Update of the formulas to convert French EBVs to a Canadian equivalent
Laurence Maignel, CCSI, September 2003

Formulas to convert French EBVs and repetabilities values to Canadian equivalents were computed in 2000 and 2001. These formulas were updated using recent information on new Yorkshire and Landrace boars with progeny in France and in Canada. All animals in the first data set remained in the data for the new estimation (see appendix 1 and 2). Two different models were tested to find the best conversion factors, with or without regression slope.

Model 1

The table below shows the conversion factor estimates, computed in 2000, 2001 and 2003, with their estimated standard errors, and the number of boars used in parenthesis. The conversion formula is : Canadian EBV = French EBV + conversion factor.

The model used was : $\mathbf{Y} = \mu + \mathbf{e}$
where **Y** is the observed difference between the Canadian and French EBV, μ is the conversion factor and **e** is a random residual with heterogeneous variance : $R^2_{CAD}.\sigma^2_a(1 - R^2_{FRE}.R^2_{CAD})$
where R^2_{FRE} is the repeatability of the French EBV, R^2_{CAD} is the repeatability of the Canadian EBV and σ^2_a is the genetic variance of the trait. Generalized least-squares estimation was used.

		Conversion factor		
Trait	Breed	2000	2001	2003
Litter size	YO	+1.1 ± 0.08 (19 boars)	+1.4 ± 0.05 (38 boars)	+1.6 ± 0.05 (68 boars)
	LA	+1.2 ± 0.14 (5 boars)	+0.7 ± 0.07 (22 boars)	+1.2 ± 0.06 (44 boars)
Backfat	YO	+0.52 ± 0.13 (40 boars)	+0.47 ± 0.10 (65 boars)	+0.47 ± 0.08 (78 boars)
	LA	+1.37 ± 0.18 (20 boars)	+1.82 ± 0.11 (41 boars)	+2.46 ± 0.10 (58 boars)
age	YO	-3.6 ± 0.5 (40 boars)	-2.2 ± 0.5 (65 boars)	-0.80 ± 0.4 (78 boars)
	LA	+4.9 ± 0.7 (20 boars)	+2.5 ± 0.5 (41 boars)	+3.6 ± 0.5 (58 boars)

With the increasing number of boars used in the analysis, the standard errors of estimates tend to be lower in the last analysis. Except for backfat in Yorkshire, the new conversion factors are quite different from those estimated in 2001. For fat and litter size, the changes look consistent with genetic trends in both countries (see appendix 3).

Model 2

The model used was : $C = \mu + b.F + e$

where F is the French EBV, C, is the deregressed Canadian EBV, b is a scale conversion factor, μ is an intercept, and e is a random residual with heterogeneous variance.

The Canadian EBVs are deregressed according to : $C = \frac{EBV - \bar{x}}{R^2_{CAD}}$ where x is the sample mean.

The variance of each residual is : $\frac{\sigma^2_a(1 - R^2_{FRE}.R^2_{CAD})}{R^2_{CAD}}$

where σ^2_a is the genetic variance of the trait specific to Canada.

Trait	Breed	Analysis	Animals in data	Intercept	Slope
Litter size	YO	2000	19	+1.2 ± 0.4	2.02 ± 0.65
		2001	38	+1.4 ± 0.3	1.69 ± 0.37
		2003	68	+1.9 ± 0.3	+1.34 ± 0.32
	LA	2000	5	+0.9 ± 0.6	1.30 ± 1.38
		2001	22	+0.9 ± 0.3	0.88 ± 0.31
		2003	44	+0.9 ± 0.2	+1.39 ± 0.24
Backfat	YO	2000	40	+0.4 ± 0.2	1.58 ± 0.23
		2001	65	+0.5 ± 0.1	1.60 ± 0.11
		2003	78	+0.5 ± 0.1	1.07 ± 0.15
	LA	2000	20	+1.5 ± 0.4	0.28 ± 0.58
		2001	41	+1.4 ± 0.1	1.03 ± 0.16
		2003	58	+2.6 ± 0.2	1.23 ± 0.26
Age	YO	2000	40	-2.5 ± 1.4	2.0 ± 0.4
		2001	65	-1.3 ± 1.0	1.6 ± 0.3
		2003	78	-1.2 ± 0.9	1.3 ± 0.3
	LA	2000	20	+7.0 ± 3.1	2.5 ± 0.9
		2001	41	+1.7 ± 1.0	1.1 ± 0.2
		2003	58	+4.1 ± 1.0	1.1 ± 0.2

