



IRISH CATTLE BREEDING FEDERATION

The benefits of genotyping at farm level & the impact across the wider dairy herd in Ireland



Kevin Downing
27th October, 2016

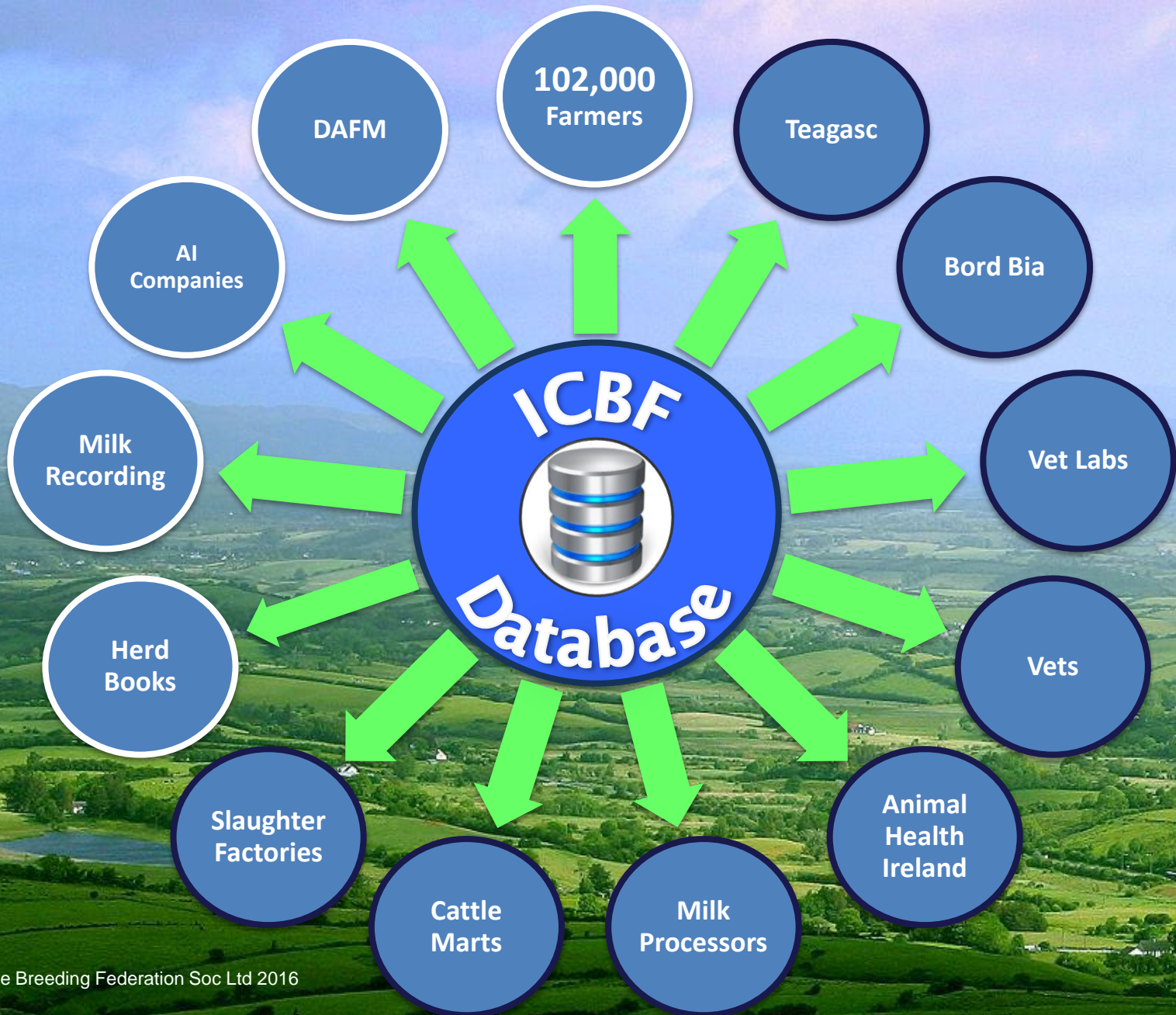


Introduction

- Working with ICBF since 2002 in the farm services area
- Owner of 145 cow Pedigree Holstein Herd
- Producing ~560kg MS/yr with Calving Interval ~370 days
- Milk Recording & AI
- Genotyping males since 2009 and females since 2011
- To date we have genotyped 161 male calves & 374 females



