Status as of: 2019-04-16

**Form GENO**

**DESCRIPTION OF NATIONAL GENOMIC EVALUATION SYSTEMS**

|  |  |
| --- | --- |
| Country (or countries) | France |
| Main trait groupa.  NOTE. Only one trait group per form! | Conformation |
| Breed(s) | [I] Holstein, Montbéliarde, Normande  Each breed evaluated separately |
| Trait definition(s) and unit(s) of measurement Attach an appendix if needed | **HOL:**   * Capacity and Rump: Height at Sacrum (HS); Chest Width (CW); Rump Angle (RA); Rump Width (RW); Body Depth (BD) * Angularity (ANG); * Locomotion: Rear Legs Set (RLS); Locomotion (LOCO); Foot angle (FA), Rear Leg Rear View (RLR); * Udder: Fore Udder (FU); Rear Udder Height (RUH); Udder Support (US): Udder Cleft; Udder Depth (UD): Udder-Hocks distance; Teat Placement (TPF): Front teat Placement; Teat Length (TL); Udder Balance (UB); Teat Direction Rear (TDR) * Workability traits: milking speed (MD), temperament (TE) * Body Condition Score   **Montbéliarde:**   * Capacity and rump: Height at sacrum (HS):chest width (CW); Chest depth (CD); Body depth (BD); Rump length (RL); Width at hips (WH); Width at thurl (TW); Rump angle (RA); rump overall score (RO) * Locomotion: Rear legs set (RLS); foot angle (FA) Feet and legs overall score (F&L); * Udder: fore udder attachment (FU);Rear udder height (RUH); Rear udder width (RUW); Udder Depth (UD); Udder balance (UB); Udder Support (US) Teat placement front (TPF), Teat direction rear (TD); Teat length (TL); teat form (TF) udder overall score (Udder), Teat overall score (Teats); * Others: withers (WI), thighs (TH) * Workability traits: Milking speed (MD), Temperament (TE)   **Normande :**   * Udder: Fore Udder Attachment (FU), Rear Udder (RU), Udder Depth (UD), Udder Balance (UB), Udder Support (US), Teat Placement Front (TPF), Teat Direction (TD), Udder Overall Score (Udder) * Capacity and Rump: Height at Sacrum (HS), Chest Width (CW), Chest Depth (CD), Rump Length (RL), Width at Hips (WH), Rump Angle (RA), Size * Locomotion: Rear legs (RLS); Feet and Legs (F&L) * Muscularity (MU): Loin; Thighs (TH); Withers( WI); Rump   Workability traits: Milking speed (MD) |
| Source of genotypes (chips used) | Genotypes from Illumina50K SNP Chip or from lower density imputed on the 50K chip |
| Imputation method for missing genotypes | Based on Fimpute (Szargolzei et al, 2014) |
| Propagation of genomic information to non-genotyped descendants and ancestors | None |
| Animals included in reference population (males, females, countries included, total number) | Holstein : 30700 bulls from the Eurogenomics consortium  Montbéliarde : 2650 bulls, 22000 cows (France)  Normande : 2330 bulls, 11800 cows (France) |
| Source of phenotypic data (DYD, de-regressed proofs, national EBVs and/or MACE evaluations) | For bulls: DYD of sires obtained from conventional national genetic evaluation (or de-regressed MACE EBVs if DYD are not available(e.g., for foreign bulls)) of sires obtained from conventional national genetic evaluation  For cows: YD |
| Other criteria (data edits) for inclusion of records | Based on genotypes, individuals that are incompatible with their declared parents are removed |
| Criteria for extension of records (if applicable) |  |
| Sire categories | All genotyped bulls + genotyped females in Montbéliarde and Normande |
| Genomic model (linear, Bayesian, polygenic effect, genotypes or haplotypes) | Single trait Mixed Linear model including a regression on identical-by-statehaplotypes associated with up to 3000 QTL and a residual polygenic effect  Applied after a QTL detection with Bayes Cpi |
| Blending of direct genomic value (DGV) with traditional EBV | For Holstein and Brown Swiss genotyped females only |
| Environmental effects in the genetic evaluation model | Overall mean (possibly different when both DYD and de-regressed EBV are used) |
| Adjustment for heterogeneous variance in evaluation model | Using corresponding EDC |
| Computation of genomic reliability | Approximated from the BLUP coefficient matrix |
| Blending of foreign/Interbull information in evaluation | Use of de-regressed Interbull EBVI when DYD are not available |
| Genetic parameters in the evaluation | Same global heritability as the conventional genetic evaluation  On average 20% of genetic variance attributed to the residual polygenic effect, the rest equally distributed across haplotypes |
| Expression of genetic evaluations If standardized (e.g. RBV), give standardization formula in the appendix | See GE Form conventional genetic evaluation |
| Definition of genetic reference base | See GE Form conventional genetic evaluation |
| Labeling of genomic evaluations |  |
| Criteria for official publication of evaluations | Only for bulls officially declared as “bulls known from GEBV information”, genotype reliable, the parents and four grand-parents are known and  Reliability of GEBV >= 0.50 |
| Number of evaluations / publications per year | 6 genomic evaluations among which 3 are official (April, August, December) |
| Use in total merit index | INEL and ISU (see GE Form for conventional genetic evaluation) |
| Anticipated changes in the near future | Extension to regional dairy breeds |
| Key reference on methodology applied | Sargolzei, M., J. P. Chesnais, and F. S. Schenkel. 2014. A new approach for efficient genotype imputation using information from relatives. BMC Genomics, [15:478](http://www.biomedcentral.com/1471-2164/15/478)  Idele, La nouvelle méthode française d’évaluation génomique IBL n° 2015-5, Référence n°0015202010  (<http://idele.fr/no_cache/recherche/publication/idelesolr/recommends/ibl2015-5-la-nouvelle-methode-francaise-devaluation-genomique.html>)  Croiseau P. et al. , 2015. Comparison of different Marker-Assisted BLUP models for a new French genomic evaluation. EAAP meeting. Warsaw, Poland. |
| Key organization: name, address, phone, fax, e-mail, web site | Computing:  GenEval Evaluation génétique des animaux d’élevage  3 rue du Petit Robinson F78350 Jouy-en-Josas  Mail: [contact.international@geneval.fr](mailto:contact.international@geneval.fr)  Phone : +33 (0) 1 85 36 05 05 Web site : <https://www.geneval.fr/>  Publishing:  Institut de l’Elevage  149 Rue de Bercy  F75595 Paris cedex 12  Mail: [sophie.mattalia@idele.fr](mailto:sophie.mattalia@idele.fr)  Web site : [www.idele.fr](http://www.idele.fr) |

