



IRISH CATTLE BREEDING FEDERATION

Playing with Xbred records in Interbeef



ICBF genetic team / InterBeef



Background





ICAR-Interbeef Genomics Workshop

ICBF, Teagasc & the Irish Farmers Journal will be hosting a Dairy & Beef genomics user conference, for the Irish cattle breeding industry on Wed. Nov. 26th from 1.45pm to 5.15pm. Watch the livestream at <https://www.youtube.com/watch?v=wpv4t0ntd0>

- 1.45pm Welcome. *Seán Coughlan, CEO ICBF*
- 2.00pm Understanding genomics. *Dr Séamus McEntee, Teagasc*
- 2.30pm An international perspective: the current and future application of genomics in farm animals. *Prof Orlan Carroll, Iowa State University*
- 3.15pm Application of genomics in Irish Dairy Cattle. *Dr Pádraic Kearney, ICBF*
- 3.30pm Application of genomics in Irish Beef Cattle. *Dr Douglas Berry, Teagasc*
- 3.50pm Understanding the potential of genomic technology for the Irish Agri-food industry: from farm to fork. *Dr Matt McKibbin, ICBF*
- 4.10pm Discussion Forum, moderated by Jack Kennedy, Irish Farmers Journal.
- 5.00pm Closing remarks. *Dr Frank O'Mara, Teagasc*



 Wednesday November 26th, 2014
 Live stream at
<https://www.youtube.com/watch?v=wpv4t0ntd0>



Source: google/image

My last 2 slides

Work near completion

- Genetic parameters for data including Xbred
 - IRL Xbred data uploaded to IDEAtest
 - Including pseudo-ancestry for Xbred founders
 - 300,000 IRL animals with records
 - Genetic parameters (IRL-other)
 - Correcting for HET & REC
 - Using phantom groups of breeds
 - ~finish for LIM & CHA

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In the pipeline

- Test run for EBV including IRL Xbred
 - Calculate breed composition at Interbeef level
 - Adapting Interbeef model for IRL
 - Spring 2015