ICBF Database - 2016



The Irish Breeding Index - EBI

2014 Economic values and % emphasis for traits in the EBI

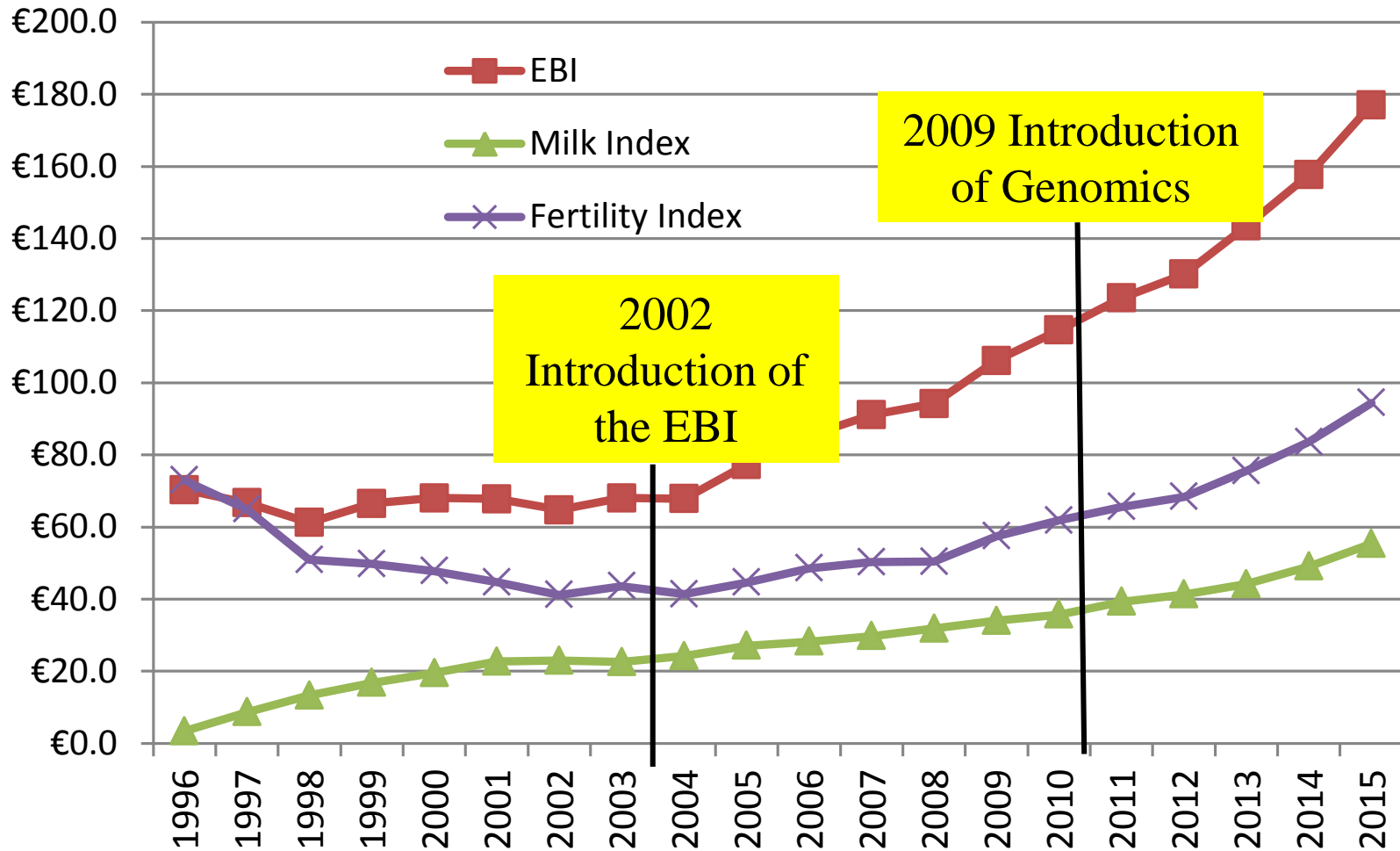
Sub-Index	Trait	Economic Weight	Trait Emphasis	Overall Emphasis
Production	Milk	-€0.09	10.6%	33%
	Fat	€1.04	3.4%	
	Protein	€6.64	18.9%	
Fertility	Calving Interval	-€12.43	24.0%	35%
	Survival	€12.01	10.9%	
Calving	Direct Calving Difficulty	-€3.52	2.8%	9%
	Maternal Calving Difficulty	-€1.73	1.3%	
	Gestation Length	-€7.49	4.1%	
	Calf Mortality	-€2.58	1.0%	
Beef	Cull Cow Weight	€0.15	0.7%	9%
	Carcass Weight	€1.38	5.1%	
	Carcass Conformation	€10.32	1.7%	
	Carcass Fat	-€11.71	1.1%	
Maintenance	Cull Cow Weight	-€1.65	7.2%	7%
Management	Milking Time	-€0.25	2.1%	4%
	Milking Temperament	€33.69	1.9%	
Health	Lameness	-€54.26	0.6%	3%
	SCC	-€43.49	1.8%	
	Mastitis	-€77.10	0.8%	



- Converting data (millions of records!) into an “estimate” of genetic merit => profit index.
- EBI (Economic Breeding Index for dairy Cattle.
- Strong focus on Fertility which is a key driver of output and profit in Ireland.
- More traits will be added in 2017 as data becomes available

