Breeding for Superior Beef Meat eating Quality

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Meat quality – why?

• >600,000 tonnes of beef produced in 2018 (Bord Bia)
• Exports €2.5bn
• 5th biggest exporter in the world

Beef exports to China set to increase ten-fold

The Bord Bia and Department of Agriculture predictions suggest that beef exports of €9 million last year will grow to €120m by the end of 2020.
Can we breed for it?

Huge improvements in meat quality in recent years..

Where will the next jump in quality come from?
How much is genetics?

Middle estimate
25% to 50% of the estimates

Highest 25% of estimates

Lowest 25% of estimates

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Genetic Evaluations

What?
A way to rank animals based on their (and/or their family members) performance for a certain trait(s)

How?
Meat quality data, pedigree information & other info

Estimated breeding values (EBVs) for all animals &
Reliability figure – level of confidence

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The Data

• Currently >5,000 cattle slaughtered
• Range of phenotypes collected including sensory analysis of meat
  • Trained panellists
    • Tenderness
    • Juiciness
    • Flavour

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How much is genetics?

$$h^2 = \frac{\text{Genetic variance}}{\text{Phenotypic variance}}$$

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<th>$h^2$ (SE)</th>
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<td>Tenderness</td>
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Within breed differences

25% of Simmental sires are better than worse angus

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Genetic evaluations
EBVs of sires with reliability of ≥30%

Progeny undergoing consumer trial

Frequency

Estimated breeding value

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Importance of data

![Graph showing the relationship between Reliability and Number of progeny. The data points are scattered, and there is a trend line indicating a positive correlation.](image-url)
### Terminal Index
Made up of the traits that are **important** to farmers that breed cattle for slaughter

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<th>Trait</th>
<th>Emphasis</th>
<th>Economic Value (€/unit)</th>
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<tr>
<td>Calving Difficulty</td>
<td>18%</td>
<td>-4.65</td>
</tr>
<tr>
<td>Gestation</td>
<td>4%</td>
<td>-2.25</td>
</tr>
<tr>
<td>Mortality</td>
<td>4%</td>
<td>-5.34</td>
</tr>
<tr>
<td>Docility</td>
<td>2%</td>
<td>-18.92</td>
</tr>
<tr>
<td>Feed intake</td>
<td></td>
<td>-0.13</td>
</tr>
<tr>
<td><strong>Carcass weight</strong></td>
<td></td>
<td><strong>4.03</strong></td>
</tr>
<tr>
<td><strong>Carcass conformation</strong></td>
<td>11%</td>
<td><strong>18.93</strong></td>
</tr>
<tr>
<td><strong>Carcass fat</strong></td>
<td>5%</td>
<td><strong>-10.08</strong></td>
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What is the terminal index currently doing to MEQ traits?

The changes in the eating quality traits per generation:

• Tenderness will increase by 0.07 units
• Juiciness will remain constant
• Flavour will decrease by 0.03 units
Selecting for MEQ traits

- Carcass fat
- Carcass conf
- Carcass weight
- Feed intake
- Docility
- Mortality
- Gestation
- Calving diff

Tenderness

Juciness

Flavour

Response per generation

Current
Take home messages

1. If factory process is streamlined breeding could bring a massive improvement to meat eating quality

2. Ireland will launch meat quality EBVs for AI sires with the hope of identifying superior sires
Future work

3. Work on-going to incorporate GENOMICS to meat eating quality index

19% reliability → 37% reliability
Thank you for your attention

Any questions?