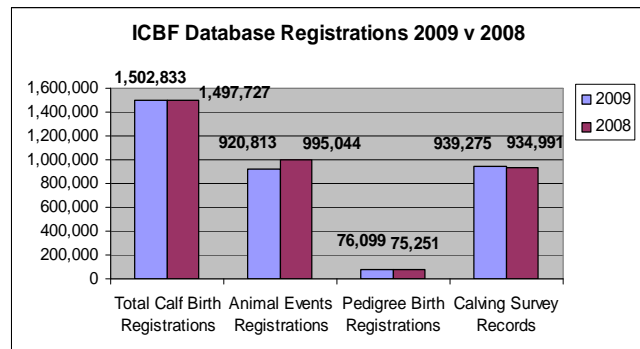
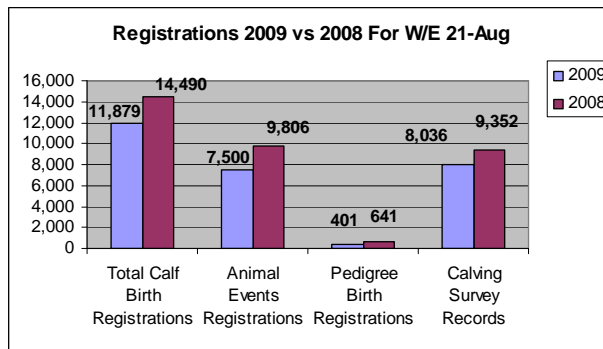


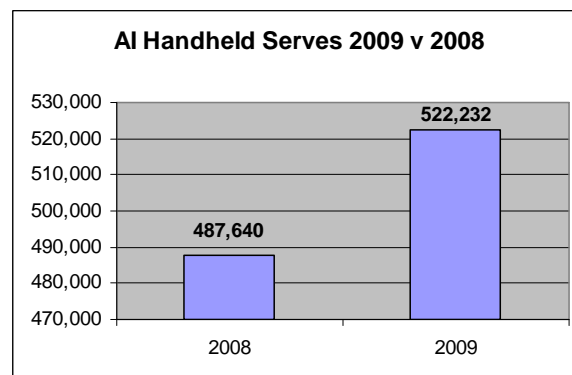
## 1. Important Dates

- ✚ **Interbull & Interbeef Meetings** – Fri. to Sun. 21<sup>st</sup> to 23<sup>rd</sup> August. In Barcelona before EAAP meeting.
- ✚ **Beef Breeding Consultation Meeting** – Tuesday 1<sup>st</sup> September, Abbeyleix Manor Hotel.
- ✚ **EBI €100 Discussion Group Open Day** – Tuesday 8<sup>th</sup> September, Paddy O’Leary’s Farm, Conna, Co. Cork. This open day is being hosted by the Blackwater Discussion group and features the herd with the highest EBI in Ireland. This herd has bred many GEN€IR€LAND® bulls in the last few years. **Every farmer and breeder with an interest in the direction of Irish cattle breeding should make the effort to attend this very important event.**
- ✚ **ICBF & Sheep Ireland Board Meetings** – Thursday 17<sup>th</sup> September, Highfield House, Shinagh, Bandon, Co. Cork.
- ✚ **GEN€IR€LAND® Tully Open Day** – Saturday 10<sup>th</sup> October, Tully, Co. Kildare.
- ✚ **GEN€IR€LAND® Dairy Conference** – Thursday 29<sup>th</sup> October, Corrin Mart, Rathcormac, Co. Cork.

## 2. Database



- ✚ The 2009 suckler forms (pre and post weaning) continue to go out to farmers. In relation to 2008 born calves, the number of calves with a meal feeding introduction has increased to 867,000, with just over 737,000 of these having been weaned.
- ✚ The revamp of the Milk Recording system is progressing. Testing within the milk recording organisations continues this week.
- ✚ In conjunction with the finalisation of the milk recording solution, a number of other developments are taking place that will allow the migration of all users to a completely web-based front end, and the removal of the need for the Wide Area Network (WAN). The herdbooks will be the first to move off the WAN, before the end of August.
- ✚ Work has begun on the new Beef Discussion Group Reports.
- ✚ Design of a new on-line application for AI companies to manage their interaction with ICBF on bull codes is continuing. We expect this to be live at the end of September.
- ✚ The graph shows Inseminations recoded on AI Handhelds in 2009 compared with 2008. There are more



technicians using the handhelds in 2009 than there were in 2008, so even though the number of inseminations recorded is up, it looks like the overall inseminations for the season will be down.

