



IRISH CATTLE BREEDING FEDERATION

# Genetic Trends in EBI; Latest Analysis.



March 2020.



# Key Questions.

- What is the rate of gain in EBI? How does this differ for different categories of animals?
  - All progeny with EBI, AI bred progeny & Stock Bull progeny?
  - Different breeds of sire?
  - Young genomic bulls versus daughter proven bulls.

# Data Analysis.

- Latest EBI data extracted for dairy females based on their year of first calving. Using 2020 as an example;
  - Take all replacement heifers that calved for the first time on farms this year (to-date).
  - Key questions. What is their EBI? Who is their sire? Is he an AI sire? What breed is he? Was the sire a young Genomic Selected (GS) bull or a Daughter Proven (DP), when the farmer decided to use the semen in 2017 (i.e., calved in 2020 => calf born in 2018 => inseminated in 2017).
- Repeat for additional years of first calving; 2019, 2018, 2017, 2016 etc....

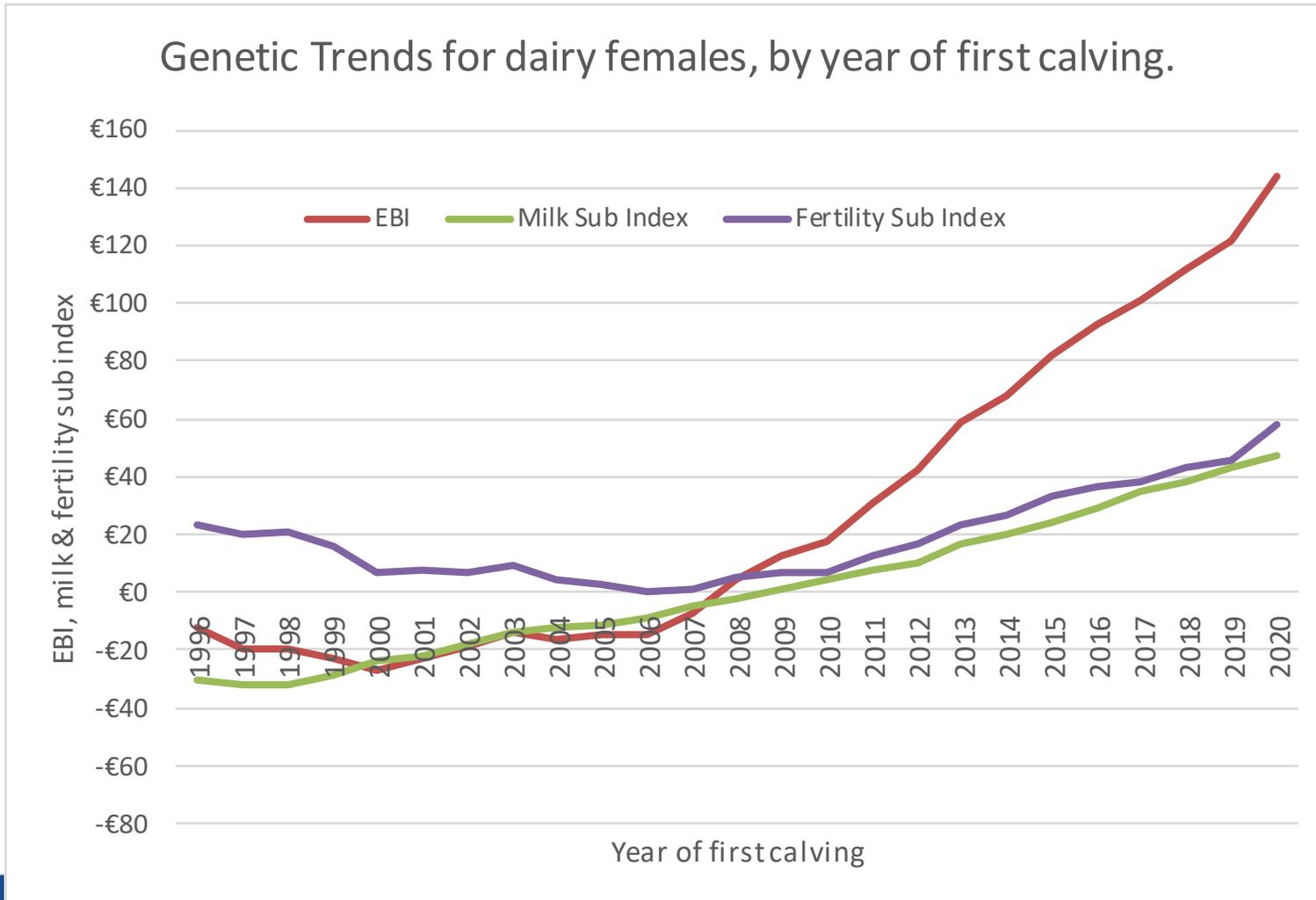
# Trends in numbers of dairy females with EBI by year of 1<sup>st</sup> calving

