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Examination of New Zealand sport horse performance records and their suitability for the calculation of breeding values

A thesis presented in partial fulfilment
of the requirements for the Degree of Master of Science
in
Animal Science
at
Massey University

Frances Emily Creagh
2011
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Abstract

Currently, there is no system for genetic evaluation of sport horse sires in New Zealand; however, the implementation of such a system would be beneficial to the sport horse industry. Official performance data for the 2008/09 and 2009/10 competition seasons were obtained from Equestrian Sport New Zealand. Initially data were examined using descriptive statistics. There were 1123 and 1472 horses registered for dressage, 902 and 1255 horses registered for eventing and 1326 and 1331 horses registered for show jumping during the 2008/09 and 2009/10 seasons respectively. 13.2% and 14.2% of horses registered for dressage, 15% and 3.8% of horses registered for eventing and 16.3% and 17.2% of horses registered for show jumping had no sire recorded. Between 63.6% and 75% of sires had only 1 progeny record. For dressage and eventing points and number of starts were recorded. Zero points were recorded for 1.8% and 1.1% of horses in dressage and 64.6% and 13% of horses in eventing. For show jumping, prize money was recorded and records were usually only available for horses which placed in competition.

Data on points, number of starts and prize money was skewed but approached normality under log\(_{10}\) transformation for all 3 disciplines. EBVs were calculated for these variables. 11.8%, 11.3 % and 14.2% of sires had 5 or more progeny records available for genetic analysis. Estimated breeding values for points per start ranged from -0.066 to 0.158 and -0.076 to 0.182 for dressage and eventing. Estimated breeding values for number of starts ranged from -0.117 to 0.232 and -0.101 to 0.168 for dressage and eventing respectively and from -0.523 to 0.993 for prize money in show jumping.

In conclusion, the use of estimated breeding values could lead to increased genetic gain and improved performance of New Zealand sport horses on the international stage. However, the current data recording has some limitations as records have not been kept for the purpose of genetic evaluation. Hence, there is a need for greater listing and reliability of pedigree data in order to effectively utilise estimated breeding values for selection of New Zealand sport horse sires.
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<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>BLP</td>
<td>Best Linear Prediction</td>
</tr>
<tr>
<td>BLUE</td>
<td>Best Linear Unbiased Estimates</td>
</tr>
<tr>
<td>BLUP</td>
<td>Best Linear Unbiased Prediction</td>
</tr>
<tr>
<td>dnst</td>
<td>log(number of starts) for dressage</td>
</tr>
<tr>
<td>dpps</td>
<td>log(points per start+1) for dressage</td>
</tr>
<tr>
<td>EBVs</td>
<td>Estimated Breeding Values</td>
</tr>
<tr>
<td>enst</td>
<td>log(number of starts) for eventing</td>
</tr>
<tr>
<td>epps</td>
<td>log(points per start+1) for eventing</td>
</tr>
<tr>
<td>ESNZ</td>
<td>Equestrian Sport New Zealand</td>
</tr>
<tr>
<td>FEI</td>
<td>Federation Equestre Internationale</td>
</tr>
<tr>
<td>GLM</td>
<td>General Linear Model</td>
</tr>
<tr>
<td>HHANZ</td>
<td>Holsteiner Horse Association of New Zealand</td>
</tr>
<tr>
<td>LSE</td>
<td>Least Squares Equations</td>
</tr>
<tr>
<td>MME</td>
<td>Mixed Model Equations</td>
</tr>
<tr>
<td>MSI</td>
<td>Missing Sire Information</td>
</tr>
<tr>
<td>NZHS</td>
<td>New Zealand Hanoverian Society</td>
</tr>
<tr>
<td>NZWBA</td>
<td>New Zealand Warmblood Breeders Association</td>
</tr>
<tr>
<td>REML</td>
<td>Restricted Maximum Likelihood</td>
</tr>
<tr>
<td>Sib(s)</td>
<td>Sibling(s)</td>
</tr>
<tr>
<td>SPT</td>
<td>Stallion Performance Test</td>
</tr>
<tr>
<td>SQRT</td>
<td>Square Root</td>
</tr>
<tr>
<td>tpm</td>
<td>log(total prize money+1)</td>
</tr>
<tr>
<td>UELN</td>
<td>Unique Equine Life Number</td>
</tr>
<tr>
<td>VCE</td>
<td>Variance Components Estimator</td>
</tr>
<tr>
<td>WBFSH</td>
<td>World Breeding Federation for Sport Horses</td>
</tr>
<tr>
<td>WSI</td>
<td>Wrong Sire Information</td>
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