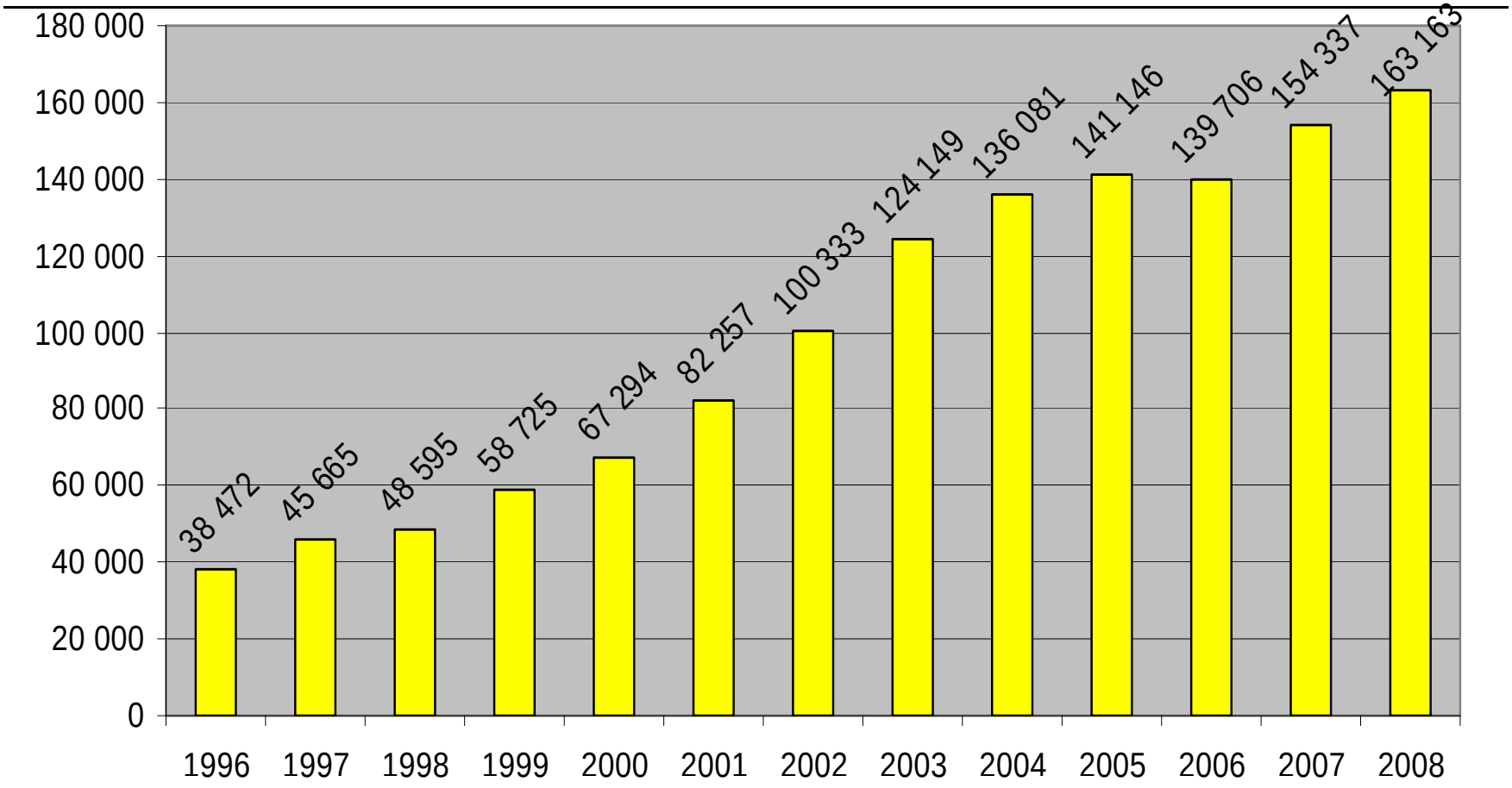
