An all-or-none trait to account for pre-selection in Icelandic horse breeding

Elsa Albertsdóttir
PhD student
Landbúnaðarháskóli Íslands
Agricultural University of Iceland
Department of Land and Animal Resources

Aim of research

- Definition
  - The all-or-none trait 'Test-status'
  - Measurement of amount and trend in pre-selection?

- Estimation of (co) Variance compontents
  - Is there a genetic variation?
  - How does it correlate to other traits under selection?

Þóroddur from Þóroddsstaðir

Introduction: Breeding field-tests

- Breeding field-test scores ➡ Breeding values
  - 16 traits
    - Assessment-scale 5.0-10.0
    - Different weighing factors
    - Total score
  - Price influencing factor

Selection largely based on EBV's

- Presentation of horses
  - Unequal between genders
    - ↑ % geldings
  - Unequal preparation

G*E

Material and methods

www.worldfengur.com

- Breeding field-test data
  - 76 043 horses
    - born in Iceland 1990-2001

39 443 females

- Breeding field-test scores from 1994-2007
  - Total of 9102 assessments
    - 18% males + 82% females
      - 7 431 assessments

19% of all born females

- Pedigree information
  - 103 172 horses
  - 10 generations

Definition of the Test-status trait

- Threshold trait
  - Horses are assigned values of 0
    - no record
  - Horses are assigned values of 1
    - at least one performance record

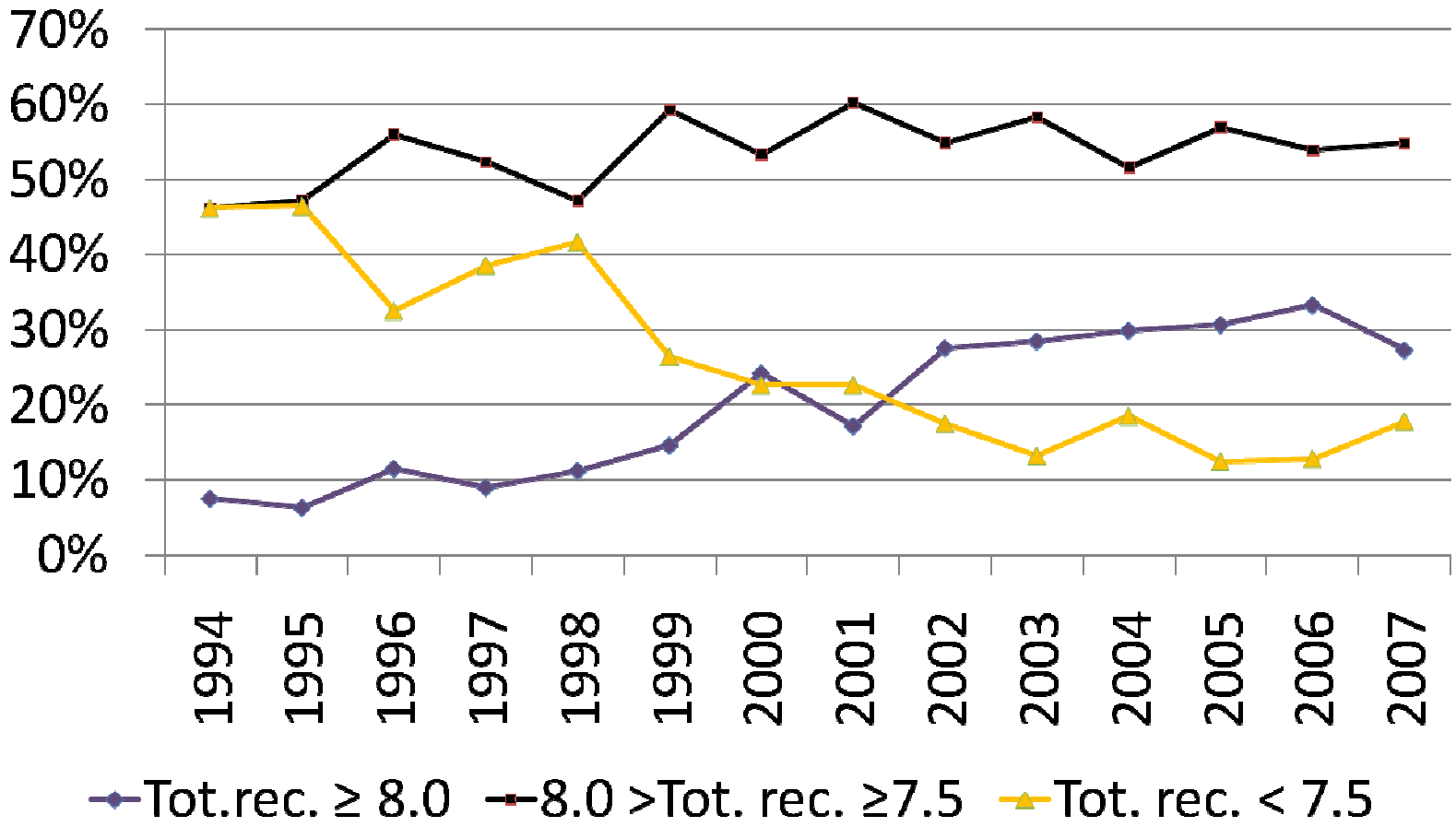
Reflects it pre-selection?

- Participation at breeding field-tests
  - Is it random?
  - Is it based on the horses assumed potential to score high?

