

PROOF VALUES by Dr. Steven Larmer

All Proofs are not created equally (or should we say, should not be compared equally!). Different countries have differing scales for their genetic evaluation that can significantly change how genetic values are to be interpreted. The main two scales are the Estimated Breeding Value (EBV) and Predicted Transmitting Ability (PTA). Each of these scales have their own interpretation of genetic values. In general, most countries choose to use EBVs, with a few notable exceptions, (USA, GBR, ISR, IRL).

DEFINITIONS:

EBVs are an estimation of the genetic value of an individual. This means they represent all that individual's genetic potential. PTAs on the other hand, represent that average expected transmitted genetics to the next generation. This means that for the exact same trait, a PTA would be half of an EBV.

SCALE:

This can be further complicated by a few things. Firstly, the scale on which the trait is measured. For example, US genetic evaluations for production use pounds, and most other countries use kilograms. This means that the US evaluation must be divided by 2.2 to be equivalent on scale, but then must be multiplied by 2, as the US uses PTA values, so the expected comparison is that US values will be 1.1 times less than EBV values using KGs coming from other countries for total milk, fat and protein.

DIFFERENCES IN EVALUATION:

The final consideration when comparing genetic values across country, is the evaluation system used. Each country uses a slightly different model, and dataset, that will lead to

a difference in the scale of genetic values. For example, the variance of genetic values for fat% and protein% in Canada is almost 3 times what US PTA values show. This is partially because Canadian values are expressed as an EBV, vs the US PTA, but that would only explain the variance being 2X. The remainder of the difference comes from the different models used by the two countries in their genetic evaluations.

RBVS:

Finally, for some traits, countries can choose to express the traits as relative breeding values. In this case, the units will be chosen based on the variation in the trait, to make it easier to interpret. Clear examples of this are health traits in many countries, where the scale is set to a mean of 100, and a standard deviation of 5. This is done to help compare animals without confusion around exactly what the trait definition is.

Example:

The chart below shows the average and Standard deviation for the same 2,000 Semex bulls in US and Canada, for a few important traits, to demonstrate how much difference is expected in proof values:

CANADA	EBV Milk KG	EBV Fat KG	EBV Protein KG	EBV Fat %	EBV Protein %	RBV Herd Life	RBV scs	RBV Daughter Fertility	RBV Conformation
Average	1182.97	70.99	56.88	0.23	0.15	105.64	104.424	103.43	4.94
Standard Deviation	653.73	30.74	21.57	0.28	0.12	3.00	3.70226	4.16	3.58
USA	PTA Milk	PTA Fat Lbs	PTA Protein Lbs	PTA Fat %	PTA Protein %	PTA Productive Life	PTA SCS	PTA Daughter Pregnancy Rate	PTA Type
Average	754.46	48.55	32.93	0.07	0.03	3.10	2.84	0.15	1.13
Standard Deviation	616.63	26.00	16.99	0.10	0.04	2.14	0.15	1.60	0.64