Trend in EBI

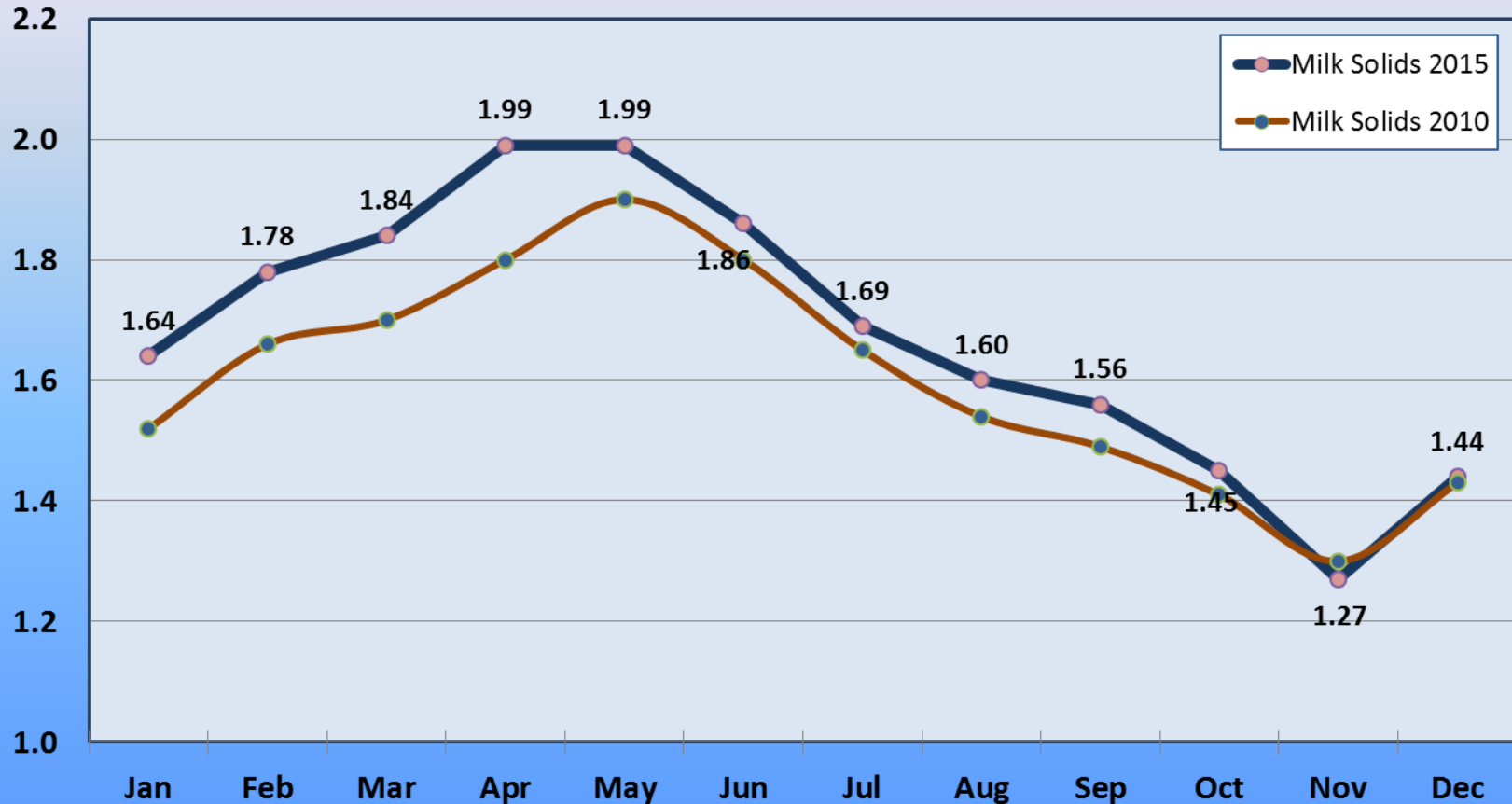
Genetic Trends in EBI (1996 - 2015).



