Genetic/genomic Improvement of Beef Cattle in Ireland.

May 2021.

An Roinn Talmhaíochta, Bia agus Mara
Department of Agriculture, Food and the Marine

Euroopa Maaelu Arengu Põllumajandusfond: Euroopa investeeringud maapiirkondadesse

AgTech - it's in our DNA

Overview of Talk.

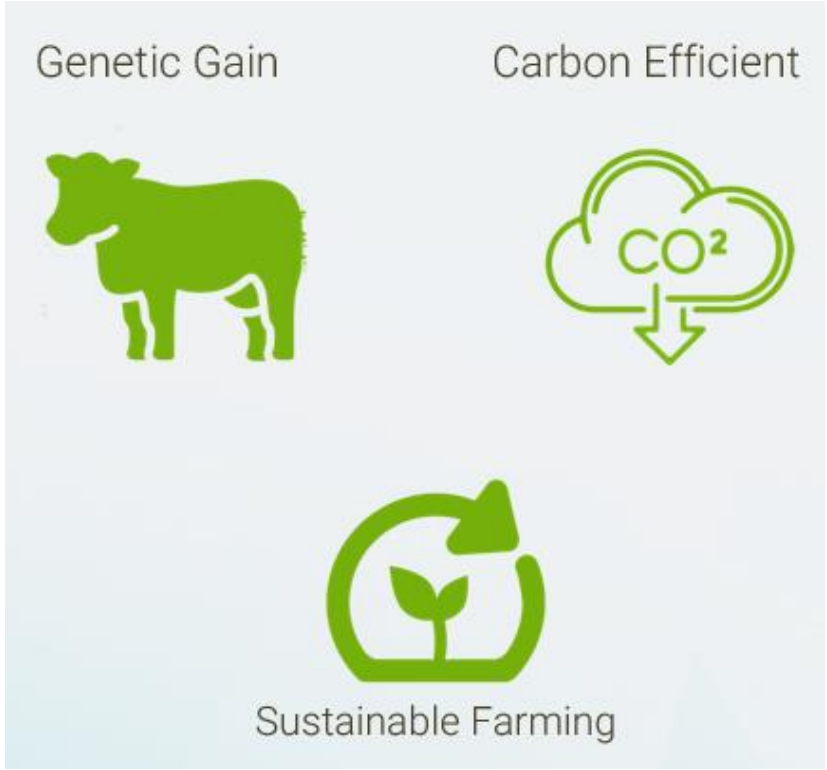
- About ICBF.
- Overview of beef genetic evaluations & beef genetic improvement in Ireland.
- The Irish Beef Data and Genomics Program.
- Areas of current interest.
- Feedback/discussion.

Our “Burning Platform”.

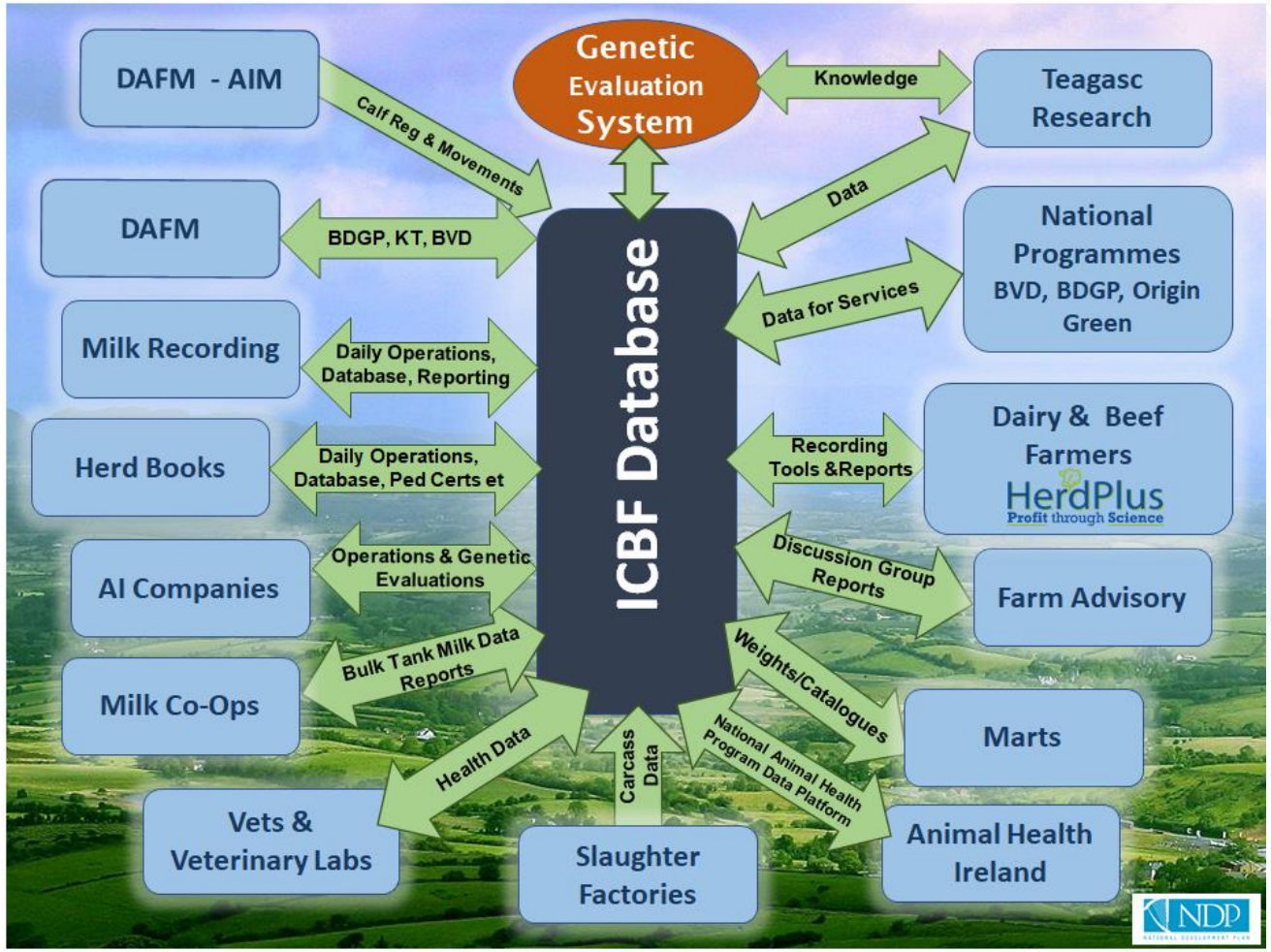
- Beef cattle are not carbon efficient => Policy to cut size of beef herd.
- But need cattle => extensive systems & rural infrastructure.
- Can we breed more carbon efficient beef cattle? Simultaneously improve other traits important for beef production, e.g., cost of calving, efficiency, meat eating quality…?

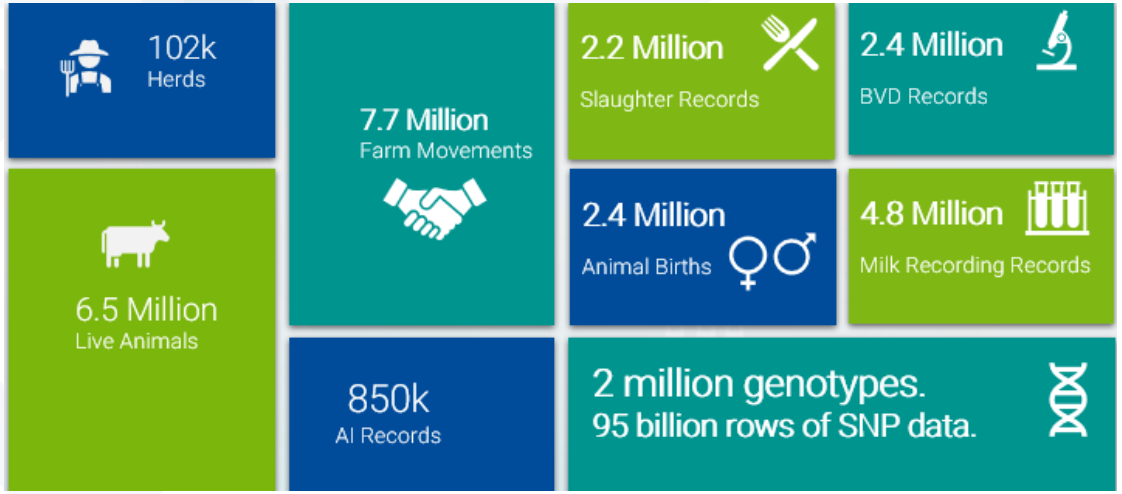
About ICBF.

- Co-operative, established in 2000.
  - AI, data recording, herdbooks & farmers.
- Objective => Ensure next generation of animals are better that previous;
  - Profit, environment, climate & welfare friendly.
  - Not a “quick” fix but permanent, cumulative & cost effective.
- Close relationships with key stakeholders (e.g., DAFM, Teagasc, AHI, Universities, Weatherby’s…)
- World-leading (research => implementation).
  - 2nd in world to launch dairy genomics.



