

## Form GE

### DESCRIPTION OF NATIONAL GENETIC EVALUATION SYSTEMS

<b>Country (or countries)</b>	United States of America
<b>Main trait group</b>	Calving [calving ease ( <b>CE</b> ) – service sire and daughter, stillbirth ( <b>SB</b> ) – service sire and daughter]
<b>Breed(s)</b>	HOL (B&W, R&W), BSW (CE only); all breeds and first-generation crossbred calves evaluated together in a multibreed sire-MGS model
<b>Trait definition(s) and unit(s) of measurement</b>	<p><b>CE:</b> Expressed as percentage of births of bull calves that are difficult in primiparous heifers (<b>%DBH</b>), 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</p> <p><b>SB:</b> Expressed as percentage of births of bulls calves that are stillborn in primiparous heifers (<b>%SB</b>), 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</p>
<b>Method of measuring and collecting data</b>	<p>In recent years, scores reported almost entirely through Dairy Herd Information Affiliates</p> <p><b>CE:</b> Scored by owner on a scale of 1 to 5, where 1 = no problems encountered or unobserved birth and 5 = extreme difficulty.</p> <p><b>SB:</b> 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</p>
<b>Time period for data inclusion</b>	Calvings from 1980 and later
<b>Age groups (e.g. parities) included</b>	All parities
<b>Other criteria (data edits) for inclusion of records</b>	<p>No multiple births; sire age of &gt;18 months or &lt;18 years on calving date; MGS age of &lt;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.</p> <p><b>CE:</b> Data from herd-years with abnormal score distributions excluded (about 3% of data) based on a goodness-of-fit statistic for multinomial score distribution</p> <p><b>SB:</b> Herds with &lt;5 reported calf deaths in database excluded</p>
<b>Criteria for extension of records (if applicable)</b>	None
<b>Sire categories</b>	All sires (AI and NS) evaluated together

<b>Environmental effects, pre-adjustments</b>	None
<b>Method (model) of genetic evaluation</b>	ST threshold sire-MGS model; CE and SB evaluated separately
<b>Environmental effects<sup>3</sup> in the genetic evaluation model</b>	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)
<b>Adjustment for heterogeneous variance in evaluation model</b>	None
<b>Use of genetic groups and relationships</b>	Inverse of relationship matrix calculated using sire, MGS, and sire-MGS birth year effects within breed
<b>Blending of foreign/Interbull information in evaluation</b>	None
<b>Genetic parameters in the evaluation</b>	See Appendix CA for $h^2$ estimates  <b>CE:</b> Sire variance, 0.022; MGS variance, 0.022; sire-MGS covariance, 0.011 <b>SB:</b> Sire variance, 0.008; MGS variance, 0.018; sire-MGS covariance, 0.004
<b>System validation</b>	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
<b>Expression of genetic evaluations</b>	<b>CE:</b> %DBH <b>SB:</b> %SB  Values from underlying scales reported to Interbull
<b>Definition of genetic reference base</b>	HOL: Direct, bulls born in 2015; maternal, bulls born in 2010 BSW: Direct, bulls born between 2011 and 2016; maternal, bulls born between 2005 and 2010
<b>Next base change</b>	April 2025
<b>Calculation of reliability</b>	Approximated by inverse of diagonal element of coefficient matrix
<b>Criteria for official publication of evaluations</b>	Bull from AI organization that supports calving trait evaluation
<b>Number of evaluations/publications per year</b>	3 (April, August, December)
<b>Use in total merit index<sup>4</sup></b>	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: <a href="https://aipl.arsusda.gov/reference/nmcalc-2018.htm">https://aipl.arsusda.gov/reference/nmcalc-2018.htm</a>
<b>Anticipated changes in the near future</b>	None

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

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

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

Trait	$h^2$	Genetic variance	Official proof standardisation formula <sup>a</sup>
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.