Moorepark Dairy Levy Research Update

Moorepark Animal & Grassland Research and Innovation Centre

Ballyhaise Agricultural College

Thursday 6th October, 2011

Series 17

Increasing Animal Performance from Grazed Grass

teagasc

Agriculture and Food Development Authority

Moorepark Dairy Levy Research Update

Thursday 6th October, 2011
Ballyhaise Agricultural College

Series No. 17

Increasing animal performance from grazed grass

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

www.teagasc.ie

Table of Contents

Introduction to Ballyhaise College Open day

Increasing animal performance from grazing

The function of the Ballyhaise College systems experiment is to provide dairy farmers in the Border Midlands West region with locally generated research information and technology to increase the profitability of their business. Preliminary results from this ongoing study demonstrate that considerable potential exists to increase animal productivity from pasture in the BMW region by increasing sward productivity in combination with appropriate grazing management practices, an optimum stocking rate and a compact calving high EBI herd.

Achieving a long grazing season (of 270 days or more) with a predominantly pasture diet is critical for high performance dairying. In that context, autumn grazing management practice to build grass reserves on the farm and extend the grazing season allows dairy farmers to produce additional high value autumn milk from grazed grass and reduce milk production costs. In addition, late autumn grazing management ensures that sufficient grass is present on the farm during the following spring. Due to wetter soils, these practices have not been widely adopted on the wetter BMW soils as many dairy farmers do not build sufficient grass supplies in autumn due to the sometimes difficult grazing conditions.

Profitable Milk Production Systems Post EU Milk Quotas

P. Clarke[1] and V. Ryan[2]

[1]Animal & Grassland Research and Innovation Centre, Teagasc, Athenry, Co. Galway
[2]Teagasc, Sligo/Leitrim Regional Unit, Ballymote, Co. Sligo

Summary

- Converting the grass grown on the milking platform will be the main driver of economic performance in the future in Ireland. There is potential to grow over 14 tonnes of grass dry matter per hectare in this region.
- Utilizing a high proportion of this grass by grazing animals will keep feed costs low. Low overall production costs are the only way to overcome milk price volatility in the future.
- Compared to average farms, higher profit farms have higher stocking rates, increased milk solids/hectare and lower feed costs.
- There are still three full years of milk quota remaining. Individual farmers must manage their quota during this period while still making plans to grow the dairy business post 2015.

The Food Harvest 2020 Report proposes a 50 per cent increase in milk output for the Irish dairy industry. There is a general agreement within the industry that these targets can be achieved. This is made possible by the one per cent annual increase in milk quotas between 2009 and 2013 (as part of the 'Health Check' Agreement) and the abolition of EU milk quotas in 2015. For the first time in 30-years, Ireland can now plan to exploit our competitive advantage in milk production. However, a freer market environment will be associated with more price volatility, so in the period up to 2015 farmers should adopt their system to be able to cope with volatility.

Economic targets for profitable milk production systems in the BMW region.

Converting the grass grown on the milking platform will be the main driver of economic performance in the future in Ireland. There is potential to grow over 14 tonnes of grass dry matter per hectare in this region. Utilizing a high proportion of this grass by grazing animals will keep feed costs low. Low overall production costs are the only way to overcome milk price volatility in the future. Targets for this region post 2015.

- Milk yield (kg/cow) 5,400
- Milk Solids per cow (kg/cow) 450
- Milk Solids per hectare (kg/ha) 1,260
- Calving interval (days) 365
- Six week calving rate (%) 90
- EBI (€) 140
- Herbage utilized (t DM/ha) 13

Some dairy farmers in the BMW region are already achieving some of these targets. These farms were in a position to purchase milk quota in recent years and expand accordingly. In addition they have also focused on cost control as their business expanded. The top 20 per cent of farmers (ranked on profit / hectare) who completed a profit monitor for 2010 in the BMW region had a net profit of 13.7 cent per litre. This compares to the average profit in Ireland of 7.5 cent / litre (National Farm Survey). These farms delivered €2,194 profit per hectare with production of 1,284 kgs of milk solids per milking platform hectare.

Compared to the average farms in the region the higher profit farms had:

- More cows stocked on the milking platform, + 1.17 cows / hectare.
- Higher per cent milk solids (fat and protein), + 0.12%.
- Higher solids per cow, + 38 kg.
- More solids per hectare sold, +384kg/ha.
- Higher gross output per hectare, + €2,475.
- Lower feed costs per litre, -0.37 cpl.
- Lower variable costs per litre – 0.78 cpl.
- Higher profit per ha, +€1,243.

Planning for post quotas

The next three year period provides an opportunity to prepare for 2015. Investment and preparation should only be in areas that will deliver profit post quota.

Grass Utilised Per Hectare

It is estimated that nationally 6.4t / ha is being utilised on specialist dairy farms. These farms operate at a stocking rate of 1.78 LU / ha. For every

one additional ton of grass utilised farm profit increase by €200 / hectare. To achieve high grass utilisation, farms must:

- **Grow the grass** – have a re-seeding plan and soil test for lime, P and K levels.
- **Stocking rate** – Match stocking rate to grass grown, more cows will be needed.
- **Supplementation** – There is a substitution effect when supplementation is fed to grazing cows, therefore, keep meal feeding to a minimum when grass is available.
- **Utilisation** – Farms must adopt various grazing techniques to over come weather conditions, soil conditions etc. Extending the grazing season in autumn is worth an extra €1 profit / cow / day. This is an additional €2,100 profit where a 100 cow herd gets three extra weeks grazing in autumn.

Breeding high genetic replacements

Breeding decisions in 2012 will determine the number and quality of heifers calving down in a post quota environment (2015). There are sufficient replacements for the next few years, but there will be increased heifers required in 2015. Put plans in place now to increase the number of high EBI heifers in 2015. Average EBI in the BMW region is €54 (Spring 2011). Farm profit will increase by €2,000 for every €10 increase in herd EBI in a 100 cow herd. With the current list of AI bulls available, it is possible to increase herd EBI in this region at a faster rate than €10 / annum.

Labour efficient system

Herd sizes will increase post quota. Any capital expenditure must consider the likely scale of your dairy enterprise post 2015. Investments should be valued on their ability to increase output, reduce labour input and the overall cost of the expenditure.

Herd Health

Between now and 2015 there is an opportunity to establish, and improve, the health status of your herd. This is the period to diagnose the health status of your herd, to cull problem animals and implement a biosecurity programme.

Financial

Put in place a financial plan for pre and post quota. This is necessary to ensure that your farm business survives the highs and lows of future milk and input prices.

