



PREP Database: Extension to Genomic Evaluation

Anahit Nazari
Interbull Centre



THE GLOBAL STANDARD
FOR LIVESTOCK DATA

Interbull Annual Meeting
Bled- Slovenia
19-24 May 2024



Interbull Centre



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

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



PREP Database – Service and Benefits

PREP

An online platform for breed societies/NGEC to submit and share descriptive information regarding **performance recording, national genetic evaluation systems** and **publication policies** in a more structured and standardized way

PREP

Enables collection of additional breed and trait information → **Harmonizes** and **standardizes** information

Easy to compare evaluations methods, traits definitions etc. across countries-breeds-traits

PREP

Common database available to cattle breed associations and third parties (incl. NGECs, Researchers, Competent Authorities): **submissions** and **data queries** → Open to All, **NOT ONLY** to Interbull users



PREP DataBase

Aims:

- Transparency
- Comparison
- Harmonisation

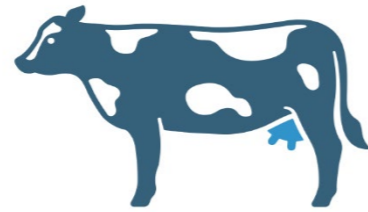
Info collected and shared:

- National evaluations
- International evaluations
- Beyond populations in international evaluations



PREP-Available and upcoming forms

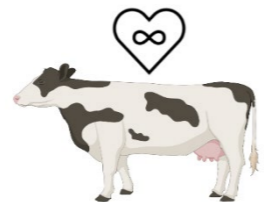
PREP-Dairy



- Production traits
- Calving traits
- Conformation traits
- Female Fertility traits
- **Udder health traits**



- **Longevity traits**



- **Workability traits**



PREP-Beef



- Adjusted weaning weight
- Calving traits
- Carcass traits



PREP-Other traits form

Information for “Other traits” evaluated nationally but not (yet) at Interbull level → **Opportunity** to start an international evaluation in the future

With the aim of getting a transparent and standardised overview of Performance Recording and Evaluation practices for all (European) cattle Populations

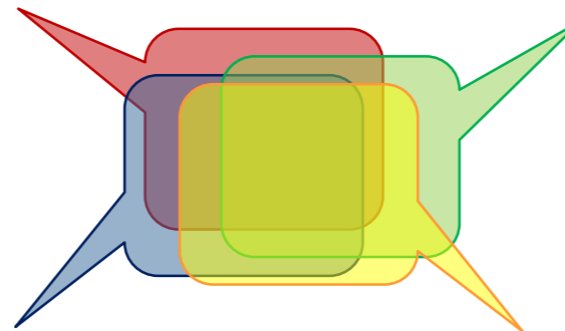
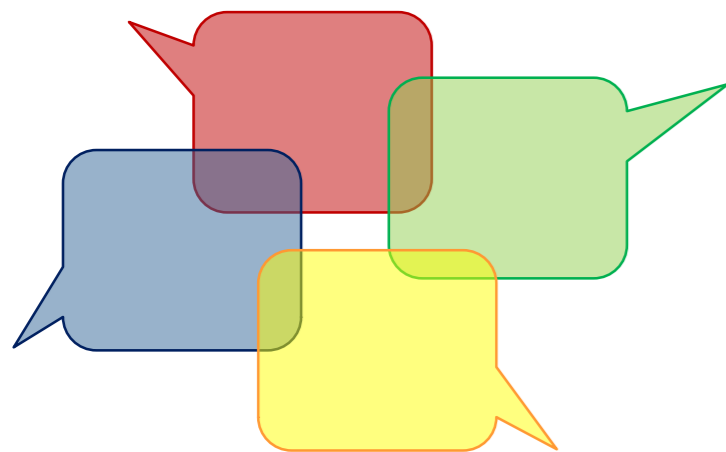
This helps with Comparison, Harmonisation, and identifying Opportunities and Challenges for **EURC** and **Interbull**