### 3. Interbull & Interbeef

- ✚ Over this weekend the ICBF Genetics team are participating in a series of Interbull and Interbeef meetings in Barcelona. These meetings coincide with the annual EAAP (European Assn of Animal Production) meeting.
- ✚ The Interbeef Working Group are discussing plans for the roll-out of a commercial international genetic evaluation service for beef cattle and breeds. A successful pilot evaluation for weaning-weight in Limousin & Charolais breeds has been completed and the results are currently being considered. This is the first proof-of-concept and a clear demonstration that the main practical problems (identifications, data sharing etc) have been solved. A Strategic Plan for Interbeef is being developed and will be one of the main outcomes of the meeting.
- ✚ Interbull is holding a two-day open scientific meeting which includes presentations from Thierry Pabiou (use of mechanical grading to predict cuts), Ross Evans (across breed evaluations for docility) and Francis Kearney (Irish experience with genomic evaluations).
- ✚ The Interbull business meeting will deal with a range of service issues including the development of international evaluations to incorporate genomic data.
- ✚ These meetings are a vital forum of ensuring the ICBF team are fully conversant to world-wide developments in dairy and beef genetic evaluations.

### 4. Genetic Dairy & Beef Evaluations

- ✚ The proofs for the next genetic evaluation run are currently being uploaded to the database. Following some larger than expected changes for some bulls for dairy calving interval and survival we have decided to use the proofs from the previous evaluation while we investigate the issue further. We hope to have proofs available for AI bulls for Wednesday of next week as we will be attending the Interbull Meeting in Barcelona until Tuesday.
- ✚ An analysis of the first group of GS bulls to receive a progeny proof has been conducted and results will be presented at the Interbull meeting. The correlations for 35 2006 test bulls between their GS proof and their proof based on progeny was 64% for milk, 51% for fat and 59% for protein. These are all higher than the correlations between the daughter proof and the parent average proof. The complete document to be presented at Interbull is at the bottom of the update.

### 5. Sheep Ireland - LambPlus

#### Texel Sale

- ✚ The Irish Texel Sheep Society held their Premier sale in Roscrea Livestock Mart on Saturday the 15<sup>th</sup> of August last.
- ✚ Top price at the sale was received for a Ram owned by Liam & Eamonn Walsh, Ballina, Co.Mayo. He was 4 Stars for Production and 5 Stars for Maternal.
- ✚ A full report of the sale will follow next week.

#### Lambplus

- ✚ Evaluations for females have now been generated and sent out to Breeders.



- ✚ A meeting to give an update on the evaluations as well as receive feedback on how they have been received was held in the Maldron Hotel, Portlaoise, last Tuesday at 2pm.
- ✚ Excellent Discussion & Debate took place covering many aspects of the new Sheep Breeding Initiative. 3 main areas that came out of the meeting as priorities are:
  1. Improvement of current Web Screens & Development of new Screens.
  2. CPT Establishment & Ram Acquisition.
  3. Clear Communication of Trait Recording Protocol for Breeders

### MALP Flocks

- ✚ The compilation of MALP files for the evaluation system is nearing completion.
- ✚ Once this work is done it will be put through a Genetic Evaluation run.
- ✚ Final Weighings are now taking place also.

### CPT Flocks

- ✚ The finalisation of what flocks to select is ongoing.
- ✚ The high standard of the applicants applying for CPT positions has made the selection task very difficult.



## 6. HerdPlus

### Beef

- ✚ The latest Beef Carcass Reports are now available on the web site (see attached sample)
- ✚ Over 2000 herds are now signed up to HerdPlus Beef with 87% choosing to receive their data from the HerdPlus web site.

### Dairy

- ✚ Testing of “Final Fertility Report” is almost complete and will be added to Fertility Section early next week.