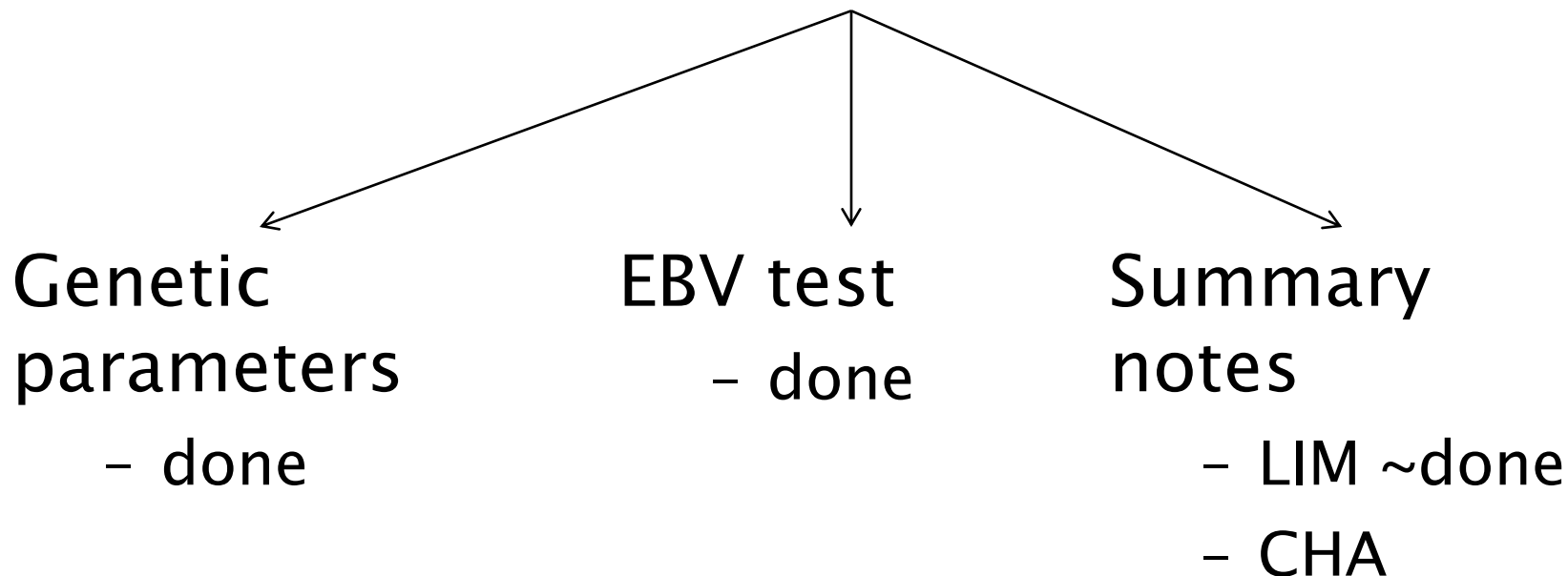
Thank you

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Where we are now



Xbred data

Table 1. Performance and pedigree data in the purebred and crossbred evaluation

	Purebred (Jan.2014)		Purebred & Crossbred (Aug.2014)	
	Charolais	Limousine	Charolais	Limousine
Performance	19,888	17,490	291,771	199,800
Pedigree	50,342	41,229	1,653,162	

Parameter estimation (VCE)

Table 2. Summary of Interbeef data and basic edits.

	N	E.T.	UNK. PARENT	C.G. < 3	N SIRE/CG < 2	EDITED DATA
Pedigree	3,728,077					3,728,077
FRA	2,322,277		439,923	28,080	342,682	1,511,592
GBR	123,974	6,261	2,683	233	29,461	85,336
IRL	199,800	821	28,751	8,677	68,656	92,895
DNK	42,165	428	1,929	2,507	6,017	31,284
ESP	33,259		2,482	71	5,229	25,477
SWE	21,124		1,465	687	3,554	15,418
FIN	13,036	72	1,436	237	1,067	10,224
CZE	7,531	559	210	256	582	5,924
DEU	67,710		3,674	2,245	11,115	50,676
CHE	24,978		4,333	455	3,150	17,040

VCE: method

- Estimating $r_{g(\text{IRL-other countries})}$
- Optimisation of connection when required (e.g., FRA, GBR, DEU)
- 2x2 country analysis using DMU on Linux (4 cores 256Gb RAM)

Univariate

- ↳ Direct ani. effect model only
 - ↳ Dir. ani. effect + permanent env. of dam model
 - ↳ Dir.+ Mat. ani effects + dam PE

VCE: results $r_{g(\text{IRL},-)}$

Direct ani. effect only

	$r_{g(\text{IRL},-)} \text{ (s.e.)}$	Conv.
DNK	0.99 (0.053)	N
CZE	0.92 (0.088)	Y
DEU	0.85 (0.089)	Y
ESP	0.94 (0.075)	Y
FIN	0.96 (0.145)	Y
FRA	0.98 (0.025)	Y
GBR	0.95 (0.036)	Y
SWE	0.83 (0.159)	Y
CHE	0.95 (0.067)	Y

Direct ani. effect + dam PE

	$r_{g(\text{IRL},-)} \text{ (s.e.)}$	Conv.
	0.99 (0.084)	N
	0.91 (0.122)	Y
	0.83 (0.122)	Y
	0.84 (0.144)	Y
	0.92 (0.216)	Y
	0.97 (0.048)	Y
	0.96 (0.047)	Y
	0.87 (0.199)	Y
	0.96 (0.088)	Y

VCE: results $r_{g(IRL,-)}$

Direct + Maternal ani. effect + dam PE

$r_{g(IRL,-)}$ (s.e.) - [current r_g]

	Direct	Maternal	Conv.
DNK	0.83 (0.112) - [0.88]	0* - [0.76]	N
CZE	0.77 (0.127) - [0.81]	0.23 (0.378) - [0.67]	Y
DEU	0.78 (0.123) - [0.66]	0.42 (0.309) - [0.68]	Y
ESP	[0.88]	[0.81]	N
FIN	0.65 (0.290) - [0.73]	0.68 (0.100) - [0.65]	N
FRA	[0.78]	[0.81]	N
GBR	0.95 (0.076) - [0.91]	0.52 (0.374) - [0.70]	Y
SWE	0.79 (0.169) - [0.73]	0* - [0.66]	Y
CHE	[0.74]	[0.64]	N

