Love Meat Tender

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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
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](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)

<table>
<thead>
<tr>
<th></th>
<th>Ireland 2014</th>
<th>Ireland 2016</th>
<th>International 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenderness</td>
<td>0.27</td>
<td>0.24</td>
<td>0.22</td>
</tr>
<tr>
<td>Juiciness</td>
<td>0.07</td>
<td>0.09</td>
<td>0.17</td>
</tr>
<tr>
<td>Flavour</td>
<td>0.16</td>
<td>0.13</td>
<td>0.10</td>
</tr>
</tbody>
</table>
Data for EBV estimation

• MEQ data
  – 1,513 animals finished in Tully test station
  – Slaughtered from 09/2013 to present

• Across-breeding 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

Genetic Reliability

Graph limited to LM, HO, CH, SI, AA, HE, BB, FR, SA breeds
# Breeds and Bulls

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

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

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

18 scored 7+
54 “ 5 to 7
4 “ < 5
Average: 6.2

34 scored 7+
43 “ 5 to 7
0 “ < 5
Average: 6.8

Validation for Tenderness

<table>
<thead>
<tr>
<th></th>
<th>Genetic</th>
<th>Genomic</th>
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</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>0.31</td>
<td>0.31</td>
</tr>
<tr>
<td>Bias</td>
<td>1.02</td>
<td>1.24</td>
</tr>
</tbody>
</table>

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

The ICBF puts eating-quality index to the test

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.
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)
• 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.