DAIRYING:
ENTERING A DECADE OF OPPORTUNITY

Teagasc National Dairy Conference 2010

Wednesday 17th November 2010
The Charleville Park Hotel
Charleville

Thursday 18th November 2010
The Mullingar Park Hotel
Mullingar

teagasc
Agriculture and Food Development Authority

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Enter the Giants

Global Dairy Outlook and Implications for Irish Dairy Farmers
Marina Rebello

Teagasc National Dairy Conference
Ireland, November 17/18, 2010

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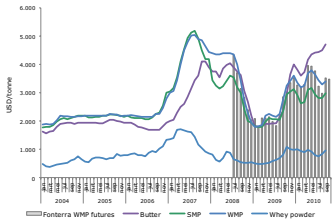
Rabobank: agricultural roots & global focus, founded on co-operative principles

offices in 41 countries

The entire dairy product complex is trading at elevated levels as at October 2010

Dairy commodity export prices (f.o.b. Western Europe), Jan 2004 - Sep 2010



Source: USDA, ZMB

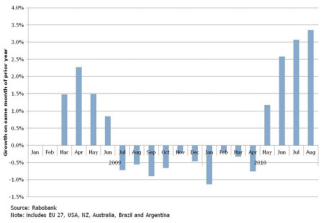
- Market sentiment turned very positive again in August in anticipation of strong imports by Russia following the drought
- Butter prices remain exceptionally strong

What's keeping prices up? (1)

Supply has actually seen considerable improvement since May

- Milk supply is expanding quickly, as farmers respond to a period of higher milk prices (though offset somewhat by poor NZ weather in Sept/Oct)
- More of that milk is being sent for export, given weak local demand in EU and USA
- EU intervention stocks are being sold down

Milk production growth – big 6 exporters



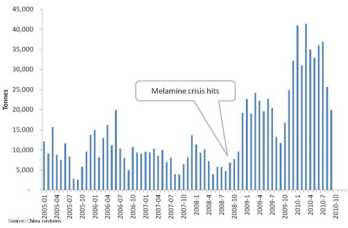
Source: Rabobank
Note: includes EU 27, USA, NZ, Australia, Brazil and Argentina

What's keeping prices up? (2)

But solid consumption growth, and exceptional import demand, has been enough to soak up increased supply without impacting prices

- World economy continues to expand
- Robust dairy sales growth in SEA, Latin America and China in particular
- Exceptionally vigorous buying by the world's two largest importers: China (post melamine) and Russia (post drought)
- A weakening USD is also playing a role in sustaining high USD dairy price levels

Chinese milk powder imports



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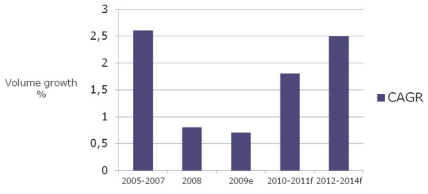
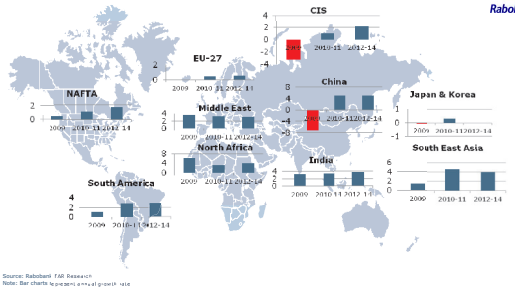
Global dairy demand growth to continue

- In 2008, high prices restrained demand growth
- In 2009, slow economic growth resulted in a similarly depressed growth rate
- Returning to more solid growth rates in 2010/2011



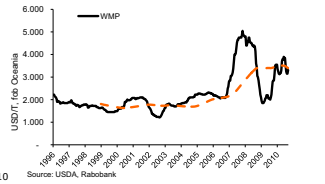
Global growth is mainly driven by developing markets



Conclusions on the market

- The year 2010 has been a relatively stable year in terms of price volatility
- Constraints for milk production growth in traditional export regions remain
- The global market cannot do without additional EU and US milk
- Rabobank expects average milk revenues to trade in a higher band in the mid term

WMP prices f.o.b. Oceania since 1996



Source: USDA, Rabobank

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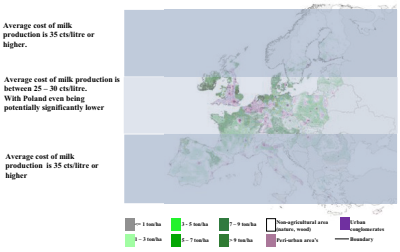
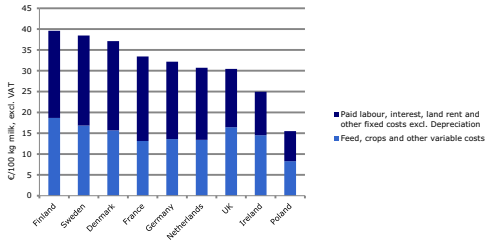
Differences in cost of milk production will drive regional growth and contraction beyond 2015

Regional differences



Cost level relatively low in Ireland, fixed cost level in particular



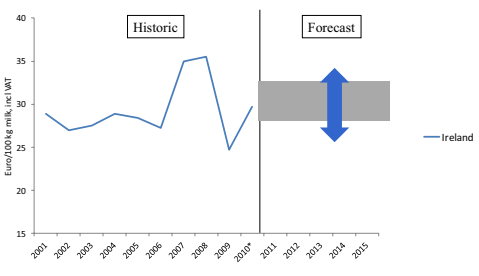
Figures regard 2006-2008 average, excluding depreciation

Source: LEI, FADN, Rabobank

SWOT Irish Dairy Sector

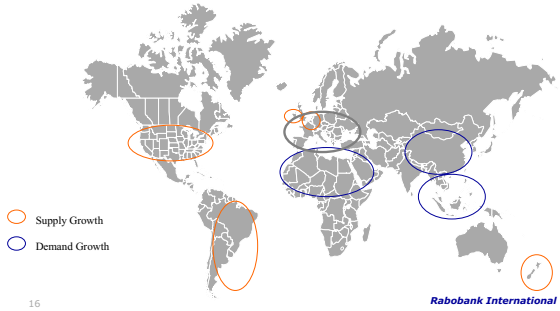
Strengths	Weaknesses
• Low-cost EU producer • Low level of fixed costs • Low dependence on volatile animal feed prices • Export orientation with access to growth markets outside EU • Ample sweet water resources	• Profitability dairy farms • Fragmented processing segment • Inflexible Milk Quota Trading system
Opportunities	**Threats**
• Expected global dairy demand growth combined with export-oriented sector • Liberalisation production and trade environment • Global perspective: supply shocks offer opportunities • Land availability for expansion – though price development decisive	• Volatility milk price and liquidity on farm • Volatility inputs (fertiliser, fuel) • Substitution • Stricter environmental regulations (emission GHG, nutrient disposal)

Irish milk price forecast: continued volatility; mid-term average around 29-30 ct/litre, BUT…



*2010 based on 9 months
Source: DG Agri

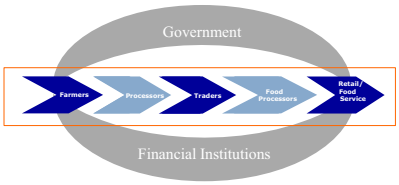
Supply and demand growth not parallel worlds, demanding higher levels of investment



Challenge: Capitalise Optimal Production Conditions

Rabobank

- On Farm Cost Efficiency
- Investing in the Future, Access to Capital
- New Markets for New Milk



17 Rabobank International

Food Harvest 2020: The First Steps

Tom O'Dwyer, Head of Dairy Knowledge Transfer, Teagasc Moorepark

Summary

The Food Harvest 2020 Report[1] concludes that the most compelling picture that emerges of the decade ahead is one of opportunity. The same report states that the prospects for the dairy sector in the medium to long term are positive. Increased global demand for milk and milk products, coupled with the abolition of EU milk quotas in 2015, presents a real opportunity for the Irish dairy sector. Analysis suggests that a 50 per cent increase in milk production is achievable by 2020. But changes are required by all in the dairy industry if this ambitious target is to be met. Change is never easy. Coping with expansion will be challenging – for farmers, for the processing sector and for those responsible for marketing Irish dairy products. Planning and prioritisation is required. By working together and focussing on the benefits of increased milk output, we can seize this great opportunity.

Introduction

In 1961, American President, John F. Kennedy, made his famous 'Man on the Moon' speech to the US Congress. The following is from this speech:

"*I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the Moon and returning him safely to the Earth … if we make this judgement affirmatively, it will not be one man going to the moon, it will be an entire nation. For all of us must work to put him there*."

I want to paraphrase Kennedy's famous words and apply them to the decade ahead for the Irish dairy industry:

"*I believe that the Irish dairy industry should commit itself to achieving the goal, before this decade is out, of increasing milk production by 50 per cent while delivering sustainable returns to all … if we make this judgement affirmatively, it will not be one farmer or one processor increasing milk production, it will be the entire dairy industry. For we must work together to make this happen.*"

The vision set out for the Irish dairy industry in Food Harvest 2020 is of an expanded sector supplying 50 per cent more milk, leading to a growth in employment and exports while providing a sustainable return for competitive producers and processors. It identifies a target that beckons[2]. It describes the future we wish to create; and is getting people excited about bringing it to a successful conclusion. It can act as our road map and our rudder. The premise for this vision is that: *We can do better*. Optimism will be the fuel for realising the vision[3].

The immediate challenge is to enrol all involved in the dairy industry around this vision. Enrolment is integral for successfully bringing a newly envisioned future into being and cannot just be assumed into existence[4]. This is going to take much time

and effort, initially from a small team of leaders, but then spreading throughout the entire industry.

Change is all around

Change is how the future happens; it seems to be happening faster each year. You can secure a bright future in dairy farming – but it will be different from now and if you want to be part of it you are going to have to learn to change, fast[5].

Significant changes have occurred on Irish dairy farms over the last four decades. The motivation for decisions made by dairy farmers changed from PROFIT in the 1970's, to SURVIVAL in the 1980's to INCOME PROTECTION in the 1990's. The decoupling of direct payments in January 2005 and the imminent removal of milk quotas in 2015 once again allows farmers the freedom to make decisions based on signals from the market place. PROFIT will once again be the motivating factor for many dairy farmers. There will be some who will be motivated by LIFESTYLE considerations and they will act as custodians of the countryside.

1970's	1980's
PROFIT	SURVIVAL
1990's	2000's
PROTECT INCOMES	PROFIT v LIFESTYLE

The biggest change faced by a generation of dairy farmers is just around the corner. EU Milk Quotas will end on 31st March 2015. A whole generation of dairy farmers has operated within the confines of a quota system. The milk quota system provided a framework for support and contributed to price stability. But it caused industry stagnation, prevented the development of scale at farm and processing level, inhibited increased specialisation at farm level and limited market development.

Table 1: Irish Dairy Industry: 1975 – 2005.

	Year		Change	%
Dairy Cow numbers (,000)	1975	1,380		
	1985	1,495	+115	8.3
	1995	1,221	-274	-18.3
	2005	1,101	-120	-9.8
Milk deliveries (million litres)	1975	3,212		
	1985	5,518	+2,306	71.8
	1995	5,136	-382	-6.9
	2005	4,915	-221	-4.3
Milk yield per cow (kg)	1975	2,328		
	1985	3,691	+1,363	58.6
	1995	4,206	+515	14.0
	2005	4,464	+258	6.1

Source: www.cso.ie

In the ten year period from 1975 to 1985, domestic milk deliveries increased by 72 per cent. This was made up of 8 per cent and 59 per cent increase in cow numbers and milk yield per cow respectively. Eighty two per cent of the increase in milk deliveries in that decade was due to increased per cow production. Milk deliveries actually declined in the next two ten year periods with a decline in cow numbers and a much smaller increase in milk yield per cow.

What other changes will we see in the next decade? What will the world look like in 2020? What type of operating environment will Irish dairy farmers face in 2020? I expect that by 2020:

- There will be less dairy farmers and increased milk production per farm;
- The increase in milk production will not be uniform across the country;
- EU Milk Quotas will be consigned to history; but they may be replaced by 'supplier contracts' or 'processing rights' by some milk processors;
- There will be two main milk processors;
- Milk price will range from 23 to 33 cpl (annual average prices) or 20 to 40 cpl (monthly prices) over the next decade;
- Most milk will be produced from grass based, seasonal calving milk production systems;
- A proportion (10 per cent) of milk production will be produced using high input systems to supply liquid milk and meet the manufacture of specific products all year round;
- There will be less family labour on farms with more hired labour being employed;
- There will be increased automation;
- There will be increased energy and fertiliser costs.

For the first time in almost three decades, Ireland has the opportunity to significantly grow its dairy industry. Being prepared or ready will allow you to seize the opportunity. All worthwhile opportunities pose challenging questions:

- Are you ready to reject the status quo?
- Can you reject the familiar present in favour of an uncertain future?
- Are you willing to take a big risk on the chance of a bigger reward?

Every "yes" answer is a tribute to the uniquely human gift of daring. To seize a big opportunity is to dare – and to dare greatly. Nobody ever achieved anything major without the courage or boldness to try the untried, or go where others feared to tread. Imagination, optimism, knowledge and courage are required[6].

Each opportunity only knocks once; if you don't take it, it's gone. We have to have the courage to move ahead. This window of opportunity may slam shut if we hesitate. We must seize the opportunity that now presents itself. The preparation has already started – increased numbers of replacements, increased levels of reseeding, co-operation between milk processors. But much work still remains.

Three parts to one industry

Milk production in Ireland is predominantly based on spring-calving systems. This is because grazed grass is the lowest cost feed and can make up a large proportion of the diet over a long grazing season. As a result, Ireland has a highly seasonal milk supply pattern and the Irish dairy industry produces a high proportion of its output as base or commodity type products (butter, powder, and bulk cheeses). A much larger incentive will be required to ensure all-year-round milk supply in Ireland compared to other EU countries. As a national strategy, it may be worth considering having a portion of the national herd calving in the autumn to supply the fluid milk market and for the manufacture of specific products all year round[7]. Ireland has a milk production cost advantage but seasonality imposes severe limitations on the product mix.

The achievement of the 50 per cent growth target will result in 2.7 million tonnes of additional milk – all of which will have to be processed and marketed. Product and market development does not happen overnight; it will require investment. A figure of €850 million has been put on the cost of the additional processing capacity, working capital requirement and the securing of a route to market and market infrastructure[8]. Dairy farmers are currently demonstrating their confidence in the future by way of their investments in stock and facilities. Dairy processors and those involved in marketing Irish dairy products must now play their part and put in place the additional processing capacity and secure the necessary routes to market.

If dairy farmers cannot get a reasonable or fair price, expansion will be limited. On the other hand, if dairy farmers demand the highest price possible for their milk, processors may have inadequate resources to develop the additional processing and marketing capacities required. If a processor is to invest in additional capacity, it will have to deliver a return. And if the Irish Dairy Board is to invest in and develop new routes to market, it too will have to get a return. The challenge is to strike the right balance between production cost efficiency from grass and optimum sustainable market returns.

The 'Right Mindset'

We live in challenging times. Change is rampant. The biggest challenge facing dairy farmers is to close the gap between the potential as identified by research and on-farm performance. Some dairy farmers believe that this gap can be closed; they are right. Many others believe that this gap will never be closed; they are also right. Having the 'right mindset' is a prerequisite if you are to 'close the gap'.

You can achieve anything you want, if you know what you want, know why you want it, and are prepared to do what has to be done to get it. We don't always get what we want; we get what we expect. If we are to get what we want, we must prepare for it[9]. We must commit ourselves to increasing milk output. Commitment is the act of

making a decision; when you commit to something, you are cutting away all other possibilities, all other options … all the rationalisations, all the excuses[3].
If change is to be positive, it must be planned by, and executed by you. Change forced on you will not work. You must take responsibility for the changes that have happened or that have to happen on your farms; your business performance is a direct result of your decisions[5]. You must accept the new market realities; price volatility is here to stay. Once you accept this, many other decisions should be easier to make.

Why expansion is necessary

We finally have an opportunity to grow the Irish dairy industry after nearly thirty years of supply control. Expansion is necessary for individual dairy farmers and for the dairy industry for a number of reasons. These include[10]:

- To maintain or increase income;
- To provide security for retirement/ rainy day;
- To build an asset for the next generation;
- To benefit to the Irish Economy – both local and national ;
- Scale is necessary to cope with price volatility (but only if efficiency is right).

For dairy farmers with the capability and motivation to improve their farm incomes, improved efficiency represents the quickest and cheapest way forward. Expansion represents the best option available to very efficient farmers who wish to maintain or increase farm income. However, expansion does not represent a viable option for inefficient farmers, because expansion involves increased investment, more borrowings and possible reduced cash flow[11]. Productivity improvements and efficiency must come first and only then be followed by scale increases.

Expansion potential

I believe that the dairy industry offers significant untapped potential. A lot of this future potential is sitting under our noses waiting to be tapped. Expansion will be achieved through two channels: increased deliveries of milk solids per cow and increased cow numbers on the milking platform.

Increased output per cow can be achieved through improved breeding, improved herd and grassland management and longer lactations. As such it should not incur significant additional production costs.

The capacity to carry additional cows on the milking platform will depend on the current stocking rate on the milking platform and the ability of the milking platform to grow the required amount of grass to support the higher stocking rate. After all there is little point in increasing cow numbers, and stocking rate, and having to purchase feed onto the farm. Our competitive advantage is in our ability to grow large amounts of grass; the returns from milk production will depend on our ability to efficiently convert this grass into milk.

Recent research[12] has indicated that dairy cow numbers could increase by 48 per cent on the existing 'national' dairy platform. Combined with a 2 per cent annual productivity gain in milk deliveries, this would see milk production increase by 72 per cent by 2020. A number of factors influence our ability to expand milk sales by this amount. These include: the number of farmers exiting milk production, annual productivity gains, expansion costs and milk price.

It has also been estimated[13] that an increase in dairy cow numbers of 270,000 (24 per cent) over the decade combined with an annual productivity improvement of 1.5 to 2.0 per cent per year will lead to an increase in milk production of 47 per cent. Without annual productivity gains, more cows and land will be required. Additional replacements will be needed to grow the National Herd.

Productivity

Increased productivity is a must. More cows per person, more grass per hectare, more production per hectare and per person. Farmers in other parts of the world are increasing productivity faster than Irish dairy farmers. It is not that it cannot be done, but how can it be done? Increased productivity will lead to improved profits. Small changes in two (or more) factors can combine to yield big changes in the key drivers of profitability. A recent survey[14] concluded that there is considerable underutilisation of existing animals, land and labour with considerable scope for increased productivity, increased stocking rate and increased specialisation in dairying.

Teagasc is very clear on the three main factors which will drive productivity improvements on dairy farms. They are:

- More grass per hectare – each extra one tonne grass dry matter utilised per hectare will lead to an increase of €200 in profit;
- The right cow will produce more milk solids, calve once per year and last in the herd for 5.5 lactations;
- Cost control will ensure that only necessary costs are incurred.

Dairy farmers have no option but to increase efficiency and scale of production if they are to maintain incomes. Acquiring and applying newer skills and knowledge needed for more efficient milk production is essential. Research develops new technologies which will allow dairy farmers to increase scale while at the same time reduce the unit cost of production. Membership of a discussion group will provide dairy farmers with the knowledge, skills and support required to adopt proven technologies and to trial newer technologies on their farms.

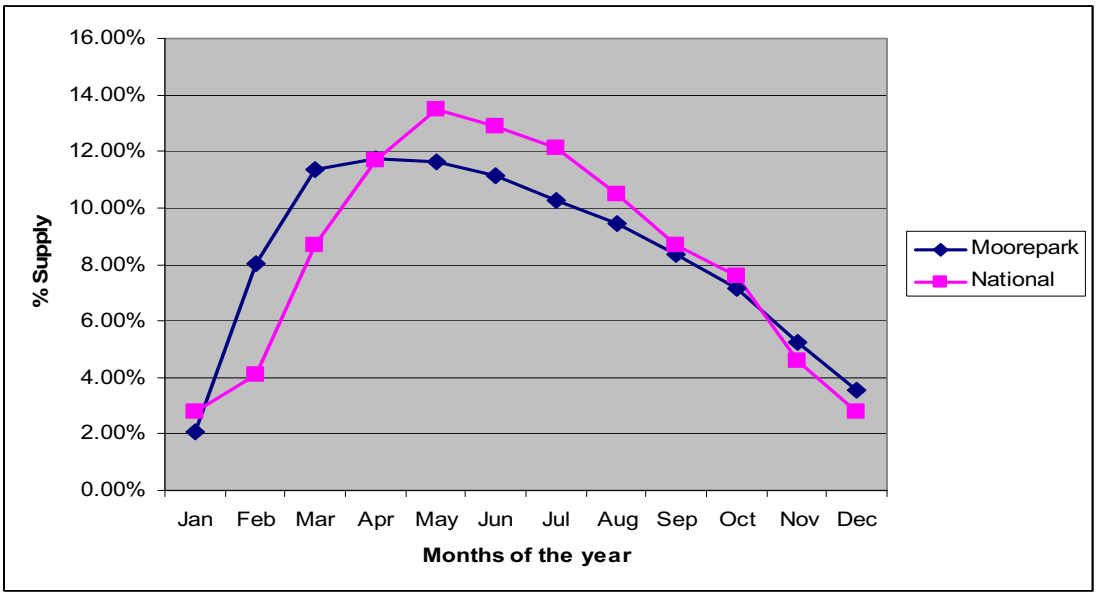
Calving pattern and supply profile

Calving date has the biggest impact on milk supply profile; feeding and management also play a part. Mean calving date had moved forward from 18th March in 1975 to approximately 1st February in 1985. However since 1985, mean calving date has

slipped back to where it was in 1975. The introduction of the Economic Breeding Index (EBI) has helped to address the decline in herd fertility but we need to see increased AI usage of high EBI bulls to continue the genetic progress made to date.

Figure 1 shows the milk production profile for Irish spring calving herds and that being achieved at Moorepark with the high EBI herd on a grass-based milk production system[13]. Mean calving date in the Moorepark herd is the 10th to 15th February compared to mid-March nationally. Seventy per cent of the cows are calved in the Moorepark herd by the 1st March compared to 40 per cent nationally. Thirty per cent of annual milk production is produced in the months of February, March and April in the Moorepark herd compared to 21 per cent nationally. Peak milk supply occurs in late-April to early-May in the Moorepark herd while nationally it occurs in late May/ early June. Plant processing capacity utilisation is approximately 5 per cent higher (~65 per cent) using the milk production profile from the Moorepark herd compared to that being achieved nationally.

Figure 1: Lactation profile for Moorepark and National spring milk production.



Economic analysis[15] of the impact of calving date on farm profitability in a non-quota environment has shown that:

- A mean calving date of 14th February compared to 1st or 15th March will result in increased milk sales, increased milk revenue and higher overall profitability;
- With an earlier calving date (31st January), the gains in milk receipts are outweighed by the increased costs leading to lower overall profitability;
- The advantage of a mid-February calving date over earlier or later dates was evident at both a 'low' and 'high' milk price but the advantage of achieving the optimum calving date was greater at the 'low' milk price.

Finance

Access to credit in adequate amounts, at competitive rates and terms, is a key success factor for any growing business. An expanding dairy sector will require finance for growth:

- Dairy farmers to fund appropriate on-farm infrastructural improvements and working capital;
- Milk processors to fund modernisation of plant and investment in new processing capacity;
- The Irish Dairy Board to develop new routes to market and working capital.

If you as a dairy farmer are to get the best deal from your bank(s), you must be highly businesslike in running an efficient and effective farm business and you must manage the relationship with your bank. You have absolute control over both.

And a word of warning. Don't underestimate the short-term impact on cash flow of expansion.

Risks

There are a number of risks which both the dairy industry, and each dairy farmer, faces in the next decade. These include:

- Price volatility;
- Super Levy in the remaining four years of the EU Milk Quota regime;
- 'Processing Rights' – who will pay for the additional processing capacity?
- Supply Profile (processing capacity is 60% utilised with a current peak to trough ratio of 6:1);
- Failure to optimise the use of existing processing capacity and efficiently build the required additional processing capacity;
- Failure to secure the routes to market for additional milk products;
- 'Mindset' and managerial capacity;
- Environmental limitations;
- Availability of finance for expansion at producer and processor levels and to fund the development of new routes to market.

We know that:

- Milk Quotas are in place until 31st March 2015;
- Ireland was 5.1 per cent under quota at the end of September 2010;
- The current Super Levy fine is 28.66 cent per litre;
- There is an expected 2 - 4% increase in the national dairy herd in 2011;
- 1 per cent additional Milk Quota in 2011/12, 2012/13, 2013/14.

We don't know:

- What weather patterns we will have in the next decade;
- What milk price will be paid in the future but we do know that milk price volatility will be a feature;
- Whether our current processing capacity is adequate to cope with expected milk supplies to 2015;
- What arrangements will be in place post the removal of Milk Quotas in 2015 i.e. Processing Rights?

Every farmer must weigh up the information available to him and apply it to their situation. You must look at the costs or benefits of taking action (or doing nothing). Then decide on your attitude towards risk (risk averse or risk taker). And remember that every decision involves risk; some decisions involve more risk than others.

Figure 2: The Risk Matrix.

		Threat Level		
	High	Medium	High	Critical
Likelihood	Medium	Low	Medium	High
	Low	Low	Low	Medium
		Low	Medium	High
		Impact		

What are the options available to dairy farmers for the remaining four years of EU Milk Quota?

The first option is to do nothing and wait to start breeding extra heifers until spring 2012 at least. But it takes time to build your herd size and you might arrive late to the expansion drive.

The second option is to breed more heifers now; many farmers are already doing this. In that case you will need to examine the risk of Super Levy on your farm and look at spreading your risk by selecting some of the following options:

- Purchase quota (Milk Quota Trading Scheme);
- Enter a farm partnership;
- Sell surplus heifers;
- 'Upgrade herd' – sell surplus cows;
- Lease cows to another farmer;
- Reduce meal feeding;

- Include a figure for cost of Super Levy in cash flow;
- Once-a-day milking;
- Early dry-off.

What must Teagasc do?

Teagasc, its researchers, advisers and specialists, must play their part in leading this exciting growth phase of the dairy sector. We must inspire and motivate farmers and industry personnel towards achievement of the vision. We must work with farmers to set goals/ targets for their farms, equip them with the skills necessary to achieve their goals and help them to monitor their performance over time.

Teagasc must redouble its efforts to ensure that proven technologies are adopted by an increasing number of dairy farmers. This can be achieved through discussion groups/ Dairy Efficiency Programme (DEP) but will be made easier if dairy farmers can associate the adoption of grass, breeding and cost control technologies with successful expansion of their farms, and the Irish dairy industry. Farmer education and capacity building, leading to an improved ability to make the changes required, will be central to the achievement of the growth in milk output.