PREP-Harmonisation of traits

- 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**
- Extracting the Information from PREPdb → ICAR- Interbull Guidelines to improve across country compatibility of traits
- Calving- 2022
- Fertility- 2024





PREP- Structure of the current Form(s)

Forms are structured **separately** for each **TRAIT GROUPS**

Breed-trait(s) combinations

All breeds-
individual trait(s)
within the trait groups

The screenshot shows a software interface with a navigation menu on the left and a main content area on the right. The navigation menu has two items: '1. Conformation Traits' and '1.1. Conformation Traits and Breeds'. The '1.1. Conformation Traits and Breeds' item is highlighted in blue. The main content area has a title '1.1 Conformation Traits and Breeds' and a descriptive paragraph: 'This section serves adding several breeds and traits recording and evaluation information at the same time. Therefore, some options are repeated later on for adding more specific information'. Below the text is a form with two columns: 'BREED' and 'TRAIT'. The 'BREED' column has a list of breeds: Holstein (HOL), Jersey (JER), Brown Swiss (BSW), and Red Dairy Cattle (RDC). The 'TRAIT' column has a list of traits: Stature, Chest width, Body depth, and Angularity. To the right of the 'TRAIT' list is an 'ADD' button. The entire form area is enclosed in a red border.

BREED	TRAIT	
Holstein (HOL)	Stature	ADD
Jersey (JER)	Chest width	
Brown Swiss (BSW)	Body depth	Add
Red Dairy Cattle (RDC)	Angularity	



PREP- Structure of the current Form(s)

Forms are structured **separately** for each **TRAIT GROUPS**

General information for each individual traits

Trait's definition, scale, measurement methods, heritability, data edits, TMI, etc.

- 1. Conformation Traits
 - 1.1. Conformation Traits and Breeds
 - 1.1.1. Holstein (HOL)-Stature
 - 1.1.1.1. Conformation traits definition
 - 1.1.1.2. Scale of scoring/measurements of the conformation traits
 - 1.1.1.3. Formula for the index in overall scored traits
 - 1.1.1.4. Heritability of the trait
 - 1.1.1.5. Genetic variance of the trait
 - 1.1.1.6. Procedures for data handling
 - 1.1.1.7. Which animals are recorded (Age group of animals)?
 - 1.1.1.8. Sire categories
 - 1.1.1.9. Is the recording date available?
 - 1.1.1.10. Is the data adjusted and/or selected?
 - 1.1.1.11. Starting year of recording
 - 1.1.1.12. Conditions for data inclusion

1.1.1.1 Conformation traits definition

- Height at hip
- Height at sacrum
- Height of the rump between hips also known as wither height
- Other definitions of the trait



PREP- Structure of the current Form(s)

Forms are structured **separately** for each **TRAIT GROUPS**

Evaluations and statistical models

National-International
MT-ST/MB-SB
BLUP- AM
Fixed -Random effects.
Reliability- validation methods, publication criteria etc.

- 1.1.1.15. Evaluations and statistical models
 - 1.1.1.15.1. Type of evaluation
 - 1.1.1.15.1.1. National evaluation
 - 1.1.1.15.1.1.1. Method/Model
 - 1.1.1.15.1.1.1.4. FIXED Environmental effects
 - 1.1.1.15.1.1.1.5. RANDOM Environmental effects
 - 1.1.1.15.1.1.1.6. Environmental effects as COVARIABLES
 - 1.1.1.15.1.1.1.7. NESTED Environmental effects
 - 1.1.1.15.1.1.1.8. If you are using Genetic Groups, what factors are they defined by?
 - 1.1.1.15.1.1.1.9. How blending of foreign/Interbull information in evaluation is used?
 - 1.1.1.15.1.1.1.10. Is Relationship Matrix used?
 - 1.1.1.15.1.1.1.11. Do you adjust for heterogeneous variance in the evaluation model?
 - 1.1.1.15.1.1.1.12. What system validation do you use?



