



IRISH CATTLE BREEDING FEDERATION

## Love Meat Tender



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# Background



10<sup>th</sup>

Vancouver,  
August 17-22

Species Breeding: B

234 - Phenotypic and Genetic An  
Presenting Author: Francis K

## Conclusions

- **Meat eating quality as assessed by trained scorers exhibits additive genetic variation**
- **No significant differences between breeds based on current small dataset**
- **Potential useful relationships with traits collected routinely e.g. temperament and pH at factory post slaughter**
- **No indication yet of major genes at play**
- **Need to collect larger volumes of data and run validation studies with consumers to confirm results**

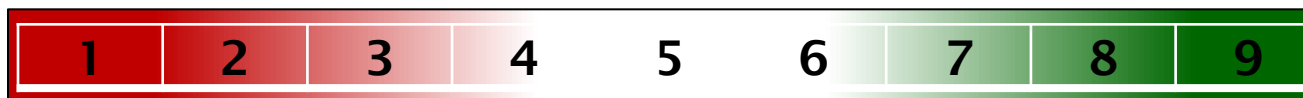
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# Background

## Meat Tasting Phenotypes

3 phenotypes: **Tenderness**, **Juiciness**, & **Flavour** - Scored 1 to 9



“Extremely Tough”  
“Not at all Juicy”  
“Off-note”

“Extremely Tender”  
“Extremely Juicy”  
“Extremely flavoursome”

## Meat Tasting Protocol

*Longissimus thoracis* muscle from right side of each carcass

2.5cm steaks which were thawed at 4°C at 24 hours before analysis

Grilled to a ‘medium’ cooking finish, allowed to rest for two minutes



- Eolas International, Co. Cork
- 7-10 trained panellists
- <http://www.eolasinternational.com>

# What's new?

- Meat Eating Quality (MEQ) phenotypes collected
  - Tully test station
  - WCGALP 2014 ~ 500 animals
  - ICAR 2016 ~1.500 animals

## What's been investigated?

- New Variance Components
- Estimation of EBVs and Reliabilities
- Breeds and Bulls
- EBV Validation

# New Variance Components

- Across-breed model using repeated records (date of tasting & scorer)

	Ireland		International
	2014	2016	
Tenderness	0.27	<b>0.24</b>	0.22
Juiciness	0.07	<b>0.09</b>	0.17
Flavour	0.16	<b>0.13</b>	0.10