The Moorepark Food Research Centre including Moorepark Technology Ltd. must achieve greater innovation impact by ensuring that the knowledge generated through research is applied by milk processors in the development of innovative products.

I believe that there is an opportunity to re-examine the grassland and animal production research which was carried out in the period 1975 – 1985 to see if lessons learnt then (in a non-quota environment) can be applied now.

Conflicting messages create confusion and slow down practice adoption and change. Teagasc must play a greater role in co-ordinating messages on breeding and grassland. Researchers, advisers and specialists need to engage with service providers and other stakeholders to ensure the delivery of consistent messages.

Teagasc must also inform the debate about a number of issues central to the successful expansion of the Irish dairy industry. These include:

- A product plan for Irish milk production post 2015;
- The management of increased milk supply between now and 31st March 2015;
- The development of appropriate milk supply profiles to optimise the returns to dairy farmers, processors and marketers;
- Ensuring the availability of land for dairy production/ farm structures;
- Finance for expansion.

Success is …

Jamie Fitzgerald is a New Zealander with a number of significant sporting achievements including the world record for rowing across the Atlantic Ocean. In 2009 he addressed[16] the South Island Dairy Conference (SIDE) in Christchurch New Zealand and concluded as follows:

"*How we cope with times of adversity and deal with ambiguity can create an ultimate and sustainable competitive edge. It isn't just bloody-mindedness. Rather, success is the result of stretching ourselves – thinking the options through analytically, backing our judgement, adapting our processes, and believing in our ability.*"

We have an once-in-a-lifetime opportunity to grow the Irish Dairy Industry. I believe we can grow milk production by 50 per cent by 2020, but only if we do the right things and take the right decisions now. Our destination has been identified; it is up to us to complete the journey.

Notes

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Tackling SCC: The Australian Experience
Countdown Downunder: Australia's mastitis and cell count control programme

Pauline Brightling and John Penry
Harris Park Group, 22 William St, Melbourne, Australia 3000

Summary
The success of the Australian dairy industry is underpinned by supply of high quality dairy products to domestic and international markets. The quality of raw milk at the farm gate sets the ceiling on the quality of dairy products (put simply, there is no 'fix' beyond the farm for poor milk quality). Maintaining milk quality is a complex, multi-factorial activity that relies on good mastitis control and good milk harvesting practices.

Australia's milk quality is a combination of outputs from 7,500 dairy farm businesses. To reduce the risk of mastitis, farms need to have consistent milking routines, optimal milking machine performance, and good management practices and hygiene at milking, drying-off and calving *every day*. Knowing what to do and always being able to respond appropriately to changes in circumstances is a lot to ask of farm teams. An 'enabling' environment that supports farmers to achieve this (such as having access to independent information and resources, skilled dairy service providers, competent staff and good data) requires a collective approach to be achievable and affordable.

Dairy Australia's Countdown Downunder program is the industry's investment in mastitis control and milk quality. Since its inception in 1998 it has guided the overall culture change toward the goal of every vat collected being below 400,000 cells/ml. Countdown has created guidelines, tools and training and developed networks of veterinarians, milking machine technicians and other advisers who can work together with farmers to solve mastitis problems or maintain mastitis control by reducing risks.

Farmers who have participated in Countdown activities have achieved better mastitis control than the national average. Progress has been achieved despite the challenges of nation-wide drought.

The drivers behind the investment in Countdown
The impetus for a collective investment in mastitis and milk quality control (branded Countdown Downunder) came from a meeting in 1997 of stakeholders convened by Dairy Australia (the Research & Development Corporation funded by farmer levies). The meeting had representatives from peak industry bodies of dairy farmers, dairy processing companies, product and equipment suppliers, veterinary pharmaceutical companies, milking machine technicians and veterinarians.

Key issues tabled at that time:

- Dairy processing companies realised that they could make better quality product more cheaply from raw milk that had lower somatic cell counts.
- A new directive was being introduced by the European Union placing a somatic cell count cap on milk entering the food chain. The Australian dairy industry needed to form a position on this, given their large export market.
- One of the major dairy companies had been paying differentially on milk quality for a few years and had some immediate success. However progress had stopped and senior management believed that offering penalties and incentives for milk quality was not enough - many farmers did not know how to act.
- Farmers were concerned about increasing rates of clinical cases - especially after a wet winter.
- Although Australia had pockets of research interest, their work tended to be locked within states and organizations and there was no means for promoting use of the science to improve milk quality (such as how to incorporate cell count information into drying-off decisions etc).
- Strong leadership was needed to ensure that the industry could allay concerns about the possibility of antibiotic residues in dairy products.

There was sufficient stakeholder commitment to resource an effort to support export and domestic markets by achieving high quality milk. Countdown was consequently commissioned to deliver specific industry outcomes through five funding cycles between 1998 and 2010.

The design and initial building phase (1998-2003)

Countdown wanted to help farmers to get things right every day and to give them access to effective investigation teams to solve mastitis problems.

►Giving ownership to the industry and setting goals

Countdown's development was guided by the Australian Mastitis Advisory Council. This Council included representatives from the peak bodies of the dairy industry and helped ensure each industry segment had confidence in Countdown's recommendations. It also ensured that Countdown was independent of commercial interests.

This Council set the industry goals for milk quality:

- **100% of vats with a cell count below 400,000 cells/ml and**
- **90% of vats with cell counts below 250,000 cells/ml.**

These thresholds were highly relevant for maintaining our international reputation for milk quality and striving for improved farm profitability.

►Defining best practice – and making it easy to follow

Sustainable change in work practices on every dairy farm would require:

- Practical advice that farmers and their staff could integrate into their daily work;
- A cadre of trained professional dairy advisers providing consistent advice;
- Dairy advisers working across disciplines to solve problems;
- Regional and national support and encouragement for advisers taking the right approach;
- Supporting information delivered to dairy farmers via advisers and the media.

Throughout the initial planning phase, the Countdown team worked to create the *Countdown Downunder Farm Guidelines for Mastitis Control*. These Farm Guidelines were launched with the project in December 1998. They are a best practice manual for farmers. The Farm Guidelines describe how to prevent and control mastitis in a step-by-step seasonal guide.

The scientific and technical accuracy of the Farm Guidelines is underpinned by the *Countdown Downunder Technotes* - an essential reference for dairy advisers. They provide the evidence to substantiate the recommendations in the Guidelines.

All Countdown's advice and online and training resources are grounded in the Guidelines and the Technotes. These two documents together changed the way advisers talked about mastitis. Rather than worrying about technical uncertainties, there was a sense that mastitis can be controlled by good management, rather than waiting for a new "silver bullet" fix.

►Building a new mastitis control 'frontline' in each dairying region

Discussions with farmers showed that it would not be sufficient for the project to simply deliver "the right information" to farmers. The Farm Guideline recommendations were most likely to be adopted when farmers directly interact with the professionals who advised them. So Countdown set out to identify these professionals, then to empower and support them so that they could help their clients implement best practice mastitis control.

The first step was to identify Australia's (approximately 1,000) dairy advisers and brief them on Countdown. Coordinators were appointed in each dairying region. Each coordinator developed a database of dairy advisers in their region then organised seminars for them.

As the project developed, many (over 400) of these advisers went on to participate in the 4-day Adviser Short Course. These "Countdown-trained" advisers were then at Countdown's frontline, interacting with farmers in their localities. Countdown's philosophy was to build a network of advisers, to design and pilot Countdown training, and then to ask the people who would benefit to pay for the actual delivery costs.

The Countdown Adviser Short Course particularly focussed on helping multi-disciplinary teams of advisers to successfully investigate and solve mastitis problems for farmers - to achieve better problem definition and produce more workable plans.

The advisory population continually changes as people take on new roles, or enter or leave the industry. All projects that use service providers as their extension frontline must provide ongoing opportunities for training, open discussion and face-to-face meetings to maintain active and effective regional networks.

►Recognising high achieving farmers

In 2001 Countdown established the national Milk Quality Award. This award recognises the 5% of suppliers across Australia who had the lowest average bulk milk cell counts and helps focus attention on milk quality issues.

Consolidation phase and further research (2004-2007)

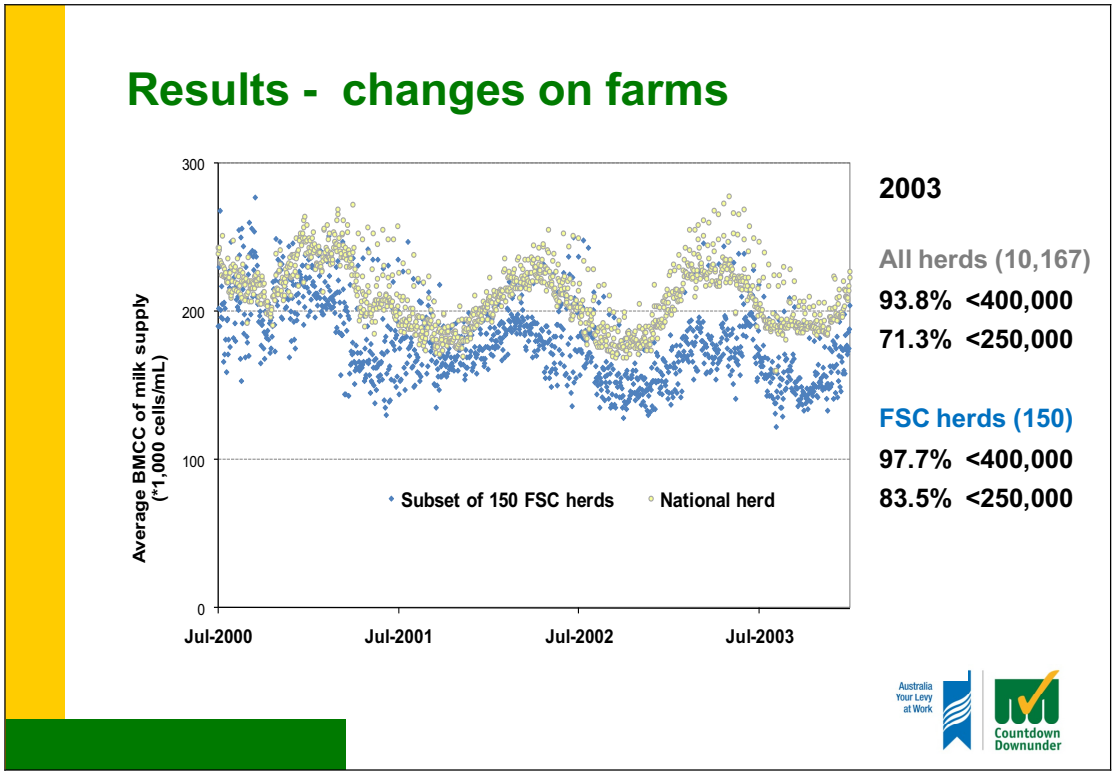
The challenge in the next phase was to translate the knowledge and skills of the whole farm team (farmers and advisers) into continuous improvement and risk management on farm. Farmers and their advisers needed to work jointly to prioritise udder health activities and regularly review and build on the outcomes.

To help achieve this, Countdown worked to extend the planning skills of the farm team and develop new tools to help them review progress (Countdown Mastitis Focus), make informed decisions at critical times and assess how effort in mastitis control and milk quality fits within their overall farm business.

The Countdown Farmer Short Course, in particular, was designed to improve the mastitis management capacity of farmers and help them develop Mastitis Action Plans tailored to their herd and situation. Post-course surveys found that most of the 1,800 farmers who had participated in the course were more confident and competent in managing cell counts

►Impact of participation in the Countdown training

Farmer Short Course survey herds already had a lower cell count than the national herd and this difference became more marked.

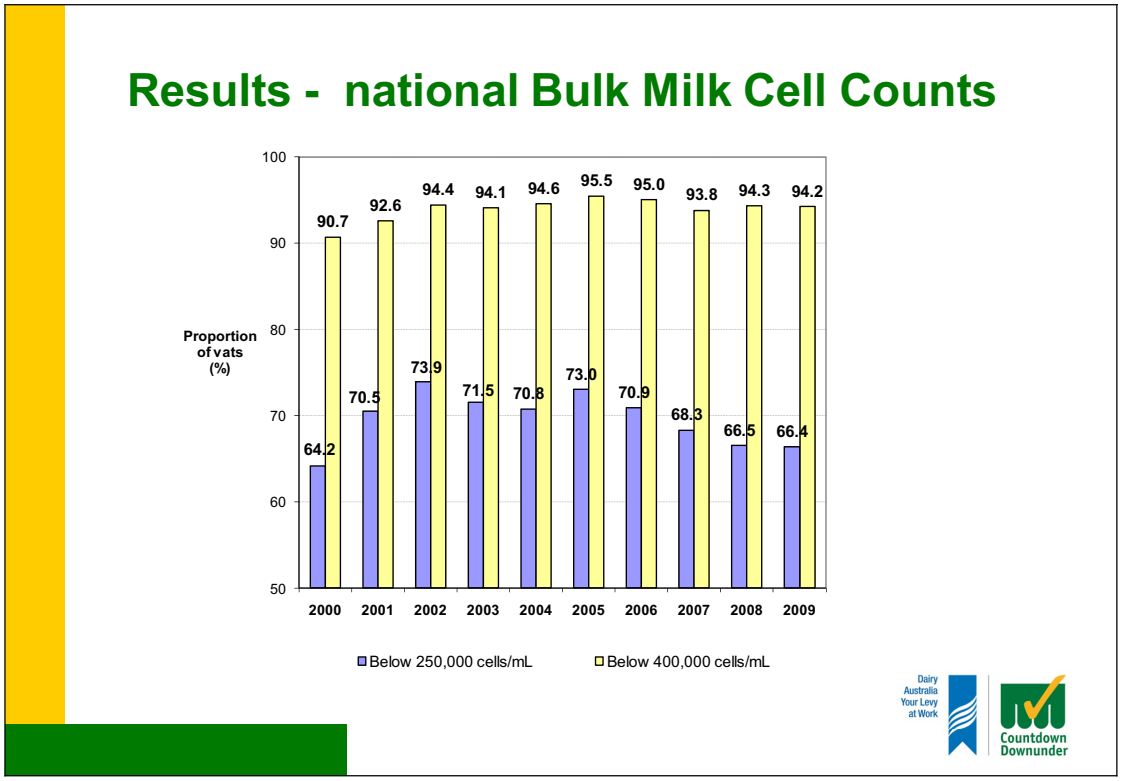


In the Australia-wide drought of 2003-2005, milk prices were low and costs relating to feed and water were high, and many farmers were forced to reduce their expenditure on udder health (dry cow treatments etc.) which had an adverse effect on milk quality. Drought conditions in 2007-2009 in some regions continued the stress despites some better milk prices.

In 2003 cell count data for a subset of (150) course farmers showed that they, in contrast to the national figures, maintained better milk quality in 2003.This was very encouraging as many of these farmers had used Countdown's key messages to better manage risks. Their increased management capacity had helped them maintain milk quality even in adverse circumstances. Without this increased capacity, the cell count of the national herd in 2003 and the flow-on implications for 2004 would have been higher.

►Progress toward the industry cell count goals

Despite significant challenges during the last decade, Australia has maintaining its position as a supplier of high quality milk and has made progress towards the target to have all vats below 400,000 cells/ml.



The Countdown messages are now part of the approach to dairying in Australia.

The new approach - case study: "Attacking the mastitis problem"

When Mike and Sarah O'Brien arrived as Farm Managers at the Macalister Demonstration Farm in July 2007 they inherited a herd with a history of high Bulk Milk Cell Count (BMCC) levels. They set themselves a goal to reduce BMCC to below 250,000 cells/ml and consistently achieve premium milk prices within three years. At the end of their second milk season and the beginning of their second calving, after two years of hard work and focus they are well on the way to a herd at the premium level.

Setting a goal, making a plan

Working with vet, Dr Mark Humphris, Mike and Sarah developed a plan based on the principles of the national mastitis program, Countdown Downunder. By sticking to their plan they have been able to reduce calving time mastitis (clinical?) in the heifers from 26% to 3% and in cows from 8% to 2%. Over the same period the number of cows in the herd with one ICCC greater than 250,000 cells/ml in the season fell from 67% in 2006-07 season to 25% in the 2008-09 season.

Building a relationship with their vet

If today's milk quality figures (BMCC) are substituted into the milk production figures of 06-07, before mastitis control became such a focus, the farm would have earned an extra $11,100 (an increase of 1.5%) in milk income. This doesn't include any of the extra milk production that results from better mastitis control and more than compensates for the estimated $1,200 cost of teat sealing heifers.

Monitoring progress

Milking has become progressively easier and much better for milking staff with fewer cows to exclude from the vat and no second herd to contend with. Everyone is happier!

Articulating the benefits

Macalister Demonstration Farm Newsletter 21, July 2009

Tackling SCC - The Irish Position and Recent Research

Finola Mc Coy

Animal & Grassland Research and Innovation Centre, Moorepark, Fermoy

Abstract

High somatic cell counts (SCC) are a challenge to all dairy farms at different times throughout the year and are resulting in major financial losses which are eroding farm profitability. All too often, mastitis and SCC are viewed as unrelated challenges and seen as something outside our control, something we “have to put up with”. However, with an understanding of the dynamics of infection within our herds, this doesn’t have to be the case. So how can we achieve better mastitis control on farm? Recent Teagasc research has looked at a team based approach to mastitis control. It has highlighted factors that motivate change on farm, as well as obstacles to change. If we look internationally there are several successful examples of structured approaches to mastitis control. It’s clear that a collective, multidisciplinary approach is most successful, and it is in this context that Animal Health Ireland (AHI) is working for the industry. Using the existing tools and knowledge from home and abroad we have the opportunity as an industry, with AHI co-ordinating the various stakeholders, to develop a collaborative programme that will provide sustainable solutions to mastitis control.

Background

High SCC are a challenge to all dairy farms at different times throughout the year and are resulting in major financial losses which are eroding farm profitability. Somatic cells are found in milk in response to infection in the mammary gland and indicate the presence of mastitis. All too often, mastitis and SCC are viewed as unrelated challenges. High bulk milk somatic cell count (BMSCC) is often seen as something outside our control, something we “have to put up with”. However, with an understanding of the dynamics of infection within our herds, this doesn’t have to be the case.

The dynamics of infection

At any one time in our dairy herds, a proportion of the animals are infected with mastitis (both clinical and subclinical), while the remainder of the milking herd are uninfected. These categories are not static. The status of these animals can change over time, with uninfected animals becoming infected with intramammary pathogens, and infected animals being cured. There are many factors that influence these dynamics of disease. Treatment (lactating cow therapy and dry cow therapy) and self

cure are the tools for returning infected cows to the uninfected group. However, there are a greater number of factors that can drive cows from the uninfected to the infected category. If we ensure that these factors are optimal, then we can influence the likelihood of an animal becoming infected. These factors include the environment, the milking machine, milking routine, cow factors and hygiene.

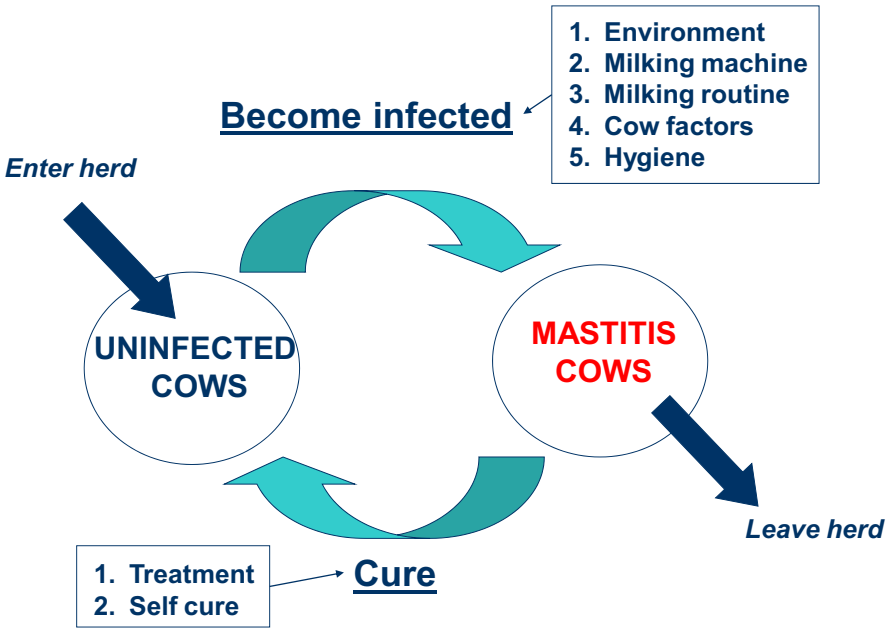


Figure 1: The dynamics of udder infection.

Looking at the dynamics of udder disease in this way identifies some clear points:

- Due to its dynamic nature, mastitis is something that we must aim to control, not eradicate and then forget about;
- Mastitis is a multifactorial disease, thus there is no “one solution” or “magic bullet”;
- Due to the multifactorial nature of mastitis, it is important that people with various strengths and skills in the factor areas mentioned above work together to develop appropriate plans and solutions for farmers.

The cost of mastitis

Another common belief is that mastitis control is a costly exercise. This is not always true, as in fact many solutions to reducing SCC levels involve changing milking or management practices, or an investment of time and attention to detail, rather than a large financial outlay. The benefits of change and the cost of “staying the same” are far greater than the benefits of “staying the same” and the cost of change. The financial gains to be made from improved control of this disease are substantial and often forgotten about. We can easily quantify the payment penalties incurred for a

BMSCC over 400,000 cells/ml, and for some suppliers bonus payments may be lost when top quality is not achieved (e.g. SCC<200,000 cells/ml). Clinical cases of mastitis also incur costs, including treatment costs, loss of milk during treatment period and subsequent impact on yield, not to mention the stress and time involved in dealing with clinical cases. By far the greatest cost associated with udder infection, is the production loss that results from subclinical infection. Cows with high SCC are not yielding to their full potential, mainly due to damage and loss of milk secretory tissue in the udder. For example, a cow with a SCC of 350,000cells/ml is producing about 0.5L less milk per day than if her SCC were 250,000cells/ml. The culling costs associated with chronically infected cows are also hugely significant. In an era of herd expansion, the focus needs to be on growing a herd of healthy animals, not just replacing less productive animals.

Staying within the dairy industry, but moving outside the farm gate, there are also gains to be made within the processing industry from a higher quality raw product. SCC impacts negatively on of the processability of milk, the shelf life and the yield of final product and potentially on export market access. Thus high SCC potentially costs the processing industry a lot of money, the real cost of which has yet to be truly quantified.

Team-based approach to mastitis control, the €uroMilk pilot study

So how can we achieve better mastitis control on farm? Recent Teagasc research has looked at a team based approach to mastitis control. €uroMilk was a pilot study of 23 farmers and was based on a US model of mastitis control (MilkMoney). The participating Glanbia suppliers were asked to put together their own “milk quality teams”-people that they regularly engaged with in the area of mastitis control and farm management. Teams ranged in size from 4 to 7 people and included at least 3 of the following disciplines-Glanbia milk quality advisors, Teagasc farm advisors, vets, milking machine technicians and nutritionists. Many farmers also included family members and farm staff on their teams.

Teams met 5 times over 12 months, at regular intervals. All team members were expected to attend each meeting. The teams were supplied with meeting guidelines, which included a farm management questionnaire and forms with which to record farm targets and action plans. Team members were expected to use their existing knowledge and experience for problem-solving and strategic recommendations.

At the first meeting, individual farm problems were identified by analysing available information and listening to farmers’ own concerns. Available records varied from farm to farm, but included milk recording data, clinical case records, machine test reports and previous milk bacteriology results. Farm management practices, environment and infrastructure were also assessed using the management questionnaire supplied.

A simplified and conservative cost calculator was used to estimate the economic losses due to udder disease on the farm in the previous full year (2008). This included costs associated with co-op penalties, clinical cases of mastitis, culling of animals and production loss associated with subclinical infection. The average cost of mastitis in 2008 for each of the 23 farmers was almost €30,000 per farm, or €200 per cow.

Up to three targets were then set by the farmer. Farmers were asked to set targets that were specific, measurable, achievable, realistic and time-bound (SMART). They could be new targets e.g. reduce BMSCC from 400,000 cells/ml to 250,000 cells/ml or quantifying existing targets e.g. continue to keep the total bacterial count (TBC) below 50,000.

Action plans aimed at achieving the specific targets were then agreed upon by the team. The action plan was limited to four strategic tasks per meeting. One person was assigned responsibility for each task (in most cases responsibility lay with the host farmer). Tasks included corrective e.g. post-milking teat disinfection and investigative actions e.g. culture milk samples from infected cows. Some tasks were ongoing e.g. wear clean gloves during milking, while others were once-off changes e.g. service the milking machine. At subsequent meetings, progress on farm was discussed, completion of the agreed tasks was reviewed, and a further set of tasks was agreed upon.

Production data such as supplier data, milk recording data and farm records were collected during the course of the pilot study in 2009. Preliminary data analysis shows an average reduction in the bulk SCC of milk supplied by the pilot group of over 100,000 cells/ml between 2008 and 2009. The same trend was not observed in the complete population of Glanbia suppliers, with the average supplier SCC remaining the same in 2008 and 2009.

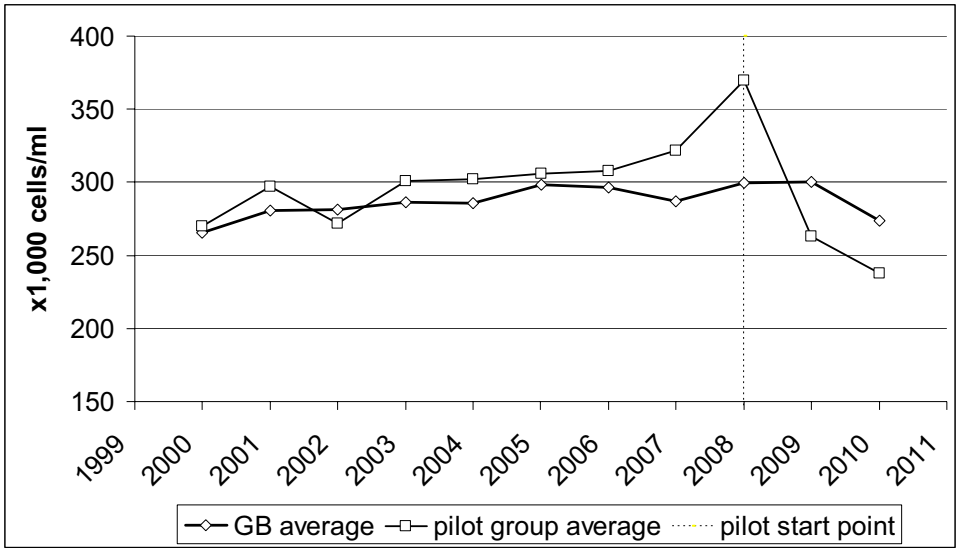


Figure 2: Average bulk SCC of pilot group, compared to all Glanbia suppliers (2000-July 2010).

