Overview of Talk.

• Is the EBI Working?
• Minimising Risk in Your Breeding Program.
• Changes for 2018.
• Questions & answers.
High index Holstein route not the answer

Very disappointing results from three year trial

Where we started; Irish dairy herd 2000

 Measures of fertility needed in index
The ideal Irish dairy cow; High milk solids (500 kg MS/cow/year) & excellent fertility (CI = 365 days).
Rate of genetic gain in EBI (€/lact) for dairy females born in Ireland between 1996-2017

- 2002. Establish ICBF & EBI
- 2005. Establish GEN€ IR€
- 2009. Establish Genomics; Rate of gain doubled
- 2020. Next Gen Herd
## Farm Profit

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<tr>
<td>Labour cost (€)</td>
<td>32,443</td>
<td>31,660</td>
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<td>Replacement costs (€)</td>
<td>29,079</td>
<td>46,022</td>
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<td>Total costs (€)</td>
<td>163,081</td>
<td>178,782</td>
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<td>Livestock sales (€)</td>
<td>34,792</td>
<td>42,593</td>
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<td><strong>Profit Farm (€)</strong></td>
<td>92,305</td>
<td>68,023</td>
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<td></td>
<td>+ €220/ cow</td>
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Trend in herd performance 2010 – 2016

Based on 2,801 creamery suppliers with EBI, milk co-op and fertility data

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<tbody>
<tr>
<td>EBI Performance</td>
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<tr>
<td>- Herd EBI (Cows only)</td>
<td>€2.3</td>
<td>€22.4</td>
<td>€41.8</td>
<td>€53.1</td>
<td>€58.2</td>
<td>€67.8</td>
<td>€69.5</td>
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<tr>
<td>Milk Co-op performance</td>
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<tr>
<td>- Milk litres delivered/cow</td>
<td>4,858</td>
<td>4,872</td>
<td>4,713</td>
<td>4,795</td>
<td>4,845</td>
<td>5,240</td>
<td>5,170</td>
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<tr>
<td>- F+P kg/cow</td>
<td>363.4</td>
<td>367.8</td>
<td>359.5</td>
<td>365.9</td>
<td>374.0</td>
<td>410.4</td>
<td>407.1</td>
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<tr>
<td>- Fat%</td>
<td>4.00%</td>
<td>4.05%</td>
<td>4.13%</td>
<td>4.12%</td>
<td>4.17%</td>
<td>4.20%</td>
<td>4.28%</td>
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<tr>
<td>- Protein%</td>
<td>3.48%</td>
<td>3.50%</td>
<td>3.50%</td>
<td>3.51%</td>
<td>3.55%</td>
<td>3.64%</td>
<td>3.60%</td>
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<td>Fertility performance</td>
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<tr>
<td>- CI Days</td>
<td>393.5</td>
<td>393.8</td>
<td>388.7</td>
<td>385.8</td>
<td>387.2</td>
<td>383.3</td>
<td>381.2</td>
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<tr>
<td>- Six week calving rate</td>
<td>55.3</td>
<td>56.2</td>
<td>59.5</td>
<td>62.1</td>
<td>61.3</td>
<td>62.0</td>
<td>63.9</td>
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<tr>
<td>- % calving 22-26 mths</td>
<td>67.4</td>
<td>70.2</td>
<td>73.4</td>
<td>70.5</td>
<td>72.0</td>
<td>74.8</td>
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<tr>
<td>Total milk solids</td>
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<td></td>
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</tr>
<tr>
<td>- F+P kg/Herd</td>
<td>28,222</td>
<td>30,713</td>
<td>31,042</td>
<td>33,014</td>
<td>34,370</td>
<td>41,097</td>
<td>43,808</td>
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<tr>
<td>- % increase</td>
<td>8.8%</td>
<td>10.0%</td>
<td>17.0%</td>
<td>21.8%</td>
<td>45.6%</td>
<td>55.2%</td>
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</table>
Questions over genomics at Greenfield

Looking at some of the first calvers in Greenfield as they approach the end of the first lactation, you would have to question if this is the type of cow that will stay long-term on the farm. Some of the GZY-sired heifers look very leggy, big and Holstein-like compared with the mature cows on the farm. Now, I say this, recognising that heifers are in their working clothes at this time of the year and it isn’t looks that puts milk solids in the tank. I also say this in the full knowledge that the milk solids and fertility performance of the herd as a whole has improved significantly over the last five years.

