**Herdbook technical meeting**

*Killeshin Hotel, Portlaoise. 1st November 2011.*

**Agenda.**

  - Update on female fertility.
- Calving difficulty – Francis.
- Data reliability - Andrew
- Other projects - Andrew
- AOB.
Maternal weaning weight evaluation

Changes since August meeting

• Reduced genetic correlation between direct and maternal weaning

• Predictor traits
  - Inclusion of Linear type Muscle composite and carcass traits with a mild negative correlation with muscle, weight and conformation and mild positive with carcass fat
  - Dairy herd milk yield, fat and protein yield as predictors for dairy cows and SI and SH
  - Reforming of breed groups: now 5 year groups
  - Splitting up of heterosis into beef x beef and beef x dairy
## Correlations with other traits

<table>
<thead>
<tr>
<th>Possible predictor Trait</th>
<th>Current Milk pd</th>
<th>NEW Test Milk pd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weaning weight</td>
<td>-0.10</td>
<td>-0.15</td>
</tr>
<tr>
<td>Carcass weight</td>
<td>-0.57</td>
<td>-0.43</td>
</tr>
<tr>
<td>Carcass conformation</td>
<td>-0.49</td>
<td>-0.33</td>
</tr>
<tr>
<td>Carcass fat</td>
<td>0.51</td>
<td>0.35</td>
</tr>
<tr>
<td>Skeletal Composite</td>
<td>0.03</td>
<td>-0.06</td>
</tr>
<tr>
<td>Muscle Composite</td>
<td>-0.03</td>
<td>-0.22</td>
</tr>
<tr>
<td>Development of hind Quarter</td>
<td>-0.32</td>
<td>-0.24</td>
</tr>
<tr>
<td>Loin Development</td>
<td>-0.37</td>
<td>-0.36</td>
</tr>
<tr>
<td>Current Milk index</td>
<td></td>
<td>0.71</td>
</tr>
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</table>

## New data since August (with mgs)

<table>
<thead>
<tr>
<th>TRAIT</th>
<th>Aug-11</th>
<th>Oct-11</th>
<th>Extra</th>
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<tbody>
<tr>
<td>age 50-150</td>
<td>27,514</td>
<td>29,508</td>
<td>1,994</td>
</tr>
<tr>
<td>age 150-250</td>
<td>104,344</td>
<td>133,355</td>
<td>29,011</td>
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<tr>
<td>age 250-350</td>
<td>114,323</td>
<td>138,618</td>
<td>24,295</td>
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<tr>
<td>age 350-450</td>
<td>73,539</td>
<td>88,000</td>
<td>14,461</td>
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<tr>
<td>age 450-550</td>
<td>22,551</td>
<td>30,310</td>
<td>7,759</td>
</tr>
<tr>
<td>age 550-700</td>
<td>34,230</td>
<td>45,499</td>
<td>11,269</td>
</tr>
<tr>
<td>Total</td>
<td>376,501</td>
<td>465,290</td>
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</table>
Correlation = 0.73