Another very encouraging result from the study was a reduction in the number of cases of mastitis treated in the year of the pilot, as recorded by the participating farmers (38 Vs 22 cases per 100 cows). This suggests a reduction in the incidence of clinical mastitis, and/or a more prudent use of antibiotic treatments.

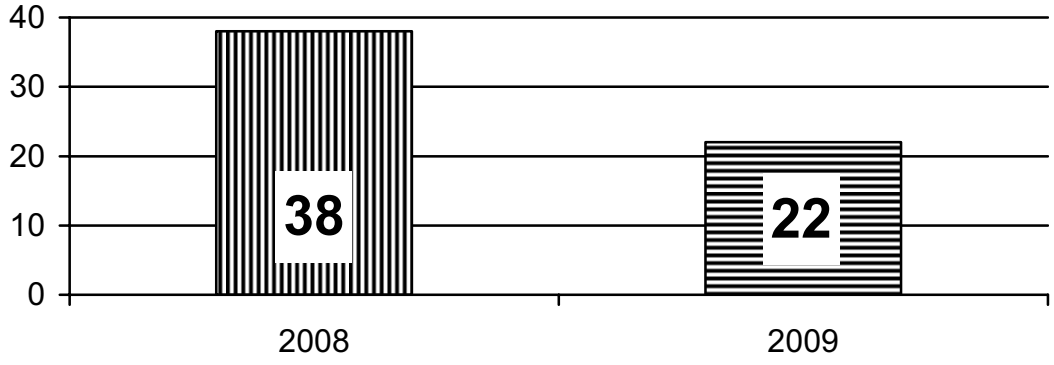


Figure 3: Average number of mastitis cases treated (per 100 cows) per farm (2008 & 2009).

At the end of the pilot study, the cost calculator was again used to estimate the economic losses due to udder disease on the farm, this time over the year of the study (2009). Again, the data included costs associated with co-op penalties, clinical cases of mastitis, culling of animals and production loss associated with subclinical

infection. The average cost per farm of udder disease was reduced by over €5,000, from almost €30,000 in 2008 to under €25,000 in 2009.

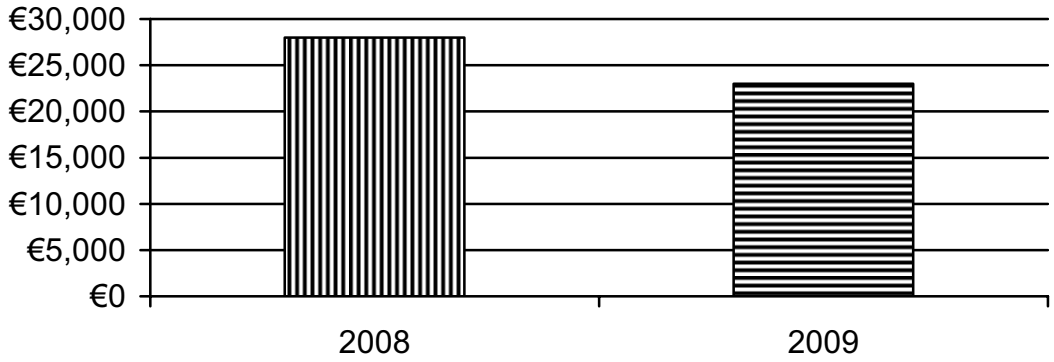


Figure 4: Average cost of udder disease per farm (2008 & 2009).

This pilot study also incorporated the work of a social scientist. One objective of this aspect of the study was to explore the obstacles to, and motivation for farmers to adopt changes and recommendations. We were also interested in investigating the feasibility of a team-based approach to mastitis control in the Irish dairy industry. Finally, we identified this pilot study as a starting point to help discover the recommendations and requirements for the future development and delivery of mastitis control programmes in Ireland. Face to face and telephone investigative interviews were conducted with participating farmers following each team meeting. Focus group sessions were also conducted with team members.

Motivating factors

Farmers directly acknowledged that both emotional distress and the financial impact of the mastitis problem on their farm motivated change. Understanding the extent of the “unseen” costs, identified through the use of the cost calculator in the project increased this motivation. The team structure was successful in providing motivation, through several avenues:

- Farmers responded to an informative, objective viewpoint;
- The multidisciplinary approach instilled confidence in the farmer;
- Farmers have a very strong sense of identity, and inclusion in the decision making process, as happened at these team meetings was important in initiating attitudinal and behavioural change;
- Inclusion of farm staff in teams motivated them to integrate suggested changes into their current routines;

- Teams that maintained realistic expectations of results were more successful in maintaining this motivation.

One of the key features of the €uroMilk pilot study was the holding of regular meetings on the farm. There were a number of benefits of this. The fact that the meetings were held on the farm, for the farm, provided farm-specific information, which proved to be very important. The provision of regular meetings in itself provided motivation for the farmer. This was because the regularity of the meetings highlighted the presence of a problem. Previously the farmers were "normalising" the situation. However, the structured approach created awareness and understanding of the causes of the problem, which in turn empowered and motivated the farmer. "Repetition, repetition, repetition" is a phrase we often hear, and it emerged as important in this pilot study. Consistency and repetition reinforced the messages and the importance of behavioural change. The regularity of the meetings facilitated regular monitoring of outcomes and discussion.

Other positive outcomes that were documented from the pilot study were:

- Establishment of communication networks between professions;
- Learning from and a greater understanding of other disciplines;
- Demonstration of the importance of the working relationship in influencing choice of team members, interaction with members and perception of information and knowledge relayed. This emphasises the importance of engaging with farmers' regular service providers;
- Many of the teams chose to continue working together, independently of the pilot study, in the area of mastitis control. Some farmers also chose to use the team-based approach to address other farm issues such as calf health.

Obstacles to change

Obstacles to change cannot be underestimated, and are an important consideration in influencing adoption of technology and practices. Various obstacles were identified during the pilot study, including a poor understanding of subclinical disease. Some farmers were sceptical about recommendations given, having previous experience of what they perceived as "ineffective treatments". However, in many cases, these previous "solutions" were not appropriate to the farm problem, or were adopted with unrealistic expectations of the results. The practicalities and ease of altering the existing routine can be a challenge, which is sometimes given little consideration by the service provider. The availability of existing farm resources such as labour, and the limitations of farm infrastructure can impede change. Farmers will naturally weigh up the financial cost and implications of change, but we often forget to balance this against the financial benefits of that same change. The study also showed that

farmers regularly use the penalty level i.e. SCC 400,000 cells/ml as their farm target, rather than setting targets for maximum quality, productivity and profitability.

Recommendations for future development

Recommendations that arose from the Teagasc research and requirements for future development of a programme such as this included:

- To agree on evidence-based science, target existing research gaps and minimise the need to rely on anecdote;
- A demand for consistent training and education, both for farmers and service providers;
- A greater need to increase the awareness of the existence of infection, including the costs associated with subclinical infection;
- A need to agree on national targets, and to move away from seeing 400,000 cells/ml as an acceptable on-farm target;
- To investigate how advisory work such as this can be developed and integrated into businesses and presented as a value service.

Where to for Ireland, to enhance milk quality?

If we look internationally there are several successful examples of structured approaches to mastitis control e.g. the Countdown Downunder programme developed by DairyAustralia, and the work of the Dutch Udder Health Centre. How can we best use the knowledge and the tools that exist both at home and abroad, in Ireland? It's clear that a collective, multidisciplinary approach is most successful, and it is in this context that Animal Health Ireland (AHI) is working for the industry.

The mission of the AHI initiative is to develop and deliver, in partnership with other stakeholders, a sustainable mastitis control programme for Irish farmers and the dairy sector. This mastitis control programme will improve milk quality by reducing the SCC to agreed standards, thereby contributing to improved dairy profitability. With AHI co-ordinating the various stakeholders we have the opportunity, as an industry, to develop a collaborative programme that will provide sustainable solutions to mastitis control. Using the knowledge that we have gained from recent Irish research, along with the experiences of other countries it will allow us to tailor a programme relevant and appropriate to the Irish dairy industry, in the most time- and resource-efficient way. Collaboration between AHI and Dairy Australia has already provided AHI with access to the very successful Countdown Downunder programme materials and "intellectual property".

The groundwork has already started. A technical working group on milk quality has been initiated. This group consists of experienced practitioners and other experts from a variety of fields. The group is tasked with drawing up agreed science and protocols for mastitis control. In particular, the milk quality technical working group will be asked to review, update and adapt as necessary the evidence-based technical materials made available by Dairy Australia. This work will be one of the fundamental steps in the AHI initiative, ensuring that simple, consistent and science-based advice is made available to the industry.

In tandem with this, economic analysis is being carried out in order to quantify more accurately the current cost of udder disease in Ireland, both at farm and industry levels, and the financial opportunities that exist with improved mastitis control.

Work has also commenced to explore in more detail the drivers for change both at farm level and within the industry, based on initial findings from the Teagasc €uroMilk study. A series of planning workshops has commenced, and is ongoing, incorporating the experience of the Australian project team, and ongoing consultation with Irish industry representatives.

Finally, the first year of the initiative will focus on creating awareness and information, which will be built upon as we work together towards the long term goal of a fundamental change in the way we view and deal with milk quality.

The Benefits of the Membership of a Dairy Farm Discussion Group: Evidence from the Irish National Farm Survey

Thia Hennessy[1] and Carol Newman[2]
1 Agricultural Economics Department, Teagasc, Athenry, Co Galway
2 Department of Economics, Trinity College Dublin.

Introduction

In December 2009 the Irish Department of Agriculture launched the Dairy Efficiency Programme. The Dairy Efficiency Programme is designed to encourage efficiency gains on dairy farms by supporting the transfer of technology. The Department of Agriculture will make €6 million available in each of 2010, 2011 and 2012 to encourage participation in discussion groups. Farmers will receive a payment of approximately €1,000 for participation. While payment for participation is a new phenomenon, dairy farm discussion groups have been in operation for a number of years. The objective of this paper is to examine the role of discussion groups in relation to technology adoption and farm profit. Drawing on Teagasc National Farm Survey data from 2008 and 2009, the economic benefit of participating in a discussion group is examined in this paper.

Data on Discussion Group Membership

The National Farm Survey (NFS), operated by Teagasc, surveys a sample of approximately 1,200 farms each year. The stratified random sample is selected to be nationally representative of Irish farming and each farm that participates in the survey is assigned a national aggregation factor. Hence, the sample of 1,200 farms is weighted to represent approximately 120,000 farms nationally. There are approximately 330 dairy farms participating in the survey each year and these farms represent the national population of dairy farms, recorded at 18,930 as of April 2009.

The NFS has recorded data on membership of a dairy farm discussion group for the years 2008 and 2009 (Connolly et al., 2008 and 2009). This data, coupled with the existing NFS dairy database, proves very useful in that it allows us to assess the economic benefits of membership in a discussion group and its overall relationship with total costs. Focussing on just dairy farms, Table 1 shows the number of farmers participating in the survey and the number of those that were members of discussion groups.

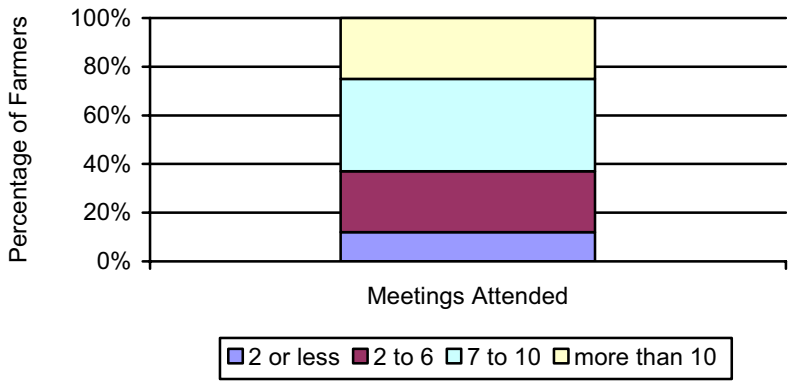
Table 1: Membership of Discussion Groups.

	2008	2009
Sample of Farms	320	335
Percentage of Farmers in Discussion Groups	24	26
Average length of membership (years)		8
Percentage of Members in Teagasc Groups		91
Percentage of Members in non-Teagasc Groups		9

Source: NFS – Connolly et al. (2008) & Connolly et al (2009).

Across 2008 and 2009 about one quarter of the sample of dairy farmers participated in discussion groups. It is important to note that the Dairy Efficiency Programme was not announced until December 2009 and so this sample reflects farmers that participated in discussion groups before the financial incentive was introduced. The long history of discussion groups is evident from the average length of membership in the group; 8 years for the 2009 sample. Four of the farms surveyed stated that they had been members of discussion groups since the early 1980s. The large majority of farmers (91%) are members of Teagasc co-ordinated discussion groups.

Figure 1: Number of discussion group meetings attended in 2009.



Source: NFS – Connolly et al. (2009).

Figure 1 shows the number of meetings attended by members each year. The average number of meetings attend per year was 8. About 10 percent of farms attended 2 meetings in the year or less, about 25 percent attended between 2 and 6 meetings, 38 percent of farms attended between 7 and 10 meetings, while 25 percent attended more than 10 meetings.

Using the wider NFS database it is possible to examine the characteristics of discussion group members and non-members (Table 2). As can be seen discussion group members have, on average, larger farms and larger herds. Discussion group members' farms also tend to be more intensively stocked, with members producing 9,724 litres per hectare compared to 7,642 litres per hectare for non-members. In terms of the use of purchased concentrate feed, discussion group members seem to

use concentrate feed more efficiently, delivering 6.8 litres of milk per kilogram of concentrate feed used compared to 5.8 for non-members. Discussion group members also tend to have a longer grazing season, achieving 248 days at grass in 2009 compared to a national average of 235 days for all dairy farms. The differences in milk solids per cow between discussion group members and non-members are small, but the differences in milk quality, in terms of somatic cell count, is more considerable. Discussion group members have an average somatic cell count of 230,000 cells/ml compared to the average for the full sample of 270,000.

Table 2: Summary Statistics 2009.

Variable	Measure	Member	Non-Member	All
Size of Farm	Hectares of area	66	49	53
Size of Herd	Cows	75	45	53
Output per hectare	Litres/ha	9,724	7,642	8,195
Milk sold per kg Concentrate Fed	Litres / Kilograms	6.8	5.8	6.1
Grazing Season	Days at grass	248	230	235
Milk solids per cow	Kilograms	331	330	335
Somatic Cell Count	'000 cells/ml	230	280	270
Age of Farmer	Years	47	52	51
Region = South	% of farmers	38	62	
Region = South west	% of farmers	17	83	
Region = East	% of farmers	32	68	
Region = Border, Midland & West	% of farmers	22	78	

Source: NFS – Connolly et al. (2009).

Table 2 also shows that discussion group members are slightly younger than the average, with an average age of 47 compared to 51 for the sample as a whole. The regional data present an interesting insight into the geographic dispersion of group membership. Just 17 percent of those farming in the South West are group members compared to 38 percent South.[1] Clearly discussion groups are more prevalent in certain regions. This regional bias may account for some of the differences in terms of scale and productivity between members and non-members. This is addressed in more detail in subsequent sections of the paper.

[1] BMW region = Louth, Leitrim, Sligo, Cavan, Donegal, Monaghan, Galway, Mayo, Roscommon, Longford, Offaly, Meath, Westmeath and Dublin. Southwest region = Kerry, Clare, Limerick and Tipperary. East region = Kildare, Wicklow, Laois, Carlow, Kilkenny and Wexford. South region = Waterford and Cork.

Using statistical modelling methods, it is possible to measure the types of farmers that are more likely to participate in discussion groups. The results of this probit analysis suggest that larger farmers and those farming in more advantaged regions are more likely to participate in discussion groups.

Discussion Group Membership and technology adoption

One of the main aims of the Dairy Efficiency Programme is to promote technology adoption on dairy farms. The Dairy Efficiency Programme is based on the premise that dairy discussion groups are a good forum for the promotion of new technologies and adoption of best farm practice. In 2009 the NFS conducted a supplementary survey on technology adoption on farms and using this data it is possible to examine whether members of dairy discussion groups are more likely to adopt new technology and best farming practice than non-members.

Table 3 presents data on the percentage of farmers adopting various technologies/practices on their farms in 2009. Across the full sample of farmer, approximately 35 percent participate in milk recording; however 74 percent of those in discussion groups are also in milk recording. Similarly, about 70 percent of dairy farmers nationally use artificial insemination but almost 90 percent of discussion group members use artificial insemination. The adoption of newer technologies such as artificial insemination using genomic bulls is also more prevalent among discussion group members, with 39 percent of members adopting the technology compared to 14 percent nationally.

Table 3: Percentage of Farmers Adopting Various Technologies/Practices 2009.

	Member	Non-Member	All
Milk Recording	74	22	35
Artificial Insemination	87	67	70
Artificial Insemination with Genomic Bulls	39	14	19
Dry Cow Therapy	96	82	85
Teat Disinfection	93	75	79
BVD Vaccination	48	27	31
Reseeding at least 10 percent of grass in last 3 years	40	26	30

Source: NFS – Connolly et al. (2009).

In relation to dry cow therapy and teat disinfection, almost all discussion group members are operating these practices. The numbers vaccinating against BVD are also higher. The latest Teagasc advice on grassland management is that farmers should aim to increase reseeding rates to 4 percent per year. Table 3 shows the percentage of farmers that reseeded at least 10 percent of their grassland in the last

3 years. Forty percent of discussion group members reseeded at least 10 percent of their grassland area in the last three years compared to 26 percent of non-members.

In general, the data shows that technology and best practice adoption is far higher on discussion group farms that on those that do not participate in a discussion group. A statistical analysis shows that the effect of discussion group membership is significant in the probability of adopting most of the technologies listed in Table 3.

Discussion Group Membership and profit levels

The data above shows that farmers that participate in discussion groups tend to have larger more intensively stocked farms and in general are more likely to adopt technology and best practice. It is interesting therefore to consider whether or not this contributes to a higher profit for the farmer. The data presented in Table 4 shows some average profit indicators for all farms in the sample.

Table 4: Discussion Group Membership and Profit 2009.

Variable	Measure	Member	Non-Member	All
Gross Output per Hectare	€ per hectare	2,523	1,928	2,087
Gross Margin per litre	Cent per litre	13	10	11
Gross Margin per hectare	€ per hectare	1,338	885	1,006

Source: NFS – Connolly et al. (2009).

As can be seen in Table 4, discussion group members have a higher gross output per hectare, a higher gross margin per litre of milk produced and a considerably higher gross margin per hectare. However, when interpreting this data it is important to consider that it has already been acknowledged that discussion group members tend to farm larger, more intensive farms in geographically more advantaged areas. It is possible that discussion group members are more profitable than non-members because they have larger farms and that it is economies of scale that are responsible for the higher profit rather than the actual membership of a group. Furthermore, as discussion group members tend to farm in more advantaged regions, it is possible that the more favourable soil and climatic conditions they experience allow them to exploit their use of grass further, thus reducing their need for concentrate feed and in turn reducing their costs of production. It is therefore important to control for some of these factors while measuring the impact of discussion group membership on profit levels.

Using a multiple regression analysis, it is possible to control for the effect of farm size, location and various other factors while measuring the effect of discussion group membership on profit. The results of this regression analysis are presented in Table 5. The results suggest that when the location of the farm, the size of the herd and the farmer's age are controlled for, that membership of a discussion group is still

associated with a higher gross margin per hectare, with a coefficient of 247.45. In other words, if you compare two identical farmers in the BMW region, aged 50 with a herd of 60 cows, the farmer in a discussion group will have a gross margin per hectare of €1,079 while the farmer with the same characteristics that is not in a discussion group will have a gross margin per hectare of €832.

Table 5: Multiple Regression Analysis of Gross Margin per Hectare.

Dependent Variable	**Gross Margin Per Hectare €**	
Independent Variables	***Co-eff***	***t-Stat***
Constant	765.28	
BMW	-164.83**	-2.30
East	122.35	1.79
South West	-110.15	-1.44
Herd Size	4.40*	5.69
Farmer's Age	-0.6421	-0.26
Member of a Discussion Group	247.45*	4.08
n	329	
R^2	0.25	
F-Statistic	18.66*	

* significant at the 99% confidence level & ** significant at the 95% confidence level

One final point to note when analysing the effect of discussion group membership on profit is a problem that is referred to in statistics as self selection bias. This problem arises if there are characteristics of an individual that can not be captured in a dataset but may still affect the results of the analysis. The classic example of such problem is the analysis of the performance of private schools, as outlined by Evans and Schwab (1995). One could compare the results achieved by student attending private schools and students attending public schools and could control for recorded characteristics of the student such as age, gender, parents' level of education etc. And on controlling for these characteristics one could conclude whether private schools deliver better results than public schools. This is more or less the same as the analysis conducted above for profit levels on farms. However, such a conclusion could be incorrect if the analysis does not account for all of the other characteristics of students attending private schools, many of which may be unobserved, for example the inherent ability of the student. These unobserved characteristics may be partly responsible for the higher results rather than the actual school attended. It is therefore important to control for these factors when assessing the impact of discussion group membership on profit.

There are statistical techniques available for such an analysis. In this case the endogenous switching regression model is applied, as per Tauer (2005). The results of this analysis show that there is self selection bias at play in this model. However,

when it is controlled for, the effect of discussion group membership on profit is still positive.

Conclusions

The results of this analysis show that to date, farmers participating in discussion groups tend to farm larger, more intensively stocked farms in more advantaged regions of the country. However, even when the characteristics of discussion group farmers are controlled for, the results of the analysis show that farmers in discussion groups are more likely to adopt new technology/best practices and are likely to have higher profit levels.

These results support the programme launched by the Department of Agriculture that aims to enrol more farmers in discussion groups. The results of the analysis show that farmers of all levels of intensity, size and in all regions could gain from membership of a discussion group.

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Getting the Most from your Discussion Group in 2011

Stuart Childs, Teagasc, Kilmallock, Co. Limerick

Introduction

Economic factors have a significant role to play in how decisions are reached in terms of adoption of technologies and general operations of the farming enterprise in a commercial farming set-up. Commercial farms will typically embrace and make use of technologies on a broad scale.

Farms that are less commercially driven have a slower uptake of new technologies and failure to implement these technologies can have effects in terms of the productivity, efficiency and even the viability of these farms.

Family farms in general tend not to be operated as out and out commercial entities and as a consequence have particular characteristics pertaining to their operation and management. An important feature of the family farm is the impact of social and cultural factors on top of economic factors in how decisions relating to the operation of the farm are reached.

There are three forms of capital that are thought to influence family farm decision making:

- Economic Capital;
- Cultural Capital;
- Social Capital.

As already outlined, commercially run operations are guided by economic capital. However, on the family farm, while economic capital plays a role, cultural and social capital are extremely influential in the decision making process.

Economic capital is exactly what it says on the tin – material wealth.

Cultural capital is based on the knowledge and skills a person has. Cultural capital is dynamic and can change over time but until that change occurs, cultural capital can be a cause of resistance to change. An example of this might be where a person has never used AI and has always run a bull with the herd. The resistance caused by the cultural capital in this instance will revolve around picking holes in the concept of AI. However, over time, this attitude can change. Knowledge transfer processes such as discussion groups that allow farmers to be active participants, contribute positively to changing cultural capital and developing new forms.

Social capital which is described as the value derived from social relationships and networks, has a very significant impact on farmer decision making. Very few people want to go out on a limb for fear of getting it wrong. Adoption of new technologies can depend on the opinion of one's peers. Disapproval amongst these can often result in the non-adoption of a technology. Alternatively, the decision to adopt a new technology can equally be positively influenced by the decision of one's peers to adopt the technology.

The discussion group style setting is widely acknowledged as being effective in the transfer of knowledge in order to influence the cultural and social capital decisions of family run farms. The impact of these on the economic capital of those involved in discussion groups has been outlined in this proceedings.

Clearly, a good discussion group will have a positive influence on the economic capital of your farm. The significance of the impact will be influenced by your level of participation and willingness to interact with your fellow group members.

How many people here involved in a discussion group regularly attend the meetings but when you go home do little or nothing with the information gathered at the meeting?

If this is you, then what can you do to improve what you get from your discussion group in 2011?

The biggest failing that I see in groups is the belief that the facilitator is the organiser and driver of the group – this is not the case. The role of the facilitator is to facilitate discussion amongst you, the group members. It is you, the group members, who are expected to derive benefits from the group. Consequently, it is up to the individual group members to strive towards making the group work to their advantage.

The Dairy Efficiency Programme has prompted a large number of people to join discussion groups for the first time. This in itself is a good thing. However, just being a member of a group isn't enough to help you derive the benefits that can be acquired from group membership. Active participation is vital if you want to get the most out of the meetings. The focus should not be on making sure you get the mandatory attendance required to get the €1,000 – the focus must be on improving and tweaking your practices and decisions in order to run your farm business in a way that can make your life better or make you more money.

Some of the benefits of being involved in a discussion group highlighted by the Fanesiders discussion group at the 2009 National Dairy Conference were:

- An ability to tap into a vast amount of experience (16 opinions vs 1);
- Make more informed decisions based on better information;
- Given them confidence to complete on-farm development;
- Challenge each other to achieve goals;
- Problem sharing (problem shared = problem halved);
- Personal and family friendships.

Similarly, the members of the CFS group who spoke at the 2008 Conference believe that the business of farming is more profitable and more rewarding when the experience and knowledge that each of them hold individually is pooled and shared.

The objective of that group is to be as good as they can be – a realistic and achievable goal for all groups.

To be as good as you can be, you will need to make good decisions - the basis of good decision-making is good information.

To get the most from your group for 2011 make sure that you do the following things;

1. Have a plan for the year and set goals!

- Elect a chairman and a treasurer or secretary.
- Review the results of the previous year and set out the programme for the year ahead – whose farm you will visit each month and the topics you want to cover.

- Set your date and time for the meetings that suits you all best – above all be committed to attending all meetings – knowing the date of the meeting will allow you to plan around it – if you won't make it notify the chairman.
- Arrive on time and finish on time.
- Be prepared – have the information that will be required at the meeting to hand. The very successful groups are now gathering the information before the meeting takes place – this allows more time for discussion of the figures presented.
- Setting goals is a fundamental of a good discussion group. If you don't have something to aim for, how can you expect to achieve it? You must set goals that will keep you focussed throughout the year. Remember the goals must be realistic and achievable or it will seem like no progress is being made – this will be bad for morale.