The regression slope is found to be non-significantly different from 1 or very close to 1 in most cases. Thus, the results obtained from model 1 can be used, as before, to provide conversion formulas.

New conversion formulas

Litter size
Yorkshire
Canadian EBV number born = French EBV number born + 1.6
Landrace
Canadian EBV number born = French EBV number born + 1.2

Backfat thickness at 100kg (expressed in mm or in index points)
Yorkshire
Canadian EBV fat (mm) = French EBV fat (mm) + 0.47
or Canadian EBV fat (mm) = [100 - French EBV fat (points)]/31.78 + 0.47
Landrace
Canadian EBV fat (mm) = French EBV fat (mm) + 2.46
or Canadian EBV fat (mm) = [100 - French EBV fat (points)]/28.90 + 2.46

Age at 100kg (expressed in days or in index points)
Yorkshire
Canadian EBV age (days) = French EBV days (days) – 0.80
or Canadian EBV age (days) = [100 - French EBV age (points)]/5.61 – 0.80
Landrace
Canadian EBV age (days) = French EBV days (days) + 3.6
or Canadian EBV age (days) = [100 - French EBV age (points)]/5.73 + 3.6

Remarks

Several changes occurred in the French evaluation system since 2001 :

- The reproduction trait “Number born” was replaced by “Number born alive”. This trait is slightly less heritable than the previous one in both breeds.
- New genetic parameters were estimated and included in the evaluation for production traits in 2002.
- The reference population used in the French system to compute standardized indices is now changed every month, as in the Canadian evaluation.

Conclusions

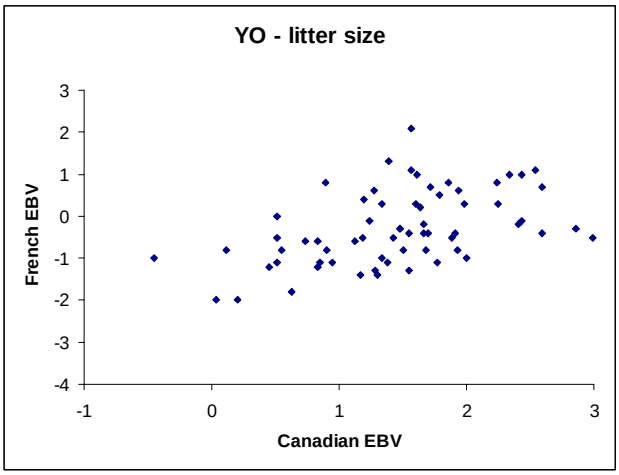
- The larger data set available for this new analysis allowed to compute more accurate estimates of conversion factors. These factors are quite different from those computed in 2001, mainly because of the better accuracy but also because of changes in the French evaluation system.
- The values have to be updated regularly, for example every six months, in order to improve the accuracy of the coefficients and to take into account possible changes in the French and in the Canadian evaluation systems.
- Converted values (for number born, age, fat, sire line index and dam line index) are provided on CCSI’s website (in the member services section) and will be integrated in EBV files (for animals without values in the Canadian system).