VCE: conclusion

- Not any easier with xbred data
 - Especially maternal
- Fill missing correlations with EBV correlation (Calo)?
- Update current Interbeef matrix
 - Maybe not

Impact of IRL Xbred on breeding values (EBV)

- Using current Interbeef co-variance matrix
- Xbred model addition: het & rec + pedigree phantom groups (breed ; breed/country/year)
- Run genetic evaluation using MiX99
 - Xbred model
 - Purebred model
- Analysis with EBV on IRL scale
 - Genetic trend
 - EBV & Reliability

What of the 'FAKE' ancestors

- 'FAKE' ancestors : created when founder animals are not purebred
- Used to derive breed composition of all animals in the pedigree file
 - Used to calculate HET & REC
- Then discarded from pedigree for genetic evaluation (Interbeef workshop 2014)

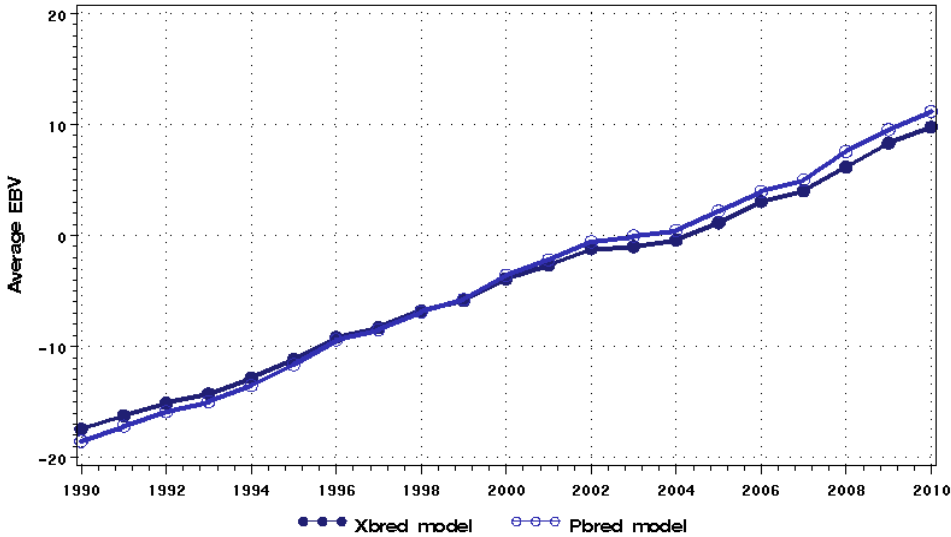
Genetic trend

GENETIC TREND FOR DIR.WEAN.WT. ON IRISH SCALE

Models: [Purebred no PG] and [Xbred PG= breed]

Sires with at least 10 progeny

Limousine breed — Interbeef country of origin

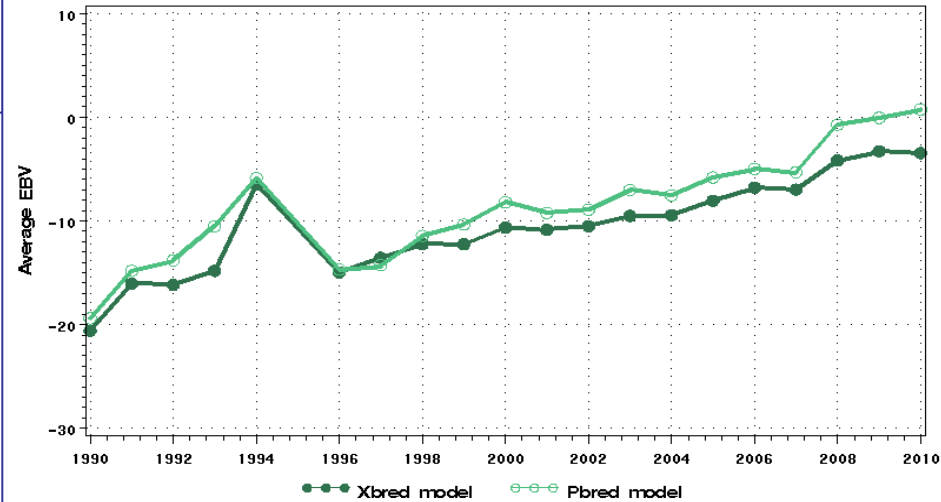


GENETIC TREND FOR DIR.WEAN.WT. ON IRISH SCALE

Models: [Purebred no PG] and [Xbred PG= breed]