Quota management

There are still three full years of milk quota remaining. Individual farmers must manage their quota during this period while still making plans to grow the dairy business post 2015. Options to consider for managing quota include:

- Reduce or omit supplementary concentrate feeding
- Feed more milk to calves
- Purchase milk quota
- Reduce milking frequency for part or all of the year
- Reduce lactation length
- Reduce herd size

The options chosen should take into account what type of herd is required in 2015. To maximise production herds should have the maximum number of healthy milking cows with high EBI and an appropriate age structure.

Milk Production Systems for an Expanding Irish Dairy Industry

B. Horan and M. O'Donovan

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

Summary

- The mindset on Irish dairy farms must change to increasing profitability per hectare with grass eaten per hectare and cost control, the two drivers of farm profitability post quotas.
- Increased stocking rates in association with an appropriate calving date will deliver increased grass utilisation and milk solids production.
- Grass growth will limit the productivity and grazing management practices must continuously present adequate high quality grass to the dairy herd while ensuring that the sward is properly conditioned for future grazing events.
- High EBI animals will deliver increased milk solids production within the context of higher stocking rate systems while the efficiency of the system will be increasingly maximised with a smaller crossbred cow within larger scale and increasingly feed limited dairy herds.

Introduction

As a consequence of Ireland's natural comparative advantage in food production from grazed pasture, the recent Food Harvest 2020 report conservatively anticipates a 50 per cent expansion in dairy production. The mindset and approach to milk production on Irish dairy farms must change after milk quotas are removed. Post quotas and with profitability per hectare as the core objective, Irish pasture-based production systems must focus on increasing home grown pasture production and utilisation through new feed management objectives, increased stocking rates, accelerated cow and maiden heifers calving rates (90 per cent in six weeks; 50 per cent in 10 days), reduced supplementary feed usage and a more feed efficient dairy cow. The production system will continue to be based on a predominantly pasture diet. In the next decade, fewer dairy farmers with increased operational scale will leverage increased productivity and profitability from grass based systems fueled by leading edge management technologies. Every dairy farm business must use the intervening years to quota abolition to develop their farming operations in a manner consistent with the requirements of a

vibrant and expanding industry for the future. This paper will describe the characteristics of profitable grass based systems post milk quota and the steps that farmers must now take to expand their dairy farm business for long term profitability.

The defining characteristics of profitable milk production post milk quotas

Irish dairy farmers must revisit the very essence of their business. Our systems of production must allow expansion, be financially robust irrespective of fluctuations in product prices and interest rates and be highly efficient per unit of land, labour, capital and environmental resources. A provisional analysis of 2010 profit monitor data indicates that while the average dairy farm completing profit monitor analysis in 2010 achieved a net profit (including return to own labour) of 11.5 cent / litre (c/l), the highest profit farmers achieved a 50 per cent higher profitability based on higher value output (+ 1.9 c/l) and reduced feed (1.0 c/l) and fixed costs (3.5 c/l). On that basis, it is apparent that farms with increased reliance on grazing to achieve higher product quality and reduced external feed and fixed costs associated with increased mechanisation or confinement are achieving the greatest returns from dairy farming. Such systems are also more environmentally friendly and provide for a more enjoyable labour efficient lifestyle. Consequently, **high profit dairy farming must achieve the maximum level of milk solids production from the limited supply of feed available to the dairy farm** as home grown feed utilisation is likely to be the main long term limitation to profitable milk production.

To facilitate expansion, dairy farmers must implement technologies that increase pasture production and utilisation, improve nutrient use efficiency and increase both the proportion of grazed grass in the dairy cow diet and the amount of product which is subsequently produced. The following technologies should be implemented on Irish dairy farms to increase the overall efficiency of the production system and achieve increased farm profitability.

1. Stocking Rate and Calving Date

To capture the maximum benefits of grazed grass, the most fundamental management practice must be to have the correct number of cows calving compactly at the beginning of the growth season. Stocking rate, traditionally expressed as cows / hectare (ha) is widely recognised as the major factor governing productivity from grass. Previous research indicates that, while milk production per cow is reduced, milk production per hectare will tend

to be maximised at higher stocking rates as increased animal demand drives more efficient grazing practices and improved sward utilisation. While delivering superior per hectare productivity, increased stocking rates result in a farm system where winter feed production capability is reduced and so increased stocking rates may result in increased feed and capital costs (associated with accommodating and feeding increased numbers of animals). Ultimately, the optimum stocking rate for an individual farm is that which gives the maximum sustainable profitability per hectare and will be dependant on the individual farms grass growth capability and the relative value of imported feed and milk solids produced. On the basis that Irish farms have the potential to achieve annual pasture production of 16 tons DM / hectare based on best practice grazing technologies, the recommended best practice stocking rate for an enclosed production system is 2.94 cows / hectare. This indicates that with a current average mean stocking rate of 1.9 livestock units / hectare, the Irish dairy industry has the potential to increase milk production significantly through increased stocking rates and improved grass utilisation.

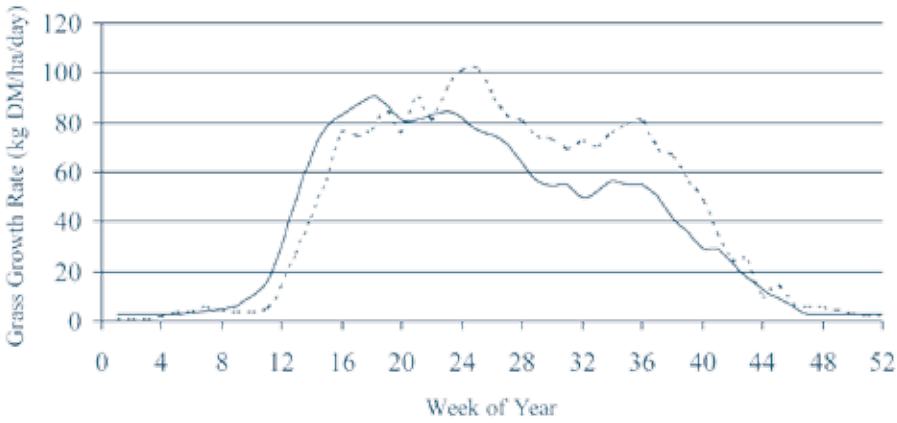
In seasonal grazing dairy systems, the planned start of calving, the calving rate (pattern) and the mean calving date are critical in terms of optimising the match of feed supply and herd feed demand in early spring. Calving should be concentrated just before the start of the grazing season to maximise grass utilisation and minimise feed supplementation. At a given stocking rate, the correct calving date will maximise animal performance by increasing the length of lactation as well as having a high level of production per day of lactation. Calving too early, in particular at higher stocking rates, will lead to underfeeding or a requirement for increased supplementation as grass growth rates will be unable to match herd demand in early spring. A spread out calving rate or delayed calving date will lead to reduced grass utilisation. In general, the herd should be calved as early as possible, provided that it can be fed adequately from a predominantly grazing diet throughout the lactation. While there is no ideal mean calving date that will be appropriate to every farm (due to differences in ground conditions, spring growth rates, higher stocking rates, etc.), a mean calving date of February 15 to 25th with 90 per cent of the herd calved in 42 days appears to be generally appropriate for most Irish dairy farms in comparison to the current average mean calving date of March 15th.

