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A Breeding Strategy for an Expanding Dairy Industry

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Introduction

This important and timely event provides Irish dairy farmers with up-to-date research information as they prepare for the start of the breeding season for the first time within an environment of milk quota expansion. As you are aware, many dairy farmers have applied for and purchased additional milk quota in the last eighteen months and will receive a 2% increase in milk quota this year with the possibility of further annual increases.

The ICBF Animal Events system shows that the number of AI bred females has increased by 5% per year over the last two years. However, the number of replacement dairy females born over the last two years is inadequate to maintain the present national dairy herd size, and greatly inadequate in an increased national milk quota scenario. A recent survey carried out by ICBF and Teagasc indicates that the Irish dairy industry must set a target of a 20% increase in AI use in 2008.

Therefore, the objective of this event is to provide comprehensive direction to dairy farmers in breeding strategy for the coming breeding season. Compact calving, generating additional high EBI replacements, increasing AI usage and increasing overall profitability of the dairy herd, is the focus of the day. This event also offers dairy farmers an opportunity to meet with ICBF, NCBC and the main AI organisations. The various alternative breeds and crossbreeds currently being evaluated at Ballydague research farm are also exhibited. This Open Day is an ideal opportunity to see at first hand the results of the comprehensive research programme at Moorepark and to meet research and advisory personnel from Teagasc. The financial support for the research programme from state grants and dairy levy research funds is gratefully acknowledged.

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Fundamental Principles of a Breeding Strategy for Farm Expansion

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The initiation of milk quota exchange markets over the last 18 months coupled with fundamental EU policy changes favouring a potential expansion in EU milk quotas from April 2008, has signalled an opportunity for Irish dairy farmers to increase the long-term competitiveness of their dairy business. **The objective of this paper is to summarise the herd characteristics for an expanding milk quota scenario to ensure that any expansion in overall milk production at farm level realises increased overall farm profitability in future years.**

Future farm systems will continue to be based on low input pasture-based production focused on the maximum utilisation of grazed grass. Profitable expansion must be based on a breeding strategy focused exclusively on increasing the profitability of each cow in the herd. The productivity challenge for Irish producers must be to increase overall milk output through increased utilisation of grazed grass with no additional production costs incurred in the expansion process.

The fundamental principles

A breeding strategy is a minimum of a seven-year period during which a farmer selects AI sires for his/her herd based on achieving fundamental objectives for the farm business. In the broadest sense the following basic criteria apply to all future farm systems:

- Dairy farms will be based on greater specialisation in dairying
- Profitable dairy cows must calve in February and early March
- Expansion will occur through increased stocking rates within grass-based systems
- The dairy herd must deliver additional replacements to grow herd size
- Animals must be suitable to a larger herd scenario and require less labour per cow

Endpoint

A disciplined well developed breeding strategy will deliver a dairy cow of considerably higher economic value than the current average as outlined in **Table 1** below.

Table 1. Key efficiency indicators for a high performance dairy herd

Indicators	Current average**	Target
Herd EBI (€)	42	100
Milk solids (kg/ hectare)	660	1,250
Mean calving date (day of year)	March 16th	February 10th
Six-week calving rate (%)	54	90
Labour (cows/LU)	44	100
Proportion of revenue retained (%)	29	55
Profit per ha* (€)	1,030	2,500

**based on milk price projection of 26c/litre, **based on NFS and ICBF data (NFS, 2006; ICBF, 2007)*

Compared to the current population, tomorrows herd will produce more milk solids predominantly by calving at the right time but also through increased intake and energetic efficiency, have excellent reproductive capacity (calving in 365 days, with 50% and 90% of the herd calving in the first two and six weeks of calving, respectively), and deliver additional replacements requiring less labour per cow to survive in a larger herd. The realisation of increased milk solids production per hectare will be based on achieving the above performance at an optimum stocking rate (2.8LU/ha).

The rate of progress at farm level towards the realisation of the targets outlined above will be accelerated by:

1) Using only high EBI dairy sires to breed both the dairy herd and the majority of replacement heifers
2) Calving down advanced replacement heifers at the start of the calving period
3) Using heat detection aids to increase overall submission rates
4) Keeping good records to identify problem cows and taking appropriate action

Replacement Heifer Management to Optimise Lifetime Performance

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Well bred maiden heifers have the potential to substantially impact on herd profitability in that: (1) they should represent some of the highest genetic material in the herd in terms of potential profit; (2) if calved early, they have the capacity to significantly improve herd calving pattern; and (3) if mated to high EBI sires, will provide a source of early-born high genetic merit replacement heifers for the future. Frequently, this component of the overall dairy system is overlooked despite important long-term effects on subsequent milk production performance. Achieving target liveweight gains is an integral part of heifer rearing systems. As part of the large on-farm Norwegian Red crossbreeding study run by Moorepark, almost 1,400 dairy heifers were intensively monitored for three years from three months of age on over 40 dairy farms. This data set was used to establish best guidelines in heifer rearing management.

- At mating start date (MSD) liveweight is more critical than age (**Table 1**)
- Heavier heifers at MSD produce significantly more milk than lighter heifers
- Heifers in low BCS at MSD calve later and produce significantly less milk during their first lactation
- Weight at first calving also significantly affects second lactation milk yield

Table 1. Association between heifer age, liveweight and body condition score at mating start date (MSD) and cow production performance in first lactation.

	Mean Calving Date	Predicted 305-day Yield	Predicted 305-day Fat %	Predicted 305-day Protein %	Milk Yield (kg)	Pre-Calving Weight
Age at AI (months)						
<14	Feb 23	5322	3.96	3.47	4648	
14 to 14.5	Feb 22	5294	3.99	3.47	4587	
>14.5	Feb 23	5223	4.04	3.47	4439	
Weight at AI						
≤290kg	Feb 25	5003	4.02	3.46	4186	482
291 to 316kg	Feb 23	5235	3.99	3.46	4428	517
317 to 341kg	Feb 21	5340	4.03	3.48	4722	541
≥342kg	Feb 21	5540	3.96	3.49	4897	574
BCS at AI						
≤2.75	Mar 4	4963	4.09	3.94	4053	
3.00	Feb 21	5283	3.94	3.45	4615	
3.25	Feb 20	5387	4.01	3.48	4791	
≥3.50	Feb 21	5485	3.95	3.46	4773	

At MSD the average liveweight and body condition score (BCS) was 326 kg and 3.28, respectively, for the cycling heifers, while it was 290 kg and 3.10, respectively, for the non-cycling heifers. Averaged across all herds, the level of cyclicity was 79% ranging from 31% in the poorest herd to 100% in the best herd. The data also showed that it was possible to have heifers at the desired liveweight and BCS at less than 13 months of age at MSD and to calve at 22 months of age.

Recommendations

- The following target liveweights (Table 2) must be achieved at a minimum BCS of 3.25 at MSD to ensure 90% of maiden heifers are cycling at MSD
- These target weights at MSD are equivalent to 60% of target pre-calving first lactation weights

Table 2. Liveweight targets for maiden heifers at breeding and for heifers pre-calving by breed/crossbreed

	HF	NZ	HF*NZ	NR	HF*NR	J	HF*J
Maiden heifer LW(kg)	330	315	330	315	330	240	295
Pre-calving LW (kg)	550	525	550	525	550	405	490

HF = Holstein-Friesian, NZ = New Zealand HF, NR = Norwegian Red, J = Jersey

- Young heifers, even those less than 13 months of age at MSD, can be reared to reach these weight/BCS targets before MSD
- Aim to have heifers at grass at least one month prior to MSD
- Sires with direct calving difficulty PTA values of 2.5 or less (consult figures provided by ICBF) are recommended as suitable for use on maiden dairy heifers
- A prostaglandin synchronisation programme works well when breeding replacement heifers

Management for Sustainable Reproduction

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The efficiency of seasonal-calving systems of milk production is highly dependent on herd reproductive performance. The calving pattern in spring is a reflection of the submission rates and conception rates during the previous breeding season. The relationship between heat detection rate and conception rate on a six-week in-calf rate is illustrated in Table 1. Commencing at mating start date, it is imperative that as many cows as possible get pregnant as quickly as possible. This is a summary of essential management practices that are relevant to all seasonal-calving herds, and need to be aggressively employed.