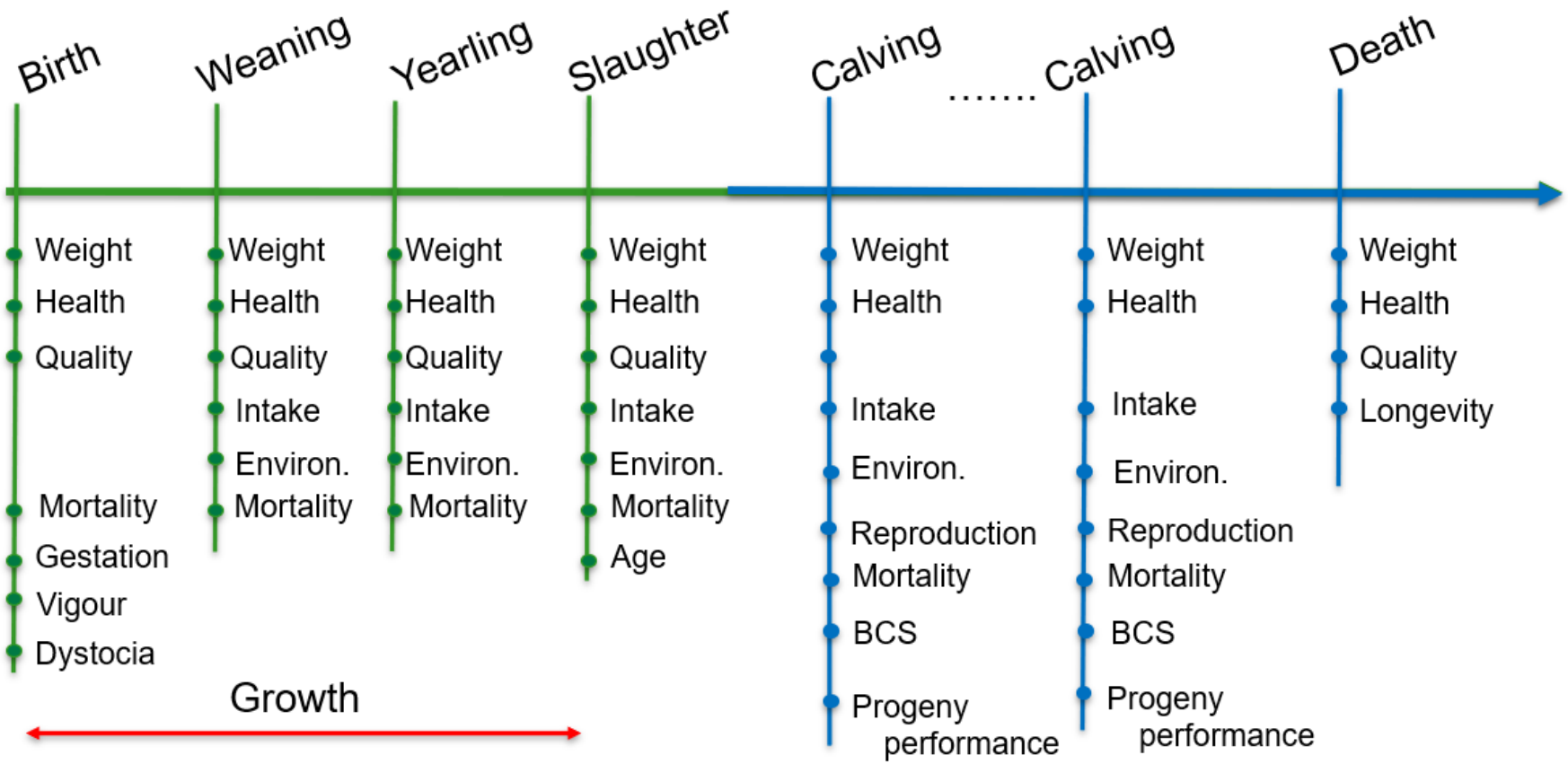
ICBF Central Database; Uniquely different.





- Unique sharing of data by relevant stakeholders => shared “common good”.
- ICBF don’t own animals.
- Routine consolidation & extraction => Independent genetic evaluations for farmers & industry.

Genetic Improvement in the Irish Beef Herd; Data.



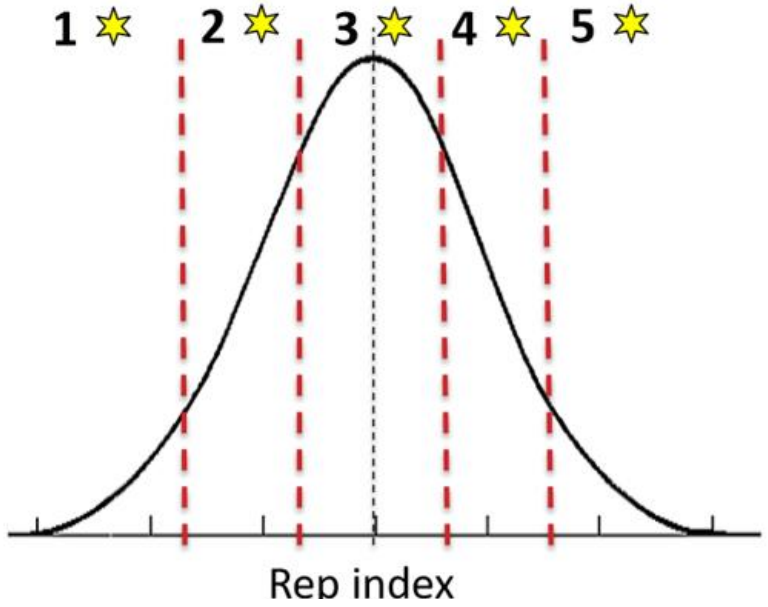
- Evaluations are;
  - Seedstock & commercial data (50k seedstock registrations per year and 900k commercial).
  - Multi-breed.
- Data volumes;
  - Growth/carcass – ~10m
  - Cow fertility – ~8m.
  - Calving – ~15m
  - Genotypes – ~2.5m
  - Foreign EBV's – ~50k
- 2-step genomic evaluations, every 2 months. Moving to single step.

Genetic Improvement in the Irish Beef Herd; Indexes.

Euro-Star Replacement Index

Trait	Economic Weight (€ Unit)	Trait Emphasis	Trait Type
Maternal Calving Difficulty	-4.98	6%	Cow Traits 71%
Age 1st Calving	-0.99	6%	
Calving Interval	-5.07	9%	
Survival	8.86	8%	
Milk	5.58	18%	
Heifer Intake	-0.76	8%	
Cow Intake	-0.55	6%	
Cow Docility	77.27	4%	
Cull Cow Weight	0.91	7%	
Calving Difficulty	-5.12	7%	Calf Traits 29%
Gestation	-2.48	2%	
Mortality	-5.87	1%	
Docility	14.72	1%	
Feed Intake	-0.07	4%	
Carcass Weight	2.1	10%	
Carcass Conformation	10.22	3%	
Carcass Fat	-5.44	1%	

- What do the star ratings mean?



- Past focus on terminal traits => deterioration of maternal traits.
- Replacement index introduced in 2014 to improve maternal traits & maintain terminal traits.

Genetic Improvement in the Irish Beef Herd; Lists.

HerdPlus Profit through Science

Beef Active Bulls (Replacement)

(Printed 06/11/20)

