Lameness evaluations for the UK dairy industry
Fern Pearston
Interbull Meeting 2016 - Puerto Varas, Chile
Content

• Data sources

• Genetic parameter estimates
  • Data
  • Model terms
  • Results

• EBV estimates
  • Data
  • Model terms
  • Preliminary results

• Next stages of analysis
Data sources

• Lameness events available through Milk Recording Organisations (MROs), NMR and CIS

• Farmer recorded events

• Type and conformation data available from Holstein UK classification records
Genetic parameter estimates – Data

Criteria restrictions;
1. Known sire and dam
2. Sire must have at least 10 daughters in data
3. Oldest 500 daughters retained
4. Drop animals missing heifer type classifications
5. Must have 1st and complete lactations
6. Drop CG without a lameness event
7. Drop CG <5 records
Genetic parameter estimates – Data

- ~169,000 animals
- ~325,000 lameness events
- ~46,000 animals
- ~11,000 >0 lame events
- ~425,000 records
- ~21,000 lame events
- ~818,000 contemporaries
- ~5.9m records

<table>
<thead>
<tr>
<th>Mean no events</th>
<th>Median no events</th>
<th>Range</th>
<th>St Dev</th>
<th>% animals &gt;0 events</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.46</td>
<td>0</td>
<td>0 – 24</td>
<td>1.15</td>
<td>24.2</td>
</tr>
</tbody>
</table>
Model terms

Binary trait, 0 – not lame, 1 – lame

<table>
<thead>
<tr>
<th>Fixed effects:</th>
<th>Random effects:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herd test month</td>
<td>Animal</td>
</tr>
<tr>
<td>Season of calving</td>
<td>Permanent environment</td>
</tr>
<tr>
<td>Days in milk</td>
<td></td>
</tr>
<tr>
<td>Lactation number</td>
<td></td>
</tr>
<tr>
<td>Calving age (nested within lactation)</td>
<td></td>
</tr>
</tbody>
</table>
Results

Heritability = 0.04
(s.e 0.007)

Previous analysis found;
h\(^2\) = 0.08 (s.e 0.01) using sire model and data from one MRO.
EBV estimates - Data

~169 000 animals
~325 000 lameness events

Criteria restrictions;
1. Known sire
2. Drop CG <5 records
3. Drop CG without a lameness event

~818 000 contemporaries
~5.9m records
~11 000 >0 lame events
~8.7m records
~322 000 lame events
EBV estimates - Data

- ~169,000 animals
- ~325,000 lameness events
- ~946,000 animals
- ~167,000 >0 lame events
- ~8.7m records
- ~322,000 lame events
- ~818,000 contemporaries
- ~5.9m records

### EBV Estimates

<table>
<thead>
<tr>
<th>Mean no events</th>
<th>Median no events</th>
<th>Range</th>
<th>St Dev</th>
<th>% animals &gt;0 events</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.34</td>
<td>0</td>
<td>0 – 25</td>
<td>1.01</td>
<td>17.6</td>
</tr>
</tbody>
</table>
## Model terms

Binary trait, 0 – not lame, 1 – lame

<table>
<thead>
<tr>
<th>Fixed effects:</th>
<th>Random effects:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herd test month</td>
<td>Animal</td>
</tr>
<tr>
<td>Season of calving</td>
<td>Permanent environment</td>
</tr>
<tr>
<td>Days in milk</td>
<td></td>
</tr>
<tr>
<td>Lactation number</td>
<td></td>
</tr>
<tr>
<td>Calving age (nested within lactation)</td>
<td></td>
</tr>
</tbody>
</table>
Results

<table>
<thead>
<tr>
<th></th>
<th>EBV</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>0.001</td>
<td>0.35</td>
</tr>
<tr>
<td>Range</td>
<td>-0.64 – 0.55</td>
<td>0 – 0.999</td>
</tr>
<tr>
<td>St Dev</td>
<td>0.06</td>
<td>0.21</td>
</tr>
</tbody>
</table>
### Results (2) – Phenotypic correlations

<table>
<thead>
<tr>
<th></th>
<th>Leg side view</th>
<th>Foot angle</th>
<th>Body condition score</th>
<th>Locomotion</th>
<th>Leg score</th>
<th>Bone quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lame lact1</td>
<td>0.026</td>
<td>-0.017</td>
<td>0.013</td>
<td>-0.112</td>
<td>-0.096</td>
<td>-0.036</td>
</tr>
<tr>
<td>Lame lact2</td>
<td>0.01</td>
<td>-0.001</td>
<td>-0.015</td>
<td>-0.019</td>
<td>-0.016</td>
<td>-0.02</td>
</tr>
<tr>
<td>Lame lact3</td>
<td>-0.008</td>
<td>0.03</td>
<td>-0.044</td>
<td>-0.04</td>
<td>-0.049</td>
<td>-0.001</td>
</tr>
<tr>
<td>Lame lact4</td>
<td>0.001</td>
<td>0.018</td>
<td>0.01</td>
<td>-0.003</td>
<td>-0.001</td>
<td>-0.009</td>
</tr>
<tr>
<td>Lame lact5</td>
<td>-0.02</td>
<td>0.004</td>
<td>-0.011</td>
<td>-0.009</td>
<td>0.009</td>
<td>-0.009</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Lame lact1</th>
<th>Lame lact2</th>
<th>Lame lact3</th>
<th>Lame lact4</th>
<th>Lame lact5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lame lact1</td>
<td>0.124</td>
<td>0.114</td>
<td>0.092</td>
<td>0.049</td>
<td></td>
</tr>
<tr>
<td>Lame lact2</td>
<td>0.193</td>
<td>0.186</td>
<td>0.25</td>
<td>0.164</td>
<td>0.261</td>
</tr>
<tr>
<td>Lame lact3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lame lact4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Next stages of analysis

• Bivariate and multivariate analyses correlating lameness with conformation traits including digital dermatitis

• Hoof trimmer data
  • Multiple sources/recording systems
  • However the data is not standardised and lower volume

• Trait definition – Mastitis

• Genomic evaluations for Lameness;
  Over 4,000 sire with genotype and lameness EBV
  \(~3,800\) have lameness reliability \(>30\%\)
  \(~2,800\) have reliability \(>50\%\)
Acknowledgments

Alex Brown
Raphael Mrode
Karolina Kaseja

Marco Winters
ICAR CONFERENCE
2017

14–16 June
Edinburgh, Scotland

To register your place at ICAR 2017 visit www.icar2017.co.uk.

Early bird prices available until March 2017.