1. **Keep good records.** The importance of this cannot be overstated: you can not improve herd reproductive performance without knowing where your specific problem lies.
   - Keep records of calving date, all peripartum problems /disorders /infections, pre-breeding heat dates, insemination dates, submission rates, six-week in-calf rate, breeding season length, final empty rate
   - The main targets for seasonal calving systems are as follows: submission rate in the first three weeks, 90%; conception rate to first service, >50%; six-week in-calf rate, 75%; final empty rate, <10%
   - Look at the performance achieved on your farm. This can be easily carried out by keeping all animal events (calvings, inseminations, etc.) up to date on Herd Plus. Following examination of your results, set realistic targets for improvement
   - Prior to MSD, identify cows with peripartum disorders and cows not cycling, and get these cows examined

2. **Maiden heifer breeding management.** Heifers are the highest genetic merit stock on the farm. To continue genetic progress, heifers should be inseminated with a high EBI easy calving dairy AI sire.
   - Puberty in heifers is strongly influenced by liveweight (LW) and BCS. Failure to reach BW targets results in an unacceptably high proportion of non-cycling heifers
   - By MSD, Holstein-Freisian heifers should weigh >330 kg at a BCS of 3.25. BW targets for New Zealand Friesian, Norwegian Red and Jersey heifers are 315, 315, and 240 kg, respectively. Jersey x Holstein-Friesian crossbreds should achieve a target of 295 kg
   - Prostaglandin synchronisation regimes work extremely well with cycling heifers. The protocol that has worked best at Moorepark over the last number of years is to tail paint all heifers, and inseminate following observation of oestrus during the first nine days of the breeding season
   - All heifers not inseminated in the first nine days receive a prostaglandin injection, and are inseminated following observation of oestrus in the next three to five days. Heifers that fail to come into heat following the first shot of prostaglandin receive a second shot ten days later

- After this second shot, heifers are inseminated at a standing heat, or receive fixed time AI at 72 and 96 h after the second shot of PG. All heifers are observed for repeat heats, and a stock bull is introduced five to six weeks after the start of the breeding season. This protocol typically results in conception rates to first service of ~65-70% in Moorepark.

3. **Heat detection.** It is not possible to achieve good reproductive performance without having a good heat detection rate, and good heat detection is not possible without use of a heat detection aid.
   - A number of aids are available. By far the most common is tail paint, but tail paint is only efficient if it is frequently reapplied.
   - Alternative stick-on devices are also available that give comparable performance to tail paint (e.g., Checkmate, Estrotect "scratch card").
   - Choose one that suits your system, and use it properly throughout the period of AI use.

4. **Body condition score.** Body condition scoring is an excellent tool to monitor the energy status of the herd.
   - Cows that are thin during the breeding season (<2.5) are frequently anoestrus, and even if cycling, they are likely to have poor conception rates.
   - Calving cows at too high a body condition score is also problematic, as these cows are more at risk of metabolic disorders postpartum, and also have compromised reproductive performance.
   - Cows should calve at a BCS of 3.0-3.25, lose <0.5 BCS unit after calving, and mean herd BCS at breeding should be >2.9.

Table 1. The relationship between conception rate, heat detection rate and six-week in-calf rate

		Conception rate (%)			
		60	**50**	**40**	**30**
Heat detection rate (%)	**90**	79	70	59	47
	70	66	58	48	38
	50	51	44	36	28
	40	42	36	29	23

Benefits of Increased Use of High EBI AI this Spring

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EBI is a tool to identify the most profitable genetics for the average Irish dairy farm. It favours bulls that will increase herd milk solids yield, through a combination of both genetics for increased milk solids and longer lactation lengths through improved fertility. Remember genetics is cumulative and permanent, so a bad decision made this coming breeding season may have repercussions for several years to come. In an expanding dairy market there will be an increased demand for high EBI heifers from AI. Approximately six AI straws are required per milking heifer needed. Recent research suggests minimal effects on production of calving heifers younger than 24 months if properly grown. Therefore, even if sufficient replacements have been generated it will be worthwhile to continue AI with dairy semen to produce surplus heifers for sale.

Changes to the EBI in 2008

The EBI was revised in late 2007 in light of higher than expected milk prices and greater feed costs driven mainly by higher concentrate costs. The index weightings and relative emphasis on the different sub indexes within the EBI are summarised in the Table below.

Sub-index	Trait	€	%	%
Milk Production	Milk yield (kg)	-0.09	12	42%
	Fat yield (kg)	1.26	5	
	Protein yield (kg)	6.91	25	
Fertility	Calving interval (days)	-11.97	24	34%
	Survival (%)	11.17	11	
Calving Performance	Direct calving difficulty (%)	-3.65	4	11%
	Maternal calving difficulty (%)	-1.73	2	
	Gestation (days)	-7.50	5	
	Calf mortality (%)	-2.85	1	
Beef Performance	Cow weight (kg)	-0.51	2	9%
	Progeny carcass weight (kg)	1.38	4	
	Progeny carcass conformation (1-15)	10.32	2	
	Progeny carcass fat (1-15)	-11.71	1	
Health	Somatic cell count ($\log_e$ units)	-57.21	3	4%
	Locomotion (1-9)	1.13	1	

The changes in the EBI from 2007 are minimal and will not affect the ranking of sires although accumulation of new data is likely to cause re-ranking of sires over and above the change in the economic values. One notable change is that now the economic value on cow weight is negative. Hence, everything else being constant, lighter animals are more economical. This is mainly due to the lower feed costs associated with growing this animal as well as the lower feed costs of maintaining a lighter animal. Therefore, the EBI favours animals with high milk solids yield, good fertility and health, and lower cow liveweight.

Choosing sires this spring

1. Determine your average herd EBI and EBI subindex values from your Herdplus herd summary sheet
2. Determine what herd characteristics (for example fertility) you want to improve and by how much
3. Decide on whether you want to use young test sire semen on a portion of your herd
4. Ignoring AI company, breed of sire and reliability of proofs, identify sires predominantly from the active bull list that fit your herd's breeding goals, in terms of what traits you want to improve
5. Decide on whether or not you want to crossbreed or to which breed you want to restrict yourself. Remove unsuitable sires based on this criteria but before you do, examine what attributes they could have brought to your herd and think again
6. Decide on three to five bulls that you want to use in your herd ensuring that at least two are easy calving (direct calving difficulty <2.5) and suitable for use in heifers and that you can get access to the semen
7. Get the average EBI and EBI subindex values of your team of bulls and make sure they are better that your targets set out in step 2. This will ensure genetic gain

How long will it take me to increase my herd EBI from X to Y?

On average assuming a replacement rate of 20%, a team of bulls that are at least €70 greater EBI than the milking herd average should increase the milking herd EBI by €5 annually. Obviously bulls more than €70 above the herd average will increase it faster. Therefore, a herd with an average EBI of €50 should use a team of bulls with an average EBI of at least €120 to increase herd EBI rapidly.

Crossbreeding the Dairy Herd – A Real Alternative

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Introduction

The cow required for future Irish milk production systems must be robust and 'easy care' as well as being capable of producing high milk solids per unit area. The former is particularly true given expansion is likely to be the norm going forward. Compact calving is a critical component of the system. It enables cows to express their production potential via a long lactation (target 305 days) and allows grazed grass to be utilised to the maximum in the dairy cow diet. Many decades of intensive selection for milk production within the Holstein-Friesian has resulted in unrivalled production potential, but unfortunately, a cow less suited to the demands of a seasonal production environment, in particular reduced reproductive efficiency. Although many countries have diversified their breeding goals to include measures of survivability or functionality, it is arguable that few have weighted fertility sufficiently to counteract the decline. Principally to overcome these issues interest in crossbreeding has increased. In New Zealand, it has been demonstrated that crossbred (JerseyxHolstein-Friesian) cows are the most profitable, surviving on average 227 days longer (almost one lactation more) compared to the average of the parent breeds. It has been calculated that at current rates of genetic gain for longevity (9.5 days per year) it will take 24 years of selection before a similar rate of survival is reached with cows within the straight breeds.

Crossbreeding studies at Moorepark

To evaluate/demonstrate the potential merits of dairy crossbreeding under Irish conditions two crossbreeding studies were established at Moorepark. Both studies are advancing with two lactations now completed in both studies. One study is evaluating crossbreeding with the Norwegian Red, a breed that has been selected with an index not dissimilar to the Irish EBI since the 1960s. This study is being run across 46 commercial dairy herds i.e., a study with large numbers. The second trial, based at the Ballydague research farm is evaluating Jersey crossbreds. Fundamentally, when crossbreeding the aim is to: (1) introduce favourable genes from another breed selected more strongly for traits of interest; (2) remove the negative effects associated with inbreeding; and (3) for many traits to capitalise on what is known as heterosis or hybrid vigour (HV). HV means that crossbred animals usually perform better than that expected based on the average of their parents.

The results to-date strongly suggest that using a Norwegian Red or Jersey sire will deliver high profit to Irish farmers. In both cases production potential is not compromised by crossbreeding, but crucially, reproductive efficiency and survival of the crossbred cows is markedly improved compared to the Holstein-Friesian cows on trial. The advantage from crossbreeding is likely to be substantial where the EBI or more specifically the fertility sub-index is low. However, farmers will benefit from hybrid vigour even with high EBI herds. That is the basis for crossbreeding in New Zealand, where they use the best bulls (highest BW) from both breeds and also benefit from the added bonus that is hybrid vigour.

