Interbeef Activities and the Interbull Centre

Toine Roozen

Interbull Centre Director
Interbull Centre

- International Bull Evaluation Service
- Established in 1995 at SLU, Department for Animal Breeding and Genetics (HGEN)
- Contract between SLU and International Committee for Animal Recording (ICAR)

- Enabling importers and exporters to select, worldwide, the best genetics for different countries, environments or breeding goals
Interbull Centre

- International Genetic and Genomic evaluations
- **Infrastructure** and **expertise** for **International Data Exchange** and **Quality Assurance**:
  - Processes, Standards
  - Protocols, CoP
- **Global Reach**
  - 35 countries
  - 5 continents
- **ISO certified**
## Guiding Principles

<table>
<thead>
<tr>
<th>Guiding Principles</th>
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<tbody>
<tr>
<td>Customer oriented</td>
</tr>
<tr>
<td>Accurate / Unbiased</td>
</tr>
<tr>
<td>Independent / Transparent</td>
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<tr>
<td>Integrity</td>
</tr>
<tr>
<td>Cost effective</td>
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<tr>
<td>Innovative/Leading Edge Services</td>
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</table>
• EU Animal Breeding Law: Regulation (EU) 2016/1012
• Interbull Centre is EU Reference Centre for Bovine Breeding
• Provide technical expertise to the Standing Committee on Zootechnics.

• ICAR Guidelines
• Animal Breeding and Evaluations
  • Interbull International ID
    • Unique ID world wide
- **Quality Assurance (Data):** All data validated by customers and Interbull Centre staff before each evaluation via a set of in-house developed programs.
  - Primary key: Interbull ID (worldwide unique identifier)

  **Breed country sex  12-digit number**

  SIM    FRA    M    000123456789

- **ISO Standard (Processes)**
  - Certified January 2016: Now ISO 9001-2015
  - Zero non-conformities (3rd year in a row)!
Interbull Centre Team: 4 IT staff; 5 Geneticists, 1 Director
Additional support from Dept of Animal Breeding and Genetics
High priority for Security and Privacy:

- Firewalls, Security Enhanced Linux and Intrusion Detection Systems: integrated parts of entire infrastructure
- Privacy is protected; only users with right permission can access data that they are supposed to
1. **Web interfaces** for users and staff to **Add**, **Modify** and **Display** data:
   - Interbull Data Exchange Area ("IDEA")
   - International Genotype Exchange Platform ("GenoEx")

2. **Database backend**: storing and processing of data in multiple - interacting – databases

3. **Calculating and Storage Cluster**:
   - Modular: Possibility to expand with increase in demand
   - Parallel, fast processing, large RAM
   - Storage cluster with multiple backup; connected with servers for persistent storage.
## Databases and Data at Interbull Centre

<table>
<thead>
<tr>
<th>Platform</th>
<th>Database</th>
<th>Records</th>
<th>Breeds*</th>
<th>First use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interbull Data Exchange Area (IDEA)</strong></td>
<td>Pedigree data</td>
<td>35 340 746</td>
<td>64</td>
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<tr>
<td></td>
<td>EBVs</td>
<td>40 045 829</td>
<td>25</td>
<td>2013</td>
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<tr>
<td></td>
<td>Performance data</td>
<td>40 969 517</td>
<td>13</td>
<td>2019</td>
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<tr>
<td></td>
<td>Genetic Traits</td>
<td>22 534</td>
<td>1</td>
<td>2019</td>
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<tr>
<td><strong>International Genotype Exchange Platform</strong></td>
<td>Genotyped records for InterGenomics*</td>
<td>44 565</td>
<td>1</td>
<td>2014</td>
</tr>
<tr>
<td></td>
<td>GenoEx-PSE: SNP Records for Parentage Verification</td>
<td>57 021</td>
<td>32</td>
<td>2019</td>
</tr>
</tbody>
</table>
Estimation of International Breeding Values for Beef bulls

- 5 Breeds: Aberdeen Angus, Charolais, Hereford, Limousine and Simmental
- 3 Evaluations / year (2 routine + 1 test)
- 3 Traits: Adjusted Weaning Weight, Calving Ease and Birth Weight
<table>
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<tr>
<th>Interbeef</th>
<th>Jan 2017</th>
<th>Jan 2018</th>
<th>Jan 2019</th>
</tr>
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<tr>
<td>Countries</td>
<td>7</td>
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<td>9</td>
</tr>
<tr>
<td>Evaluation breeds</td>
<td>2</td>
<td>3</td>
<td>5</td>
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<td>Country-breed-trait combinations</td>
<td>18</td>
<td>22</td>
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<td>Animals in the pedigree database</td>
<td>28 256 603</td>
<td>29 965 798</td>
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<td>Submitted phenotype records</td>
<td>7 890 490</td>
<td>8 234 838</td>
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<tr>
<td>International estimated breeding values</td>
<td>61 142 008</td>
<td>63 215 818</td>
<td>257 156 657</td>
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<tr>
<td>Distributed international estimated breeding values</td>
<td>1 344 841</td>
<td>1 407 786</td>
<td>6 805 936</td>
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• ‘AnimInfo’
• ‘GenoEx’
• Exchange with
  • National organisations
• Used by
  • National organisations
  • Breed Associations
• For improved quality & additional info
  • Animal information
  • Pedigree verification
  • Pedigree Certificates
1 - Amongst Interbeef participants only

Multilateral exchange of information:
- Has the animal been genotyped?
- Can the genotype be shared?
- **NOT:** actually genotypes

2 – International Genotype Exchange Platform

Multilateral exchange of SNP data:
- 200 SNP for successful parentage verification
The main **purpose** of GenoEx-PSE is to provide a service for exchanging standardised sets of SNP for genotyped animals to facilitate and streamline **parentage analysis activities** carried out by organisations that are responsible and/or active in parentage integrity.

**Parentage SNP Exchange:**
- **200** SNPs for successful parentage verification
ICAR Accredited DNA Data Interpretation Centres is a pre-requisite for organisations joining the GenoEx-PSE

20 accredited organisations. 9 joined GenoEx-PSE:

Poland (NRIAP)  
Norway (GENO)  
Germany (VIT, GAU)  
Italy (ANAFI, ANAPRI, ANARB)  
Ireland (ICBF, Weatherbys)  
Slovenia (AIS, Univ. of Ljubljana)  
Denmark (SEGES)  
Japan (LIA)  

Switzerland (QUALITAS)  
Austria (ZuchtData)  
The Netherlands (CRV)  
USA (CDCB)  
Canada (CDN)  
Sweden (Växa)  
Finland (Faba)
GenoEx-PSE: current data

57021 records
= unique individual IDs

- Norway (GENO)
- Germany (VIT)
- Italy (ANAFI)
- Poland (NRIAP)
- Ireland (ICBF)
- Slovenia (AIS)
- Denmark (SEGES)
- Italy (ANAPRI)
- Japan (LIA)

Only 282 records from two organisations
4% Beef breeds
2370 animals (out of 57021; 4.2% of all data)
100% males
98% > 186 SNPs

* Other breeds include: Piedmont (29), Dexter (13), Wagyu (5), Galloway (3), Highland Cattle (3), Rouge des Pres (2), Murray-Grey (1)
Enabling importers and exporters to select, worldwide, the best genetics for different countries, environments or breeding goals.