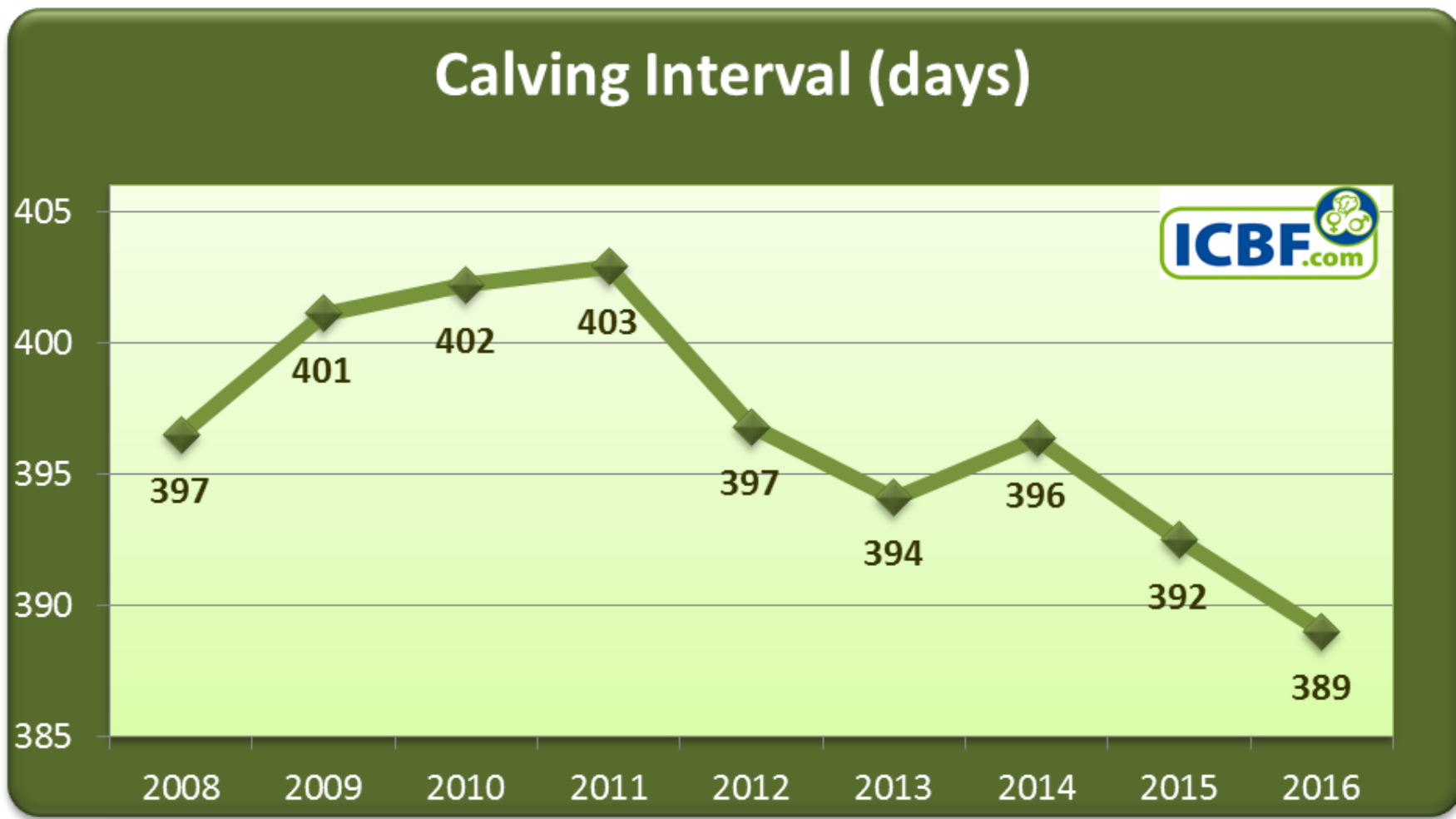
National Milk Recording - 2010 V's 2015

KG Solids

Average Milk Recording Fat + Protein KG's



National Fertility Data (~14,000 herds)



Impact of Genomics in AI

- In Ireland AI companies are genotyping ~6,000 males calves/yr
- Another 5,000 Pedigree registered bulls are genotyped
- => ~11,000 bulls available as selection candidates
- ~50 are purchased and produce semen
- Used in 'Gene Ireland' program @1 yr of age
- Returned to widespread AI @ 2yrs of age depending on calving difficulty and absence of genetic defects.

ICBF Active Bull List

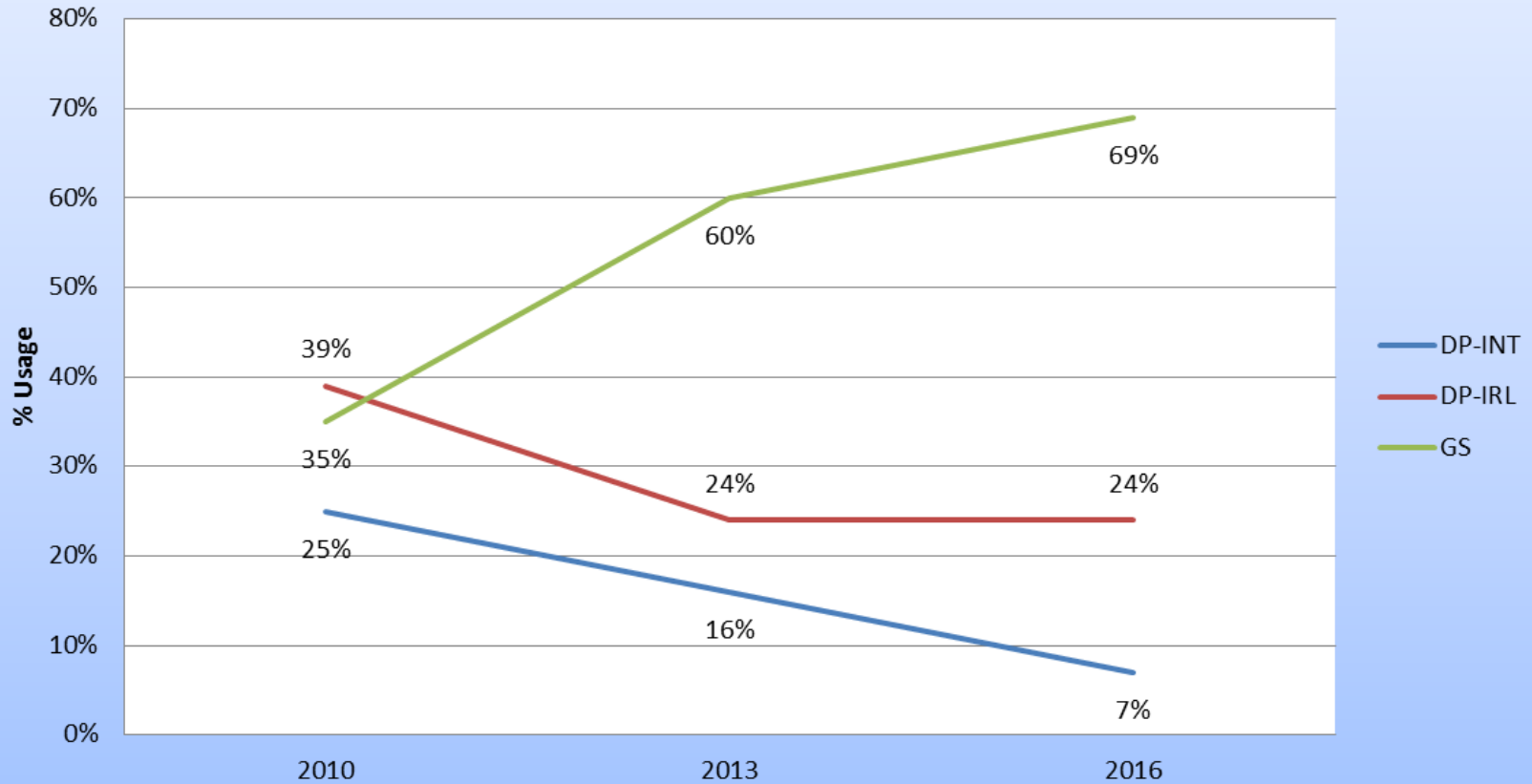
ICBF active dairy bull list - autumn 2016

