



IRISH CATTLE BREEDING FEDERATION

Implementation and Uptake of Genomic Evaluations in Ireland

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Outline

- Estimation/Validation of genomic EBV (GEBVs) (Aug08-Feb09)
- Publication of GEBVs (Feb09)
- Uptake of GEBVs for Spring 2009
- First results for bulls marketed with GEBVs in Spring that now have traditional daughter based EBVs (Aug 09)

Estimation/Validation

- Genomic Evaluations were introduced in Ireland in Feb 2009
- Training population of ~ 1000 bulls
- Ireland, UK, NZL and Poland genotypes
- Validation done using bulls with at least 40 daughters milking in Ireland
- Correlations were of the order of 0.4-0.6
- Increases in reliability for young bulls about 10-20%

Implementation

- Active Bull List is published in spring for main breeding season
- Top 75 bulls with >2000 doses with minimum reliability for EBI $\geq 58\%$

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

Implementation

- How to publish GEBVs for bulls??
 - As 'team' or individually?
- Published GEBVs for young genotyped bulls and young bulls from other countries where genotypes were provided to us
- Publish EBV where progeny information existed otherwise GEBV (since moved to $\geq 70\%$ for milk and $\geq 50\%$ for fertility traits)

Implementation

- Bulls with GEBVs were eligible for Active Bull list where reliability for EBI $\geq 35\%$ and calving proof based on progeny was $\geq 50\%$
- DAFF imposed limits on use of semen from these bulls
 - $<35\%$ Rel – 3,000 doses
 - 35-50% Rel – 5,000 doses
 - 50% Rel -10,000 doses
- Farmers advised to use a minimum of 4 bulls
- AI companies marketing fresh semen rotated bulls on a daily basis to ensure farmers received multiple bulls

Implementation

Effect of including genomically selected (GS) bulls on Active Bull List

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

Implementation

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	HAZAEI 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	HAZAEI MN SWEETDREAM*	NWorthy	100	€182	35%	+/-€95	GS	€114	€71	€17	-€12	-€8

DP-IRL – daughter proven with IRL daughters

DP-INT – daughter proven with no IRL daughters

GS- Genomically Selected bulls (Lay-off with calving evaluation $\geq 50\%$)

Uptake of GS bulls

- 349,000 inseminations from Spring 2009 breeding season collected via AI technician handheld
- Do-it-yourself (DIY) insemination not available (DIY ~33% of total insems)
- Looked at 3 categories of bulls DP-IRL, DP-INT, and GS