2. Complete the Profit Monitor

- Discussion without information is a waste of time.
- Profit Monitor will help you identify the strengths and weaknesses of your business.
- Group reports will provide factual information that will help all to make better decisions

3. ICBF Herdplus

- Signing up for Herdplus will allow you and your fellow group members to know the genetic merit of your herd. This will allow the group to discuss the best breeding decisions to help improve the herds of group members into the future.

4. Grass budgeting

- Everybody is aware of the value of grass but are we all making the best use of it? There are simple methods available to you to maximise your return from grass – all that is needed is the willingness to get up and do it! Putting figures on the grass situation on your farm will also allow your fellow group members to get an idea of how you are fixed. 'Ok for grass' – a term that is regularly used at discussion groups all over the country is a very loose term. Answers like this mean little discussion is generated and better decisions that could be made may go a begging.

5. Projects

- Projects give groups a focus and keep the group dynamic.
- The creation of small sub-groups within the group that focus on different projects will help to give all members some responsibility and more ownership of the group.

6. Help each other

- If you need help with something – ask? If you feel someone needs help with something – offer!
- **DON'T** just head home after the meeting content with your participation – act on it.

7. Consider a social outing

- Your discussion group is like your team. Good teams are always based on good team spirit and this is can be fostered through a social outing that helps people to get to know one another a bit more outside of the discussion group forum. A bond of friendship will help to strengthen the group and ensure that every player plays for each other and the team.
- It is possible to become great friends while trying to become better farmers.

Summary

Discussion groups have a vital role to play in the effective dissemination of information and the adoption of technologies to improve productivity, efficiency and profitability at farm level. A well run discussion group operating as outlined above has the potential to put many hundreds and possibly thousands of extra euros in your pocket as well as improving the members as individuals and strengthening friendships.

To get the most from a discussion group, active participation and discussion based on solids facts (Profit Monitor and Herdplus data etc.) is necessary.

Maximising the return from your discussion group in 2011 and into the future will depend on **you** and the commitment that **you** give to the group – you can only expect "to get out of it what you put into it".

A discussion group that operates as outlined above has the potential to put many hundreds and possibly thousands of extra euros in your pocket.

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Getting the most from OUR Discussion Group

Sean Kearney
Anglesboro/Glenroe Discussion Group

Introduction

I am farming with my wife Olivia and our two children 2 miles from Kilbehenny near Mitchelstown.

Farm size is 73 ha in total with a milking platform of 38 ha. We currently milk 75 cows currently and would hope to expand to 100 cows over the next few years. Due to fragmentation of the farm, we also run a beef enterprise.

I took over the farm from my father Jim in 2002 having been working on the farm since 1994 when I had completed my green cert.

With eight years of work experience on the farm, I was confident in my ability to run the farm on a day to day basis but I found that I had a lack of business experience and a whole lot of responsibility that I hadn't had before – this I found quite daunting.

Joining a discussion group

Tim Ryan of Teagasc Kilmallock had been assisting us in the matters of the transfer of the farm and he encouraged me to join the local Anglesboro/Glenroe discussion group. At first I wasn't sure about going but decided to give it a go and went along one day to suss it out. I was immediately welcomed into the group and have been a member since and am currently the chairman of the group.

Benefits

The initial benefit that I found from being a member of the group was that we discussed topics that were relevant to each stage of the year as we went along. Facilitators such as John Donworth, John Maher and more recently Tom Downey and our advisor Stuart bring up to the minute information and advice to the meetings.

Another benefit of joining the group was that we had greater exposure to our advisor which hadn't always been the case in the past.

I have found that being a member of the group has given me the support and confidence to take on new technologies as they arise. Being in the group allows me to benefit from free advice from people who know me, the land I farm and the type of business I'm running. The way I see it is if you have 20 farmers in a group as we do who have all been farming for 10 years, then you have the backing of 200 years of experience which is a massive resource to be have available.

Joining the group and seeing how others were turning out cows early in the spring gave me the confidence to give it try - I have be doing since even through the most difficult of springs. This is putting between €15 and €200 extra in my pocket each day in my case depending on numbers calved. Then, there are the added benefits of better health, the reduction is slurry to be spread and the fact that the early grazing helps to set the farm up for the year ahead.

In our group, we have been fortunate that we have had a monitor farmer in the group. He has brought some invaluable information to the group as a result of his

participation in the monitor farm programme. We also have the benefit of three coop sub-board members in the group. They supply us with regular updates which are also very useful.

I read the farming press regularly and there is a vast amount of technical information in many of these articles. Sometimes however it can be difficult to understand how the final figure is derived. A case in point from my point of view was the need to use 5-6 straws per heifer required. Despite reading about this in the press, the figures just didn't sit right with me. However, ten minutes of discussion on the matter at the next meeting clarified the figures involved and I was happy to run with it. At the meeting, we got the information, having discussed it, we made the decision and decided to take it on. This has yielded good results for me as I have 24 heifers to calve down in 2011 and 30 for AI next year. This gives me options as it will allow me to expand herd size from within. Alternatively I can cull some poor performers or sell surplus stock. Little things like that can make a big difference.

Getting out of the comfort-zone

It took me a while to complete a Profit Monitor – I gave a few attempts at it without success. I have a half a profit monitor from 2004 when I started it but failed to complete it. The advent of the Cost Control Planner helped me to complete my first one in 2005 and I have been completing it religiously at the end of each year since. I find that the Profit Monitor highlights the things I did well during the year but more importantly highlights where I slipped up. It helps to focus my mind to improve on these areas in the subsequent year. It also allows me to benchmark my performance against other farms in the locality that I have knowledge of, rather than farms that I know nothing about and whose circumstances could be very different to my own. I find the Cost Control Planner extremely useful as it helps me to keep on top of things throughout the year and helps me to keep focussed. And of course it makes completing the Profit Monitor a "doddle".

Moving forward

As we currently stand, all the talk of increasing herd size looks like becoming a reality. That will result in challenges inside the farm gate. There will be a need to further push the boundaries in terms of improving efficiency. Grassland management and more critical financial analysis along with the adoption of new technologies will become more and more important to help me run a viable business.

Being a member of my discussion group will ensure that I receive the highest quality information at a very early stage. Through discussion within the group, weigh up the pros and cons to help avoid making expensive mistakes which could very well happen. There is more than one way to skin a cat and in my view, being a member of my group ensures that we have thought out or considered most of the various options as everybody has a different perspective and way of thinking. The diversity in peoples' thought processes can generate the most practical solution to a problem, as again, they know me, know the farm I operate and the type of business I run. This is a benefit of discussion groups that cannot be quantified.

In terms of what we hope to achieve in our discussion group next year – having had new members join in 2010 through the DEP scheme, we would hope to learn more as we again diversify through visiting their farms and see how they are doing things. We, as a group, would hope for enhanced discussion in the year ahead as everybody should now know the lie of the land and feel 100% comfortable in the group. Historically, we have failed to deliver on promises of all completing the Profit Monitor. However, in 2011 a big effort is going to be made to get as many Profit Monitors completed as possible. We hope to achieve this by dividing into sub-groups with some of us who have completed Profit Monitor over the last number of years acting as mentors to those who don't feel as confident about completing one. This, we hope will allow us to have more concrete discussion at our meetings in 2011 and the coming years and allow us to look critically at the costs incurred on members' farms. Better discussion should then result in better decisions and as a result a better outcome for the host farmer.

Hopefully we can develop into a more cohesive unit and try to help one another out more to achieve both our individual and group aims.

With the help of Stuart, we hope to "up the ante" a little in terms of grassland management. We are looking at developing sub-groups that will meet more regularly to measure grass. Hopefully this will help us to increase our tonnes of grass utilised which has such a significant impact on profitability.

We hope that mini projects like these will help to give us greater direction and focus for 2011 and helps us all to reach new heights. I am confident that through working together we can.

Getting the most from OUR Discussion Group

David Moriarty
Kilbehenny Discussion Group

Introduction:

I farm 78.5 ha with my wife Zelia and our three children just over two miles outside of Mitchelstown. I am currently milking 54 cows but as quota frees up and the situation becomes clearer I hope to increase to 100 cows. I also carry all non dairy stock to beef. The farm is challenging in that it is quite high – the farm yard is at 850ft above sea level and rises to 1100ft at the highest point. Needless to say if I'm not feeling fresh going out for the cows in the morning, I'm feeling fresh by the time they're coming in!

Joining a Discussion Group:

I joined the Kilbehenny Discussion Group in March of this year. It is a new group that was set up as a result of the DEP scheme. It is largely down to the efforts of one of our friends and current group chairman William Noonan that the group came into being as he did a lot of encouraging to get people to sign up. He was so focussed on it getting it up and running that some of us thought he was being paid to do it!

I signed up, however, I wasn't 100% sure whether or not I would attend. The first meeting was held in the Teagasc office in Kilmallock and even on the day I still wasn't sure if I'd go or not but William again encouraged us to give it a chance so I went along and haven't missed a meeting since.

Why not in a Group before now?

Many of you will be asking why I wasn't in a group before and the answer is simply this – up to three years ago, any ideas or discussion I wanted to have, I had with my father who was farming with me. Believe me they were serious discussions, they could start over breakfast and finish over supper. When he passed away, it never really entered my head to consider the idea of joining a group. I suppose there is no denying that the carrot of the €1,000 was an incentive to sign up in the first place but I would like to think that if that was gone in the morning the group would stay together, as I think the group has developed well over the year and I have really enjoyed being involved in it.

There is also the added benefit of the social aspect of being a member of the group as life has changed a lot in the last number of years. A lot less people call into the yard compared to in the past. It is now quite possible to go from one end of the week to the other without meeting anybody. It's good to be able to meet with other people of similar thinking and have a discussion and the odd laugh about what we do.

Benefits of the Group:

What have I gained from the group? Well, I'm standing here today in front of you which is something I wouldn't have thought I'd be doing in a million years! That aside though, as Sean has already indicated, being a member of a group has meant greater and more regular access to our advisor. Through this enhanced exposure, I have acquired a wealth of information in a very user friendly form throughout the year. I had always known the importance of grass in terms of cost effective milk production but the concepts of grass budgeting and grass wedges were not something that I knew a lot about. I have found that being in the group has heightened my awareness of the value of grass. This year, I found that I was more willing to take out surplus grass when presented with it. Previously I would not have been as aggressive in terms of the grassland management from that point of view. The group has helped me to focus more on the benefits of grass. The discussion surrounding the wedge has helped me to develop better grassland management skills but there is still more for us to learn.

What Sean has said about the vast quantity of experience that is brought to the table by people who are in the game for a number of years is so true. Not every suggestion is right for everyone but then again not every suggestion is wrong either. It is a great facility to have to be able to throw out an idea and see what the response is like. In many cases you will find that somebody may have already tried what you are thinking of trying to do. As a result, they can identify the pitfalls, as they see them, for you before you even start. Again, it's free advice from people with a knowledge of you, the land you're working and the business you're running.

Where to from here?

Having felt that I have learned a lot this year, I am looking forward to taking things on another step next year now that we have bedded in as a group and have gotten to know each other a little better.

Stuart is pushing us to start looking at financials and though he'll probably have to keep pushing us, we know that what he is saying is correct.

If we want to have good discussions and get the most out of **OUR** group we will have to look to discuss hard facts. With that in mind, it would be great if we could make progress in terms of completing a Profit Monitor in 2011, which would help to give us a picture of where we stand and help us to try to chart where we go from here.

Comparing figures will allow us to set our own individual targets or our targets as a group. This will hopefully give the group a good focus to keep us sharp throughout the year.

I am looking forward to good hard talking, honest discussion in 2011. Working together and working with facts will help us realise our targets.

Soil Fertility – Getting the Basics Right

Stan Lalor, Teagasc, Johnstown Castle.

Summary

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

Introduction

Good productive soils are the foundation of any successful farm system. The increasing demand within intensive grazing systems for high grass growth rates over an extended season represents an increasing demand on soil fertility levels. The ability of soils to supply nutrients at a time and in appropriate quantities for grass growth is a key determining factor of how productive a field or farm can be. Therefore, the management of soil fertility levels should be a primary objective on any farm.

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

- Taking soil tests:
- Using the results to plan fertilizer and lime applications.

Both of these steps are equally important.

Why soil test?

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

The new role of soil testing within the regulations has resulted in soil testing being associated more with bureaucracy and regulation than with good farming practice.

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

Taking a representative sample

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

- Area - Take one sample per 2-4 ha (maximum of 5 ha with derogation). Sample areas should be as uniform as possible regarding soil type; slope; drainage; and cropping history. Sample areas should reflect practical management units of the farm.
- Sampling pattern - Take a representative sample from the entire field, following a 'W' sampling pattern. Avoid unusual spots such as gateways; sites of feeders or manure heaps; old fences or ditches; and dung or urine patches. Take a minimum of 20 soil cores per sample.
- Timing - Allow 3-6 months after previous P, K or manure application. Allow 2 years after previous lime application for accurate lime requirement assessment. For comparison, sample at the same time of year as previous sampling. Avoid dry or wet extremes of weather.
- Depth - This is particularly critical for P analysis, as P tends to accumulate in the top few cm of grassland soils. Samples not taken from the full depth of 10 cm will usually overestimate the soil P level. Wear on the end of the soil corer and soil moisture conditions at sampling can have an impact on sampling depth. Where grassland is being ploughed, soil at the surface that is high in P can be moved to deeper in the soil, and replaced at the surface by soil with lower P content. Therefore, it is advised to soil test after ploughing.

Soil pH and Lime

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

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

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

Phosphorus and Potassium

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

- Index 3 is the target level required for optimum grass production. The fertilization rate should replace the nutrients removed in product, be that milk or meat, or in losses such as leaching in the case of K. Only approximately 30% of soils are in Index 3 for P and K.
- At low soil P levels (Index 1 and Index 2), additional nutrients are required to build up the soil reserves to Index 3 levels. This normally takes a number of years to achieve, and can be monitored with regular soil testing.
- When soil P levels are high (Index 4), responses to fertilizer applications to Index 4 soils are rare. Soils with fertility levels in Index 4 will be productive without fertilizer applications until the soil fertility reverts to Index 3 levels, at which time, nutrient applications to replace offtakes should recommence. The speed with which soils will return from Index 4 to Index 3 will depend on land use and the soil type. Regular soil testing is essential for monitoring.

P and K advice

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

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

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

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

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

P and K in cattle slurry

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

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

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

Separating P and K

The nitrates regulations place no restrictions on K fertilization rates or timing. The application of K fertilizer has declined inline with P usage in recent years. This is because P and K are normally applied together as compound fertilizer products. The

requirements for K fertilizer should still be considered even where no P fertilizer is required or permitted. The requirements for K are particularly crucial on silage crops. On fields with no P requirement, the use of either straight K fertilizer or N:K fertilizer compounds should be considered where there is a requirement for K.

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

Conclusions

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

Achieving Increased Grass Utilisation

Aidan Brennan & Donal Patton
Teagasc, Animal & Grassland Research and Innovation Centre

Summary

- A direct correlation exists between farm profit and grass utilisation.
- For optimum output and utilisation, Stocking Rate must be closely matched to the growth potential of the farm
- Good farm infrastructure is a prerequisite to harvesting high quantities of pasture per hectare
- Simple management tools, such as the Spring Rotation Planner, Feed Wedge and 60:40 Autumn Plan are necessary tools for increasing utilisation.
- Farmers should quantify what their current level of grass utilisation is and aim to increase it as a means of generating more profit.

Introduction

The benefits of increasing grass utilisation have been well documented. Grazed grass is the cheapest feed source available to Irish dairy farmers and increasing the proportion of grass in the diet has the ability to significantly increase profitability. Dillon et al. (2005) suggests that a 10% increase in grazed grass in the feeding system will reduce the cost of milk produced by 2.5c/l. An analysis of the Profit Monitors for 544 spring-calving herds in 2006 showed a clear association between net profit per hectare and grass consumed per hectare. Each additional tonne of grass dry matter consumed per hectare was associated with an increase of €200 of net profit per hectare. (Clarke & Ramsbottom, 2007). These findings are supported by data from overseas. Figure 1 shows a direct correlation between pasture eaten per hectare and overall farm profit (Economic Farm Surplus).

As we are now living in an era of increased volatility - in terms of prices for milk and costs for farm inputs, it is now more important than ever that Irish farmers limit their exposure to those inputs with volatile prices, the costs of which are outside of their direct control and instead implement and refine systems that will deliver profit each year irrespective of milk price. Therefore, systems of milk production being employed on Irish dairy farms must be low cost. As described above, increasing grass utilisation has been shown to lower costs and increase profit. This paper will set out the tools, techniques and management practices used to achieve higher levels of grass utilisation on the Teagasc dairy research farms at Ballyhaise, Co. Cavan and Curtins Farm, Co. Cork. Both farms vary considerably in terms of region, climate, altitude, aspect, timing of seasons, soil type, topography and grass growth curves. However, despite these differences, management practices on both sites are very similar and both farms have substantially increased grass utilisation over the past 5 years.

Figure 1. Relationship between pasture eaten and Economic Farm Surplus from New Zealand dairy farms participating in Fonterra Westpac Dairy Excellence Awards, 2002.

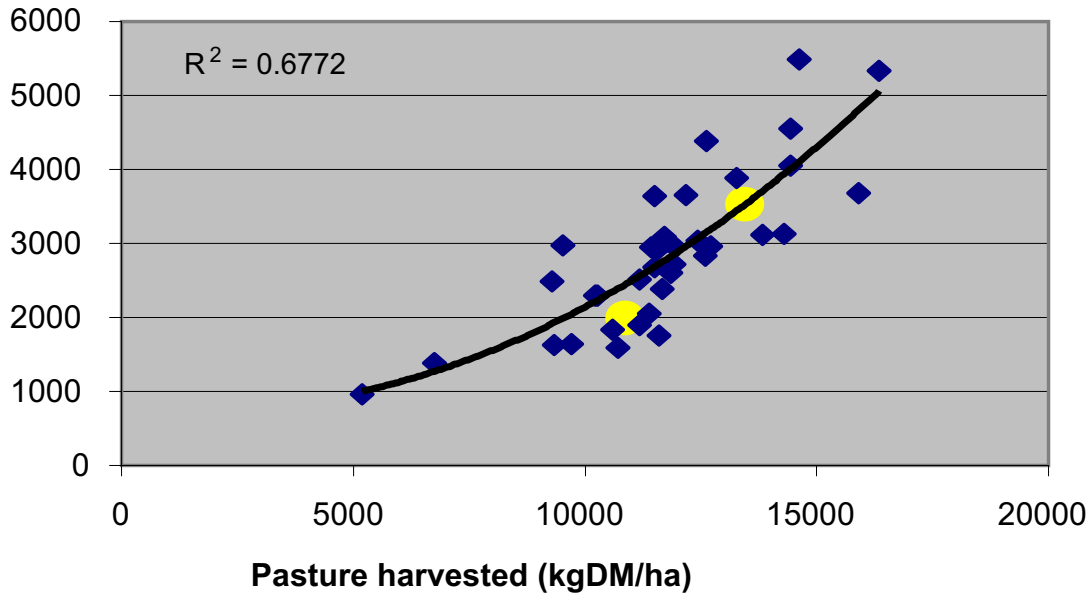


Table 1. Tonnes of Grass Utilised in Ballyhaise & Curtins 2005 & 2010

	2005	2010*
Ballyhaise (tonnes DM/Ha)	12.2	13.3
Curtins (tonnes DM/Ha)	14.1	15.1

*Estimates based on available information

Drivers of Increased Utilisation

One of the principal drivers in increasing grass utilisation on these farms has been to match the stocking rate to the growth potential of the farm. Stocking rate, expressed crudely as cows per hectare, or more accurately as kilograms of live-weight per hectare or best described as kilograms of live-weight per tonne of dry matter available (comparative stocking rate) gives a good indication of the intensity of the farming system being practiced. More intensive systems, i.e. grass allowance of less than 5.8 tonnes dry matter per cow per annum, greater than 1450kg live-weight per hectare and a comparative stocking rate greater than 90kg live-weight per tonne of dry matter available tend to have the highest levels of grass utilisation as grazing intensity is greater. In a study conducted at Curtins in 2009, it was found that paddocks grazed intensively with highly stocked cows (105kg Lwt/tDM) had lower post-grazing heights, fewer rejected areas and a smaller proportion of dead leaves in the sward (Tunon, 2010). Such grazing practices create the ideal environment for the growth of high quality pasture, which leads to improved performance per hectare.

Hence, an inextricable link exists between stocking rate, grass utilisation and ultimately profitability. However, it must be noted that higher stocking rates are not necessarily more profitable. It is only when stocking rate is increased optimally to match the grass growing potential of the farm, where grass utilisation increases and where no major additional increases in either concentrate or fertiliser uses occur that the true profit potential of increasing stocking rate will be realised. Furthermore, all stocking rates must be compliant with environmental legislation and must have a high animal welfare status.

Another principal driver in increasing grass utilisation in both Ballyhaise and Curtins has been in the breeding of high EBI cows. In 2005, the average EBI of the cows in both herds was €46. By 2010 this had increased to €109, showing a 58% increase or an average increase of €16/year. High EBI cows are more fertile. Fertile cows are important in all dairy systems but their importance is exemplified in grass based seasonal production systems such the ones practiced on the farms in question. There is a requirement on these farms that cows calve consistently and compactly at the start of the grazing season so that increasing pasture growth will be met by increasing herd demand, limiting the need for extra supplementation and maximising grass utilisation. While the appropriate mean calving date will vary from farm to farm, a prerequisite is to have fertile cows with a mean calving interval of 365 days. Another benefit of having high EBI cows in a herd is that high EBI cows tend to retain more body condition after calving and increase body condition score at a faster rate post negative energy balance, even in intensive grazing regimes. This reduces the requirement to supplement cows in order to increase body condition score.

Prerequisites to Achieving High Utilisation Rates

As described above, having an appropriate stocking rate and cow type are the two main drivers behind increasing grass utilisation. However, for actual utilisation to increase, the necessary infrastructure must also be in place to enable the cows to harvest the grass. Proper grazing infrastructure is a prerequisite to achieving high levels of utilisation. In this regard, both Curtins and Ballyhaise have an advantage as both farms have been well developed over many years. In terms of investments at farm level, it is important that farmers prioritise the investments in grazing infrastructure that offer the greatest return. Undoubtedly, the largest investment in terms of grazing infrastructure is in the construction of a network of farm roadways. A good network of farm roadways brings about many advantages. Every paddock is easily accessible by roadway or cow track on both farms. This facilitates grazing the whole farm in spring and autumn and is a major assistance when ‘on/off grazing’ or when grazing in 12 hour blocks. A good network of farm roadways simplifies the farming operation and allows for the easy installation and adoption of other infrastructure and techniques that help to increase utilisation. These include:

- Multiple access points to paddocks (minimum of two). This will allow cows to enter and exit at different points, thus reducing damage from cow traffic when soils are wet.

- The use of temporary fencing (polywire with reel and pigtail posts). These are essential tools in achieving high levels of grass utilisation when soil and weather conditions are sub-optimal. They are also used as an aid when slowing down the rotation length or when pre grazing yields are high and it is more difficult to achieve target post-grazing height. The principles of wet weather grazing, i.e. 12-hour grass allocations, back fencing previously grazed areas, walking cows in single file and allocating grass in square blocks cannot be achieved without a heavy reliance on temporary fences. In both Curtins and Ballyhaise, temporary fences are used routinely during the first and last rotations and sporadically in between.
- The adoption of on/off grazing during wet weather. This is used during periods of high rainfall when soil conditions are poor and the risk of poaching is high. The approach involves allowing cows access to pasture for two three-hour periods every 24 hours. When cows are not grazing they are indoors without access to feed. Research has shown that spring calving cows in early lactation can obtain 95% of their grass intake during these two three hour grazing periods (Kennedy et al. 2009).
- Appropriate residency time per paddock. This varies considerably depending on time of year, ground conditions and growth rates and ranges from as low as 3 hours (during on/off grazing) up to a maximum of 48 hours. The objective on both farms is to achieve high levels of utilisation while at the same time maximise grass intakes. In order to balance these sometimes-conflicting objectives, a lot of attention is paid to residency time per paddock. The target duration time per paddock during winter/early spring is 12-hours, 24-hours during late spring and 36-hours during the mid-season and autumn when growth has slowed and the risk of re-growths being grazed is less. Residency times longer than these are avoided as it becomes more difficult to graze out dung pads as cows turn their attention to grazing re-growths, thus resulting in poor utilisation and a reduction in subsequent paddock growth rates.

Tools for Increased Utilisation

Over the past number of years, a number of new tools that act as an aid to grazing management at different times of the year have been developed. The use of these tools in Ballyhaise and Curtins has made significant contributions towards the increase in grass utilisation observed in Table 1. These tools are:

- The Spring Rotation Planner
- The Feed Wedge
- The Autumn Grassland Management Plan

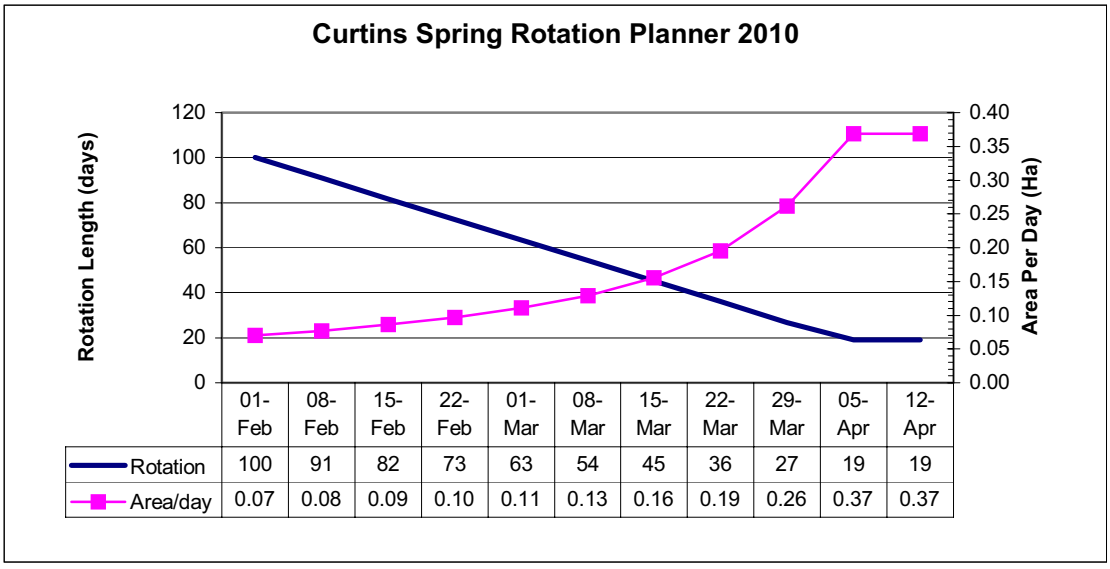
Spring Rotation Planner

The Spring Rotation Planner (SRP) effectively allocates an increasing proportion of the farm each day to the herd from turnout to grass in spring up to magic day (where growth rate equals demand). The concept behind the plan is to ration the total supply of grass available until growth rates exceed demand while ensuring that additional

area and feed are supplied to the herd as more cows calve and intakes increase during the first rotation. The 2010 SRP for Curtins Farm, illustrated in Figure 2, was planned to commence on the 1st of February at $^{1}/_{100}$th of the farm per day and end on the 5th of April at $^{1}/_{19}$th of the farm per day. By joining the two points with a line a plan was created for each week of the first rotation defining the proportion of the farm that should be grazed each day. (For example, on the 22nd of February the plan was to graze $^{1}/_{73}$rd of the farm per day or 0.1ha/day.) The SRP for Ballyhaise is very similar to the one presented in Figure 2. The main difference between Curtins and Ballyhaise is that turnout and end of the first rotation are approximately 10 days later in Ballyhaise. This is because spring grass growth is later in the northern half of the country so the mean calving date and the start and finish of the first rotation are later for Ballyhaise.