## 7. Milk Recording

### National Milk Recording Results by County - 10 day Period 11/08/09 to 21/08/09.

	No. Herds Recorded	No. Cows Recorded	Average Herd Size	Average 24hr Milk kg/Cow	Average Fat %	Average Protein %	Average F + P kg	Average SCC
CARLOW	9	662	74	21.2	3.67	3.29	1.48	478
CAVAN	22	1,093	50	21.7	3.59	3.29	1.49	438
CLARE	25	1,534	61	19.6	3.60	3.31	1.35	252
CORK STH	219	14,327	65	19.2	3.98	3.45	1.43	310
CORK NTH	220	15,292	70	19.7	3.97	3.49	1.47	289
DONEGAL	10	769	77	20.9	3.96	3.45	1.55	356
DUBLIN	2	70	35	27.6	3.67	3.48	1.97	446
GALWAY	14	1,357	97	19.7	4.20	3.47	1.51	313
KERRY	86	5,446	63	19.2	3.84	3.34	1.38	341
KILDARE	12	621	52	20.1	3.99	3.45	1.50	349
KILKENNY	27	2,079	77	17.2	3.98	3.52	1.29	328
LAOIS	29	2,196	76	17.0	4.42	3.48	1.34	366
LEITRIM	3	148	49	20.4	3.95	3.31	1.48	278
LIMERICK	69	5,119	74	19.6	3.71	3.37	1.39	344
LONGFORD	8	425	53	16.8	4.01	3.32	1.23	465
LOUTH	20	1,541	77	19.9	3.47	3.40	1.37	287
MAYO	19	980	52	23.3	3.60	3.44	1.64	416
MEATH	49	3,595	73	20.2	3.68	3.40	1.43	468
MONAGHAN	35	1,802	51	18.6	3.82	3.39	1.34	390
OFFALY	36	2,513	70	19.2	3.96	3.43	1.42	274
ROSCOMMON	4	282	71	24.5	3.73	3.32	1.73	310
SLIGO	4	230	58	22.7	3.41	3.54	1.58	362
TIPPERARY NTH	45	3,228	72	18.3	3.94	3.51	1.36	342
TIPPERARY STH	73	5,823	80	17.3	3.99	3.50	1.30	278
WATERFORD	37	3,917	106	17.5	4.20	3.60	1.37	311
WESTMEATH	7	428	61	23.2	3.93	3.40	1.70	340
WEXFORD	54	4,332	80	17.3	3.99	3.52	1.30	382
WICKLOW E	14	903	65	18.0	3.61	3.41	1.26	379
WICKLOW W	8	540	68	20.2	3.43	3.35	1.37	339
	No. Herds Recorded	No. Cows Recorded	Average Herd Size	Average 24hr Milk kg/Cow	Average Fat %	Average Protein %	Average F + P kg	Average SCC
National	1,160	81,252	70	20.0	3.84	3.42	1.45	353

### National Milk Recording Averages by Province - 10 day Period 11/08/09 to 21/08/09.

Provincial	No. Herds Recorded	No. Cows Recorded	Average Herd Size	Average 24hr Milk kg/Cow	Average Fat %	Average Protein %	Average F + P kg	Average SCC
Munster	774	54,686	71	18.8	3.86	3.45	1.37	308
Leinster	275	19,905	72	19.8	3.71	3.42	1.42	377
Connacht	44	2,997	68	22.1	3.81	3.42	1.60	336
Ulster	67	3,664	55	20.4	4.27	3.38	1.56	395

National Milk Recording Statistics - Herds, Cows & EDIY 21/08/09						
Milk Recording Organisation	Total Herds Recorded YTD 21/08/09	No. EDIY Herds YTD 21/08/09	% Herds EDIY	Total No. Cows Recorded YTD 21/08/09	No. EDIY Cows YTD 21/08/09	% Cows EDIY
Progressive	2,062	838	41%	173,407	70,238	41%
Dairygold	1,500	560	37%	115,206	45,191	39%
Kerry	888	66	7%	61,822	4,208	7%
SWS	856	114	13%	61,040	8,781	14%
Tipperary	135	55	41%	10,998	4,890	44%
Arrabawn	141	116	82%	11,806	10,024	85%
Connacht	138	48	35%	9,171	3,167	35%
Donegal	32	32	100%	3,687	3,687	100%
<b>Total</b>	<b>5,752</b>	<b>1,829</b>	<b>32%</b>	<b>447,137</b>	<b>150,186</b>	<b>34%</b>

