IRISH CATTLE BREEDING FEDERATION

How ICBF and cattle genetics are changing the sustainability game



Kevin Downing

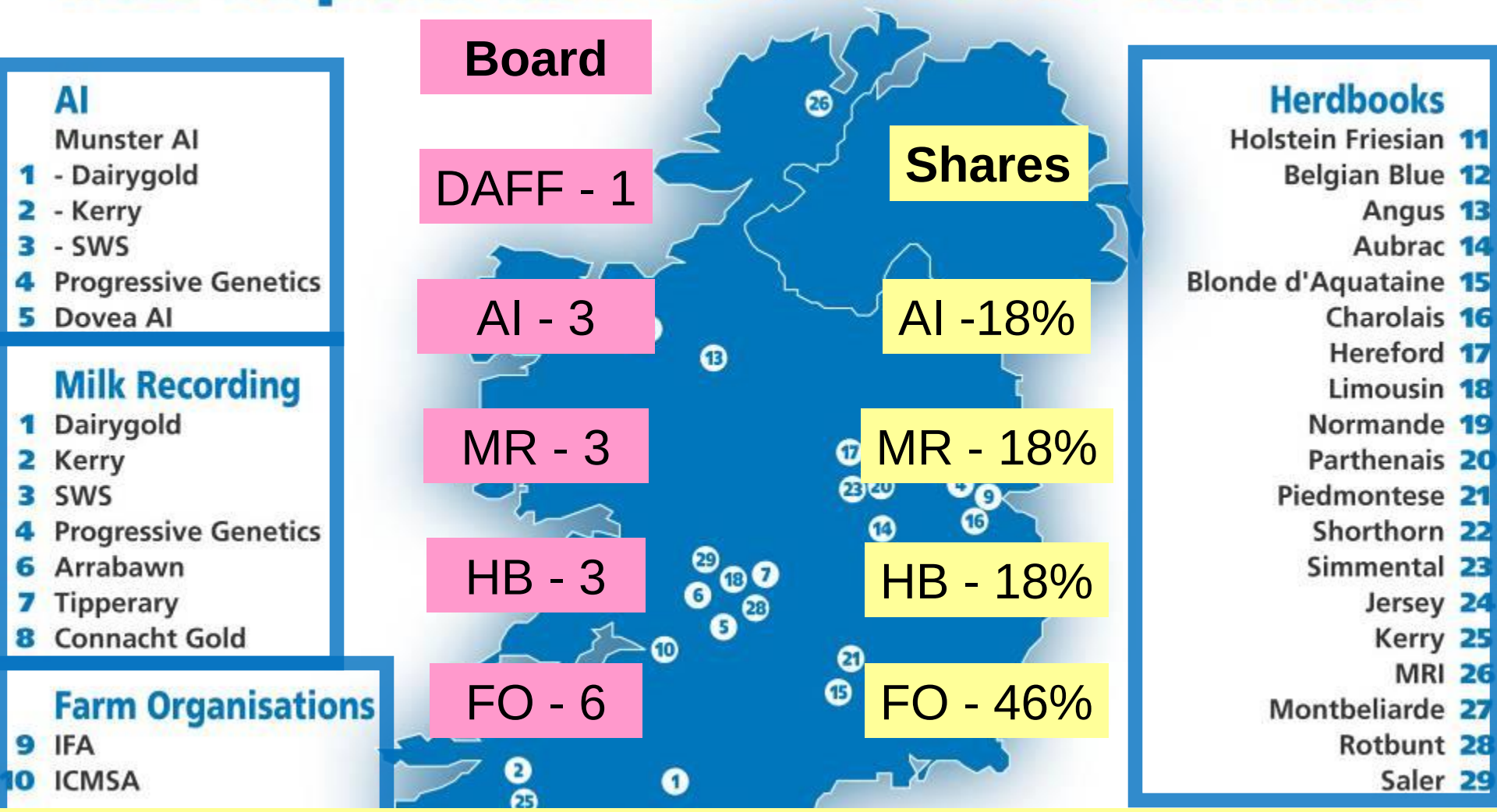
October 11th 2018

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

Introduction

- ICBF – Make-up & Role
- National Cattle Breeding Database & Industry Links
- Beef Euro-Star Index
- Impact of the Euro-Star Index
- Focus areas that are driving innovation

One Database, Many Partners
less duplication and cost for farmers



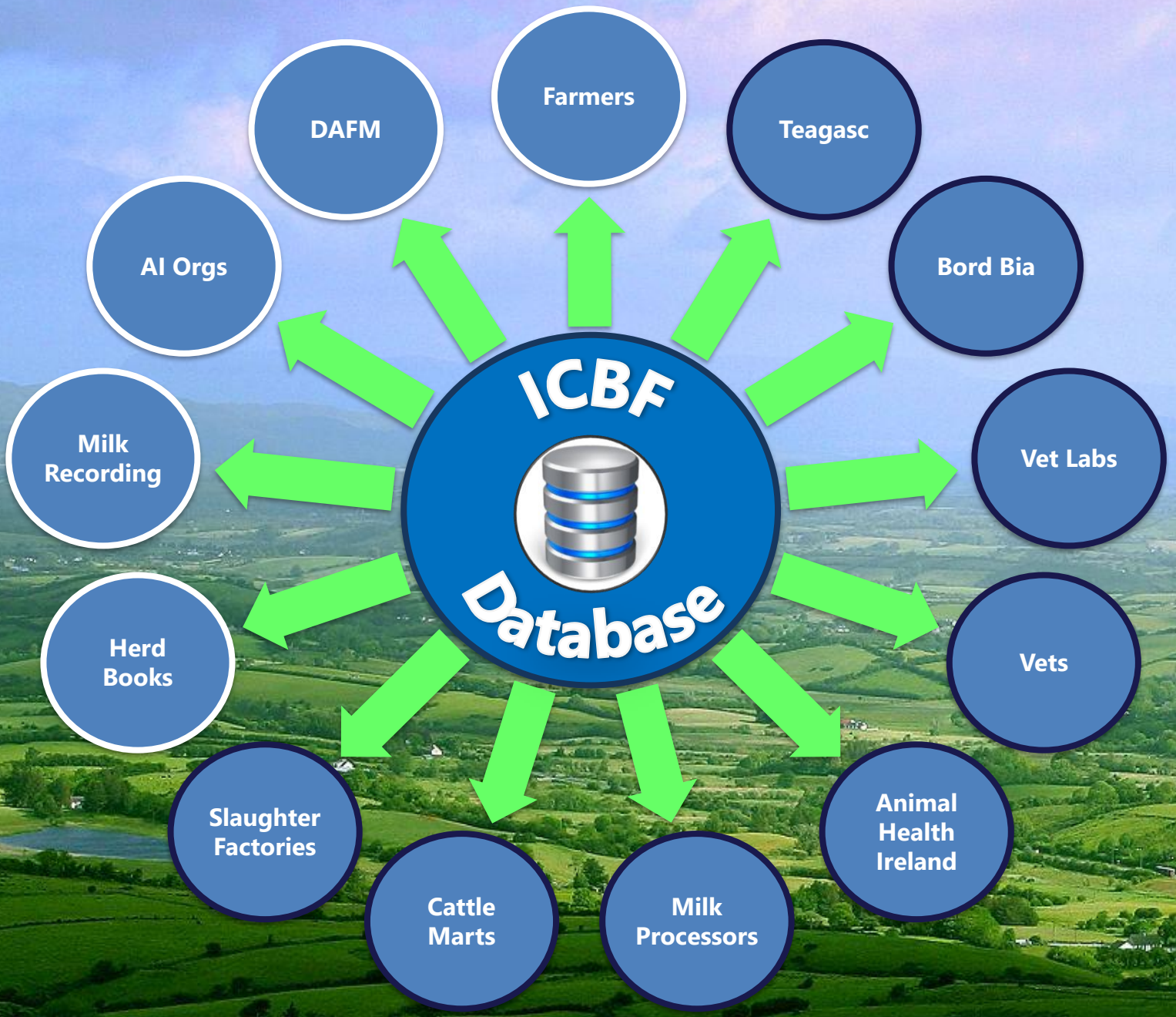
Stakeholders in cattle breeding control decision making

