**Form GE**

## DESCRIPTION OF NATIONAL GENETIC EVALUATION SYSTEMS

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| **Country (or countries)** | United States of America |
| **Main trait group** | Calving [calving ease (**CE**) – service sire and daughter, stillbirth (**SB**) – service sire and daughter] |
| **Breed(s)** | HOL (B&W, R&W), BSW (CE only); all breeds and first-generation crossbred calves evaluated together in a multibreed sire-MGS model |
| **Trait definition(s) and unit(s) of measurement** | **CE:** Expressed as percentage of births of bull calves that are difficult in primiparous heifers (**%DBH**), where difficult births are scored as requiring considerable force or being extremely difficult (4 or 5 on a 5-point scale); service-sire CE measures tendency of calves from a particular service sire to be born more or less easily; daughter CE measures ability of a particular cow (daughter) to calve easily<br>**SB:** Expressed as percentage of births of bulls calves that are stillborn in primiparous heifers (**%SB**), where stillborn calves are scored as dead at birth or born alive but died within 48 hours of birth (2 or 3 on a 3- point scale); service-sire SB measures tendency of calves from a particular service sire to be stillborn more or less often; daughter SB measures ability of a particular cow (daughter) to produce live calves |
| **Method of measuring and collecting data** | In recent years, scores reported almost entirely through Dairy Herd Information Affiliates<br><br>**CE:** Scored by owner on a scale of 1 to 5, where 1 = no problems encountered or unobserved birth and 5 = extreme difficulty.<br>**SB:** Scored by owner on a scale of 1 to 3, where 1 = calf born alive and still alive 48 hours after birth, 2 = calf born dead, and 3 = calf born alive but died within 48 hours after birth; scores of 2 and 3 combined into a single category for evaluation |
| **Time period for data inclusion** | Calvings from 1980 and later |
| **Age groups (e.g. parities) included** | All parities |
| **Other criteria (data edits) for inclusion of records** | No multiple births; sire age of >18 months or <18 years on calving date; MGS age of <18 years on dam birth date; herds with a single calving record reported or with more than 95% of calving records reported as scale 1 (easy) are excluded. Classes 4 and 5 are combined in the evaluation. Missing MGS year of birth is estimated from the daughter's year of birth.<br><br>**CE:** Data from herd-years with abnormal score distributions excluded (about 3% of data) based on a goodness-of-fit statistic for multinomial score distribution<br>**SB:** Herds with <5 reported calf deaths in database excluded |
| **Criteria for extension of records** (if applicable) | None |
| **Sire categories** | All sires (AI and NS) evaluated together |

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| **Environmental effects, pre-adjustments** | None |
| **Method (model) of genetic evaluation** | ST threshold sire-MGS model; CE and SB evaluated separately |
| **Environmental effects[3] in the genetic evaluation model** | Year-season (F), parity-sex (F), sire-MGS birth year group (F), MGS breed (F; CE only) (F), calf heterosis (F), Parity-Sex-YOB (R), HYParity (R) |
| **Adjustment for heterogeneous variance in evaluation model** | None |
| **Use of genetic groups and relationships** | Inverse of relationship matrix calculated using sire, MGS, and sire-MGS birth year effects within breed |
| **Blending of foreign/Interbull information in evaluation** | None |
| **Genetic parameters in the evaluation** | See Appendix CA for $h^2$ estimates<br><br>**CE:** Sire variance, 0.022; MGS variance, 0.022; sire-MGS covariance, 0.011<br>**SB:** Sire variance, 0.008; MGS variance, 0.018; sire-MGS covariance, 0.004 |
| **System validation** | Means and SDs for all variables calculated and examined overall as well as for each data submission; means for new bulls, changes for high bulls, largest changes, and key statistics for recent AI bulls checked |
| **Expression of genetic evaluations** | **CE:** %DBH<br>**SB:** %SB<br><br>Values from underlying scales reported to Interbull |
| **Definition of genetic reference base**<br><br>**Next base change** | HOL: Direct, bulls born in 2015; maternal, bulls born in 2010<br>BSW: Direct, bulls born between 2011 and 2016; maternal, bulls born between 2005 and 2010<br><br>April 2025 |
| **Calculation of reliability** | Approximated by inverse of diagonal element of coefficient matrix |
| **Criteria for official publication of evaluations** | Bull from AI organization that supports calving trait evaluation |
| **Number of evaluations/ publications per year** | 3 (April, August, December) |
| **Use in total merit index[4]** | Used in Lifetime net merit dollars (**NM$**), Cheese Merit dollars (CM$), Fluid Merit dollars (FM$) and Grazing Merit dollars (GM$) with variable relative weighting. Latest merit information is available at: https://aipl.arsusda.gov/reference/nmcalc-2018.htm |
| **Anticipated changes in the near future** | None |