Rk	Code	Bull Details				EBI Details				EBI Sub Indexes						
		Name of Bull	Sire	Breed	Status	HO%	EBI	Rel%	Proof	Milk	Fert	Calv	Beef	Maint	Mgmt	Health
1	FR2056	(IG) MODELIGO WHISPER	WLY	HO	SRM	63	€311	57%	GS	€63	€190	€55	-€8	€13	€3	-€5
2	YAB	(IG) BARTLEMY ANDREW	WLY	HO	SRM	78	€298	58%	GS	€67	€168	€47	-€21	€23	€5	€8
3	FR2053	KILDARRA MAESTRO	WLY	HO	SRM	66	€294	56%	GS	€88	€146	€52	-€14	€20	€5	-€2
4	FR2005	(IG) KEALFINCHEON NORMAN	WLY	HO	SRM	66	€292	56%	GS	€71	€151	€52	-€5	€10	€6	€6
5	ZRL	CURRA ROYAL LAURENCE	DGC	HO	PED	72	€285	62%	GS	€49	€201	€44	-€18	€10	-€2	€1
6	YKG	IMLEACH LUCKY GLOSS	WLY	HO	SRM	63	€283	54%	GS	€60	€183	€45	-€12	€8	€3	-€4
7	FR2079	(IG) MODELIGO LUKE	AKZ	HO	SRM	56	€278	53%	GS	€87	€147	€45	-€22	€23	€4	-€6
8	FR2024	(IG) CLOHANE VANDIKE	ABO	HO	SRM	75	€269	52%	GS	€78	€144	€56	-€24	€20	€0	-€4
9	FR2084	MONEEN MIAMI	WLY	HO	SRM	69	€268	52%	GS	€61	€151	€46	-€2	€7	€2	€3
10	FR2051	CURRA ALFIE	DGC	HO	PED	84	€267	60%	GS	€51	€171	€54	-€8	€0	€1	-€1
11	FR2032	(IG) OAKGLEN HARRY	JKF	HO	PED	88	€267	57%	GS	€75	€157	€46	-€7	-€3	€3	-€5
12	FR2041	CURRA ROYAL CONOR	CTK	HO	PED	69	€267	50%	GS	€39	€187	€45	-€19	€13	-€1	€2
13	GZY	GADDAGH CUDDY REEKS	LHZ	HO	PED	81	€263	61%	GS	€81	€164	€18	-€11	€7	€1	€3
14	FR2007	(IG) NEXTGEN BRIGADE	GXY	HO	SRM	75	€262	53%	GS	€62	€159	€37	-€8	€10	€4	-€2
15	LWR	(IG) LONGVIEW RELIABLE	ABO	HO	PED	75	€261	57%	GS	€92	€125	€50	-€11	-€3	€2	€5
16	FR2034	(IG) GABRIEL GOLIATH	WLY	HO	SRM	72	€260	58%	GS	€82	€126	€30	-€5	€12	€7	€8
17	OMG	(IG) MODELIGO GRAND MAN	BGJ	HO	SRM	69	€258	63%	GS	€32	€167	€50	-€10	€12	€8	€0
18	FR2040	CURRA ROYAL STEVIE	ABO	HO	PED	72	€257	56%	GS	€61	€152	€43	-€19	€15	-€1	€7
19	WLY	IMLEACH LUCKY WHISTLER	MWH	HO	SRM	63	€257	87%	DP-IRL	€62	€147	€43	-€12	€10	€6	€0
20	FR2031	(IG) TISAXON ELMO	ABO	HO	PED	84	€257	59%	GS	€62	€124	€59	-€10	€10	€5	€7
21	FR2129	NODSTOWN CHAMPION	ABO	HO	PED	88	€256	63%	GS	€45	€181	€43	-€4	-€10	-€1	€2

- 2001 - 2 (3%) Irish bulls on ICBF Active Bull List
- 2016 – 74 (99%) are Irish Born
- Trend started in 2009 on the back of Genomics

Dairy Inseminations

Trend in Dairy Inseminations 2010 - 2016



Dairy Inseminations 2016

Type	Average EBI	Total Num serves	Avg Num Bulls Used
DP-INT	€57	46,735	2.6
DP-IRL	€67	147,239	1.9
GS	€194	431,747	4.5
		625,721	

- DP-INT – Daughter Proof with Foreign daughters
- DP-IRL – Daughter Proof with Irish daughters
- GS – Genomically selected with no daughters
- Farmers listening to industry advice by using more GS bulls to spread their risk.