Sires with at least 10 progeny

Limousine breed — Country of origin = IRL



Breeding values

Table 9. Summary stats on breeding values: crossbred model phantom groups = breed

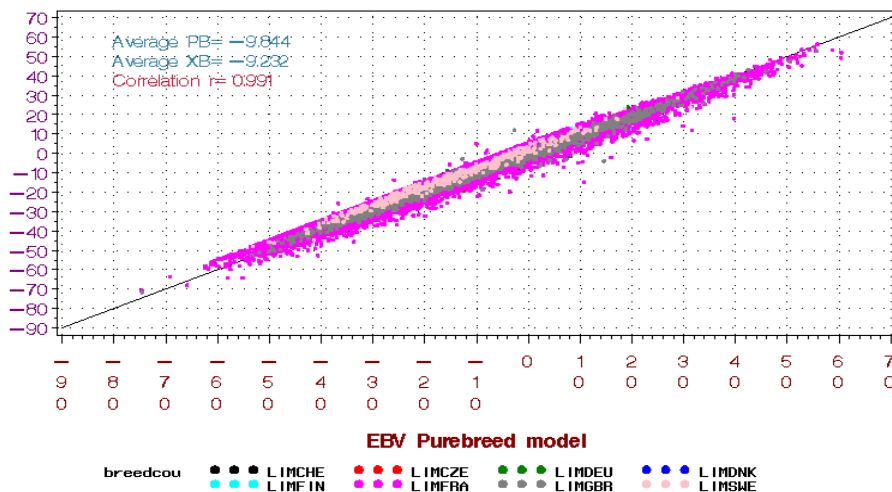
Model	EBV type	N	Mean	StdDev	Min	Max
Purebred	Raw	2983164	13.32	14.85	-51	98
	Adjusted 2010*	2983164	-12.34	14.85	-77	72
Crossbred	Raw	2983164	-0.49	13.72	-63	81
	Adjusted 2010*	2983164	-11.04	13.72	-74	70

CORRELATION DIR.WEAN.WT. EBVs ON IRISH SCALE

Models: [Purebred no PG] and [Xbred PG=breed]

Sires with at least 10 progeny — N= 42552

Limousine breed — Interbeef country of origin excl. IRL

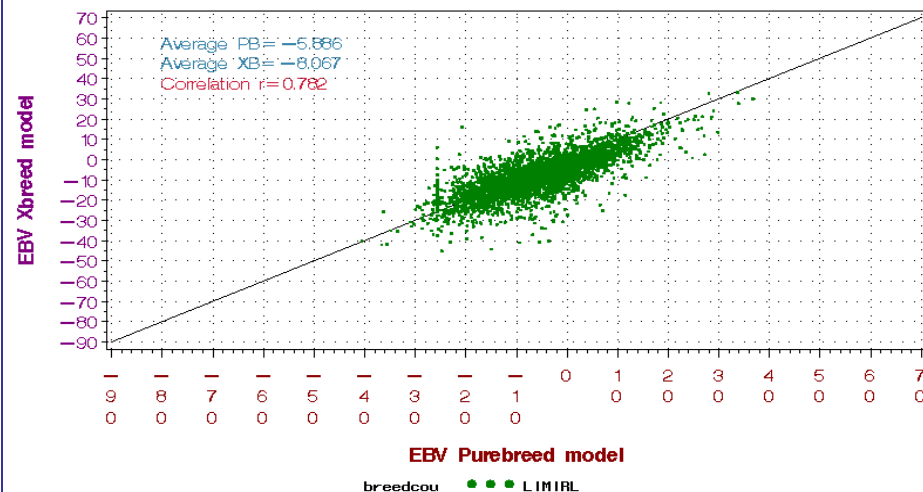


CORRELATION DIR.WEAN.WT. EBVs ON IRISH SCALE

Models: [Purebred no PG] and [Xbred PG=breed]