Farmer owned & controlled

Role of ICBF

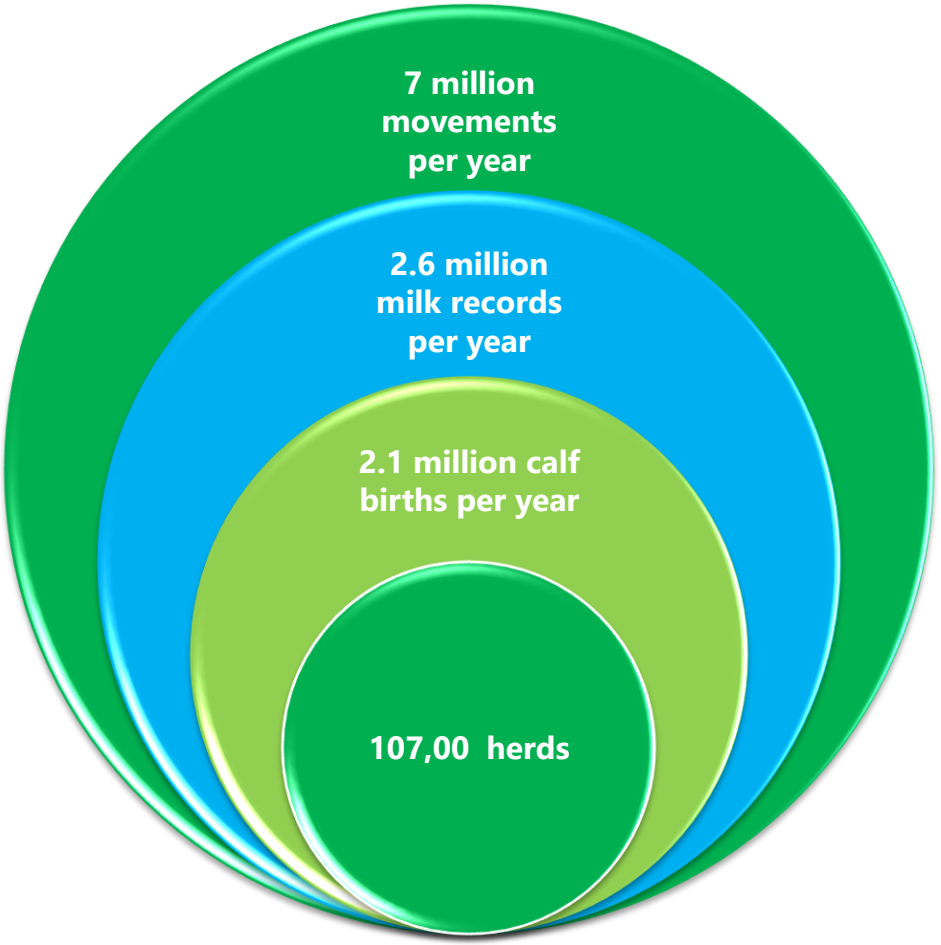
- Focus on genetic improvement as a tool for improving future profit on Irish cattle farms.
- Establish & maintain a central database of performance data.
- Define a breeding goal and selection index (e.g. Euro-Star Index).
- Provide routine genetic evaluations for all breeds and traits.
- Ensure a breeding scheme of optimal design is operating in Ireland (e.g. Gene Ireland).
- Ensure continuous improvement base on science.

