EXPERIENCES IN THE UTILIZATION OF U.S. AND CANADIAN PRODUCTION AND CONFORMATION GENETIC INDICES IN THE PREDICTION OF FUTURE PROOFS OF YOUNG BULLS

Wencan Zhang and Herman DeBoer
Semex Canada

INTRODUCTION

Canadian A.I. units sample over 350 young bulls each year, about 1/3 of which are from the U.S. Exchange of germplasm has been very frequent across the border due to geographic proximity and genetic variation in production and type performance of each population. The selection of young sires with superior genetic potential is vital to the survival of the A.I. industry in an increasingly competitive international semen market. Since the early 1980s, Semex has been using the sire-son regression analysis to obtain regression factors for different combinations of ancesters of a young bull and for different genetic sources (U.S. and Canada) to predict a young bull's genetic merit (Schaeffer, 1981). This method seems to take care of the differences in genetic base and scale between countries and potential problems with overestimation of cow indexes. This report will compare this method and the conversion method proposed by Interbull for pedigree indexing.

MATERIAL AND METHOD

A total of 1418 young bulls entered in Canadian A.I. from 1980 to 1987 were contained in the analysis based on their pedigree; January 1991 bull proofs and cow indexes were obtained from Agriculture Canada, Holstein Canada and Holstein USA for production and type information. Regression factors were obtained for sire only, sire and dam, from Canadian and U.S. information sources for milk, fat, protein, final class (FC), mammary system (MS), feet and legs (FL), and capacity (CAP). These traits are used to determine the Canadian Lifetime Profit Index (LPI=6(5fat + 6protein) + 4(3FC + 4MS + 2FL + CAP). The regression factors were set feee-flow to obtain a and b values for U.S. information; for Canadian sires, .5 was used for all traits, the same for the type traits of Candian dams. The production traits of Canadian dams were set at a free value, the b value was given as .5. This study was to to compare the means for these traits by a) the Semex method; b) the conversion method recommended by Interbull (1990) - conversion factors were obtained from Agriculture Canada, and parental average for Canadian information -, and c) the actual proof of January 1991 by four genetic groups, i.e. AA, AC, CA, and CC, where A denotes U.S., C denotes Canada, first letter denotes a sire and second letter a dam.

RESULT AND DISCUSSION

Table 1 shows the regression factors for pedigree indexing. To convert U.S. information into Canadian units, A values represent the base difference between U.S. and Canadian in two populations; B represents the difference in the scale of measurement. U.S. sires have positive A values for production traits; on the other hand, U.S. sires and dams did have lower A values for type traits, especially for Final Class and Mammary System. The corresponding A values for production traits of U.S. dams were much smaller than those of U.S. sires. For the Canadian information, .5 was used for the sire only, a negative intercept from the regression solution reflected on average an overestimation of bull dams.

Table 2 shows the means of the proof and pedigree index by the Semex method and by the conversion of four genetic groups. The means of the actual proofs showed that group AA had the highest production proofs and the lowest type proofs for most traits. Group CC had the lowest production and medium type. Compared to different methods, generally speaking, the Semex method gave better estimates which were close to the actual proofs, while the conversion method gave an overestimate of the genetic merit of the young bulls in question, with most means significantly higher than the actual means.

Table 3 shows the correlations between proof and pedigree index of the two methods. Although both methods gave very similar correlations, the Semex method always ame out with slightly higher correlations than the conversion method.

Table 1. SEMEX regression factors for JAN, 1991 proofs

Trait	Combination	sire factors			dam factors			
		CAN	USA		CAN		USA	
			A	B	A	B	A	B
Milk	Sire	.5	1.77	.0047				
	Sire+dam	.5	2.31	.0034	-1.81	.5	.67	.0031
Fat	Sire	.5	1.39	.1521				
	Sire+Dam	.5	1.59	.1099	-2.45	.5	.14	.0838
Protein	Sire	.5	1.73	.1524				
	Sire+Dam	.5	2.18	.1140	-.62	.5	.18	.1033
FC	Sire	.5	-5.64	3.8291				
	Sire+Dam	.5	-2.88	3.2795		.5	-4.51	2.067
FL	Sire	.5	.76	.5507				
	Sire+Dam	.5	1.51	.4243		.5		
MS	Sire	.5	-.51	2.0112				
	Sire+Dam	.5	1.32	1.7660		.5	-2.12	1.2471
CAP	Sire	.5	-1.49	1.7405				
	Sire+Dam	.5	-.55	1.7737		.5		

Table 2. Mean of proof (JAN, 1991), convesions (CONV), and SMEX method (SEMEX) of proven holstein bulls entered in Canada AI 1980-1987

Genetic group	Method	No OBS	mil	fat	prt	FC	CAP	FL	MS	LPI
AA	PROOF	470	5.	5.1	5.3	-.3	-.8	.7	-.1	339
	CONV		7.**	6.7**	8.2	3.6**	.9**	.8	2.2**	582**
	SEMEX		5.	5.1	4.6	-.1	-1.0	.8	0.0	318
AC	PROOF	262	2.	2.5	2.1	2.2	1.0	1.5	2.0	225
	CONV		4.**	4.9**	3.6	2.4	1.5**	1.4	1.4**	349**
	SEMEX		2.	2.5	2.1	2.1	1.0	1.4	1.9	222
CA	PROOF	101	2,	3.9	2.5	.3	.9	-.9	.4	216
	CONV		3,	4.6	4.5	3.5**	3.4**	-.1	2.8**	395**
	SEMEX		2;	3.2	2.0	.3	1.8	-.1	-.1	173
CC	PROOF	585	1:	1.9	1.0	1.5	1.6	.5	1.1	137
	PARENT AVE.		2I**	4.1**	1.6	2.7**	2.8**	1.3**	2.0**	263**
	SEMEX		1.	1.6	1.0	2.7**	2.9**	1.3**	1.9**	168**

** P < .01

Table 3. Correlation of proof (JAN, 1991) ad conversions (CO), and SEMEX method (SEMEX) of proven holstein bulls entered in Canada AI 1980-1987

all proven bulls	Method	No OBS	milk	fat	t	FC	CAP	FL	MS	LPI
1980-1987	CONV.	1418	.68	.65	;9	.63	.65	.71	.59	.67
	SEMEX		.68	.66	'0	.69	.65	.71	.64	.68

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