As the first-calvers approach the end of the first lactation, evaluation proof was available in 2014 when GZY was used so he was selected not knowing if she was hard calving or easy calving. After a few years in use, he now has a calving difficulty of 3.2, which means he is a hard calver. For me, AI sires need to be less than two for heifers and proof takes shape. So it looks like this sire, having started out with a good looking milk proof, is not going to do much to bring more fat and protein into the bulk tank. The fact that 25% of our heifers are bred from GZY means we have lost opportunity for genetic gain with
Bull proofs will change over time.

Do all minor/u21 hurlers or footballers become great seniors?
Our breeding industry will change over time => Game Change.

• How will our breeding industry change in the next 10 years?
  – New technologies.
    • Genomics, sexed semen, gene editin…….
  – New traits.
    • Mastitis, lameness, diseases (TB, fluke…).
    • Feed intake/efficiency => cow size.
    • Fertility => compactness of spring calving.
  – Changing economic values…
    • Cost of labour…
    • Impact of GHG & environmental legislation.
    • Anti-microbial resistance => dry cow therapy.
Game change. Football=> Aussie Rules.

- Joe Kernan.
- Is it the same game?
  - Are the best in one still the best in other?
- What did Joe do to try overcome the differences and win the test series?
<table>
<thead>
<tr>
<th>What are the main differences between football and Aussie Rules?</th>
<th>What did Joe do to try and overcome these?</th>
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<tr>
<td>What are the main differences between football and Aussie Rules?</td>
<td>What did Joe do to try and overcome these?</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>------------------------------------------</td>
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<tr>
<td>Different Shaped Ball.</td>
<td>Large squad.</td>
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<tr>
<td>4 posts.</td>
<td>Rotation.</td>
</tr>
<tr>
<td>Different shaped pitch.</td>
<td>Not overuse key players</td>
</tr>
<tr>
<td>Amateurs versus pro’s</td>
<td>Enlist local AFL players.</td>
</tr>
<tr>
<td>Weather/ground conditions</td>
<td>Younger players</td>
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<tr>
<td>Two referee’s</td>
<td>Hassle the ref!</td>
</tr>
<tr>
<td>No Dub’s!</td>
<td></td>
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</tbody>
</table>
Breeding decisions 2018+

- Back to breeding cows, given anticipated changes our breeding industry in the future, how should we approach bull selection?
Managing Risk – Use of Bull Teams

- Yes we use teams of bulls
- But we majorly over-use individual bulls
  - Especially relevant for heifers – herds using 1 or 2 bulls on heifers!

<table>
<thead>
<tr>
<th></th>
<th>Herds*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number herds</td>
<td>5,973</td>
</tr>
<tr>
<td>Number bulls used</td>
<td>7.5</td>
</tr>
<tr>
<td>% to most heavily used bull</td>
<td>34%</td>
</tr>
<tr>
<td>% to most heavily used 3 bulls</td>
<td>69%</td>
</tr>
<tr>
<td>% herds where usage of 3 most</td>
<td>18%</td>
</tr>
</tbody>
</table>
Breeding Program Strategy

High EBI Bulls

Equal use of bull teams.
Updated Bull Usage Guidelines

<table>
<thead>
<tr>
<th>Herd Size (incl. Heifers)</th>
<th>Minimum Bull Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 - 100</td>
<td>7</td>
</tr>
<tr>
<td>101 - 150</td>
<td>8</td>
</tr>
<tr>
<td>151 - 200</td>
<td>10</td>
</tr>
<tr>
<td>201 - 250</td>
<td>11</td>
</tr>
<tr>
<td>251 - 300</td>
<td>12</td>
</tr>
<tr>
<td>301 - 400</td>
<td>14</td>
</tr>
</tbody>
</table>

• New guidelines account for;
  - relatedness of bull teams
  - increase in reliability of bull team from 90% to 95%
  - impact of herd size/industry
• Minimum use targets & equal usage of bulls
Managing Risk - Use Young GS Bulls.