Recorded Cows by Milk Recording Organisation - Year on Year Comparison			
Milk Recording Organisation	YTD 2008 Cows Recorded 01/01/08 - 21/08/08	YTD 2009 Cows Recorded 01/01/09 - 21/08/09	2009 vs 2008 Year on Year Difference (%)
Progressive	176,838	173,407	-2.0%
Dairygold	121,016	115,206	-5.0%
Kerry	78,266	61,822	-26.6%
SWS	60,974	61,040	0.1%
Tipperary	12,913	10,998	-17.4%
Arrabawn	12,656	11,806	-7.2%
Connacht	9,685	9,171	-5.6%
Donegal	4,620	3,687	-25.3%
<b>Total</b>	<b>476,968</b>	<b>447,137</b>	<b>-6.7%</b>

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# Beef Carcass - Female Summary Report

Herd Owner: **SAMPLE**  
 Herd Number: **IE1234567**  
 Report Period: **01-Jul-2008 to 30-Jun-2009**  
 Date Printed : **20-AUG-2009**

**Overall Summary - relative to all beef females, progeny of suckler beef cows, slaughtered in the period 1st Jul 2008 - 30th Jun 2009.**

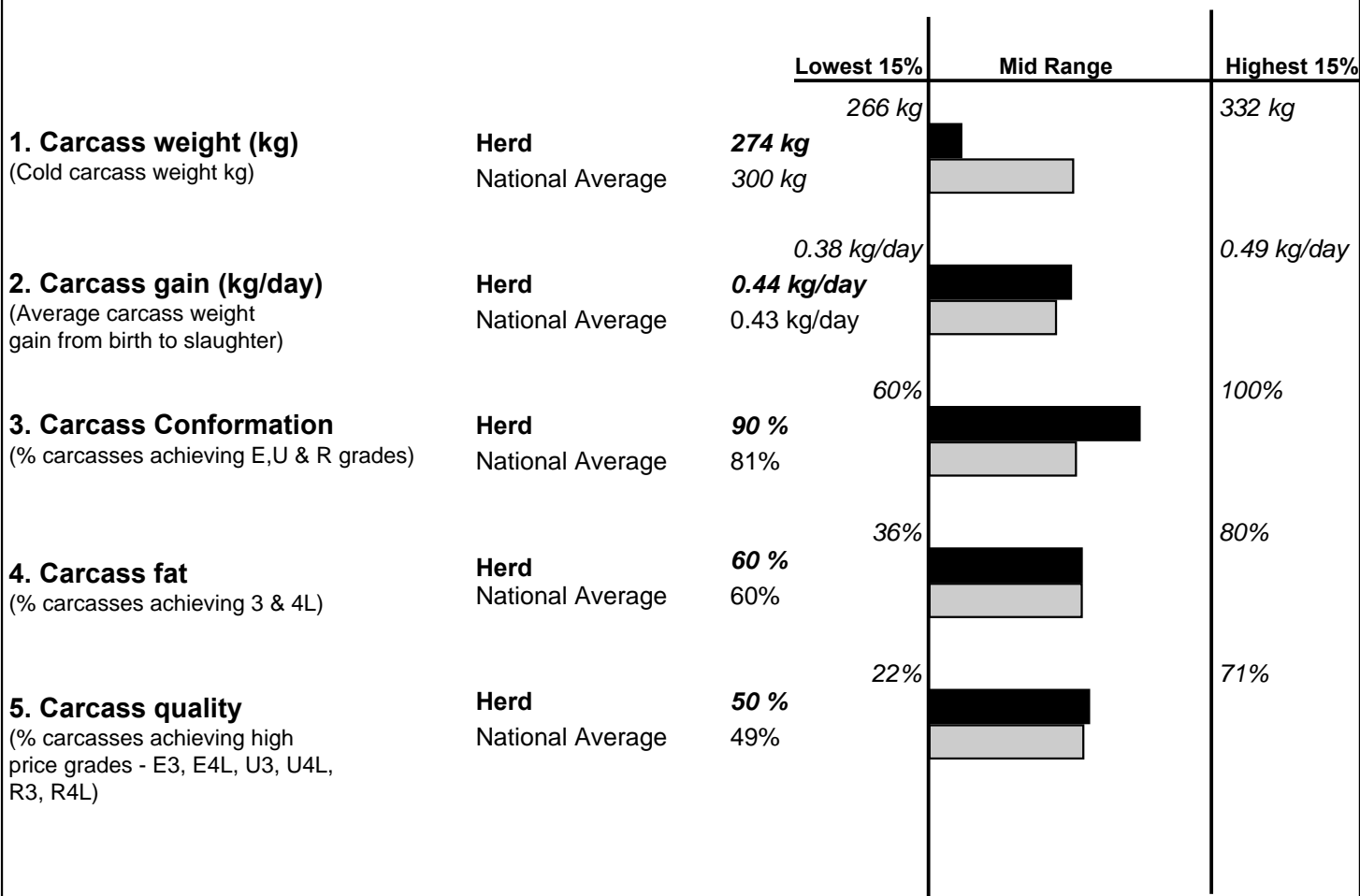
*i. Farm & slaughter details*

**Total females slaughtered**      **10**  
**Average age at slaughter**      **20.6 mths**  
**Start slaughter date**            **19-Aug-2008**  
**Range in age at slaughter**      **18 - 26 mths**  
**End slaughter date**              **09-Mar-2009**  
**Beef Cows**                          **53**

*ii. Carcass breakdown*

	E	U	R	O	P	Total
1			1			1
2			1			1
3			4	1		5
4L			1			1
4			2			2
4H						0
5						0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>9</b>	<b>1</b>	<b>0</b>	<b>10</b>

**Slaughter Statistics - relative to all beef females slaughtered in period. National summary statistics are based on 2013 herds with more than 10 females slaughtered during the period. Average age at slaughter for these animals was 23.2 mths.