The inclusion of international level showjumping results in the genetic evaluation of Irish Sport Horses

Quinn-Brady, K.M., Harty, D. and Corbally, A.

Horse Sport Ireland, Beech House, Millennium Park, Osberstown, Naas, Co. Kildare.
Background

• Breeding objective
  “to produce a performance horse that is sound, athletic with good paces and suitable temperament and capable of winning at the highest international level in FEI disciplines”

• Irish breeders prioritise showjumping and eventing

• Crucial that genetic evaluations include international performances
Existing methodology

• Genetic evaluations for showjumping have been carried out in Ireland since 1995
  - Multi-trait repeatability animal model approach with high, medium and low levels of performance treated as separate but correlated traits
  - Measure of Performance: normalised score based on ranking in each competition
  - International level performances were not included
Career Progression

Breeding Objective
International level

Genetic Evaluation
National level

Major International Championships
CSI5*
CSI4*
CSI3*
CSI1*/CSI2*

National 1.50m level
National 1.40m level
National 1.30m level
National 1.20m level
National 1.10m level
National 1.00m level

4 year old classes
5 & 6 year old classes
7 year old classes

New international level horses
New Stallions?

4 year old classes
5 & 6 year old classes
7 year old classes
National 1.00m level
National 1.10m level
National 1.20m level
National 1.30m level
National 1.40m level
National 1.50m level
CSI1*/CSI2*
CSI3*
CSI4*
CSI5*
Major International Championships

Breeding Objective
International level

Genetic Evaluation
National level
Data collection

No central comprehensive database of international level performances

- FEI database does not include all international performances
- Focus has been on results counting towards Rolex rankings
Data collection

At major shows, not all classes are recorded by the FEI

e.g. Dublin CSIO5* but similar situation exists for all major shows

<table>
<thead>
<tr>
<th>Year</th>
<th>No. international classes</th>
<th>No. recorded in FEI database</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>2011</td>
<td>18</td>
<td>6</td>
</tr>
<tr>
<td>2010</td>
<td>18</td>
<td>7</td>
</tr>
<tr>
<td>2009</td>
<td>18</td>
<td>7</td>
</tr>
<tr>
<td>2008</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>2007</td>
<td>18</td>
<td>0</td>
</tr>
</tbody>
</table>
Data collection

- Not all international level shows are recorded by the FEI
  
  • Very little data on smaller international level shows, e.g. shows at CSI1* and CSI2* levels
  
  • No results on over 75% of classes at CSI1*/CSI2* level in Ireland in 2012
Major International Championships
- CSI5*
- CSI4*
- CSI3*

FEI Database

Data Gap
- CSI1*/CSI2*
- National 1.50m level

National Database e.g. SJI
- National 1.40m level
- National 1.30m level
- National 1.20m level
- National 1.10m level
- National 1.00m level

Career Progression
- 4 year old classes
- 5 & 6 year old classes
- 7 year old classes

New international level horses
New Stallions?

Data Gap
How to fill the data gap?

• Manual collection of international level performances for ISH horses is required
  – Aim is to augment data available from FEI
  – Number of sources used, e.g. Jumpfax, Show Jumping Archive …
  – Also, collate performances at foreign national level, e.g. classes in US
  – Resource-intensive process
Data collection

• Issues with data quality
  – Horses frequently change name
  – UELN is not always available
  – Pedigree is often not recorded
  – Studbook may not be recorded
**Lifetime Performance Rating (LPR)**

- Not feasible to collate individual performances in each class for each ISH horse
- Focus is on assessing the “highest level” successfully achieved by a horse during its lifetime
- Success = Two double clear rounds at a particular level
- Similar to the approach taken by the Netherlands genetic evaluation and recent Belgian research
- Difference – highest level successful vs. highest level competed
Lifetime Performance Rating Levels

- Success at Major International Championships
- Success at CSI5*
- Success at CSI4*
- Success at CSI3*
- Success at CSI1*/CSI2* → Success at National 1.50m level
- Success at National 1.40m level
- Success at National 1.30m level
- Success at National 1.20m level
- Success at National 1.10m level
- Success at National 1.00m level
- Not successful
## Data used

<table>
<thead>
<tr>
<th>Description</th>
<th>No. of records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of performances</td>
<td>1,119,770</td>
</tr>
<tr>
<td>Number of horses</td>
<td>16,727</td>
</tr>
<tr>
<td>Maximum number of performances per horse</td>
<td>535</td>
</tr>
<tr>
<td>Mean number of performances per horse</td>
<td>35.5</td>
</tr>
<tr>
<td>Number of stallions</td>
<td>1,780</td>
</tr>
<tr>
<td>Mean number of progeny of stallion</td>
<td>9.4</td>
</tr>
<tr>
<td>Maximum number of progeny of stallion</td>
<td>559</td>
</tr>
</tbody>
</table>
Model used

• LPR model
  - Fixed effects of sex, year of first performance and Thoroughbred percentage
  - Random effect of animal

• National model
  - Fixed effects of age, sex and grade of performance
  - Random effects of animal and permanent environment
Genetic Parameters

- AS Reml Software used
- Genetic Variance: 0.66 ± 0.049
- Phenotypic Variance: 2.41 ± 0.029
- Heritability of LPR = 0.28 ± 0.019
- Genetic correlation between LPR and national Grand Prix level (1.40m/1.50m) = 0.96
Correlation between EBVs

Published stallions = 0.77
Conclusions

• Relatively large effect on the EBVs and rankings of stallions
• Reflects a decrease in emphasis on young horse results
• LPR methodology better reflects the breeding objective
• Published in spring 2013
Acknowledgements

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