- Progeny of young GS bulls perform better than daughter proven bulls.

<table>
<thead>
<tr>
<th></th>
<th>Genomic</th>
<th>Daughter Proven</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. cows/herd</td>
<td>96.2</td>
<td>76.4</td>
</tr>
<tr>
<td>Herd EBI</td>
<td>€92</td>
<td>€73</td>
</tr>
<tr>
<td>% calf 2011-14 calf crop GS</td>
<td>72%</td>
<td>13%</td>
</tr>
<tr>
<td>Milk production 2016</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Litres /cow</td>
<td>5,176</td>
<td>4,853</td>
</tr>
<tr>
<td>Fat kg/cow</td>
<td>223.9</td>
<td>204.3</td>
</tr>
<tr>
<td>Protein kg/cow</td>
<td>187.4</td>
<td>174.6</td>
</tr>
<tr>
<td>F+P kg/cow</td>
<td>411.3</td>
<td>378.9</td>
</tr>
<tr>
<td>Fertility 2016</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CI Days</td>
<td>378.0</td>
<td>379.1</td>
</tr>
<tr>
<td>6-week calving rate</td>
<td>67.7</td>
<td>63.9</td>
</tr>
<tr>
<td>Heifers calved at opt age</td>
<td>81%</td>
<td>66%</td>
</tr>
</tbody>
</table>
Changes to EBI for 2018+

- Updating the economic values in the EBI.
  - Not updated since 2014.
- New genetic evaluations for milk traits.
  - New Test Day Model evaluations.
- Update the training population.
  - More bulls added => increased accuracy.
- New genetic evaluation software.
  - More frequent and increased accuracy.
- New genomic evaluations for health & disease traits.
  - The new “fertility” => increasing problem at farm level.
### Updating Economic Values in EBI

<table>
<thead>
<tr>
<th>Trait</th>
<th>2014</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk (kg)</td>
<td>-0.09</td>
<td>-0.09</td>
</tr>
<tr>
<td>Fat (kg)</td>
<td>1.04</td>
<td>2.08</td>
</tr>
<tr>
<td>Protein (kg)</td>
<td>6.64</td>
<td>5.88</td>
</tr>
<tr>
<td>Calving interval (d)</td>
<td>-12.43</td>
<td>-12.59</td>
</tr>
<tr>
<td>Survival (%)</td>
<td>12.01</td>
<td>12.43</td>
</tr>
<tr>
<td>Calving difficulty dir (%)</td>
<td>-3.52</td>
<td>-4.19</td>
</tr>
<tr>
<td>Calving difficulty mat (%)</td>
<td>-1.73</td>
<td>-2.31</td>
</tr>
<tr>
<td>Gestation (d)</td>
<td>-7.50</td>
<td>-7.93</td>
</tr>
<tr>
<td>Calf mortality (%)</td>
<td>-2.58</td>
<td>-2.58</td>
</tr>
<tr>
<td>Cow (kg)</td>
<td>-1.65</td>
<td>-1.65</td>
</tr>
<tr>
<td>Carcase weight (kg)</td>
<td>1.38</td>
<td>1.38</td>
</tr>
<tr>
<td>Carcase conf</td>
<td>10.32</td>
<td>10.32</td>
</tr>
<tr>
<td>Carcase fat (units)</td>
<td>-11.71</td>
<td>-11.71</td>
</tr>
<tr>
<td>Cull cow (kg)</td>
<td>0.15</td>
<td>0.15</td>
</tr>
<tr>
<td>Lameness (%)</td>
<td>-54.26</td>
<td>-72.47</td>
</tr>
<tr>
<td>Mastitis (%)</td>
<td>-77.10</td>
<td>-82.65</td>
</tr>
<tr>
<td>SCC ($\log_e$)</td>
<td>-43.49</td>
<td>-43.49</td>
</tr>
<tr>
<td>Milking duration (seconds)</td>
<td>0.25</td>
<td>0.31</td>
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</tbody>
</table>