Table 1. Trends in number of dairy females with EBI, by Sire Type.						Table 2. Trends in number of dairy females with EBI, by main breed of sire (AI bred progeny only).										
Year Calving	ALL	AI Sire	Sbull	No Sire	% AI bred	ALL AI Sire	HO AI Sire	%	FR AI Sire	%	JE AI sire	%	Red AI Sire	%	Others	%
2000	101,421	54,121	8,702	38,598	53%	54,121	47,784	88%	5,562	10%	110	0%	25	0%	639	1%
2001	134,051	69,211	10,636	54,204	52%	69,211	60,571	88%	7,352	11%	135	0%	49	0%	1,104	2%
2002	178,234	88,074	13,161	76,999	49%	88,074	75,665	86%	10,000	11%	269	0%	82	0%	2,056	2%
2003	231,479	103,565	14,332	113,582	45%	103,565	84,886	82%	15,609	15%	369	0%	140	0%	2,555	2%
2004	226,286	98,805	21,480	106,001	44%	98,805	79,752	81%	14,947	15%	554	1%	229	0%	3,003	3%
2005	224,210	99,783	27,788	96,639	45%	99,783	76,334	77%	17,750	18%	891	1%	336	0%	4,151	4%
2006	213,115	95,747	31,905	85,463	45%	95,747	71,402	75%	18,051	19%	1,043	1%	1,095	1%	3,977	4%
2007	201,986	93,481	32,537	75,968	46%	93,481	69,397	74%	18,634	20%	1,419	2%	637	1%	3,244	3%
2008	197,031	94,320	32,941	69,770	48%	94,320	67,934	72%	21,293	23%	1,358	1%	954	1%	2,724	3%
2009	194,394	101,939	30,731	61,724	52%	101,939	74,309	73%	22,955	23%	1,470	1%	761	1%	2,263	2%
2010	200,047	109,418	32,384	58,245	55%	109,418	79,269	72%	24,640	23%	1,819	2%	935	1%	2,495	2%
2011	239,171	130,826	39,015	69,330	55%	130,826	94,399	72%	27,242	21%	4,325	3%	1,922	1%	2,262	2%
2012	259,035	139,438	45,520	74,077	54%	139,438	99,445	71%	28,849	21%	5,521	4%	2,098	2%	1,959	1%
2013	274,517	151,425	54,932	68,160	55%	151,425	112,007	74%	25,109	17%	8,798	6%	2,642	2%	1,626	1%
2014	283,061	157,493	58,058	67,510	56%	157,493	117,725	75%	25,738	16%	8,461	5%	1,866	1%	1,745	1%
2015	320,210	184,411	62,547	73,252	58%	184,411	131,636	71%	34,199	19%	8,603	5%	4,015	2%	1,800	1%
2016	307,607	181,373	60,186	66,048	59%	181,373	136,425	75%	29,481	16%	8,459	5%	2,697	1%	1,763	1%
2017	311,640	191,445	56,396	63,799	61%	191,445	152,112	79%	25,556	13%	7,643	4%	1,853	1%	1,680	1%
2018	323,584	201,041	55,340	67,203	62%	201,041	160,372	80%	24,126	12%	8,049	4%	1,862	1%	1,513	1%
2019	313,383	199,988	51,330	62,065	64%	199,988	159,125	80%	19,257	10%	14,409	7%	1,624	1%	1,436	1%
2020*	198,436	156,637	30,672	11,127	79%	156,637	127,878	82%	10,216	7%	13,306	8%	1,104	1%	882	1%

\* Based on year to date, i.e., heifers calved for first time by mid March 2020.

- % of AI bred female replacements has increased by ~20% since mid-2000's. Data for 2020 is still incomplete. Only about ~65% of dairy female replacements have calved at this stage.