**



**Notes: The report contains information on beef females slaughtered from herds involved in the ICBF cattle breeding database. Only animals that are the progeny of suckler beef cows have been included on the report.**

# Implementation and Uptake of Genomic Evaluations in Ireland

Francis Kearney<sup>1</sup>, Andrew Cromie<sup>1</sup>, and Donagh P. Berry<sup>2</sup>.

<sup>1</sup>*Irish Cattle Breeding Federation, Highfield House, Bandon, Co. Cork, Ireland.*

<sup>2</sup>*Teagasc, Moorepark Dairy Production Research Centre, Fermoy, Co. Cork, Ireland*

## 1. Introduction

Genomic selection in Holstein-Friesian dairy cattle was launched in Ireland in February 2009. The objective of this document is to outline the implementation and the uptake of genomic estimated breeding values (GEBVs) in Ireland for Spring 2009. We also outline the results of the first group of Holstein-Friesian bulls that were selected on GEBVs compared to their progeny test proofs obtained in the August 2009 evaluations.

## 2. Estimation of GEBVs

A detailed document on the estimation of GEBVs for Ireland was reported by Berry et al.,(2009a). Briefly, the training population was made up of just over 1,000 Holstein-Friesian bulls, genotyped using the Illumina Bovine50 Beadchip. The majority of the bulls were genotyped using funds secured through competitive funding from the Irish Department of Agriculture, Fisheries and Food (DAFF) and the remaining genotypes were provided by international collaborators in New Zealand, the UK and Poland. Direct genomic values (DGVs) are estimated in Ireland using mixed models equations by replacing the traditional numerator relationship matrix with a genomic relationship matrix as outlined by VanRaden (2008).

