragement required	Capable of standing with assistance but unable to walk	Recumbent
Interest in surroundings	Interactive when approached	Interactive when approached	Uninterested when approached	Uninterested when approached	Uninterested when approached
Suck Reflex	Good suck reflex	Diminished suck reflex	Markedly diminished suck reflex	No suck reflex	No suck reflex
Feed intake	Feeding well	Slow to drink and may not finish what is offered	Reduction in feed intake (not finishing what is offered)	No feed intake (not taking any of what is offered)	No feed intake (not taking any of what is offered)
Dehydration	Clear bright eyes	Eyes slightly sunken	Eyes sunken	Eyes markedly sunken	Eyes markedly sunken

Herd lameness- causes and solutions

Ger Cusack[1] and Joe Patton[2]

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Summary

- Lameness prevalence has been estimated at 4% in spring and 7% in autumn for Irish dairy herds; incidence and risk may increase with herd expansion
- For grazing herds, mechanical lesions (white line disease, bruising, sole ulcers) are significantly more common causes of lameness than infectious lesions (foul in the foot, mortellaro).
- Herd locomotion scoring, yard infrastructure design, and regular maintenance of roadway surfaces are essential elements in controlling herd lameness

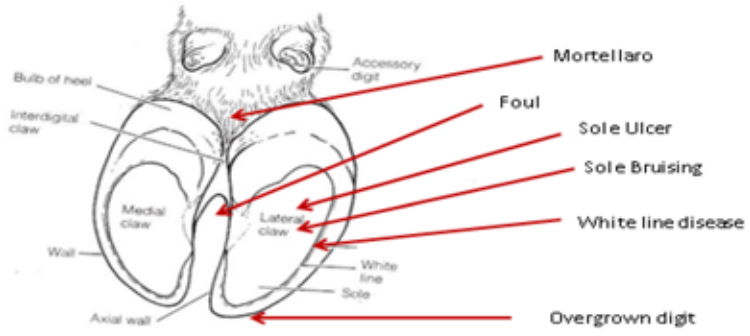
Introduction

Lameness prevalence and costs Irish dairy herds

Lameness prevention is receiving renewed focus as a management issue across many dairy herds in Ireland. The cost of a single case of lameness has been estimated at approximately €300 (UCD Herd Health Group), which comprises €50 in treatments, €100 direct production loss, €100 extra culling costs, and €50 on fertility/other costs. However, the intangible costs of extra workload ('hassle factor') and compromised cow welfare are often of more immediate concern to dairy farmers experiencing herd lameness problems.

In order to begin developing farm-specific lameness management plans, it is first essential to understand the prevalence rates, the different types of hoof lesions and the causal factors for each. A recent study of spring calving herds carried out by Teagasc Moorepark (Sayers et al, 2016) estimated, using the AHDB cow mobility scoring system (Table 1), a lameness prevalence of 4% in the spring period. Cows in the same study were 10 times more likely to show reduced mobility in the autumn period. Overall lameness rates compared quite favourably with lameness incidence in confinement-type systems.

Figure 1. Normal hoof and sites of common lameness problems



Interestingly, when lame cows were inspected further, over 95% of hoof lesions were mechanical (bruising, white line disease, ulcers, overgrown digits) as opposed to infectious (mortellaro, foul in the foot) in nature. This indicates that the priority factors to be addressed for grazing herds are related to infrastructure and managing cow flow around milking times. Some key control measures for grazing herds include:

- Sharp stones and pebbles are the primary cause of white line disease and bruising. Road surfaces should be finished with 50mm of surface material (<5mm aggregates) spread and compacted across the base layer. A road camber and regular cleaning of verges are essential to maintain good drainage.

- Avoid sharp turns on roadways where possible
- Manage the interface between roadways and yards/tunnels to avoid cows bringing pebbles onto concrete areas. Bark mulch is good option in some cases.
- Provide non-slip finishes on concrete areas.
- Cows will try to 'pick their step' while walking to avoid injury. Avoid rushing cows with dogs or a quad and allow the herd find its own pace when walking to/ from milking. Staff will need to be trained on this point.
- Cows generally enter the milking parlour in a different order than they arrive at the collecting yard. Collecting yards need to allow at least 1.5m^2 space per cow to enable re-sorting and efficient cow flow. Install non-slip rubber mats if parlour exit space is confined
- Cows are at greater risk of sole damage immediately after calving due to short-term changes in hoof ligaments. Avoid long walks for 2-3 days post-calving.
- Provide adequate cubicle space (of comfortable size and lying surface) and feed space (60cm) per cow to reduce lameness in heifers and lighter/ timid cows.
- Thin cows go lame more easily. Keep body condition score (BCS) at 2.75+ at all times during the year and provide adequate trace minerals (zinc) to promote hoof health.
- Regular herd mobility scoring is a very useful way to identify problem cows early (Table 1). Timely identification and intervention greatly increases the success of hoof treatments.

Table 1. AHDB Herd Mobility Scoring System

Score	Description	Actions
0	Even weight on 4 feet, long strides, flat back	No treatment, monitor
1	Short, uneven steps. Affected limb not obvious	May benefit from trimming
2	Uneven strides, affected limb identifiable	Examine hoof, treat as needed
3	Slow walking pace, arched back, pain evident	Treat immediately

(https://dairy.ahdb.org.uk/technical-information/animal-health-welfare/lameness/husbandry-prevention/mobility-scoring/#.WDP_pbsnzKJ)

Conclusion

Developing a simple herd lameness prevention plan is recommended for all dairy herds. For grazing systems, emphasis should be placed on regular mobility scoring, infrastructure and managing herd movements. Herd expansion may tend to increase the risk and incidence of lameness, not because of the greater herd size *per se*, but rather by placing undue pressure on existing facilities. However, implementing good control protocols will reduce financial losses and increase cow welfare across all herd sizes.