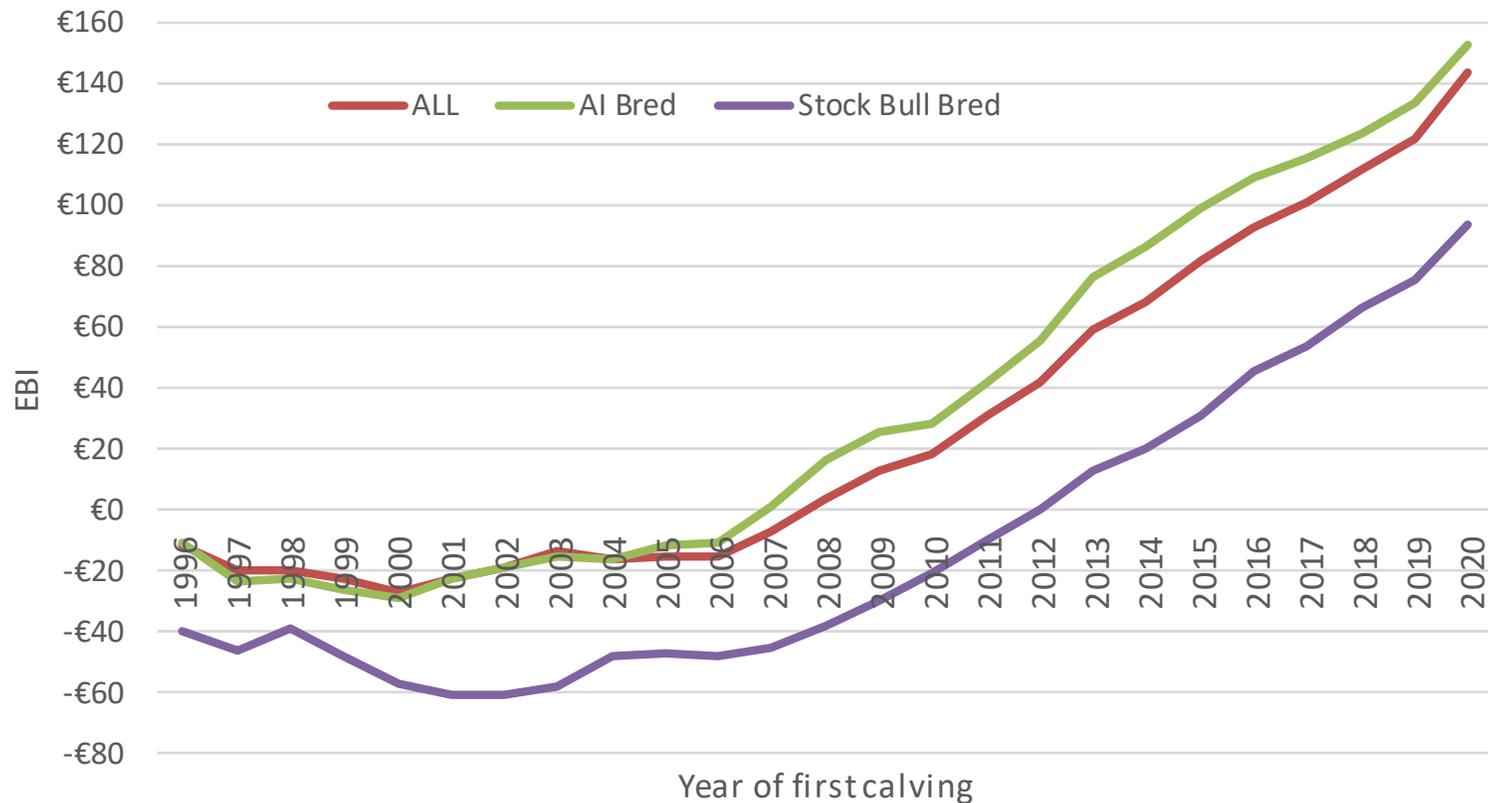
# EBI Continues to Increase.



- Rate of gain in EBI now €12.6/year.
  - Average for last 10 years. Equivalent to 0.20 genetic standard deviation units in EBI.
  - High rate of gain, in line with “world best”.
- Balanced across milk & fertility.