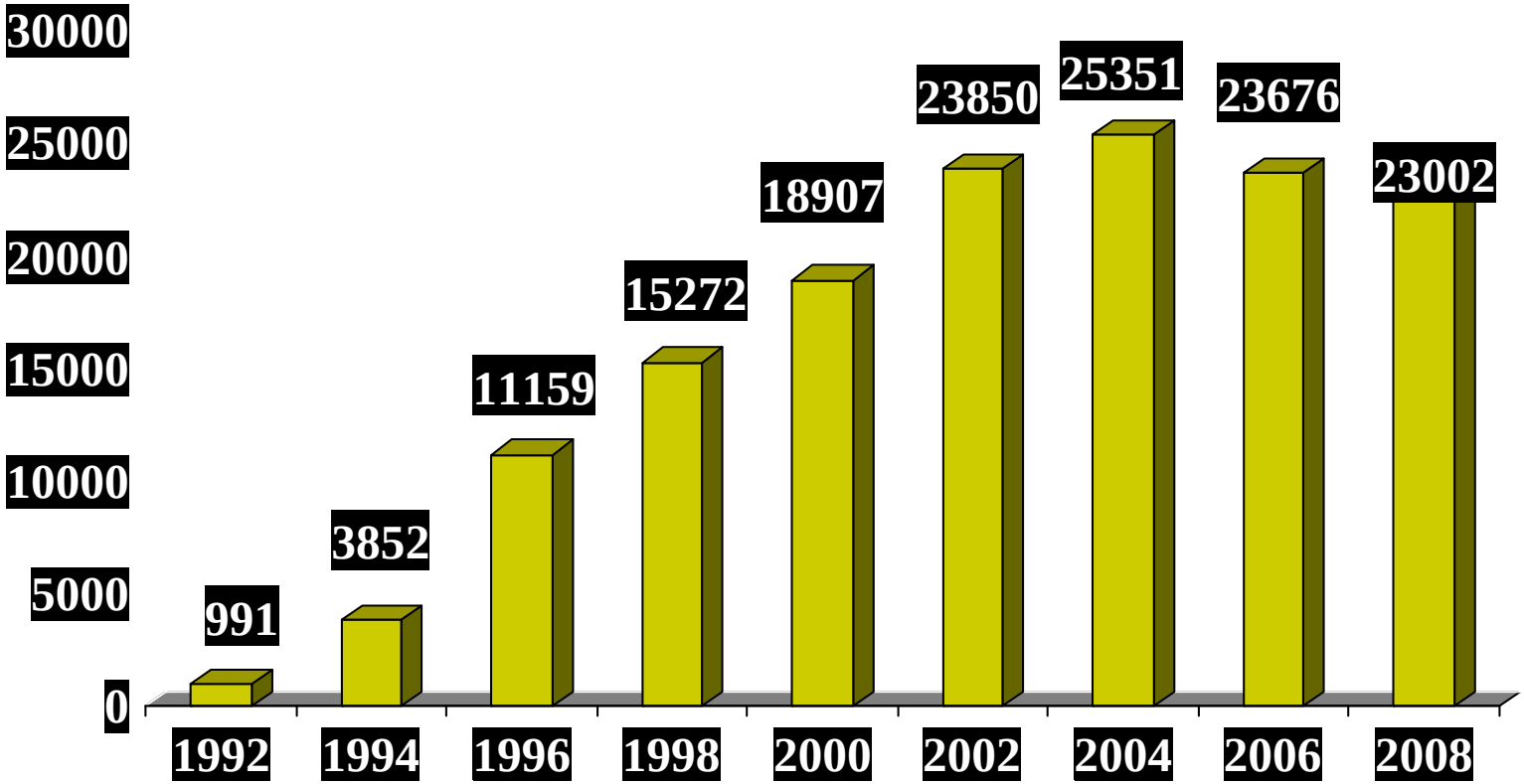
Short country report
Czech Republic

