Changes to Evaluation System (August 2006)

Productive life credits revised

By Paul VanRaden, Mahinda Dematwewa, Ron Pearson, and Mel Tooker

An economic definition of productive life (**PL**) was introduced to replace the previous definition used since 1994. Cows now get credit for continuing in milk after 305 days of lactation and after 84 months of age. Previously, credits were limited to the first 10 months of each lactation because records for longer lactations had not been stored in the Animal Improvement Programs Laboratory (**AIPL**) database. Improvements in herd management and genetics allow cows to remain productive and profitable without maintaining a yearly calving interval. Credits now are based on standard lactation curves, with highest credits at the peak of lactation and diminishing credits across the remainder of lactation. The standard is set such that a second-lactation cow with 305 days in milk gets credit for 10 months. First lactations get less credit and later lactations slightly more credit in proportion to average production. Lactation-curve credits ensure that cows with multiple lactations get more total credit than cows with just one long lactation.

The standard deviation of predicted transmitting ability (**PTA**) for revised PL is 1.4 times as large as the standard deviation for previous PTA PL because of the credits for longer lactations and additional life after 84 months of age. A simple conversion formula is revised PTA PL = 1.4(previous PTA PL). A more accurate conversion formula can be obtained by adjusting for changes in correlations of PL with daughter pregnancy rate (**DPR**) and somatic cell score (**SCC**): revised PTA PL = 1.4(previous PTA PL) – 0.11(PTA DPR) – 0.29(PTA SCC – 3.00). With the new definition of PL, some emphasis is shifted away from fertility toward SCC because longer lactations require more mastitis resistance and the correlations of PL with yield traits are slightly higher. A revised matrix of trait correlations is provided in the 2006 net merit documentation.

The inbreeding adjustments used for yield, DPR, and SCC evaluations since February 2005 (VanRaden and Smith, 1999, Journal of Dairy Science 82:2771) are now used for PL evaluations. As compared with previous PTA PL, revised PTA PL decreases by 0.12 for each percentage of expected future inbreeding and increases by 0.05 for each percentage of past daughter inbreeding. Estimated genetic trend decreased by 25% as compared with the trend without inbreeding adjustment. However, trend with the new model is higher because of the larger units. The factors used to predict future longevity for cows still alive also were updated. Methods are described by Van Raden et al. (2006, Journal of Dairy Science 89:3213). Heritability of PL was decreased slightly to 8% based on AIPL research and that of Tsuruta et al. (2005, Journal of Dairy Science 88:1156). The reliability of PTA PL also will decline slightly for recent bulls because the end point for predictions is later. Correlation of revised with previous PTA PL is 0.99 for high-reliability bulls, 0.97 for recent artificial-insemination bulls, and 0.96 for recent cows.

Looking at changes in PTA PL of individual bulls can help breeders understand the new evaluations. Comparisons of PL were calculated with the new and old evaluation programs and May 2006 data for each breed. Change in PTA PL was calculated as new PTA PL – 1.4(old PTA PL) to remove the scaling effect. The comparisons do not include additional bull data from the International Bull Evalution Service (**Interbull**; Uppsala, Sweden) for foreign daughters and are based on domestic data only. **These unofficial comparisons are provided for educational purposes only and are not for use in advertising.** Expected changes to net merit, which include the PL changes, the contribution of stillbirth evaluations for Holsteins, and other changes to the net merit formula also are reported.

Revised PL is more highly correlated to longevity traits defined by other nations. Average increase in genetic correlation with the other 18 countries that evaluate Holstein longevity was 0.03 (an increase from 0.73 to 0.76). The United States has the highest average genetic correlation across countries for both Holstein and Jersey breeds, which indicates that the new PL definition is an accurate summary of U.S. data and an excellent predictor of longevity in other environments.

Stillbirth and calving ability

By John Cole, George Wiggans, and Paul VanRaden

Stillbirth evaluations estimate the percentage of calves that are born dead or die within 48 hours. Percentages of stillborn calves have been between 7 and 8 in recent years, and a base of 8% was chosen for simplicity and for consistency with the calving-ease base of 8% for Holsteins. An earlier proposal used only the stillbirth rate for first parity as the base (12%), although the stillbirth rate for later parities is much lower (5%). Service sire and maternal grandsire effects on stillbirth are

both evaluated with a threshold model that is similar to the model used for calving ease. Evaluation methods are described by Cole et al. (2006, Proceedings of 8th World Congress on Genetics Applied to Livestock Production, CD-ROM Comm. No. 01-28; 2006, Journal of Dairy Science 89(Suppl. 1):273(abstract 339). Economic values are discussed in the 2006 net merit documentation.

Stillbirth evaluations from the United States will not be included in Interbull evaluations until November 2006 because daughter counts sent to Interbull with data for the March test evaluation were incorrect. For August 2006, stillbirth evaluations for foreign bulls will be estimated from Interbull calving-ease evaluations using the genetic correlations of stillbirth with calving ease. Six other countries currently provide stillbirth data to Interbull for multitrait, across-country evaluation of stillbirth. Data reported to Interbull, and evaluations received are on the continuous underlying scale for the trait; thus, Interbull evaluations will be converted to the U.S. reported scale (expected percentage of births that are stillbirths). Beginning in November 2006, Interbull stillbirth evaluations will be used in net merit calculations.

Lifetime net merit revised

By Paul VanRaden

See "Net Merit as a Measure of Lifetime Profit: 2006 Revision."

Calving-ease edits

By Curt Van Tassell and George Wiggans

Additional restrictions were imposed on calving-ease scores from herds with unusual distributions. The mode (most frequent score) for calving-ease scores in a herd is expected to be 1, but the mode was higher for nearly10% of data. Data from herd-years with a mode of 4 or 5 (1.2%) were deleted. A mode of 3 is an indication that the scorer assumed that the scores should be normalized (middle score of 3 for an "average" birth). For herds with a mode of 2 or 3, scores up to the mode were changed to 1, and scores greater than the mode were decreased accordingly. For example, in a herd-year with a mode of 3, scores of 1, 2, and 3 all became 1, scores of 4 (1 higher than the original mode) were changed to 2, and scores of 5 were changed to 3. The combining of categories lowered the portion of difficult calvings (scores of 4 or 5) and, therefore, increased the impact of the subsequent goodness-of-fit test. Overall, 6.4% of data were excluded.