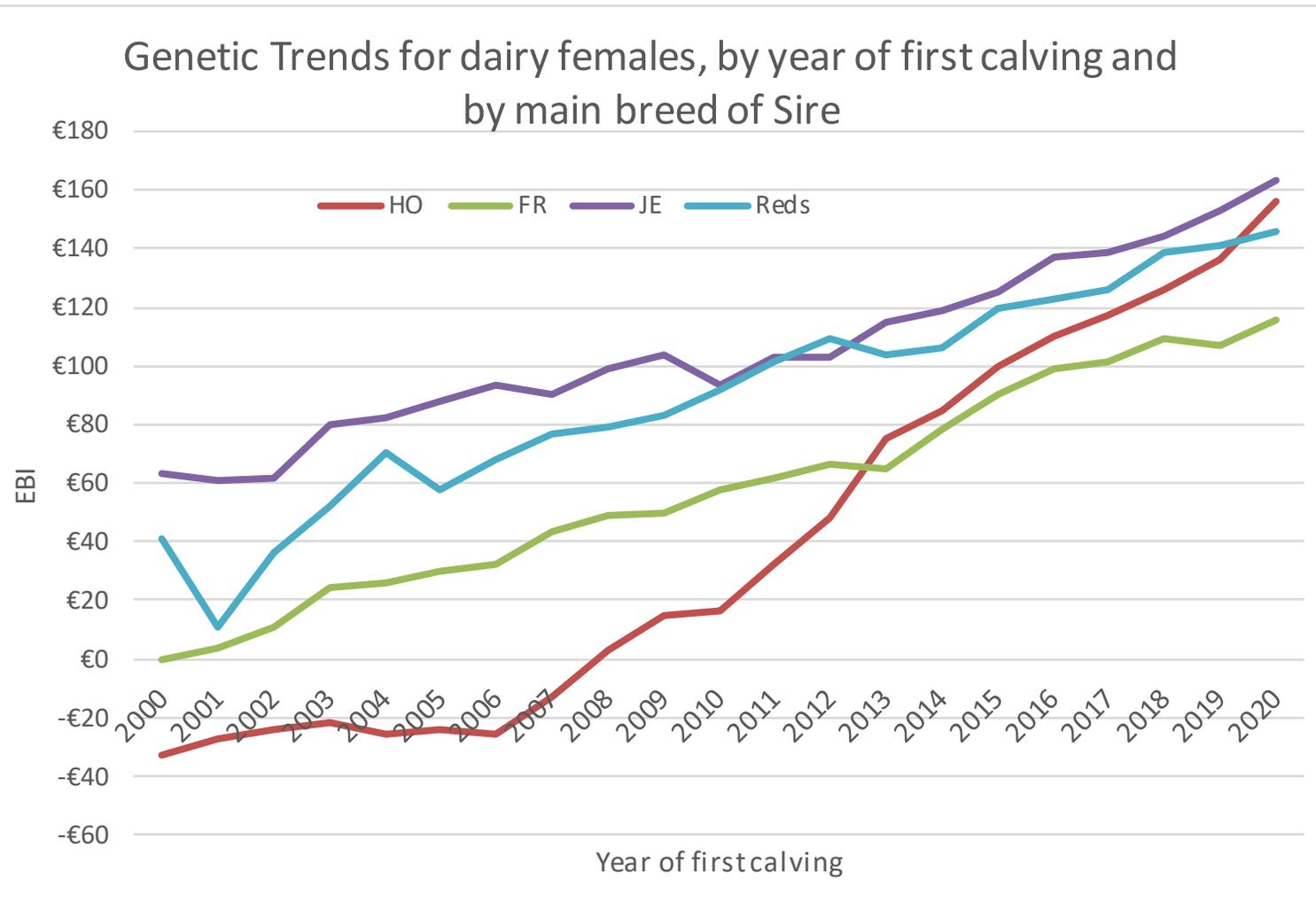
# AI Bulls ahead of stock bulls.

Genetic trends for dairy females by year of first calving and by sire type.



- Progeny of AI bulls are €60 higher than progeny of stock bulls, in EBI terms.
- Equivalent to €120/lactation and €540 over cow's lifetime (average length of lactation for cows in Ireland is 4.5).

# Holstein breeding program gaining.



- GENE IRELAND program is delivering for all breeds, but especially the Holstein breed (the largest program).
  - €100+ behind Jersey breed in mid-2000's (when program started) to now being on par for females calving in 2020.
  - Twice the rate of gain for the Holstein breed compared to other breeds.