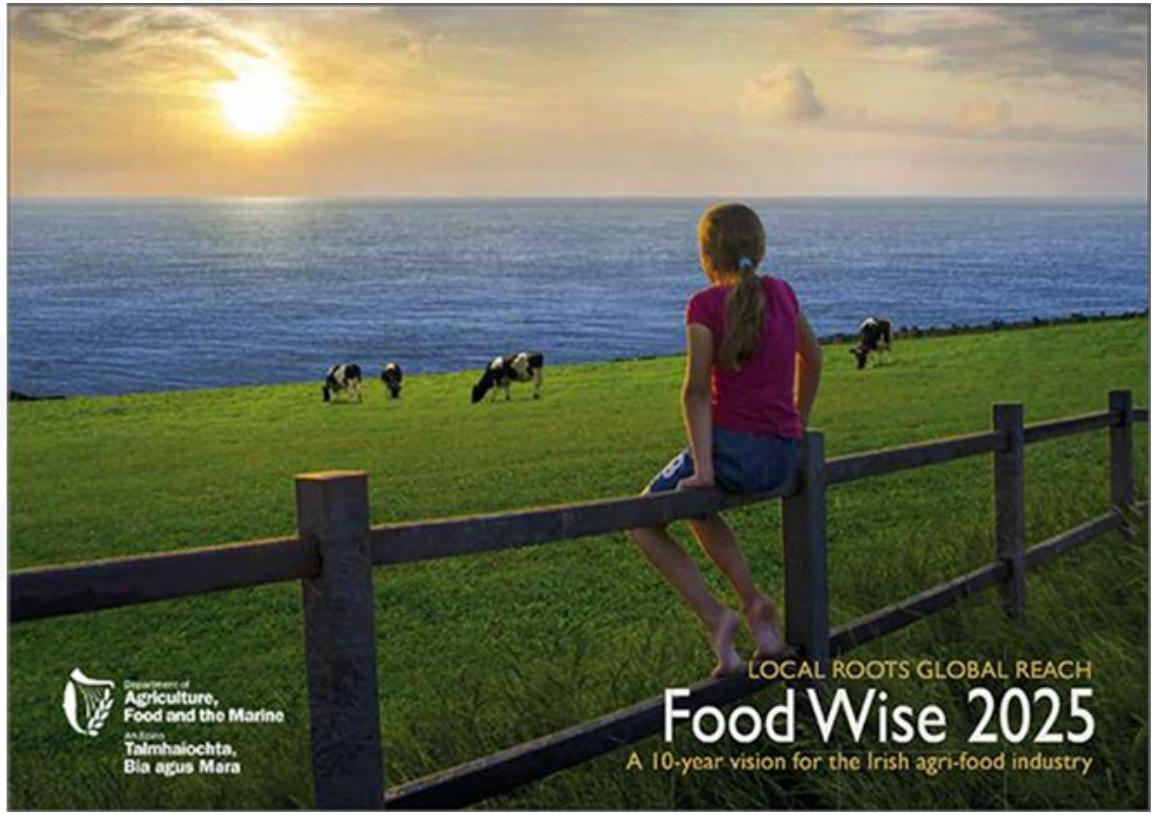
icbf

Animal Details					Replacement				Calving						Docility		Daughter Traits						Semen Details			
Rank	Code	Bull Name	Brd	GI	Index	Rel %	St W	St A	Heife	Rel	Cow	Rel	GL	Rel	Docil	Rel %	MCD	Rel %	Milk	Rel %	CI	Rel %	Avail	Beef	Price	Supplier
1	SA2189	Ulsan	SA	No	264	85	5	5	3.6	98	0.8	97	-1.1	99	-0.2	99	4.5	84	9.8	92	-7.6	65	High	2140	10	Dovea
2	SA4059	Beguin	SA	No	251	77	5	5	4.3	94	1.5	95	0.1	98	-0	97	4.1	69	13.9	84	-6	50	Medi	693	26	NCBC
3	SA4604	Knottown Roy	SA	Yes	250	57	5	5	5.6	93	1.4	93	-0.2	98	0.1	90	5.3	58	11.9	49	-3.8	41	High	593	10	NCBC
4	SA2153	Highfield Odran	SA	Yes	233	85	5	5	5.3	97	2.2	98	1.1	99	-0	99	6.4	80	8.1	88	-6.5	62	Medi	1818	14	NCBC
5	SI2152	Curaheen Earp	SI	Yes	217	91	5	5	8.6	97	3.5	99	1.8	99	0.09	99	4.8	91	5.2	95	-9.3	77	High	5663	10	NCBC
6	ORF	Orfevre	AU	No	211	70	5	5	5.3	50	1.3	78	1.9	65	-0.1	68	4.9	67	4.5	83	-3.2	60	Low	4	18	NCBC
7	AU4683	Turloughmore Magr	AU	Yes	205	52	5	5	6.9	60	1.8	85	0.8	96	0.12	63	6.6	56	4.8	48	-4.1	42	Medi	86	10	NCBC
8	SFL	Du Stordeur Flaneur	BB	No	202	97	5	5	10.7	98	4.4	99	-1.4	99	0.28	99	5.7	97	4.7	99	-1.5	97	Medi	6905	30	Bova
9	VTA	Vaillant	SA	No	199	87	5	5	4	89	2.4	94	1.9	96	-0.1	94	5.9	85	9.3	92	-4.5	75	High	276	14	Bova
10	HE4344	Allowdale Rambo 4	HE	Yes	189	66	5	5	12.4	63	4	85	-1.7	97	0.16	77	5.6	67	13.5	69	-5.9	44	High	52	12	NCBC
11	AA4315	Lanigan Red Mikado	AA	No	182	64	5	5	4.7	89	1.1	91	0.1	94	0.06	94	7.5	63	14.5	50	-5.2	49	High	336	10	Bova
12	SA4060	Baron	SA	No	182	60	4	5	3.6	53	2.5	74	0.4	83	-0	74	7	55	9.4	71	-3	40	High	38	22	NCBC
13	AU4563	Johnstown Loyd 103	AU	Yes	181	54	5	5	5.5	80	1.7	88	-1.3	99	0.06	83	5.4	52	5.1	45	-1.7	38	Medi	207	10	NCBC
14	LM4007	Tomschoice Jet	LM	No	179	75	5	5	11.7	94	6.2	97	2.3	99	0	98	3.9	69	7.0	71	-0.6	49	High	1414	12	Eurogene
15	SPL	Solpoll 1 Handsome	HE	No	178	96	5	5	7	97	2.5	98	0.7	99	0.12	98	4.9	98	4.2	98	-7.9	94	High	1793	10	NCBC
16	AHC	Auroch Deuter Pp	SI	Yes	177	88	5	5	7.7	87	2.9	99	1.5	99	0.06	98	5.5	85	9.4	91	-0.8	69	High	1563	10	NCBC
17	CH2218	Bivouac	CH	No	176	78	5	5	11.3	93	3.7	99	-1.8	99	0.11	99	5.3	72	3.2	84	-4.6	52	High	2893	10	Dovea
18	AA4075	Oakchurch De Admi	AA	No	176	63	5	5	4.4	70	1.9	84	-3.2	96	0.03	71	6.9	58	14.4	55	-4.3	43	High	91	14	Eurogene
19	LM2014	Ewdenvale Ivor	LM	Yes	174	83	5	5	5.8	99	2.5	99	3	99	-0.1	99	5.7	78	-2.0	86	-2.5	57	High	6704	10	Dovea
20	ZLL	Lanigan Red Deep C	AA	No	174	93	5	5	4.9	98	1.3	98	-1.3	99	0.07	99	7.8	93	11.1	97	-5.1	83	Low	1805	30	Bova

- Top 20 Active AI bulls => Range of breeds + both foreign and Irish bred/tested (shaded yellow).

Irish Beef Data and Genomics Program.

- More profitable, sustainable & carbon efficient cows.
- €300m total funding 6 years (2015-2020), as part of RDP.
  - Farmers paid ~€90/cow/year to complete key actions, e.g., genotyping, data recording, replacing with 4/5 star cows & bulls.
  - ~24k farms & 550k cows. ~2.5m animals genotyped to-date.
- Supplemented with additional BEEP scheme in 2019 (BEEP-S).



BDGP; Smart, green growth. Using the latest technology to help support an important indigenous industry.

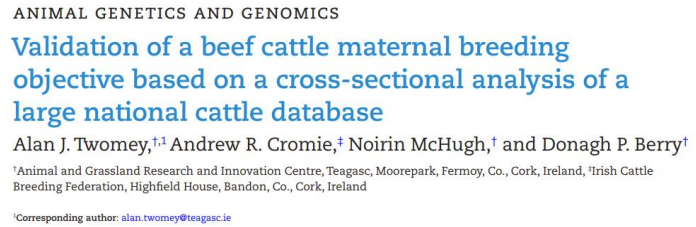
Validation; Selection on Rep Index.

Table 1. A validation comparison of suckler cows ranked on €uro-Star Replacement Index, based on key performance metrics*

Genetic Merit		Cow Traits						Calf Traits		Progeny Carcass Traits			
Group	Rep Index	Age 1st Calving Days	CI Days	Cow Lwt Kg	Surv %	Wean Wt kg	Wean Eff %	Birth Wt kg	Calv Assist %	Age at Slau Days	Carcass Wt Kg	Carc conf (1-15)	Carc fat (1-15)
Very low	€33	990	391	730	83	291.1	39.9%	44.7	0.15	745	389.4	8.29	8.15
Average	€92	986	390	702	85	292.0	41.6%	43.9	0.13	743	387.1	8.31	8.17
Very high	€153	977	389	702	87	294.8	42.0%	43.6	0.11	740	388.1	8.22	8.26

** Validation based on ¾ bred suckler cows born in 2012 & 2013, with subsequent cow and progeny performance data. All metrics corrected to equivalent performance for a 3rd parity cow (Twomey, 2020, in press).*

- Validation based on 92k commercial females, taking their evaluations at birth and establishing how well these evaluations predicted lifetime performance.
- Confident that index is taking us in the right direction; How can we go faster??



ANIMAL GENETICS AND GENOMICS

Validation of a beef cattle maternal breeding objective based on a cross-sectional analysis of a large national cattle database

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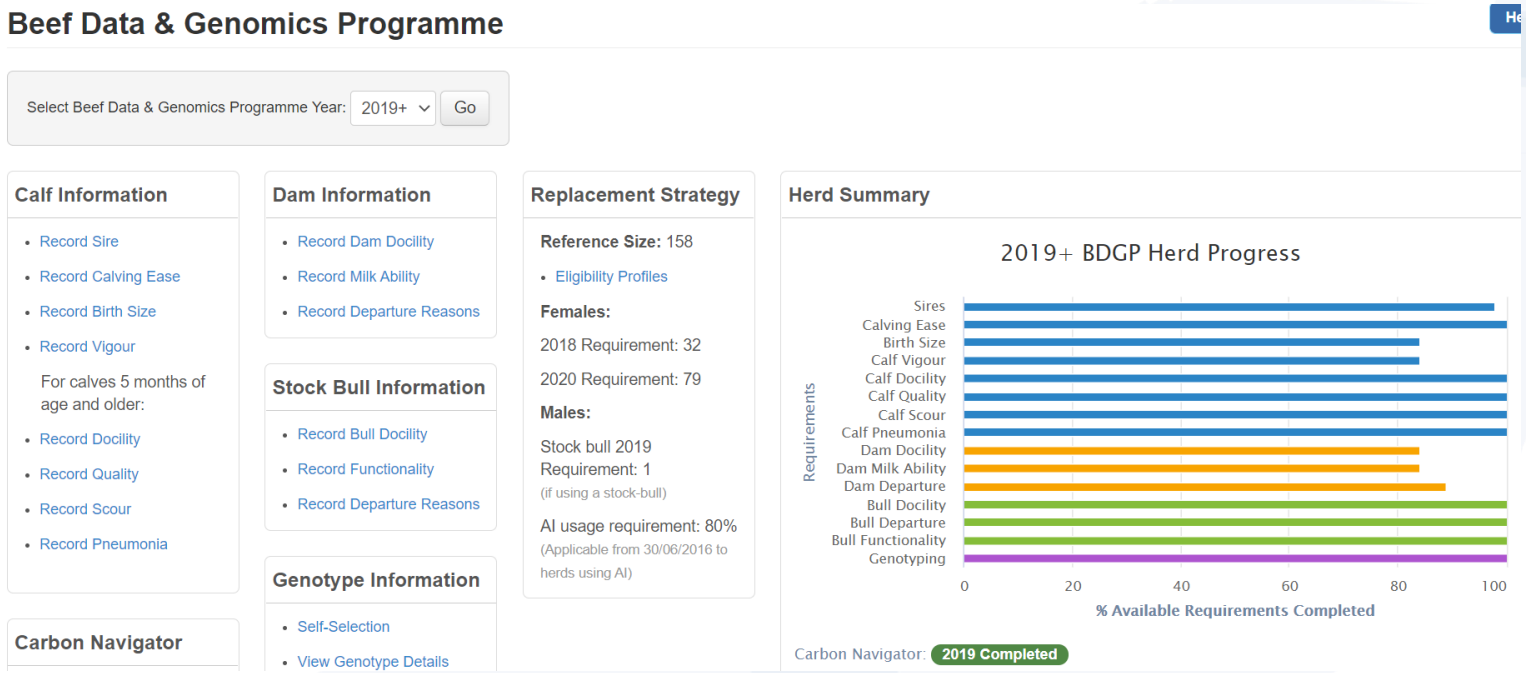
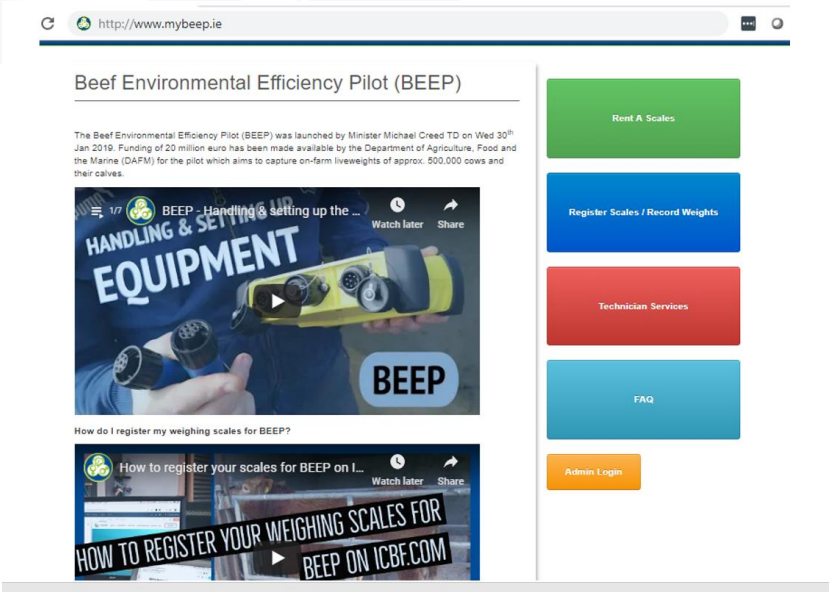
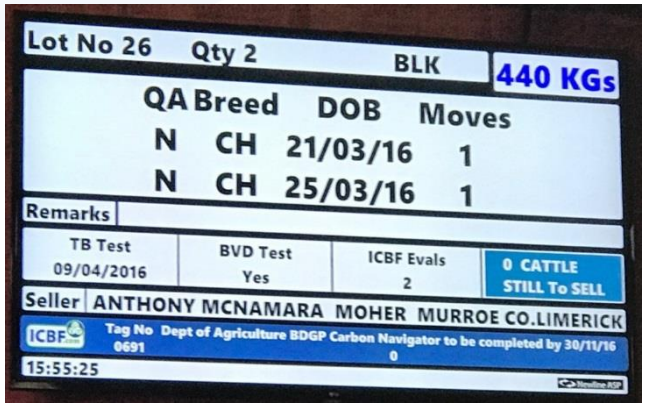
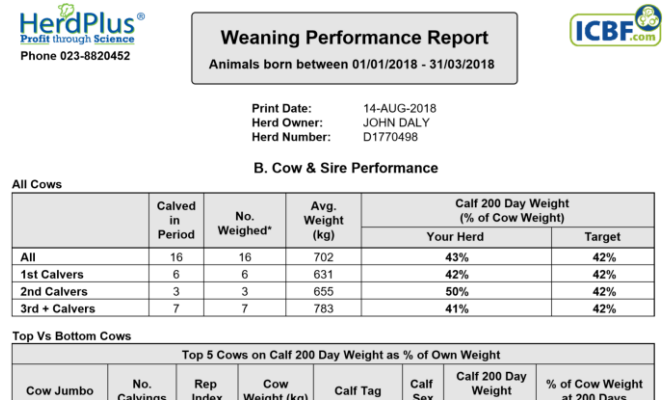
BDGP & BEEP-S; Implementation.