Use minimum of 5 bulls – use them equally

Validation of Genomic for Sires

- 190 bulls who had a genomic evaluation and now are daughter proven.

	Parental Average	Blended Genomic	Daughter Proven	Correlation with Daughter Proven	
				Parent Avg.	Genomic
Milk Kg	168	108	116	0.71	0.79
Fat	11.9	10.2	10.4	0.55	0.70
Protein	9.6	7.7	7.8	0.63	0.75
Calving Int	-3.1	-3.7	-4.5	0.6	0.63
Survival %	1.52	1.7	2.01	0.41	0.63

- Results showing genomics as a better predictor
- Parental average proofs over predicted for production

Validation of Genomics for Females

HIGH EBI DELIVERS

Will a high EBI herd deliver better fertility? Yes is the answer so far in Cork

JACK KENNEDY
DAIRY EDITOR

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The Elite high EBI herd in the Teagasc Kilworth farm is outperforming the

what is the diet.

Both genetic herds are divided into three groups on three different feeding treatments. The three Elite herds (EBI €244) on average are yielding 18.0 kg, at 4.94 F%, 3.96 P% (1.57 kg MS/day),



- Results from Teagasc 'Next Generation' Dairy Herd
 - Established in 2013 to validate the EBI & Genomics

Teagasc Next Generation Herd Results

	Elite	Nat Ave	Diff
Predicted at birth based on genomic EBI			
EBI (€/lactation)	€249	€133	€232
Milk Solids (€/lactation)	€69	€49	
Fertility (€/lactation)	€169	€63	
Actual performance (1 & 2 lactations only)			
Milk Solids (Fat + Protein kg/lactation)	397	390	€301
Calving Interval (days)	370	379	
Survival (% from lact to lact)	90%	76%	

- Yes, EBI works in Irish Research Herd

Benefits of Genotyping to my Herd

- Females
 - Parentage verification where large numbers of cows are being calved in a short period of time.
 - **More reliable EBI for selecting replacements**
- Males as candidates for AI
 - 4 bulls purchased by AI Companies in 2016

DOB: 13/02/2012

PKR (IG) PARKDUV MOUNT EVEREST

(IG) LAURAGH EVERT

HEDRA FESTIVAL

GALTEE MERCI ET

PARKDUV JILL 21 VG88

PARKDUV JILL 11

PARKDUV JILL 4

GENOMIC PROOF



Pictured after 5 calves, Dam Parkduv Jul 21 VG88 Bred by Kevin & Michael Downing, Whitechurch, Cork



- ✓ Massive EBI €300
- ✓ From a 9500kg Dam @ 3.60% Prot
- ✓ No O-Man or Hugo bloodlines

