64th Annual Meeting of the European Federation of Animal Science
Nantes, France August 26-30. 2013
Session H27-15

Transformed variables for the genetic evaluation of the competition performance of jumping horses

J. Posta, A. Rudiné Mezei and S. Mihók
University of Debrecen, Department of Animal Husbandry, Böszörményi str. 138., H-4032 Debrecen, Hungary

Introduction

Different methods have been utilized for the evaluation of performance events in sport horses. The evaluation of such results is difficult because performance frequently is evaluated subjectively, may be a function of a number of other traits and may not be normally distributed. The rankings of horses were transformed to create a normally distributed variable using different mathematical functions.
The aim of the study was to compare different transformation of competition performance of show-jumping horses and the estimation of genetic parameters based on these measurement variables.

Materials and methods

Show jumping competition results collected between 1996 and 2011 were analyzed. The results were collected by the Show-jumping Group of the Hungarian Horse Breeder's Society. The database contained 358.342 starts of 10.199 horses. The results were gathered from Hungary and other European countries. Identity number, name and sex of the horse, rider, competition year, the level and location of the competition, fault points and ranks were recorded in the database. Competitions were categorized into five groups based on their difficulty levels. The transformed variables were differently weighted with the difficulty level and are shown in Table 1.
The following repeatability animal model was used for each measurement variable:

$$Y = \underbrace{Age + Gender + Place + Year}_{\textit{fixed effects}} + \underbrace{rider + perm + animal}_{\textit{random effects}}$$

The goodness-of-fit of the transformed variables was evaluated with the determination coefficients of the models and the distribution of the residuals. Variance component were estimated with VCE-6 software package.

Results and discussion

The goodness-of-fit of the models based on the determination coefficient was moderate and varied between 0.446 and 0.519. The best goodness-of-fit model was the Variable-7 while the lowest was found for Variable-1 and Variable-3 (Table 2.).
Heritability values were low for each measurement variables between 0.054 and 0.09. The highest heritability value was estimated for Variable-6, the lowest for for Variable-1 and Variable-3 (Table 3.). The repeatability values varied between 0.178 and 0.276. The highest repeatability was calculated for Variable-6 while the lowest for Variable-7 (Table 3.).

Table 1.
The description of the different mathematical transformations

Measures	Mathematical transformation
Variable-1	$(10\text{-}\log_2(\text{rank}))*(\text{difficulty\_level})^2$
Variable-2	(15-sqrt(rank))*difficulty_level
Variable-3	$(3\text{-}\log_{10}(\text{rank}))*(\text{difficulty\_level})^2$
Variable-4	$(6\text{-}\ln(\text{rank})+3*(\text{difficulty\_level})^2$
Variable-5	(Blom-normalised ranks + 3)*difficulty_level
Variable-6	(Blom-normalised ranks + 3)+3*difficulty_level
Variable-7	Exponential scale based on difficulty level

Table 2.
Goodness-of-fit of the different measurement variables

Measures	Determination coefficient	Log-likelihood
Variable-1	0.446	98093.4759
Variable-2	0.474	79207.9032
Variable-3	0.446	98402.7952
Variable-4	0.486	67393.5670
Variable-5	0.447	104284.9838
Variable-6	0.511	47087.0535
Variable-7	0.519	86635.8356

Table 3.
Genetic parameters of the different measurement variables

Measures	Heritability	Repeatability
Variable-1	0.054	0.223
Variable-2	0.074	0.252
Variable-3	0.054	0.223
Variable-4	0.059	0.232
Variable-5	0.071	0.233
Variable-6	0.089	0.276
Variable-7	0.049	0.178

Authors' e-mail addresses

János Posta postaj@agr.unideb.hu
Anita Rudiné Mezei mezeia@agr.unideb.hu
Sándor Mihók mihok@agr.unideb.hu

Acknowledgements

This work was made possible by the financial support of the "OTKA-PD83885" research project. The research study was carried out in a close cooperation with The Association of Hungarian Horse Breeders and Horse Organization.