The dependent variable included in the genomic evaluation are the deregressed traditional EBVs of the animal as outlined by Berry et al. (2009a). Genomic EBVs (GEBVs) are the combination of the DGVs and the traditional EBVs. This blending procedure is done because not all animals in the pedigree are genotyped (genotypes of no females are currently included in the genomic evaluation) and therefore not all

information is included in the genomic evaluation. To test the accuracy of genomic selection using Irish data only genotyped sires with at least 40 milking daughters in Ireland were retained (n=803). This dataset was divided into sires born prior to 1997 (n=596; training dataset) and sires born after 1996 (n=207; validation dataset). DGVs and GEBVs were predicted for the validation dataset. The accuracy of genomic selection was quantified by the mean bias and RMSE as well as the correlation and regression of actual EBVs (as estimated using the traditional methods) on genomic EBVs. Correlations were in the region of 0.6 to 0.8 for most traits (Berry et al, 2009a) and the results were broadly in line with that achieved by other countries taking cognizance of the smaller training population size in Ireland.

## 3. Implementation of GEBVs

The top 75 bulls for total merit index in Ireland, the EBI, with a minimum of 2000 doses of semen available and with a minimum reliability of 58% are published twice per year in the Irish active bull list. After consultation with representatives from the Irish dairy industry it was decided to publish GEBVs of individual bulls without progeny on the list of active bulls for the Spring 2009 breeding season. Breeding organizations were supplied with the components that made up the GEBVs (i.e., parental average EBVs, and DGVs) as well as the weighting on genomic information within the GEBVs.

Bulls included on the active bull list had to have sufficient progeny born to have a reliability for direct calving difficulty of  $\geq 50\%$  in the country of origin. Also the reliability of the GEBV for EBI, had to be  $\geq 35\%$ . In 2008, prior to the introduction of genomic evaluations, each sire on the active bull list had to have a reliability of EBI of  $\geq 58\%$ .

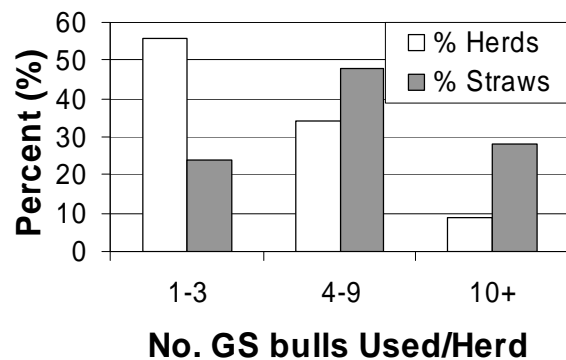
The effect of relaxing the threshold on reliability on the average genetic merit of sire on the active bull list can be seen in Table 1. Compared to 2008, the average EBI of the bulls on the list was higher, but the reliability was lower. In addition younger sires replaced sires that had occupied the list for many years, but the number of bulls with daughters in Ireland decreased. Also, there is a marked increase in the average EBI from 2008 to 2009 compared to increases seen since 2004.

In order to reduce the risk associated with farmers using just the top genomically selected bulls, DAFF placed a limit on the number of straws to be sold from any one genomically selected bull. The limit for maximum number of straws was based on reliability of the EBI of the sire with the highest limit set at 10,000 doses for sires with >50% reliability for EBI. In addition the recommendation to farmers was to use a minimum of 4 to 5 of these bulls during the breeding season. This message to farmers was strongly advocated by all industry partners and was reiterated throughout the breeding season.

AI companies offering fresh semen rotated the bulls used each day to ensure farmers got a greater selection of bulls and thus the risk was spread. The bulls that were offered were mainly test bulls awaiting a progeny proof as well as foreign bulls that that were genomically selected in Ireland through access to their genotype. Initially the publication rules were that a bull only got a GEBV where no EBVs based on daughter information were available. Currently we use GEBVs until a bull passes 70% reliability for production and 50% for fertility. Once we are satisfied the technology is working satisfactorily we will publish GEBVs only. Bulls were flagged on the active bull list and the website as having genomic information included (GS). Proven bulls were differentiated into the bulls that had daughter proofs with Irish daughters (DP-IRL), or daughter proofs with no Irish daughters (DP-INT). A sample of the active bull list is given in Table 2.