Crossbreeding and the EBI

At all times farmers must strive to use the best bulls and this means high EBI. Currently, ICBF do not have reliable EBI estimates for many alternative breed bulls. Essentially, this is due to a lack of data for many sires, and as far as individual breeds are concerned, a lack of data or poor data distribution. In the absence of Irish proofs with high reliabilities for Jersey and Norwegian Red bulls (or other breeds of choice) the index of country of origin should be assessed. This means as a general rule, bulls good for fertility and milk solids, in particular those tested in a grass-based environment, should deliver in EBI. ICBF has calculated a value for hybrid vigour somewhere in the region of €50. This value is not included in the published EBI of alternative breed sires. In essence, a farmer can expect greater performance than that explained by the EBI of these sires. This is because of hybrid vigour. The value of €50 is based on an average value for all crossbreds in the national data base. It is likely to be different depending on the breeds being crossed.

How different is a crossbred cow?

Based on the studies at Moorepark, crossing Holstein-Friesian cows with a Norwegian Red sire will result in a type of cow very similar in terms of appearance and production characteristics to the Friesian cows farmers are used to working with. However, improved fertility, udder health and body condition can be expected. Thus, it is an option for those wishing to avail of the benefits of crossbreeding but who feel crossing with Jersey is too drastic i.e., for those farmers who want to keep the type of cow they have; similar colour, size, weight, production characteristics, calf value etc. Jersey crossbred cows will in general be dark brown/black in colour. On average, they will be smaller and more compact, 50-60 kg lighter than Holstein-Friesian contemporaries, but body condition will tend to be superior. Milk volume will be reduced, but milk solids content will be significantly increased and as a result the yield of milk solids will be maintained or indeed increased. Increased production efficiency is a consequence of maintained solids production at a reduced body size. This is due to a lower maintenance energy cost. High solids production in conjunction with lower milk volume will be favoured with a multiple component milk pricing payment system i.e., ‘A+B-C’. Cull cow and male calf value will be reduced.

Where to after the first cross?

Three options exist with regard to the breeding strategy that can be employed when it comes to breeding the crossbred (F1) cow. These are as follows:

1) Two-way crossbreeding. This entails mating the F1 cow to a sire of one of

the parent breeds used initially. In the short-term HV will be reduced but over time settles down at 66.6%.

2) Three-way crossing. Simply use a high EBI sire of a third breed. When the F1 cow is mated to a sire of a third breed HV is maintained at close to 100%. However, with the reintroduction of sires from the same three breeds again in subsequent generations the HV levels out at 85.7%.
3) Synthetic crossing. This involves the use of F1 or crossbred bulls. In the long-term a new (synthetic) breed is produced. HV in this strategy is reduced to 50% initially and is reduced gradually with time.

Summary

Crossbreeding is often referred to as a quick fix solution (relatively speaking). Results from these studies suggest this may well be the case. The ultimate aim for all Irish dairy farmers must be to generate cows that will maximise profitability in our system. Experience to-date strongly suggests we can have confidence that crossbreeding works. The key is to utilise the best available genetics, ultimately based on the EBI, to ensure real genetic improvement.

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Nutrition at Pasture for Good Dairy Cow Fertility

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In spring-calving herds the breeding season occurs while cows are at pasture, with grazed grass making up the majority of the diet. During the main grazing season the objective is to achieve high milk production and good fertility performance from an all grass diet.
Research at Moorepark has indicated that:

- Increasing the total amount of concentrate fed during lactation from 350 kg to 1,500 kg had no effect on reproductive performance and there is no evidence that offering supplementation during the breeding season when adequate amounts of high quality pasture are available results in improved reproductive performance. Therefore, the diet during the breeding season should consist of high quality pasture offered at an adequate allowance
- Negative energy balance (NEB) which results from cows obtaining inadequate amounts of energy to meet their requirements can be maintained at an acceptable level (loss of < 0.5 BCS from calving) by offering adequate amounts of high quality grazed grass in early lactation
- Concentrate supplements high in digestible fibre are preferable for supplementing pasture
- The optimum level of concentrate supplementation is dependant on grass supply
- During the main grazing season allocate a grass allowance of 18-19 kg DM/cow, and target a post-grazing sward height of 4.5-5 cm
- Graze at the three leaf stage, maintain swards with a high leaf mass (1,500 kg DM/ha) by keeping rotation length within the range of 18-21days, with a farm cover at 180-190 kg DM cow
- Continued strip grazing of cows with 12-hour allocations in the main grazing season can result in herd underfeeding, especially where grass allowance is inadequate; when grass supply is adequate from April onwards, grass allocations should be on a 24 to 36-hour basis

Reducing NEB

Optimal nutritional management of the dairy herd should ensure that NEB is minimised in the early lactation period. This can be achieved by turning cows out to high quality pasture soon after calving rather than feeding indoors on grass silage. NEB is a major problem in over conditioned cows (especially later calving cows); for each one unit increase in BCS, NEB is increased by 1.76 UFL, due to lower dry matter intake. Research at Curtin's farm indicated that high production type cows lost excessive BCS during early lactation and failed to gain condition in the remainder of lactation. Energy from higher levels of concentrate supplementation with this type of cow is partitioned more towards milk production than to decreasing BCS loss. Herd BCS should be 3.25 on average at calving, and 2.9 at the start of the breeding season. Feeding the herd well at pasture is key to maintaining herd BCS during the breeding season.

Concentrate supplementation at pasture

Energy supplements for cows at pasture can be classified into two broad types: (1) those with high levels of sugar (molasses) or starch (cereal grains) which are rapidly fermented in the rumen; and (2) those containing high levels of digestible fibre (beet pulp, citrus pulp and brewers grains) which are slowly digested in the rumen. Supplements high in sugar or starch tend to depress grass intake to a greater extent than those based on high fibre due to the rapid fermentation rate, reduced rumen pH and adverse effect on the rate of grass digestion. The level of concentrate to feed depends on three main issues: (i) grass allowance; (ii) concentrate cost; and (iii) quota situation. When supplementing cows at pasture (spring/summer) avoid using high protein concentrates (>18%). Spring grass is high in degradable protein and an excess can lead to reproductive problems.

Effect of concentrate supplementation on fertility performance

Increasing the total amount of concentrate fed during lactation from 350 kg (low Concentrate) to 1,500 kg (High Concentrate) had no effect on reproductive performance over a three-year period (2001-2003) (**Table 1**). Thus concentrate feeding levels at pasture should be based on the factors outlined above and supplementing in excess of the optimum based on these factors is unlikely to impact positively upon reproductive performance.

Table 1. Effect of feeding system on reproductive performance

	Low Concentrate	High Concentrate
Conception to first service (%)	59	54
Conception to second service (%)	40	57
Six-week in-calf rate (%)	69	63
Overall pregnancy (%)	86	86
Services per cow (no.)	1.87	1.96

Trace elements

The main trace mineral deficiencies associated with poor reproductive performance are copper, selenium and iodine. Molybdenum also plays an indirect role because high levels of molybdenum reduce the absorption of dietary copper. Supplementing with minerals where no deficiency exists can lead to toxicity problems. The requirement for specific mineral and vitamin supplements varies by region. A pre-calving mineral mix should be fed for the final four to six weeks of pregnancy and an appropriate post-calving trace element supplement should be offered for at least four to six weeks after calving. This is generally offered in concentrate fed during early lactation.

Key Farm Efficiency Factors Required for an Expanding Dairy Industry

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The Irish dairy industry is facing into a period of unprecedented change with CAP no longer insulating dairy farmers from influences in world dairy markets. In the past the CAP market intervention schemes supported milk price, while at the same time limited milk production through the imposition of milk quotas. However, with the reform of CAP this policy is now changing with Agenda 2000 and the Luxembourg Agreement. Milk quota restrictions have remained, but are to be reduced over the coming number of years as part of the Health-Check. Global demand for dairy products is growing, driven by increasing consumption in Asia and China; however, with reduced market supports there will be greater volatility in dairy product prices. This change in policy will result in Irish dairy farmers being allowed to increase overall milk production for the first time in 25 years. Based on a survey of a large number of dairy farmers, there is large latent capacity on most dairy farms with the average current stocking rate of 1.8 cows/ha and average production per hectare of 8,500 litres. In order for dairy farmers to take advantage of this latent capacity there is a requirement that they embrace a number of key technologies which will result in substantial increases in profitability in an expanding scenario.