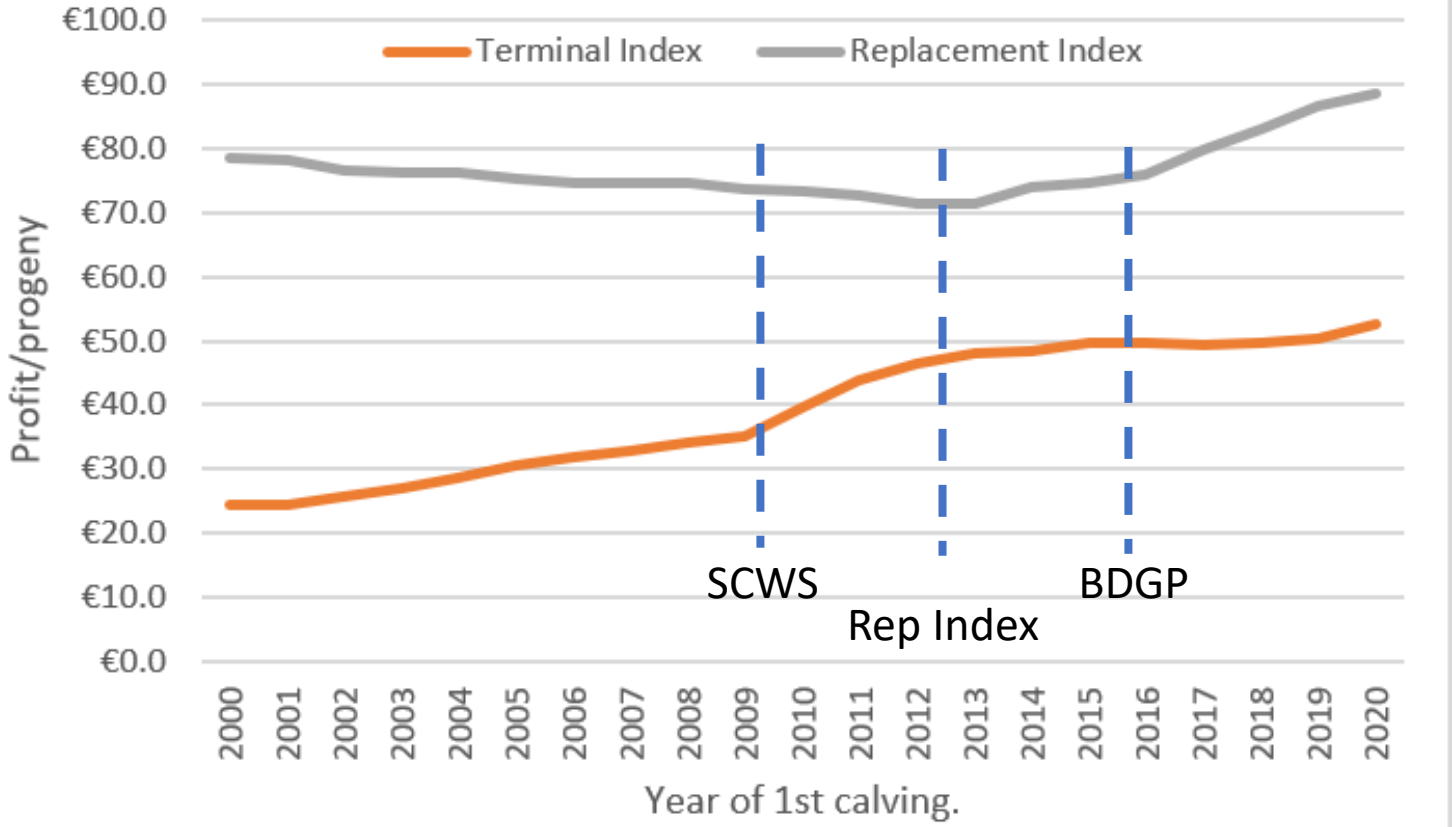
- Range of "enablers" introduced to support implementation of programs on the ground.
  - Includes systems to support action-based payments to program participants.
- Have the programs delivered?





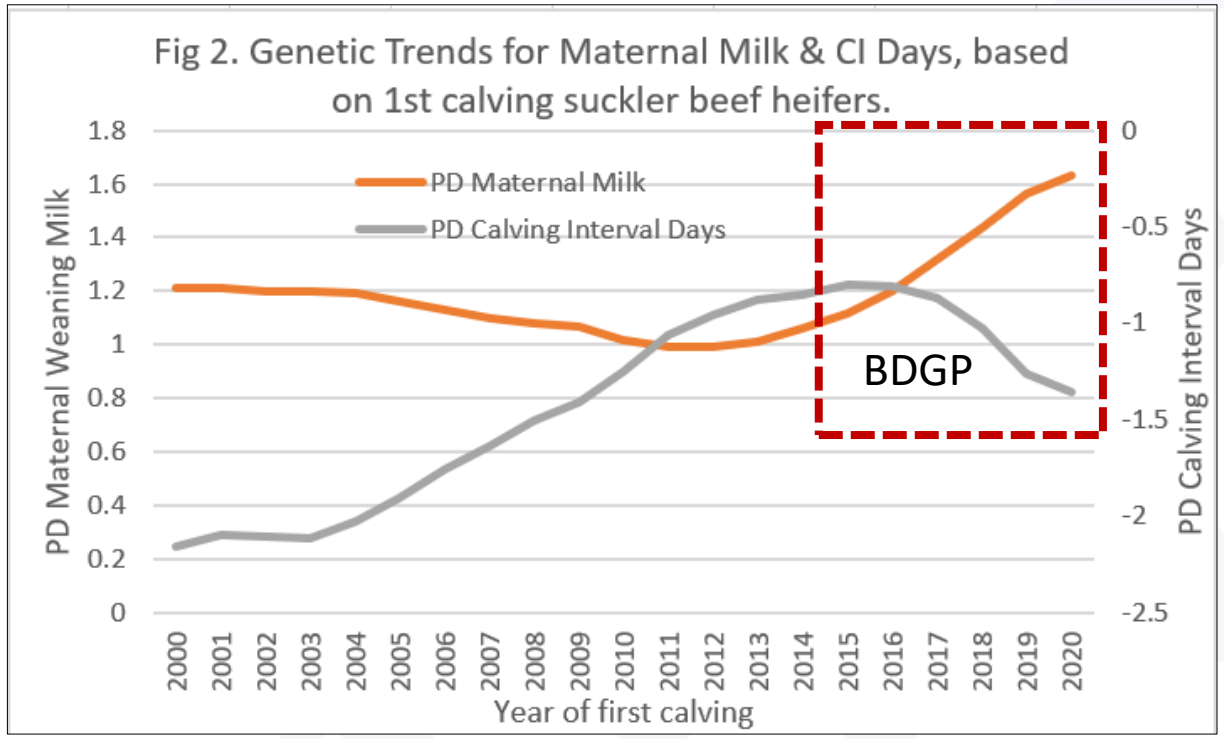
Genetic Trends within the Suckler Beef Herd (i).

