EURC Zootechnics (Bovine Breeding)

Toine Roozen
Interbull Centre Director
Director EURC Zootechnics
Overview

• Interbull Centre
  • International Evaluations in Dairy and Beef

• EURC Activities (2021/2022 and 2023/2024)
  • Validation
  • Performance Recording and Harmonisation
  • Interactions with EURC Endangered Animal Breeds

• Summary and Discussion
Interbull Centre
Interbull Centre

Section of the Department of Animal Breeding and Genetics ("HGEN") of the Swedish University of Agricultural Sciences ("SLU")

Operational unit of the ICAR’s Interbull SC and Interbeef WG

European Union Reference Centre (EURC) for Zootechnics (Bovine Breeding)

ISO 9001 certified.
Interbull Centre

- Provide genetic information services and applied research for improvement of livestock to a worldwide network
- International Evaluations
- Validations
- Data Exchange
International Dairy Evaluations (1995)

Holstein
Jersey
Guernsey
Red Dairy Cattle
Brown Swiss
Simmental
Economically important traits

- PRODUCTION (milk, protein, fat)
- CONFORMATION (body condition score, locomotion, stature, udder support + 34 other traits)
- UDDER HEALTH (somatic cell score, mastitis)
- LONGEVITY (direct longevity)
- CALVING (direct and maternal calving ease, direct and maternal stillbirth)
- FEMALE FERTILITY (heifer conception, interval, cow recycling, lactating cow ability to conceive)
- WORKABILITY (milking speed, temperament)
Economically important traits

- ADJUSTED WEANING WEIGHT
- CALVING TRAITS (birth weight, calving ease)

Under development:

- CARCASS TRAITS (carcass weight, carcass conformation score, carcass fat, age at slaughter)
- FERTILITY
European Union Reference Centre (EURC) for Zootechnics (Bovine Breeding)

Promotion of **harmonisation** or **improvement** of the methods of **performance testing** or **genetic evaluation**.
Validation

Quality Assurance and Improvement of Genetic and Genomic Evaluations
Genetic Evaluation and Validation

**AI Bulls must have a (g)EBV:**
1. Genetic evaluation methodologies
2. Calculation of reliabilities

**Genomically evaluated bulls:**
1. Genomic evaluation method validated for each genomically evaluated trait;
2. All traits to be revalidated

........in accordance with EURC rules and standards.
One of Interbull Centre’s most important roles

• Testing national evaluation results for consistency
• Reducing bias in data, increase quality
• Public recognition:
  • Data supplied by countries is reliable
  • EU Reference Centre responsibility
Regularly adjusted, improved, additional tests:

- 4 Validation tests for conventional evaluations
  - “Models I – IV”
- 1 Validation test for genomic evaluations
  - “GEBVtest”
• International evaluations:
  • Validation of national results
  • 22 EU Member States

<table>
<thead>
<tr>
<th>EU Member States</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022 (Jan-Jul)</th>
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<tr>
<td>Conventional</td>
<td>99</td>
<td>106</td>
<td>53</td>
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<tr>
<td>Genomic</td>
<td>103</td>
<td>149</td>
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<tr>
<td>Total</td>
<td>202</td>
<td>255</td>
<td>168</td>
<td>105</td>
</tr>
</tbody>
</table>
Service introduced in August 2022:
- For National Genetic Evaluations
- All EU Member States
- All breeds
- All traits evaluated internationally

Population size may limit relevance of tests
Developments needed due to Genomic Evaluation

- “Model III” (conventional validation) needs refinement
  - Affected by shorter use of bulls: fewer bulls in test
- Focus on “GEBVtest” (genomic validation)
  - Affected by genomic pre-selection
  - Recommendations and revised software to deal with genomic pre-selection (2023)
  - (EURC Validation late 2023?)
Challenges:

- Low level of AI usage
- Small contemporary groups
- Fewer “well proven” sires available

Validation under development (2021-2023)
- Based on “old” dairy validation models / new models
- (Launch in 2024?)
PREP DATABASE

Performance Recording, Evaluations and Publications
Performance Recording, Evaluations and Publications

Aims:
- Transparency
- Comparison
- Harmonisation

Info collected and shared:
- National evaluations
- International evaluations
- Beyond populations in international evaluations
Welcome to the Interbull Performance Recording, Evaluation and Publication information database!

The PREP database is developed and hosted at the Interbull Centre within the context of the Centre's function as the European Union Reference Centre (EURC) for Zootechinics and enables users to upload descriptive information regarding performance recording, national genetic evaluation systems and publication policies.

The platform is accessible to all European and International Cattle breeding organisations whether or not they are involved in Interbull Centre’s International Bull evaluations for dairy (Interbull) and/or beef (interbeef).

You will need to register in order to access the platform. Contact Interbull Centre (interbull at slu.se) if you require access to it.

The latest user manual is available under Help in the menu.
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Detailed info on:
- Production (dairy)
- Calving (dairy)

Next:
- Calving (beef)
- Adjusted Weaning weight (beef)
- Fertility (dairy)
- Carcass Traits (beef)
44 ‘Other traits’, including:
- Health traits
- Efficiency traits
- Trait definition
- Number of years of data
- Method of evaluation
• Trait correlations play an important role in the quality of the estimations for international evaluations.

• Harmonisation of traits helps to improve correlations and thus to achieve better national and international evaluations.
Harmonisation of traits

- Information from PREP DB
- Guidelines to improve across country compatibility of Calving Traits
- Next: Fertility
EURC Synergies
EURC Zootecchnics (Bovine Breeding)
EURC Endangered Animal Breeds
Collaborate / Organise joint meetings

Validation:
- EURC Validation

Transparency:
- Performance Recording, Evaluation, Publication Database
- Possibility to work together

Genomic Data Exchange for small cattle populations?
- International Genotype Exchange Platform at Interbull Centre
About the Services

The GenoEx platform is created to allow worldwide exchange of SNP data in an efficient and secure way.

It provides two alternative services, depending on the customers' needs:
limited Parentage SNP Exchange (GenoEx-PSE) and full Genomic Data Exchange (GenoEx-GDE).

- GenoEx-PSE allows exchange of limited sets of SNPs - standardised for parentage analysis - to facilitate and streamline the activities carried out by organisations that are responsible and/or active in parentage integrity.

- GenoEx-GDE is extended to full genotypes exchange, controlled fully by the data owners and it covers a variety of available genotyping chips.

GenoEx Documentation

- List of Genotyping laboratories
- List of Platform-Array Combinations
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Summary

Increased Harmonisation:

- **Performance Recording, Evaluation, Publication Database**
- Increased Transparency; Thorough analysis; Recommendations

Improve through validation:

- Performing Validation Tests
- Develop and introduce new tests
- Extend Populations

Explore synergies with EURC EAB