The objective in early spring is to feed as much fresh grass to calved cows as possible with at most one third of their diet coming from other sources of feed. The advantage of using the SRP technique is that it presents the farmer with a plan for the entire first rotation in advance while taking the guesswork out of the decision making process. As the area to be grazed per day is known from the graph and the cover of grass in that area is known after measuring, one can tell exactly how much extra feed (if any) is necessary during each week of spring. Furthermore, the two biggest pitfalls in the first rotation (not enough area is grazed in February with the result that there are insufficient re-growths for the second rotation and secondly, the first rotation ending too soon) are overcome by adhering to the SRP.

Figure 2. Spring Rotation Planner for Curtins Farm 2010.



	01-Feb	08-Feb	15-Feb	22-Feb	01-Mar	08-Mar	15-Mar	22-Mar	29-Mar	05-Apr	12-Apr
Rotation	100	91	82	73	63	54	45	36	27	19	19
Area/day	0.07	0.08	0.09	0.10	0.11	0.13	0.16	0.19	0.26	0.37	0.37

Feed Wedge

After the completion of the first rotation the primary grassland management tool used on both farms is the feed wedge. The feed wedge, as illustrated in Figure 3 is a series of bar charts depicting the grass cover (kg DM/ha) in each paddock ranked from highest to lowest. It gives a visual breakdown of the herbage mass available in each paddock on the farm and acts as an early warning device for future surpluses or deficits that may be coming on stream as the actual cover available in each paddock is compared against a target cover. The target pre-grazing yield is derived from the following formula:

[stocking rate (cows/ha) * grass intake (kg DM/cow) * rotation length (days)] + target post grazing residual (kg DM/ha).

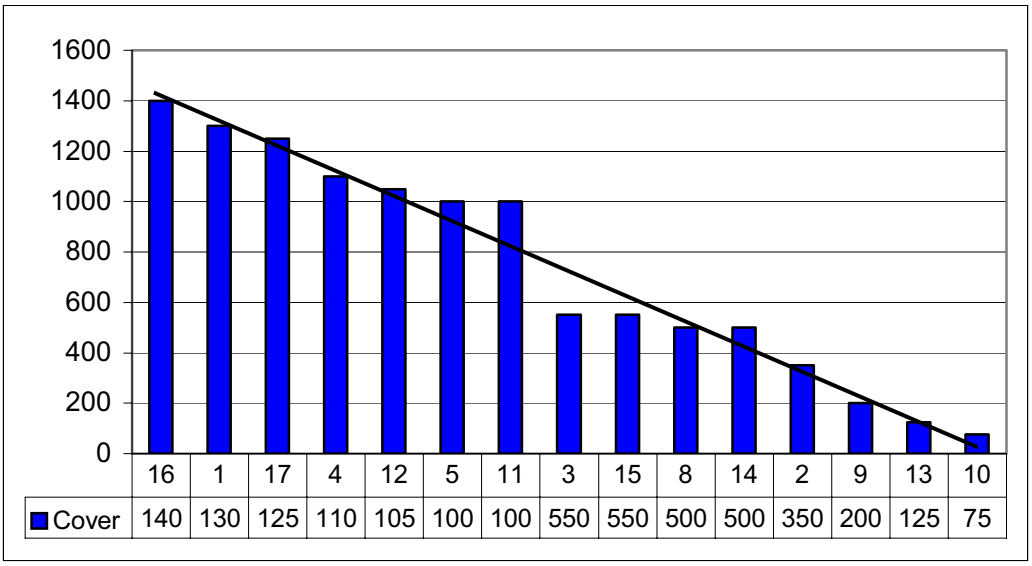
The target cover for each paddock is obtained by drawing a line from the target pre-grazing yield to the target post grazing cover. A typical mid season feed wedge is presented in Figure 3, below.

The wedge is updated once a week after measuring the grass in each paddock. In Ballyhaise and Curtins the wedge is created using a computer programme but can be just as easily created manually using graph paper. The most important part of the process is that the correct decisions are made from the data that is available. These decisions are influenced by the answers to the following three questions:

1. Is there a grass surplus?
2. Is there a grass deficit?
3. What is the short term forecast for growth?

The objective of the exercise is to keep pre-grazing yields at the target level (between 1200 and 1500kg DM/ha for optimum intake and utilisation). Paddocks above the target level are generally skipped and cut for silage while supplements will be introduced if paddocks are below the target level. Obviously, decisions such as these are influenced by what the expected growth rate for the next 7 days will be. For example, a prolonged dry spell during July may lead to an increase in growth in Ballyhaise but a decrease in growth in Curtins. Such factors are very farm specific but do act as a caveat when making grass management decisions. In Ballyhaise, the feed wedge also acts as an indicator for when certain paddocks should be grazed. For example, wet paddocks that are prone to poaching are represented by a different colour on the wedge. Once these paddocks get into the top third of the wedge they are grazed. Grazing these paddocks at lower pre-grazing yields in dry weather increases utilisation substantially.

Figure 3. Typical mid-season feed wedge.



Autumn Grassland Management Plan

The objective in autumn grassland management is to extend the grazing season and also to ensure that there will be sufficient grass on the farm for the next spring. Two tools are used to achieve these objectives. Firstly, the rotation length is gradually extended from 21 days in early August to 45 days by late September. By extending the rotation length the average cover of grass on the farm increases and this is then used to extend the grazing season when cows would otherwise have been housed. The second tool is used to ensure that there will be sufficient grass on the farm for the coming spring. The 60:40 Autumn Grassland Management Plan is a simple calculation used to ensure that a sufficient proportion of the farm is closed early. Paddocks that are closed early will have an opportunity to grow more grass before growth rates decline in November. The target is to have 60% of the grazing area closed within the first month of closing. The start date of closing will depend on soil type and the farm's grass growing capability. The general recommendation is the 10th of October but this can be 1-2 weeks earlier in wet areas or where growth rates decline earlier. Achieving the target of 60% grazed in 30 days involves grazing 2% of the farm per day. To achieve this it may be necessary to skip high covers and instead graze paddocks with lighter covers in order to get sufficient ground closed in time. Once the 60% target is achieved, the remaining 40% of the grazing area can be rationed out for as long as grazing is desired. Research has shown that each one-day delay in closing from 10th of October to 11th December reduces spring herbage mass by 15kg DM/ha/day. Older pastures or the poorer growing areas of the farm should be targeted for grazing in the last 40% as their contribution to spring growth will be low anyway. Both of these tools (extending rotation length and 60:40 closing plan) while being very simple have nonetheless made significant contributions towards increasing grass utilisation during the critical periods of spring and autumn in both Ballyhaise and Curtins.

Conclusion

The tools and techniques outlined above have been shown to substantially increase grass utilisation both on research and commercial farms. The steps involved are easy to follow and do not require vast experience at measuring or budgeting grass. The benefits of adopting a more proactive approach towards grass management coupled with a clearly defined and profit focused system of production are significant and will result in increased profitability. In order to measure progress, you need to know where you began. With this in mind every farmer should calculate his or her current level of grass utilisation. The following calculation will give an approximate estimation of how much grass is being utilised on farms:

Three figures are required:
Stocking rate (cows/ha) _____
Milk yield per cow (litres) _____
Supplements imported per cow (tonnes) _____

- Think of the farm as a factory producing feed for the herd. This is supplemented to varying degrees on most farms with other feeds produced elsewhere. The grass grown on the farm and the supplements brought on to the farm are satisfying the maintenance requirement of the herd plus the energy required to produce milk.
- We know that it takes approximately 2 tonnes DM of feed to maintain a cow per year and for every 1000 litres of milk produced requires approximately 0.5 tonnes DM of feed.
- Therefore if we add up the feed requirement per hectare and subtract the feed imported per hectare we can calculate the feed supplied by grass grown on the farm.

Table 2. Example Grass Utilisation Worksheet.

	Example 1	Example 2
Stocking Rate (cows/ha)	2	4
Milk Yield (litres)	6000	7000
Supplements Fed (tonnes)	1	3.5
Feed for Maintenance/cow (tonnes)	2	2
Feed for Production/cow (tonnes)	3	3.5
Total/Cow	5	5.5
Total/Hectare	10	22
Less Supplements/Hectare	2	14
Grass Utilised	**8**	**8**

Both of these examples show farms with grass utilisation figures of 8 tonnes. In example 2 even though the farm is heavily stocked at 4 cows/ha it has not influenced how much grass is being utilised. This is because the extra two cows per ha are

being fed with imported feed. Thus, grass utilisation has not increased despite a higher stocking.

Work out this figure for your own farm and compare it with other farmers in your discussion group and/or with research farms to benchmark future progress.

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Healthy People, Healthy Cows

Sinéad McParland and Donagh Berry
Animal and Bioscience Research Department, Animal and Grassland Research and Innovation Centre, Teagasc, Moorepark, Fermoy, Co. Cork

Summary

- A method to accurately predict the different types of fats, in particular, the saturated fats (apparently "bad" fats) and unsaturated fats (apparently "good" fats – associated with health promoting factors) in cow milk has recently been developed. The method uses the same technology (i.e., mid-infrared spectrometry), that is currently used by milk recording organisations to routinely determine the content of protein, total fat and lactose in all milk samples.

We already know that the ratio of bad to good fats in milk is not consistent across all animals and that the genetics to produce healthier milk (more good than bad fats) is passed from parent to offspring. Using this new method on all milk recorded cows will allow us to breed for improved milk quality.

We are satisfied that the equations are robust across different breeds and production systems. However, before implementation nationally, we must first investigate the implications of selecting for healthier milk fatty acid profiles including the effects on milk processing ability, as well as the relationships between a healthier milk fatty acid profile and other performance and welfare traits of the cow herself.

The potential to predict the energy balance of a cow using the same mid-infrared spectrometry procedure is also being investigated. Energy balance is known to be associated with the health and reproductive status of the cow. Initial analyses show large promise.

Because our approach uses already collected milk samples (either from individual cows or bulk milk tanks) the outcomes of the research can be exploited by farmers for management and breeding purposes at little or no extra cost. The potential benefit of producing healthier milk is significant.

Introduction

Bovine milk has traditionally been viewed as a nutritious, healthy product, largely due to its abundance of naturally present vitamins and minerals. However, in recent times, with the shift in consumer demand for "healthier" and "lower fat" foods, dairy products, among others have come under scrutiny in relation to the types of fats they contain. The question both dairy consumers and producers alike now ask is "*Can we make milk an even healthier product?*"

However, we do not want to improve the quality of milk for human consumption at the expense of the cow's own health and wellbeing. So the question we at Moorepark are working towards answering is "*How can we make milk an even healthier product without impacting on the cows own health and wellbeing?*"

Current research at Moorepark in collaboration with other European research institutions is investigating the potential to select cows to produce a healthier milk

fatty acid profile, and to simultaneously select cows that do not reach severe negative energy balance. The first step in any such study requires the collection of a large quantity of data for the trait(s) in question from an unbiased cross section of the national herd. Despite their obvious importance to any breeding programme, these traits (milk fat composition and energy balance) to-date have not been included in breeding goals, such as the EBI, due to the associated prohibitively expensive costs of measurement.

The first step in this on-going research is directed at investigating the use of mid-infrared spectrometry as an inexpensive tool to monitor both the types of fat which individual cows produce in their milk as well as the energy balance status of the cows producing the milk. If successful, this tool could be used on all routinely milk recorded cows nationally as part of milk recording operations, providing the data necessary to facilitate the direct or indirect inclusion of milk fat composition and cow energy status in the national breeding programme. This in turn could provide the information needed by farmers and breeders to make improved selection decisions regarding milk fat composition and cow health in commercial herds thereby increasing the value of milk.

What is mid-infrared spectrometry?

Currently in Ireland, over 400,000 cows are milk recorded a minimum of four times per year. The vial of milk taken during milking is sent to a laboratory for analysis to determine the fat, protein and lactose content of the milk. The same analysis is performed on all bulk milk samples. All samples are put through a mid-infrared spectrometry machine where light is shone through each milk sample. The absorbance of the light at different wavelengths in the mid-infrared region is recorded, and it is the combination of different absorbance levels of the individual wavelengths (known as the spectrum) which enables the determination of fat, protein and lactose contained in the samples.

Mid-infrared spectrometry is the method of choice worldwide for a quick and relatively inexpensive determination of fat, protein, lactose, casein and urea content in milk. Research is now focusing on how mid-infrared spectrometry can assist as a tool in the measurement of other important aspects of milk quality and indeed on other measures such as animal health.

Measuring milk fat composition

Gas chromatography is the standard method to measure milk fat composition, yet is timely and expensive, and thus is not a procedure regularly undertaken on commercial animals. However, access to large quantities of up-to-date data is necessary for routine genetic evaluations. This is where mid-infrared spectrometry plays an important role.

Using the spectrum data from hundreds of individual milk samples, we have derived equations to predict the different groups of fats in milk, for example, the content of saturated, monounsaturated and polyunsaturated fats in milk. The approach is similar to how the overall content of fat and protein is currently routinely predicted. Accuracy

of predicting saturated fat content in milk is 98%. Although equations were also developed to predict the individual fats in milk, such as the beneficial Conjugated Linoleic Acid (CLA), the accuracy of predicting individual fats is not strong enough to be used at this time.

The equations were developed using data from Ireland, Belgium and Scotland and incorporates data from several different breeds and from animals maintained on different production systems, including European concentrate systems and Irish grass-based systems of production. The equations are robust having provided accurate results when tested on animals of different breeds including the Holstein-Friesian, Norwegian Red, Jersey, Montbeliarde, Normande and dual-purpose Belgian Blue. The equations were also successfully tested on a group of randomly collected commercial Irish cows.

Why are we interested in milk fat composition?

Bovine milk fat can be broken into two general categories; saturated fats, which are thought to be linked to deleterious health defects such as coronary heart disease, cancer and obesity, and unsaturated fatty acids which are less harmful and may be beneficial for human health. For example, Conjugated Linoleic Acid (CLA), an unsaturated fat present in milk has been shown to have cancer inhibiting as well as cholesterol reducing properties.

The milk fat breakdown of the average dairy cow is approximately 70% saturated fatty acids (bad fats) to 30% unsaturated fatty acids (good fats). This ratio is not optimal; a preferable ratio would be to have a greater proportion of unsaturated fats than saturated fats in the milk. In addition, although only up to 25% of the fat in our diet arises from consuming dairy products, up to 35% of the saturated (bad) fats arise from dairy products.

The good news is that the ratio of saturated to unsaturated fats in milk is not consistent across our national herd. In fact the Irish national herd has a more favourable saturated to unsaturated fat ratio than other countries due partly to our grass based system of production which promotes the production of CLA in the milk and meat of our animals. The milk of the average cow in the Curtains Moorepark herd has approximately 65% saturated fats and 35% unsaturated fats, which is more favourable than for the typical cow as mentioned above.

Milk fat composition is also under genetic control. Approximately 42% of the variation among animals for saturated fats in milk is due to genetics. This means that if we have the power to know which animals produce healthier milk, we can identify sires and dams with a more optimal milk fatty acid profile. If included in the EBI then this may be achievable without impacting on performance in other traits.

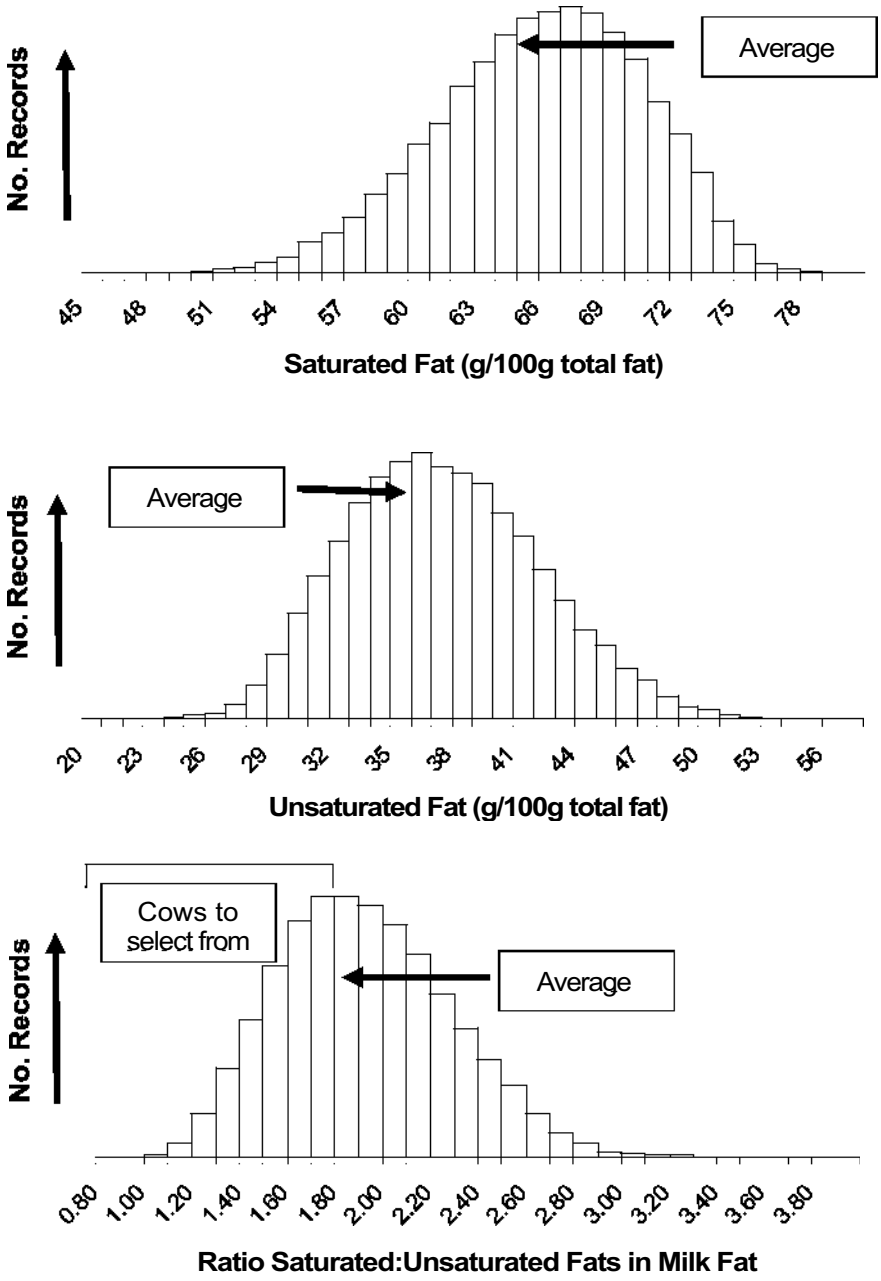

Figure 1. **Distribution of the total percentage of saturated fat, unsaturated fat and the ratio of saturated to unsaturated fat in milk fat of cows in the Moorepark Curtains herd. The average content across the herd is depicted as well as the range of animals with more favourable milk profiles.**

A recent study investigated the differences in milk fat composition among the three groups of Holsteins involved in the selection experiment at the Moorepark Curtains farm. The animals comprise a group of high genetic merit cows of North American ancestry (average EBI = €77), a group of North American ancestry cows of national average genetic merit (average EBI = €49) and a group of high genetic merit cows of New Zealand ancestry (average EBI = €89). That study found that cows of New

Zealand ancestry produced more saturated fats per kg milk fat than either group of North American ancestry cows; however differences were biologically small. Also, there was no difference between the two groups of North American ancestry Holstein-Friesians. These results indicate that although selection practices may alter the fatty acid profile of milk (differences between cows of North American and New Zealand ancestry) to date in Ireland, selection for improved EBI has not adversely affected the fatty acid composition of milk (no difference between cows of different genetic merit).

The distribution of the percentage of saturated fat and unsaturated fat in fat and the ratio of saturated to unsaturated fat in fat are graphed in Figure 1 for the Moorepark Curtains herd. The graphs show a normal distribution for all traits, but more importantly, the existence of considerable variation. This variation exists even with no conscious selection pressure on this trait. Therefore the natural variation in ratio of saturated to unsaturated fats in milk varied from [44% saturated fats: 56% saturated fats] to [79% saturated fats: 21% unsaturated fats]. These graphs highlight the large range in fat composition present even in a single herd. It is this variation which we will attempt to exploit through breeding.

Energy balance as an indicator of cow health

The energy balance of an animal refers to the difference between the animal's energy intake and utilisation and is considered an important indicator of dairy cow health and fertility. The extent and duration of negative energy balance in early lactation is well known to be linked to subsequent health and performance. Not only has negative energy balance implications for cow health and fertility, but it has also been shown that cows in negative energy balance produce an increased proportion of saturated fat in their milk.

Energy balance is also prohibitively expensive to measure routinely. A correct gauge of energy balance requires accurate information on all energy intake and energy outputs, for example, milk fatty acids from the cow.

Using mid-infrared spectrometry to measure energy balance

Research at Moorepark is also investigating the potential of mid-infrared spectrometry to predict the energy balance of a cow, based on the same routinely collected milk samples and the procedure described above. The ratio of fat to protein in milk is sometimes used as an indicator of energy balance status. We also know that the milk fat composition changes relative to the energy status of the cow. Since both fat and protein fractions of milk are predicted using mid-infrared spectrometry, it makes sense that the same technology could be used to predict energy balance

directly. Similarly, the milk fatty acid content of the milk changes depending on the energy status of the cow and we now know that we can accurately predict milk fatty acid content from the mid-infrared spectrum.
Work is on-going on the development of these equations to make them more robust across breeds and production systems, although they currently show promise to be used, at least, as an accurate indicator of energy balance. The accuracy of prediction is not as high as for the fatty acids but very high accuracies are not expected since energy balance itself, is not exact.

What are we waiting for?

Unfortunately, having accurate prediction equations is only the first step in breeding for a trait. Important questions yet to be answered include: What impact does producing healthier milk have on milk processing ability? What impact does producing healthier milk have on the cows own health? What impact does producing healthier milk have on all of the other traits currently included in the EBI?

To answer these questions, it is important to collect large quantities of data from the national herd on traits such as milk fat composition and energy status and then to quantify the associations between these traits and others. Such traits to be investigated include those related to milk processing ability, for example rancidity and cheese making ability, as well as traits of the cow herself, for example fertility and overall production.

Where will the research lead to?

Once the research is complete and we are satisfied that we know the impact of selection on fatty acid composition on other traits of economic importance, we can begin to produce breeding values for milk quality, and a decision can be made on whether or not this trait should be included in the EBI.

Once the equations to predict energy balance have been made more robust and research is complete, energy balance could be considered as a useful indicator of fertility. Data on energy balance could also contribute towards a very useful on-farm management tool, whereby warnings could be issued with the regular milk report to indicate which cows are in negative energy balance, and to what extent they are in negative energy balance and thus require attention before the breeding season begins.

Acknowledgements

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Rearing Replacement Heifers

John Donworth, Teagasc Limerick & Emer Kennedy, Teagasc Moorepark

Summary

- Well bred heifers represent the best genetic material in the herd and have the capacity to increase farm profit through improving herd calving pattern and milk production.
- The national dairy herd needs to grow at 3 to 4% each year to ensure that both current milk quota is filled and that sufficient extra replacements are generated to allow for expansion.
- Currently, only 26 dairy bred heifers per 100 cows are produced per year.
- Target live weights at 6, 15 and 24 months of age should be identified as part of a heifer rearing programme.
- Bodyweight and BCS of maiden heifers at Mating Start Date is more critical than age.
- Heifers that achieve target weights at mating start date produce significantly more milk in their first three lactations than heifers that are underweight at Mating Start Date.
- The net benefit to the dairy farmer as a result of having animals at the correct weight at mating is €50/cow per lactation.

Introduction

The main goal of a replacement heifer rearing programme is to grow heifers to reach optimal size and weight early, to start puberty, establish pregnancy and calve easily at the lowest cost possible. Well bred and well reared heifers have the potential to substantially impact upon herd profitability in that:

- They should represent some of the highest genetic material in the herd in terms of potential profit.
- If calved early and at the correct weight, they have the capacity to significantly improve herd calving pattern.
- If they are mated to high EBI AI sires, they will provide a further source of early-born high genetic merit replacement heifers for the future.
- The sale of surplus heifers may provide a source of extra income.

Is the scarcity of heifers a major limitation to herd expansion?

In a recent survey, almost 50% of farmers indicated that they intend to expand their dairy enterprise over the coming years. The potential to expand post quota will depend on the availability of well bred, high EBI replacement heifers. Increasing the number of replacement heifers you rear will provide you with the opportunity to benefit from improved herd performance or capitalise on the increasing demand for replacements from others choosing to expand. Currently, we are struggling to increase herd size. Since the introduction of milk quotas, the Irish dairy herd has contracted by over 1% per year.

Has progress been made nationally in generating extra replacements to allow for expansion of the Dairy Herd?

In 2009, the national herd stood at 1,126.9m cows - 50,600 lower than in 2000 (Table 2). However, for the first time since the introduction of milk quotas, both the number of in calf and weanling dairy heifers has started to increase (see Table 1). Between 2006 and 2009, an additional 60,715 dairy heifer calves were born. Of these, approximately three quarters (47,418) were born in the important January-March period

Provisional figures for 2010 again mirror this trend with a further increase over 2009 in the number of dairy heifer calves born. However during the January-March period, the increase was less than 2%.

Table 1. Number of dairy heifer calves born by month between January and June in the years 2006 to 2009 inclusive with estimates for 2010 and 2011.