2. Grazing Management Practices

Grazing management for high animal productivity is based on a common sense approach to continuously present adequate high quality grass to

the dairy herd while ensuring that the sward is properly conditioned for future grazing events. The relatively low level of milk productivity currently achieved on Irish dairy farms (NFS, 2009; 670kg of milk solids / hectare with concentrate supplementation of approximately 700kg / cow) indicates that while there are also other contributory factors, best practice grassland management has not been widely adopted and current practices continue to limit the productivity of Irish farms. Recent grazing studies at various Teagasc facilities reveal that where appropriate grazing management practices (including maintaining optimum pregrazing herbage masses, postgrazing residuals, rotation lengths and soil fertility) are combined with measurement to identify and reseed underperforming pastures, high annual pasture growth (in excess of 14.5 tons DM / ha / yr) can be achieved, regardless of location. Figure 1 compares the growth rates for Ballyhaise Agricultural College, Co. Cavan and Curtins Farm, Moorepark during the years 2005 to 2007 (inclusive). The graph illustrates that while increased growth rate occurs two weeks earlier at Moorepark, mid-season growth is consistently higher at Ballyhaise. Management practice at both sites has focused on increased grazing severity and reducing pre-grazing herbage yields to improve pasture quality and increase regrowth rates. While similar pasture production can be achieved regionally, pasture utilisation on wetter soils is more challenging. In recent years, the selection for a lighter crossbred cow, use of on/off grazing and flexible grazing management to prioritise wetter soils within the farm in conjunction with increased investment in grazing infrastructure including multiple access points to paddocks with good roadways and water infrastructure has allowed the Ballyhaise College dairy herd to achieve a grazing season of 280 days at pasture, with animals kept indoors on few occasions between mid-February and mid-November. Increased emphasis on flexible grazing of wetter soils has allowed the management to avoid pasture damage and compromised regrowth and in conjunction with reseeding of underperforming pastures, is anticipated to result in similar overall growth and utilisation at Ballyhaise Research farm and Moorepark in future years.

Figure 1. Grass growth rates at Moorepark (___) and Ballyhaise (----) during 2005, 2006 and 2007.



3. The Realisation of Appropriate Animals Post Milk Quotas

The overall success of high performance grazing systems are based on creating the ideal environment within the farm to grow higher quantities of higher feed value pasture for larger better fed dairy herds to realise record levels of productivity. A steadily increasing proportion of all milk production costs (approximately 25 per cent in 2010) are associated with feed provision on Irish dairy farms and consequently, every effort must be made to achieve the maximum return from feed. The dairy heifer calf conceived in 2012 will produce milk in a production environment post quotas where feed availability defines not just her productivity, but also several other important functions such as her capability for growth and ability to maintain body condition and achieve good reproductive performance. Recent results at Teagasc Moorepark have shown that higher EBI animals will deliver increased milk solids production within the context of such systems, while exhibiting superior reproductive performance to lower EBI animals.

In selecting animals for a future scenario of larger and increasingly feed limited herds, breed choice also provides opportunities for Irish farmers. In a review of grazing experiments at Moorepark in recent years, average daily pasture intakes of 17 kg DM / cow were reported for Holstein Friesian cows of approximately 550kg of mid-lactation body weight, (equivalent to only 3.1 per cent of bodyweight). In comparison, intake data from the Ballydague research farm indicates that Holstein-Friesian Jersey crossbred animals of approximately 450kg bodyweight are achieving intakes equivalent

to 3.6 per cent of bodyweight. An increased intake per kg bodyweight generally results in increased milk production per kg bodyweight (i.e. a more productively efficient dairy cow). As smaller cows have lower absolute daily energy demands during lactation which can be satisfied from grazing alone, it can be concluded that the increased intake capacity of the crossbred within our grazing system is partially responsible for the high milk production and improved health and vigour of crossbred animals reported in international grazing studies. Indeed, the financial review of the Ballydague breed comparison study estimates that selection for a smaller Holstein-Friesian*Jersey crossbred dairy cow could further increase overall farm profitability by 30 per cent (equivalent to €400 / hectare / year) by virtue of higher animal performance and excellent reproductive performance within low supplementation grazing systems in the future.

Conclusions

High profit dairy farming occurs where high levels of milk solids productivity are achieved from the limited supply of feed available to the dairy farm. Increasing stocking rate in association with an appropriate calving date will increase the productivity of Irish dairy farms post EU milk quotas. As producers aim for larger and higher EBI herds, pasture growth will limit productivity and consequently every effort should be made to adopt grazing management practices that ensure high annual pasture productivity while the selection of a crossbred dairy cow has the potential to further increase animal productivity and farm profitability.

Ballyhaise Dairy Research Programme Update

D. Patton and B. Horan

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

Summary

- High levels of pasture and animal productivity are achievable within low cost grass based systems in the BMW region.
- Current system development has focused on identifying the optimum stocking rate to maximise pasture utilisation and annual farm profitability while improving the reproductive performance of the herd.
- As part of the ongoing experiment, a complete financial appraisal of each production system will be prepared at the end of year five of the study including sensitivities on milk, feed and land rental prices.

The expansion of milk production in Ireland will require increased productivity from pasture through increased grass production and utilisation on dairy farms and in some instances will require that more marginal soil types on farms are brought into production. At a national level, the Border, Midland & Western region of Ireland comprises 13 counties including the six border counties with Northern Ireland and, while accounting for 47 per cent of national land area, currently only accounts for 25 per cent of total national milk production (CSO, 2009). Historically, the wet mineral soils, which are characteristic of the region, impede drainage and result in a shorter grazing season and lower pasture production compared to the South of Ireland. One that basis, and in conjunction with the major co-ops in the region, the farm systems research project at Ballyhaise Agricultural College was initiated in 2005 to compare the biological and economic efficiencies of expanding pasture-based production systems on a wetland drumlin soil and to provide farmers in the BMW region with locally generated and accessible research information which will help them to grow their farming operations profitably post quotas. While the region has traditionally been considered as a less efficient production location due to a shorter grass growing season, impeded drainage and inferior soil quality, recent research results have shown that highly profitable milk production can be achieved in the region and the results are outlined hereunder.