# Genomic versus Daughter Proven.



## ICBF Dairy Active Bull List (Printed 26/03/17)



Animal Details							EBI Details			EBI Sub Indexes							Key Profit Traits										Semen Details				
Rank	Code	Bull Name	Sire	YOB	Breed	Status	HO %	EBI	Rel(%)	Proof	Milk	Fert	Calv	Beef	Maint	Mgmt	Health	M Kg	F Kg	P Kg	F%	P%	CI	SU%	CD%	CD Rel%	M.Time	Avail	Calv Recs	Price	Supplier
1	FR4021	(IG) BALLINTESKIN ARNOLD	GZY	2015	HO	PED	59	295	56	GS	49	207	33	-9	10	1	4	-132	4.7	4.86	0.17	0.16	-12.92	3.9	2.5	70	4.39	52	High	19	NCBC
2	FR2385	(IG) NEXTGEN YKG CANDY 593	YKG	2015	HO	SRM	59	282	55	GS	67	164	34	-15	26	3	2	134	11.57	10.15	0.11	0.09	-7.72	5.7	2	92	-1.54	423	High	20	NCBC
3	FR2339	BALLYBRIDE CARDIFF	SEW	2015	HO	PED	72	273	60	GS	81	142	43	-19	20	0	6	35	18.79	9.78	0.3	0.15	-7.49	4.04	1.8	94	4.92	618	Medium	14	Bova AI
7	FR2053	KILDARRA MAESTRO	WLY	2014	HO	SRM	66	263	62	GS	85	110	54	-13	21	6	0	146	19.13	11.74	0.23	0.11	-5.59	3.35	2.6	99	-1.59	3997	High	21	Eurogene/LIC
8	SEW	SEAROAD AWS PAMELA 1	AWS	2013	HO	PED	84	262	70	GS	89	121	54	-26	18	0	7	174	18.32	12.95	0.19	0.12	-6.74	3.1	1.4	99	7.56	15597	High	18	Dovea
39	AZG	DEANS GROVE ARGENT	HZS	2011	HO	SRM	72	223	74	DP-IRL	73	92	46	-12	18	10	-3	-83	15	7.5	0.33	0.19	-4.45	3.04	1.7	95	-21.78	715	High	18	Dovea
52	KZK	(IG) CAHERDERG LOCKIE	LRW	2012	HO	SRM	78	216	75	DP-IRL	78	94	49	-4	-5	3	0	208	16.5	12	0.14	0.08	-4.41	3.24	2.3	89	-9.59	261	High	19	NCBC

- Genomics has been applied widely in the context of the Holstein breeding program. How have the GS bulls performed relative to the DP bulls?
- Taking 2020 as the example year, was the sire a young GS bull or a DP bull when the farmer decided to use the semen in 2017 (i.e., calved 2020 => calf born in 2018 => cow inseminated in 2017).
- Looking at relevant ICBF Active Bull List (i.e, Spring 2017), bulls born in 2013, 2014, 2015 were categorized as GS bulls. All older bulls were DP bulls. Exercise repeated for calving years 2019, 2018, 2017, 2016 & 2015.



# Big increase in use of GS bulls.

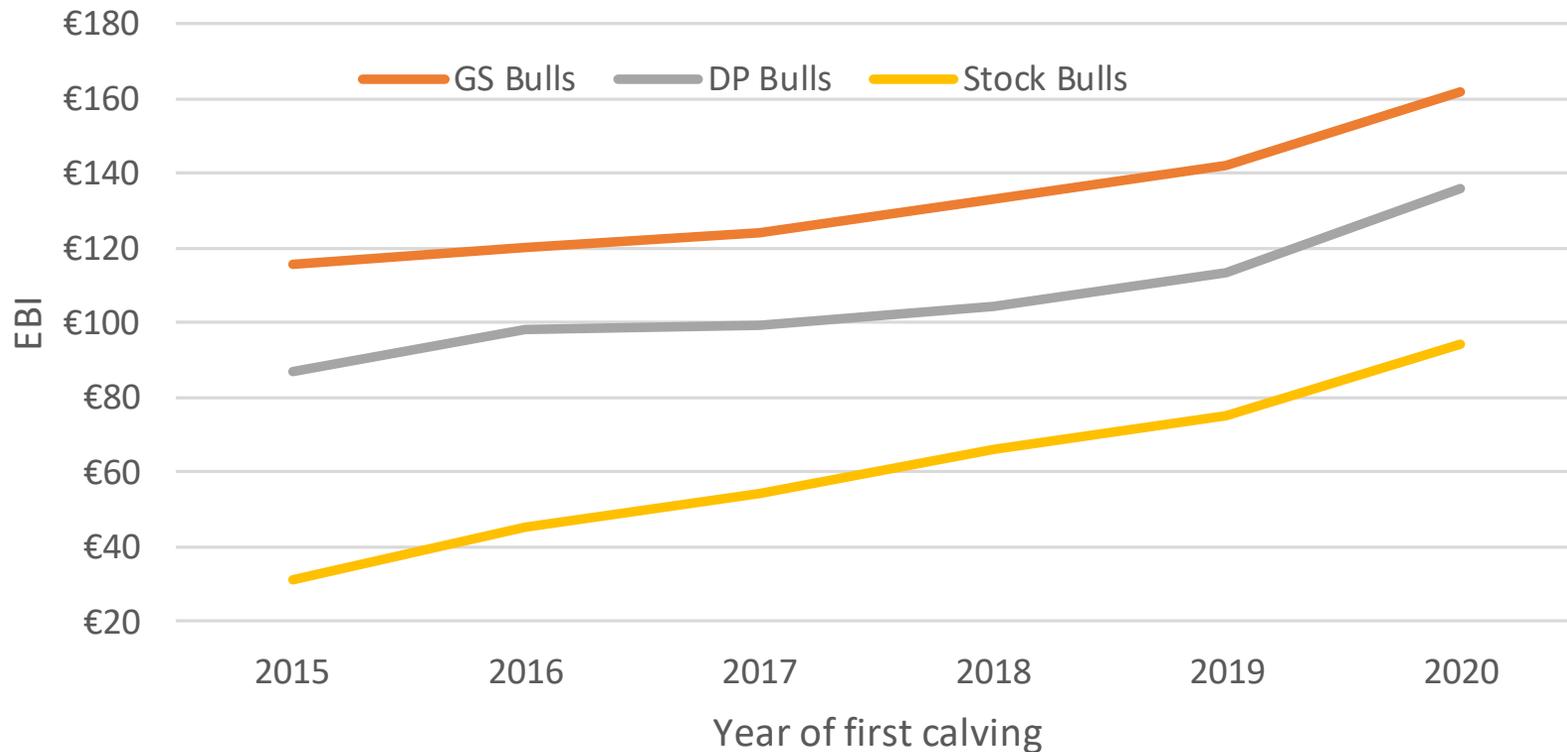
Table 1. Numbers of progeny from GS and DP bulls, by year of first calving.