#### 4. Uptake of GS evaluations

An analysis of the uptake of genomic selection was conducted on 349,000 AI insemination records collected via technician handhelds from January to June 2009. Do-it-yourself (DIY) inseminations, which account for about a third of all inseminations, generally are not recorded on the database by farmers until the end of the year and were thus not available for inclusion in this exercise. The usage for the DP-IRL bulls was the highest at 37% of inseminations with GS bulls accounting for 34%, and DP-INT bulls 29% (Table 3). The average number of serves per bull was much higher for GS bulls than the DP bulls (either DP-INT or DP-IRL) as fewer bulls were available. The mean number of DP proven bulls used per herd was 3 and 2.7 for bulls with Irish daughters and international daughters respectively. The mean number of GS bulls was higher at 4. The maximum number of bulls used was similar across the 3 categories and a high of 30 GS bulls used in one herd alone was achieved. A closer look at the distribution of GS bulls reveals that 56% of herds used fewer than the recommended 4 bulls however only this only accounted for 25% of the total GS straw usage (Figure 1). For example, 31% of herds used just one GS bull. One reason for this is that farmers wanted to use only the best GS bulls and did not want to sacrifice lower EBI values for reduced risk. However, many of the herds that used only 1 GS bull also used other bulls



**Figure 1.** The distribution of GS bull inseminations (n=119,000) for Spring 2009 by herd and the number of straws.



The distribution of GS bulls suggests that many farmers, especially those who were buying larger numbers of GS bulls, did in fact use at least 4 bulls as recommended to reduce the risk of using only the top one or two bulls. Farmers that used only GS bulls accounted for only 6,500 of the total inseminations with most of these in teams of at least four bulls. The very positive uptake of GS bulls can be attributed to the difference in genetic merit between these bulls and the daughter proven bulls. The top two proven bulls had limited availability and were expensive therefore their use was low. The weighted average EBI of the GS bulls was €69, more than one standard deviation (€62) ahead of the DP-IRL bulls. The average across all three groups of bulls used in 2009 was €38 more than the bulls used in 2008.

## 5. Comparison of GEBV and EBV

The young bulls entering the national progeny test programme in 2006 were marketed in the Spring 2009 programme as GS bulls. These bulls had daughters who calved for the first time this spring and we now have obtained the first accurate progeny test proofs for milk production for these bulls following the August 2009 proof run. At this point in time the results are based on records in progress for these daughters and are based on bulls with a reliability of >70% for production traits. Table 4 compares the correlation of the daughter proven EBV to the DGVs, the GEBVs, and the parent average proof for 35 bulls who received a progeny test proof in the August 2009 evaluation. The correlations between parent average and daughter proof are consistently lower than those of the GEBV and the DGV. This is especially true for fat yield which may be a function of the DGAT1 gene (Berry et al., 2009b) as well as other genes. The differences in means are also given in Table 4. Currently they are over predicting each of the traits with the DGVs closest to the current EBVs. At this stage the DGVs are the best predictors of progeny performance however one must recognize the limitations of this analysis due only 35 bulls being included in this comparison, the average reliability of the sires is 80%, and the daughter records are not completed lactation records.

However, it is encouraging that the correlations obtained for GEBVs are consistent with the findings from the validation and that the correlations are generally higher than if parent average proofs had been used.

## 6. Future Work

There are several areas of future research identified for the short term and these include improving the algorithms for data editing and analysis, including sires with no progeny in Ireland in the training population via their MACE evaluations as well as accounting for possibly heterogeneity in allele frequencies within different strains of Holstein-Friesians. Other research already underway with the collaborators is the design of optimal breeding programs to fully exploit the use of genomic information. In addition, a genomic service will be offered to breeders and AI companies wishing to obtain GEBVs for male and female animals.

## 7. Conclusions

Overall the implementation of genomic evaluations in Ireland has been very successful. The uptake of the bulls has been very encouraging with farmers using several bulls as recommended to reduce the risks. Initial results on how the technology is working are promising and the introduction of genomic evaluations will generate greater genetic gain in the future.