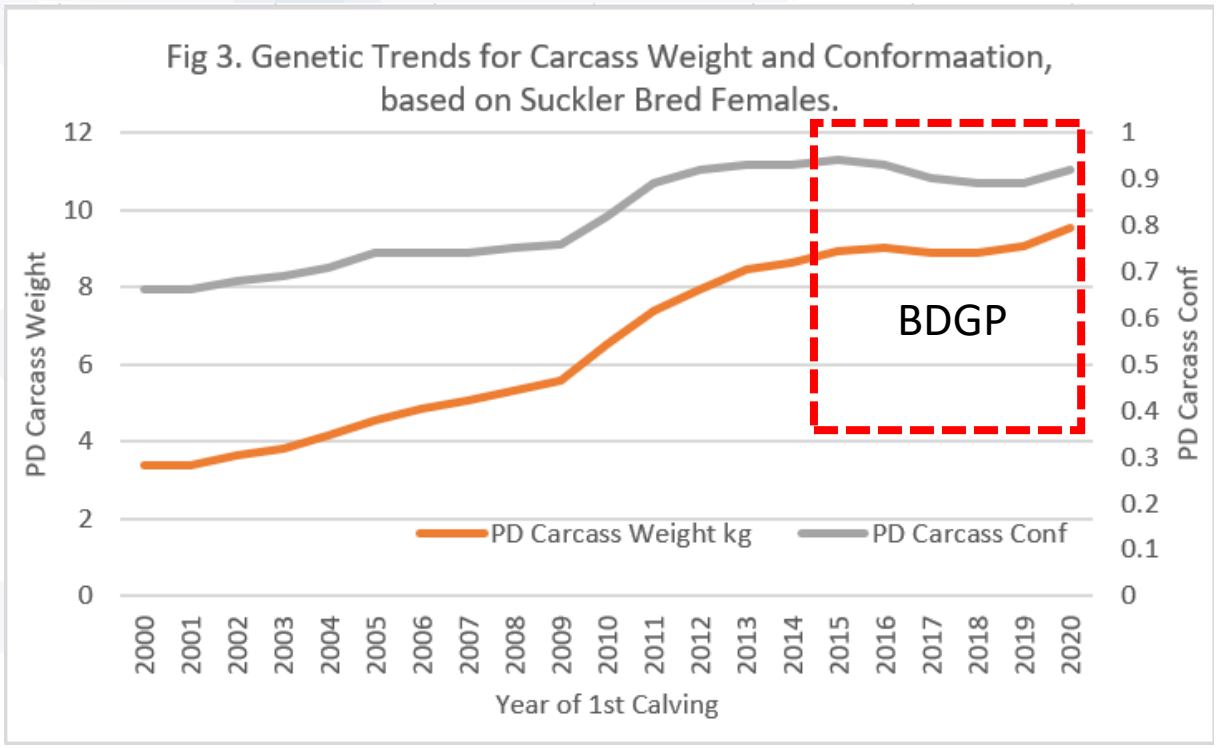
Fig 1. Genetic Trends for Replacement & Terminal Index, based on 1st Calving Suckler Beef Females.



- Genetic Improvement in the Suckler Beef Herd defined by three significant events;
  - 2007. Introduction of Suckler Cow Welfare Scheme (SCWS). Resulted in increased sire recording => more accurate evaluations & faster genetic gain for terminal traits.
  - 2011. Establishment o the Replacement Index (Rep Index) => Shifting emphasis away from terminal traits towards maternal traits.
  - 2015. Beef Data and Genomics Program (BDGP) =Utilizing genomics + better data recording to accelerate genetic gain for maternal traits.

Genetic Trends within the Suckler Beef Herd (ii).





- Impact of BDGP most pronounced => now accelerating gains in milk and fertility traits, whilst holding carcass weight and conformation traits constant.

Trends in Slaughter Performance.

T1. Trends in average performance of steers (<30 months), based on breed group (2010-2020).

	Beef*beef					Beef*Dairy					Dairy*Dairy				
Year	N	Cwt	Conf	Age	Gain/day	N	Cwt	Conf	Age	Gain/day	N	Cwt	Conf	Age	Gain/day
2010	157,559	361.2	8.00	794.8	0.45	98,664	322.9	5.94	804.5	0.40	70,598	308.5	4.25	791.6	0.39
2011	145,398	370.9	8.18	790.5	0.47	81,130	332.1	6.09	801	0.41	63,181	316.4	4.41	790.9	0.40
2012	130,767	376.0	8.20	782.2	0.48	74,404	336.3	6.02	795.3	0.42	57,050	318.7	4.38	767.9	0.42
2013	150,015	367.9	8.34	766.7	0.48	81,020	321.8	5.87	787.2	0.41	96,611	302.5	4.15	761.3	0.40
2014	160,931	369.5	8.19	800.4	0.46	94,697	328.6	5.85	801.1	0.41	113,444	311.9	4.12	793.1	0.39
2015	189,453	380.7	8.42	793.1	0.48	103,650	333.9	5.92	787.5	0.42	117,111	315.7	4.16	783	0.40
2016	197,856	380.8	8.32	790.0	0.48	130,759	334.3	5.76	784.6	0.43	112,091	316.9	4.06	780.7	0.41
2017	207,709	380.6	8.20	793.3	0.48	160,843	333.6	5.62	787.4	0.42	136,843	311.7	3.88	775.3	0.40
2018	178,599	379.4	8.23	794.2	0.48	161,794	326.9	5.48	780.8	0.42	133,207	307.9	3.79	775	0.40
2019	157,853	385.5	8.35	795.8	0.48	161,648	333.7	5.71	783.1	0.43	103,658	313.4	3.99	776.2	0.40
2020	202,958	389.5	8.40	791.9	0.49	192,116	337.9	5.66	785.7	0.43	118,129	318.9	3.99	782.4	0.41

- No decline in performance/efficiency of suckler beef herd. Significant increase in number of <30 month suckler bred steers now being slaughtered (+45k).

Key performance & sustainability metrics.

T1. Impact of Herd Replacement Index on key performance & sustainability metrics*

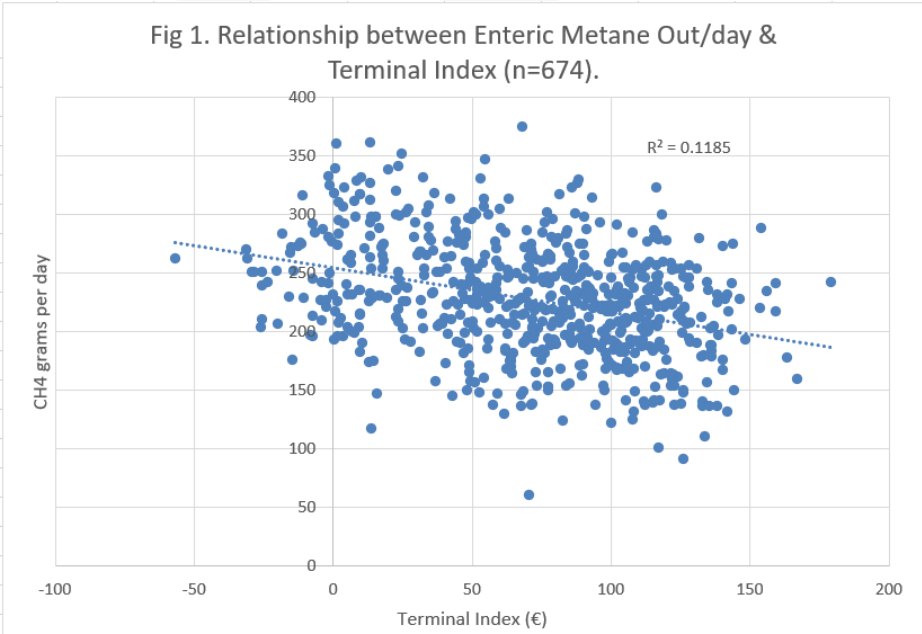
		Replacement Index €urostars					
Herd Average Trait	Source	SD	Btm 20%	Btm 21-40%	Average	Top 21-40%	Top 20%
Average Replacement Index	ICBF/BDGP		€42	€63	€80	€96	€122
Cow Liveweight (All parities; kg)	BEEP	56.0	688.8	669.5	664.3	655.5	651.6
Calf 200 day Liveweight (kg)	BEEP	34.8	279.7	280.1	284.9	286.3	287
Weaning Efficiency (%)	BEEP	5.5	40.8	42.0	43.0	43.9	44.3
Calving Interval (days)	ICBF	28.7	399.1	394.2	389.8	384.6	387.7
Calves/cow/year	ICBF	0.12	0.85	0.88	0.89	0.91	0.91
Profit/livestock unit	Teagasc		€207	€219	€238	€244	€262
Carbon Footprint (GHG/kg)	Bord Bia	1.82	13.16	12.97	12.82	12.42	11.91

David Kelly, PhD, Teagasc.

- Analysis based on 3,150 herds with valid carbon footprint, BEEP, and genetic merit data from 2020 for analysis

Current priorities; Methane Yield.

- To date, 674 animals have direct measurement of growth, feed intake & methane output/day from Tully. Clear breed & gender differences.
- Indexes are moving us in right direction => validation of BDGP.
- Also clear evidence of genetic variation in traits (15-20%), above what we can predict from biological models *(as part of DAFM funded GreenBreed project)*



T1. Animal performance, by breed & gender for key performance & climate metrics.

	Suckler Steer	Suckler Heifer	Suckler Young Bulls	Dairy Beef Steers	Dairy Steers
Records	206	245	90	92	*Under test*
Beef merit index (€/animal)	€167	€167	€175	€14	*Under test*
ADG (kg/day)	1.40	1.32	2.00	1.83	*Under test*
Carcass weight (kg)	362	310	393	342	*Under test*
Age at slaughter (mths)	18.9	16.7	16.3	21.2	*Under test*
Carcass daily gain (cwt/day)	0.63	0.61	0.79	0.53	*Under test*
Feed intake (DMI kg/day)	11.1	10.2	12.6	14.0	*Under test*
Methane output (g/day)	242	220	153	282	*Under test*

- Tully now the largest site globally measuring methane output in cattle.
- Can we expand on this and other sites?
  - Genetics, role of additives, indoor vs outdoors.
- Goal of having genomic predictions for methane traits by 2022. Accuracy will depend on number of phenotypes.