Suckler cows development



Number of recorded cows

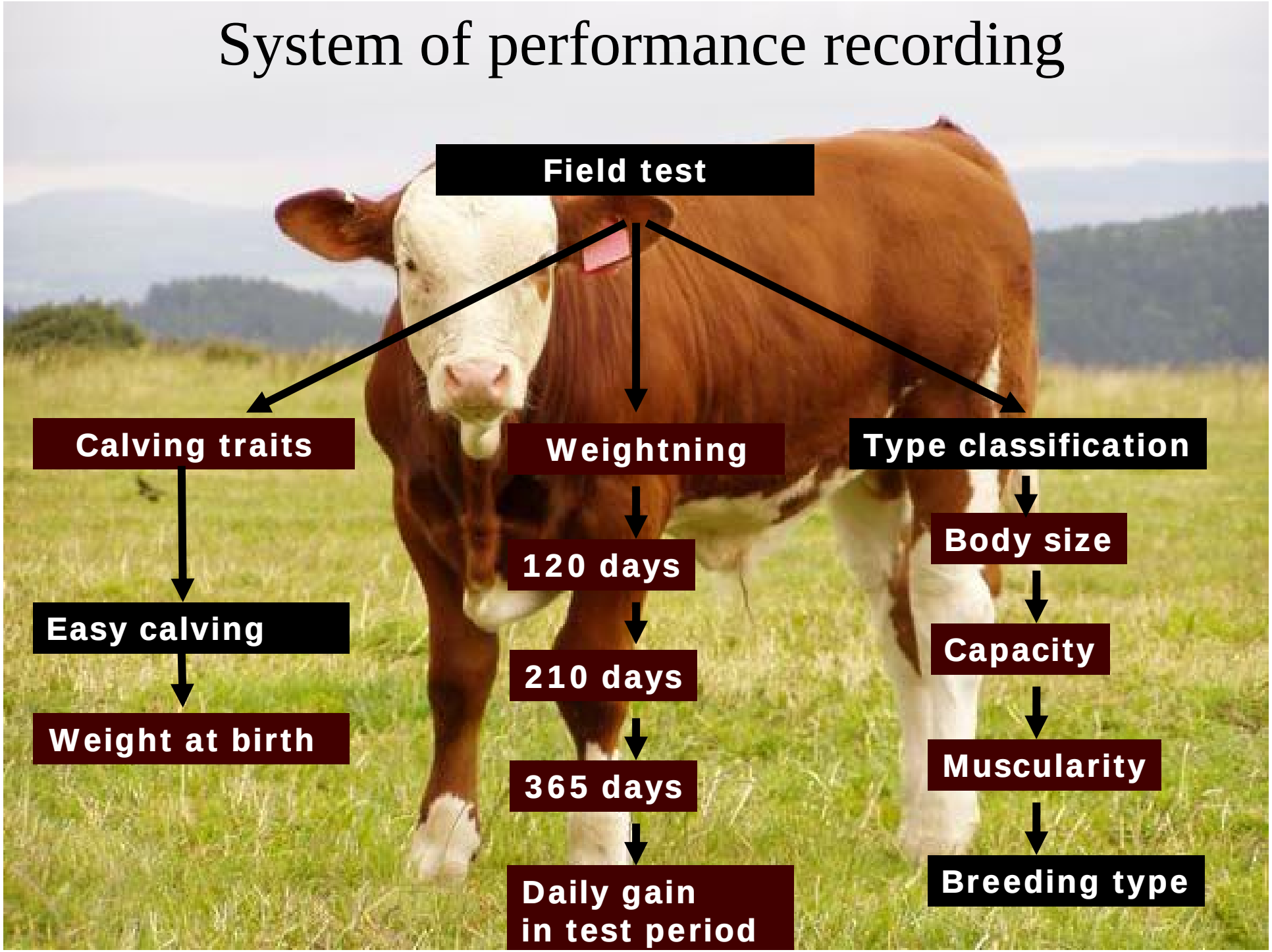


Distribution of different beef breeds registered in Herd Books

Breed	Number of cows
Charolais	6475
Aberdeen Angus	4245
Hereford	1616
Beef Simmentaler	3759
Limousine	1356
Piemontese	755
Blonde d‘Aquitaine	773
Galloway	456
Gasconne	348
Highland	328
Belgian Blue	174
Salers	81

Recording

System of performance recording



Genetic evaluations

Breeding values for beef cattle

1. Field test (2000)
2. Own growth of beef bulls at performance-test station (2004)
3. Type traits (2005)

- 21 Breeding values

Breeding values for beef cattle

1. Field test (2000)

   Multi-trait animal model with maternal effects

   - Calving ease
   - Birth weight
   - Weight at the age of 120 days
   - Weight at the age of 210 days
   - Weight at the age of 365 days

