Upgrading dairy cattle evaluation system in Russian Federation.


Interbull, Tallin, 26.08.2017
Russian Dairy Industry - Background

- **Number of cows:** 8.3 millions
- **Main breeds.**
  - Black and White – 54,2%
  - Holstein - 13,9%
  - Simmental – 7,1%
  - Kholmogor – 7,1%
  - Other breeds – 17.7%
- **Type of Farms.**
  - Breeding herds
  - Breeding reproducer
  - Commodity farms
- **Max production regions.** (Red)
  - Bashkortostan republic – 1812K kg
  - Tatarstan republic – 1751K kg
  - Altaysky kray - 1413K kg
  - Krasnodar kray - 1320K kg
- **Regions with max per cow production level.** (Blue)
  - Leningrad region – 8432kg (74 farms)
  - Archangelsk region – 7444kg (15 farms)
  - Kirov region – 7328kg (54 farms)
  - Vologda region – 7320kg (50 farms)
RRIFAGB Background

• Russian Research Institute of Farm Animal Genetics and Breeding established in 1969.

• State research and service institute for cattle, poultry and pigs.

• Black and White, Holstein and Ayrshire cattle association.
Industry overview

• Identification.

• ICAR standards not in use.

• Name and short (barn) number.

• Internal data base number has 13 digits.

• New identification project based on ICAR guidelines started in 2017.
Industry overview (continue)

Milk recording system.
Industry overview (continue)

Breeding value evaluation.

- **Official document:** “Instruction for the inspection and evaluation of bulls of dairy and dairy-beef breeds on the quality of offspring”.

- **Published in 1980.**
  - Official method is contemporary comparison (CC).
  - Bulls getting categories (A1 to A3) based on superiority of daughters.
  - Old phenotypic base used for contemporary groups.
  - Neutral category given to bulls with yield +180% from phenotypic base.
  - Minimum number of daughters is 30.

<table>
<thead>
<tr>
<th>Contemporary group</th>
<th>Production level (kg)</th>
<th>Difference from contemporary group in %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A1</td>
</tr>
<tr>
<td>I</td>
<td>&gt;4501</td>
<td>&gt; 3</td>
</tr>
<tr>
<td>II</td>
<td>4001-4500</td>
<td>&gt; 4</td>
</tr>
<tr>
<td>III</td>
<td>3401-4000</td>
<td>&gt; 6</td>
</tr>
<tr>
<td>IV</td>
<td>2800-3400</td>
<td>*</td>
</tr>
</tbody>
</table>
Leningrad region (Dairy industry background).

- Region with highest milk production level per cow.
- Breeds
  - Holstein - 10936 (kg/305d.)
  - Black and White – 8785 (kg/305d.)
  - Ayrshire – 7239 (kg/305d.)
- 60 herds (Breeding plant and breeding reproducer).
  - Holstein – 10 herds
  - Black and White – 38 herds
  - Ayrshire – 12 herds
- Herd size from 500 to 2100 cows.
- All breeding herds participating in milk recording system.
Research agreement

• Russian Dairy Cattle Genetic Evaluation (RUDGE).
• Period: 2015-2017
• Aim of project: Research and development in Russian B&W and Holstein dairy cattle genetic evaluation.
• Members
Phenotypic data and evaluation model.

Phenotypic data.
- 452622 animals in pedigree.
- 356907 repeated records from 142083 cows

Model.
- Repeatability Animal Model with two fixed effects.
  
  Fixed effects:
  - HYS – herd-year-season (2603 levels).
  - DOAC – Days open – age of calving (155 levels).

- Genetic parameters were calculated using DMUv6 (Madsen and Jensen, 2008).

<table>
<thead>
<tr>
<th>Traits</th>
<th>$\sigma^2_g$</th>
<th>$\sigma^2_{pe}$</th>
<th>$\sigma^2_e$</th>
<th>$h^2$</th>
<th>$r$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>330956</td>
<td>270116</td>
<td>1244178</td>
<td>0.18</td>
<td>0.33</td>
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<tr>
<td>Fat</td>
<td>420</td>
<td>308</td>
<td>1718</td>
<td>0.17</td>
<td>0.29</td>
</tr>
<tr>
<td>Protein</td>
<td>242</td>
<td>149</td>
<td>972</td>
<td>0.18</td>
<td>0.28</td>
</tr>
</tbody>
</table>

- Breeding value evaluation was done using MiX99 software (Luke, 2017).
- Interbull validation method I for trend validation.
Calculation of EBV’s.

Cows genetic trend in milk yield

![Graph showing the trend of EBV's in milk yield over birth years from 2003 to 2016. The graph compares single lactation model and multiple lactation model.]
Calculation of EBV’s.

Cows genetic trend in fat and protein yield.

![Graph showing the trend of EBV's for fat and protein yield from 2003 to 2016.](Image)
Comparing CC to BLUP AM.

Regression of CC (X) on BLUP AM (Y) in milk kg.

$R^2 = 0.3713$
Genotypic data from bulls and cows.

- 500 cows using 54K SNP chip
- 600 cows using IDBv3
- 272 bulls using 54K
- 201 bulls using IBDv3

1573 animals
Few pitfalls make system slip.

- Repeating and overlapping of names and numbers.
- Data recording system is not secured from editing.
- Old legislation gives second chance to poor bulls.
- Low phenotypic base makes negative bulls neutral.
Thank you for your attention!