Sires with at least 10 progeny — N= 3855

Limousine breed — Country of origin = IRL



Reliability

Table 11. Summary stats on reliability

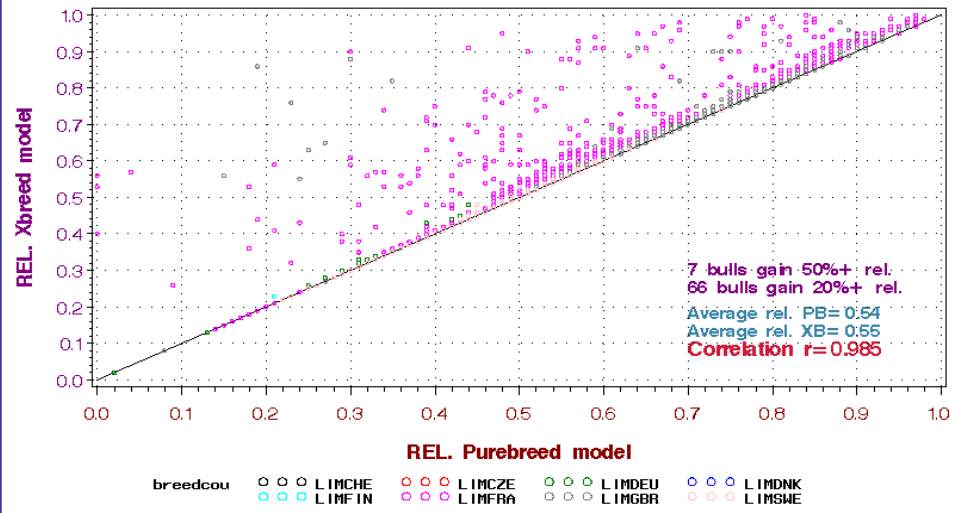
Model	Type	N	Mean	StdDev	Min	Max
Purebred	Reliability	2983164	0.33	0.09	0.00	0.99
Crossbred	Reliability	2983164	0.34	0.09	0.00	0.99

CORRELATION DIR.WEAN.WT. RELIABILITY ON IRISH SCALE

Models: [Purebred no PG] and [Xbred PG=breed]

Sires with at least 10 progeny — N= 42555

Limousine breed — Interbeef country of origin excl. IRL

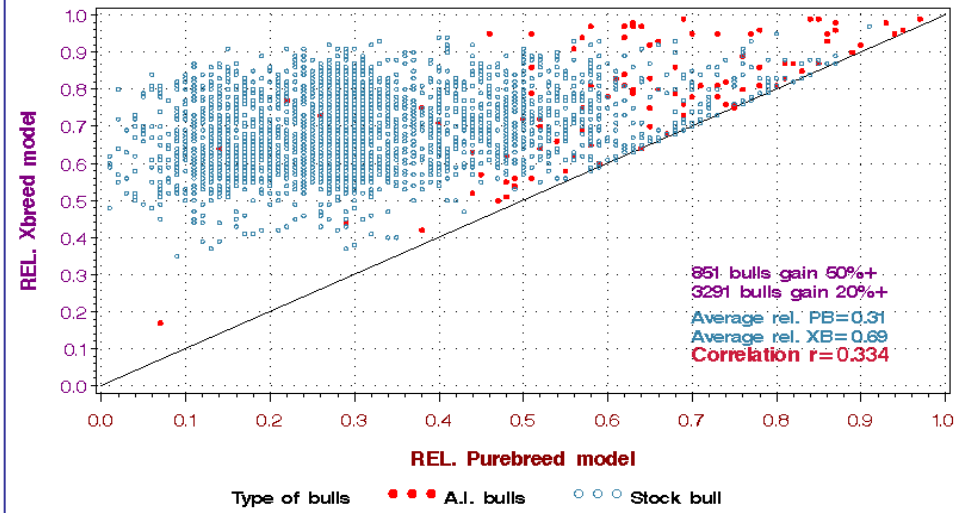


CORRELATION DIR.WEAN.WT. RELIABILITY ON IRISH SCALE

Models: [Purebred no PG] and [Xbred PG=breed]

Sires with at least 10 progeny — N= 3777

Limousine breed — Country of origin = IRL



Reliability

Table 12a. Pbred (current) x Xbred (grp b) - Top 20 gain in reliability by using the Xbred model - all bulls

