Changes in USDA-DHIA Genetic Evaluations (October 1988)

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Progress on the animal model system for genetic evaluation is continuing. The Animal Improvements Programs Laboratory (AIPL) plans to implement the system for July 1989 evaluations. Current efforts include developing computer programs to process and distribute evaluations as well as to add supplemental data. Some aspects of the evaluation system still are being developed in an effort to include as many desirable features as possible by July. This memorandum describes the system as it is expected to be when implemented. However, some minor issues are subject to change because of research currently in progress and an effort to coordinate with evaluations in other countries.

Factors relating to evaluations

1. Data included in evaluations will be nearly the same as for the Modified Contemporary Comparison (MCC). However, lactations beyond fifth will not be used. Research is planned to determine if fewer lactations would produce more accurate animal model evaluations. The earliest data included will be 1960 calvings. For lactation data to influence evaluations of relatives, a cow must have a first-lactation record, and only data from her first herd will be included. For cow evaluations, lactations from all herds will be included through a separate process, and cows without a first lactation will be evaluated.

2. Comparison of a cow's lactation with those of her contemporaries will be called "management group deviation" (MGDev). Management groups will be defined by her, 2-month season, parity (first vs. later), and registry status (registered vs. grade). Management groups with fewer than five lactations will be combined. Modified Contemporary Deviation will be replaced by MGDev, which has a similar interpretation and is nearly the same if number of contemporaries is large. Average number of lactations in a cow's management group includes the cow. Paternal half-sibs are not excluded from a cow's management group.

3. Heritability has been set at 25 percent. The within-pedigree heritability of 20 percent used in MCC bull evaluations is equivalent in animal model evaluations to approximately 28 percent. For cows, effective MCC heritability is lower, therefore, a heritability of 25 percent was chosen for the animal model. Herd-sire component (or environmental correlation) remains at 14 percent and permanent environmental component at 16 percent, resulting in a repeatability of 55 percent.

4. Genetic base for each breed is expected to be average genetic value of all cows born in 1985 and will be labeled by the year in which the base is implemented (1989). An effort is being made to coordinate with other countries; therefore, some change is possible. Information on expected genetic level of animals resulting from current breedings also will be provided. This will be computed by projecting the trend observed in the last 2 years for the next 5 years. These values should provide a current reference point for making breeding decisions.

5. Evaluations will be termed "predicted transmitting ability" (PTA). This name will be applied to both bull and cow evaluations and indicates that evaluations measure half the breeding value of animals.

6. Measure of accuracy will be called "realiabilty" (REL) instead of Repeatability. This change will allow the term repeatability to be reserved for the similarity among repeated records. The REL will measure information from parents and progeny as well as an animal's own records. The changes are that sons and daughters contribute to cows and that parents and sons contribute to bulls. Number of progeny of cows will be reported in daughter equivalents. A son could contribute as many as four daughter equivalents.

7. Cows will receive an evaluation of "predicted producing ability (PPA), which is calculated as herd-sire and permanent environmental effects plus twice PTA.

8. "Parent-average" (PA) will replace ancestor merit for bulls as an indication of pedigree contribution. For cows, PA will be provided instead of dam evaluation. The dam PTA included in PA is from her first herd only. If the dam changed herds of did not have a first-lactation record, her PTA will not be the same as her contribution to her

progeny's PA.

9. Only one percentile ranking based on PTA dollars (PTA$) from milk, fat, and protein will be provided. Percentiles will continue to be computed separately for bulls and cows. If a cow does not have a protein evaluation, PA protein will be used. For bulls with no daughters, PA will be used. For bulls with one to nine daughters, the evaluation including PA and daughter information will be used.

10. Red and White and Holstein evaluations will be combined. Procedures are being tested, and details are under consideration by the breed associations. Red and White bulls that also are registered as Holsteins will have their Holstein numbers substituted in data, however, they will be included in bull evaluation files under both identifications. Unknown parent groups will be separate for Red and Whites. Red and Whites and Holsteins will have the a common base.

11. Separate unknown parent groups will be defined for Holsteins of Canadian origin.

Distribution of results

1. Distribution of cow evaluations will be limited to cows born in the last 10 years or for cows with progeny, those born in the last 20 years. Complete history files will be available for dairy records processing centers and breed associations following July 1989 evaluations.

2. The bull evaluation file on computer tape will continue to be a complete replacement. It will include records for all bulls with 10 or more daughters and in addition, identification and PA information for bulls with fewer than 10 daughters and National Association of Animal Breeders (NAAB) cross-reference codes.

3. The organizational bull evaluation and daughter list on tape (formerly the 1202 tape) for those artificial-insemination (AI) organizations that request it will include that organization's bulls with at least 10 daughters and its other bulls with NAAB cross-reference codes. Only daughters born in the last 10 years will be included. Bulls with fewer than 10 daughters will have a daughter list but no evaluation.

4. The printed bull evaluation and daughter list (formerly form 1202) will include all active AI, custom-collected, and progeny-test bulls with at least 10 daughters and selected other bull 8 years old or younger. Only daughters born in the last 10 years will be included. Bulls

with over 100 daughters included in their previous evaluation will not have a copy of the daughter list printed. A bull will be included the first time his evaluation includes at least 10 daughters. Subsequently, a bull not in active AI service will be included when his combined fat and protein changes by more than 5 lb from the last time he was included.

5. The complete bull list on microfiche will include bulls that are active AI, custom collected, progeny test, inactive AI 11 years old or younger, or non-AI 8 years old or younger. Only bulls with 10 daughters or more are included.

6. An example of the bull evaluation and daughter list is enclosed. A column "contribution to bull" is included. This column should be particularly useful in analyzing a bulls's evaluation. Distribution of a bull's first-lactation daughters is indicated by number of herds, number of daughters, her with most daughters, and number of daughters in that herd. This information is provided in place of effective daughters per herd.

7. The state with the most daughters will not be updated after a bull is 11 years old. Values from his last evaluation before reaching 11 years will continue to be included in his evaluation. This restriction will insure that these values do not change as the oldest data are dropped from data used to compute them.

8. Variables that will be included in cow and bull evaluations distributed on computer tape and their definitions are in proposed formats 105 and 380 (enclosed). Please review these formats and notify AIPL by November 20, 1988, of any suggestions. Final formats will be distributed after reviewing those suggestions.

Preliminary results from comparisons of MCC and animal model evaluations from breeds other than Holsteins show an overall correlation of about .9 for both cows and bulls. The correlation increases with amount of information; for bulls with high REL, the correlation is .99. Additional comparisons are underway to measure ability of animal model evaluations to predict future progeny performance and to examine particular animals with large differences between MCC and animal model evaluations.