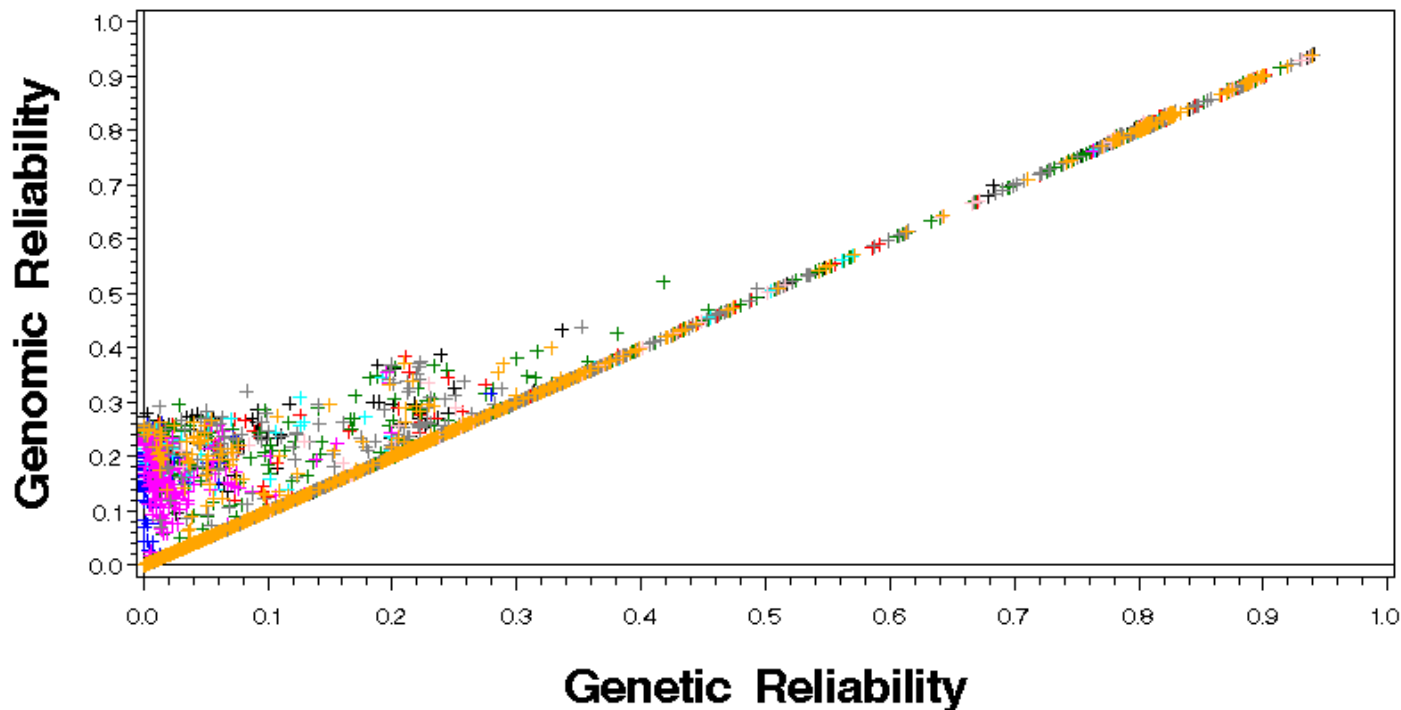
# Data for EBV estimation

- MEQ data
  - 1,513 animals finished in Tully test station
  - Slaughtered from 09/2013 to present
- Across-breed model
  - Correcting for breed composition (AA, BB, FR, HE, HO, LM, SA & SI)
- 2 types of evaluations / EBVs
  - Genetic evaluation using pedigree relationship matrix
  - 1-step genomic evaluation
    - 2,770 animals genotyped (1,244 with phenotypes)
  - MiX99 (Luke, Finland)