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| **Key reference on methodology applied** | Van Tassell, C.P., and G.R. Wiggans. 2002. Enhancing quality of dystocia data by integration into a national dairy cattle production database. Proc. 7th World Congr. Genet. Appl. Livest. Prod. 32:557–560.<br>Wiggans, G.R., C.P. Van Tassell, J.C. Philpot, and I. Misztal. 2002. Comparison of dystocia evaluations from sire and sire-maternal grandsire threshold models. Proc. 7th World Congr. Genet. Appl. Livest. Prod. 32:561–564.<br>Wiggans, G.R., I. Misztal, and C.P. Van Tassell. 2003. Calving ease (co)variance components for a sire-maternal grandsire evaluation model. J. Dairy Sci. 86:1845–1848.<br>Van Tassell, C.P., G.R. Wiggans, and I. Misztal. 2003. Implementation of a sire-maternal grandsire model for evaluation of calving ease in the United States. J. Dairy Sci. 86:3366–3373.<br>Cole, J.B., R.C. Goodling, Jr., G.R. Wiggans, and P.M. VanRaden. 2005. Genetic evaluation of calving ease for Brown Swiss, Jersey, and Holstein bulls from purebred and crossbred calvings. J. Dairy Sci. 88:1529–1539.<br>Cole, J.B., G.R. Wiggans, and P.M. VanRaden. 2007. Genetic evaluation of stillbirth in United States Holsteins using a sire-maternal grandsire threshold model. J. Dairy Sci. 90:2480–2488.<br>Cole, J.B., G.R. Wiggans, P.M. VanRaden, and R.H. Miller. 2007. Stillbirth (co)variance components for a sire-maternal grandsire threshold model and development of a calving ability index for sire selection. J. Dairy Sci. 90:2489–2496.<br>Yao, C., K.A. Weigel, and J.B. Cole. 2014. *Short communication:* Genetic evaluation of stillbirth in US Brown Swiss and Jersey cattle. J. Dairy Sci. 97:2474–2480. |
| **Key organisation: name, address, phone, fax, e-mail, web site** | **Evaluation calculation and distribution:**<br>Council on Dairy Cattle Breeding<br>One Town Center<br>4201 Northview Drive,<br>Suite 302<br>Bowie, MD 20716<br>Ph: 240 334 4164<br>e-mail: joao.durr@uscdcb.com<br>web site: https://www.uscdcb.com<br><br>**Evaluation methodology:**<br>Animal Improvement Program<br>Animal Genomics and Improvement Laboratory<br>Agricultural Research Service, U.S. Dept. of Agriculture<br>10300 Baltimore Ave.<br>Bldg. 005, Room 306, BARC-West<br>Beltsville, Maryland 20705-2350, USA<br>voice: 301-504-8334; fax: 301-504-8092<br>e-mail: john.cole@usda.gov<br>web site: http://aipl.arsusda.gov |

**Form GE** **Appendix CA**

**Parameters for national genetic evaluations for calving traits as provided to Interbull**

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| **Country (or countries):** | United States of America |
| **Main trait group:** | Calving Traits [Service-sire and daughter CE**,** service sire and daughter SB] |
| **Breed(s):** | HOL (B&W, R&W), BS (CE only) |

| Trait | $h^2$ | Genetic variance | Official proof standardisation formula[a] |
|---|---|---|---|
| Direct CE | 0.072 | | |
| Maternal CE | 0.053 | | |
| Direct SB | 0.030 | | |
| Maternal SB | 0.065 | | |

[a] Expressed as follows:

StandEval = ((Eval − a)/b) × c + d, where a = mean of base adjustment, b = SD of base, c = SD of expression (include sign if scale is reversed), and d = base of expression.