ICBF Database - 2018

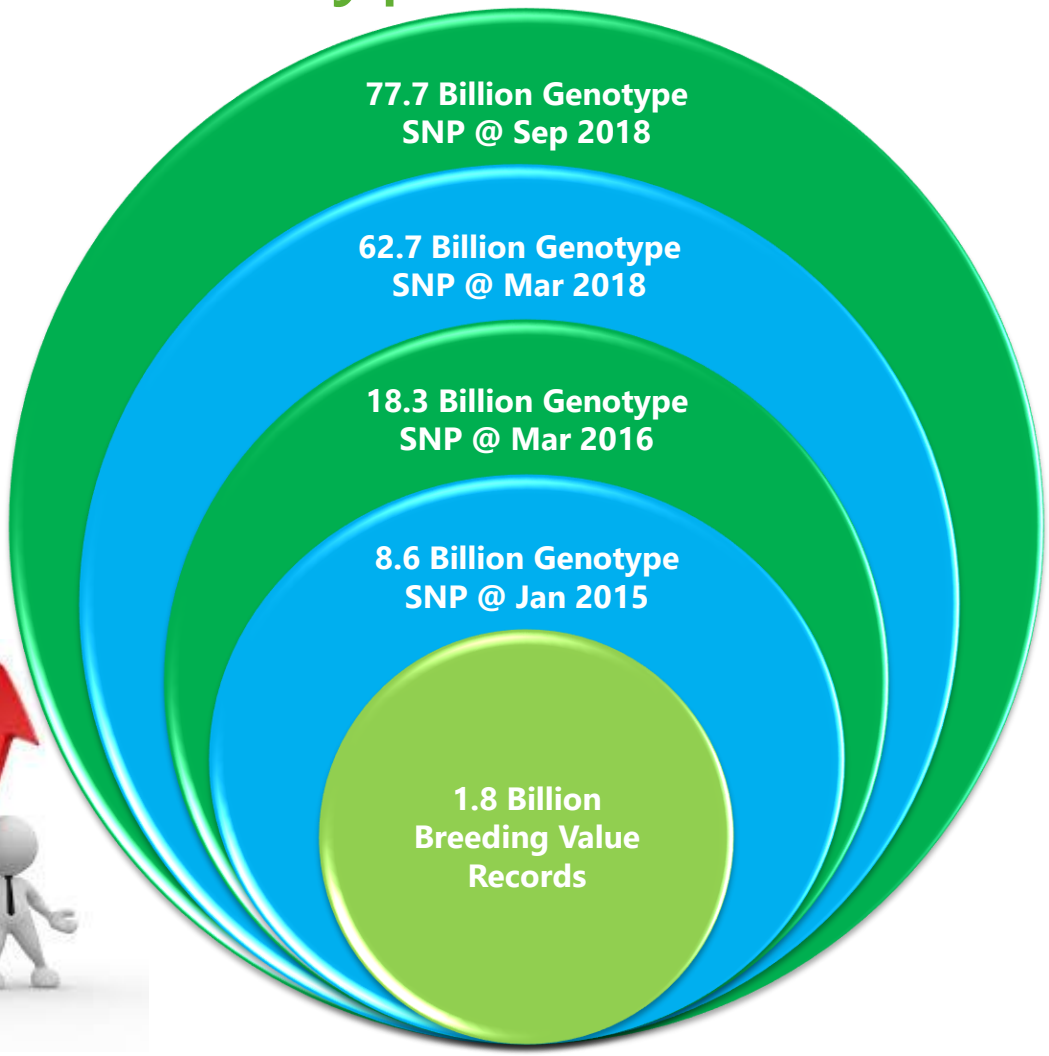


Data in the ICBF Database

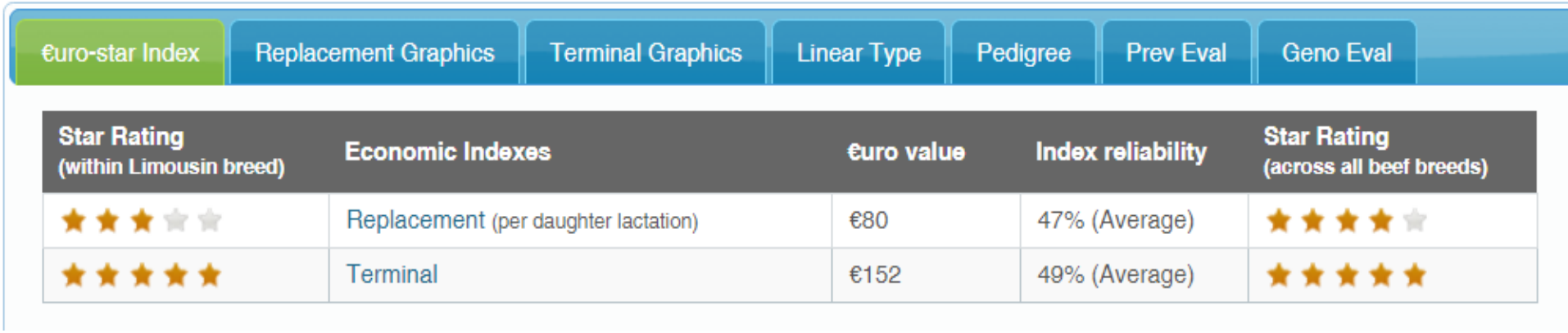
- Herds: 107k
- Live Animals: 6.2m
- Calving Records: 2.1m/yr
- Milk Recording: 2.6m/yr
- Farm Movements: 7m/yr
- AI Inseminations: 700k/yr
- Slaughter Data: 2m/yr
- BVD records: 2.1m/y



Big Data - Genotype Data



What is the Beef Euro-Star Index?



Star Rating (within Limousin breed)	Economic Indexes	€uro value	Index reliability	Star Rating (across all beef breeds)
★★★☆☆	Replacement (per daughter lactation)	€80	47% (Average)	★★★★☆
★★★★★	Terminal	€152	49% (Average)	★★★★★

- Profit Index, e.g., €80 more per calving
  - Multi-breed evaluations.
- Star system; 5 star versus 1 star.
  - Across all breeds, including commercial.
- Two main profit indexes; (i) Replacement and (ii) Terminal

Make-up of the Replacement Index

Trait	Goal	Relative wt
Calving Difficulty	Less	16%
Feed Intake	Less	18%
Carcass wt (for age)	More	21%
Maternal milk	More	18%
Female fertility	More	23%
Docility	More	4%

The ideal Irish beef cow - A weaned calf every year of good weight & quality.

ICBF Spring Active Beef Bull List 2018

Bull Details					Replacement				Calving			Milk		Semen	
Rank	Code	Bull Name	Breed	Gene Ireland	Index	Rel %	Stars Within	Stars Across	Calv Diff %	Rel %	Calv Recs	Daughter Milk (kgs)	Rel %	Price	Supplier
1	SA4059	Beguin	SA	No	**€252**	59	5	5	1.6	83	121	15.8	72	€26	Munster,PG
2	SA2189	Ulsan	SA	No	**€203**	63	5	5	1	96	780	11.7	73	€10	Dovea
3	SI4383	Derreen Declan	SI	No	**€192**	54	5	5	3.2	74	69	12	49	€12	Dunmasc
4	ZAG	Castleview Gazelle	LM	**Yes**	**€191**	77	5	5	4.4	99	27072	0.9	76	€10	Munster,PG
5	SFL	Du Stordeur Flaneur	BB	No	**€183**	96	5	5	5.1	99	10244	4.4	99	€15	Bova
6	VTA	Vaillant	SA	No	**€179**	77	5	5	2.1	93	300	6.2	85	€14	Bova
7	ISL	Islavale Cracker 11	SI	No	**€171**	76	5	5	7.2	97	1148	8.6	86	€10	Dovea
8	SI2469	Lisnacrann Fifty Cent	SI	**Yes**	**€170**	57									er,PG
9	SA2153	Highfield Odran	SA	**Yes**	**€166**	54									er,PG
10	QCD	Cloondroon Calling	SI	**Yes**	**€161**	82									
11	SA4060	Baron	SA	No	**€161**	50									er,PG
12	JSS	Usse	LM	No	**€160**	52									ene
13	SI2152	Curaheen Earp	SI	**Yes**	**€159**	59									er,PG
14	VMO	Voimo	CH	No	**€159**	64									er,PG
15	CH2218	Bivouac	CH	No	**€155**	59	5	5	4.1	90	258	3.9	70	€10	Dovea
16	XCD	Clonagh Direct Debit	SI	No	**€155**	60	5	5	3.4	90	327	11.7	51	€16	Dunmasc
17	GEU	Gordon Et Du Golard	BB	No	**€155**	77	5	5	9.5	90	260	6.4	83	€10	Munster,PG
18	SI4030	Auchorachan Wizard	SI	No	**€153**	54	5	5	9.1	73	34	17.9	62	€50	Eurogene
19	TSO	Curaheen Tyson (Et)	SI	No	**€150**	89	5	5	5.7	96	552	5	94	€50	Celtic Sires
20	LZR	Lataster Eric	SA	No	**€150**	92	4	5	4.7	98	1702	5.6	97	€10	Munster,PG
21	SI2099	Kilbride Farm Escalop 13	SI	No	**€149**	51	5	5	13.9	89	290	18.7	44	€10	Bova
22	ZLL	Lanigan Red Deep Canyon Et	AA	No	**€146**	78	5	5	2	98	2415	9.7	84	€30	Bova
23	KYA	Cornamuckla Lord Hardy K222	AA	No	**€145**	95	5	5	0.8	99	39775	3.6	98	€10	Munster,PG
24	ZEP	Hawkley Red Zeppelin N659	AA	No	**€143**	50	5	5	2.1	91	380	5.3	38	€10	Dovea
25	PZB	Bonaparte	SA	No	**€142**	81	3	5	3	97	1284	1.1	90	€10	Munster,PG
26	DZJ	Drumlegagh Dennis	SA	No	**€141**	64	3	5	3.2	87	244	6.3	68	€12	Eurogene
27	AHC	Auroch Deuter Pp	SI	**Yes**	**€140**	61	5	5	5.4	96	827	9.5	44	€10	Munster,PG
28	YFK	Kilbride Farm Delboy 12	SI	No	**€138**	64	5	5	10.6	96	805	9.7	58	€15	Eurogene
29	OKH	Keltic Handsome	LM	**Yes**	**€138**	66	5	5	6.1	99	4322	1.5	54	€12	Munster,PG
30	SI4083	Clonagh Frosty King Et	SI	**Yes**	**€137**	50	4	5	4.1	65	36	12.2	50	€10	Munster,PG