Correlation = 0.69
Correlation = 0.99

Correlation = 0.98
AI sires >70% in FRA and IRL
Correlation = 0.82

LM new 150-250 WITH rg v foreign proof

AI sires >70% in FRA and IRL
Correlation = 0.72
Overall 2783 bulls: 29% to 43%

Compare AI sires across breed (>50% rel)

```
<table>
<thead>
<tr>
<th>ACROSS Breed STAR</th>
<th>No. SIRES</th>
<th>Number of CG comparisons</th>
<th>Number of grand progeny</th>
<th>Progeny 150-250</th>
<th>Herdmate 150-250</th>
<th>Difference</th>
<th>Current milk pd</th>
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</thead>
<tbody>
<tr>
<td>*****</td>
<td>192</td>
<td>32</td>
<td>60</td>
<td>305</td>
<td>298</td>
<td>7</td>
<td>15</td>
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<td>190</td>
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<td>59</td>
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<td>293</td>
<td>4</td>
<td>9</td>
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<tr>
<td>***</td>
<td>219</td>
<td>51</td>
<td>106</td>
<td>297</td>
<td>295</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>**</td>
<td>230</td>
<td>37</td>
<td>73</td>
<td>293</td>
<td>294</td>
<td>-1</td>
<td>-2</td>
</tr>
<tr>
<td>*</td>
<td>265</td>
<td>35</td>
<td>65</td>
<td>295</td>
<td>298</td>
<td>-3</td>
<td>-9</td>
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</table>

<table>
<thead>
<tr>
<th>Test ACROSS Breed STAR</th>
<th>No. SIRES</th>
<th>Number of CG comparisons</th>
<th>Number of grand progeny</th>
<th>Progeny 150-250</th>
<th>Herdmate 150-250</th>
<th>Difference</th>
<th>Test milk pd</th>
</tr>
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<tbody>
<tr>
<td>*****</td>
<td>240</td>
<td>31</td>
<td>55</td>
<td>307</td>
<td>295</td>
<td>12</td>
<td>10</td>
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<tr>
<td>****</td>
<td>176</td>
<td>38</td>
<td>70</td>
<td>300</td>
<td>298</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>***</td>
<td>161</td>
<td>53</td>
<td>105</td>
<td>297</td>
<td>294</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>**</td>
<td>225</td>
<td>43</td>
<td>78</td>
<td>296</td>
<td>296</td>
<td>0</td>
<td>-1</td>
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<tr>
<td>*</td>
<td>294</td>
<td>33</td>
<td>68</td>
<td>289</td>
<td>297</td>
<td>-8</td>
<td>-8</td>
</tr>
</tbody>
</table>
```

5* Across breed current: 5 breeds represented
5* Across breed New: 12 breeds represented
Comparison of Grange cows

- Access to a milk yield estimate from Grange herd on 105 cows
- Calves weighed before and after and difference = milk yield
- Average = 6.9 kg
- Min = 1.4, Max = 13.2, sd = 2.9
- 80 of the cows have weaning weight from linear scoring session (different weighing)
- Correlation of 0.43 with the new proofs
- Need to get access to the actual weights from this weighing session and include them into the evaluation and see the correlation
- Very useful independent measure of milk yield for comparison

Further work

- New evaluation for industry meeting
  - Reliabilities update for new data
  - More new data to come as busy time for weanling sales
  - New data from last 3 months increased the sd of the proofs by 0.2 from previous run
    - Good quality weaning weight data in the 150-250 day age range is the key!
- Target implementation Dec 2011.
Beef Fertility evaluations

Current beef evaluations

- Parity 1 only
- Contemporary group defined within parity 1 animals (loss of data)
- Calving interval and survival in multi-trait evaluation

→ Low reliability!!
New evaluation

• More data (i.e., more lactations and more recordings – suckler welfare scheme)
  – Lactations 1 to 10
  – Redefinition of contemporary group across parities
• Better statistical model – increase heritability
  – Better definition of contemporary group for age at first calving
  – Repeatability model
• Use of predictor traits
• Calving in the first 42 days of calving season (heifers and cows separately)
  – Live-weight, muscularity, docility, price, carcass traits, cow milk and docility scores

Relationship with old evaluation

\[ r = 0.82 \]

\[
\begin{array}{c}
\text{New fertility proofs} \\
\text{Old fertility proofs}
\end{array}
\]
Effect on reliability

Animals above the line have increased reliability

Conclusions

• Work almost completed

• Testing of heterogeneity of variance
  - (caused by management differences between herds)
  - Age at first calving
  - Calving interval

• Work scheduled for coming weeks
• Target implementation December 2011.
Calving Performance Evaluations

- Separate calving on heifers vs calving on later parities rather than including overall parity effect
- New genetic parameters
- Use gestation & mortality as correlated traits
- Dropping historical data
Calving Performance

- Currently based on parameters that were estimated a number of years ago
- Large increase in data in the last number of years
- Estimates of heritability based on records across all lactations
- Is heifer calving/gestation a different trait?