Table 1 shows a comparison of the physical and financial performance from the Average specialist dairy farmer in the National Farm Survey (NFS), the average from the Top discussion group, and the Moorepark Target. This shows that there is significant potential for increased efficiency and scale on most commercial dairy farms. To reach the potential profitability target of over €3,600 using 2007 milk prices there will be a requirement to increase both efficiency and scale at farm level. The current output of 660 kg milk solids (MS)/ha will not be enough to reward owned resources in the future. Present day high land costs will require dairy farmers to maximise the potential milk production from their existing resources through increasing the amount of grass that is utilised from the farm. At milk yields of 340 kg MS/cow and stocking rates of 1.8 cows/ha, there is substantial potential for expansion through increasing grass utilised from the current national average of 7t/ha to the target 13t/ha. **Table 1** shows that the Top discussion groups are achieving good performance, when compared to the Moorepark Targets.

Increasing production, >1,300 kg MS/ha requires additional feed from outside the grazing platform. The economics of increasing output beyond 1,300 kg MS/ha will depend on: milk, feed price ratio (including price fluctuation), additional labour, and capital requirement.

Table 1. Comparison of the average farm from the National Farm Survey, Top Discussion Group and the Moorepark Target using 2007 milk price

	National Average*	Top Discussion Group	Moorepark Target
Mean calving date	16th March	1st March	14th February
Milk yield (kg MS/cow)	340	410	460
Stocking Rate LU/ha	1.90	2.40	2.80
Milk production kg MS/ha	660	990	1,300
Margin €/kg MS	2.13	2.57	2.95
Margin €/ha	1,403	2,354	3,619

** National average projected for 2007*

Key technology drivers required in an expanding dairy industry

Table 2 shows key components of profitability in an expanding milk quota scenario.

- **Calving date and pattern -** Where milk quota is the limitation at farm level the optimum mean calving date is late February because farm profitability is maximised through cost minimisation. Where milk quota is no longer binding the optimum mean calving date becomes early to mid-February. The current national average mean calving date is 16 March, which is approximately one month later than optimum. Earlier calving through increased grass utilisation, higher milk yield per cow and longer lactation length will increase MS yield by 100 kg/ha and increase profit by €305/ha
- **Replacement rate –** Reproductive performance on Irish dairy farms has declined in recent years with a corresponding increase in replacement rate. It is estimated that the costs of rearing a replacement animal to calving stage is €1,550 (includes calf cost). The optimum replacement rate for seasonal calving systems is 17%, while the current (projected) national average is 27%. Reducing replacement rates to 17% will increase milk output by 40 kg MS/ha, and increase profit/ha by €300 or €0.23/kg MS
- **Stocking rate -** Increasing stocking rate is one of the best strategies available to the majority of Irish dairy farmers to increase milk output and farm profitability. Current stocking rate on the majority of Irish dairy farms is low mainly due to the imposition of milk quotas. An increase in stocking rate from the current level of 1.8 to 2.4-2.80 cows/ha (within the grazing platform) will be required to maximise profit when milk quotas are removed. Increasing stocking rate from 1.8 to 2.8 cows/ha will result in an increase in milk output of 400 kg MS/ha and profit by €800/ha
- **Increase grass utilisation -** Grass measurement and budgeting provides dairy farmers with the tools to increase milk output from grazed grass while at the same time keeping costs under control. Over the past 10 years grass budgeting has had a large impact on the length of the grazing season with increases of over 50 days with better quality grass common on farms that carry out grass budgets. A number of studies have shown that increasing the length of the grazing season by one day is worth €2.70/cow. Therefore, grass budgeting has the potential to increase profitability by €540/ha/year

Table 2. Key components of profitability in an expanding milk quota scenario

	National Average	Moorepark Target	Increased Profit €/ha
Calving date and pattern	16th Mar	14th Feb	305
Replacement rate %	27	17	300
Stocking Rate LU/ha	1.9	2.8	800
Grazing season length (days)	220	290	540

Out-Wintering-Pads — an Option for Expansion

Padraig French
Teagasc, Moorepark Dairy Production Research Centre

Introduction

For dairy farmers considering an increase in cow numbers the provision of wintering accommodation is the single biggest capital cost. Any alternative wintering system to conventional facilities needs to have a low capital cost, low running cost, be labour efficient and environmentally secure. It is also imperative that any alternative wintering system has no negative impact on cow productivity or welfare.

Winter accommodation systems

An out-wintering-pad (OWP) is an alternative method to conventional sheds for accommodating cattle. Over the last four years, research at a number of Moorepark farms has evaluated a range of alternative OWP systems for wintering dry spring-calving cows, replacement heifers and winter milking cows. The research focused on the impact of these systems on production (body condition scores, weight and feed intake), labour input and running costs, health (hoof health, dirtiness score, mastitis levels, limb lesion score, locomotion scores and any incidences of clinical disease) animal behaviour and environmental impact. A range of alternative designs of OWP were evaluated at Ballydague research farm using herds of approximately 50 spring-calving cows for the winters of 2005 to 2008. The four winter accommodation systems compared were:

1) Indoor cubicle housing with one rubber matted cubicle/cow (Cubicle-Housing)
2) OWP at a space allowance of 12m^2/cow with easi-feed silage system (EF-OWP),
3) OWP with a self-feed silage system at a space allowance of 16m^2/cow (SF-OWP)
4) OWP with a windbreak and plastic cover overhead at a space allowance of 6m^2/cow (PC-OWP).

All cow groups, except the self-feed systems, had a concrete feed face adjacent which allowed 0.6 m of feed space/cow. Cows on all four winter accommodations produced similar milk production in the subsequent lactation (**Table 1**). Wintering cows on pads had no deleterious effect on cow welfare and resulted in minor improvements in hoof health during the dry period.

Table 1. The effect of winter accommodation system on performance of spring-calving dairy cows

	Cubicle-Housing	EF-OWP	SF-OWP	PC-OWP
Silage intake (kgDM/day)	10.2	9.9	9.8	10.4
Milk solids yield (kg)***	345	363	356	345
Liveweight gain (kg/day)	0.65	0.57	0.60	0.52
Condition score change	0.15	0.19	0.13	0.27

**** Kg fat and protein from calving to Oct 22, 2006*

Tables 2 outlines the capital and operating costs associated with a range of alternative winter accommodation systems with both clay and plastic lining requirements. With both liner types, the self-feeding silage option was the most economically and labour efficient system for wintering cows.

Table 2. Construction, operating and annualised housing cost of different systems

		Plastic-lined		Clay-lined	
		SF	EF	SF	EF
	Cubicle-Housing	-OWP	-OWP	-OWP	OWP
Construction costs					
Slurry storage m^3**	5.28	12.19	9.71	12.19	9.71
Construction cost (€)	2,505	588	724	291	499
Running cost (€) (100 days)	54	56	70	56	70
Total cost/cow/year (€)	254	103	128	80	110

***Based on 16-week slurry storage and 37 mm/week winter rainfall*

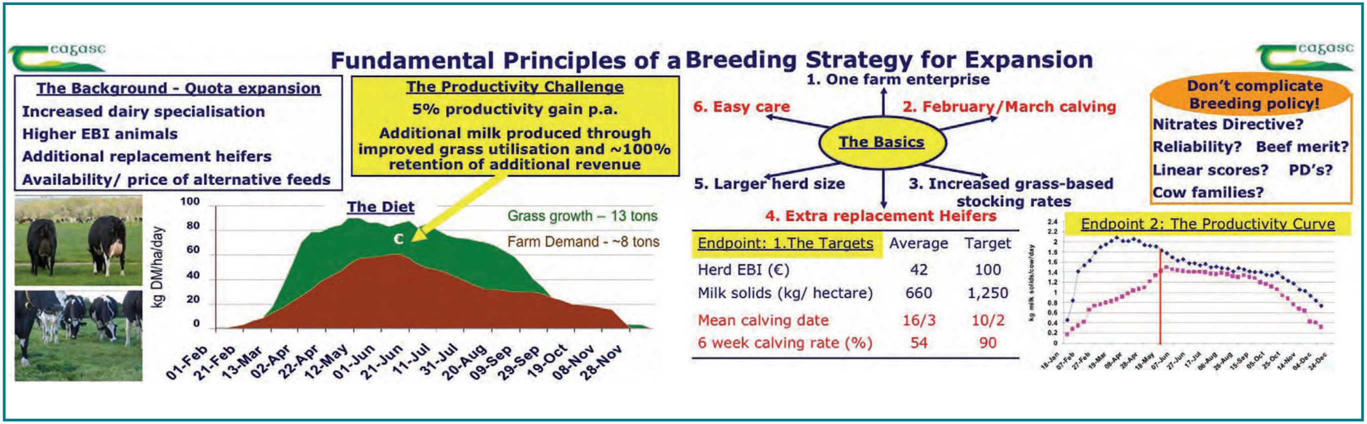
Planning an out-wintering-pad

All out-wintering-pads require planning permission and a site assessment report completed by an approved site assessor. A planning application is then prepared and, together with the completed and signed site assessment report, is sent to the Local Authority for planning permission. Some locations will be unsuitable for soil-lined out-wintering-pads, by virtue of the presence of very close underlying rock; the presence of unsuitable subsoils such as sand or gravel; high water tables; or other adverse conditions. Such locations may necessitate lining the OWP with a geomembrane. The OWP must be built in accordance with DAFF specifications S132 and certified by the construction contractor which is the liner supply company in the case of geo-membrane lined OWPs.