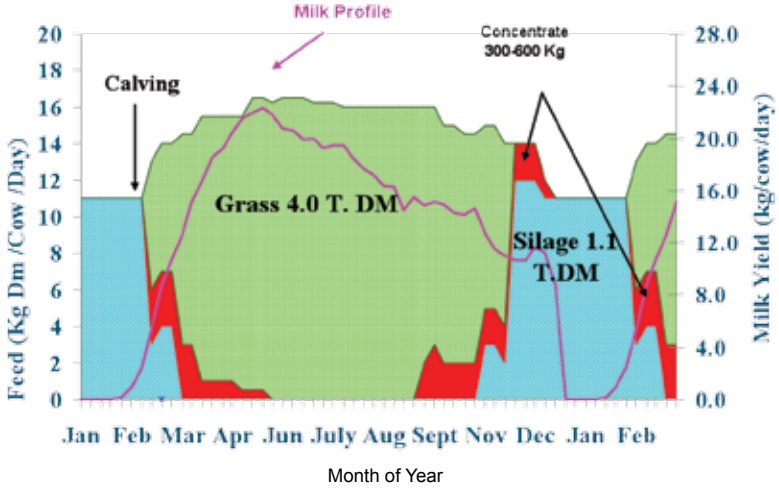
Pasture systems at Ballyhaise

Average pasture growth at Ballyhaise has been 14.3 ton DM/ha between 2007 and 2010 and is similar to that achieved at Moorepark over the same period (15.2 tons DM/ha). There is however, a significant difference in the annual growth pattern with a shorter growing season with higher peak growth evident at Ballyhaise. This shorter and higher growth curve suggests that the site is capable of sustaining a higher stocking rate for most of the main grazing season with lower risk of mid-summer moisture deficits. The research programme is based comparing the biological and economical performance of two grass based systems of milk production differing in stocking rate and level of supplementary feeding. The shorter growing season has necessitated that the mean calving date is later in Ballyhaise (March 5th) to minimise exposure to feed deficits in early spring.

Systems being evaluated at Ballyhaise:

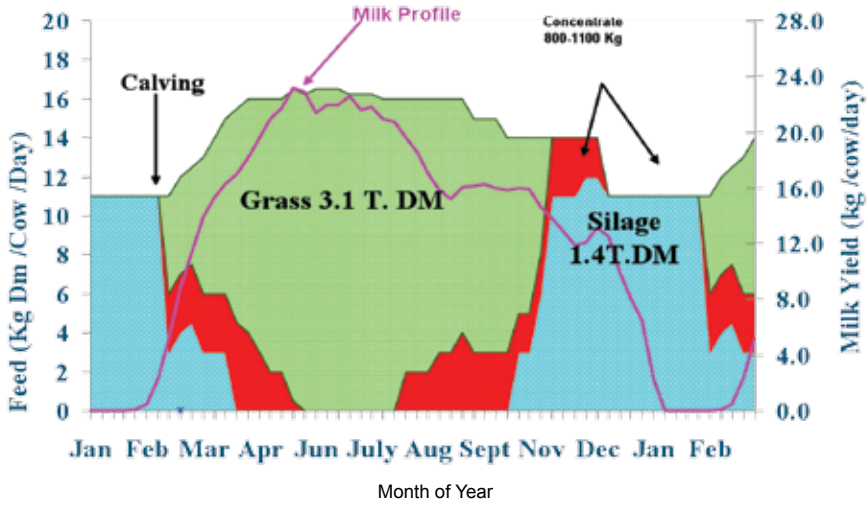
a) **Low cost enclosed system (HG):** This is a low cost pasture-based system based on maximum grass production and conversion to milk with all winter feed requirements produced from within the grazing platform. The stocking rate of this treatment is 3.1 cows / ha. Concentrate supplementation is the minimum required over the season and average input was 595kg / cow over the years 2008, 2009 and 2010. The feed budget for the HG system is illustrated in Figure 1 below.

Figure 1. The Annual Feed Budget for the Low cost enclosed system (HG).



b) High pasture utilisation open system (HI): This is high supplementation high output system based on a maximum grass conversion to milk from the grazing platform. Stocking rate on this farmlet was 4.5 cows / hectare over the past three years of the study, while the majority of the winter feed requirements are imported from outside the grazing platform. Average concentrate supplementation per cow was 1,225kg in 2008, 2009 and 2010. The diet of the HI system is illustrated in Figure 2 below.

Figure 2. The Annual Feed Budget for the High pasture utilisation open system (HI).



Both production systems are based on high milk solids (fat plus protein) production from within grass-based systems differing in stocking rate and feeding intensity. Each experimental group has its own farmlet which received the same amount of Nitrogen (250kg N/ha).

Milk Production and Reproductive Performance

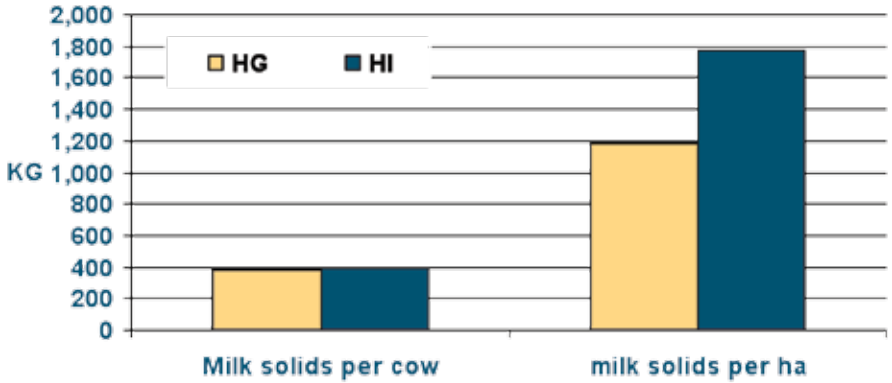
The performance of each experimental group during 2010 is outlined in Table 1 and Figure 3 below. The HI system produced more milk per cow, similar fat and protein composition and higher milk solids (fat plus protein) production / hectare.

Table 1. Effect of system of production on animal productivity in 2010.

System of Production	*HG*	*HI*
Stocking Rate (cows/ha)	3.14	4.35
Concentrate fed (kg/cow)	633	1,197
Silage fed to milking cows (kg DM/cow)	213	400
Milk yield (kg/cow)	4,826	4,977
Fat (%)	4.43	4.37
Protein (%)	3.54	3.52
Milk solids (kg/cow)	382	394
(kg/ ha)	1,185	1,772

The current experiment demonstrates that with improved grassland management in combination with increased stocking intensity, significant increases in milk production per hectare of farm land can be achieved with both HG and HI type systems. In 2010, the HI system produced more milk per cow, similar fat and protein composition and higher milk solids (fat plus protein) production per hectare.

Figure 3. Milk solids production per cow and per hectare for the HG and HI systems at Ballyhaise in 2010.