Current Model

- Evaluate calving difficulty, maternal calving difficulty, gestation, mortality
- No correlation between traits except a negative 0.7 correlation between direct and maternal calving difficulty
- Historical calving data used as a correlated trait for each trait
**Heritabilities**

<table>
<thead>
<tr>
<th></th>
<th>Current Estimates</th>
<th>New Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>heritability</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calving Diff</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td>Gestation</td>
<td>0.40</td>
<td>0.13</td>
</tr>
<tr>
<td>Mortality</td>
<td>0.01</td>
<td>0.07</td>
</tr>
</tbody>
</table>

New estimates in line with those in the literature

**Correlations**

Correlation between direct and maternal – current estimates indicate that daughters of bulls that are easy calving have difficulty calving themselves

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>New</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD-MCD</td>
<td>-0.7</td>
<td></td>
</tr>
<tr>
<td>CD-MCD -1st</td>
<td></td>
<td>-0.48</td>
</tr>
<tr>
<td>CD-MCD - later</td>
<td></td>
<td>-0.24</td>
</tr>
</tbody>
</table>
Results

CD 1

Correlation = 0.86

Current Eval

Results

CD Later

Correlation = 0.89

Current Eval
## Results

### Correlation

![Graph showing correlation](image)

Correlation = 0.87

### Variable Summary

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current CD</td>
<td>795</td>
<td>7.51</td>
<td>4.54</td>
<td>0.8</td>
<td>33.6</td>
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<tr>
<td>CD Heifer</td>
<td>795</td>
<td>5.20</td>
<td>2.80</td>
<td>0.8</td>
<td>23.3</td>
</tr>
<tr>
<td>CD Later</td>
<td>795</td>
<td>5.27</td>
<td>2.98</td>
<td>1.1</td>
<td>22.3</td>
</tr>
</tbody>
</table>
Results - Reliability

**Correlation = 0.88**

CD 1

**Correlation = 0.97**

CD Later
## Results - Reliability

### Correlation = 0.91

#### CD Later

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current CD</td>
<td>795</td>
<td>90.1</td>
<td>8.0</td>
<td>71</td>
<td>99</td>
</tr>
<tr>
<td>CD Heifer</td>
<td>795</td>
<td>72.5</td>
<td>17.6</td>
<td>25</td>
<td>99</td>
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<tr>
<td>CD Later</td>
<td>795</td>
<td>80.6</td>
<td>14.2</td>
<td>45</td>
<td>99</td>
</tr>
</tbody>
</table>
Summary

• Correlations with previous proofs are high but significant individual changes

• Some bulls easier on heifers?

• Lower heritabilities for calving diff will result in lower reliabilities especially for new test bulls

• Biologically a model with 1st and later parities evaluated separately should be used for CD

• Publication of both traits with associated economic values?

• Direct calving will have less of an impact on maternal calving due to a lower correlation

Summary

• The new evaluation has passed Interbull tests for suitability for international evaluations for dairy bulls

• New gestation, mortality and maternal proofs will also be provided

• Inclusion of foreign data is currently underway

• Feedback on the proofs is welcomed

• Target implementation December 2011.

• Future work in this area; incorporation of birth weight data to be collected in 2012+.
What is data reliability?

- The confidence that you can place in a bull (or cows) proof.
  - Higher is better.
  - Varies depending on trait (heritability).
  - Varies depending on “category” of animal (e.g., young bull, stock bull, AI bull).
  - Influenced by quality & quantity of data.
  - Based on the animals in the proof (can change as more data becomes available).
Current reliability limits.