- **Correlation among proofs (n=4208) of 0.9986**
- **Correlation among proofs of Active Sires (n=650) of 0.992**
- **Upward shift in mean EBI value (+€10-€15), mainly due to milk price increase & fat kg.**

Relative emphasis

Milk | Fertility | Calving | Beef | Maintenance | Health | Management

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<tbody>
<tr>
<td>Milk</td>
<td>100%</td>
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<tr>
<td>Fertility</td>
<td>0%</td>
<td>100%</td>
<td>80%</td>
<td>60%</td>
<td>40%</td>
<td>20%</td>
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<td>Calving</td>
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Why change milk evaluations?

- Old milk production evals based on predicting individual test days => 305-day yield and then undertaking genetic eval on the 305-day yield.
- More accurate approach is to evaluate the individual test day (better account for effects specific to that test day, e.g., weather, grass quality, conc feeding) and then sum these to an overall value for each animal.
  - Also allows for animals (& sires) to have different shapes of lactation curve => new traits such as persistency.
  - In-line with international best practice.
- Extensive R&D undertaken over last 3 years.
Base cow production.

<table>
<thead>
<tr>
<th>Parity</th>
<th>Milk kg</th>
<th>Fat kg</th>
<th>Protein kg</th>
<th>Fat%</th>
<th>Protein%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parity 1</td>
<td>5538</td>
<td>216.3</td>
<td>188</td>
<td>3.91%</td>
<td>3.39%</td>
</tr>
<tr>
<td>Parity 2</td>
<td>6246</td>
<td>243.7</td>
<td>216.1</td>
<td>3.90%</td>
<td>3.46%</td>
</tr>
<tr>
<td>Parity 3</td>
<td>6587</td>
<td>258</td>
<td>227.1</td>
<td>3.92%</td>
<td>3.45%</td>
</tr>
<tr>
<td>Overall</td>
<td>6044</td>
<td>236.2</td>
<td>207.5</td>
<td>3.91%</td>
<td>3.43%</td>
</tr>
</tbody>
</table>

- Same group of animals as before (born 2005, milking 2007). Now expressed against first 3 lactations as opposed to heifer equivalent => more in line with best practice.
  - Base cow production = 6,044 Milk kg, 236.2 Fat kg & 207 Ptn kg
  - Bull A = +300 kg milk, +12 kg Fat, + 10 kg Protein.
  - Daughters = 6,344 milk, 248.2 Fat kg & 217 Ptn kg.
Benefits of TDM – Bulls differences.

Example; YAD – increasing on new TDM vs YGD falling back.
Impact; Comparison of Current Official and New Test Proofs*

- 6 out of Top 10 bulls are still in Top 10 on New EBI
- 85 out of Top 100 bulls are still in Top 100 on New EBI

*Based on 886 Active AI Sires (Test proofs distributed yesterday).
Summary.

- EBI has worked well on farms.
- Need to shift focus towards EBI and equal use of bulls teams.
- Teams of high EBI GS bulls will perform better than DP bulls.
- Proofs for all bulls will change, both Daughter Proven and Genomic.
- ICBF will continue to “make changes” (new data, new traits, new EV’s, new technology…….). Another key way to help manage risk.
- Ireland is right to have a Genomic based breeding program. Agile & able to respond to change.