Current priorities; Age at Slaughter.

The voice of Ireland's farming industry

IRISH FARMERS JOURNAL

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IRISH COUNTRY LIVING

'Slash suckler herd' – climate report

HANNAH QUINN-MULLIGAN
NEWS CORRESPONDENT

Drastic measures to cut the Irish suckler herd by as much as 53% have been recommended by the Government's Climate Change Advisory Council.

It assessed three scenarios of cutting the suckler herd by 15%, 30% and 53% to reduce overall agricultural emissions.

Suckler cow reductions of between 304,000 and 536,000 are favoured by the chair of the council, Prof John Fitzgerald. This would mean a 30% or 53% cut to the current suckler herd.

Agriculture accounts for 32.1% of Ireland's greenhouse gas emissions, the highest of any sector.

The country will miss its 2030 target unless agriculture emissions are reduced.

Increasing forestry and adopting low-emission slurry spreading would not be enough to meet 2030 targets without reducing cattle numbers, Fitzgerald said.

The report recommends an "extensification" process be included in the next CAP.

Farmers would be guaranteed their full direct payment from CAP for reducing numbers, the report says.

It also suggests cutting the payments of more intensive farmers to pay suckler farmers who opt to reduce numbers.

"We're not trying to wipe out a sector," Fitzgerald told the *Irish Farmers Journal*. "What we're suggesting is a steady [herd] reduction over the next 12 years."

He also questioned future expansion for the dairy herd.

"We really need to stop expanding the dairy herd," Fitzgerald said.

"If there is any increase in the dairy herd then we need a bigger reduction in the suckler herd."

See pages 8-9

Tullamore Farm open day

Farm manager Shaun Diver and Irish Farmers Journal tillage editor Andy Doyle talk to a section of the 4,500-strong crowd at the Tullamore Farm beef and sheep open day in association with FBD Insurance on Wednesday. The sheep system was the shining light on the farm in 2018, delivering a net margin of €560/ha when ANC and ewe payments are included.

See more on page 3

Philip Doyle

T1. Overview of prime cattle killed from the National herd in 2020.

Gender	Num	%	Cwt	Age days	Age mths
Heifer	506,055	38.4%	317	796	26.2
Steers	679,199	51.5%	358	848	27.9
Young Bulls	134,074	10.2%	378	592	19.5
Overall	**1,319,328**	**100.0%**	**345**	**802**	**26.4**

T2. Impact of reducing age at slaughter on GHG output. Expressed per 1 month reduction.

Potential reduction in age at slaughter from genetic/systems.	**30**
CH4/day (kg/day at Tully based on GreenFeed machines)	0.25
Convert to CH4 to GHG/CO2 eq (factor is 25)	6.25
GHG (CO2 equivs) saved per animal, expressed in tonnes/month	0.1875
GHG (CO2 equivs) saved per animal, across all prime beef cattle (tonnes/month)	**247,374**

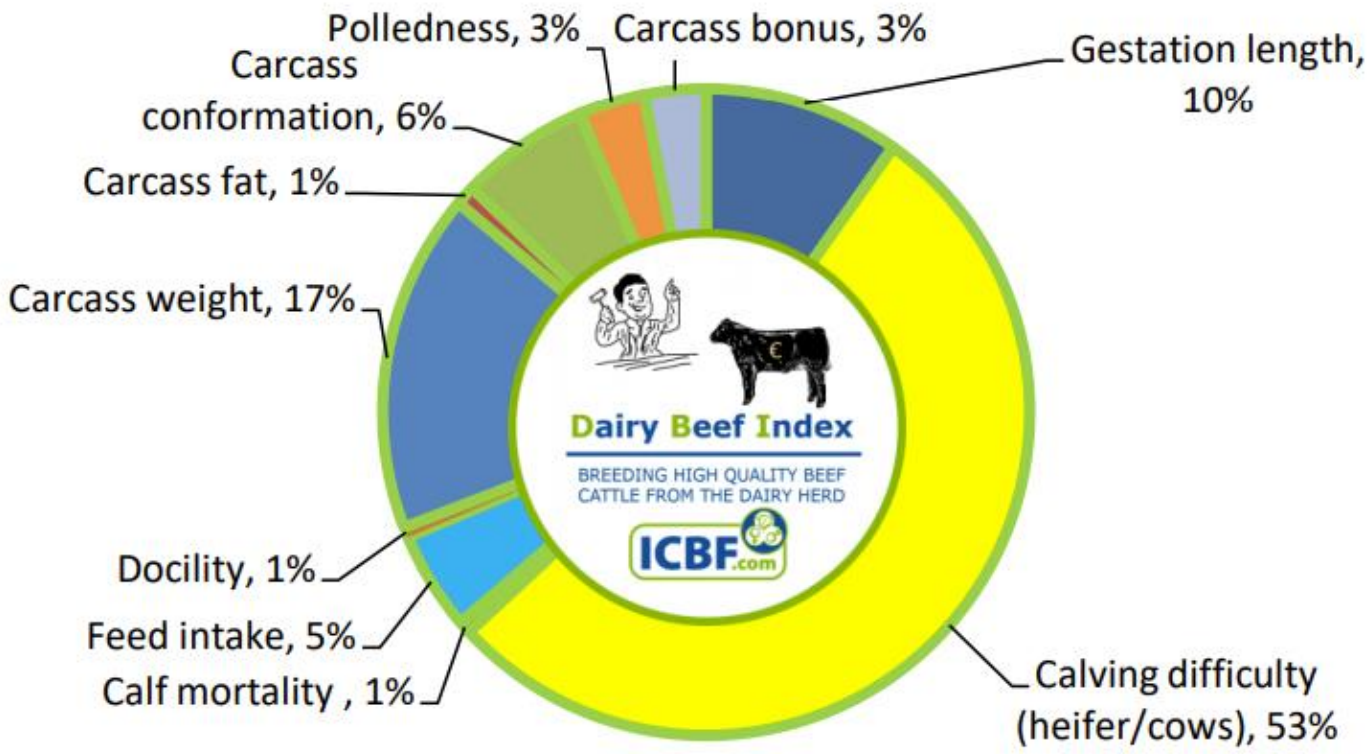
T3. Impact of reducing age at slaughter on GHG output, expressed in cow numbers, per 1 month reduction.

Current herd - Count cows (dairy & beef).	2,500,000
GHG output per cow (expressed/tonne/year)*	2.55
Total GHG (CO2 equivs) national cow herd	6,375,000
One month reduction in slaughter age in cow eqiuvalents (%)	3.88%
Expressed as a % of National Cow Herd	**97,009**

** Blended figure of 2.55 tonnes/cow/year, based on dairy and beef cow figures (as per EPA, 2020).*

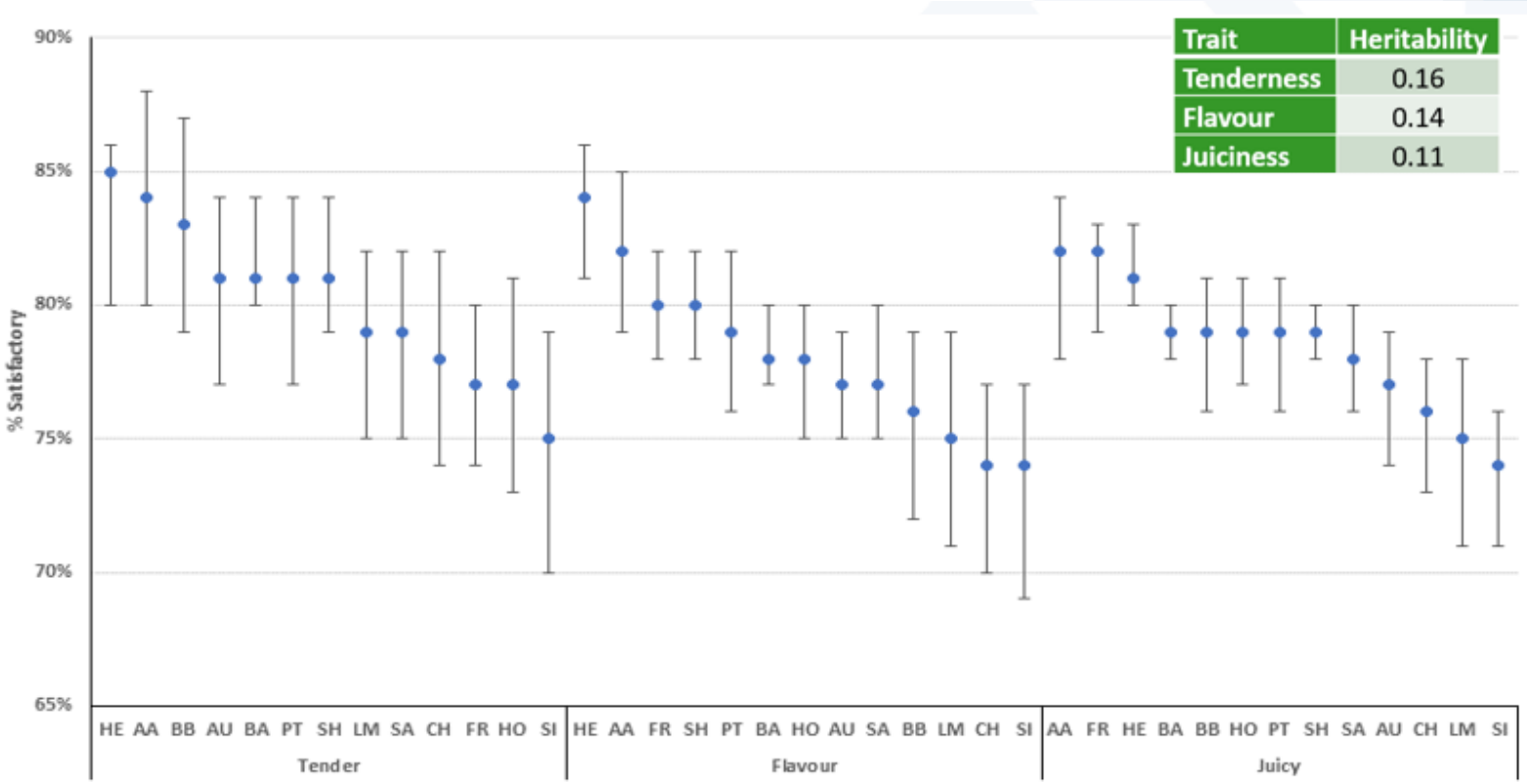
- Taking current prime cattle kill (of 1.32m cattle in 2020), each 1 month reduction in age at slaughter, has potential to remove 247 KT of GHG. Equivalent to NOT having to cull 97k cows from the National herd.
- A very positive outcome for farmers and industry => can we get alignment around this as a proposition?