   - Direct & maternal effect ⟶ 10 breeding values

Breeding values for beef cattle

1. Field test (2000)
   - Multi-trait animal model with maternal effects

$$Y = HYS + CS + DAG + BVD + BVM + PE + HEC + HED + e$$

Breeding values for beef cattle

1. Field test (2000)
   - Multi-trait animal model with maternal effects

$$Y = HYS + CS + DAG + BVD + BVM + PE + HEC + HED + e$$

HYS – herd, year, season

Breeding values for beef cattle

1. Field test (2000)
   - Multi-trait animal model with maternal effects

$$Y = HYS + CS + DAG + BVD + BVM + PE + HEC + HED + e$$

CS – calf sex – male, female / single calves, twins

Breeding values for beef cattle

1. Field test (2000)
   - Multi-trait animal model with maternal effects

$$Y = HYS + CS + DAG + BVD + BVM + PE + HEC + HED + e$$

DAG – dam's age at calving
below three years, four-years,
five- to seven-years old dams, above seven years

Breeding values for beef cattle

1. Field test (2000)
   - Multi-trait animal model with maternal effects

$$Y = HYS + CS + DAG + BVD + BVM + PE + HEC + HED + e$$

BVD – breeding value for direct effect

Breeding values for beef cattle

1. Field test (2000)
   - Multi-trait animal model with maternal effects

$$Y = HYS + CS + DAG + BVD + \underline{BVM} + PE + HEC + HED + e$$

BVM – breeding value for maternal effect

Breeding values for beef cattle

1. Field test (2000)
   - Multi-trait animal model with maternal effects

$$Y = HYS + CS + DAG + BVD + BVM + PE + HEC + HED + e$$

PE - permanent maternal environment for cows

Breeding values for beef cattle

1. Field test (2000)
   - Multi-trait animal model with maternal effects

$$Y = HYS + CS + DAG + BVD + BVM + PE + HEC + HED + e$$

HEC - heterosis of calves
regression according to calf heterozygosity

Breeding values for beef cattle

1. Field test (2000)
   - Multi-trait animal model with maternal effects

$$Y = HYS + CS + DAG + BVD + BVM + PE + HEC + HED + e$$

HED – heterosis of dams
regression according to dam heterozygosity

Breeding values for beef cattle

1. Field test (2000)
   - Multi-trait animal model with maternal effects

$$Y = HYS + CS + DAG + BVD + BVM + PE + HEC + HED + \underline{e}$$

e - random error

Breeding values for beef cattle

2. Own growth of beef bulls at perfomance-test station (2004)
   - Single-trait animal model

$$Y = H + SYS + DAG + AT + AT*AT + BV + e$$

Breeding values for beef cattle

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$$Y = H + SYS + DAG + AT + AT*AT + BV + e$$

H – herd (classes according conditions)

Breeding values for beef cattle

2. Own growth of beef bulls at perfomance-test station (2004)
   - Single-trait animal model

$$Y = H + SYS + DAG + AT + AT*AT + BV + e$$

SYS – station, year, season
group of contemporaries in test-station

Breeding values for beef cattle

2. Own growth of beef bulls at perfomance-test station (2004)
   - Single-trait animal model

$$Y = H + SYS + DAG + AT + AT*AT + BV + e$$

DAG – dam's age at calving
below three years, four-years,
five- to seven-years old dams, above seven years

Breeding values for beef cattle

2. Own growth of beef bulls at perfomance-test station (2004)
   - Single-trait animal model

$$Y = H + SYS + DAG + \underline{AT + AT*AT} + BV + e$$

AT - Age of introduction into the test

Breeding values for beef cattle

2. Own growth of beef bulls at perfomance-test station (2004)
   - Single-trait animal model

$$Y = H + SYS + DAG + AT + AT*AT + \underline{BV} + e$$

BV – breeding value

Breeding values for beef cattle

2. Own growth of beef bulls at perfomance-test station (2004)
   - Single-trait animal model

$$Y = H + SYS + DAG + AT + AT*AT + BV + \underline{e}$$

e – random error

Breeding values for beef cattle

Multi-trait animal model

3. Type traits of young animals (2005)
   - Height at sacrum (HS)
   - Body lenght (BL)
   - Live weight (LW)

   } body measurements

   - Front chest width (CW)
   - Chest depth (CD)
   - Pelvis (P)

   } body capacity

   - Shoulder muscling (SM)
   - Back muscling (BM)
   - Rump muscling (RM)

   } muscling

   - Production type (PT)