Year	2006	2007	2008	2009	2010	2011
Jan	31,983	34,120	36,200	43,185	44,030	?
Feb	79,370	85,244	92,123	103,942	103,641	?
Mar	55,973	57,336	55,550	67,617	70,767	?
Apr	26,236	27,686	25,799	30,620	33,899	?
May	12,288	12,991	13,334	15,585	16,670	?
June	6,035	6,198	6,303	7,786	7,193	?
Total	245,485	255,777	267,735	306,200	314,651(E)	330,383E
% born in Jan/Feb/Mar	68.16%	69%	68.67%	70%	69.42%	

Source: Dept. of Agriculture AIM Bovine Statistics Reports, various years

The national milk quota is also increasing as shown in Table 2 and will continue to increase by a further 1% for the next three milk quota years. This increase will add a further 210 million litres to the national milk quota compared to 2010. Over the period 2008-09 to 2013/14 an additional 83,000 cows are required to fill this additional quota. This increase equates to 7.36% of the 2009 national dairy herd.

The current increase in dairy heifer calves on dairy farms is to be welcomed. However health issues including fertility and somatic cell count. Ensure that current replacement rate requirements are not less than 25%. Thus, replacement rates of 30% will be needed on many farms to allow for an increase in herd size while resolving herd health issues. This will impact on the volume of milk produced on dairy farms since first lactation animals only produce 75% of the yield of mature cows.

Table 2 Numbers of dairy cows and in calf heifers, national milk quota between 2000 and 2013.

Year	Dairy cows ('000's)	In calf dairy heifers	National Quota (m litres)	Milk quota (% Increase)
2000	1,177.5	206,500	-	-
2001	1,182.5	198,300	-	-
2002	1,164.1	230,700	-	-
2003	1,155.6	215,800	-	-
2004	1,156.1	229,600	-	-
2005	1,137.0	230,200	-	-
2006	1,109.2	228,700	5,238.8	-
2007	1,087.0	217,800	5,239.2	-
2008	1,113.9	205,400	5,343.8	2%
2009	1,126.9	227,900	5,397.0	1%
2010	1,176.9 (E)	275,284 (E)	5,406.1	1%
2011	1,226.9 (E)	283,186 (E)	5,505.7	1%
2012	1,235.9 (E)	297,344 (E)	5,560.7	1%
2013	-	-	5,616.6	1%

Source: CSO June census numbers for dairy cows and in calf heifers; (E) estimate

Data from dairy farmers who participated in the 2009 ACCBank Discussion Group Competition showed that the number of dairy heifers in dairy herds has risen in the last three years from 21 heifers per 100 cows to 26 heifers per 100 cows but with substantial variation between groups of farms. The Teagasc target is to produce 40 dairy heifers per 100 cows.

Further analysis from discussion group members who participated in the completion also reveals that 66% of discussion members used AI on breeding heifers in 2009. The use of AI varied from 83% from the top 20% of the groups to 47% for the bottom 20% of groups.

Breeding heifers are the most fertile animals on the dairy farm. It should therefore be easier to get dairy replacements from this group of animals compared to the main body of the dairy herd. Since one is dealing with fertile animals, it makes absolute sense that these animals are bred to easy-calving (less than 1.5% direct calving difficulty), high EBI (average €200+), AI bulls.

Many dairy farmers state that quota, labour, land fragmentation and difficulties in heat detection as their main reasons for not using A.I. on the breeding heifers. However, heat synchronisation programmes as well as "new" heat detection aids have made the job of heat detection with this group of animals somewhat easier.

The 2009 €100 EBI Discussion Group Competition also revealed that where AI was used on breeding heifers, these heifers received on average, 0.72 straws. In other words 72 A.I. straws were used on 100 heifers. The target for every dairy farmer

who is striving to put additional heifers on the ground must be to use a minimum of 1 A.I. straw for each breeding heifer in the herd.

Will they be needed?

The reality is that when issues such as (1) the pattern of dairy heifer births nationally (only 70% of heifer calves are born during the key months of January, February and March), and (2) the expected losses from birth to lactation (over 10%) are considered, the increase in supply of dairy heifer calves achieved in 2009 and 2010, will have to be maintained, if the national dairy cow population is to grow by the required 3 to 4% per year (an additional 40,000 cows each year).

Irish dairy farmers are also minimising the cost of current performance by recycling cows; estimated at 18% nationally in spring calving herds (10% in the top 10% of spring calving herds based on EBI). Secondly, of the 302,200 dairy heifer calves born in 2009, it is estimated that only 55.6% were sired by an AI bull. This figure needs to increase to 70% to maximise genetic gain in the national dairy herd.

Target weights of heifers

Research indicates that heifers should weigh 25% - 30% of mature liveweight at six months of age, be mated at 55% - 60% of mature liveweight and calve at 85% - 90% of their mature weight. Heifers, on average, reach puberty at 30 to 40% of their mature weight. However, excessive weight gains (more than 0.8kg/day for large breeds) prior to puberty are detrimental to milk production. Excessive fat is deposited in the developing udder tissue, at the expense of milk-secreting tissue. Recommended mature liveweights vary considerably between countries. For example, in the US, the target liveweight for mature Holstein cows is 650 kg. In New Zealand however, the target is 100 kg less. By calculating target weight as a proportion of mature weight, country to country and strain differences can be overcome.

In practice, on many Irish dairy farms, heifer rearing receives low priority and achieving target weights is not an issue of concern to many dairy farmers. The target liveweights for Holstein-Friesian, New Zealand-British Friesian and first cross Jersey X Friesian replacement heifers at different stages during the rearing period are outlined in Table 3.

Table 3. Target weights for strains of Friesian heifers and first cross Jersey X Friesians from birth to calving at 2 years of age.

Age	Month	% Mature Weight	Holstein Friesian	New Zealand/ British Fr	Jersey Friesian
Birth	February	-	41	38	34
6 Weeks	March	-	63	56	56
3 Months	April	-	90	80	80
6 Months	July	**30%**	155	148	138
8 Months	September	**-**	175	170	160
9 Months	October	**40%**	220	210	196
12 Months	February	**-**	280	267	250
15 Months	May	**60%**	330	315	295
19 Months	September	**-**	450	425	390
21 Months	November	**-**	490	470	437
24 Months (pre calving)	February	**90%**	550	525	490

Heifers that fail to achieve their target weights are unlikely to milk to their full potential. Reduced levels of management will result in lesser profit, as heifers may calve later than 24 months and produce less milk compared to better managed heifers. Well bred heifers, if calved early, have the capacity to significantly improve herd calving pattern and when mated to high EBI sires, will provide a source of early born, high genetic merit replacement heifers for future herd development.

Heifers that become pregnant late in the breeding season are at risk of leaving the herd after their first lactation, as they may not have sufficient time during the short breeding period to recover from calving and become pregnant again. It is imperative that heifers conceive at the beginning of the breeding season to give them a fighting chance of surviving in the herd for much longer. Thus, it is critical that heifers reach the target weights outlined in Table 1.

While it is important that heifers achieve all their target weights, at various stages during their first two years, the weight achieved on the 1st of May, at 15 months of age, is probably the single most critical milestone. Why? Heifers that are underweight at this date are unlikely to be cycling at mating start date. Discovering that your heifers are under weight in March or April (13 -14 months) is too late. Heifers should be weighed four to six months previously before the planned start of breeding and corrective action taken then to ensure that the target pre-breeding liveweight is achieved.

Growth rates of 0.6 to 0.7 kg/day can be achieved from birth to mating, if heifers are managed correctly (ad-lib high quality grass in the autumn, early turnout after first winter). Concentrate supplementation will be required if the target weights set out in

the Table 3 are not being achieved. Supplementation should begin from September onwards and continue indoors to within three weeks of turnout to grass. Maiden heifers can gain over 1 kg per day on spring grass from mid-February until late April/early May. This is significantly higher (and cheaper) than the weight gain obtained indoors. Replacement heifers should receive priority access to spring grass, particularly underweight heifers, and are the next most critical group of animals (after milking cows) to be let out to grass in the spring. Indeed on many farms they should be put ahead of the cows when it comes to accessing spring grass.

Subsequent Heifer Performance

Since first lactation animals only produce 75% of the yield of mature cows, it is imperative that they calve down at the correct weight and correct body condition score. First, second and even third lactation performance is not to be compromised. The faster an animal grows, the more efficient it is at converting feed into liveweight, because a smaller proportion of its feed is used for maintenance, and thus a greater proportion is available for growth. The size and body condition of a heifer at calving influences her subsequent milk yield.

An analysis of data from 2,380 heifers from Moorepark's on-farm fertility study (1999-2000) demonstrated the effect of age and weight at first calving on milk and reproductive performance during the first lactation. The data showed that weight at first calving had a significant positive effect on milk production in the first lactation. This trial also showed that weight at first calving also had a significant effect on milk yield in the second lactation. Light heifers produced significantly less milk, and of poorer composition in the second lactation. This work also showed that weight, rather than age, at first calving appears to have a more long-term impact on animal performance.

More recently, Dr. Frank Buckley, Teagasc Moorepark, examined the records of 800 Holstein Friesian heifers included in the 50 farm Norwegian Red study (2005-2008). The weights of the maiden heifers were recorded at mating time and used to evaluate subsequent fertility performance and milk production over the first three lactations as outlined in Table 4.

Table 4: Effect of pre-breeding liveweight of maiden heifers on subsequent heifer fertility and milk solids production during lactations 1-3.

Heifer pre-breeding weight (kg)	≤ 290 kg	291-316 kg	317-342 kg	≤ 343 kg
Fertility				
% cycling at start of mating	55	75	77	81
% of heifers calved	82%	88%	92%	93%
Mean calving date	15th Mar	5th Mar	1st Mar	27th Feb
Milk production				
1st Lactation (kg MS/head)	383	394	404	417
2nd Lactation (kg MS/head)	448	462	467	478
3rd Lactation (kg MS/head)	474	487	496	503
Average (kg MS/head)	435	448	456	466
Difference (Kg)	**0**	**+13**	**+21**	**+31**

The data in Table 3 show that more of the heavier heifers were cyclic at the start of mating. It is important that heifers are cycling at the start of mating to ensure that their calving spread is minimised, few calve later in the calving season and that empty rate is minimised. The variation in cyclicity levels among the herds was substantial and ranged from 31% to 100% between herds. Furthermore, only 82% of the lightest category of heifers calved the following spring. In addition, they calved an average of 16 days later than the heaviest heifers at mating. The level of body condition score at breeding also had a similar effect on the level of cyclicity. Animals with a condition score of 2.75 or less at breeding had a level of cyclicity of close to 50%. However, for animals with a condition score of 3.25 or greater, the level of cyclicity at breeding was above 80%.

Milk production is also affected by pre-breeding liveweight. The data in Table 4 also shows that the lightest category of heifers produce 31 kg less milk solids per lactation compared with the heaviest group of heifers. A similar effect was observed with body condition score. Animals with lower body condition score produce a lower level of milk solids.

Heavier heifers produce milk (provided that they are not overfat at calving). There are two reasons for the increase in milk production per lactation with increased bodyweight. First, the heifers have greater body reserves which can be used to produce more milk in early lactation. Second, the heavier a heifer is at calving, the closer she is to her ultimate mature weight. She therefore requires less energy for growth during her first lactation, to reach her mature weight. This allows more energy for milk production. Analysis of Frank Buckley's data shows that the well grown heifers produced more milk not only in their first lactation, but in their second and third lactation as well.

A follow on analysis of the study heifers was conducted with further weighings of the animals during their first, second and third lactations (as outlined in Table 5). This revealed that the lighter heifers subsequently matured into smaller cows. Indeed the difference in average liveweight between the lightest and heaviest groups amounted to 74 kg liveweight over their three lactations.

Table 5: Effect of pre-breeding heifer weight on cow liveweight.

Heifer pre-breeding weight (kg)	**≤ 290 kg**	**291-316 kg**	**317-342 kg**	**≤ 343 kg**
1st Lactation	427	455	474	499
2nd Lactation	477	501	521	545
3rd Lactation	498	519	552	579
Average	467	492	515	541
Difference	**0**	-	-	**+ 74 kg**

Is there a financial penalty due to the fact that heifers are underweight at breeding? Yes, is the short answer. As already stated, heavier heifers produced an extra 31 kg milk solids. Cull cow weight was also heavier. But heavier cows have a higher maintenance requirement. They are therefore more expensive to maintain. However, allowing for the higher maintenance costs, the additional receipts generated in kg of milk and kg of carcase is worth approximately €50 per cow per lactation.

Conclusion

It should be the objective of every dairy farmer to have dairy heifers that are well grown, with high EBI and that a sufficient number of them are in place to either replace unproductive cows in the herd, increase herd size or to generate surplus cash from heifer sales. Ensuring that heifers achieve the required weight at the various milestones will be greatly facilitated by weighing the animal at least twice during the growing phase.

Having heifers at the required weight at mating start date will increase the potential of these animals to generate maximum receipts during their lifetime. Good animal husbandry and attention to detail will ensure you achieve your objectives.

IBR: Does Ireland need a Control Programme?

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

Summary

- IBR is a highly contagious bovine viral disease which employs a strategy of latent infection reactivation for survival within a herd.
- Should IBR viral reactivation occur at a critical point during the annual cycle (e.g. breeding season, peak lactation), the economic effect can be devastating.
- IBR control programmes are well-underway in other EU countries and international pressure will grow for more widespread control of IBR.

Introduction

Infectious Bovine Rhinotracheitis (IBR) is a viral disease of cattle. It is caused by Bovine Herpes Virus 1 (BHV-1) and is a disease characterised by latent infection which reactivates during periods of stress (Snowdon, 1965). Due to the economic impact of IBR, many European countries have initiated (Germany) or completed (Denmark, Finland, Sweden, Austria, Italian province of Bolzano) EU-approved IBR eradication programmes (Nardelli et al., 2008). Ireland has recently recognised the increasing prevalence of diseases such as IBR, Bovine Viral Diarrhoea (BVD) and Johnes disease, i.e. those diseases not currently under statutory control, and the establishment of Animal Health Ireland (AHI) has proved a dramatic step forward in harmonising the control of such diseases. A consultation document is currently being compiled by AHI with regard to implementation of a national control programme for BVD, and it is now incumbent amongst Irish farmers to decide if an additional national programme for IBR is either necessary or worthwhile.

Principles of IBR eradication used in other EU countries

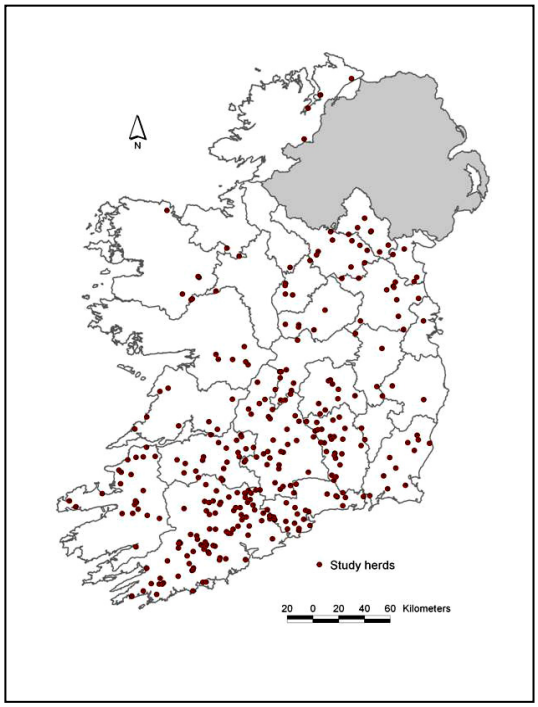
IBR virus is a herpes virus, and as such, behaves very similarly to the human 'cold-sore' virus in that once an animal is infected, it is infected for the remainder of its life. The infected animal, however, does not shed IBR virus continuously over its lifespan, but rather stores the virus in an inactive (latent) state following initial infection. The latent virus then becomes re-activated during periods of stress and is shed resulting in further IBR infections within a herd (Nylin et al., 2000). When an animal contracts IBR, antibodies are generated towards the virus, and any animal testing positive for IBR antibodies can be considered a lifelong carrier and potential shedder of the virus. In order to eradicate IBR therefore, animals must be tested for IBR antibodies and those animals yielding a positive result culled. Such an approach has proven extremely effective in countries where the levels of IBR-antibody positive animals (seroprevalence) are low and culling by slaughter is economically feasible. In countries where the seroprevalence is high, the use of marker vaccines is most appropriate. These vaccines allow differentiation between a vaccinated animal and an infected animal to a degree which makes national vaccination programmes feasible. The duration of a national control/eradication programme in any particular country ultimately depends on, the initial seroprevalence of IBR, the culling rate of

infected animals and the rate of new infection and re-activation. National eradication programmes for IBR must be carried out in line with EU legislation (Decision 2004/558/CE) which defines the requirements to be fulfilled in order to obtain EU approval for such a programme (Nardelli et al., 2008). A comparison of IBR control currently carried out in EU countries is available at http://www.ibr-marker.com/IBR-eradication-Europe.asp. Unfortunately, Ireland remains one of few countries that has not implemented some level of IBR control.

Prevalence of IBR in Ireland

The current prevalence of IBR in Ireland in unknown, although a study carried out at Moorepark, has shown that approximately 80% of Irish dairy herds have been exposed to IBR virus. Over the course of the 2009 lactation, a total of 319 HerdPlus dairy herds (Figure 1) submitted bulk milk samples on four occasions (March, June, August, November) to Teagasc for testing as part of the 'Herd Ahead' project. Each sample was tested for antibodies to IBR, a positive result indicating that one or more IBR carriers existed in the herd or that the herd was vaccinated.

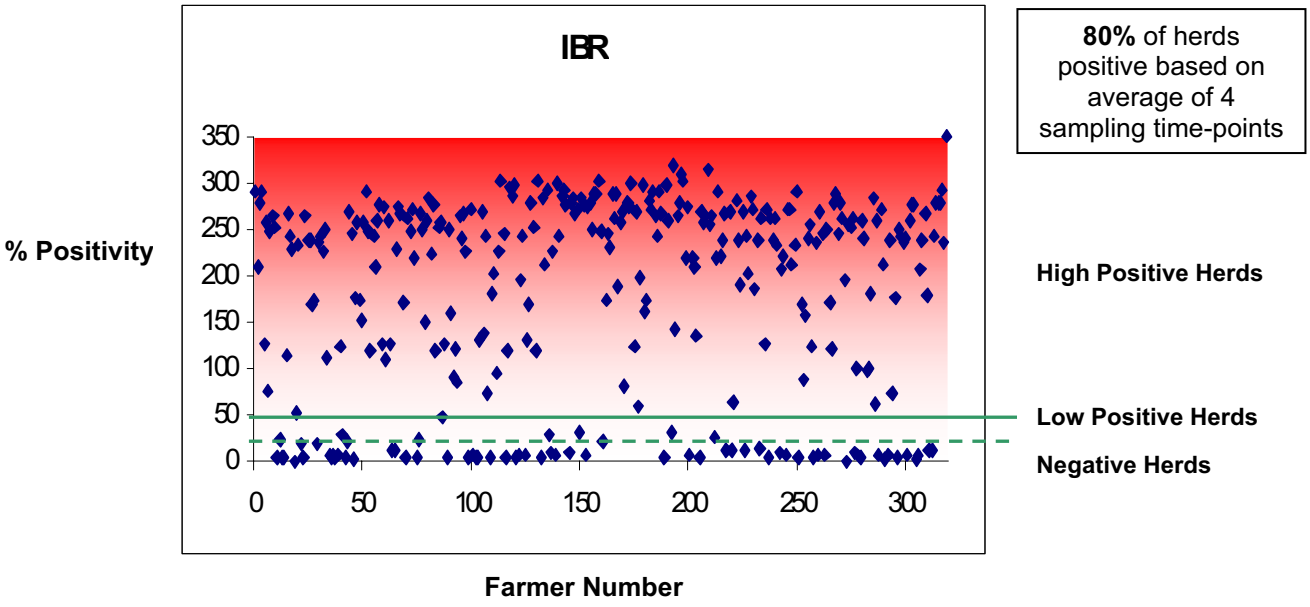
Figure 1: Location of 'Herd Ahead' study participants.



Results were averaged over the four time points and plotted against farm number (Figure 2). Herds recording average readings of greater than 50 were classified as 'High Positive' herds, and represent herds that contain a high number of IBR carriers or have vaccinated animals within the milking herd. Herds recording average readings of 25 to 50 were classified as 'Low Positive' herds and represent herds that have lower numbers of IBR carriers in the herd. Those recording readings of less than 25 were classified as 'Negative' herds and represent those herds in which all animals can be considered naïve to IBR. Only 12% of study participants had vaccinated their herds for IBR and had done so, in the majority of cases, on the basis

of an IBR outbreak and so for the purposes of this study can be classed as positive herds.

Figure 2: Proportion of HerdPlus herds displaying exposure to IBR.

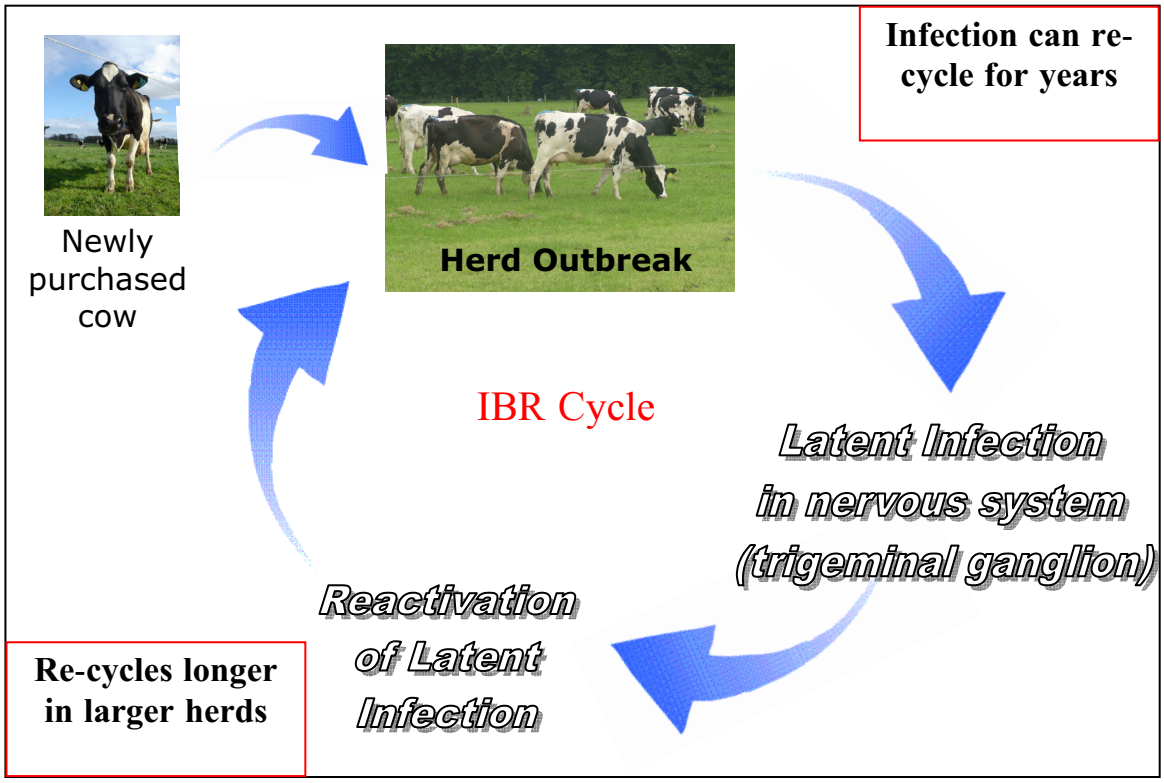


This study shows that IBR is present in an unacceptable proportion of dairy herds and the impact of this disease in terms of farm profit and animal welfare should not be underestimated. A control programme should be given serious consideration in order to increase the health status of the national herd as a whole, and to limit future on-farm losses.

Transmission and symptoms of IBR

Direct animal contact is the most efficient method of IBR virus transmission with nasal discharges from infected animals containing large amounts of virus. Animals that have become exposed to the virus in their lifetime can become carriers of the disease and as such pose a threat to the dairy herd. Stress re-activates latent infections in carrier animals that then infect additional animals in the herd and maintain the cycle of infection (Figure 3). Indirect transmission can also occur although of lower risk.

Figure 3: The infection / re-infection cycle of IBR.



IBR manifests itself in two ways in an infected herd:

1. The initial outbreak – this is characterised by;
    - Sudden milk drop and high fever
    - Nasal discharge – sore, inflamed, crusty nose
    - Sore and cloudy eyes (conjunctivitis)
    - Severe pneumonia due to secondary bacterial infections
    - Abortions in the second half of pregnancy
    - Increase in calf pneumonia

All or some of these clinical signs may be present during an outbreak.

2. Secondary outbreaks – these are not as severe as the initial outbreak and are characterised by;
    - Occasional abortions in second half of pregnancy
    - Increased levels of calf pneumonia
    - Intermittent respiratory illness amongst individual cows

(Radostits et al., 2006)

It should be noted, however, that in any particular year, a 'Positive' herd as classified by bulk milk analysis may not record any OBVIOUS clinical signs of IBR infection. In such herds, the disease often manifests during some period of change in herd management such as off-farm rearing of replacement heifers, mixing of management groups of differing ages, and purchase of livestock onto the farm.

Treatment and Control

Following diagnostic testing, if latently infected IBR carriers are detected in the herd, they should be sold for slaughter only. IBR carriers will shed the virus intermittently over their lifetime and will place a herd at risk of continuing IBR outbreaks. As the number of potential carriers in a herd may be high, immediate culling of carrier animals is often not an option. In this case, the priority is to protect new animals entering the herd (replacements, purchases) using bi-annual vaccination. Such a vaccination protocol combined with annual diagnostic testing will lead to eventual elimination of IBR from the herd through natural culling of carrier animals. It should be noted that an initial IBR outbreak can be controlled and its impact reduced by use of a modified-live vaccine (Bosch et al., 1996). These vaccines are designed to function in the face of an outbreak and to protect against generation of new carrier animals. If an IBR outbreak is suspected, the importance of rapid vaccine intervention cannot be stressed highly enough. Antibiotic treatment may also be warranted in animals displaying severe respiratory disease.

Pedigree breeders should be aware of the fact that candidate bulls for AI will be rejected if they test positive for antibodies to IBR. There is no distinction made between antibodies to vaccine and antibodies to the actual IBR virus for the purposes of screening bulls for performance testing. Such animals should NOT be vaccinated, therefore, if intended for performance testing and should be isolated immediately from high risk animals on the farm if an outbreak has occurred. It should also be remembered that it is possible for modified-live vaccines to be transmitted from one animal to the next, resulting in antibody generation in bulls that may not have been vaccinated directly, again resulting in exclusion from AI programmes. If producing bulls suitable for performance testing, ensure you discuss IBR control plans (with particular regard to vaccination) in detail with a vet knowledgeable in this area.