Bull Age*	Category	2015	2016	2017	2018	2019	2020 ytd
4 years	GS Bull	1,231	1,723	2,364	4,545	5,816	2,652
5 years	GS Bull	11,117	27,324	27,162	35,968	38,452	36,394
6 years	GS Bull	25,280	28,503	50,015	50,804	51,132	41,584
7 years	GS Bull	19,698	18,416	25,788	25,492	29,090	17,012
8 years	DP Bull	16,936	13,021	10,028	13,944	12,022	13,531
9 years	DP Bull	9,667	8,398	7,365	5,694	8,324	8,043
10 years	DP Bull	16,856	8,047	5,029	4,998	2,531	3,831
11+ years	DP Bull	30,851	30,993	24,361	18,927	11,758	4,831
<b>Total</b>		<b>131,636</b>	<b>136,425</b>	<b>152,112</b>	<b>160,372</b>	<b>159,125</b>	<b>127,878</b>
* Average age of bull when daughters calve							
Total progeny from GS bulls		57,326	75,966	105,329	116,809	124,490	97,642
Total progeny from DP bulls		74,310	60,459	46,783	43,563	34,635	30,236
%GS		44%	56%	69%	73%	78%	76%
% DP		56%	44%	31%	27%	22%	24%

- % of progeny from young GS bulls has increased from 44% in 2015 (relative ICBF Active Bull List was 2012), to 76% for 2020 (year to date).
- Analysis based on progeny from main breed Holstein AI sires.

# Young GS bulls ~€30 ahead of DP Bulls.

Genetic Trends for 1st calving replacement females from young GS bulls, DP bulls & stock bulls.



- Progeny from young GS bulls are €30 ahead of progeny of DP bulls. Consistent across years.
- In line with expectation as these bulls are ~3 years younger, equivalent to ~3 years genetic gain.
- Young GS bulls are €70 ahead of stock bulls.
- Use teams of high EBI GS bulls in your breeding program this Spring.

# Summary.

- High rates of genetic gain are now being achieved on Irish dairy farms. ~€12/cow/year (~0.20 genetic SD in EBI).
- AI bred progeny are ~€60 ahead of stock bull progeny in EBI terms. Worth ~€540 in a cow's lifetime.
- Rate of gain is highest in the Holstein breed. This is a direct result of the impact of GEN€ IRELAND breeding program, including the application of genomics.
- Progeny from young GS bulls are consistently €30 years ahead of DP bulls in terms of EBI.
- Use teams of high EBI bulls in your dairy breeding program this Spring. Invariably these will be AI bred and young GS bulls.