The specification is available at http://www.agriculture.gov.ie/areasofi/fds/S132OWPSpecFeb2007.pdf or from your local Teagasc office.

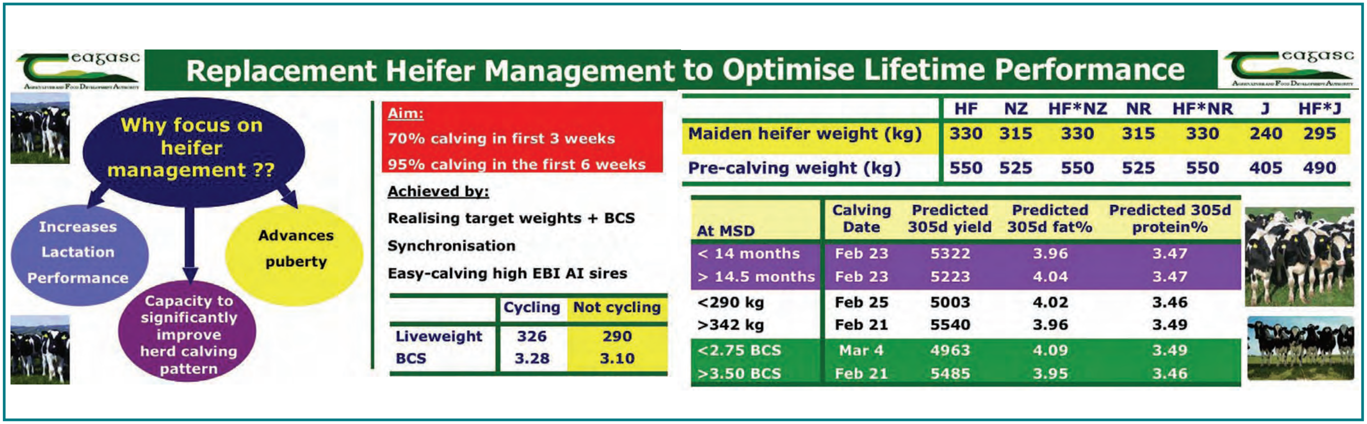
Open Day Stands

Stand No. 1



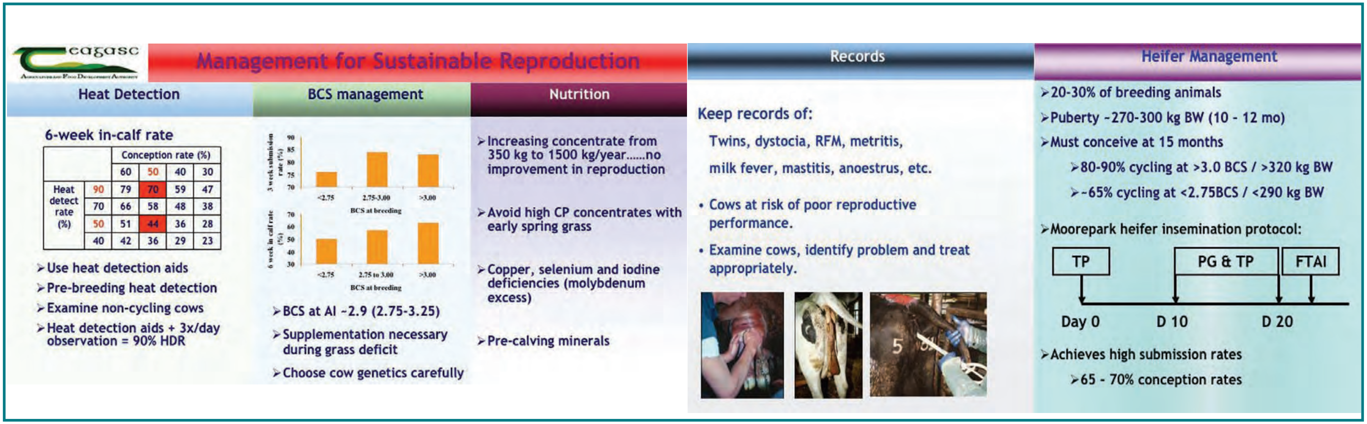
Fundamental Principles of a Breeding Strategy for Farm Expansion

Stand No. 2



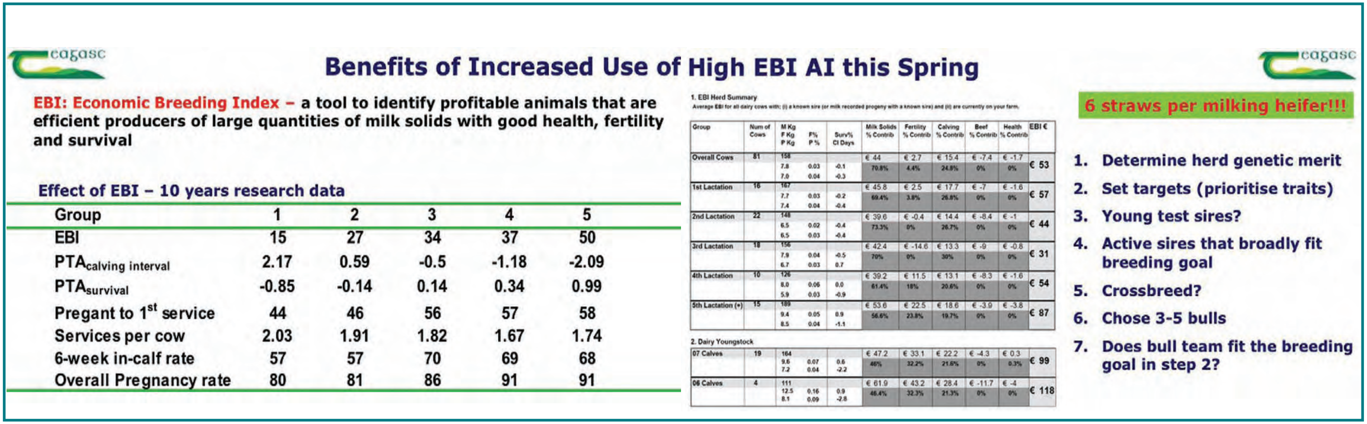
Replacement Heifer Management to Optimise Lifetime Performance