# Genetic / Genomic Evaluations

## DISTRIBUTION OF TENDERNESS GENETIC & GENOMIC RELs

Correlation  $r = 0.991$



+++ AA    +++ BB    +++ CH    +++ FR    +++ HE  
+++ HO    +++ LM    +++ SA    +++ SI

Graph limited to LM HO CH SI AA HE BB FR SA breeds

# Breeds and Bulls

## TENDERNESS EBV BY A.I. SIRES BREED

### Top Romantic A.I. bulls in Ireland: Best for Tenderness

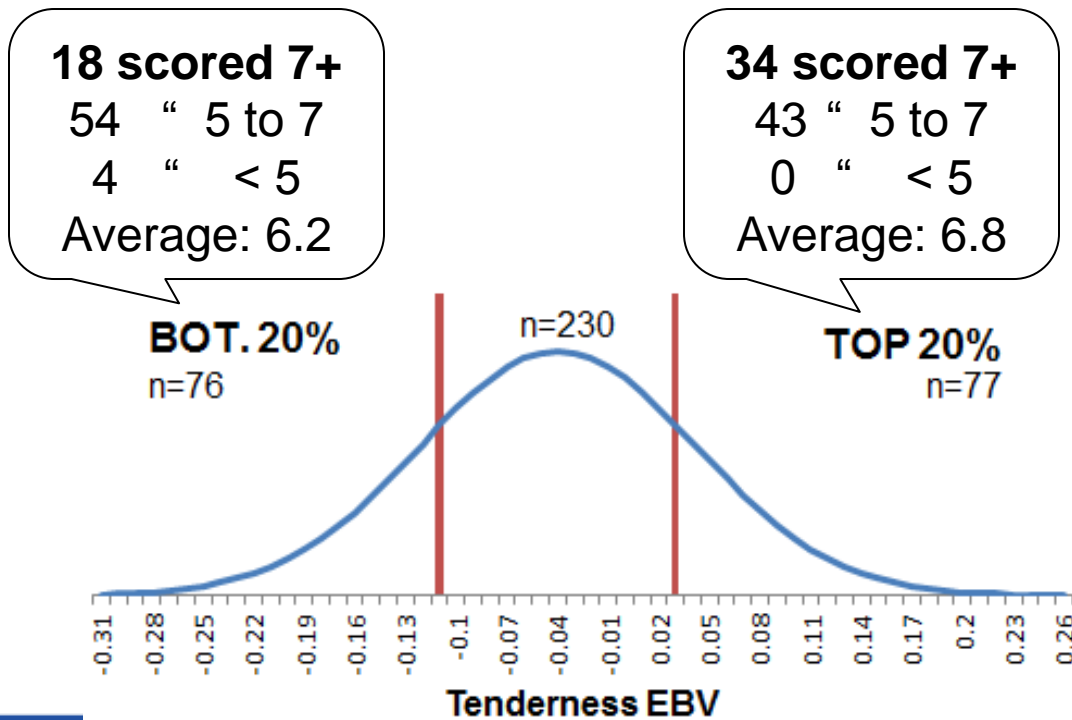
Breed	International ID	Name	Birth year
Angus	AANIRLM121657620895	LISDUFF DANDY K895	2010
Belgian Blue	BBLBELM000455716400	KUBITUS DE BRAY	2009
Charolais	CHAFRAM008130562111	ULRICH	2003
Hereford	HERGBRM700495200634	DENDOR 1 KOHINOOR PP	2012
Limousine	LIMFRAM003615030964	ROCKY	2000
Salers	SALFRAM001998004082	CORLURGAN OURSON	1998
Simmental	SIMAUTM000276570944	ENFIELD HURRICANE HUGO	1988

Graph limited to 1040 A.I. sires of AA, BB, CH, HE, LM, SA, and SI breeds



# Lab Validation

- Validation on 383 animals (142 steers + 241 bulls) slaughtered on consecutive dates
- Evaluations ran on 1,513 – validation animals



Validation for Tenderness		
	Genetic	Genomic
Accuracy	0.31	0.31
Bias	1.02	1.24

Accuracy:  $r(\hat{y}, y) / h$   
 Bias:  $b(\hat{y}, y)$

# Consumer Validation

**LIVESTOCK** IRISH FARMERS JOURNAL Saturday 23rd July 2016

## Breeding better beef

# The ICBF puts eating-quality index to the test

The ICBF put its newly developed beef eating quality index to the test at BEEF 2016 last week and the results are promising, writes Cláirín Lenehan

**Key points**

- The ICBF has developed a genetic index for beef eating quality.
- Data from 1,200 bulls fed at Tully progeny-testing centre used to develop index.
- Tested on 101 consumers at BEEF 2016. Given two steak samples, one from a high- and one from a low-index animal.
- Asked to identify high eating-quality index beef.
- 75% correctly identified the high-index eating quality beef.

It's quite rare to happen when a genetic index for beef eating quality is put to the test at a major event such as BEEF 2016. The ICBF has developed a genetic index for beef eating quality, based on data from 1,200 bulls fed at Tully progeny-testing centre. The index is based on a genetic index for beef eating quality, based on data from 1,200 bulls fed at Tully progeny-testing centre. The index is based on a genetic index for beef eating quality, based on data from 1,200 bulls fed at Tully progeny-testing centre.