- Range of breeds on Top Bull Listing => Focused on promoting these bulls within the relevant breeds.

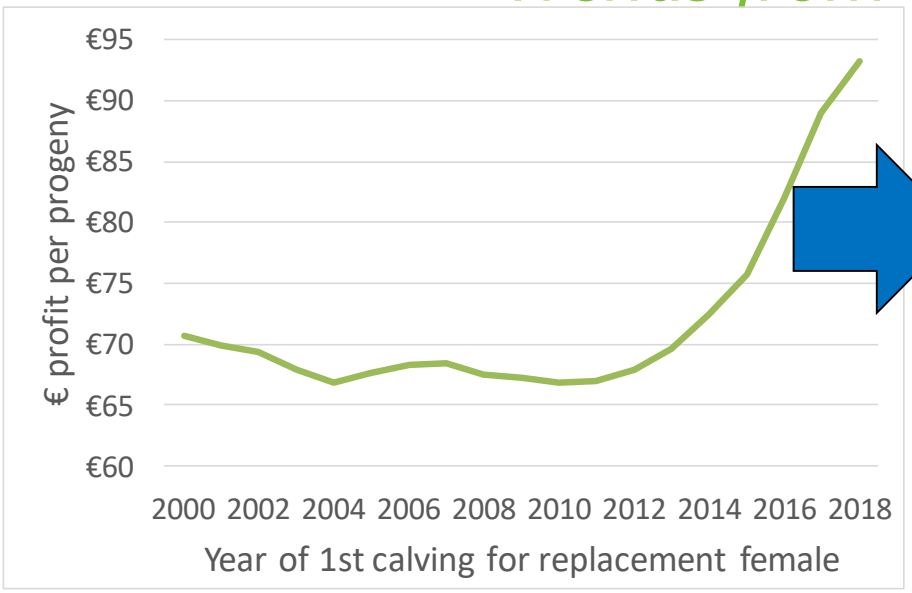
The Irish Beef Breeding Goal

One of David's best cows. This nine-year-old SI X cow has a Replacement Index of €169 (5 star, top 1%). She calved for the first time at 24 months, has had eight calves with an average calving interval of 364 days and she weaned the heaviest calf of David's 2015 calf crop. She is sired by the old Simmental AI bull Hurtig (HRG).

- To generate more 5-star cows (i.e., for milk, fertility, weight for age…..) for Irish beef farmers…..which when crossed with 5-star terminal index sires, produce progeny with better weight for age, feed efficiency, etc.

Are we making progress? => **YES**

Trends from National data.



Year	Calves per cow per year	Calving Interval (days)	Calving at 2 years age (%)
2014	0.80	407	0.17
2017	0.87	393	0.26

** Based on data from 24k herds involved in Beef Data and Genomics Program.*

- Past focus on terminal traits=> decline in maternal traits & no gain in replacement index. Beef genomics scheme introduced (2014), replacement index has turned around => Major gains in calves/cow/year and carcass traits.
- Clear evidence that commercial beef farmers are responding positively to new technologies such as Euro-Stars & beef genomics.

Are we making progress? => YES.

Trends from Teagasc-ICBF validation.

Star Rating	No. Animals	Replacement Index/parity	Lifetime CO2e*	AFC (days)	CIV (days)	Cow Wt (kg)	Wean Wt (kg)	Progeny Carc Wt (kg)	Progeny Carc Age (days)
5 Star	2,183	€130	17,085	860	375	664	311	374	604
4 Star	1,881	€87	17,260	862	376	672	305	373	606
3 Star	1,984	€58	17,378	881	377	684	299	370	605
2 Star	120	€31	17,484	887	377	689	296	364	605
1 Star	724	-€6	17,635	896	383	737	285	361	610
Diff 1 v 5 star		**€136**	**-550**	**36**	**8**	**73**	**26**	**13**	**-6**
Pvalue				***	*	***	***	***	**NS**

** Based on Gross Emissions Output over the cows lifetime. Includes emissions from the cow and her progeny.*

- Validation study based on 46 suckler herds & ~7k cows. All cows & calves weighed for last 3 years on participating farms.
- Initial results based on Teagasc-ICBF validation study indicate that 5 star cows are €136 more profitable per parity and produce 550 kg less CO2e in their lifetime.
- **Breeding for profit & breeding for sustainability are effectively same.**

Are we making progress? => **YES**

Trends from Bord Bia-ICBF validation

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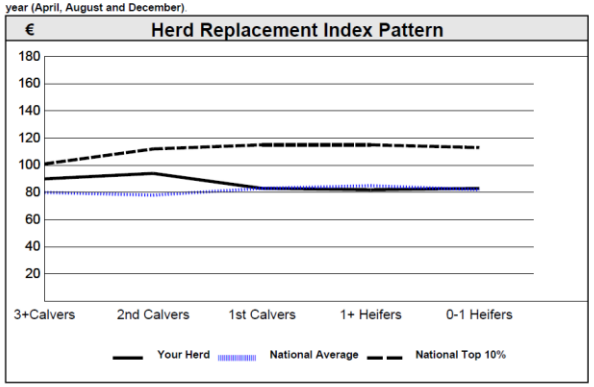
Euro-Star Report
Female Summary Section

ICBF.com

Report Date: 09-JUN-2018 (May 2018 Evaluation)
Herd Owner: DENIS LARGE
Herd Number: V1810692

A. The data contained in this report is based on the **May 2018 Evaluation**. ICBF re-evaluates Beef Euro-Star values **3 times a year (April, August and December)**