Current priorities; Beef from Dairy.



- Continued expansion of National dairy herd (+5%/year for last 10 years).
- Improved fertility performance (impact of EBI).
- Level of beef from dairy has now doubled => approaching ½ our total beef production.
- Need to identify bulls that are;(i) easy calving & short gestation, AND (ii) that will produce a “good” calf.
- A challenging task!

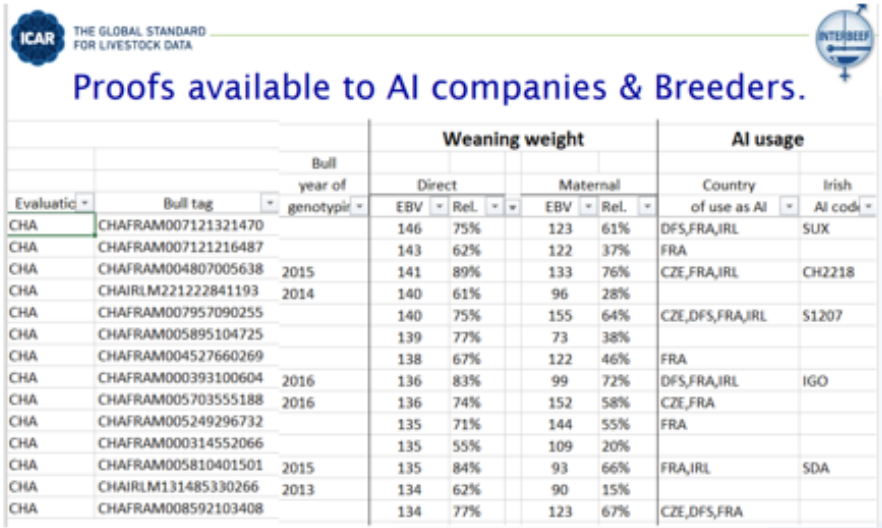
Current priorities; Meat Eating Quality.



Trait	Heritability
Tenderness	0.16
Flavour	0.14
Juiciness	0.11

- Major 5 year project involving ICBF, Teagasc and meat processing industry.
- ~6k animals with meat eating quality data and with genotypes.
- Phenotypes based on trained panel data (~8 obs/animal).
- Very good heritability estimates.
- As expected, AA and HE ranking best, but good & bad bulls within all breeds. How would Wagyu compare?!
- Moving to have MEQ data available on animals as they are slaughtered => link with future payment systems.
- Work underway to add directly into economic indexes.

Current priorities; ICAR & Interbeef.



ICAR THE GLOBAL STANDARD FOR LIVESTOCK DATA — INTERBEEF

Proofs available to AI companies & Breeders.

			Weaning weight				AI usage	
		Bull year of	Direct		Maternal		Country	Irish
Evaluatic	Bull tag	genotypir	EBV	Rel.	EBV	Rel.	of use as AI	AI cod
CHA	CHAFRAM007121321470		146	75%	123	61%	DFS,FRA,IRL	SUX
CHA	CHAFRAM007121216487		143	62%	122	37%	FRA	
CHA	CHAFRAM004807005638	2015	141	89%	133	76%	CZE,FRA,IRL	CH2218
CHA	CHAIRLM221222841193	2014	140	61%	96	28%		
CHA	CHAFRAM007957090255		140	75%	155	64%	CZE,DFS,FRA,IRL	S1207
CHA	CHAFRAM005895104725		139	77%	73	38%		
CHA	CHAFRAM004527660269		138	67%	122	46%	FRA	
CHA	CHAFRAM000393100604	2016	136	83%	99	72%	DFS,FRA,IRL	IGO
CHA	CHAFRAM005703555188	2016	136	74%	152	58%	CZE,FRA	
CHA	CHAFRAM005249296732		135	71%	144	55%	FRA	
CHA	CHAFRAM000314552066		135	55%	109	20%		
CHA	CHAFRAM005810401501	2015	135	84%	93	66%	FRA,IRL	SDA
CHA	CHAIRLM131485330266	2013	134	62%	90	15%		
CHA	CHAFRAM008592103408		134	77%	123	67%	CZE,DFS,FRA	

CH5980
Jalabert
DOB: 15-Oct-2014
Bred by Earl Cazard Vivier, France

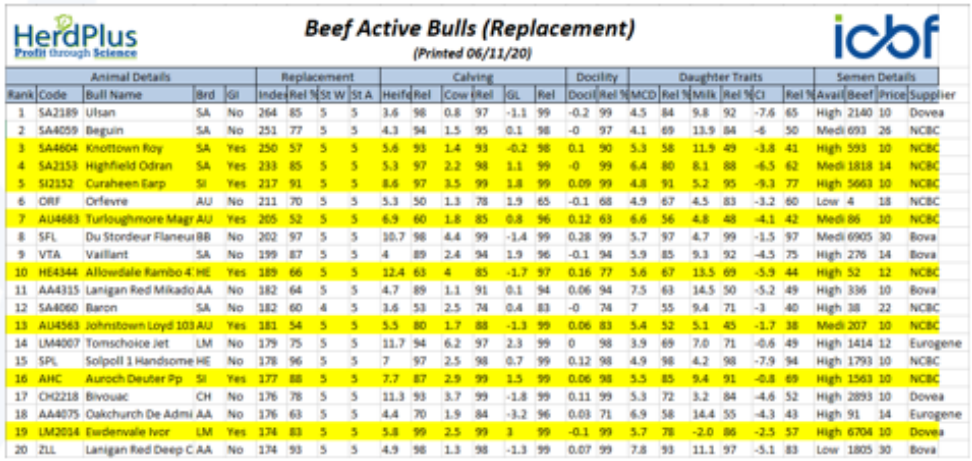
Myostatin Free

Veime — Natur, Ovation
Fanette — Viviers, Uranie

"French bred son of the proven easy calver Veime"

Star Rating (Within Breed)	Economic Indexes	€ Value	Index Reliability	Star Rating (Across Breed)
★★★★★	Replacement Index	€110	46%	★★★★★
★★★	Terminal Index	€129	52%	★★★★
CALVING DIFFICULTY (births requiring considerable assistance: %3 & 4)				
When Mated With				
Beef Cow	Breed avg: 5.66%, All breeds avg: 3.83%	+4.5%	69% (High)	
Beef Heifer	Breed avg: 10.89%, All breeds avg: 8.27%	+12.4%	43% (Average)	
Star Rating (Within Breed)	**Key Replacement Profit Traits**	**Value**	**Reliability**	**Star Rating (Across Breed)**
EXPECTED PROGENY PERFORMANCE				
★★★	Docility (1-5 scale)	0.04	43%	★★★★
★★★★	Carcass Weight (Kg)	+36.3kg	55%	★★★★★
★	Carcass Conformation (1-15 scale)	+1.45	54%	★★★
EXPECTED DAUGHTER BREEDING PERFORMANCE				
	Daughter Calving Diff (%3&4)	+3.1%	54%	
★★★★★	Daughter Milk (Kg)	+5kg	49%	★★★★
★★★	Daughter Calving Interval (days)	-1.2 days	35%	★★★

To order straws call 023 8820452



HerdPlus Profit through Science

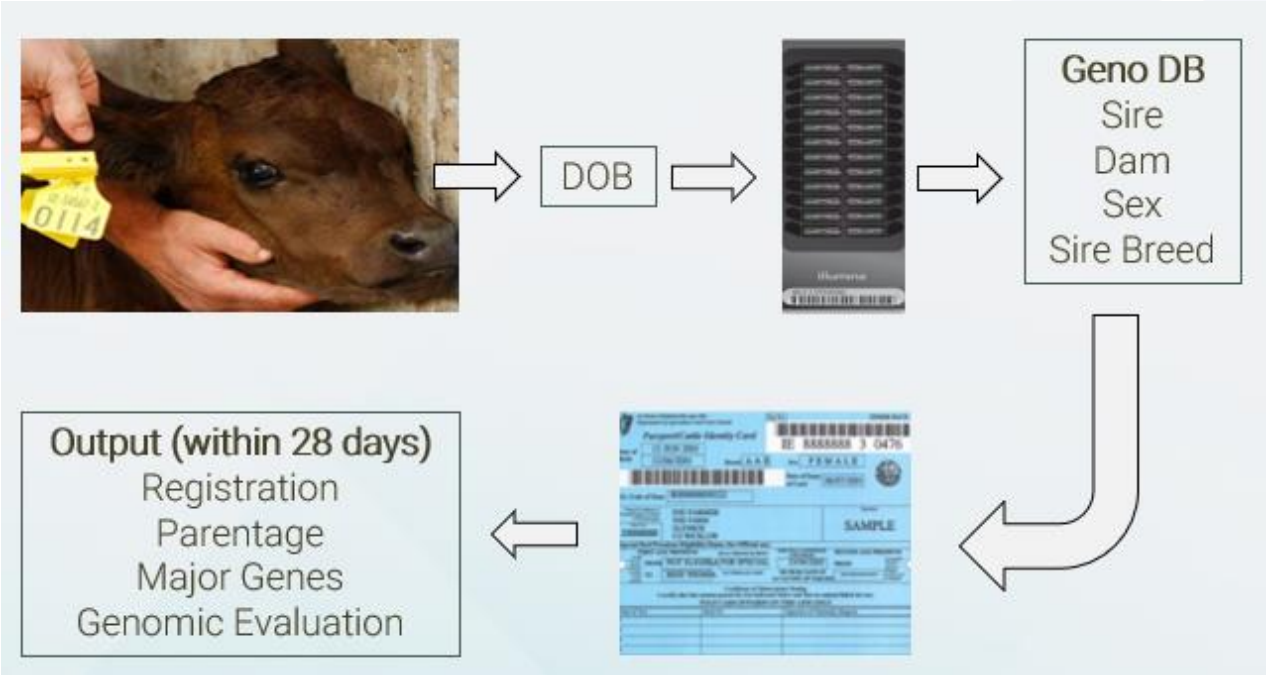
Beef Active Bulls (Replacement)
(Printed 06/11/20)