Control of IBR in dairy herds

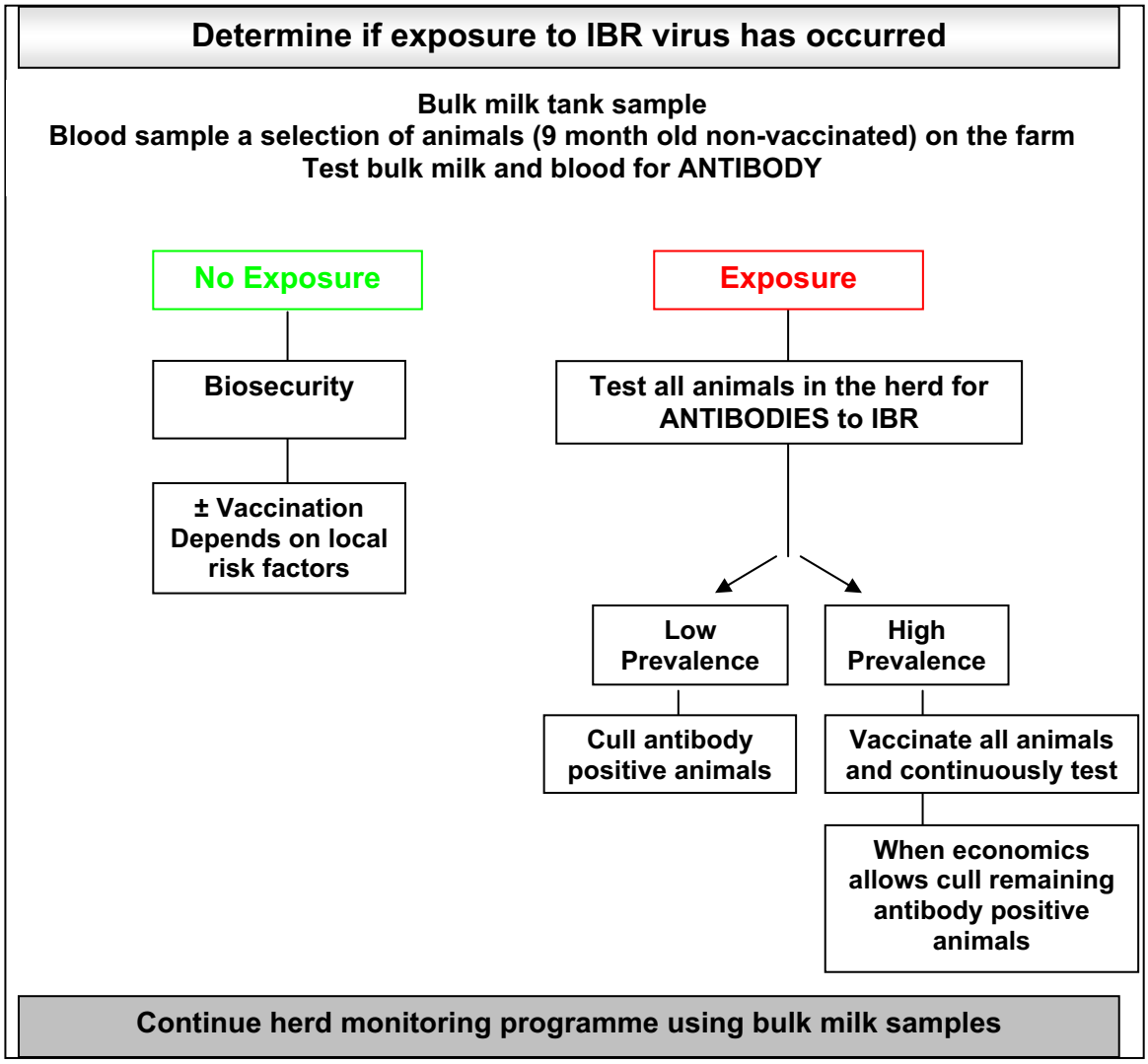
Disease control in dairy herds should employ a combination of biosecurity, vaccination and diagnostic testing. This combined approach allows determination of the health status of a herd. Many EU and non-EU countries (Netherlands, UK, Australia, New Zealand) are now implementing such disease control programmes utilising bulk milk sample testing in centralised laboratories to routinely screen herds, monitor their disease status, and promote implementation of appropriate biosecurity strategies. With the increasing prevalence of IBR in Ireland, dairy farmers need to take such practices on board in order to maintain competitiveness. Figure 4 outlines the steps that should be taken to determine if exposure IBR has occurred, and the necessary follow up steps to be taken should viral exposure be indicated. Briefly, it is first necessary to determine viral exposure by testing a bulk milk sample and blood samples from a selection of 9-month-old (approximately) unvaccinated weanlings for ANTIBODIES to the virus. If exposure is indicated by a medium to high level of antibody in the bulk milk sample combined with any or all of the weanlings testing positive for ANTIBODIES, control measures have to be put in place. These control

measures may include whole herd testing to identify latently infected animals. The number of latently infected IBR carrier animals in a herd can be high and so a combination of vaccination and diagnostic testing is the most economical option to control, and eventually eliminate, IBR from a herd (Figure 4). All vaccination and testing programmes must be supported by a minimum level of biosecurity to ensure continued IBR control and prevent re-introduction to the herd.

Planned Research at Moorepark

The 2009 Herd Ahead project did highlight the fact that although many farms recorded high bulk milk reading for IBR exposure over the entire lactation, many of these farms had not experienced any obvious clinical signs of the disease. The possibility may exist that strains of differing virulence (severity) exist in different herds, thereby resulting in severe disease on only a proportion of farms. The possibility may also exist, that certain carriers of IBR may not reactivate the virus following initial infection, and as such pose no threat to the remainder of the herd. It should also be remembered that IBR and clinical signs of the disease are very much related to the stress-levels a cow/heifer may experience throughout her lifetime. Minimisation of stressors on certain farms may alone account for the differences in disease severity that is recorded across farms. Future studies in Moorepark intend to examine these three possibilities (differing strain types, inability to reactivate virus, and stress management) with regard to IBR infection in order to contribute valuable information to the control and eventual eradication of IBR in Ireland.

Figure 4: Monitoring and control of IBR in a dairy herd.



Conclusion

Does Ireland need a control programme for IBR?

Diseased animals perform sub-optimally and decrease farm profitability through waste feed, labour and veterinary costs. By using the combined approach of biosecurity, diagnostic testing and vaccination on individual farms, control of IBR, both on-farm and nationally, will become feasible, and will reduce the economic impact of this disease. If Ireland is serious about optimising the health of the national herd and maintaining international competitiveness, then the answer must be YES.

Summary of IBR Control

Eliminate IBR from your herd by;
1. Vaccinating with a live vaccine in the face of an outbreak
2. Testing to establish the level of carriers in the herd
3. Vaccinating with either a live or inactivated vaccine to reduce the level of IBR carriers in a herd
4. Continuing to vaccinate at six-monthly intervals
5. Culling carriers out of the herd when economically feasible
6. Designing and implementing a biosecurity plan including diagnostic testing

Acknowledgements

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Dairy Farm Energy Consumption

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

Summary

- Energy audits have shown that electricity usage contributes on average, 0.60 cent/litre to milk production costs. In terms of electricity consumption per dairy cow milked, the figures vary from 4 kWh/cow/week to 7.3 kWh/cow/week. This is equivalent to €0.60/cow/week to €1.10/cow/week.
- Key opportunities for reducing energy consumption include;
  - Eliminate energy wastage; fix all hot water leaks, insulate all hot water piping and refrigerant gas piping and use lights only when necessary. A leak as small as one litre per hour can waste 8500 litres of hot water and 3800 kWh per year.
  - Optimise plate cooling by increasing water flow to achieve the correct water to milk flow ratios. Increasing the milk to water flow ratios from 1:1 to 1:3 can reduce power consumed by the bulk tank by over 40%.
  - Switch all water heating to night rate only; consider using an oil fired boiler.
  - Consider using a variable speed drive controller on vacuum pumps. This can save over 60% on vacuum pump running costs.
  - Use energy efficient lighting.
- There is scope for Irish dairying to increase energy efficiency thereby helping to reduce costs while at the same time reduce greenhouse gas emissions.

Introduction

The cost of electrical energy will increase dramatically in the future and awareness of energy consumption in the dairy industry is becoming an issue in the cost of milk production. The recently established energy research programme at Moorepark aims to reduce electricity consumption/costs on Irish dairy farms and hence their carbon footprint. Commencing the programme in January 2009 the first objective was to carry out detailed energy audits on 3 dairy farms. Electricity consumption data was collected from 3 Teagasc Research Farms that were fitted with electricity monitoring equipment over a 30 week period from March to November 2009. A summary of the results can be seen in ***Figure 1.*** The audit showed that milk cooling is the largest consumer of electricity (37%) followed by water heating (31%), vacuums pumps (19%) and lighting (10%). Other items such as wash pumps, milk pumps, feed augers and air compressors make up the balance (3%).

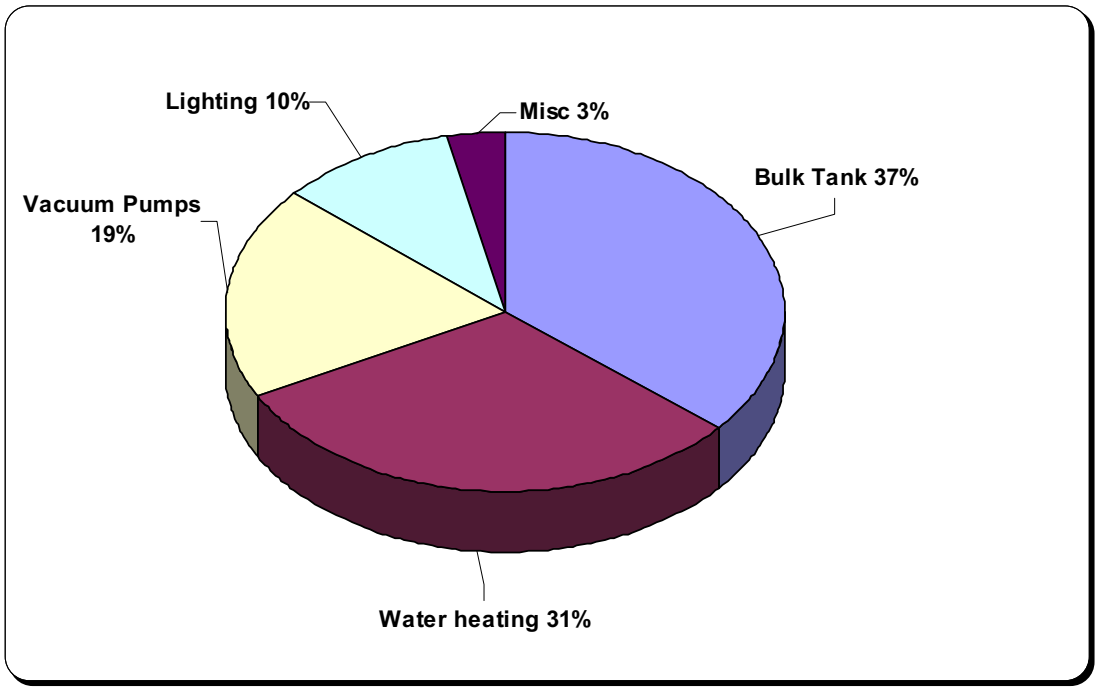


Figure 1; **Summary of electricity audit on three Teagasc Research Farms**

Milk production data was also collected for this 30 week period which allowed electricity cost, in cents per litre of milk produced to be calculated. These figures varied from 0.47 cent/litre to 0.69 cent/litre. The average figure for the three farms was 0.60 cent/litre. In terms of electricity consumption per dairy cow milked, the figures varied from 4 kWh/cow/week to 7.3 kWh/cow/week.

Opportunities for reducing energy consumption

Results to date indicate that electricity usage on dairy farms can be reduced by over 50%. The first step is to reduce energy wastage i.e. fix hot water leaks, insulate hot water piping and refrigerant gas piping, using lights only when necessary and make use of night rate electricity. Applying these good management practices will reduce energy costs without any capital expenditure. The benefits of reducing electricity consumption are two fold. Reducing milk production cost is an obvious benefit but also due to the fact that 86% of electricity generated in Ireland is from fossil fuels, 531g CO_2 are produced for every kWh of electricity used. Hence reducing electricity consumption will also reduce the industries carbon footprint.

1. Water Heating

The heating of water is a substantial energy input in the operation of a modern dairy farm. Electricity used by water heating equipment can add up to two kWhs per cow per week. The most common method of providing hot water on dairy farms is electrical water heating, with oil fired boilers also being a popular choice, particularly on larger dairies. Both systems differ significantly in terms of efficiency and have relative strengths and weaknesses. **Table 1** displays the results of a recent water heating trial in Moorepark where 500 litres of water was heated from 14°C to 80°C

with i) a 3kW element and ii) a 26kW oil fired burner running on kerosene. The amount of usable water was defined as the quantity of water drawn off from the cylinder between 60°C and 80°C. Inspection of **Table 1** shows that a 3kW immersion element takes over 16 hours to heat the 500 litre tank to the final temperature of 80°C. This would not be satisfactory as night rate electricity should be utilised for electrical water heating. This element would not be capable of heating the water on night rate alone. **Table 1** shows a comparison of electrical and oil to heat water. Tariffs used for these calculations are shown in **Table 2.**

***Table 1*:** Comparison of electricity and oil for water heating

Heating Method	Power Consumed (kWh)	Time (Hrs)	System Efficiency*	Useable Water ** (litre)	Cost per 100 litres (€) Night/Day Rate	Kg of Co_2 Produced
Electricity	48.24	16.5	79%	411	0.87 / 1.77	25.6
Oil	45.5 (4.4l Kerosene)	1.75	84%	415	0.60	12.7

*System efficiency is the ratio of energy extracted from the system in terms of hot water, to energy consumed by the system (i.e. electricity or oil)

**Useable water is defined as the amount of water drawn from the cylinder between 60°C and 80°C

Table 2: Tariffs used for calculating water heating costs (Correct on 15/10/2010)

Unit Type	**Cost per Unit (€) Ex VAT**	**Tariff**
Electricity Day units (kWh)	0.15	ESB Rural night saver
Electricity Night units (kWh)	0.07	ESB Rural night saver
Kerosene (Litre / kWh)	0.57 / 0.06	Based on quote for 1000l

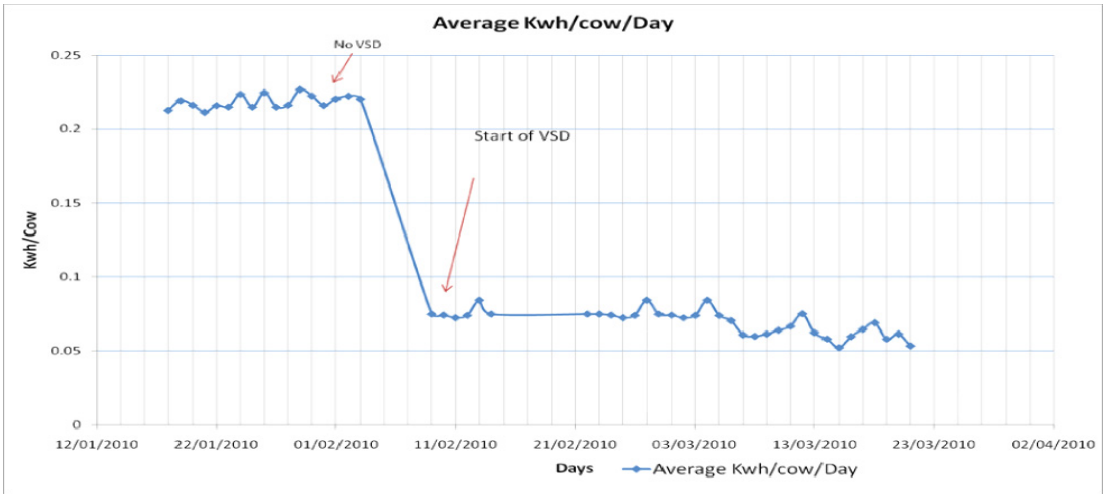
The importance of using night rate electricity is immediately apparent. **Table 1** show that the oil boiler can produce 100 litres of usable water at a much lower cost than the 3kW element on night rate and substantially cheaper than the electrical element on day rate. Oil prices can fluctuate but the price of kerosene would need to increase by 45% from today's price to match the cost of the electrical heating system. The oil fired system also has a number of other advantages. Firstly the recovery time is very low and this means that hot water will be available both morning and evening if required which is an important factor in system selection for many farmers. Secondly the amount of CO_2 emitted by the oil fired system is much lower that the comparable electrical system. Naturally the capital investment of the oil fired system will be higher than the electrical system but as **Table 1** illustrates the savings involved can be noteworthy depending on hot water usage and whether or not night rate electricity is available. In any case serious consideration should be given not only to initial purchase cost but also to running costs and environmental impact.

2. Vacuum Pumps

Conventional vacuum systems incorporate a vacuum pump operating at a fixed speed, a vacuum regulator and a load. The load consists of the air admitted by the components that make up the milking system including milking units, pulsators, claws and other devices that admit air during operation. To maintain a set vacuum level, the vacuum pump must remove air from the milking system at the same rate as air is being admitted. Since the air admitted is dynamic and the pump out rate is constant, a vacuum regulator is necessary to admit the difference between the pump capacity and the air load. The typical vacuum regulator is a mechanical device that adjusts the rate of air admission into the system. The vacuum regulator provides airflow into the system so that the sum of the air admitted by the milking system plus the air admitted through the regulator exactly matches the fixed airflow at the vacuum pump. When the air load is low, the regulator must admit nearly the entire pump capacity. When the load increases the regulator must close and admit less air. Introduction of variable speed drive (VSD) technology for controlling vacuum in a milking system can contribute to reduction in energy use, while still producing equivalent vacuum stability. The VSD is able to adjust the rate of air removal from the milking system by changing the speed of the vacuum pump motor to equal the rate air is admitted to the system at a given vacuum level. All of the energy used to move air through the conventional vacuum regulator is saved. Variable speed drive “vacuum regulators” consist of a sensing element, a controller, and a variable frequency motor drive. The sensing element is an electronic vacuum transducer that converts the vacuum signal into an electrical signal for processing by the controller. The controller monitors the vacuum level signal from the transducer and determines the appropriate speed to operate the vacuum pump in order to maintain the desired vacuum level. The controller contains the operator interface where vacuum level settings are adjusted. The variable frequency motor drive is a device that converts standard line voltage at 50Hz to a variable frequency and variable voltage output to drive a 3 phase induction motor. By reducing the frequency and voltage supplied to the motor, the speed and the power consumed by the motor will be reduced. As with conventional, mechanical regulators, placement of the sensing element of a variable speed regulator is very important. The sensing element should be located as close to the receiver as possible.

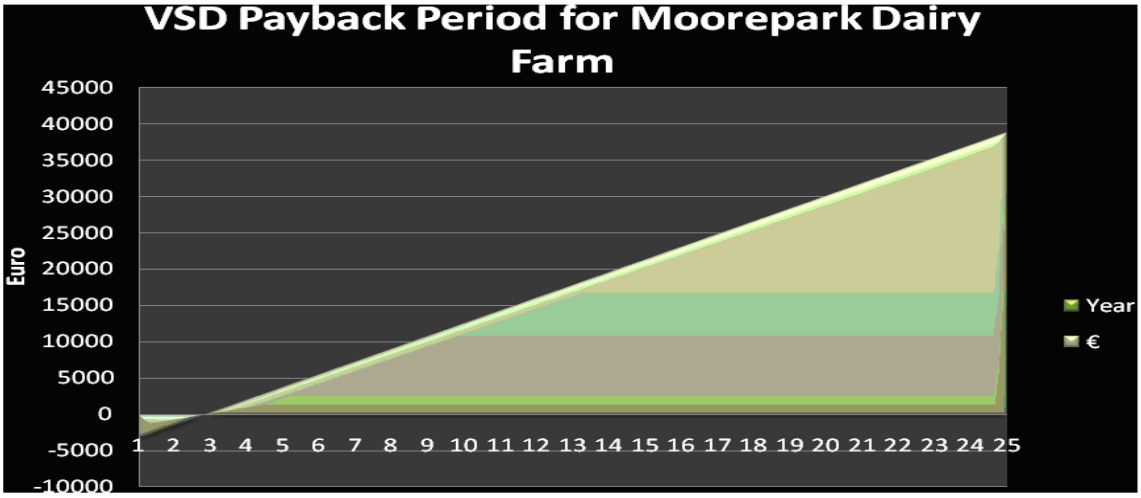
Over a two month period at Moorepark the power usage of the vacuum pumps was monitored, pre, and post VSD installation on a 30 unit herringbone milking machine. The milking equipment consists of a highly automated 30 unit milking machine with two DM 5 vacuum pumps driven by two 4kW motors. The vacuum pump capacity is 2600 litres of free air per minute. The plant consumption is 1200 litres per minute during milking. The unit chosen was an Invertek optidrive E2 AC variable speed drive. In addition to power consumption, cow numbers milked, milk yields and mlilking time were all recoded.

***Figure 2*: Power consumption of vacuum pumps pre and post VSD insatllation**



The annual energy consumption of the vacuum pumps before the VSD was installed was over 16,300kWh. With the installation of the VSD the electrical energy use dropped to 4,700kWh, this gives a saving of 11,600kWh. The payback for the VSD installation is 2.85 years based on an initial cost of €5,000 and an annual cost saving of €1,752. The annual saving of CO_2 as a result of the VSD installation are 6.2 tonnes/ year.

Figure 3: Projected payback for VSD installation in Moorepark



3. Milk Cooling

Milk cooling is the largest consumer of energy on Irish dairy farms. The cooling of milk immediately after milking is vital to maintaining high milk quality levels. On a typical Irish dairy farm the cooling process is completed in two stages; pre-cooling and refrigeration. Pre-Cooling is achieved by passing the hot milk through a Plate Heat Exchanger (PHE) before entry to the bulk tank. Cold water is pumped through the opposite side of the PHE. The cold water absorbs a portion of the heat, thus pre-cooling the milk. A PHE is designed to run at certain operating conditions; each PHE

has a specific milk to water flow ratio and extra plates can be added to accommodate for very large milk flow rates. The goal of pre-cooling is to bring the milk temperature as close as possible to that of the water. In July 2010 Teagasc Moorepark conducted a series of audits on plate heat exchangers currently being used on active dairy farms. The results from these audits concluded that the vast majority of plate heat exchangers were performing at only a fraction of their full cooling effectiveness. This was mainly due to the improper milk to water flow ratios being employed, the average of which was 1:1.2. PHE manufactures recommend milk to water flow ratios of between 1:2.5 and 1:3 depending on the model. If a PHE is sized correctly in relation to the power of the milk pump and the correct ratio of water is supplied then the power consumed during the refrigeration stage can be dramatically reduced.
Table 3 represents the results of PHE testing carried out at Moorepark Engineering Laboratories. A PHE was analysed at varying milk to water flow rates and with an increasing number of plates. The milk and water entry temperatures were set to 35°C and 10°C respectively and the milk exiting temperature from each test was recorded.

Table 3*:* Milk exit temperatures (^{o}C) for a PHE ratio and plate capacity test

	Milk:Water ratio			
No. Plates	**1:1**	**1:2**	**1:3**	**1:4**
25	20.8	16.8	14.8	13.7
29	20.7	16.6	14.6	13.6
33	20.5	16.3	14.5	13.5
37	20.5	16.1	14.3	13.3
41	20.4	16.0	14.1	13.2
45	20.4	15.9	14.0	12.9

The most noticeable result from the above test is the reduction in milk exiting temperature corresponding with the increased milk to water ratio. However it takes an ever increasing water flow rate to reduce the milk temperature, as the ratio increases the cooling effect per litre of water is reduced.

Another observation from the test is the influence of increased plate capacity on milk temperature. The extra plates have a mild effect on the performance of the PHE. The addition of extra plates to the heat exchanger increases its heat transfer area however this also increases the number of flow channels, thus reducing the milk flow velocity and water flow velocity at a set flow rate. This reduction in flow velocities retards the heat transfer rate in the PHE. The resulting effect is that increasing the number of plates on a PHE produces only a modest increase in cooling performance.

Milk Cooling Systems & Smart Metering

Two types of milk cooling systems are used on Irish dairy farms. Firstly “Direct expansion” (DX) refers to a system where the evaporator plates are incorporated in the lower portion of the storage tank in direct contact with the milk. Liquid refrigerant expands inside the evaporator taking heat out of the milk directly thus the name

"direct expansion". Milk cooling takes place within the tank. Generally, this milk cooling system cannot cool the milk as fast as the milk enters the tank. The cooling system must run for a period during and after milking. DX cooling systems are the most efficient cooling system in terms of kWhs consumed per litre of milked cooled however the must operate on "day rate" electricity.

"Instant" cooling is where the milk cooling is completed external to the storage tank and then pumped into storage. An intermediate cooling fluid, such as chilled water from an ice builder is used to cool milk rapidly in a dual phase plate heat exchanger. This cooling system is less efficient in terms of kWh consumed per litre of milk cooled however ice bank builders can generate enough ice at night to meet the entire milk cooling demand the next day. This system takes advantage of significantly cheaper night rate electricity.

In 2009 the Central Energy Regulator (CER) began trialling a new electricity pricing system called Smart Metering, see **Figure 4**. Smart Metering allows for the dynamic pricing of electricity dictated by the load on the national grid.

Figure 4: *Smart Metering Plan*

Over the next decade this new structure will be rolled out nation wide. Smart Metering will result in cheaper electricity during the night time and much more expensive electricity during the peak period. Bearing these planed developments in mind along with the fact that the evening milk cooling load may land partially or entirely on the "peak" time of use tariff, the case for ice builders with instant cooling will become stronger. The trend towards larger milking herds, greater milk production per cow and larger more efficient milking machines will increase milk flow rate (litre/minute), with large volumes of milk to be cooled within a 24-hour period. The

"instant" cooling system is not limited by the amount of surface cooling area in the storage tank which is another important attribute in favour of the ice bank system. This milk cooling strategy has been flagged as a priority research area for engineers in Moorepark in the coming years.