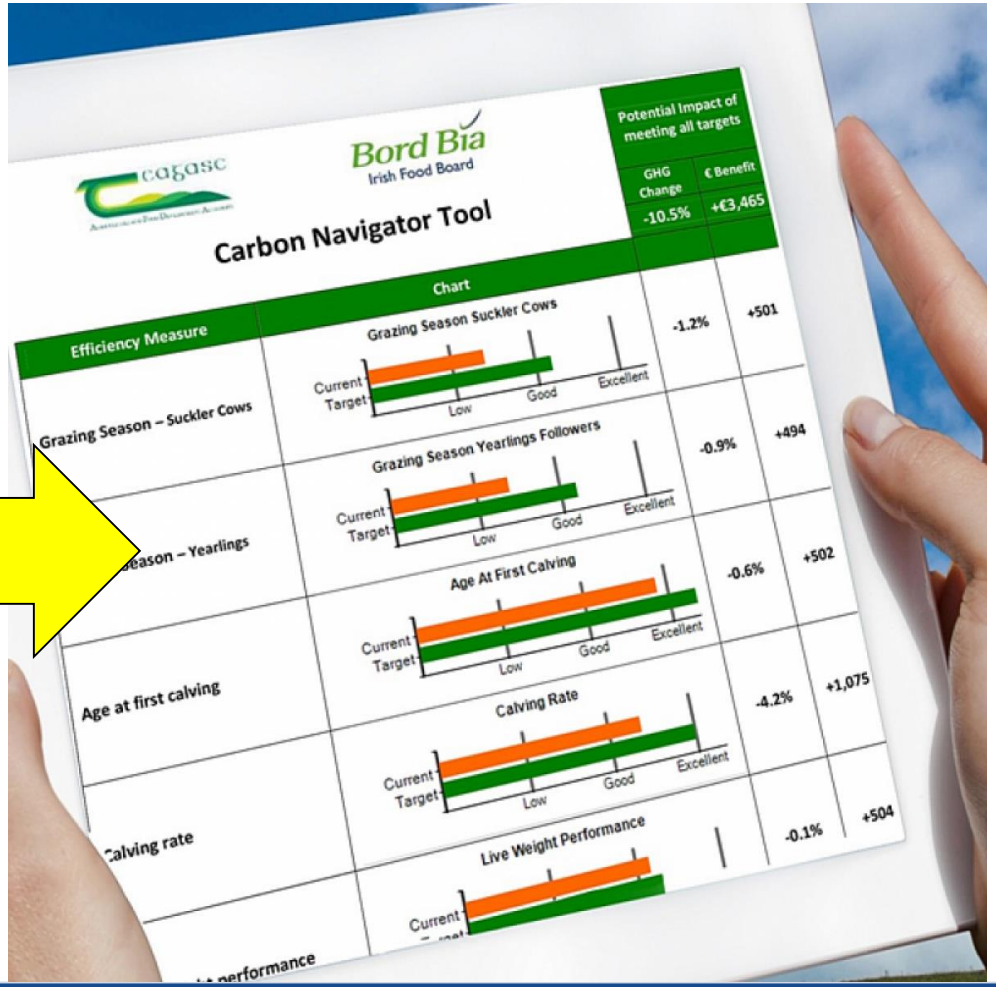


Cows
Your Herd Average
€89
Cows
National Average
€80
Cows
National Top 10%
€100

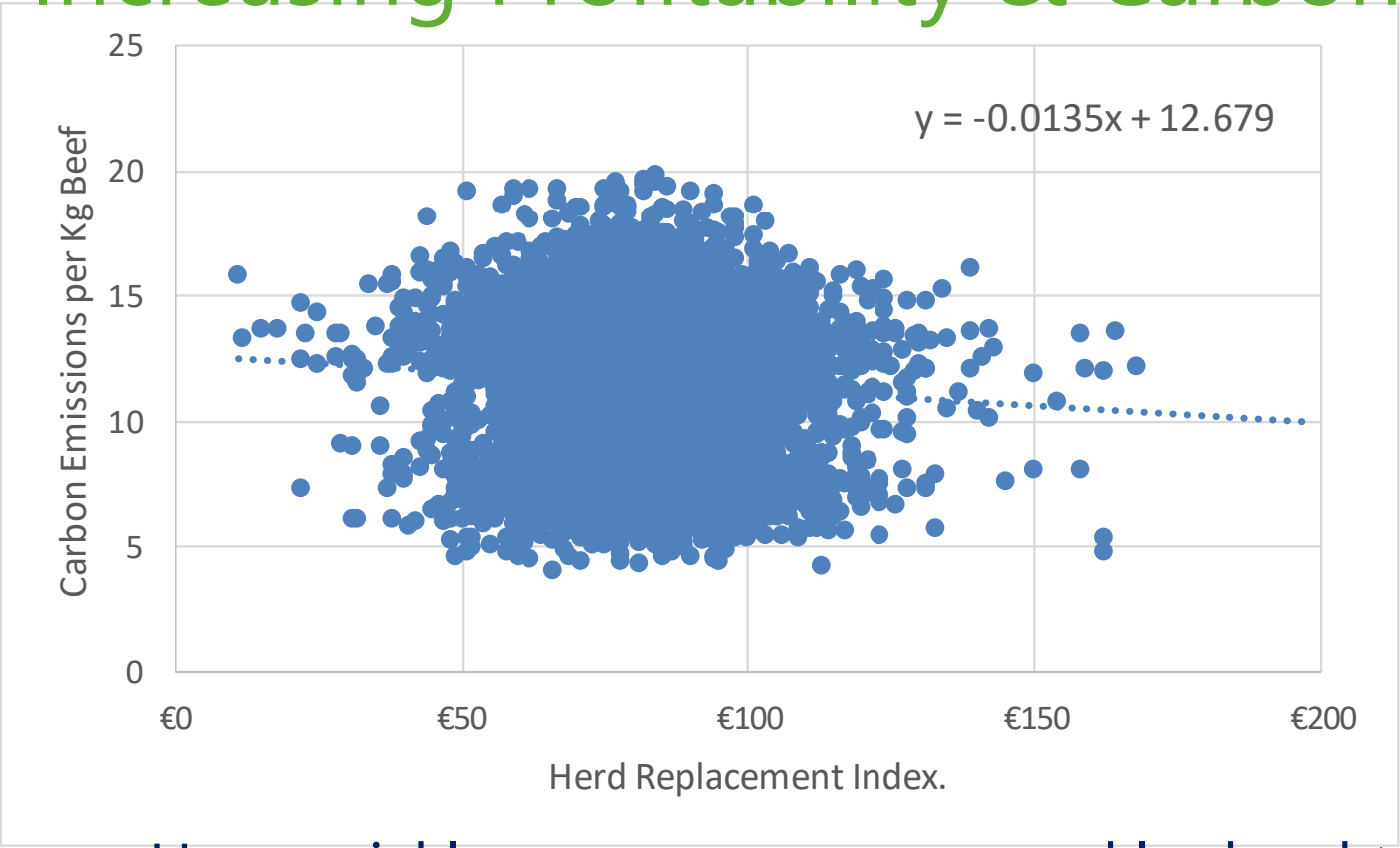
B. The Star rating **cut-offs**, in brackets below, are based on the **May 2018 Evaluation**. **These may change** in subsequent evaluations.