Rank	b.year	ITT	Xbred model		Pbred model	
			N desc.	Rel.	N desc.	Rel.
1	2006	LIMIRLM281318310736	52	0.84	1	0.06
2	2006	LIMIRLM331248570094	39	0.80	7	0.02
3	2001	LIMIRLM231245310089	97	0.91	24	0.15
4	2004	LIMIRLM131234720206	58	0.87	14	0.11
5	2004	LIMIRLM271300440185	40	0.81	7	0.06
6	2006	LIMIRLM182066850228	57	0.86	20	0.11
7	2003	LIMIRLM381056050103	39	0.80	20	0.06
8	2006	LIMIRLM131588820278	43	0.81	17	0.07
9	2006	LIMIRLM271815030409	36	0.79	9	0.05
10	2007	LIMIRLM141722390473	47	0.84	7	0.10

Reliability

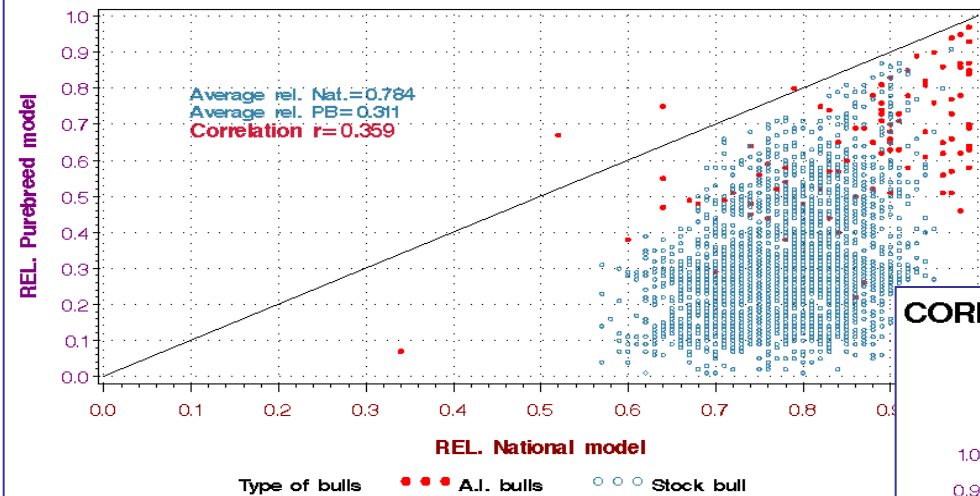
Comparison with national evaluation

CORRELATION DIR.WEAN.WT. RELIABILITY ON IRISH SCALE

Models: [Purebred no PG] and [National]

Sires with at least 10 progeny — N= 3748

Limousine breed — Country of origin = IRL

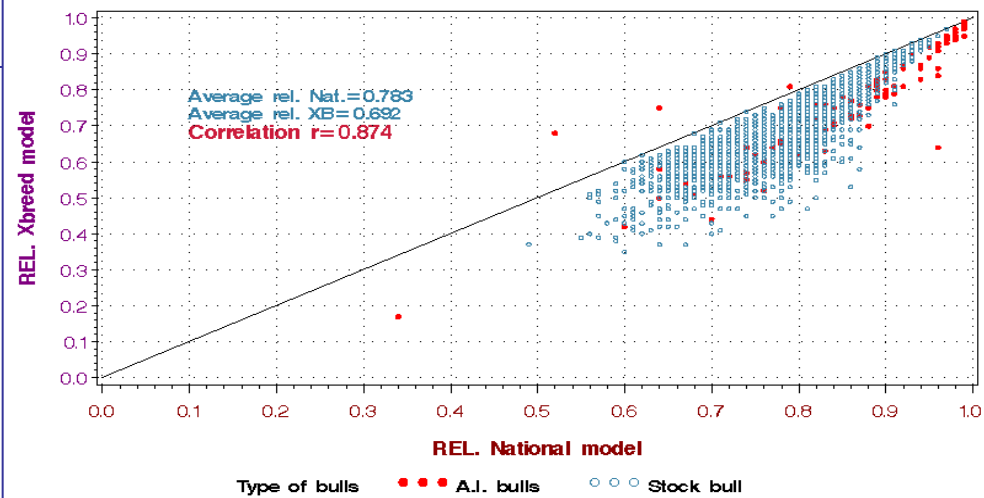


CORRELATION DIR.WEAN.WT. RELIABILITY ON IRISH SCALE

Models: [Xbred PG= breed] and [National]