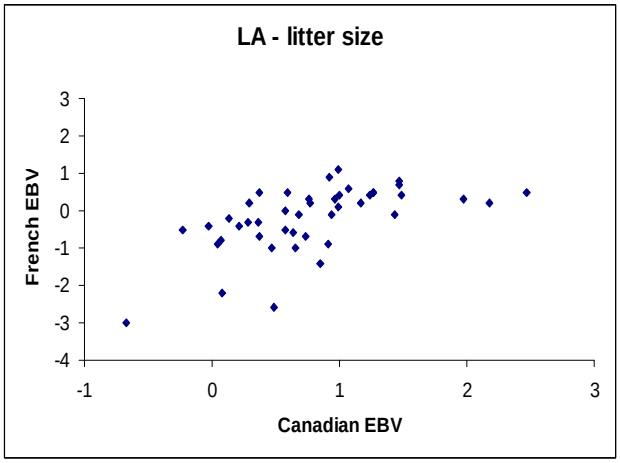
- Conversion formulas could be developed for other traits available in the French National evaluation system, such as feed efficiency, lean depth...

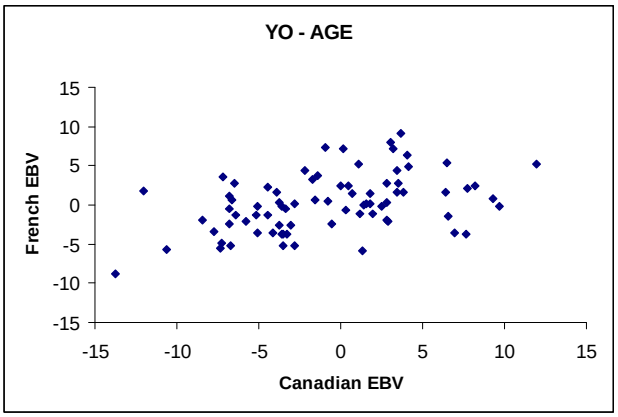
Appendix 1 : Animals used in the conversion study

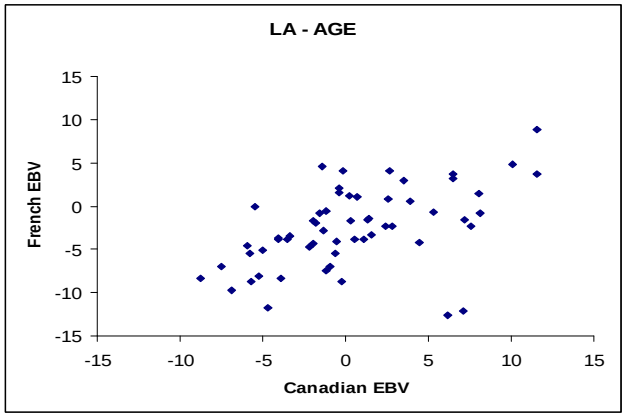
Trait	Breed	Number of boars	Average number of progeny with records		Average EBV		Standard deviation of EBV	
			France	Canada	France	Canada	France	Canada
Litter sixe	YO	68	284	81	-0.30	+1.46	0.85	0.81
	LA	44	183	88	-0.21	+0.78	0.88	0.62
Backfat	YO	78	376	141	+0.08	+0.58	0.68	1.09
	LA	58	206	101	-0.36	+2.18	0.65	1.35
Age	YO	78	376	141	+0.20	-0.82	3.65	5.32
	LA	58	206	101	-2.54	+0.47	4.60	4.89

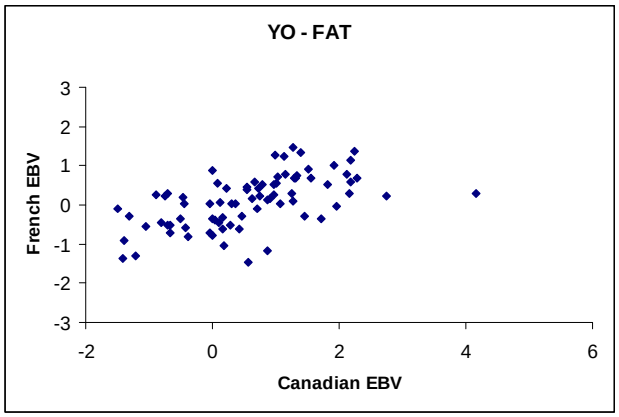
Appendix 2 : Distribution of Canadian and French EBV in the data sample