		Replacement Index (Across Breed Stars)					
	Total	Missing Stars*	★ (Up to €44)	★★ (€45 to €63)	★★★ (€64 to €79)	★★★★ (€80 to €98)	★★★★★ (€99 & Over)
Cows	137	7	14	12	24	30	50
1year+ heifers	76	3	13	9	9	13	29
0-1year heifers	74	2	5	13	15	17	22
Total	287	12	32	34	48	60	101

* The most common reason for an animal to be missing Euro-Stars is not having a recorded sire. Missing sires can be recorded online at www.icbf.com



Increasing Profitability & Carbon Efficiency



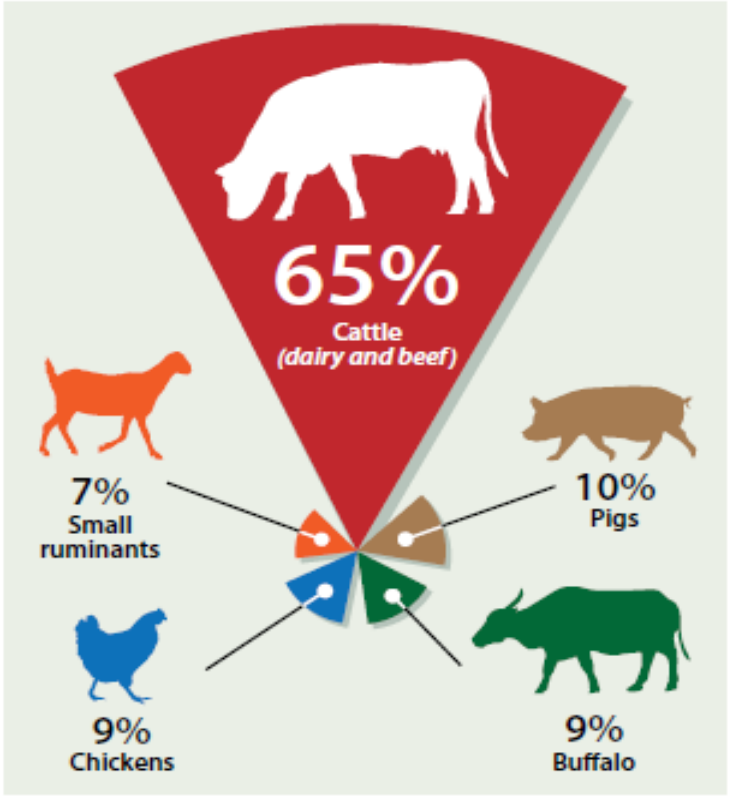
- Moving National Herd from €82 to €200 => a reduction in carbon emissions (CO2 eq) per kg beef from 11.6 kg to 10kg (-14%).

- How quickly can we move our suckler herd to having a herd replacement index of €200+?
- ***About 15 years => Can we shorten this process?***

Focus Areas - Driving Innovation

- Beef Data & Genomics Program (BDGP)
- Weight recording pilot
- GreenBreed project
- DNA based calf registration
- Health & Disease traits
- Meat Eating Quality

Current Problem



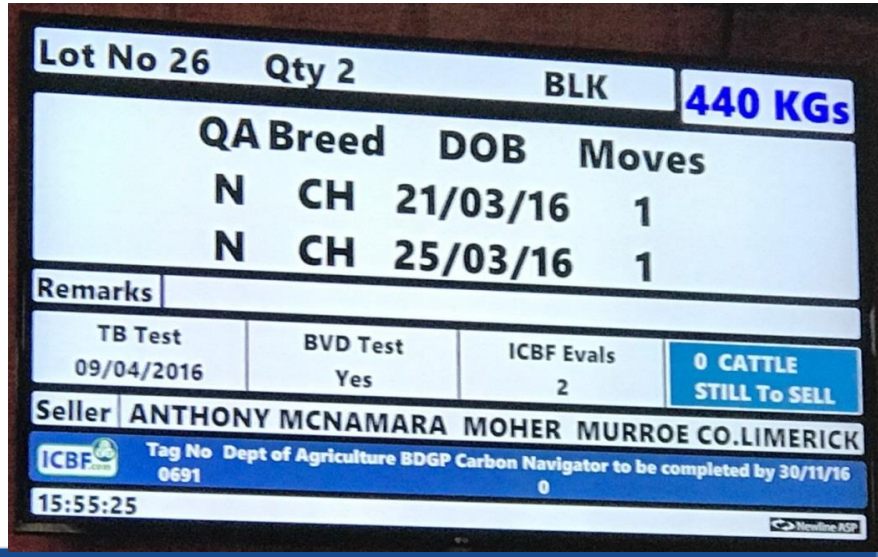
Livestock greenhouse gas emissions per species
(Lifecycle Analysis, Gerber et al., 2013)

- 12% of global GHG emissions are from agriculture (figure is 33% for Ireland).
  - Cattle are worst offenders.
- Environmental Solution; cut our cattle herd.
- Irish Solution; Breed more sustainable animals => BDGP 2015-2020.

Scheme was sold on the basis of climate change benefits

Beef Data and Genomics Program (BDGP)

- Breed more profitable, sustainable & carbon efficient cows.
- €300m total funding 6 years (2015-2020).
  - Farmers paid ~€90/cow/year to complete key actions re: the scheme, e.g., targets for 4/5 star cows & bulls
  - Data recording x 14 e.g. Scour & Pneumonia, Calf Vigour & Quality
  - ~23k suckler herds & ~550k cows
  - ~1.4m animals genotyped to-date
  - Genotyping costs €22/animal
- Other countries now looking at introducing similar schemes.



Weight Recording Pilot

Budget 2019: suckler scheme worth €20m confirmed

Further details of the suckler support scheme, revealed by the Irish Farmers Journal on Monday night, were confirmed as part of Budget 2019.

- New €20 million Beef Environmental Efficiency Pilot (BEEP) scheme launched by DAFM
- Weights from up to 500k Suckler cows and their calves!
- Payment of €40 per Suckler cow for providing weight data on both cows and calves.

Greenbreed Project

- €3m DAFM funded project
- Aims to develop tools & resources to improve the environmental footprint.
- For same meat or milk output, there still is a ~15-20% in GHG output between individual animals.
- Opportunity to breed even more climate efficient cows for the future.