The reproductive performance of the Ballyhaise herd in 2005 and 2011 is shown in Table 2. The reproductive performance results of the herd have improved dramatically in the last five years through aggressive genetic improvement using high EBI sires in addition to the purchase of high EBI replacements to expand the herd. Notwithstanding these changes, the reproductive performance of the herd is low with only 56 per cent of cows in calf in 42 days and a 21 per cent empty rate at the end of the 13 week breeding season and so continued genetic selection for improved reproductive performance is required.

Table 2. Reproductive performance during a 13-week breeding period.

Performance Indicators	*2005*	*2011*	*Target*
Herd EBI (€)	28	125	> 150
Fertility subindex (€)	13	74	> 100
24 day Submission rate (%)	58	95	> 90
Pregnancy rate to 1st service (%)	31	47	> 60
6 week pregnancy rate (%)	38	58	> 75
13 week empty rate (%)	30	21	< 10

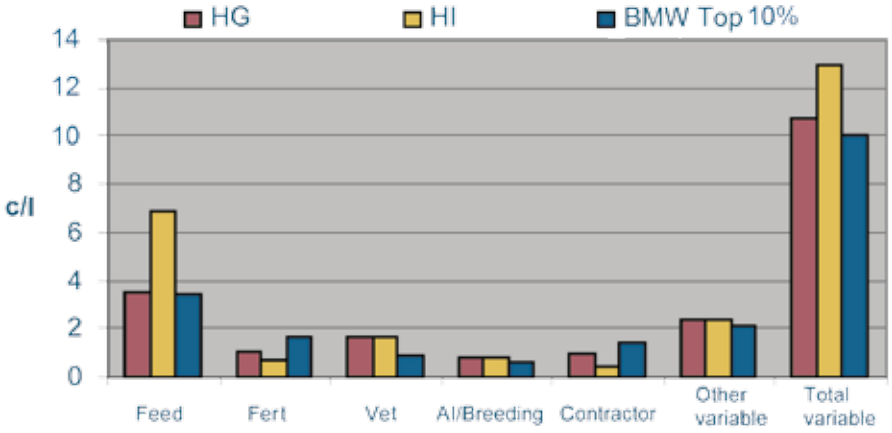
Financial Analysis

As part of the ongoing experiment, a complete financial appraisal of each production system for 2010 was prepared using the profit monitor system and compared to the top 10 per cent of profit monitors completed in the BMW region for 2010. The financial analysis was carried out for a 40 ha farm which could carry 125 cows in the HG system or 174 cows in the HI system based on the actual performance of each treatment during 2010.

Figure 4 below illustrates the breakdown of variable costs for both the HG and HI treatments during 2010 in comparison to the top 10 per cent of profit monitors completed within the BMW region. The main difference in variable costs related to feed costs which were 3.5 cent/litre for both the HG system at Ballyhaise and the top 10 per cent of profit monitors compared to 6.9 cent / litre for the HI treatment resulting in total variable costs of 10.7 cent / litre for HG and 12.9 cent for HI. Assuming 6.5 cent / litre in own labour charges, the total fixed costs were 14.1 and 14.8 cent / litre for the HG and HI treatments, bringing total costs of milk production to 24.8 and 27.7 cent / litre, respectively. The net profit after all production costs was 8.8 and 4.5

cent / litre and € 1,320 and €990 / ha (Figure 5) for the HG and HI systems, respectively.

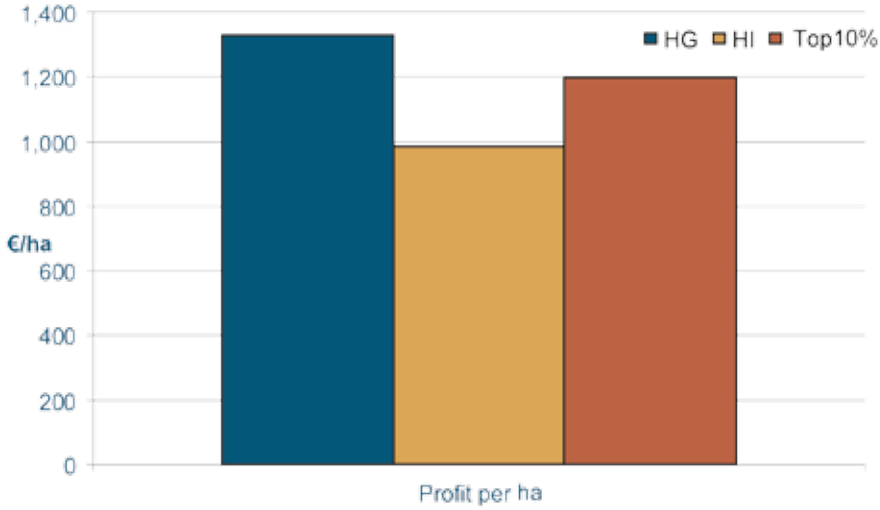
Figure 4. Effect of system of production on variable costs per litre during 2010.



In completing this financial analysis exercise, a number of conclusions can be drawn:

- We consider that while profit / ha will be more important financial criteria post quotas, profit / litre continues to be the best measure of on farm financial efficiency in the short to medium term.
- The results indicate that the HI system is capable of high profitability per ha but low profitability per litre and consequently overall profitability will be very sensitive to milk price fluctuation. In comparison, the HG system delivers high profit per litre and per ha and is more robust to fluctuations in milk price. There will be re-ranking of systems as milk and input prices fluctuate.
- The results also show that there is an opportunity to increase the profitability of the Ballyhaise systems through improved reproductive performance and further reductions in feed costs through increased pasture utilisation.

Figure 5. Effect of system of production on profitability per hectare during 2010.



Conclusions to date

The preliminary results from this study indicate that comparable levels of pasture production and quality can be achieved on low cost grass based dairy farms in the BMW region. The production results to date suggest that considerable potential exists to increase milk production from pasture within the region beyond historical levels, through improved grassland management practice. When this increase in sward productivity is matched with an appropriate stocking rate, the performance and profit potential per hectare of dairy farms in the region can increase significantly in a no milk quota scenario.

(Weekly updates on all Moorepark research herds are available online at: **www.agresearch.teagasc.ie/moorepark**).

Herd Management in Late Lactation

A. Brennan[1] and P. Gowing[2]

[1]Animal & Grassland Research and Innovation Centre, Teagasc, Moorepark, Fermoy, Co. Cork
[2]Teagasc, Sligo/Leitrim Regional Unit, Ballymote, Co. Sligo

Summary

- Autumn herd management must focus on producing high value milk at low cost while preparing the farm and the herd for optimum performance next spring.
- Extend the grazing season and keep grass in the diet into November to achieve high quality milk production in autumn.
- Supplements should be used only when grass supply is inadequate to maintain animal requirements. Feeding supplements in wet conditions removes animal appetite and makes grazing out paddocks more difficult and increases the likelihood of poaching.
- The autumn/winter period is the most opportune time to manage herd health and protocols should be put in place to prepare the herd for optimum performance.