PREP- Structure of the current Form(s)

Forms are structured **separately** for each **TRAIT GROUPS**

Scientific
base

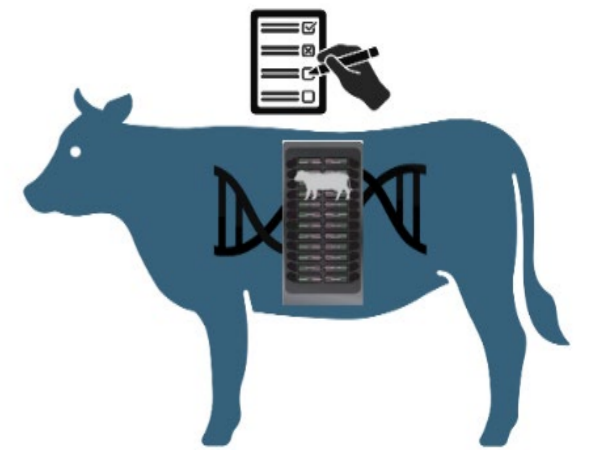
Scientific
references used
for reliability or
validation
methods for traits

1.1.1.16. Scientific base
1.1.1.16.1. Key reference(s) on methodology applied
1.1.1.16.2. Online documentation describing methodology used in evaluations



PREP- Genomic Form- Concept

- Similar structure as the current available forms on PREP database.
- ✓ More **genomic-oriented**
- ✓ **General genomic information** → SNP chip used, Imputation method, reference population
- ✓ **Genomic model and methods** → Single-Step/ Bayesian, Polygenic etc.
- ✓ **Genomic reliability and System validation**





PREP - Genomic Related form(s)

Having a separate form **ONLY** for “**Genomic**” related questions and options with the concept of having **ONLY** one general form for all **TRAIT GROUPS** (**NOT Individual Traits**)

- 1. General Genomic Form
- 1.1. Trait groups and Breeds

1.1 Trait groups and Breeds

This section serves adding several breeds and traits group genomic information and evaluation at the same time.

BREED	TRAIT GROUPS	
Holstein (HOL)	Production	ADD
Jersey (JER)	Calving	Add
Brown Swiss (BSW)	Conformation	
Red Dairy Cattle (RDC)	Female fertility	



PREP - Genomic Related form(s)

Pros:

- ✓ More efficient and easier for organizations to fill in the form
- ✓ **No need** for **repeating** to fill the information already have been provided in the Conventional forms
- ✓ Possibility of **copying information across TRAIT groups and breeds** in **ONE** form
- ✓ Possibility **to modify/edit** the information that may differ among different TRAIT GROUPS

The screenshot illustrates the 'Copy' functionality in the PREP interface. On the left, a tree view shows the hierarchy of forms: 1. General Genomic Form, 1.1. Trait groups and Breeds, 1.1.1. Holstein (HOL)-Production, and 1.1.2. Jersey (JER)-Production. A green double-headed arrow indicates the relationship between these two forms. A red box highlights the '1.1.2 Jersey (JER)-Production' section in the tree. A dialog box is open, showing a dropdown menu with 'Holstein (HOL)-Production' selected and a 'Copy' button. Below this, a larger window shows the '1.1.2 Jersey (JER)-Production' form with the '1.1.2.4.1. Number of animals included in the reference population' field highlighted. A callout box for this field shows the format 'M-850; F-500' and a pencil icon for editing.



PREP – Genomic Form- Conclusion

General GENO form: more efficient, user friendly and more general form

- More general and informative regarding genomic evaluation, information all in **ONE** form (instead of several separate forms)
- Only **ONE** form for different TRAIT GROUPS with the feasibility of **copying/modifying** information across different TRAIT GROUPS (that could be more efficient even in case that countries change the model/ SNP chip they used etc. over time for different trait-breed)
- **No need for repeating** the information regarding the individual traits definition, scale, heritability etc. for countries have already provided such information in the Current Conventional PREP forms
- ❖ **Some Consideration:**
 - Countries/Organizations still **need to** fill in/access general information regarding each individual traits via current conventional form in PREP.

