Estimation of genetic parameters for Irish test day milk production evaluation

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Session 4: National and International Evaluations
Background

• Current milk production model is 305d model
• Parameters estimated in 1999
  – Change in herd profile
  – Change in recording methods/frequency
• Desire to move to new software and run in-house
• Project to develop test day model
  – First step parameter estimation
Background

- Ireland has primarily pasture-based dairy production system
  - Calving coincides with grass availability
- Seasonality is likely to become stronger
- Price fluctuation
- Removal of Quota post 2015 – increasing herd size
- Economic weight of -11.89 Euro / day calving interval
Objective

To estimate variance components of milk production based on Irish data, with a view to developing a Random Regression Test Day model and investigate the inclusion of seasonality
Data/Model

- Holstein / Friesian animals, Parity 1-5
- Traits: Test Day Milk/Fat/Protein/SCC
- MiX99
- Animal Model
- No across trait correlations
  - Parity 1  Parity 2  Parity 3/4/5
- Heterogeneous residual (12 blocks/parity)
- 4 random regressions
- 1 fixed regression
- 3 fixed class effects,
Correlation between current 305d and new RR TD EBV’s

- Using current 305d EBVs and newly estimated RR TD (including general het. & rec.) EBVs

<table>
<thead>
<tr>
<th>EBV correlations between current 305d model and new RR TD model for complete lactation</th>
<th>AI Sires</th>
<th>Cows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk Yield</td>
<td>0.93</td>
<td>0.83</td>
</tr>
<tr>
<td>Fat Yield</td>
<td>0.90</td>
<td>0.88</td>
</tr>
<tr>
<td>Protein Yield</td>
<td>0.78</td>
<td>0.74</td>
</tr>
<tr>
<td>SCC</td>
<td>0.86</td>
<td>0.89</td>
</tr>
</tbody>
</table>
Seasonality

• Are there benefits to using certain bulls at specific times in breeding season
• Examine variance components of milk production as effected by both stage of lactation and month of production
• Instead of Days in Milk (DIM)
  – Months in Milk (MIM) – Stage of lactation
  – Test Months (TM) – Month of Year
Results: heritability

h² of test-day milk yield for Spring Calvers

- Jan Calvers
- Feb Calvers
- Mar Calvers
- Apr Calvers
- May Calvers
- No Seasonality
### Split genetic variances across MIM & TM

#### 1. MIM

<table>
<thead>
<tr>
<th>TD Milk</th>
<th>Genetic variance for MIM (diag.) &amp; genetic correlations between MIM (off diag.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Early lactation (MIM=2)</td>
</tr>
<tr>
<td>Early lactation (MIM=2)</td>
<td>2.28</td>
</tr>
<tr>
<td>Mid lactation (MIM=5)</td>
<td>2.25</td>
</tr>
<tr>
<td>Late lactation (MIM=8)</td>
<td></td>
</tr>
</tbody>
</table>
## Split genetic variances across MIM & TM

### 2. TM

**TD Milk**

| Genetic variance for TM \((diag.)\) & genetic correlations between TM \((off \ diag.)\) |
|---------------------------------|-----------------|-----------------|-----------------|
|                                | April Milk test (TM=4) | June Milk test (TM=6) | Sept Milk test (TM=9) |
| **April Milk test (TM=4)**     | 0.01             | 0.46            | -0.71           |
| **June Milk test (TM=6)**      |                  |                 |                 |
| **Sept Milk test (TM=9)**      |                  |                 |                 |
Results: Genetic Correlations of 305 day milk yield

- Compare predicted 305 milk yield from this model with “standard” test day model
- For AI bulls with >20 progeny
  - Correlations milk yield > 0.996
  - Correlations persistency >0.930
- LogL suggest “standard” model preferable
Next Steps

- Interbull test run Sep 2012
- Fixed effects across breed
- Specific Heterosis/Recombination
- Heterogeneous variance
- Persistency
- Practical considerations
  - Weighing across parity
  - Presentation
Thank you