Short country report
Czech Republic
Suckler cows development
Number of recorded cows

- 1992: 991
- 1994: 3852
- 1996: 11159
- 1998: 15272
- 2000: 18907
- 2002: 23850
- 2004: 25351
- 2006: 23676
- 2008: 23002
## Distribution of different beef breeds registered in Herd Books

<table>
<thead>
<tr>
<th>Breed</th>
<th>Number of cows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charolais</td>
<td>6475</td>
</tr>
<tr>
<td>Aberdeen Angus</td>
<td>4245</td>
</tr>
<tr>
<td>Hereford</td>
<td>1616</td>
</tr>
<tr>
<td>Beef Simmentaler</td>
<td>3759</td>
</tr>
<tr>
<td>Limousine</td>
<td>1356</td>
</tr>
<tr>
<td>Piemontese</td>
<td>755</td>
</tr>
<tr>
<td>Blonde d‘Aquitaine</td>
<td>773</td>
</tr>
<tr>
<td>Galloway</td>
<td>456</td>
</tr>
<tr>
<td>Gasconne</td>
<td>348</td>
</tr>
<tr>
<td>Gasconne</td>
<td>348</td>
</tr>
<tr>
<td>Highland</td>
<td>328</td>
</tr>
<tr>
<td>Belgian Blue</td>
<td>174</td>
</tr>
<tr>
<td>Salers</td>
<td>81</td>
</tr>
</tbody>
</table>
Recording
System of performance recording

Field test

Calving traits
- Easy calving
- Weight at birth

Weighting
- 120 days
- 210 days
- 365 days
- Daily gain in test period

Type classification
- Body size
- Capacity
- Muscularity
- Breeding type
Genetic evaluations
Breeding values for beef cattle

1. Field test (2000)
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 \[\rightarrow\] 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

\[ Y = \text{HYS} + \text{CS} + \text{DAG} + \text{BVD} + \text{BVM} + \text{PE} + \text{HEC} + \text{HED} + e \]

HYS – herd, year, season
Breeding values for beef cattle

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

\[ Y = \text{HYS} + \text{CS} + \text{DAG} + \text{BVD} + \text{BVM} + \text{PE} + \text{HEC} + \text{HED} + e \]

CS – calf sex – male, female / single calves, twins
Breeding values for beef cattle

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

\[
Y = \text{HYS} + \text{CS} + \text{DAG} + \text{BVD} + \text{BVM} + \text{PE} + \text{HEC} + \text{HED} + e
\]

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

\[ Y = \text{HYS} + \text{CS} + \text{DAG} + \text{BVD} + \text{BVM} + \text{PE} + \text{HEC} + \text{HED} + e \]

BVD – breeding value for direct effect
Breeding values for beef cattle

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

\[ Y = \text{HYS} + \text{CS} + \text{DAG} + \text{BVD} + \text{BVM} + \text{PE} + \text{HEC} + \text{HED} + e \]

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

\[ Y = \text{HYS} + \text{CS} + \text{DAG} + \text{BVD} + \text{BVM} + \text{PE} + \text{HEC} + \text{HED} + e \]

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

\[ Y = HYS + CS + DAG + BVD + BVM + PE + HEC + \text{HED} + e \]

**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

\[ Y = HYS + CS + DAG + BVD + BVM + PE + HEC + HED + e \]

\( e \) - random error
Breeding values for beef cattle

   - Single-trait animal model

\[
Y = H + SYS + DAG + AT + AT \times AT + BV + e
\]
Breeding values for beef cattle

   - Single-trait animal model
Breeding values for beef cattle


- Single-trait animal model

\[ Y = H + SYS + DAG + AT + AT*AT + BV + e \]

\( H \) – herd (classes according conditions)
Breeding values for beef cattle

   - Single-trait animal model

\[ Y = H + \text{SYS} + \text{DAG} + AT + AT\times AT + BV + e \]

SYS – station, year, season
    group of contemporaries in test-station
Breeding values for beef cattle

   - Single-trait animal model

\[ Y = H + SYS + \textbf{DAG} + AT + AT*AT + BV + e \]

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

   - Single-trait animal model

   \[ Y = H + SYS + DAG + AT + AT \times AT + BV + e \]

   **AT** - Age of introduction into the test
Breeding values for beef cattle

   - Single-trait animal model

\[ Y = H + SYS + DAG + AT + AT \times AT + BV + e \]

- BV – breeding value
Breeding values for beef cattle

   - Single-trait animal model

\[ Y = H + SYS + DAG + AT + AT^*AT + BV + e \]

- \( e \) – random error
Breeding values for beef cattle

Multi-trait animal model

3. Type traits of young animals (2005)

- Height at sacrum (HS)
- Body length (BL)
- Live weight (LW)
- Front chest width (CW)
- Chest depth (CD)
- Pelvis (P)
- Shoulder muscling (SM)
- Back muscling (BM)
- Rump muscling (RM)
- Production type (PT)

- Body measurements
- Body capacity
- Muscling

† Height at sacrum (HS)
† Body length (BL)
† Live weight (LW)
† Front chest width (CW)
† Chest depth (CD)
† Pelvis (P)
† Shoulder muscling (SM)
† Back muscling (BM)
† Rump muscling (RM)
† 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

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

   \( HYS_i \) – 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
        \[ y_{ijkl} = \mu + HYS_i + S_j + AM_k + aAE_{ijkl} + g_{ijkl} + e_{ijkl} \]
     2. Muscling & production type
        \[ y_{ijk} = \mu + HYS_i + S_j + aAE_{ijk} + bDG_{ijk} + g_{ijk} + e_{ijk} \]

   \[ S_j \] – 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
        \[ y_{ijkl} = \mu + HYS_i + S_j + AM_k + aAE_{ijkl} + g_{ijkl} + e_{ijkl} \]
     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
        \[ y_{ijkl} = \mu + HYS_i + S_j + AM_k + aAE_{ijkl} + g_{ijkl} + e_{ijkl} \]
     2. \[ y_{ijk} = \mu + HYS_i + S_j + aAE_{ijk} + bDG_{ijk} + g_{ijk} + e_{ijk} \]

   *\( aAE_{ijkl} \) – regression on age at 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
        \[ y_{ijk} = \mu + HYS_i + S_j + aAE_{ijk} + \textcolor{red}{bDG}_{ijk} + g_{ijk} + e_{ijk} \]

\textcolor{red}{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
     \[ y_{ijkl} = \mu + HYS_i + S_j + AM_k + aAE_{ijkl} + g_{ijkl} + e_{ijkl} \]
  2. Muscling & production type
     \[ y_{ijk} = \mu + HYS_i + S_j + aAE_{ijk} + bDG_{ijk} + g_{ijk} + e_{ijk} \]

\[ e_{ijkl} \text{— random error} \]
Breeding values for beef cattle

- SEUROP (2011)
  - Multi-trait animal model

- Own growth of beef bulls at performance-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