- Database.
  - All evaluations are loaded regardless of data reliability.
- ICBF Bull Search.
  - All evaluations are presented regardless of data reliability.
- €uro-Star catalogues.
  - Evaluations for bulls that are bottom 10% for given trait (within breed) are presented as “not available”.
- ICBF Active Bull Lists (published).
  - Bull must be >=50% rel on SBV and >=50% rel on calving sub index to be on “published” list.
  - All AI bulls (& all information) presented on website list.

What are the issues?

- AI bulls appearing on website & active bull list with potentially 0% reliability for certain traits.
- Reliability criterion on catalogues doesn’t appear to be “consistent” across traits.
  - Single criterion for all traits?
- There is little understanding of the concept of reliability.
  - What is ICBF & Teagasc’s role?
  - To “protect” farmers or instil the principle of “buyer beware”.

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Propositions (i)

1. Undertake an analysis of all traits *including new traits* and revert with a proposition regarding publication criterion for each.
   - Database, website, catalogues & Active Bull List.

2. Initiate a piece of work to provide more detailed information around each trait and for each animal (on website).
   - Number of registered progeny.
   - Number of records in each evaluation.
   - Broken down by pedigree and commercial.

Propositions (ii)

3. Highlight (on website and potentially bull lists) bulls that are deemed proven for; (i) calving, (ii) terminal, (iii) maternal & (iv) overall indexes.

4. Initiate a piece of work with Teagasc to promote understanding of the term “data reliability”.

5. Launch herd “data quality” index.

6. Are there other pieces of work that we should be doing?
Other projects.

Killeshin Hotel, Portlaoise.
1st November 2011.

Other projects (i)

- On-farm weight recording using weigh scales, platform, “blue-tooth” technology & handhelds.
- Birth weight project.
- Herd data quality index & recording protocol document.
- G€N€ IRELAND.
Other projects (ii)

• Stock bull durability.
  - Initial analysis; Service days, service years & stock bull score. No indication of genetic variance.
  - Highly relevant and interesting trends for ICBF and beef herdbooks.
    • Pedigree bulls versus non pedigree bulls.
  - Time to be devoted at next HB technical meeting.
• Testing the accuracy of maternal proofs.
How should we test the “accuracy” of proofs?

- Weanling & carcass traits.
  - Results from research & National data have confirmed the value of €uro-stars.
- Maternal milk traits.
  - Results more difficult to ascertain due to complexity of separating direct and maternal effects in raw data.
  - Need a “more structured” approach.

Proposition.

- Project involving ICBF, Teagasc and beef herdbooks.
- Identify G€N€ IRELAND & pedigree herds with good ancestry and data recording (~30 herds * 1000 cows).
  - Range of maternal grand sires used (high milk bulls & low milk bulls).
  - Using one of more bulls (AI or stock bull) to breed calves.
- Evaluate performance of progeny.
  - Accurate recording of all relevant data.
  - Birth weight & multiple on-farm weights.
Research project (i)

Herd of cows

Single stock bull used.

Calves

- Difference in calve weights should be due to genetic index of maternal grand sires;
  - \[(\text{weight of High Milk calves} - \text{weight of Low Milk calves})\]
- Test this hypothesis using; (i) historical data, and (ii) data going forward.

Research project (ii)

Herd of cows

High Growth bulls. \quad \text{and} \quad \text{Low Growth bulls.}

Calves

- Difference in calve weights should be due to genetic index of maternal grand sires;
  - \([(\text{weight of HM} \times \text{HG calves}) - (\text{weight of LM} \times \text{HG calves})]\)
  - \([(\text{weight of HM} \times \text{LG calves}) - (\text{weight of LM} \times \text{LG calves})]\)
- Test this hypothesis using; (i) historical data, and (ii) data going forward.
What next?

- Identify ~30 herds (15 GENIE IRÉLAND & 15 pedigree) to be involved in the project.
- Undertake analysis of “historical data”.
- Ensure data capture systems are in place for future data.
  - Same/similar herds as “birth weight” project.
- Valuable reference point going forward.
- Feedback?