aAa Score
aAa 432561



48 Parkduv Heifers Genotyped in 2011

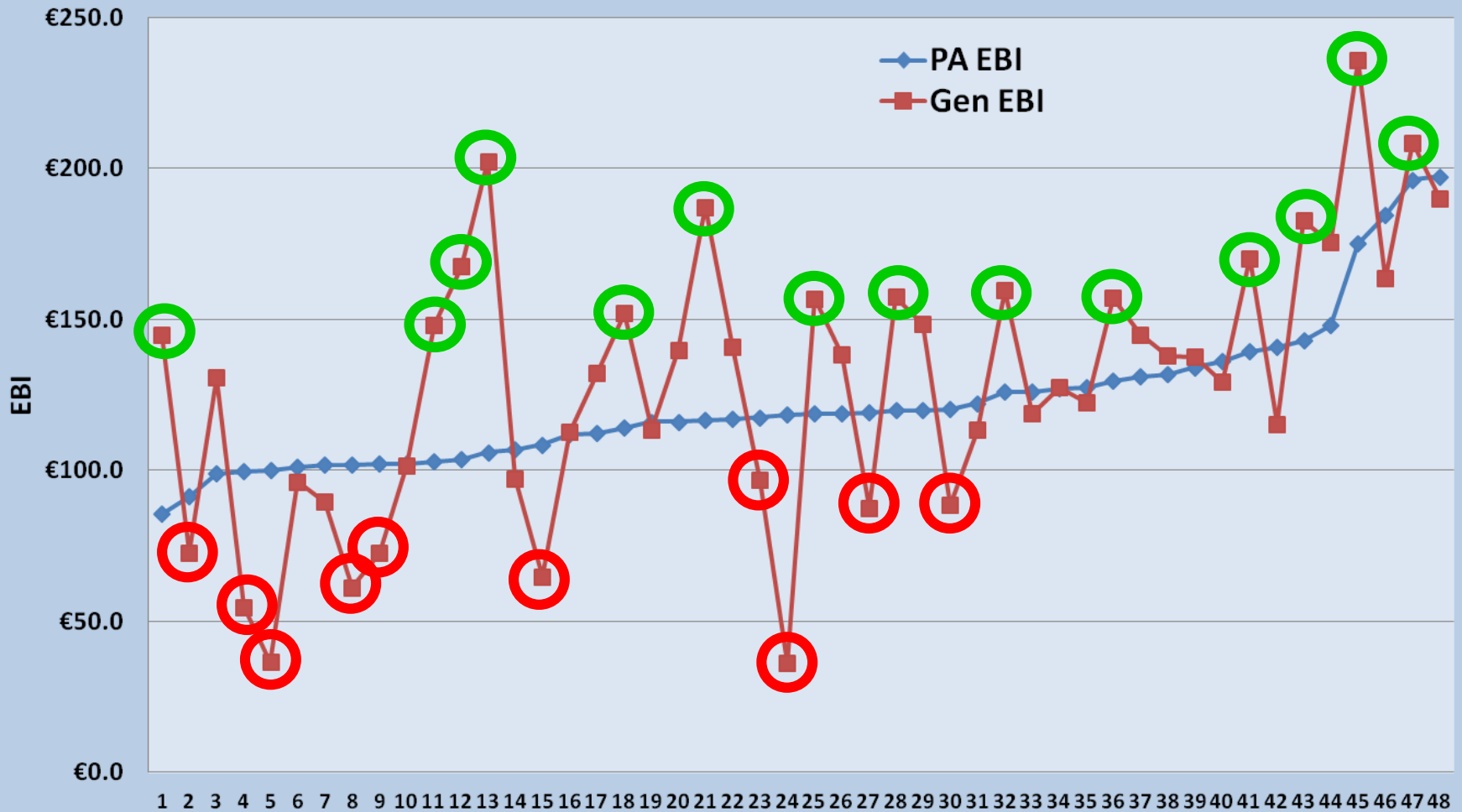
Genomic Evaluation Report

Jumbo	1281	Lact. No	
Tag	IE151013721281	Sex	F
Name		Sire	KSI (€ 122)
DOB	09-Jan-2010 1y 2m	Dam	IE151013771105 (€ 122)
Breed	HO (97%), FR (3%)	Dam's Sire	HFL (€ 150)
Date of Evaluation	29-Mar-2011		

Index	Official Genomic Evaluation	Reliability	Weighting on Genomics	DNA Value	Parent Average Evaluation	Reliability	Diff.from Parent Avg	Increase In Reliability
EBI €	147	53%	32%	127	122	31%	+25	22%
Milk Sub Index €	52	63%	41%	51	42	37%	+10	26%
Fertility Sub Index €	91	43%	26%	73	74	23%	+17	20%
Calving Sub Index €	19	54%	28%	17	20	36%	-1	18%
Beef Sub Index €	-14	49%	26%	-14	-17	31%	+3	18%
Maintenance Sub Index €	3	44%	23%	3	4	27%	-1	17%
Health Sub Index €	-4	58%	41%	-4	-3	30%	-1	28%