Stand No. 3



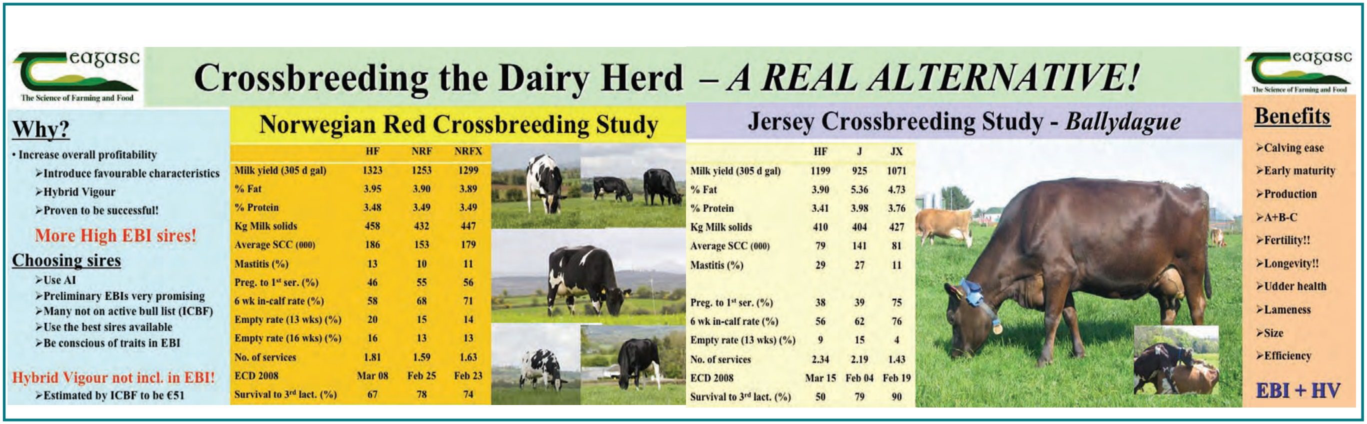
Management for Sustainable Reproduction

Stand No. 4



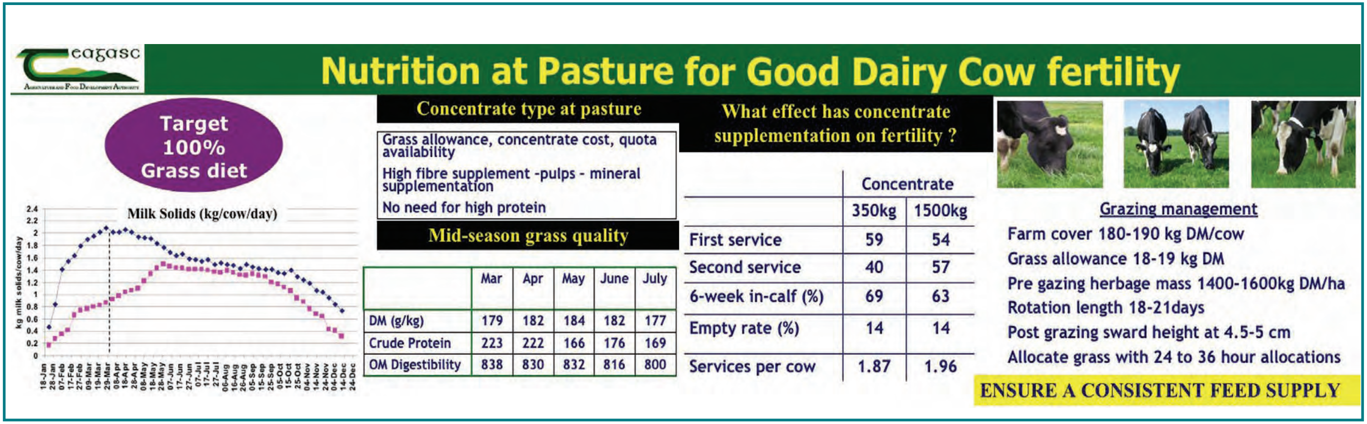
Benefits of increased use of high EBI AI this spring

Stand No. 5



Crossbreeding the Dairy Herd - a Real Alternative

Stand No. 6



Nutrition at Pasture for Good Dairy Cow Fertility

Stand No. 7

Key Efficiency Requirements in an Expanding Dairy Industry

- Milk quotas less restricted in the future
- Price support no longer available (fluctuation)
- Potential to expand dairy operations

Profit targets based on next most limiting resource
- Land
- Labour
- Capital
- Mindset

Successful farm system	*Average	Top Discussion Group	Moorepark Target
Mean calving date	16th March	1st March	14th February
Milk yield (kg MS/ha)	340	410	460
Stocking rate (LU/ha)	1.90	2.40	2.80
Milk production (kg MS/ha)	660	990	1,300
Margin €/kg MS	2.13	2.57	2.78
Margin €/ha	1,403	2,354	3,619

Efficiency Requirements

	Average	Moorepark Target	Profit Increase €/ha
Mean calving date and pattern	16th Mar	14th Feb	305
Replacement rate %	27	17	300
Stocking Rate LU/ha	1.8	2.8	800
Grazing season length (Days)	220	290	540

Highest profit achieved when grass utilisation is maximised

Calving date
- Breeding season
- Fertility sub-index
- Management

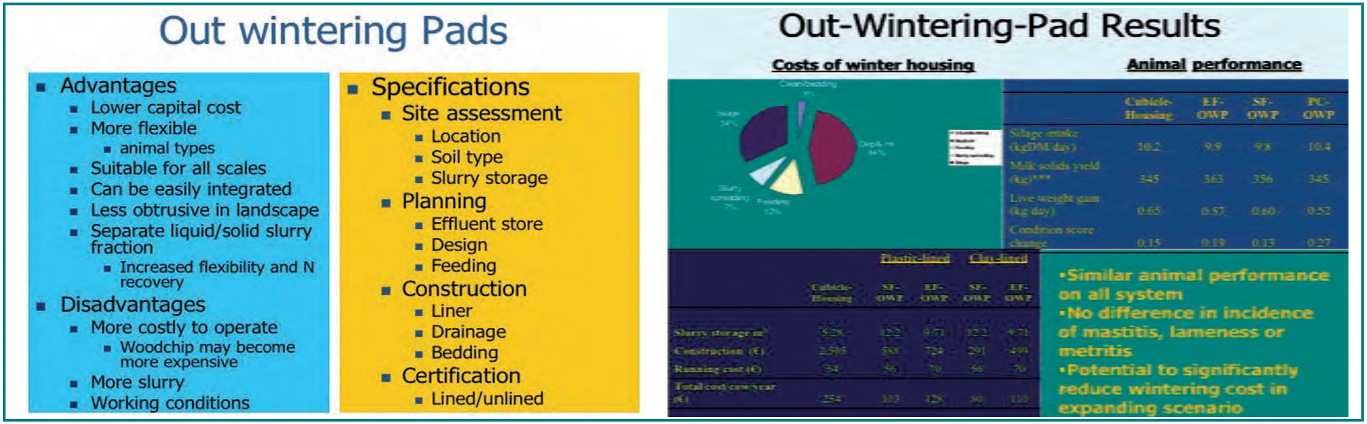
Replacement rate
- Fertility sub-index
- Condition score
- Submission rates

Stocking rate
- Milk quota purchase?
- Reseeding
- High EBI genetics

Grazing season
- Grass budgeting
- Infrastructure
- Autumn management

Key Farm Efficiency Factors Required for an Expanding Dairy Industry

Stand No. 8



Outwintering Pads-Option for Expansion

Appendices

Appendix 1. The 2007 milk production performance of the Holstein-Friesian genotype at Ballydague farm

Cow	SIRE	MGS	CALV_DATE	LACT	Yield	MS Yield	FAT %	PROT%	LACT%	Weight
2513	HRZ	DSB	23-Jan-07	1	5193	387	4.00	3.46	4.63	459
2563	NHS	DSP	24-Jan-07	1	5339	411	4.08	3.61	4.47	490
2578	KLA	ESZ	24-Jan-07	1	5242	377	3.95	3.24	4.52	451
2592	LOO	ESZ	14-Feb-07	1	5210	434	4.80	3.53	4.41	512
2597	LOO	ESZ	16-Feb-07	1	4981	375	4.07	3.45	4.36	461
2610	NHS	OYE	26-Jan-07	1	4512	340	4.04	3.49	4.46	470
2611	KLA	MBH	19-Jan-07	1	4956	333	3.58	3.14	4.64	443
2620	LBO	TKV	28-Jan-07	1	4800	346	3.88	3.32	4.79	459
4574	RUU	HRZ	14-Feb-07	1	4615	352	4.15	3.48	4.53	457
4576	RUU	GMI	23-Feb-07	1	4736	351	3.97	3.44	4.35	481
4579	RUU	UBO	28-Feb-07	1	5428	385	3.75	3.35	4.47	495
4580	RUU	ESZ	10-Feb-07	1	4128	305	3.98	3.42	4.51	490
8298	RUU		05-Feb-07	1	5055	402	4.58	3.37	4.40	492
4419	IRL	UBO	22-Feb-07	2	6789	476	3.67	3.34	4.56	528
6115	LTA	GMI	12-Mar-07	2	5109	387	4.15	3.43	4.41	471
6123	DXD	ELC	10-Feb-07	2	6378	507	4.41	3.54	4.52	562
6126	NWY	JVH	18-Feb-07	2	5452	410	4.03	3.49	4.56	564
6132	LYE	OYE	04-Feb-07	2	5290	400	3.89	3.67	4.57	537
8144	IRL	CAU	07-Mar-07	2	4763	357	4.01	3.48	4.65	471
8145	NWY	GMI	12-Feb-07	2	5359	384	3.77	3.39	4.48	490
8166	IRL	MAU	25-Mar-07	2	4370	334	4.19	3.45	4.49	496
8168	KOE	LLD	09-Mar-07	2	4416	314	3.85	3.25	4.43	500
8179	LTA	HRZ	16-Mar-07	2	5747	452	4.29	3.57	4.59	540
8183	KLA	DRH	06-Feb-07	2	5599	423	4.07	3.49	4.52	530
8193	LTA	ESZ	28-Mar-07	2	5229	363	3.57	3.37	4.68	522
8195	KLA	DRH	23-Apr-07	2	3885	298	4.33	3.34	4.38	560
8196	GMI		30-Jan-07	2	5403	456	4.74	3.70	4.33	521
8197	LTA	MFX	17-Feb-07	2	5565	372	3.46	3.23	4.40	505
8202	IRL	GTU	17-Feb-07	2	5791	423	3.85	3.46	4.59	519

Appendix 2. The 2007 milk production performance of the Jersey genotype at Ballydague farm