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Check up on farmers' health

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'My heart and soul are in the farm and in the land' (Boland, 2014)

Farmers take great pride in caring for their land, their crops and their animals. Farmers are always on the lookout for something not being quite right - a sick animal or a tractor's engine not sounding right. Rarely is a farmer's gut feeling wrong and farmers know only too well that this attention to detail is essential to the productivity and profitability of their farms. And yet, farmers often overlook the most important aspect of farming - themselves. Too often we put our animals' health ahead of our own health, too busy to pass any heed on aches or pains, or to talk to someone if we are feeling down. Days can turn into weeks and even months as problems fester and refuse to go away. Nevertheless, just like our animals or farm machinery, acting early if you sense a problem can make a big difference to our health.

How healthy are farmers in Ireland?

Farming is widely regarded as a healthy occupation: most people picture farmers as physically active, out in the fresh air, at one with nature. The reality, however, is somewhat different. Farming is different to most other occupations - it is never 9-5; working conditions can be unpredictable - dealing with cattle, working on slippery and uneven surfaces and using heavy machinery. Recent statistics on the health of Irish farmers highlights a number of concerns:

- Irish farmers are seven times more likely to die from heart diseases, five times from all cause of death and three times from cancer compared to other occupation groups (Smyth *et al.*, 2013);
- Farmers Have Hearts: 80% of farmers had four or more risk factors for cardiovascular disease (CVD), placing these farmers at three times higher risk of developing heart disease (van Doorn *et al.*, 2015);
- Rates of overweight and obesity are particularly high among farmers (van Doorn *et al.*, 2015; Cushen *et al.*, 2016);
- More than one in two (56%) farmers experience lower back pain and musculoskeletal disorders (Osborne *et al.*, 2010);
- Irish Farmer Lung Study: 60% of farmers who didn't smoke reported a chronic respiratory symptom (Cushen *et al.*, 2016);
- Rates of psychiatric hospital admission are higher for farmers than other occupation groups (Morrissey *et al.*, 2009);
- Other 'common' occupational illness affecting farmers relate to skin diseases and hearing loss.

These findings clearly indicate that farmers could and should do much more in terms of caring for their own health. There is, of course, also a strong business case for farmers to take increased ownership of their own health

Why should farmers take more care of their health?

Ill-health not only impacts on farmers' wellbeing but also has financial implications. Ill-health may result in a loss of farm profitability, lead to a higher risk of farming injury and disability and even premature death (Bloom *et al.*, 2012). Furthermore, agriculture is crucial to Ireland's economy (European Commission, 2016). In 2013, there were 139,600 farm holdings in Ireland

(Central Statistics Office, 2013) which contributed to 2.5% of GDP, 12% of total exports and 7% of total employment (Department of Agriculture, Fisheries and Marine, 2014). This illustrates the importance of farmers staying healthy in order to sustain a high level of productivity.

Farmers taking health matters in their own hands

Farming in Ireland is a predominantly male occupation, with 88% of farm holders being male (Central Statistics Office, 2013). Research has found that some men tend to have a 'wait and see' attitude to health. Too often aches and pains are pushed aside, with many men only acting when the complaint persists in such a way that it restricts your daily tasks. By then it can be too late. Many farmers will recognise this tendency to put work ahead of health (Mahalik *et al.*, 2007).

Lifestyle factors account for the majority of diseases that impact the health of Irish farmers: 88% of heart disease (World Health Organisation, 2015) two-thirds of cancers (World Health Organisation, 2014) are caused by unhealthy lifestyles such as poor diet, lack of physical activity, smoking and excessive alcohol consumption. High cholesterol, diabetes type 2, obesity and high blood pressure also are considered 'lifestyle diseases'. Occupational health issues such as back pain, respiratory difficulties, arthritis and hearing problems are often linked to poor systems of work such as lifting incorrectly, using mechanical aids incorrectly, dust management, and not using ear defenders or applying sun cream (Richardson and Osborne, 2013). These diseases therefore are largely preventable by adopting healthier habits and work methods. The challenge for farmers is to take these health matters into their own hands.

Kicking old habits

Changing health behaviour is challenging: an estimated 60 to 70% of attempts to change behaviour, fail (Ogden *et al.*, 2006). There are many reasons for this, such as failing to understand health messages (Petrovici and Ritson, 2006) or lacking the self-belief that one is capable of changing a behaviour (Bandura, 1977). More encouragingly, the recent 'Farmers Have Hearts' study (van Doorn *et al.*, 2015) found that 48% of farmers who participated in a heart screening at a mart in Ireland, reported having made changes to their lifestyle, mainly by increasing their levels of physical activity (93%) and altering their diet (86%). The study concluded that farmers are interested in their health but that more follow-up support is needed for farmers to encourage sustainable health behaviour change. Local community and local health services should adopt a more proactive role in reaching farmers with health messages and health promotion interventions. Health programmes provided by local health services that specifically target the farming or rural community should also be considered.

Although traditionally farmers health is associated with health and safety issues, several great health promotion initiatives for farmers have been developed, such as:

- National Ploughing Championships;
  - » Blood pressure checks
  - » Lions' diabetes screening
- Farmers Have Hearts: free heart health checks at marts throughout Ireland
- SunSmart advice for farmers and outdoor workers
- Farm Rural Stress and Help Line
- Health booklet 'Staying Fit for Farming'
- Farm Safety Action Plan 2016-2018: Goal 6 'To implement programmes for the protection of health and wellbeing of persons, including vulnerable groups, working in agriculture'

It is time for farmers to stand up and take responsibility and control of their own health. After all, a cow or a tractor can be replaced - what price can we place on a farmer's good health?

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Notes

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