4. Lighting

The cumulative magnitude of energy used by lighting equipment in all areas of the milking operation is somehow perceived to not be as significant as it really is. In fact electricity used by lighting can add up to 1 kWh per cow per week. Moisture resistant double fluorescents or high bay metal halide lamps are the most common types of luminary used on Irish dairy farms. Energy audits have shown that similar size dairies using metal halide luminaries can use over three times more electricity on lighting than a farm using fluorescent type luminaries. This is due to the high wattage of the metal halide fittings. Metal halide fittings are typically suspended from the dairy roof in a singe row over the milker's pit. The nature of this lighting strategy leads to shadows being cast by the milking machine, stallwork, milk meters and automatic cluster removers. Lux measurements taken in the milker's pit tend to be well below desired levels when excessive shadows are cast. The alternative fluorescent lighting generally consists of two rows of double tube luminaries mounted over the edges of the pit. These provide uniform lighting with little or no shadows as illustrated in ***Figure 5.***

Figure 5: Well lit parlour with 2 rows of double fluorescent fittings

During the course of the lighting experiments in Moorepark it was noted that modern fluorescent tube fittings tend to interfere with milking parlours automatic cow identification systems, reducing the effective distance from the cows' ear tag to the antenna. The underlying reason for this is the use of high frequency switching ballasts within the light fittings themselves. These ballasts give out high frequency nuisance signals which interfere with the automatic identification antenna. **Table 4** illustrates the dramatic effect these lights have on the tag reading abilities of the

automatic identification system when suspended 1 meter above the antenna. The older switch start or magnetic ballast fluorescent tubes are still commercially available and where automatic identification systems are installed these lights are the only viable option. While not the most efficient solution, they will however offer substantial savings over the high-bay metal halide lamp and will provide sufficient lux levels at the cows' udder. Where automatic cow identification does not exist any type of fluorescent can be used and focus can be given to energy efficiency.

The most commonly used type of fluorescent tube found in the dairy is the double five foot fluorescent tube. These tubes have a diameter of 1 inch and are referred to as 'T8' fittings in the lighting industry. A number of options exist to improve the efficiency of these fittings. The 'T5' fitting is an increasingly popular development in fluorescent lighting. 'T5' lamps have a diameter equal to 5/8". These lamps are approximately 40% smaller than 'T8' lamps. Traditionally upgrading to 'T5' lamps required the purchase of a new light fixture. 'T8' to 'T5' converters are now commercially available to convert existing 'T8' fittings to higher efficiency 'T5' fittings without the requirement to change the fixture itself. 'T8' LED (Light Emitting Diode) tubes are also available, although these are quite new to the market. Luminous efficiency, power consumption, and a lux value recorded one meter from the light fittings are displayed in **Table 4**. Using the double 58 watt 5Ft 'T8' as the benchmark and current industry standard, it is clear that efficiency gains can be made by upgrading existing lighting. The IES (Illuminating Engineering Society) recommend 500 lux on the operating plane (at the cows' udder) for the milking routine. One point to note is that the lux values for the 'T5' fitting are far higher than required, in fact the number of luminaries in the dairy could be halved while still meeting the required 500 lux on the working plane (at the cows udder). Moving from double 'T8' fittings to half the number of 'T5' fittings would reduce power consumption on lighting by 40% while still providing the 500 lux recommended by the IES. Simply using a 'T8' to 'T5' converter will save 30% on lighting power usage. LED tubes are very efficient and would save 48% on power usage, however at over €85 per tube the price will need to come down considerably before they will be widely adopted.

Table 4: Results of the Lighting Experiment carried out in Moorepark

	Double 19W LED	**Double 49W T5**	**T8 to T5 converter**	**Double 58W T8 High Frequency**	**Double 58W T8 Switch Start (Magnetic)**
Luminous Efficiency (%)	16.32	15.15	11.91	10.4	10.6
Energy Use (l)	0.16	0.4	0.23	0.33	0.53
Lux at 1 Meter	653	1516	685	853	1402
Tag read distance * (cm)	31	28	37	55	102

* Tag read distance is the functional distance from the antenna to the ear tag with the light fitting suspended 1 meter above the antenna

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Getting the most from your Discussion Group in 2011

Patrick Gowing, B&T Dairy Advisor, Teagasc Westmeath/Offaly

Introduction

The launch of the Dairy Efficiency Programme (DEP) in 2010 has introduced many new farmers to the benefits of participating in a discussion group. Because of this initiative many new groups are operating for the first time this year. All farmers participating in groups should work to make their group a success and this will help them to maximise the potential benefits of group membership for themselves and the others involved in it.

Core principles and stages of group formation

All groups should be based on three core principles. They are:

- Valid information is shared between group members;
- Free and informed choice/commitment is reached;
- Group commitment to the decision.

As there are many new groups operating for the first time this year, it is important to understand the different stages of new group formation before a group becomes fully established. The four main stages in group development are:

- Forming;
- Storming;
- Norming;
- Performing.

Many of you are at the forming stage in your group's development. This is where there may not be too much interaction as members are only starting to get to know each other.

Over time you will move into the storming stage which is the stage at which conflict or personal agendas can come to the fore in the group. When well managed, this can be enormously beneficial to the group in establishing members into their group.

Afterwards the group will move towards the Norming stage. Here the group starts to take shape and works towards firmly establishing the group rules or 'norms'.

Finally you will hit the performing stage where the group begins to deliver on its potential and there is good co-operation between members. It's important to remember if you are in a new group to stick with it as it takes time to get to the performing stage.

In my own area of Westmeath I facilitate 6 discussion groups. These comprise one existing group, a new group formed from two old groups and four new discussion groups. In this paper I would like to share with you what I have found to be important and where we hope to go with the discussion groups in the future.

Group structure

For the successful running of any group, it is essential to have a good group structure.

- Chairperson - a chairperson should be elected for a 1-2 year term. I find the benefit of having a good chairperson is important for the smooth running of a group. The chairperson acts as a link between the facilitator and the group. This is very important as sometimes a facilitator may not know if farmers are unhappy with aspects of the meeting or the way the group is running. At one or two meetings during the year the chairperson should take the group aside for 10 minutes at the end of a meeting without the facilitator and give farmers an

opportunity to express their feelings on how the group is operating. This can then be conveyed back to the facilitator. The chairperson should discuss with the facilitator and host farmer how each meeting went. The chairperson can help resolve any conflict that may arise in the group and determine what topics farmers wish to discuss in the upcoming meeting.

- Schedule - all groups should lay out a schedule for the group at the start at each year. This involves picking a set time and day of the month when the meeting takes place (e.g. last Thursday of the month at 11.00am). An annual schedule of farms to visit should be established at the start of the year. This should include a list of the main topic/issues to be discussed on each farm. This allows members to plan for upcoming meetings.
- Monthly performance worksheets - for any group to work all members most take an active role, be open and honest and share information. No hoovers allowed (hoovers suck all the information in but let nothing out)! With all members actively contributing to the group, you will achieve open and frank discussion. The monthly worksheet also allows quieter members to contribute. However for it to work well, all members must supply the information required. A key fundamental of any group is that everything said in the group will stay in the group. Without this there can be no trust between members and therefore no honest discussion. This sharing of information quickly builds trust among the members of new groups. The monthly performance sheets can be as detailed or a simple as the group desires and can be tailored to each group (see Figure 1 for an example of a monthly performance worksheet).
- Social element - for any group to function well there must be a good social element. One of the main benefits to any group is the friends that you make. In 2009 when milk price was on the floor and the weather poor, the social element to the group shined through. Farmers in groups had other farmers to fall back on to help and encourage them through the difficult times.

Group operation in Westmeath

- Chairperson - two of the groups have elected chairmen. The other four new groups have no elected chairperson in 2010 and are operated by Teagasc. This was to allow new groups a chance to get to know each other.
- Schedule - all groups produced a schedule of meetings and selected a day and time in each month to hold the meetings. The existing groups selected the farms based on which issue that were to be discussed and tried to pick a farmer who that would most benefit. Selection of a running order for the new groups was by picking names out of a hat as it was seen as the fairest way in 2010. All groups will have an AGM in early 2011, a chairperson elected, a schedule prepared and goals established for the coming year.
- Monthly performance worksheets - all groups provided monthly performance sheets this year. Group members texted in the relevant performance data for the month to Teagasc which was then prepared and presented on the day of the group meeting. This will continue in 2011 and further information will be added to the performance sheet. There are many benefits to the monthly performance sheet:
    - From a group's perspective it allows members to track the group progress and to determine if decisions made at previous meetings have worked;
    - It prompts discussion at monthly meetings and enables farmers to rank their performance against peers in their own area;
    - In Westmeath, the average performance of each group is presented to all groups to allow comparisons within the county. Groups also rank their performance against the performance at Ballyhaise;

- A hidden benefit of the sheet is that it gives advisors access to information they would not normally have. Each month in Westmeath I receive over 100 texts containing monthly performance information. Problems are easily identified and the farmer can be contacted to resolve the issue.

Figure 1. Example of a monthly performance worksheet from a Westmeath Discussion group.

Farmer	1	2	3	4	Average	Last month	% change
Milk Yield	16.9	14.88	15.8	13.2	18.78	21	-11%
Protein %	3.52%	3.54%	3.57%	3.77%	3.50%	3.48%	1%
Fat %	4.17%	4.17%	4.20%	4.50%	4.07%	3.96%	3%
Kg MS/cow	1.34	1.18	1.26	1.12	1.45	1.61	-10%
Kg MS/HA Grazing platform	3.35	4.31	3.02	3.34	3.48	4.91	-29%
SCC	240	321	241	147	235	216	9%
TBC	18	14	47	8	24	28	-12%
Meal kg/head	0	4	2	0	2.04	2	13%
Type of Feed	0	3 way	Coarse 14				
Stocking rate	2.5	4.3	2.7	3.6	2.93	3.49	-16%
Grass Supply (1-5)	5	5	4	5			
Average Farm Cover	820	1000	671	810	788	731.4	8%
Growth Rate	75	82.2	55	88	70.9	80	-11%
Demand	45	55	48	54	50	63	-20%
Kg DM/LU	328.0	217.0	249.2	225.4	278	223	25%
Grass allocation 12-24hr	48	12	36/48	12			
Pre Grazing Cover	1800	2000	1500	1700	1508	1430	5%
Meal cost €/t		180	185		195	174.11	12%
Milk price c/l	31.75		32.13	35	31.51	31.43	0%

Operating the group

The main benefit from any group is the technical knowledge you learn and the adoption of new skills. Each group should ensure that they are maximizing their potential in this area.

- Goals - at each AGM, the group should write down the goals that it wants to achieve and set a schedule to achieve those goals. At the end of each year members can then identify which targets the group has achieved and discuss the reasons why other targets were not attained. Such a strategy will give the group direction and keep members focused throughout the year. Some simple examples of possible group goals include increasing:
  - Grass utilisation (t DM/ha);
  - Group efficiency (e.g. group average profit)
  - Milk solids production (group average kg MS/Ha or /cow);
  - Group average herd EBI by €10/year.
- At each meeting, establish 2-3 main topics for discussion. This will keep each meeting focused to the job on hand. Be flexible when setting up your schedule and tackle any issues that arise due for example to poor weather conditions . The group chairperson or facilitator should always make sure that any issue/proposal the host farmer has is dealt with. At the start of each meeting allow the previous

host farmer to discuss how he has progressed since the last meeting and if the group's suggestions have worked for him.

- Sub-dividing your group into sub-groups to help each other between meetings is a useful technique. Many groups use this technique for grass budgeting and it is particularly valued by farmers who are inexperienced at the skill.
- Use guest speakers where relevant. Don't use them too often as they can upset the flow of the group.
- Educational trips away to other farms outside your group are excellent ways to see new ideas and how they are working.

Driving the group forward in 2011

For any group to succeed, I believe farmers should take ownership of their own group. This is essential if you want to have a viable group in your area. This will keep it vibrant and allow the group to develop the way members want it to.

Don't allow the group to grow stale. Explore new ideas and try different formats and running orders for meetings. Focus on different aspects on farm management such as controlling SCC or infectious diseases. This will keep the meetings interesting and are also very important at farm level.

When new members are joining the group outline beforehand the group's ground rules so that they understand what is expected of them. This will prevent any friction at a later stage. When inviting new members, don't be afraid of people with different ideas to your own. All of the groups that I operate in Westmeath have a mix of age, scale, production type and cow type. In my opinion this adds to a group as it allows for better debate.

Undoubtedly members must remain open minded, willing to listen and ready to change their practices should a better way come along.

The key focus for all the groups in the area is efficient production of milk. This may be assessed using Profit Monitor. It allows groups to keep track of their farm's financial and physical performance and establish whether personal farming or group targets are being achieved. Some groups are monitoring the costs in June and December to keep tighter control of what is happening on their farm.

All groups should explore how new technologies can benefit the running of the group. In the last year, huge progress has been made by farm software companies regarding grass programmes which all have discussion group functions for the sharing of information.

Another way to drive a group on is to establish group projects. Consider identifying a monitor farm within your group. This farmer may need help with a problem or in implementing a new system. The group should call in spring to establish targets and provide advice on how to achieve them. A further 3-4 follow-up meetings should be planned for the farm to determine how the groups suggestions are working and to monitor progress made. Setting up new projects for groups will keep the group challenged and interested.

Conclusion

The benefits of being in a discussion group are evident. Above I have outlined some ideas and practices that I feel are important for running a successful discussion group. I now challenge you, with your group members, to identify areas where you can improve your group in the future.

Lakeview Discussion Group

Ray Farrelly, Ballymanus, Castlepollard, Co. Westmeath

Our discussion group was set up in February 2010 as part of the DEP. Our catchment area spans quite a lot of North-Westmeath, including Delvin, Raharney, Collinstown, Castlepollard and Coole. The Group has presently 14 members, which is set to increase upwards in 2011. We are a very mixed group in regards to age, herd size, cow type and production system. Normally you might think it would be hard to operate a group with so many differences. However despite all our differences the group share a common goal and that is mainly to share, to learn, to take on constructive criticism and most of all, to try and maximise to its potential our individual circumstances in an increasing difficult economic climate. In fact having a range of farmers in the group often allows for very healthy debate. When I was asked to make a presentation on behalf of our modest group, outlining what it meant for us to be involved and the benefits that we have seen in the short few months, I sat down and began to think, even before consulting with the group what it meant to me personally to be involved in the group.

- In early February 2010 we assembled for our first meeting on my neighbours farm (Ger) and immediately as I went in the gate I said to myself “It’s terrible to think that even though Ger lives only 1 mile from me, this was the first time that I entered his yard in over 2 years”. The first meeting was quite subdued at the onset since it was only new and some farmers did not know anyone at all there but before long our new adviser Patrick got the ball rolling and we have changed completely from our initial “shyness”. So from this the visit to each others farms, to view how someone else is managing their system, I find it very beneficial and you always take something away from somebody else’s farm
- During the year the group started to complete a comparative monthly worksheet, where a number of days prior to our meeting we text on our Co-op results (litres/cow, protein %, fat %, SCC, rotation length and meal fed when applicable) to Patrick who in turn compiles them and prints a copy for each member. The really good side of this sheet is that regardless if you have 30 cows or 300 cows the results are all comparable. We also compare our group average to that of other more established groups in the area and this really lets us know how we are progressing. It also helped develop trust in the group quicker as everybody supplied their information from the start. Next year we hope to add further information to our monthly sheet.
- For me again I have to admit that despite all the talk of grass measuring and budgeting I found it hard to get to grips with it and I know that most members also had the same problem. However, as a group we are slowly getting there and as a result of the discussion group I now walk my farm once a week and roughly estimate grass covers and can make the better decisions regarding my own grassland management. This year at the end of June-early July I was confident to go on holiday knowing that there was enough grass banked up ahead of cows.
- Our third meeting was held on my own farm in April. Often farmers are apprehensive about taking a group in especially when it’s a new group. However I

think that it is a great opportunity for members to showcase their patch and hear what other farmers might do to improve the host farm, you may not always like what you hear but it is only constructive criticism at the end of the day. For example since the start of our group one of our members has completely changed his grazing system to great effect after a group meeting. He invested in infrastructure by putting in extra roadways and water troughs for accessibility to ground that was not being used to its potential and set up a new paddock system. For the first time ever this year he was able to take out surplus bales. With his new system, he now feels comfortable to increase cow numbers From the time our group visited this farm, almost all members have decided to either put in extra roadways, changed paddock layout or have plans to do so in the near future.

- For our September meeting we ventured into neighbouring Longford where we went to a very well run (1 labour unit) 100 cow spring-calving herd. This trip had something for everyone and again when you got home I found myself comparing my performance against the host farmers in Longford. It was nice to venture outside our own region and see how farmers in other areas operate.

At our last group meeting I asked the group how they had benefited from being a member to date. Here are some of the benefits they outlined to me:

- Each member is more focused on the everyday aspects of dairy farming, from grass measuring to bull selection to nutrition and diet.
- Our costs and efficiencies are being targeted in a gradual approach.
- There is a positive attitude within the group, with a willingness to share information and learn from our mistakes.
- There is a superb social aspect to the group with people feeling that they are no longer working so much on their own and as stated earlier, I had not paid a visit to my neighbour in over 2 years (it is easy to get into a cocoon) and now you we have 14 other friends that we can call on for advice. I feel that it would be terribly unjust of me not to mention something that has started recently in the group and that is that after our meetings out in the field, we have been invited into the family home for a welcome cup of tea and sandwiches. Surprisingly enough, that when some people get sitting down with a cup of tea that the discussion can really get going and often the pot has to be refilled.
- Since the start of our group, all members have improved their grassland management and have made more money because of it.
- The monthly worksheet is a huge benefit as its on-the-ground-data from our own area and its current to the circumstances we are dealing with on the day.
- You always pick something up at a meeting. Sometimes it's something you already know but just needed reminding of.
- The group feel they have a technical edge from being involved.
- As a group there was a unanimous opinion that we were extremely fortunate to be able to avail of the services of our new adviser Patrick. As stated earlier the first meeting was quite a tense affair at the offset but Patrick with his unique flair for getting everyone involved and relating to issues on the ground at any

particular time, is merely a measure of a person who is on top of their profession and we thank Teagasc for having superb advisers like Patrick on board .

Where the Group wants to go

- EBI Progress - as stated earlier our group is quite mixed with common goals and on the EBI we are no different than any other group of farmers in the country. We want the right cow for our own individual systems that will deliver on milk solids, fertility and longevity. Our group at the present time has an average of 67 cows with an EBI of €79 (milk €32:fertility €38). As these figures are quite average, we have set a target of increasing our EBI by at least €10 annually. By using the Herdplus Sire Advice programme it will take the guess-work out of bull selection for our group.
- Grass measurement - we all know and see the benefits of accurately measuring grass and how we can budget and make the appropriate decisions at an early stage to avoid any mishap. We also are determined as a group to focus on this measuring issue in the coming months. At the moment only a small percentage of our group are actually measuring but this will increase significantly in the near future. Some quotes have been obtained for measuring equipment and farm mapping. As a follow on from grass measurement, each farmer knows that their own farm is very capable of producing more milk from better utilisation of grass which in turn allows us to carry more cows/ha and with better bull selection with increased fertility and solids we will be in turn increasing output/ha.
- Our group is of the opinion that we do need to focus on our efficiencies (or as we may find out in due course our inefficiencies) and as part of this we will be completing the Profit Monitor and this will indicate to us clearly what direction we need to go. These results may not be very pretty to a number of us in the group but we have decided as a group to compare how and why there will be such a discrepancy between similar farmers in close proximity to each other and address these issues going forward.

The ultimate aim for any group would obviously be to be the best of the best and to claim the top prize in the EBI competitions, but we here in our little corner in North-Westmeath are a very ordinary bunch of farmers and our aim going forward would be:

- Now that we have a discussion group up and running, we want to make the group as strong as we possible, so as we can continue with it for the long haul;
- To increase our profitability through better management practises, better genetics and output;
- To showcase dairy farming to our families, friends and others, that with all structures correct and right, that there is a viable future in dairying, without all the hardship that was once associated with this profession.

On behalf of the Lakeview Discussion Group, I would like to thank you for your attentiveness for listening to what it has meant to us for the past 10 months to have become involved in a Discussion Group and where we want to go. We would like to

thank Teagasc for giving a minority group like ourselves a chance to tell our story and who knows, maybe in the next 10 years or so we could be at the top of our game and equal to the best of the best.

Thanks, Ray.

Getting the most from your Discussion Group in 2011 -

A farmer's view

Ciaran McDonald, Bellair Estate, Ballycumber, Co. Offaly

Married to Teresa, with three children aged between 18 and 22. Originally from Wexford, I was brought up on a 50ha dairy farm. From an early age I realised I would not get the farm in my own right. After looking at the options I decided to do a year in an Agricultural college and follow on with the Farm Apprenticeship Board. I qualified in farm management in 1986; my first job was in a dairy and tillage farm in Ardfinnan Co. Tipperary, where we remained until 1991. We then moved back to Wexford to a 170 cow dairy farm in Adamstown, and we stayed there for a further six years.

In 1998 I gained a great opportunity to manage a large dairy farm, with full management and financial control. The farm is located in Ballycumber Co. Offaly and owned by a Dutch family. The farm consists of 160ha with 280 Holstein Friesian cows (average EBI €55), calving in both autumn and spring.

Discussion Groups in the past

When working in Tipperary in the 80's, I joined Cahir discussion group. This was a mixture of winter and spring herds, made up of approx. 15 members, with an average herd size of 75 cows. The financial figures then were put through a Dairymis system, which was the predecessor to Profit Monitor, also run by Teagasc. As a young farm manager in the area, the reasons I joined are similar to today's:

- To gain knowledge when at the time resources were limited in comparison to today; i.e. computer technology.
- To gain the advice from the Teagasc advisor about research from Moorepark; which at the time was steering us towards putting cows out earlier in the Spring and reducing concentrate feeding - this was the start of the New Zealand research teaching Ireland about grass and one of our members was a monitor farm for this research.
- To compare or benchmark your own performance versus like-minded farmers in the area, mainly through use of the Dairymis figures mentioned earlier.
- To provide reassurance, that you weren't the only one with difficulties and challenges on your farm. The social aspect that accompanied discussion groups, was a bonus, and today provides an incentive on why people join groups.

The next group I was involved with was my present group in Offaly. I joined the Moate liquid group over 10years ago again as a new farmer in the area. It was a great opportunity to get to

know other local dairy farmers sharing similar soils, climate, and farming conditions. At the time, Dawn Dairies had a liquid milk plant in Moate, with a considerable amount of local farmers supplying to them all year round. The group again had approx. 15 members. There was good lively discussion in those years as we had Teagasc advisor Peter Burke bringing the Moorepark messages of crossbreeding, grassland management, and Profit Monitors into the discussions. For our group at the time these were sometimes difficult messages for farmers in all year round milk production with high yielding Holstein cows, to hear about. Again with this group I was always building up my knowledge base and listening to top-class farmers in their own right.

During this time I also joined a European Dairy Farmers group (EDF). This group was made up of 15 farmers all around Ireland, who allowed their Profit Monitor figures into a European profit monitor model, which standardizes costings to be presented equally comparing country to country. This model shows a direct indication of where Ireland stands in Europe, in relation to costs, profit, and output. Annually there is a congress held in June which is in a different country each year.

The Present Day

Our present group, 'Going Forward', was set up at the start of 2010. This group is made up of farmers from the surrounding Moate area. The reason for forming a new group was due largely to changes in Teagasc where Peter Burke, our advisor and facilitator retired in 2009, so we felt we needed to change things around in preparation for our new advisor, Patrick Gowing. Our previous group had gone stale after 10 years, there was no new blood and people were losing interest but hanging on. Milk price had been stable throughout this time as a lot of the members were on liquid milk price, which might have caused some complacency amongst the group. Other challenges facing us included milk prices coming under pressure, the A+B-C payment system and lower profit margins on farms. A change in thinking was required by the group. The Moate creamery suppliers also had a separate group in these years, and experienced similar issues plus the loss of the advisor.

The group is made up of 23 members; 13 liquid milk suppliers and 10 creamery suppliers. The average herd size is 153 cows, ranging from 50 to 560 cows, and an average EBI of €63, ranging from €1 to €113. From the start, we sat down and decided what we wanted from the group members: Interested farmers that would attend meetings, and make a real contribution to the group. Profit monitors had to be carried out by each member, even if all loan and bank details were not included, this provided enough information to enable a focused discussion. In June we did a six month Profit Monitor analysis, to compare how group's members were doing. At the end of 2010 the full 12 month Profit Monitor figures will be in, so we can analyse and talk through these figures in our first meeting of 2011. We wanted healthy competition in the group to see how both winter and spring herds would perform, so being honest and open about figures and farm performance was one of the main strengths of the group this year.

Our group was unique as all members had previously been involved a group, so we could basically hit the ground running, without the issues associated with new groups. At our first meeting we decided which areas we wanted covered throughout the year. A common issue with previous groups was that the focus was on how good the cows or the grass looked, and provided no real focus. With this group it is important to us that each meeting has a topic to suit the time of year or specific issues raised by individual members. The majority of meetings are held on a member's farm, and on occasion experts in specific areas are invited to join the discussion. Here is a layout of what was covered in some of our meetings to date, as can be seen we put considerable thought and focus into our monthly discussions:

- Grass measuring & budgeting - with a view to reduce concentrate feeding and making the most of the grass available;
- Milk payment methods - A+B-C and liquid payments, and the processing industry at peak production;
- Crossbreeding - improving milk solids, fertility and survivability through breeding;
- Zero-grazing - member with zero-grazing system and discuss the pros and cons of such a system;
- Expansion - a member land-tied with fragmented farm, wanted members ideas on how to progress in the future;
- Milk Hygiene - high cell counts and improving milking routine, with an invited Teagasc expert on the subject;
- Autumn grass budgeting - feeding cows over autumn and winter, aims for body weights and condition scoring of replacements and cows, with an invited Teagasc expert;
- Animal Health & Dairy processor - looking to the future of milk processing, and also raising awareness on diseases.

There are also some sub-groups forming as a result, meeting throughout the year for grass budgeting on each of their farms, in order to increase their confidence in grass measuring and budgeting. Another sub-group shares their grass measurement figures through a software package on the net.

During the year we had a trip out of the group's locality to the West. We visited a fully crossbred and low cost grass-based system, and a Holstein Friesian herd making maximum use of grass on a difficult farm. A bus was organised for the occasion which provided plenty of banter on the trip. As with each meeting the 'crack' is what makes being involved so enjoyable, while building up trust between group members. We also held an end-of year BBQ last week with family members, keeping up the social aspect of a discussion group.

The Future of the Group

The goal of the group is sustainable efficient milk production:

- Keep Focused - to keep an eye on what is giving us the profit from our farms and not get sidetracked into issues that are not giving us return on our time and investment;
- New Members - the life-blood of any organisation and our discussion group will be no different, and those members who lose interest must also leave;
- Invite Speakers - there is a fund of knowledge out there for farmers to access on the technical, practical, processing and economic farming and we must use this information for the good of the individual and the group;
- Projects - within the group we can be of great help to one another by looking at individual farmer's plans or problems and help them to make the right decisions for themselves;
- Be Flexible - in the subjects we choose and the farm walks we set-up because there is always issues for the group and the individual farmer that need to be addressed today and not in a month's time;
- Farmer Ownership - for the group to be successful the farmer must take responsibility for the group, much like our own farms, if you don't take responsibility for it, it cannot be successful.

Finally, I would say that the group has gotten off to a great start, with a great facilitator, and long may it continue.