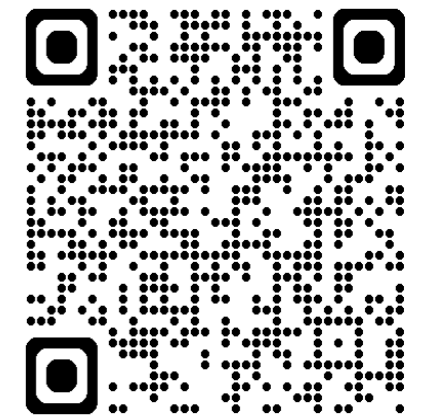
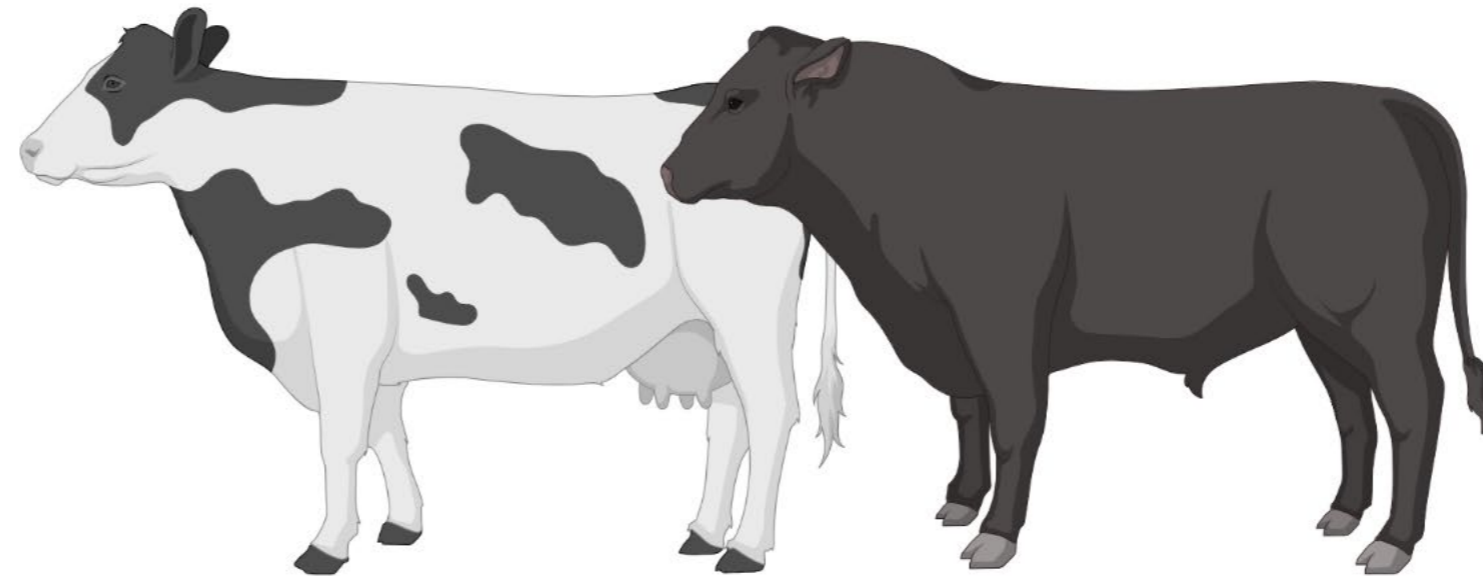


PREP Database

Thank you!

???

PREP 



PREP webinar

Interbull@slu.se

anahit.nazari@slu.se

<https://prep.interbull.org>