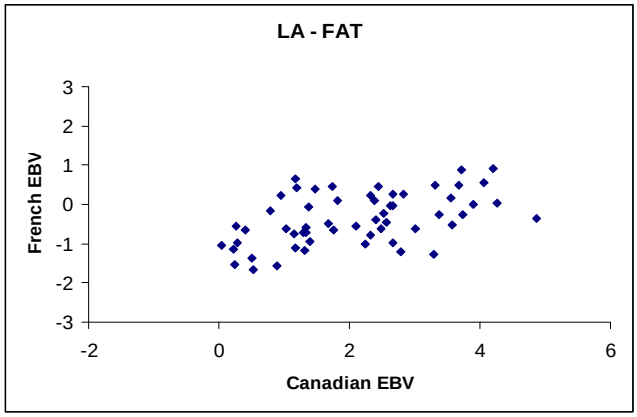






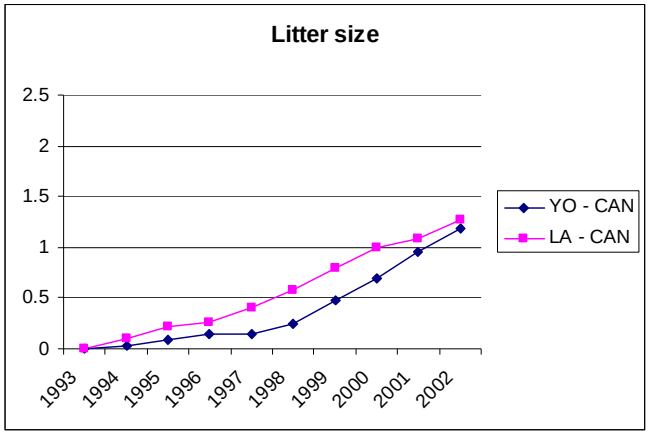


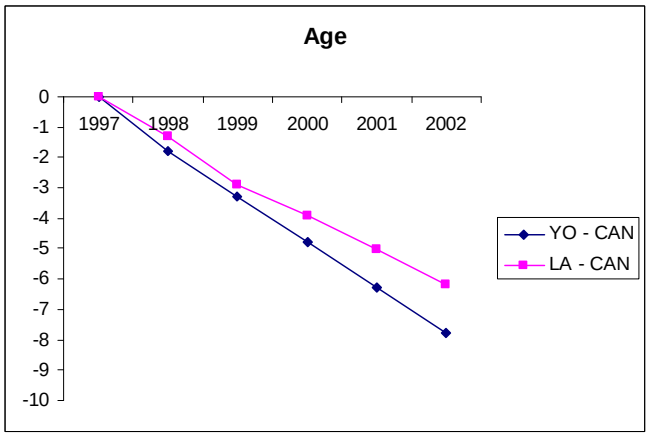


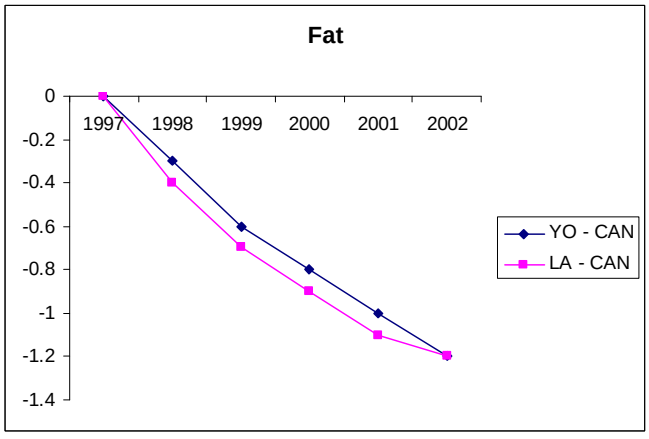


Appendix 3 : Genetic trends in Canada and in France

CANADA







FRANCE