Cow	SIRE	MGS	CALV_DATE	LACT	Yield	MS Yield	FAT%	PROT%	LACT%	Weight
4482	ALD	JSH	28-Mar-07	1	3292	329	5.74	4.25	4.47	413
4490	WAS		17-Feb-07	1	4363	408	5.51	3.85	4.65	429
4495	PIU	ALF	29-Jan-07	1	3894	339	4.65	4.06	4.26	329
4496	WAS		27-Feb-07	1	3434	339	5.87	3.99	4.63	353
4550	LIF	GJA	12-Mar-07	1	3069	257	4.60	3.77	4.54	369
4551	DYR		05-Feb-07	1	3582	344	5.57	4.04	4.60	356
4552	CJY	JUD	12-Feb-07	1	4260	367	4.86	3.76	4.45	359
4434	VFF	GJA	13-Feb-07	2	3909	411	6.15	4.36	4.56	395
4436	MKU		25-Feb-07	2	4435	382	4.68	3.94	4.67	370
4437	MKU		31-Jan-07	2	4795	399	4.37	3.96	4.72	365
4438	PWC	GJA	05-Feb-07	2	4380	421	5.38	4.24	4.55	349
4479	ALD	BOX	17-Feb-07	2	4553	400	5.03	3.76	4.48	396
4480	ALD	HEU	05-Feb-07	2	4658	429	5.19	4.02	4.69	405
4481	ALD	BOX	03-Feb-07	2	4404	417	5.41	4.06	4.69	427
4484	ALD		26-Jan-07	2	4880	427	4.92	3.84	4.71	393
4485	ALD		21-Feb-07	2	3812	353	5.21	4.06	4.66	338
4486	WAS	JSH	17-Feb-07	2	4204	425	5.95	4.15	4.51	385
4487	ALD		04-Feb-07	2	4653	440	5.34	4.12	4.54	411
4488	ALD		24-Mar-07	2	3943	369	5.40	3.96	4.71	358
4492	WAS	CNJ	30-Jan-07	2	3386	319	5.23	4.19	4.54	392
4493	WAS		10-Mar-07	2	4461	401	5.10	3.90	4.51	389
4494	ALD		30-Jan-07	2	4621	432	5.37	3.98	4.72	397
4504	ODD	JSB	08-Feb-07	2	3709	340	5.42	3.74	4.52	352
4506	ODD	FYN	17-Feb-07	2	4053	383	5.49	3.96	4.71	359
4508	ODD	JSB	15-Mar-07	2	3954	346	5.08	3.68	4.52	356
4509	ODD	JSB	16-Mar-07	2	4132	401	5.86	3.84	4.53	378
4510	JSZ	JSB	31-Jan-07	2	4272	410	5.59	4.00	4.38	404
4513	JSZ	S035	03-Feb-07	2	4355	412	5.32	4.15	4.53	423
4514	SEA	JSB	09-May-07	2	3496	311	5.17	3.73	4.46	416
4515	S035	HIB	12-Feb-07	2	4104	414	5.86	4.23	4.45	428

Appendix 3. The 2007 milk production performance of the Holstein-Friesian Jersey crossbred genotype at Ballydague farm

Cow	SIRE	MGS	CALV_DATE	LACT	Yield	MS Yield	FAT %	PROT %	LACT %	Weight
4543	CJY	CWJ	31-Jan-07	1	5523	430	4.28	3.51	4.67	417
4545	RKV	SIA	26-Feb-07	1	4245	348	4.54	3.66	4.72	379
4546	MKU	MAU	01-Feb-07	1	4595	409	4.89	4.01	4.65	456
4547	CJY	MFX	08-Feb-07	1	4169	353	4.73	3.74	4.73	379
4553	WAS	DCJ	04-Mar-07	1	4319	352	4.56	3.58	4.59	436
4554	ALD	DRH	11-Feb-07	1	4789	394	4.42	3.80	4.69	482
4555	ALD	ESZ	24-Jan-07	1	4554	393	5.06	3.56	4.72	437
4557	ALD	LEW	05-Feb-07	1	3732	321	4.76	3.83	4.67	423
4440	ALD	EZG	17-Mar-07	2	5370	434	4.49	3.60	4.64	473
4442	CJY	DRH	08-Feb-07	2	5970	490	4.34	3.86	4.59	465
4443	CJY	ELC	23-Jan-07	2	4019	362	5.05	3.96	4.72	508
4444	CJY	SBM	29-Jan-07	2	4813	365	3.91	3.68	4.38	506
4445	CJY	ELC	19-Jan-07	2	5166	454	4.73	4.05	4.73	512
4448	WAS	BGI	18-Apr-07	2	4162	383	5.32	3.89	4.52	499
4449	WAS	DRH	13-Feb-07	2	4401	383	4.84	3.87	4.36	435
4450	WAS	GMI	28-Jan-07	2	6142	518	4.60	3.83	4.42	497
4451	WAS	SBM	16-Apr-07	2	4905	399	4.46	3.68	4.57	459
4516	TUD	MFX	04-Apr-07	2	4603	369	4.44	3.57	4.73	496
4517	TUD	MAU	22-Feb-07	2	5592	449	4.39	3.64	4.55	468
4518	TUD	MAU	04-Feb-07	2	5396	446	4.50	3.76	4.57	476
4521	WAS	MAU	03-Feb-07	2	4759	418	4.97	3.81	4.55	493
4522	WAS	ASI	04-Feb-07	2	4919	432	4.87	3.92	4.71	471
4523	WAS	SPW	09-Feb-07	2	5257	443	4.62	3.80	4.62	453
4524	WAS	MFX	16-Feb-07	2	4995	438	4.87	3.89	4.74	492
4525	WAS	UYC	31-Jan-07	2	5577	487	4.92	3.81	4.55	443
4526	WAS	CWJ	26-Jan-07	2	5641	478	4.75	3.72	4.58	481
4527	TUD	SIA	12-Feb-07	2	4251	356	4.63	3.74	4.59	442
4528	WAS	RFE	23-Jan-07	2	5292	464	5.15	3.62	4.60	450
4529	WAS	RFE	17-Jan-07	2	5539	480	4.85	3.82	4.57	430
4530	ALD	RFE	07-Feb-07	2	4357	393	5.15	3.86	4.76	481
4531	CJY		03-Apr-07	2	4403	359	4.59	3.56	4.76	499
4548	TUD	MAU	26-Feb-07	2	5237	409	4.23	3.58	4.79	481
4560	WAS	ELC	20-Jan-07	2	4853	457	5.45	3.96	4.63	483
4564	WAS	MWD	24-Feb-07	2	4882	407	4.64	3.69	4.68	431
4566	WAS	ELC	18-Apr-07	2	3990	358	5.24	3.73	4.45	507
4543	CJY	CWJ	31-Jan-07	1	5523	430	4.28	3.51	4.67	417

Appendix 4. The Spring 2008 ICBF Active Bull List

SIRE DETAILS			EBI Details		
RK	Code	Name	EBI	Rel	MILK
1	OJI	O-BEE MANFRED JUSTICE	€262	84	€114
2	RXO	RAMOS	€200	69	€44
3	GIO	GIBOR	€190	68	€70
4	RDU	RUUD 96	€169	74	€79
5	WUZ	WINDSOR-MANOR DURHAM ZEUS	€160	58	€47
6	CZO	BARNKAMPER CASSANOVA	€158	61	€98
7	TCZ	ALTA TUCANO	€152	68	€60
8	DVJ	DE VETHS JIRO	€149	81	€71
9	BWZ	ZANDER KEET	€146	91	€66
10	MCL	MASCOL	€146	59	€90
11	SBH	SRB BALLS HERITAGE	€145	91	€44
12	TIH	TITTENSER HYLKE	€144	90	€14
13	BZW	BAGWORTH BELLS PRIZEWINNER	€142	64	€100
14	LOO	LOOSTER	€139	92	€102
15	DEU	DONEEN MARLEEN HUGO	€139	81	€88
16	OPJ	OPAL JPS	€139	79	€56
17	NIZ	NORZ-HILL FORM WIZARD	€137	79	€14
18	CBH	CORBOYS HACKETT	€137	90	€54
19	BGW	BAGWORTH ELLISTON BELL	€137	78	€56
20	LUA	LAUDAN	€136	70	€49
21	TKY	SRC TIMOTHYS MANDRAKE	€136	63	€71
22	JIN	JOYCE MOUNTAIN	€133	63	€53
23	ATH	ATHOL ENIGMA	€131	86	€49
24	WLI	WHINLEA EMINENCE ELLIS	€131	61	€69
25	RMW	RIVERLOCK MOWING MACHINE	€131	60	€73
26	IVI	IJSSELVLIEDT BREAKOUT	€130	86	€70
27	MTZ	MILLSTREET MERCI 5	€128	81	€66
28	LPP	LAKESIDE VCP PAN PIPER ET	€127	59	€59
29	HZU	HAZAEL FATALS DUKE	€127	70	€69
30	BBJ	BAY-BOB AMATEUR	€127	68	€69
31	CXC	CREYHORST CLOR 2	€124	61	€67
32	LWK	LAWRENCES KABUL	€123	83	€39
33	WAU	WAIAU EMINENCE LOTUS	€123	85	€46
34	WAL	WALTERS JESTER	€123	84	€52
35	MHI	MOHAIR	€121	59	€41
36	CWJ	CALDWELLS JORDANAIRE	€121	94	€59
37	WUH	MARKWELL DURHAM RHYME	€120	65	€32