DNA Calf Registration

Database predicts
- Sire
- Dam
- Sex
- Breed

- Very successful pilot project undertaken this Spring.
- 18 herds & ~2,000 calves DNA registered.
- Further pilot for this Autumn - App

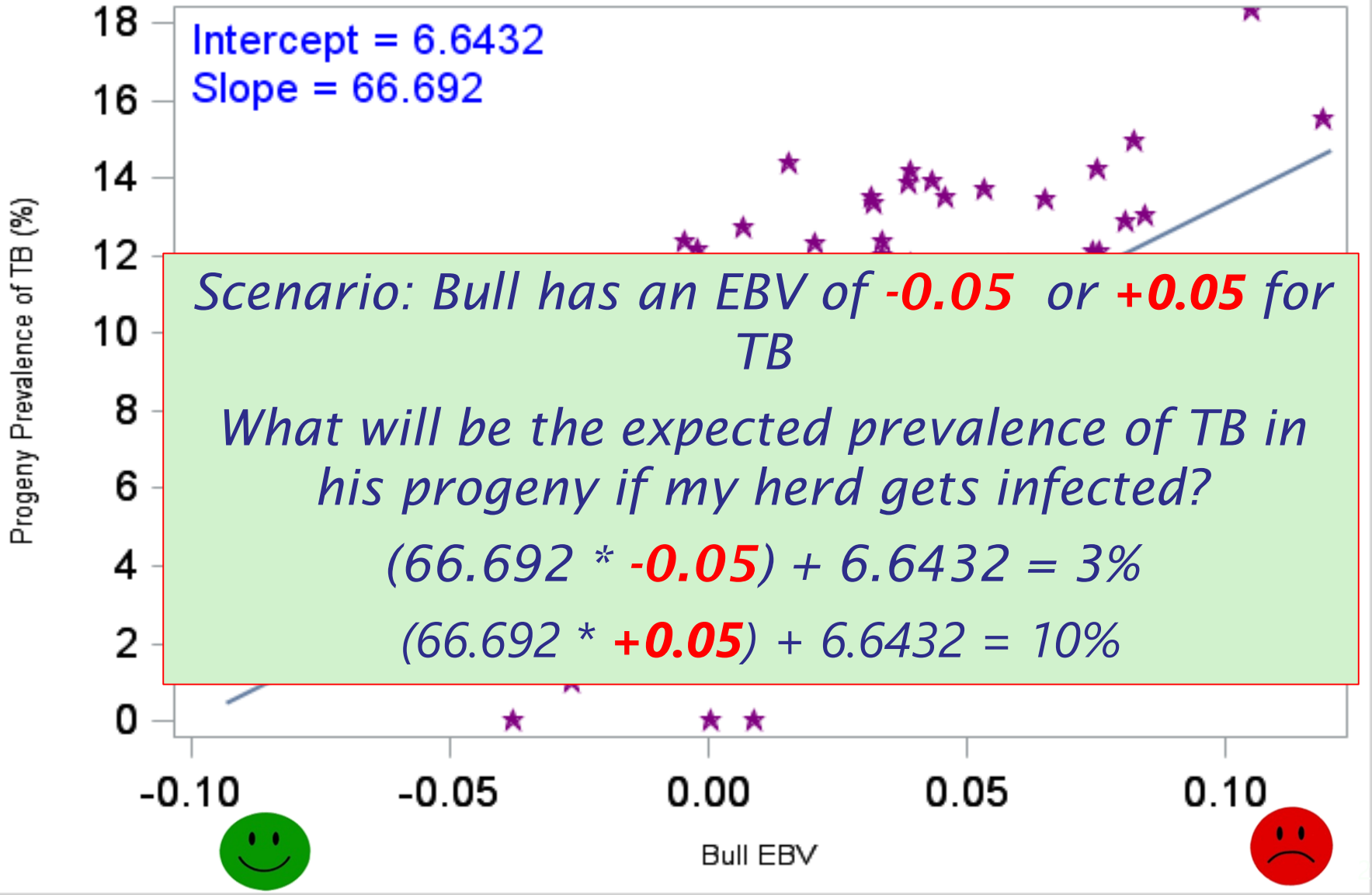
Output (by day 14)
- EU Registration
- Parentage
- Genomic Evaluation
- Major Genes
- Herdbook (optional)
- Quality Assurance

Health & Disease Traits

- Farmer Recorded
  - Lameness & Mastitis
  - Pneumonia & Scour
- Factory Data
  - Liver Fluke
  - TB

Predicting TB prevalence from EBV

(FR sires with reliability ≥90%)



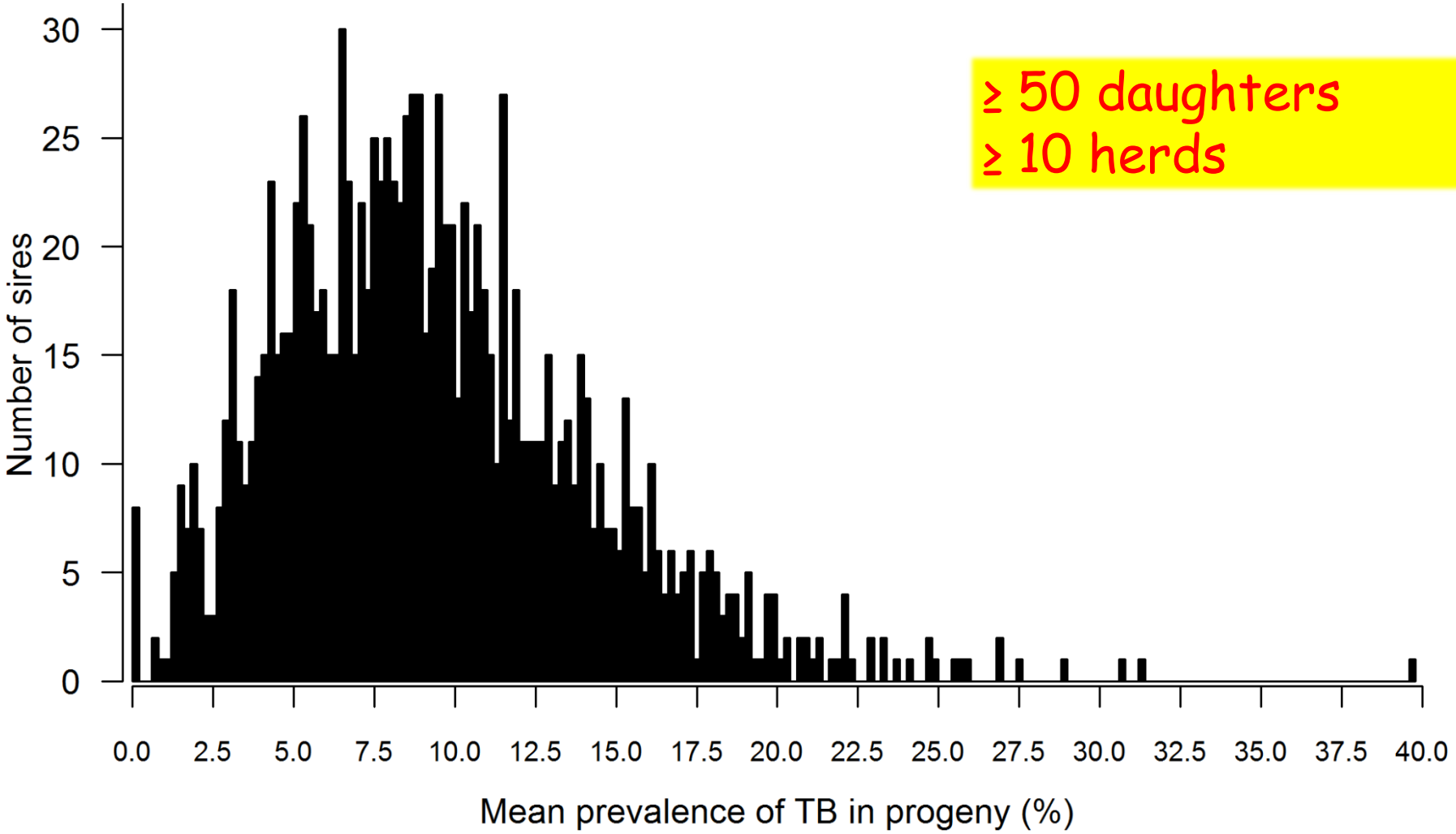
*Scenario: Bull has an EBV of **-0.05** or **+0.05** for TB*