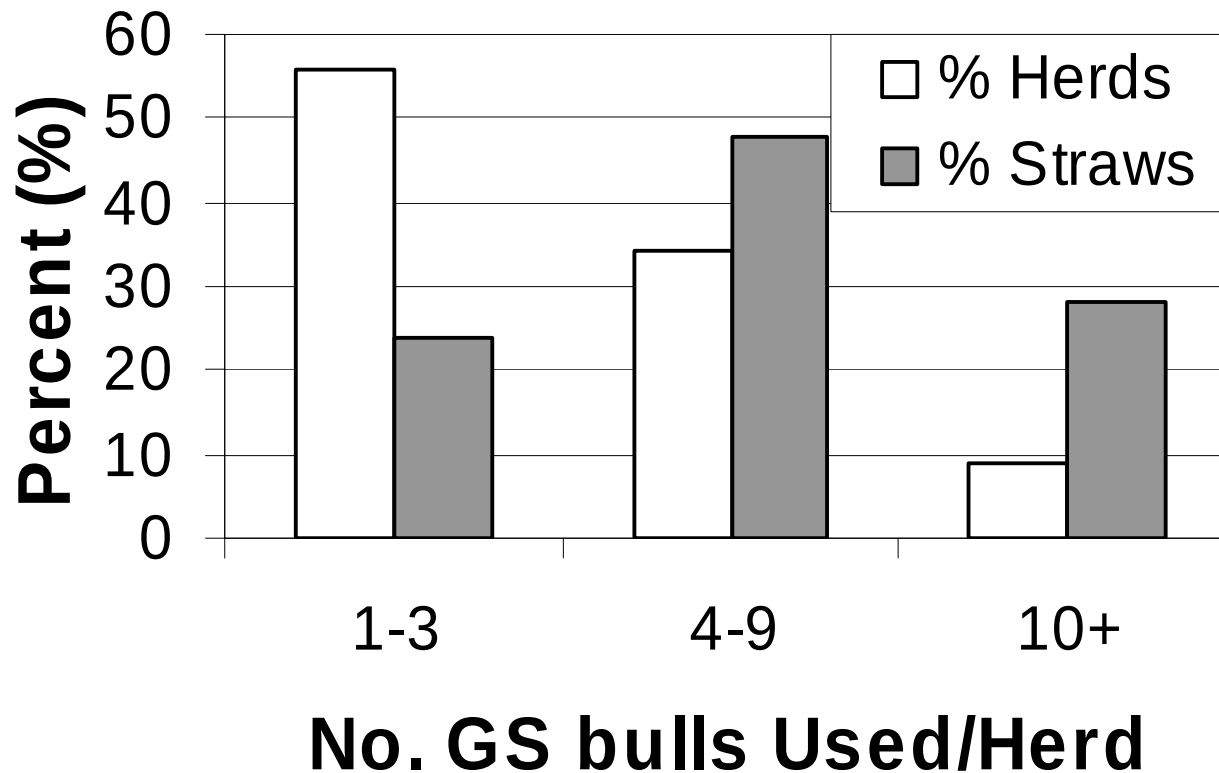
Uptake of GS bulls

Proof	No. Bulls	Straws/bull	% Use	Bulls/Herd
DP-IRL	754	175	37	2.7
DP-INT	478	204	29	3
GS	90	1310	34	4

- GS bull accounted for 34% of all inseminations
- Mean number of bulls/herd was 4 in line with recommendations

Uptake of GS bulls

- Closer look at how GS bulls were used within herd



Why such an uptake?

- Top two bulls (Oman and Ramos) had limited availability and were costly
- Pressure on milk price, cost of production – farmers were looking for excellent genetics at a good price

	Spring 2009		Spring 2008	
Proof	Mean EBI	Mean Rel	Mean EBI	Mean Rel
DP-IRL	120	86	109	75
DP-INT	133	56	99	43
GS	179	55	-	-
Mean	144	66	106	64

Why such an uptake?

- Mean difference between DP-IRL and GS bulls was €69 (more than one standard deviation better)
- Competitive pricing of GS bulls – range from €15-€18 euro
- AI companies marketed teams of bulls (high fertility, high protein, easy calving etc)
- Discount offered for buying bulls in teams

GEBVs vs. EBVs

- Test bulls from 2006 marketed as GS bulls in Spring 2009
- Just received their first proofs based on daughter performance
- 35 bulls with $\geq 70\%$ reliability for production

GEBVs vs. EBVs

	Correlation			Diff in mean		
	GEBV	DGV	PA	GEBV	DGV	PA
Milk (kg)	0.64	0.65	0.63	65	50	77
Fat(kg)	0.51	0.57	0.40	2	2	3
Prot(kg)	0.59	0.65	0.53	2	1.5	2.2

Currently, DGV appear to be best predictor, followed by GEBV and finally PA

Future Work

- Increase training population – inclusion of bulls with MACE EBVs in training population
- Inclusion of genomic data in national evaluations
- Optimal Breeding Scheme
- Genomic service to breeders and AI companies for males and females

Conclusions

- Implementation of genomic evaluations in Ireland has been very successful
- Very good uptake of GS bulls
- Majority of farmers followed advice on using multiple bulls
- Initial results are promising
- Incorporation of genomic information will lead to accelerated genetic gain in Ireland