Achieving High Quality Autumn Milk

High quality autumn milk is milk with a high solids content (greater than 13% combined fat, protein and lactose) and low somatic cell, total bacteria and thermoduric counts. Quality autumn milk is of very high value (~40 c/l this autumn) and can make a significant contribution to overall farm profitability. On farms where cows are traditionally housed early (October) the benefits of autumn milk are not being fully realised due to:

1. Lower fat, protein and lactose composition in milk
2. Increased costs of production. Silage is four times and concentrates are six times the cost of grass.
3. Reduced milk quality as SCC, TBC and Thermoduric bacteria counts tend to rise when cows are housed.

Farmers should attempt to achieve high milk receipts during autumn by keeping grass in the dairy cow diet into November. By following an autumn grassland management plan, as detailed later in this booklet and recommended grazing management practices in wet weather, farmers have the opportunity to keep grass in the cows diet for longer, increasing milk quality and reducing costs of production.

Autumn Supplementation

Supplements should be used only when grass supply is inadequate to maintain animal requirements. When deciding to supplement during autumn, the following points should be considered:

- Drying off low yielding cows early can be used instead of supplements as an effective means of reducing grass demand in the autumn. This will also assist in ensuring lactose remains above 4.45 per cent.
- Feeding supplements in wet conditions removes animal appetite and makes grazing out paddocks more difficult and increases the likelihood of poaching.
- Some farms produce excellent quality bale silage from surplus grass during the summer. This is an ideal supplement for use in autumn without compromising on milk protein composition and is more effective than concentrates at slowing rotation length.
- Where grass is very scarce and heavy supplementation is required, it is important to balance the diet so as to prevent digestive upsets. As a rule of thumb, the total diet should not consist of more than 40 per cent concentrate on a kg of dry matter basis.

During October and November of 2010, cows stocked at 3.1LU/ha at Ballyhaise were at grass for 46 days, produced on average 12.3 kg/day at 4.79% fat, 4.03% protein and 4.55% lactose with an average SCC of 240,000 and TBC of 12,000. During the 46 days at grass, average level of concentrate fed was 3kg/day. This shows the potential that exists in the BMW region to produce quality milk at low cost in late lactation.

Herd Health - Preparing for Next Season

A breakdown in herd health can have severe implications on production, fertility and total economic returns to the dairy farmer. The autumn/winter period is the most opportune time to manage herd health and protocols should be put in place to prepare the herd for optimum performance.

The following steps can be taken to help minimise the risks ill health from arising:

• Achieving Target Body Condition Score

Body condition score (BCS) at calving has been shown to have significant effects on subsequent health during lactation. The target BCS at calving is

3.25. Cows with a BCS of four or more have a high incidence of postpartum disorders, including fatty liver, milk fever, retained placenta, metritis, and ketosis. Cows below target BCS at calving will lose more condition post calving. Excessive loss of bodyweight and body condition results in anoestrus, cystic ovaries, poor expression of oestrus, decreased conception rates and increased incidence of embryonic mortality. BCS at calving is influenced to a great extent by the length of the dry period. Target BCS at drying off is three prior to an eight to nine week dry period. Cows below this BCS will need a longer dry period and/or supplementary feeding while cows above this will require a shorter dry period and/or restrictive feeding.

• Dry period management

Dry period management of the dairy herd can be divided up into two areas:

1) Udder Health. A minimum dry period of eight weeks is recommended for mature cows with 10 weeks for heifers to allow the cells in the udder to repair after the previous lactation and prepare for the subsequent lactation. Treating the udder with long acting intra-mammary antibiotics at drying off is the most cost effective means of treating existing infections and preventing the spread of new infections and is a pivotal part in managing somatic cell count. (Note: pay particular attention to withdrawal periods on dry cow therapy as some products have long milk withholding periods post calving.
2) Parasite Control. There is a large range of products available for the treatment of worms, fluke and lice and many are reasonably low cost and effective once used correctly. (Notes: When treating for worms make sure the product controls Type II ostertagia. Products licensed for fluke control in dairy cows only control mature fluke so two doses (after housing), six weeks apart will be necessary. Where rumen fluke is a problem, Zanil should be used).

• Vaccination

Vaccines have been developed to build up immunity to diseases. Decisions surrounding vaccination should be taken in consultation with a vet with each vaccine considered based on the impact of an outbreak of the disease on the farm, the probability of the disease occurring and the cost of the vaccine.

• Mineral Supplementation

Mineral Supplementation both pre and post calving is a necessary aid in the prevention of metabolic disorders and other deficiencies. As a general

rule, cows need mineral supplementation for four to six weeks pre-calving. Post calving, mineral supplementation will be decided based on specific deficiencies in the herd and forage. As cows do not store or recycle certain minerals (e.g. magnesium, iodine, selenium), supplementation of these minerals may be necessary through the breeding season. To accurately determine the mineral requirements of your herd, blood samples from a representative proportion of animals along with feed samples should be sent for analysis prior to the breeding season and a suitable mineral program drawn up based on the results.

Conclusions

There are significant benefits to be gained by extending the grazing season into late autumn. Supplements should only be used to extend the grazing season and bale silage is an excellent supplement for late lactation milk production. Autumn is the time to plan your herd health strategy for the next six months to ensure optimum cow performance next season.

Grazing Management in Autumn – Extending the Grazing Season

E. Kennedy[1] and T. Dunwoody[2]

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

[2]Teagasc, Cavan Monaghan Regional Unit, Ballyhaise, Co. Cavan

Summary

- Maximise the proportion of grazed grass in the diet of the dairy cow during the autumn period to help lower feed costs.
- Finish the grazing season with the desired farm grass cover to ensure sufficient grass is available next spring.
- The 60:40 Autumn Grassland Management Plan will help budget the grazing area to ensure target of 60 per cent grazed by end of first week in November is achieved.
- Using on/off grazing for three hours after morning milking and three hours after evening milking will maintain milk yield and ensure high grass utilisation without poaching damage.
- Poaching damage will reduce re-growth by 20 – 25 per cent in the next rotation.

Autumn Closing for Early Spring Grazing

The grazing season begins in autumn; hence autumn grassland management is a primary factor influencing the supply of grass available for grazing during the following spring. The two main objectives of autumn grazing management are (1) to maximise the proportion of grazed grass in the diet of the dairy cow during this period, and (2) to finish the grazing season with the desired farm grass cover, ensuring sufficient grass for early turnout the next spring. Grassland budgeting is essential to ensure that these objectives are achieved.

Key autumn grassland management goals:

- Build average farm cover by increasing rotation length to greater than 30 days from mid-September.
- Blanket spread the entire farm with up to one bag of CAN before the 15th of September.
- Highest average farm cover should be achieved in mid to late September at which point a farm cover of greater than 1300kg DM/ha is manageable.