What will be the expected prevalence of TB in his progeny if my herd gets infected?

*(66.692 * **-0.05**) + 6.6432 = 3%*

*(66.692 * **+0.05**) + 6.6432 = 10%*

Progeny Prevalence Per Sire

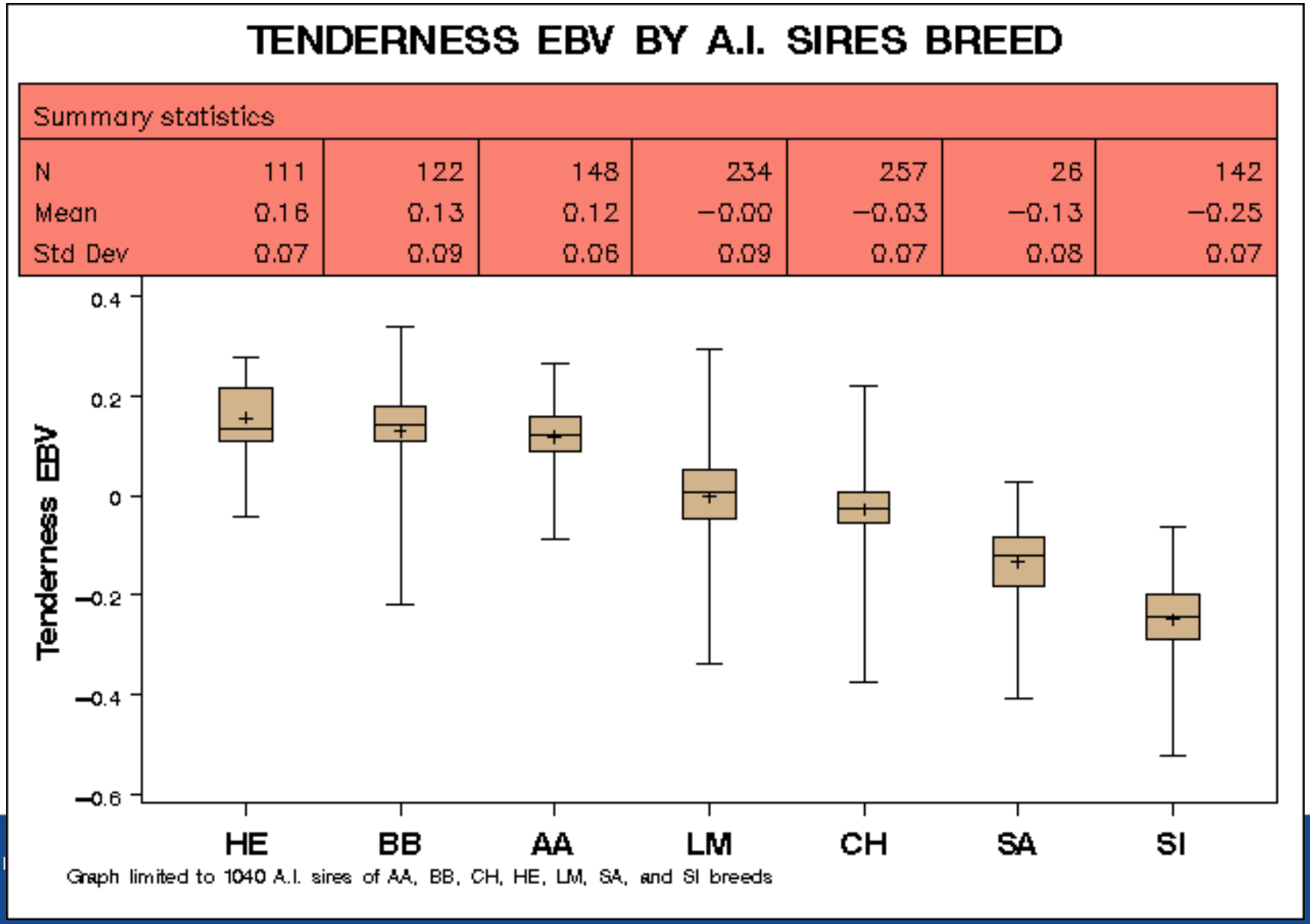


New Traits - Meat Eating Quality

Trait	Heritability
Tenderness	0.16
Juiciness	0.10
Flavour	0.09

- ~2,000 animals analysed to date, based on "trained panel" data (~14k records).
- Initial parameters indicate significant opportunity to increase meat eating quality through genetics.
  - High genetic correlations (>0.8).
- Test EBV's generated and validation work undertaken.
- Target for release through MTI & ICBF later this year.

Genomics for Meat Eating Quality



Summary

- Beef breeding is delivering. Goal is to now increase gain & deliver herd target of €200+. These cows are also more climate efficient.
  - Current and future programs will help to deliver on this opportunity (e.g. BEEP).
- DNA calf registration a major opportunity.
- GHG/weanling efficiency a key focus trait.
- ICBF is driving change in the beef industry. Not always popular, but "high level" industry metrics are now moving in right direction.

ICBF.com

Our Farmer & Government Representation

Department of Agriculture, Food and the Marine
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Irish Creamery Milk Suppliers Association

IFA

Our AI & Milk Recording Organisations

DoveaGENETICS

munster cattle breeding group

PROGRESSIVE GENETICS

TIPPERARY COOP

Our Herdbooks

AYRSHIRES Cattle Society of Great Britain and Ireland

THE ABERDEEN-ANGUS CATTLE SOCIETY

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IRISH AUBRAC

BLONDE D'AQUITAINE

Irish Charolais Cattle Society

IRISH HEREFORD

IHFA

IRISH LIMOUSIN Cattle Society

Parthenais

Irish Piemontese Society

Irish Shorthorn Society Ltd.

Simmental

ISP

Cattle Society of Ireland

Ireland's native dairy breed

Montbeliarde

MRI Cattle Society of Ireland
Meuse Rhine Issel -- Milk & Muscle!

Norwegian Red Cattle Society

Salers Cattle Society of Ireland Ltd.

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