Genomic breeding values of carcass, female fertility and calf survival traits for UK Limousin Cattle

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VIA carcass traits gEBVs

- 4 year project (2012-2015)
- Limousin genomic breeding values for abattoir VIA carcase traits
- First UK genomic breeding values March 2016
Fertility and survival gEBVs

- 1 year project (2016-2017)
- Limousin genomic breeding values for female fertility and calf survival traits
- gEBVs to be made available 2017
Building the Limousin reference population

- Have > 4,000 Limousin genotypes
  - 716 HD SRUC
  - 960 HD Ireland
  - 2,490 project 50k
  - 200 LD (IDB – 19k)
- Use One-Step approach
  - Allows breeding values to be estimated for genotyped and non-genotyped animals
British Cattle Movement Service

COMMERCIAL animals

- Information:
  - Dam
  - Breed
  - Date of birth
  - Date of death
  - Movement

- Not compulsory:
  - Sire
Benefits of industry data

• Massive benefit to the industry
  – Large numbers of records – thousands not hundreds
  – Traits of importance £
  – Stronger links in the supply chain

• ‘Super-pedigree’
  – Most complete pedigree in the UK including all bovine
  – BCMS
  – Pedigree (beef and dairy)
  – Milk recording records
Striploin accuracy

From Birth

Average age = 9yrs (5-15)
Project Aims

• Using national records (BCMS)
• Produce GEBVs for
  – Age at first calf (age in days at first calf)
    • 548 & 1460 days (18-48m)
  – Lifespan (number of parities when aged 6.5 years)
  – Calving interval (days between 1\textsuperscript{st} and 2\textsuperscript{nd} calf)
  – Calf survival (20 days to 10 months)
• Started with \sim 12 million animal records (45\%+Limousin)
Age at First Calf

Distribution of Age at First Calving

- 3yrs
- 2yrs

Age at First Calving (months)

Frequency

0 1000 2000 3000 4000 5000 6000 7000

18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42

SRUC
Distribution of age at death and mean age at first calf for dams

Less than half (47%) of breeding cows have 4 or more calves.
Calving interval

Mean calving interval by year of birth

Year of birth

2009

Mean Calving Interval

Calving Interval 1
Calving Interval 2
Calving Interval 3
Calving Interval 4
Parameter Estimation

- 12,719,326 BCMS records (45%+ Limousin)
  - 2003 – 2009 born
  - Complete record
  - Sire or maternal grandsire known
- 1,771,907 BCMS records remained
  - 160-180k Female fertility phenotypes
- Removed ET records, small (<5) or single sire CG & outliers within CG
  - AFC Birth herd, year season (6 month) CG
  - CI & LS First calf herd, year season (6 month) CG
## Parameter Estimation

<table>
<thead>
<tr>
<th>Trait</th>
<th>N</th>
<th>Phenotypic variance</th>
<th>Heritability</th>
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</thead>
<tbody>
<tr>
<td>AFC</td>
<td>58,148</td>
<td>15057 (99.4)</td>
<td>0.13 (0.01)</td>
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<tr>
<td>CI</td>
<td>27,861</td>
<td>10448 (96.0)</td>
<td>0.05 (0.02)</td>
</tr>
<tr>
<td>LIFESPAN</td>
<td>34,307</td>
<td>1.191 (0.01)</td>
<td>0.05 (0.01)</td>
</tr>
</tbody>
</table>
Conclusion

• UK are using national datasets for genetic evaluation
• GEBVs implemented for carcass traits
• GEBVs being developed for female fertility and calf survival
  – Parameter estimation for female fertility started
  – Work on models for calf survival started
  – GEBVs expected 2017
Thank you