## 8. References

Berry, D., Kearney, F. and Harris, B. (2009a). Genomic selection in Ireland. In: Proceedings of the Interbull International Workshop : Genomic Information in Genetic Evaluations, Uppsala, Sweden,

Berry, D.P., Howard, D., O'Boyle, P., Waters, S., Kearney, J.F., and M McCabe. (2009b) Associations between the K232A polymorphism in the diacylglycerol-O-transferase 1 (DGAT1) gene and performance in Irish Holstein-Friesian dairy cattle. Irish Journal of Agriculture and Food Research. (Submitted)

**Table 1.** Statistics for the top 75 active bulls in Ireland since 2004

	2004	2005	2006	2007	2008	2009
<b>EBI(€)</b>	103	101	113	118	124	150
<b>Milk Index(€)</b>	64	59	57	46	52	69
<b>Fert Index(€)</b>	35	35	44	60	60	64
<b>Minimum Reliability(%)</b>	52	52	54	56	58	35
<b>Mean Reliability(%)</b>	67	70	73	74	76	58
<b>Mean Birth date</b>	Apr-96	Aug-95	May-06	Sep-97	Mar-98	Aug-02
<b>No. Bulls with IRL daughter</b>	22	35	32	43	41	16
<b>Domestic Bulls</b>	12	21	18	22	17	37
<b>New Bulls (&lt; 7yrs)</b>	37	16	11	12	11	48
<b>No. GS bulls</b>	0	0	0	0	0	39

**Table 2.** A sample of the Spring 2009 active bull list displaying the 3 types of proof. (<http://www.icbf.com>)

Bull Details					EBI & Proof Details				EBI Sub Indexes				
Rk	Code	Name of Bull	Sire	Hol	EBI	Rel	Range	Proof	Milk	Fertility	Calving	Beef	Health
1	OJI	O-BEE MANFRED JUSTICE	HCM	100	€250	91%	+/-€35	DP-IRL	€114	€86	€49	-€6	€7
2	RXO	RAMOS	SRH	100	€216	74%	+/-€60	DP-INT	€47	€120	€38	-€6	€16
3	HTH	HAZAEEL LIGHT DETECTOR S2F	LGI	71	€198	43%	+/-€89	GS	€84	€114	€25	-€23	-€2
4	OLG	BALLIVOR OLYMPIC GOLD ET	OJI	100	€194	50%	+/-€83	GS	€127	€32	€40	-€5	€1
5	BYJ	BALLYDEHOB JUSTICE	OJI	96	€189	53%	+/-€81	GS	€90	€76	€28	-€7	€1
6	HZL	HILLSDALE LIONEL	RUU	91	€188	57%	+/-€77	GS	€71	€68	€50	-€1	€1
7	RXR	MONAMORE ROMERO ET	OJI	100	€187	54%	+/-€80	GS	€90	€72	€38	-€16	€4
8	GIO	GIBOR	GBN	97	€186	68%	+/-€68	DP-INT	€74	€81	€25	-€9	€15
9	GYK	GARRYMARTIN KEET	BWZ	78	€184	49%	+/-€84	GS	€97	€71	€31	-€9	-€6
10	HZS	HAZAEEL MN SWEETDREAM*	NWorthy	100	€182	35%	+/-€95	GS	€114	€71	€17	-€12	-€8

**Table 3.** Usage statistics and mean genetic merit and reliability for the 3 types of sires used

Proof	Spring 2009				Spring 2008			
	No. Bulls	No. straws/bull	% Usage	bulls/herd	Mean EBI	Mean Rel	Mean EBI	Mean Rel
<b>DP-INT</b>	478	204	29	3	€133	56%	€99	43%
<b>DP-IRL</b>	754	175	37	2.7	€120	86%	€109	75%
<b>GS</b>	90	1310	34	4	€179	55%	N/A	N/A
<b>Mean</b>					€144	66%	€106	64%

**Table 4.** Correlations and mean difference between daughter proofs and GEBV, DGV, and PA proofs for 35 bulls genomically selected when in lay-off in Spring 2009 but now with greater than 70% reliability for milk production based on daughters milking in 2009.

	Correlation			Mean Difference		
	GEBV	DGV	PA	GEBV	DGV	PA
Milk(kg)	0.64	0.65	0.63	65	50	77
Fat(kg)	0.51	0.57	0.4	2	2	3
Prot(kg)	0.59	0.65	0.53	2	1.5	2.2