Impact of Changes in U.S. Evaluations on Conversions and Comparisons

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Studies at the U.S. Department of Agriculture (USDA) (1) and the International Bull Evaluation Service (INTERBULL) Centre (Banos, 1994, unpublished) have suggested that present U.S. genetic evaluations result in estimates of genetic trend that are about 25% too high for Holsteins and 10% too high for other breeds. The addition of parity and related effects to the USDA animal model in January 1995 (Norman, 1994, industry memorandum) is expected to eliminate the problem of inflated trend both immediately and for the future. Updated age adjustment factors (2) are anticipated to correct much of the problem. For simplicity, the term "parity" is used in connection with the improved model, but, in fact, effects of age, region, and time within parity are included (3).

The January 1995 U.S. evaluations will have properties that could result in substantially different conversion equations. An understanding of what to expect in those equations is important so that their dissemination will not be delayed and educational material can be prepared in advance.

Holstein data from the United States were used to predict evaluations from Canada, Italy, and The Netherlands. Predicted transmitting abilities (PTA) from January 1994 and parity-adjusted January 1994 PTA (PTA_{adj}) were available from the USDA study on effect of age and parity on genetic trend (1). These PTA in combination with January data from Canada and Italy and April data from The Netherlands were used to develop conversion equations. Daughter yield deviations (DYD) were not available from the USDA genetic trend study (1); therefore, only the Wilmink method was used. Because new age adjustment factors have not yet been implemented for the United States, the substantial computation required to calculate PTA_{adj} was not warranted for July 1994 evaluations.

Because of the lack of U.S. DYD from the model with parity adjustment included, b-values could not be calculated as recommended by the ratio of sire genetic standard deviations (SD). However, the SD for PTA were compared with those for PTA_{adj} as an indication of what to expect in January 1995. For 5885 bulls in major artificial-insemination (AI) organizations and with birth years of ≥1981, reliabilities of ≥70%, and ≥35 daughters in ≥20 herds, SD decreased by 11.0% for milk yield, 8.2% for fat yield, and 9.3% for protein yield. Thus, France should expect b-values for U.S.-to-France conversion to increase by those amounts (times the assumed genetic correlation of .9). Conversely, France-to-U.S. conversion equations would have b-values decreased by .9 times those percentages.

Mean PTA_{adj} were lower than PTA by 290 pounds for milk, 7.1 pounds for fat, and 8.8 pounds for protein. That means that these bulls are expected to drop by those amounts more than the base change for cows.

Correlations between PTA and PTA_{adj} for the 5885 bulls were .987 for milk yield, .994 for fat yield, and .984 for protein yield. For bulls used in deriving equations with the Wilmink method, correlations with non-U.S. evaluations usually were higher for PTA_{adj} than for PTA.

Because bulls used for the comparison of Wilmink results are not exactly the same as those used for official equations, the differences between a- and b-values based on PTA and PTA_{adj} (Table 1), not their actual values, are of interest. As expected based on the differences between PTA and PTA_{adj} means and SD, both a- and b-values increased for equations to convert U.S. evaluations to another country's

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Table 1. Intercepts (a) and regression coefficients (b) for conversion of U.S. evaluations for yield in pounds to another country's equivalent.

Importing country	Parity adjustment	Milk		Fat		Protein	
		a	b	a	b	a	b
Canada (BCA)	No	−.03	.00811	−2.74	.2392	−.34	.2774
	Yes	1.90	.00910	−1.32	.2581	1.78	.3041
Italy (kg)	No	1014	.56	35.3	.58	31.8	.63
	Yes	1084	.66	37.8	.64	35.3	.70
Netherlands (kg)	No	337	.67	−9.4	.74	5.5	.64
	Yes	526	.74	−4.5	.78	11.5	.67

equivalent when based on evaluations from the model including parity. Increases in b-values ranged from 5 to 18%.

Conversely, equations to convert other countries's evaluations to a U.S. equivalent had lower a- and b-values when derived from PTA_{adj}. These differences in equations do not necessarily imply that the United States has been disadvantaged as the equations would be applied to data with different characteristics.

Equations with the a- and b-values in Table 1 were used to convert U.S. evaluations to Italian and Netherlands equivalents. The top 100 bulls for the United States and Italy and for the United States and The Netherlands were determined based both on PTA and on PTA_{adj}. Bulls from the U.S. tended to rank higher if PTA was adjusted for effect of parity. The number of U.S. bulls in the top 100 increased by an average of 2 (Table 2).

Table 2. Number of U.S. bulls among the top 100 based on U.S. PTA and PTA_{adj} converted to an Italian or Netherlands equivalent and then included with the other country's evaluations.

Trait	Italy		Netherlands	
	PTA	PTA_{adj}	PTA	PTA_{adj}
Milk yield	90	93	81	86
Fat yield	94	96	38	41
Protein yield	92	93	48	48
Economic index[1]	90	93	34	35

[1]ILQ for Italy; INET for The Netherlands.

The expected base changes for Holstein cows are decreases of 941 pounds for milk, 32 pounds for fat, and 26 pounds for protein. The decline for active AI bulls is expected to be larger: 1350 pounds for milk, 37 pounds for fat, and 31 pounds for protein. These projections will be estimated more precisely in late 1994. Effects of the base change were not included in the a-values in Table 1.

Most other countries also will be changing genetic bases in January 1995. Changes in evaluation models or preadjustment of records also may occur in other countries and could affect their trends and variation.

References

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