aEither: Production (e.g. milk, fat, protein), Conformation, Health (e.g. mastitis resistance, milk somatic cell, resistance to diseases other than mastitis), Longevity, Calving (e.g. stillbirth, calving ease), Female fertility (e.g. non-return rate, interval between reproductive events, number of AI’s, heat strength), Workability (e.g. milking speed, temperament), Beef production, Efficiency (e.g. body weight, energy balance, body conditioning score), or Other traits.

## System Validation

|  |  |
| --- | --- |
| Approximate number of test bulls for this trait group: | Holstein: 1670 |
| If including foreign reference bulls:  4-yr old de-regressed MACE EBVs, OR  Current de-regressed MACE EBVs  If including foreign test bulls (type of proof 21 or 22), provide the reason. |  |
| If using a truncation ≠ 4 years, provide the reason. | - |
| If applying an age cutoff for test bulls ≠ (YYYY-8), provide the reason | - |

# Appendix GENO

## Parameters used in genetic/genomic evaluation

## *Same as conventional evaluations: see GE Form*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Country (or countries): | |  | | | | |
| Main trait group: | |  | | | | |
| Breed (repeat as necessary): | |  | | | | |
| Trait | Definition | | ITBa | h2b | Genetic varianceb | Official proof standardisation formulac |
|  |  | |  |  |  |  |
|  |  | |  |  |  |  |

aIndicate, with X, traits that are submitted to Interbull for international genetic evaluations.

bIf repeated records are treated as separate traits, provide heritability estimates and genetic variances separately for each trait, as well as for all traits pooled, i.e. for the trait submitted to Interbull.

cExpressed as follows: StandEval=((eval-a)/b)\*c+d where a=mean of the base adjustment, b=standard deviation of the base, c=standard deviation of expression (include sign if scale is reversed), and d=base of expression.