- Last rotation should commence on October 15th – every paddock grazed from this date onwards should be closed (this may be two to three weeks earlier in more northerly regions or slower grass growing regions to compensate for lower growth rates in late autumn and early spring).
- Each day closing is delayed from October 15th reduces spring grass supply by approximately 15 kg DM/ha.
- To encourage winter tillering, post grazing residuals of 150 to 200 kg DM/ha (4.5 – 5.5 cm) should be targeted during the last rotation.
- Do not re-graze closed paddocks unless the farm is well above the closing cover target
- Target closing cover should be 225 kg/LU (approximately 560 kg DM/ha for farms stocked at 2.5 cows/ha) in late November
- Be flexible - graze the lower grass covers in wet weather (this also applies during wet weather in early spring)
- Aim to close some drier paddocks earlier to facilitate early spring grazing
- Aim to have at least 60-65 per cent of the farm closed by the end of the first week of November
- The remaining 35 – 40 per cent should be grazed by the first week in December.
- The 60:40 Autumn Grassland Management Plan (available from your Teagasc advisor) can be used as a tool to ensure grazing area is budgeted correctly.

Table 1. Target pasture herbage mass (farm cover) for a spring calving herd stocked at 2.5 LU/ha.

Month	*Stocking rate (on grazing area) (LU/ha)*	*Growth (kg DM/day)*	*Target average farm cover kg DM/ha*	*Target cover / cow kg DM/cow*	*Event*
Aug 15	2.5	65.0	848	342	
Sept 15	2.5	37.1	1336	536	Peak cover achieved
Oct 15	2.5	26.8	1283	517	First paddock closed
Nov 15	2.5	8.5	650	262	Supplement introduced
Nov 22	2.5	2.7	560	224	House by day and night

Grazing during wet weather

One of the main obstacles to achieving a greater number of days at grass, especially in early spring and late autumn, are poor soil conditions and inclement weather. Traditionally, during these periods dairy cows remain indoors and are primarily offered grass silage. Allowing animal's access to pasture for three hours after each milking and offering them no additional feed when they return indoors (once there is an adequate grass supply) will result in cows grazing for 97 per cent of their time at grass and achieving 95 per cent of the intake they would achieve if grazing full-time in drier conditions. Consequently no reduction in milk yield or milk solids is observed when on/off grazing, thus it can be used as a strategy to extend the grazing season.

Effects of on/off grazing on sward re-growth

The benefits of on/off grazing are not only confined to the animal. Removing animals from pasture, thereby preventing poaching damage, increases the re-growth capacity of a sward. Studies carried out at Moorepark show that poaching damage incurred with full time access to pasture during wet conditions reduced re-growth by approximately 25 per cent (400-500kg DM/ha) for the second grazing rotation.

Conclusion

To maximise grass utilisation in autumn and ensure sufficient grass for next spring grassland budgeting should be practiced. Consequently target pre-grazing yields will not be exceeded and cows can continue grazing until late autumn. By practicing on/off grazing the grazing season can also be extended, particularly on farms with heavier soil types, without poaching damage occurring.

Genetics to maximise profit from grass

Frank Buckley and Donagh Berry
Animal & Grassland Research and Innovation Centre, Teagasc, Moorepark, Fermoy, Co. Cork

Summary

- Breeding is an integral component of profitable dairy production systems.
- The economic breeding index (EBI) is a profit based index which should be used to identify genetically elite animals for Irish production systems.
- Genomic selection is a method which supplements the traditional method of genetic evaluation with the objective of improving the accuracy of identifying genetically elite animals.
- Crossbreeding trials at Moorepark have demonstrated significant animal performance benefits. The key must be to utilise the best available genetics (high EBI) to maximize the benefit and ensure real genetic improvement.

Introduction

The ideal cow for Ireland is a cow that will efficiently deliver high milk solids from grazed grass with little fuss, and continue to go back in calf year on year. Robust reliable cows will ensure profit generation regardless of the volatility in milk and input prices that the future is expected to present. The ongoing research at Moorepark as well as close collaborations with industry partners such as the Irish Cattle Breeding Federation (ICBF), as well as trial results and tools such as the EBI, the Active Bull list, genomic selection, the National Breeding Programme etc. provide Irish dairy farmers with the where with all to identify the most profitable genetics for the Irish grass-based environment, and ensure a prevalence of new and relevant bloodlines. With each passing year further progress is being made resulting in a larger choice of quality bulls from a range of dairy breeds that will increase the profitability of the national herd. It must be appreciated that genetic change, be it improvement or otherwise, is cumulative and permanent.

The economic breeding index-a tool to identify elite animals

The economic breeding index (EBI) has been available to Irish dairy farmers as a tool to identify the most profitable animals under average production systems. The availability of sub-indexes within the EBI allows farmers to

"fine-tune" the selection of bulls to address particular issues in their herd. As with all national breeding objectives, the EBI is being constantly revised in light of changing economic policies as well as availability of additional data and greater understanding of "novel" traits. The most recent addition to the EBI being the inclusion of a 'Maintenance' sub-index which takes cognisance of cow size (weight) reflecting its contribution to feed cost. This autumn will see the revision of the genetic evaluation for fertility and survival in dairy cattle which as well as utilizing collected insemination and pregnancy diagnosis data will also increase the number of parities included in the evaluation from three to five. This is likely to improve the reliability of fertility proofs for most bulls, especially young bulls.

The representation of animal health in the EBI is currently below optimum because of the lack of routine recording by farmers of disease incidence on-farm. This is arguably one of the most vital components that needs greater consideration. Unless health information; mastitis, lameness, retained afterbirths, milk fever, etc. are recorded, the impact of selection using the EBI on these traits cannot be accurately identified and therefore no corrective measures incorporated if necessary.

Increasing the accuracy of identifying elite animals using genomics

Key to a successful breeding program, either nationally or on-farm, is the accurate identification of the best (and worst) animals. At birth, a prediction of animal genetic merit is obtained by averaging the genetic merit of the respective sire and dam. However, because progeny inherit different pieces of DNA from the parent, in a relatively random process, an accurate itself prediction of the actual genetic merit is not known until the animal has performance records itself and/or has many progeny with performance records.

How does it work?

At the end of the day, performance is driven by the genes of the animal and how those genes are affected by the environment the animal is exposed to. Genes, which are made up of DNA, remain with an animal throughout life and are identical in every cell of the body. So in other words, the genes in the follicles of a new born calf's hair are the same as the genes in that animal's carcass many years later. Therefore, knowing the genes of a newborn calf and how each gene affects performance allows us to more accurately determine how that animal would perform in the average environment many years later. This is the science underpinning genomic selection.