Quality of the mares that attended

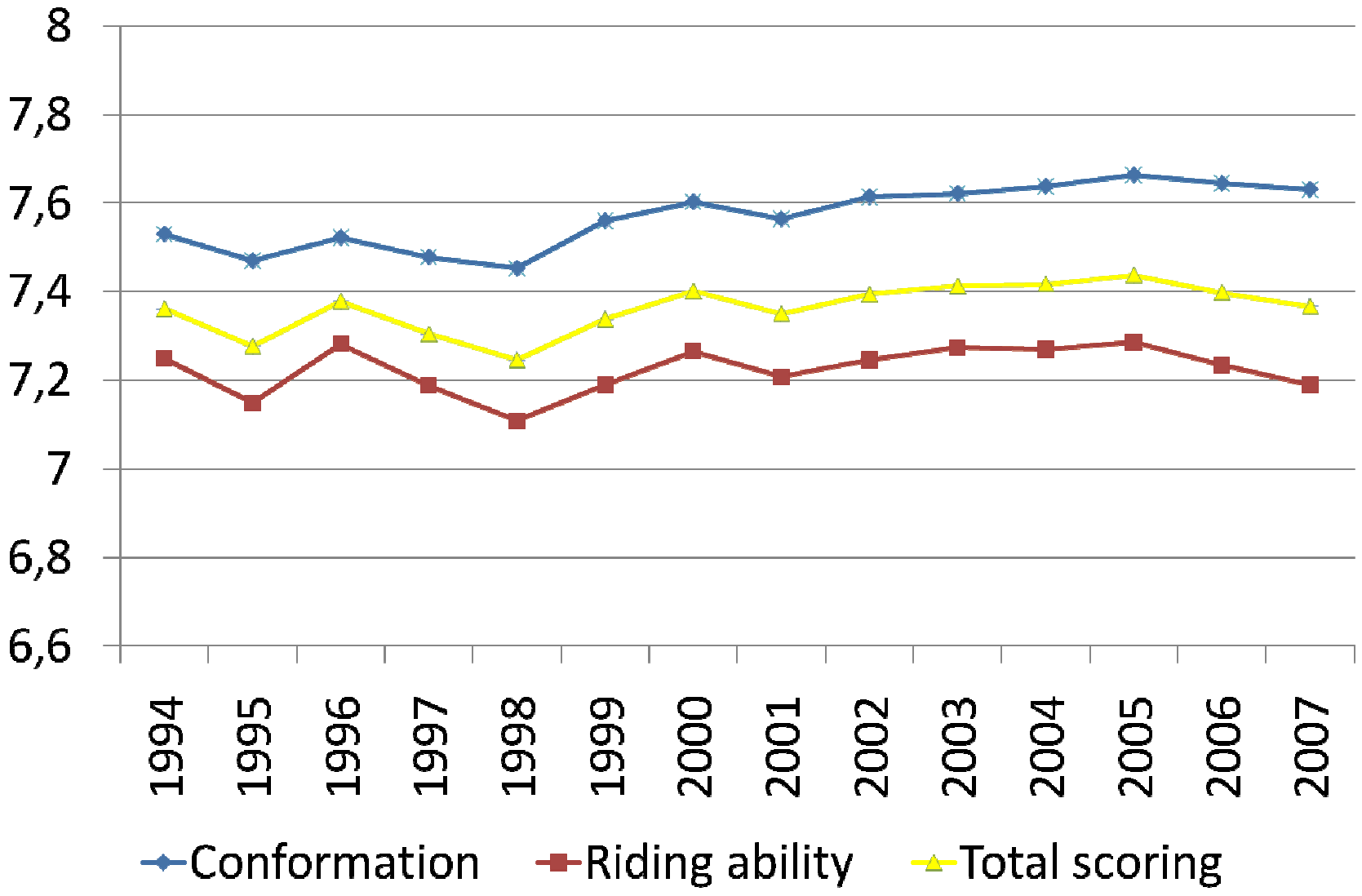
Percentage within different quality classes

Average total-score: 7.55 ➡ 8.02



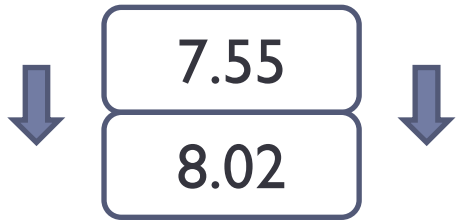
BLUE estimates:

conformation score - ridingability score - total score



Genetic progress or pre-selection?

- Difference in average scoring: 0.47
  - Average score 1994
  - Average score 2006



- Genetic progress: 0.16
- Pre-selection accounts for: 0.31

Estimation of variance compontents

- Markov Chain Monte Carlo – Gibbs sampling
  - DMU package by Jensen and Madsen (2008)

- Linear and threshold models
  - Test-status trait

$$y_{ijk} = birth\text{-}year_i + animal_k + e_{ijk}$$

Breeding field-test traits

$$y_{ijk} = year\_country_i + age\_sex_j + animal_k + e_{ijk}$$

- Univariate and multivariate analyses
  - Residual covariances restricted to 0

Estimated heritatbilities

- 0.66 and 0.71
  - the test-status
- 0.15 - 0.66
  - the breeding field-test traits

Comparisons of results from
MULTII- and UNIVARIATE analyses
Estimated heritabilities generally **higher**

↑ Weighing factors => ↑ Higher estimates

Genetic correlations:
test-status vs. breeding field-test traits

- 0.00 - 0.87
  - in general
- 0.00 – 0.50
  - Traits with lower weighing factors
- ≥ 0.70
  - Traits with the **higher** weighing factors

Conclusions

- Amount and trend in pre-selection
  - Importance of including test-status
- Genetic evaluation
  - Reduction of selection bias
  - Increased accuracy
- Significant genetic component
  - Inflated to some degree
- Unequal presentation of genders
  - Future incorporation of competition data

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