**Building an index**

The index was developed by using data from 1,200 bulls fed at Tully progeny-testing centre. The index is based on a genetic index for beef eating quality, based on data from 1,200 bulls fed at Tully progeny-testing centre.

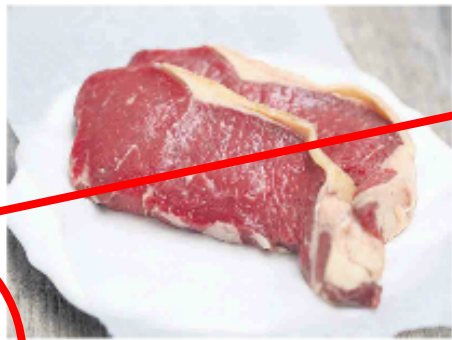
**BEEF 2016 consumer testing trials**

The index was tested on the general public at BEEF 2016 in Galway. Consumers were offered two pieces of steak, both from bulls of the same breed, but one from a bull belonging to a high beef eating quality genetic line and the other from a bull carrying lower levels of genetic beef eating quality.

The trial was held at the Galway Convention Centre. Consumers were asked to identify the high eating quality beef of the two. The trial was held at the Galway Convention Centre.

**Results**

75% of consumers correctly identified the high eating quality beef. The trial was held at the Galway Convention Centre.



## \* Key points

- The ICBF has developed a genetic index for beef eating quality.
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- 75% correctly identified the high-index eating quality beef.



**Table 6: Top 10 sires for meat eating quality**

Sire	Rank	Gen	Dev
1	1	Galaxy	Dev
2	2	Starburst	Dev
3	3	Galaxy	Dev
4	4	Galaxy	Dev
5	5	Galaxy	Dev
6	6	Galaxy	Dev
7	7	Galaxy	Dev
8	8	Galaxy	Dev
9	9	Galaxy	Dev
10	10	Galaxy	Dev

**Table 2: ICBF consumer testing session, Toppin Change BEEF 2016, 5 July 2016**

Pair	High eating quality steak			Low eating quality steak			Consumer selected "high"	
	Breed	Tag No.	ERV	Breed	Tag No.	ERV	High ERV	Low ERV
1	SD	176	3.3	OD	462	-0.3	5	2
2	CH	99	3.6	CH	967	-2.2	6	1
3	CH	368	2.6	CH	943	-3.8	6	2
4	LM	150	2.9	LM	486	-4.2	7	0
5	LM	792	2.8	LM	416	-2.9	4	3
6	LM	537	2.2	LM	598	-5.8	6	3
7	SA	152	1.7	SA	191	-0.6	7	0
8	AA	390	2.2	AA	324	-2.4	7	0
9	SI	311	2.6	SI	432	-2.0	3	4
10	CH	966	3.0	CH	526	-3.0	5	3
11	CH	992	2.2	CH	682	-2.1	3	4
12	LM	349	2.4	LM	947	-0.9	6	3
13	LM	317	2.2	LM	249	-0.3	6	2
14	SI	647	-0.2	SI	644	-6.7	6	1
			2.4			-2.5	75	26



# Conclusion

- Encouraging results!
  - Data collection is growing
  - Major topic for the industry: Pilot EBVs are well looked at
  - Validation work starting to back EBVs up
- More to do!
  - Focus on more routinely available predictors (pH, shear force, imagery...)
  - Explore major genes roles (CAPN1, CAST, MYO)

# Full Steam Ahead

- Meat Technologie Center (est. Oct 2016)
  - Industry and Industry Ireland funded initiative
  - All aspects of meat: grading, safety, consumer...
  - Work packages on genetic and genomic for MEQ
- Need for international sharing
  - data, standards... through ICAR/Interbeef
- Explore full potential of MEQ traits
  - In time, include MEQ traits as part of indexes in Ireland
  - Using genotypes, provide MEQ predictions to industry

# Love Meat Tender

Love meat blue!



Thanks for your attention.