Sires with at least 10 progeny — N= 3826

Limousine breed — Country of origin = IRL



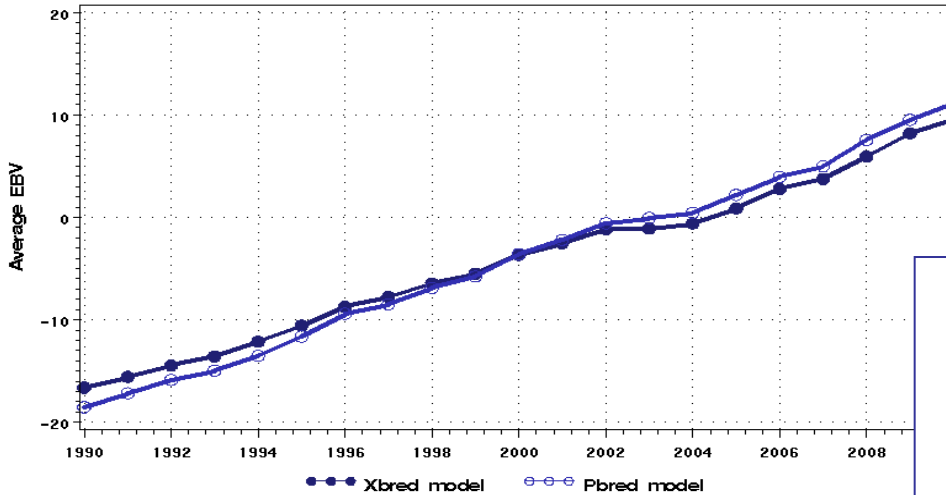
Playing with phantom groups

GENETIC TREND FOR DIR.WEAN.WT. ON IRISH SCALE

Models: [Purebred no PG] and [Xbred PG= breed/country/year]

Sires with at least 10 progeny

Limousine breed — Interbeef country of origin



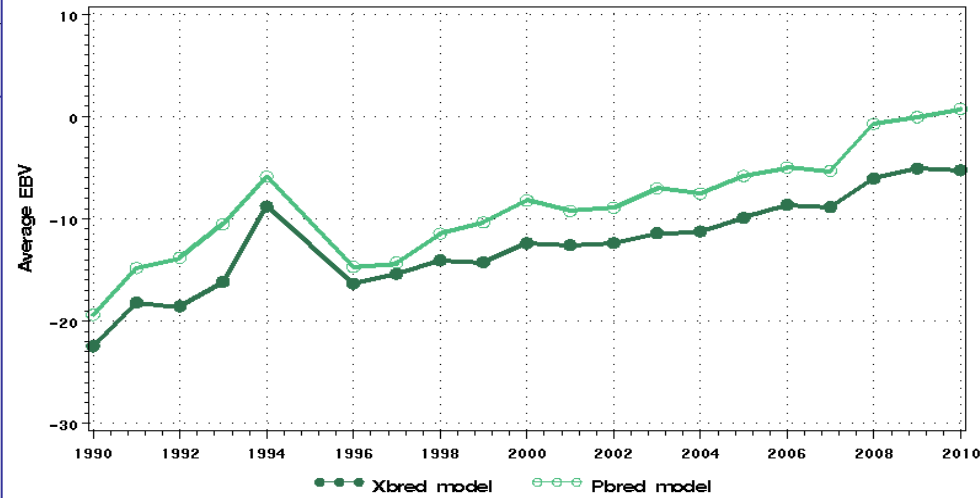
PG =
breed/country/year

GENETIC TREND FOR DIR.WEAN.WT. ON IRISH SCALE

Models: [Purebred no PG] and [Xbred PG= breed/country/year]

Sires with at least 10 progeny

Limousine breed — Country of origin = IRL



EBV: conclusion

- Including IRL Xbred data in Interbeef
 - All good news for IRL
 - ~no changes (EBV, rel.) for other countries
- Summary notes to follow shortly

Overall conclusion

- Including Xbred in Interbeef eval.
 - More accurate evaluation
 - Need update genetic evaluation chain @ Interbeef
 - Xbred data from other countries?
 - Test run?