icbf

	Animal Details				Replacement				Calving						Docility		Daughter Traits						Semen Details			
Rank	Code	Bull Name	Brd	GI	Inde	Rel %	St W	St A	Heife	Rel	Cow	Rel	GL	Rel	Docil	Rel %	MCD	Rel %	Milk	Rel %	CI	Rel %	Avail	Beef	Price	Supplier
1	SA2189	Ulsan	SA	No	264	85	5	5	3.6	98	0.8	97	-1.1	99	-0.2	99	4.5	84	9.8	92	-7.6	65	High	2140	10	Dovea
2	SA4059	Beguin	SA	No	251	77	5	5	4.3	94	1.5	95	0.1	98	-0	97	4.1	69	13.9	84	-6	50	Medi	693	26	NCBC
3	SA4604	Knottown Roy	SA	Yes	250	57	5	5	5.6	93	1.4	93	-0.2	98	0.1	90	5.3	58	11.9	49	-3.8	41	High	593	10	NCBC
4	SA2153	Highfield Odran	SA	Yes	233	85	5	5	5.3	97	2.2	98	1.1	99	-0	99	6.4	80	8.1	88	-6.5	62	Medi	1818	14	NCBC
5	SI2152	Curaheen Earp	SI	Yes	217	91	5	5	8.6	97	3.5	99	1.8	99	0.09	99	4.8	91	5.2	95	-9.3	77	High	5663	10	NCBC
6	ORF	Orfevre	AU	No	211	70	5	5	5.3	50	1.3	78	1.9	65	-0.1	68	4.9	67	4.5	83	-3.2	60	Low	4	18	NCBC
7	AU4683	Turloughmore Magr	AU	Yes	205	52	5	5	6.9	60	1.8	85	0.8	96	0.12	63	6.6	56	4.8	48	-4.1	42	Medi	86	10	NCBC
8	SFL	Du Stordeur Flaneur	BB	No	202	97	5	5	10.7	98	4.4	99	-1.4	99	0.28	99	5.7	97	4.7	99	-1.5	97	Medi	6905	30	Bova
9	VTA	Vaillant	SA	No	199	87	5	5	4	89	2.4	94	1.9	96	-0.1	94	5.9	85	9.3	92	-4.5	75	High	276	14	Bova
10	HE4344	Allowdale Rambo 4	HE	Yes	189	66	5	5	12.4	63	4	85	-1.7	97	0.16	77	5.6	67	13.5	69	-5.9	44	High	52	12	NCBC
11	AA4315	Lanigan Red Mikado	AA	No	182	64	5	5	4.7	89	1.1	91	0.1	94	0.06	94	7.5	63	14.5	50	-5.2	49	High	336	10	Bova
12	SA4060	Baron	SA	No	182	60	4	5	3.6	53	2.5	74	0.4	83	-0	74	7	55	9.4	71	-3	40	High	38	22	NCBC
13	AU4563	Johnstown Loyd 103	AU	Yes	181	54	5	5	5.5	80	1.7	88	-1.3	99	0.06	83	5.4	52	5.1	45	-1.7	38	Medi	207	10	NCBC
14	LM4007	Tomschoice Jet	LM	No	179	75	5	5	11.7	94	6.2	97	2.3	99	0	98	3.9	69	7.0	71	-0.6	49	High	1414	12	Eurogene
15	SPL	Solpoll 1 Handsome	HE	No	178	96	5	5	7	97	2.5	98	0.7	99	0.12	98	4.9	98	4.2	98	-7.9	94	High	1793	10	NCBC
16	AHC	Auroch Deuter Pp	SI	Yes	177	88	5	5	7.7	87	2.9	99	1.5	99	0.06	98	5.5	85	9.4	91	-0.8	69	High	1563	10	NCBC
17	CH2218	Bivouac	CH	No	176	78	5	5	11.3	93	3.7	99	-1.8	99	0.11	99	5.3	72	3.2	84	-4.6	52	High	2893	10	Dovea
18	AA4075	Oakchurch De Admi	AA	No	176	63	5	5	4.4	70	1.9	84	-3.2	96	0.03	71	6.9	58	14.4	55	-4.3	43	High	91	14	Eurogene
19	LM2014	Eirdenvale Ivor	LM	Yes	174	83	5	5	5.8	99	2.5	99	3	99	-0.1	99	5.7	78	-2.0	86	-2.5	57	High	6704	10	Dovea
20	ZLL	Lanigan Red Deep C	AA	No	174	93	5	5	4.9	98	1.3	98	-1.3	99	0.07	99	7.8	93	11.1	97	-5.1	83	Low	1805	30	Bova

- Continuous process of working to find the best bulls globally for the breeding program. Still early days, but exciting & rewarding process.

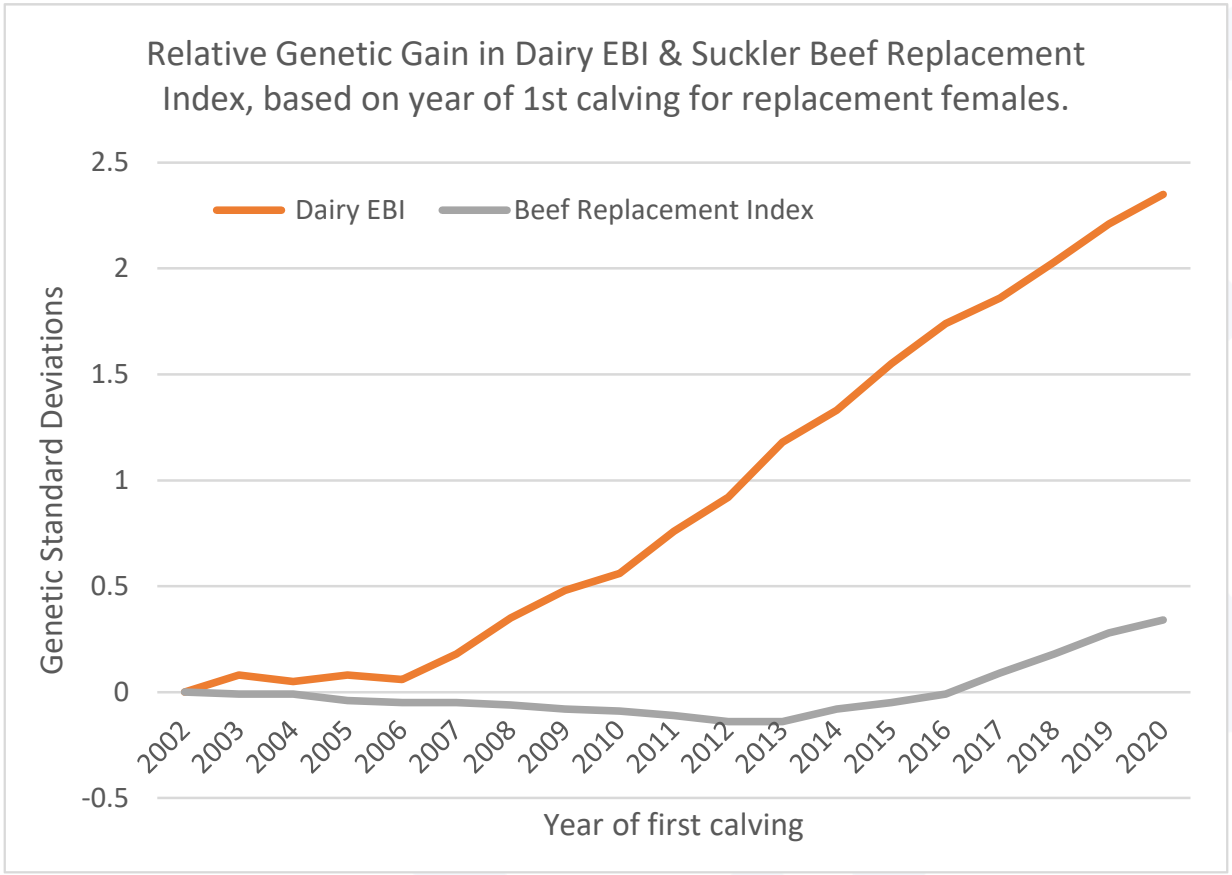
Current priorities; DNA every Calf.



- Opportunity to be world leaders in the use of science & technology to help support an important indigenous industry.

- Current pilot project with DAFM and 400 herds, where cow herd is fully genotyped and then registering resultant calves at birth based on DNA.
  - Farmer tags calf and submits DNA (from tissue tag), database works out parents!
- Cost of genotyping is €20 & decreasing.
- Can we transition our National cattle herd to DNA based calf registration over next 5 years?
- A key part of AgClimatise strategy.
- Real benefits associated with genetic gain, traceability, labour saving, R&D, market point of difference (world first) etc.
- How do we ensure an equitable approach to cost and benefit sharing? A single approach or across many different programs, e.g., BDGP?

The Future; Challenges and opportunities.



- As a result of BDGP, we are in a very strong position re: continued investment in suckler beef programs for the future.

- One of the initial objectives of BDGP was to "mimic" the genetic gain achieved in dairy, into suckler beef.
- A massive undertaking given; (i) low levels AI, (ii) many breeds, (iii) small herd size, (iv) low profitability, (v) part time farming……
- Goal of using genomics as a new technology to help kick start change.
- Program has been hugely successful in achieving this. Rates of gain have turned around in beef and are akin to dairy.
- Also, clear evidence that increases in genetic merit will result in greater sustainability and carbon efficiency for the industry.
- How do we now build on this momentum and help accelerate gains in GHG traits in the future => genotyping, more AI, age at slaughter, methane traits, more AI, ICAR/Interbeef…….