EBI Details				Availability		
FERT	CALV	BEEF	HEALTH	Avail	Price	Supplier
€93	€44	€0	€11	L	€49	NZG/EUROGENE AI
€131	€18	-€7	€14	L	€48	NZG/EUROGENE AI
€90	€23	-€6	€13	H	€27	DOVEA GENETICS
€54	€36	-€1	€0	H	€19	NCBC
€101	€15	-€8	€6	H	€19	NCBC
€35	€25	€1	-€1	H	€22	ALTA IRELAND
€74	€23	-€8	€2	H	€23	ALTA IRE/EUROGENE AI
€78	€20	-€12	-€8	L	€16	NZG/EUROGENE AI
€55	€40	-€7	-€9	H	€16	NZG/EUROGENE AI
€19	€30	-€6	€13	L	€45	DOVEA GENETICS
€97	€38	-€22	-€11	L	€16	NZG/EUROGENE AI
€116	€25	-€8	-€4	H	€20	DOVEA GENETICS
€13	€30	€9	-€10	M	€16	NZG/EUROGENE AI
€18	€29	-€9	€0	H	€22	NZG/EUROGENE AI
€51	€14	-€11	-€2	H	€19	NCBC
€58	€25	-€4	€4	H	€19	NCBC
€102	€11	€1	€9	H	€17	DOVEA GENETICS
€73	€30	-€12	-€8	M	€16	NZG/EUROGENE AI
€72	€12	-€9	€6	L	€14	NZG/EUROGENE AI
€61	€23	-€2	€6	M	€27	DOVEA GENETICS
€62	€26	-€15	-€8	M	€16	NZG/EUROGENE AI
€58	€20	-€1	€3	H	€18	NZG/EUROGENE AI
€87	€7	-€9	-€3	M	€16	NZG/EUROGENE AI
€55	€15	-€1	-€7	L	€16	NZG/EUROGENE AI
€51	€27	-€17	-€3	M	€14	NZG/EUROGENE AI
€60	€14	-€9	-€6	H	€22	ALTA IRELAND
€64	€6	-€10	€1	H	€19	NCBC
€61	€17	-€12	€2	M	€16	NZG/EUROGENE AI
€45	€13	€3	-€3	M	€16	NZG/EUROGENE AI
€40	€12	€5	€0	H	€24	NCBC
€60	€1	-€2	-€1	H	€19	NCBC
€79	€32	-€17	-€10	H	€16	NZG/EUROGENE AI
€69	€26	-€14	-€5	L	€16	NZG/EUROGENE AI
€56	€17	-€1	-€1	L	€16	NZG/EUROGENE AI
€69	-€24	€34	€0	H	€19	DOVEA GENETICS
€67	€28	-€25	-€9	H	€16	NZG/EUROGENE AI
€82	€16	-€15	€5	H	€20	NCBC

SIRE DETAILS			EBI Details		
RK	Code	Name	EBI	Rel	MILK
38	AAP	ART-ACRES PATRON SPOCK	€120	96	€62
39	SGV	STIRLING MAGLEY ANVIL	€120	63	€93
40	RJI	ROJAN HB BULLION	€120	63	€86
41	ILZ	ILIZAC	€119	90	€18
42	NVE	SANDHILL DELTA NEVADA	€119	66	€52
43	QUR	QG EUROPE ET	€119	90	€85
44	JWH	JACKWAYS HERNE	€118	88	€57
45	SLL	SALLYHALL TORELLO	€117	80	-€47
46	STX	DELTA STILIST	€117	73	€82
47	HKU	HAIKU	€116	81	-€3
48	LBO	LINDE BARTHO	€116	99	€57
49	DCA	DOVEA CAESER ET	€115	80	€14
50	HXU	D-K-DANDY HERCULES-ET	€115	66	€45
51	LCX	LANCELOT	€115	84	€80
52	BEI	BALLINFAD BERTIE 3	€114	89	€0
53	FOI	CARNATION FREEDOM CRI ET	€113	73	€21
54	RIP	REARY MC CARTHY ET	€113	64	€36
55	MSZ	MINISTER	€112	62	€13
56	KXI	KILLINGLEY MAXIE HUGO	€112	82	€46
57	KYC	KLASSIC MERRILL LYNCH	€112	81	€61
58	ETK	ETAREGGE K&L ELIAS	€110	84	€83
59	RIH	DE RITH CHASSEE	€109	66	€70
60	PAH	PACHT	€109	76	-€5
61	SLW	SRB LAWSONS KAIAPOI	€108	91	€36
62	RKO	REARY KEANO ET	€108	64	€27
63	BWK	BAGWORTH KEETS OAKLEY	€107	63	€71
64	LZP	COMESTAR LEMPIRE	€106	65	€24
65	TAE	TLEA MARTELL 4	€106	87	-€9
66	OVZ	OCEAN-VIEW ZENITH-TW	€106	86	€53
67	PNH	PICSTON SHOTTLE	€106	73	€56
68	GMI	GALTEE MERCI ET	€105	99	€67
69	LIX	LOBITO	€105	91	€86
70	MKX	MOERBEEKER HENDRIK	€104	60	€38
71	WGG	WELCOME GINO GIOVANNI ET	€104	92	€68
72	MEU	DOVEA MILLENIUM ET	€103	76	€28
73	RTZ	DOVEA REMBRANDT	€103	62	€16
74	JYX	JOYLAN ROXELL	€102	66	€51
75	KLA	KLASSIC LANCE DESTINY ET	€102	91	€33

EBI Details				Availability		
FERT	CALV	BEEF	HEALTH	Avail	Price	Supplier
€48	€19	-€11	€2	H	€23	NZG/EUROGENE AI
€27	€10	-€6	-€4	M	€16	NZG/EUROGENE AI
€14	€34	-€9	-€6	M	€14	NZG/EUROGENE AI
€86	-€6	€19	€2	H	€19	DOVEA GENETICS
€56	€19	-€5	-€3	H	€20	NCBC
€5	€33	-€2	-€3	H	€19	NCBC
€70	€22	-€17	-€14	L	€16	NZG/EUROGENE AI
€150	€29	-€9	-€6	H	€15	DOVEA GENETICS
€18	€25	-€6	-€2	H	€22	NCBC
€100	-€10	€24	€6	M	€19	DOVEA GENETICS
€41	€25	-€13	€6	H	€16	NCBC
€95	€15	-€5	-€4	H	€16	DOVEA GENETICS
€59	€13	-€7	€4	H	€15	DOVEA GENETICS
€21	€13	€5	-€4	M	€27	NZG/EUROGENE AI
€91	€32	-€7	-€3	H	€19	NCBC
€73	€21	-€9	€6	H	€16	DOVEA GENETICS
€58	€28	-€5	-€5	H	€17	DOVEA GENETICS
€73	€27	-€4	€4	H	€20	DOVEA GENETICS
€50	€25	-€9	€0	H	€19	NCBC
€33	€30	-€14	€1	H	€20	DOVEA GENETICS
€13	€16	-€4	€2	L	€16	ABS IRELAND
€40	€10	-€8	-€3	H	€24	NCBC
€105	€5	€10	-€7	M	€22	NZG/EUROGENE AI
€67	€20	-€12	-€2	L	€16	NZG/EUROGENE AI
€66	€24	-€3	-€6	M	€17	DOVEA GENETICS
€23	€16	€7	-€10	M	€14	NZG/EUROGENE AI
€64	€20	-€11	€10	H	€20	NCBC
€99	€21	-€14	€8	H	€19	NCBC
€42	€11	-€13	€13	M	€28	NZG/EUROGENE AI
€33	€10	-€8	€15	L	€70	ABS IRELAND
€23	€22	-€5	-€2	M	€19	NCBC
-€5	€28	€0	-€4	H	€17	DOVEA GENETICS
€35	€36	-€2	-€3	M	€19	NCBC
€25	€24	-€9	-€4	L	€16	ABS IRELAND
€83	€14	-€10	-€11	H	€16	DOVEA GENETICS
€86	€18	-€14	-€3	H	€16	DOVEA GENETICS
€47	-€7	€11	€0	M	€23	NZG/EUROGENE AI
€56	€31	-€19	€2	L	€14	NZG/EUROGENE AI

Notes