

Putting Genomics into practice on the farm

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Farm Details

I farm in partnership with my father Michael and farm manager Tom Carr who has been with us for almost 30 years. The farm is situated 10 kilometres north of Cork City at an altitude of 600 feet above sea level.

Farm Stats:

- Grazing block = 66ha
- Farm supplies Dairygold Co-op
- Cow numbers: 125
- Herd EBI = €99
- Heifer calves 0-1 yrs = 43 (EBI €144)
- Weanlings 1-2 yrs = 48 (EBI €140)

We are currently in the process of switching our milk production system from Spring/Autumn calving to 100% Spring. The herd average is 1,500 gallons at 4.34% Fat and 3.57% Protein.

Herd Breeding Policy

Our main focus over the last few years has been on breeding for fertility while maintaining our good milk constituents. We always use a team of 8-10 bulls to as to improve the overall reliability especially when using the lower reliability Genomic bulls.

The top EBI heifers are kept each year and achieve a ~21% replacement rate and the surplus are sold as incalf heifers.

The criteria for the team of bulls used in 2011 were as follows:

Fertility Sub-Index	> €110
Calving Interval	> - 5 days
Milk Sub-Index	> €70
Milk Kg	> 180kg

Fat + Protein Kg > 25kg

Fat + Protein % Positive

We have been using bulls from the GEN€ Ireland progeny test programme since its inception in 2005. Three of our own bulls have been selected for testing over the years and one of them, Parkduv Mark (PKK) has gone on to become a proven bull with an EBI of €216.

Using Genomics

Since the introduction of genomics in 2009, we have been selecting a team of six genomic bulls (See Table 1) for use on the cows.

2009	Sire Name	EBI when selected €	Current EBI €	Difference €
HZL	HILLSDALE LIONEL	188	168	-20
CZR	CLONTEENS RENALDO	173	105	-68
UPH	MARS UPHILL	162	177	15
BYJ	BALLYDEHOB JUSTICE	189	152	-37
GYK	GARRYMARTIN KEET	184	193	9
OTH	MERRYWELL ATHOL	185	177	-8
	Average EBI of Team	180	162	-18
2010				
BHZ	BALLYBROOK ASHLING JUSTICE	240	187	-53
BZR	BALLYBRIDE DANO	229	225	-4
NRB	HENDEL RAMOS BERLAND	203	166	-37
PKK	PARKDUV MARK	183	216	33
SOK	(IG) SUNNYBANK OMAN	268	257	-11
UPH	MARS UPHILL	217	177	-40
	Average EBI of Team	223	205	-19

Table 1: Team of GS Bulls used in 2009 & 2010

On average the teams have dropped €18-€19 from what their EBI was when selected to what they are today. The latest research work, carried out by ICBF, has shown that the Genomic

proofs were over-estimating the milk sub-index by €9.36. When you factor this in to the data in the table above, the actual drop is about €10 which is very reassuring.

Last Spring we had five bulls genomically tested by AI companies with one being purchased as a potential for the 2012 G€N€ Ireland programme. Table 2 below shows the range of genomic versus parent average EBI. One bull increased by €57 while another dropped by €44 highlighting the extremes that occur when genotyping.

Bull Tag	Sire	Genomic EBI	Genomic Rel%	Parent Average EBI	PA Rel%	Difference from PA
IE151013721406	OJI	152	47	186	25	-34
IE151013711438	RUU	170	49	161	28	9
IE151013771419	NRB	171	48	141	24	30
IE151013751458	BHZ	102	49	146	29	-44
IE151013741465	BZR	210	46	153	30	57
Average		161	48	157	27	4

Table 2: Genomic Evaluation Results for 2011 Bulls

The four bulls that didn't make the cut for the G€N€ Ireland are currently being reared for sale as stock bulls this spring. Having these bulls genotyped should make it easier to sell this spring given the extra reliability of the EBI.

Genomic Test for Females

Last Spring ICBF undertook a pilot project to genomically test female young stock. Five bull breeder herds including our herd were selected with a total of 300 females tested. We took hair samples from 48 of our calves (10 autumn 2009 & 38 spring 2010). These samples were sent to Geneseek Neogen in the US for DNA extraction and the subsequent DNA sequence was analysed by ICBF. A genomic EBI was calculated based on the SNP chip¹ and this was then blended with the calf's parent average EBI to generate a Genomic EBI.

This data was then put into a farmer friendly report. It shows the parent average (PA) and blended genomic proof for each of the 16 traits that make up the EBI. You can clearly see how each of the animal's traits differs between the PA and genomic evaluation.

¹ **SNP genotyping** is the measurement of genetic variations of [single nucleotide polymorphisms](#) (SNPs) between members of a species.

Our Results

Before the trial, the group of 48 calves had an average EBI of €123 with a reliability of 32%. The range in EBI within the group went from €86 to €197 (see Table 3).

The result of the trial showed an increase of €7 in the average EBI of our calves along with an increase of 23% in EBI reliability. However within the group there was a wide variation, with one calf increasing by €96 and another calf decreasing by €82.

Number of Heifers 48			
	Parent Avg.	Genomic *	Difference
EBI	€123	€130	€7
Reliability %	32%	55%	23%
Max. EBI	€197	€236	€38
Min. EBI	€86	€36	-€50
* Includes deduction of €9.36 for over-estimate of Genomic Milk Sub-Index			

Table 3: Parent Average V's Genomic EBI

The results clearly identified extremes with a total of 22 animals going down in EBI by an average of -€24 and 26 increasing in EBI by an average of €33.

Financial Gain

This year we plan to sell 22 of these incalf heifers and calve down and keep the remaining. Of the 22 we intend selling, 10 of them would have been kept had we not had the Genomic EBI and just relied on the parent average. Similarly we would have sold 10 heifers that we should have been keeping.

The average EBI of the 10 heifers we now intend selling is €104 while the average of the ones we are now keeping is €154. This is an increase of €50 per animal. The EBI is actually showing half the animals own actual performance, therefore the actual increase is €100. When you multiply this by on average 4.5 lactations you get at total benefit of €4,500 over the ten animals.

Had the cost of genotyping these 48 heifers been €30, which is what it is currently, the total bill would have been €1,440. Therefore you can see there is at least a 3:1 return on investment from having this information available to us at an early stage.

Other benefits to genotyping

Some of the other benefits of genomic testing are parentage checks. Last year I paid €40 to Weatherbys to identify the correct sire of a calf that we had no insemination record for. Having a genotype will allow a sire check to be done at no extra cost. It will also pick up any incorrectly recorded sires that can happen occasionally.

The more animals that are genomically tested the greater chance of identifying dams that would be suitable as bull mothers and can be subsequently contract mated.

The option of selling high EBI heifers to the 'Next Generation' herds also may be of benefit to some farmers but I would be reluctant myself to sell my best!

Genotyping females, that go on to calve down and milk, will be used in the reference population for genomics in the future national herd. This will increase the reliability of the genomic evaluations for both females and males and the industry and farmers will benefit from this.

Summary

- Continue to use G€N€ Ireland bulls and also a team of 5-6 genomic bulls as part of our breeding programme.
- Continue to focus on improving fertility while maintaining our solids
- Genomically test all our female calves each year. Hopefully this can be integrated into the health test screening programme which will become mandatory next year.
- Genomically test our top four or five bulls each year and sell as yearling stock bulls.
- Contract mate our top cows to AI bulls recommended by ICBF/Teagasc.