Breeding values for beef cattle

3. Type traits (2005)
   - Multi-trait animal model
   1. Body measurements & body capacity

      $$y_{ijkl} = \mu + HYS_i + S_j + AM_k + aAE_{ijkl} + g_{ijkl} + e_{ijkl}$$

   2. Muscling & production type

      $$y_{ijk} = \mu + HYS_i + S_j + aAE_{ijk} + bDG_{ijk} + g_{ijk} + e_{ijk}$$

Breeding values for beef cattle

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   - Multi-trait animal model
   1. Body measurements & body capacity

$$y_{ijkl} = \mu + \underline{HYS_i} + S_j + AM_k + aAE_{ijkl} + g_{ijkl} + e_{ijkl}$$

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$$y_{ijk} = \mu + \underline{HYS_i} + S_j + aAE_{ijk} + bDG_{ijk} + g_{ijk} + e_{ijk}$$

HYS_i – fixed effect of the group of jointly evaluated animals (herd, year, season)

Breeding values for beef cattle

3. Type traits (2005)
   - Multi-trait animal model
   1. Body measurements & body capacity

$$y_{ijkl} = \mu + HYS_i + \underline{S_j} + AM_k + aAE_{ijkl} + g_{ijkl} + e_{ijkl}$$

   2. Muscling & production type

$$y_{ijk} = \mu + HYS_i + \underline{S_j} + aAE_{ijk} + bDG_{ijk} + g_{ijk} + e_{ijk}$$

S_j – fixed effect of the sex of the animal
(young bulls, heifers / twins, singles)

Breeding values for beef cattle

3. Type traits (2005)
   - Multi-trait animal model
   1. Body measurements & body capacity

$$y_{ijkl} = \mu + HYS_i + S_j + \underline{AM_k} + aAE_{ijkl} + g_{ijkl} + e_{ijkl}$$

   2. $$y_{ijk} = \mu + HYS_i + S_j + aAE_{ijk} + bDG_{ijk} + g_{ijk} + e_{ijk}$$

AM_k – fixed effect of the age of mother at calving
(younger than three years, four years old,
five to seven years old, older than seven years)

Breeding values for beef cattle

3. Type traits (2005)
   - Multi-trait animal model
   1. Body measurements & body capacity

$$y_{ijkl} = \mu + HYS_i + S_j + AM_k + \underline{aAE_{ijkl}} + g_{ijkl} + e_{ijkl}$$

   2. $$y_{ijk} = \mu + HYS_i + S_j + \underline{aAE_{ijk}} + bDG_{ijk} + g_{ijk} + e_{ijk}$$

aAE_{ijkl} – regression on age at evaluation

Breeding values for beef cattle

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   - Multi-trait animal model
   1. Body measurements & body capacity

      $$y_{ijkl} = \mu + HYS_i + S_j + AM_k + aAE_{ijkl} + g_{ijkl} + e_{ijkl}$$

   2. Muscling & production type

      $$y_{ijk} = \mu + HYS_i + S_j + aAE_{ijk} + \underline{bDG_{ijk}} + g_{ijk} + e_{ijk}$$

bDG_{ijk} – linear regression on average daily gain from birth to the date of evaluation

Breeding values for beef cattle

3. Type traits (2005)
   - Multi-trait animal model
   1. Body measurements & body capacity

$$y_{ijkl} = \mu + HYS_i + S_j + AM_k + aAE_{ijkl} + g_{ijkl} + e_{ijkl}$$

   2. Muscling & production type

$$y_{ijk} = \mu + HYS_i + S_j + aAE_{ijk} + bDG_{ijk} + g_{ijk} + e_{ijk}$$

g_{ijkl} – breeding value of the animal (random effect)
– with the relationship matrix and
genetic groups according to the breed

Breeding values for beef cattle

3. Type traits (2005)
   - Multi-trait animal model

   1. Body measurements & body capacity

      $$y_{ijkl} = \mu + HYS_i + S_j + AM_k + aAE_{ijkl} + g_{ijkl} + \underline{e_{ijkl}}$$

   2. Muscling & production type

      $$y_{ijk} = \mu + HYS_i + S_j + aAE_{ijk} + bDG_{ijk} + g_{ijk} + \underline{e_{ijk}}$$

e_{ijkl} – random error

Breeding values for beef cattle

- SEUROP (2011)
  - Multi-trait animal model

- Own growth of beef bulls at perfomance-test station
  - Multi-trait animal model – Field test

Breeding values for beef cattle

- Future
  - Breeding value for reproduction
  - Performance test station - RRM

Thank you for your attention

Luboš Vostrý