

USDA Sire Conception Rate Evaluation – August 2008

Country (or countries)	United States of America
Main trait group	Male Fertility - Sire Conception Rate
Breed(s)	AYR, BSW, GUE,HOL, JER, MSH
Trait definition(s) and unit(s) of measurement	<p>Conception rate (CR) is the binary success (1) or failure (1) rate of an individual breeding, measured for the first seven (7) breedings of the cow (no heifer breedings).</p> <p>The service is coded as a failure if another reproductive event (breeding (AI or natural service), heat, or diagnosis of 'not pregnant') is subsequently reported or as a success, if validated with a pregnancy check or from a resulting calving date recorded.</p>
Method of measuring and collecting data	Collected by Dairy Herd Improvement Associations.
Time period for data inclusion	<p>Restricted to the most recent four years of data.</p> <p>The earliest breeding date included is: <i>cutoff date</i> – (4×365.25) – 70</p> <p>(<i>cutoff date</i> is the last day of data included in the current evaluation).</p>
Age groups (e.g. parities) included	Breedings in parities 1-5 are included (heifer breedings are NOT included). Parity groups are 1, 2, 3, 4, 5.
Other criteria (data edits) for inclusion of records	<p>Record must be confirmed with another breeding, a subsequent calving, pregnancy check, or do not breed code.</p> <p>Service-sire ID is required.</p> <p>Breed of service-sire must match breed of cow (no crossbreds)</p> <p>DIM at breeding must be 30 to 365.</p> <p>Only service sires with known sires and dams.</p> <p>Cow's age 2-15 years</p> <p>Minimum lactation milk levels of 10,000 lbs (HO), 8,000 lbs (BS), 6,000 lbs (all other breeds)</p> <p>No ET donors or sexed semen breedings</p> <p>Breeding occurring within 10 days of another overwrites the previous</p> <p>Herd-year must have 1 reported breedings for at least 50% of cows, have 80% AI usage, and an average conception rate of 10-90%</p>

Criteria for extension of records (if applicable)	NA
Sire categories	
Environmental effects, pre-adjustments	No
Method (model) of genetic evaluation	ST BLUP repeatability animal model.
Environmental effects in the genetic evaluation model	Fixed effects for herd-year-month registry status of breeding, parity, service number, standardized milk yield, cow age and whether the cow short cycled (breeding < 17 after last service) Covariates for service sire inbreeding and coefficient of inbreeding of mating; Random effects for age group, stud-year, service sire effect, cow's genetic ability, cow's permanent environment and a residual error
Adjustment for heterogeneous variance in evaluation model	No
Use of genetic groups and relationships	No
Blending of foreign/Interbull information in evaluation	NA
Genetic parameters in the evaluation	See table below.
System validation	
Expression of genetic evaluations If standardised (e.g. RBV), give standardisation formula in the appendix	SCR is a phenotypic predictor of bull fertility, expressed as a relative conception rate. $SCR = (\text{Solutions for service-sire} \times 100)$ rounded to nearest tenth.
Definition of genetic reference base Next base change	

Calculation of reliability	$100 \times [N / (N + 260)]$ (N = number of breedings)
Criteria for official publication of evaluations	Only bulls with ≥ 300 total matings; ≥ 100 matings in current 12 mo, and ≥ 10 herds are published for HO (limits are 200, 100, 10 for JE; 200, 30, 5 for AY, BS, GU; 50, 10, 5 for MS) Only AI bulls, if inactive < 13 years.
Number of evaluations / publications per year	3 (January, April, August)
Use in total merit index	None
Anticipated changes in the near future	
Key reference on methodology applied	Kuhn, M.T., and J.L. Hutchison. 2008. Prediction of dairy bull fertility from field data: A comparison of linear and threshold models and effects of matings with unknown outcomes <i>Journal of Dairy Science</i> (submitted). Kuhn, M.T., and J.L. Hutchison. 2008. Prediction of dairy bull fertility from field data: Use of multiple services and identification and utilization of factors affecting bull fertility. <i>Journal of Dairy Science</i> 91:2481–2492 Kuhn, M.T., J.L. Hutchison, and H.D. Norman. 2008. Modeling nuisance variables for prediction of service sire fertility. <i>J. Dairy Sci.</i> 91(7):2823–2835. 2008.
Key organization: name, address, phone, fax, e-mail, web site	Animal Improvement Programs Laboratory USDA, Agricultural Research Service Building 005, Room 306, BARC-West 10300 Baltimore Avenue Beltsville, Maryland 20705-2350 U.S.A. Tel: 301-504-8334 Fax: 301-504-8092 E-mail: inquiry@aipl.arsusda.gov web site: http://aipl.arsusda.gov

Effect	Variance
service-sire (SCR)	0.000535
stud×year	0.000110
Service sire age group	0.000143
permanent environment (PE)	0.002943
animal (cow)	0.005327
error	0.196970