Currently we measure 54,000 pieces of DNA in an animal although the technology is now available to measure almost 800,000 pieces of DNA (High Density genotyping platform). However, the short-term benefit of using more pieces of DNA is expected to be small. Of greatest importance is accurate knowledge of the association between each piece of DNA and the range of performance traits where data is available.

Genomic selection in Ireland?

Key to obtaining accurate estimates of the association between each piece of DNA and performance is a large database of both the DNA profile of animals and their performance under Irish production systems. This database in Ireland is currently up to 4,500 AI bulls which is larger than in most countries yet smaller than some countries like North American and the Eurogenomics consortium in Europe (includes The Netherlands, France, Germany and Viking Genetics based in Denmark). It is a well known fact that the greater the number of animals in this database with both DNA profiles and performance (either themselves or in progeny), the greater will be the benefit of genomics through more accurate identification of genetically elite animals. Ireland is constantly discussing with international collaborators on sharing of DNA information. Genomic selection is currently undertaken on all traits in the EBI including milk production, fertility, calving performance, beef performance and both somatic cell count and lameness. Genomic selection will soon be available on type traits. Genomic selection could be undertaken for other traits such as retained afterbirths or clinical mastitis if sufficient data were recorded and available for analysis. Such information could be used to identify animals at risk of certain diseases and could therefore be managed accordingly.

Implementation of genomic selection

The implementation of genomic selection on-farm is relatively simple. The ICBF can be contacted and a hair sampling kit ordered. A hair sample from the switch (i.e. very bottom) of the tail of the newborn calf can be taken and returned to the ICBF. They will send the sample to a laboratory who will extract the DNA from the hair follicles and determine the DNA profile of the calf. This information will be used to supplement the parental average information of the calf resulting in an increase in reliability.

Because individuals inherit chunks of DNA from their parents it is not always necessary to know the full DNA profile of all animals. A reduced DNA profile can be used to predict or impute the full profile once the full DNA profile of the sire and maternal grand sire is known. A reduced DNA profile halves the cost to €50 (incl. VAT) but can only be undertaken if the full profile of the sire

and maternal grandsire are in the ICBF genotype database. This can be checked when ordering the hair sampling kit.

Impact on genomic selection in Ireland

The reliability achievable for bulls evaluated based on their DNA is approximately 54 per cent although this will vary depending on the information available from their pedigree. This is an increase of approximately 22 percentage units compared to if genomic selection was not used. However, 54 per cent reliability is still considerably less than the maximum of 99 per cent achievable in proven (older) bulls. Nonetheless, the genetic merit (e.g. EBI) of the best genomically selected bulls is on average superior to the genetic merit of most proven bulls, available at a reasonable price. The lower reliability of genomically selected bulls can be overcome by using teams of these bulls; a recommendation is to use at least four genomically selected bulls in a team. **Use of less than four genomically selected bulls in a herd is not recommended and should never be undertaken.**

Crossbreeding – additional benefit

Ten years ago the term "high genetic merit" was synonymous with high milk producing Holstein-Friesians. Since the introduction of the EBI in 2001, and the results from a number of 'strain comparison studies' the focus has well and truly switched to the more holistic 'profit per cow'. Now, the concept of crossbreeding in the dairy herd has gained considerable acceptance and uptake on the strength of the sound scientific output emanating from our 'Ballydague' and associated research studies. Fundamentally a successful crossbreeding strategy aims to 1) introduce favourable genes from another breed selected more strongly for traits of interest, 2) remove the negative effects associated with inbreeding depression, and 3) to capitalise on heterosis or hybrid vigour, where crossbred animals usually perform better than that expected based on the average of their parents. Estimates of heterosis vary in magnitude depending on the trait being examined. Heterosis for production traits is usually in the range 0 to 5 per cent, whereas heterosis for traits related to fertility is usually in the range 5 to 25 per cent.

The performance data generated at Ballydague (Jersey) and on the large on-farm study (Norwegian Red) demonstrates that crossbred dairy cows are capable of production levels per cow similar to their Holstein-Friesian contemporaries. However, fertility and survival levels are markedly improved with the crossbred cows. Economic analysis conducted using the biological data generated from these studies has highlighted a substantial profit benefit per lactation with the Jersey×Holstein-Friesian and Norwegian Red×Holstein-

Friesian cows compared to pure Holstein-Friesian cows. The difference in performance equated to +€18,000 and +€13,000, respectively, annually from the analysis based on a 40 ha farm. This equates to over €180 and €130/cow/year more profit, respectively. This economic analysis took into account differences in production characteristics, body weight differences, replacement rates/survival, cull cow and male calf values, etc. The improved profitability is primarily attributable to improvements in milk revenue and the large differences in reproductive efficiency/longevity observed with the crossbred herds. Independent research undertaken by ICBF has indicated a potential benefit from cross-breeding of some €100/lactation in the first cross over an above that explained by EBI.

This year the first 3-way-crossbreds (Norwegian Red×Jersey×Holstein-Friesian) calved down at Ballydague. Preliminary performance results are positive indicating favourable production, fertility and body condition score characteristics – see updates available at regular intervals at: **http://www.agresearch.teagasc.ie/moorepark/**.

When selecting non-Holstein-Friesian sires, the first and most important thing to remember is that you continue to use high EBI sires. Based on the research findings, using a Jersey AI sire with an EBI of €200 will result in progeny with an increased profit per lactation of €300 (i.e. €200 from the direct genetic effect, plus another €100 from hybrid vigour). Similarly, using a Jersey sire with an EBI of €100 will only return an additional profit of €200, which is less than many of the top Holstein-Friesian sires. This fact must be borne in mind – otherwise the benefits of cross-breeding will be negated by the use of inferior sires. You should remember also that the heterosis effect (€100/lactation) does not get 'passed on' to the next generation, but will be reduced by up to 50 per cent after generation one depending on the strategy taken thereafter.

Going forward crossbreeding is expected to make an even greater contribution on Irish dairy farms in light of current and expect policy and the consequent drive by the industry to maximise output/profit per ha and reduce costs. This is indicated from other parts of the world, e.g. New Zealand and other such environments (similar grass growing and increasingly similar economic circumstances) where we find further evidence that the crossbred cow is most profitable.

Conclusions

Genetic gain in profitability is key to a long-term successful dairy enterprise. Genetic improvement for Irish dairy farmers should constitute increases in herd productivity through genetic improvement in milk solids output potential,

and reduced costs by genetically improving reproductive efficiency/survival as well as animal health (udder health, lameness, etc.). It also should be noted that improvements to calving interval and survival (fertility sub-index) will improve productivity via potentially longer lactation lengths as well as increasing the proportion of cows reaching maturity and the consequential increased production capacity that ensues. Moreover, it must be appreciated that genetic change, be it improvement or otherwise, is cumulative and permanent.

Notes

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

Tel : 025-42222
www.teagasc.ie

Fermoy Print & Design 025-31355