Lots of change and re-ranking

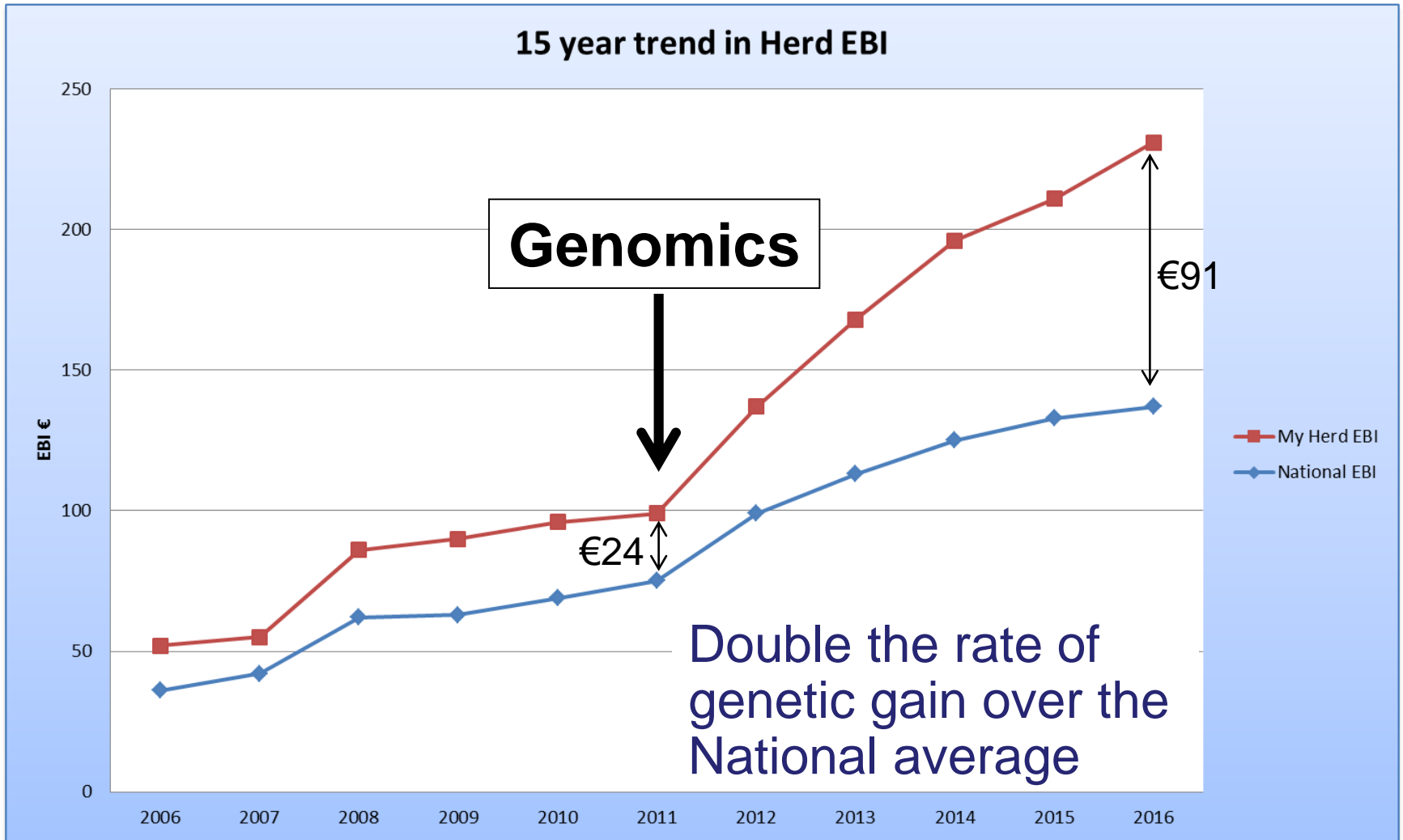
Parent Avg. EBI V's Genomic EBI



Role of Genomics in Parkduv Herd

- My breeding strategy is to keep highest EBI replacements and sell the lowest ones, where possible e.g. Calving date may effect decision.
- 48 female replacements in 2011
 - Replacement group 24 (to maintain 20% replacement rate)
 - Surplus Stock 21 (advertised online www.parkduv.com)
 - Not pregnant 3 (slaughter factory)
- As a result of genotyping the 48
 - Six I previously intended for sale were kept.
 - Six I previously intended to keep were sold.

Trend in EBI - Parkduv V's National



Added benefit - ICBF Top 200 Herds List



Top 200 HerdPlus Herds Ranked on EBI (>30 Cows) - Apr '16



Rnk	NAME	ADDRESS 1	ADDRESS 2	ADDRESS 3	EBI	MILK	FERT	CALV	BEEF	MAINT	MGMT	HEALTH	CHANGE
1	KIERAN HEARNE	BALLINACURRA	CARRICK-ON-SUIR	CO WATERFORD	€239	€66	€138	€33	-€14	€14	€2	€0	↑ 1
2	JAMES MURRAY	DERRINSALLAGH	BIRR	CO OFFALY	€234	€61	€138	€33	-€13	€13	€0	€1	↑ 6
3	PATRICK FLYNN	COOLMOHAN	KILWORTH	CO CORK	€234	€19	€181	€26	-€14	€21	-€1	€2	↓ 2
4	JIM DELAHUNT	BALLYKINASH	CARRIG	BIRR CO TIPPERARY	€232	€53	€141	€38	-€10	€10	€1	€0	↑ 1
5	TIMOTHY FITZGERALD	GREEN ROAD	BALLYROAN	PORTLAOISE CO LAOIS	€232	€56	€136	€37	-€7	€3	€4	€3	↑ 2
6	KEVIN DOWNING	FARANASTIG	WHITECHURCH	CO CORK	€231	€73	€121	€34	-€6	€5	€3	€1	↑ 8
7	VINCENT O'CONNOR	COOLEANIG	BEAUFORT	KILLARNEY CO KERRY	€227	€67	€122	€39	-€12	€12	€1	-€1	↑ 10
8	LIAM O LEARY	BALLYBRIDE	CONNA	CO CORK	€226	€71	€120	€34	-€14	€13	€2	€0	↓ 5
9	ROBERT SHANNON	GURTEENAKILLA	BALLYDEHOB	CO CORK	€225	€80	€102	€38	-€9	€8	€4	€3	↑ 15
10	SEAN RING	DOON	KISKEAM	MALLOW CO CORK	€223	€73	€110	€29	-€26	€32	€6	€0	↓ 5
11	DONALD THOMAS SCULLY	CHERRY HILL HOUSE BALLYHYLAND	PORTLAOISE	CO LAOIS	€222	€50	€136	€34	-€9	€7	€2	€3	↓ 3
12	TREVOR BEAMISH	CLONEEN	CARRIGTWOHILL	CO CORK	€222	€72	€115	€34	-€10	€10	€1	€0	↑ 23
13	KEVIN HEGARTY	BALLYDEROWN	KILWORTH	CO CORK	€220	€68	€114	€37	-€7	€4	€3	€1	↑ 3
14	MICHAEL RYAN	DEANS GROVE	CASHEL	CO TIPPERARY	€220	€68	€112	€38	-€11	€9	€3	€0	↑ 29
15	DAVID FITZGERALD	LISNABRIN	CURRAGLASS	MALLOW CO CORK	€220	€59	€128	€33	-€11	€11	€2	€0	↑ 12
16	TEAGASC NEXT GENERATION HER	TEAGASC	MOOREPARK	FERMOY CO CORK	€218	€65	€114	€34	-€21	€23	€3	€0	↑ 4

- Herd steadily moving up the list since we began genotyping.

Summary

- EBI is taking us towards a more fertile, robust, healthier cow, who is capable of producing increased milk solids.
- As more economically important traits becomes available they will be added to EBI.
- Genomics is working for farmers and having a big impact on farm profitability.
- Genomics will greatly accelerate the improvement in EBI.
- At €22/female, I'd expect to see more herds genotyping next year.

Acknowledgements

- ICBF
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- Department of Agriculture, Food and Marine



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Thank you for your attention

