International comparison of genetic evaluations

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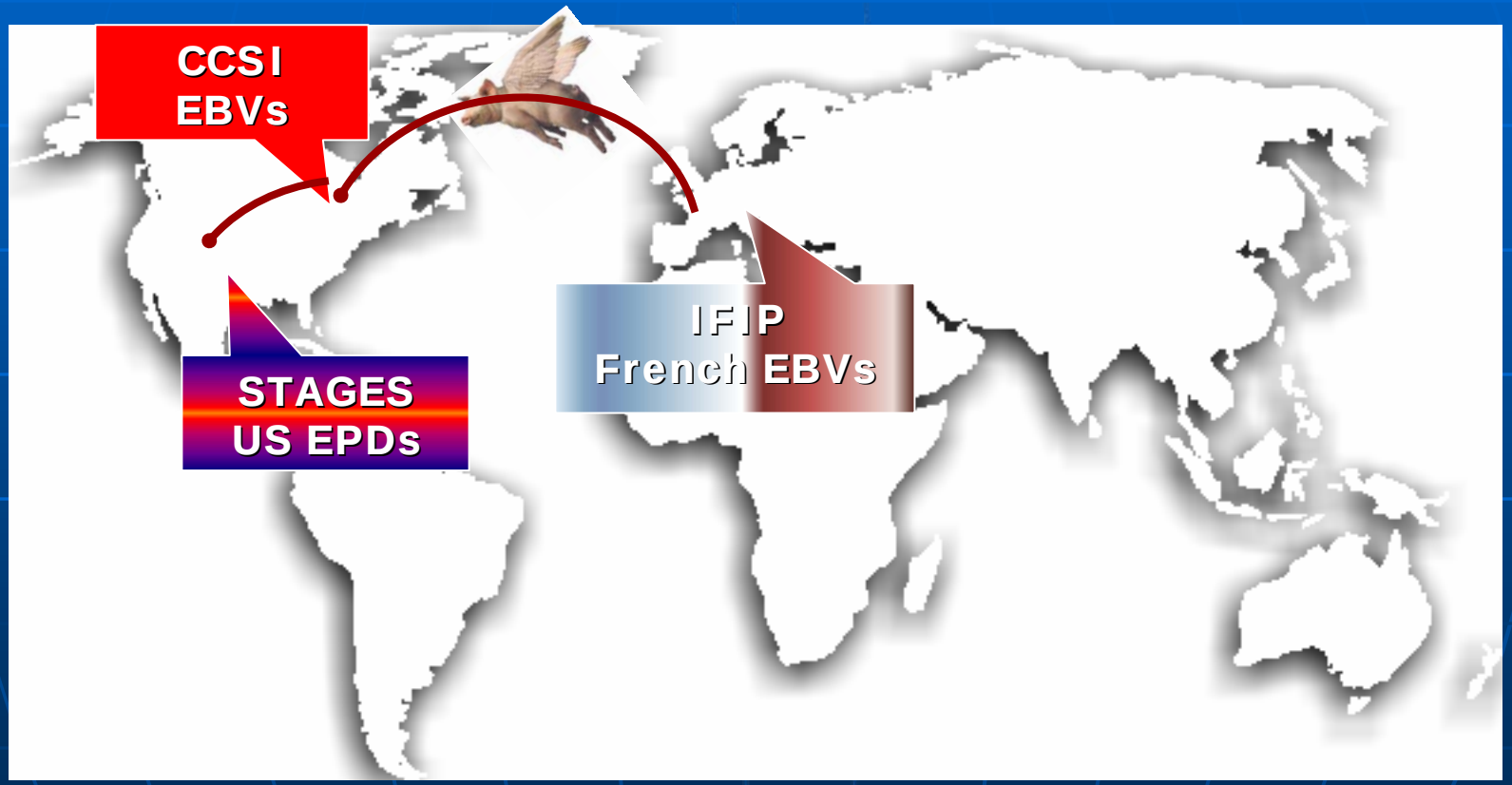
International comparison of genetic evaluations

- Exchange of genetics
- Conversion of foreign EBVs/EPDS to Canadian Equivalent
- Common genetic evaluations
- Important considerations

Genetic Exchange between Canada and other countries



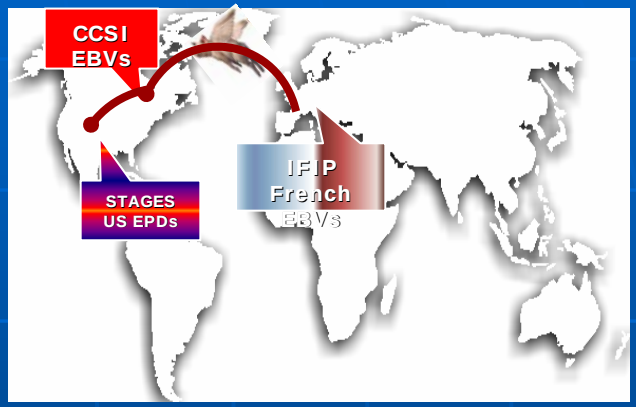
Genetic Exchange between Canada and other countries

- Genetics stock imported in Canada from US, France and other counties
- Canadian genetics exported to over 50 countries around the world
- Canadian equivalent EBVs use for initial selection
- EBVs are updated with increasing progeny information
- Countries importing Canadian genetics interested to participate in common genetic evaluations
- Same might be true for other countries as well

Conversion of EBVs or EPDs

Similarities

- BLUP evaluation system
- More or less similar traits and evaluation models



Some differences:

- Expression of breeding values
  - E.g. In US expressed as expected Progeny Difference (EPD) and measurements in pounds and inches
- Base adjustment method
- Genetic level

Number of commonly used sires

Trait	Breed	Number of sires	Average number of progeny with records	
			in France	in Canada
Litter size	Yorshire	68	284	81
	Landrace	44	183	88
Backfat/Age	Yorshire	78	376	141
	Landrace	58	206	101

Conversion Models
Model 1

Models (1) – derived from Goddard(1985) and Wilmink(1986)

1. Conversion formula : Canadian EBV = Foreign EBV + μ

Assumption : 1 unit increase in Canadian breeding value is equivalent to 1 unit increase in Foreign breeding value

Model used : $Y = \mu + e$

Vector of differences between Foreign and Canadian breeding values

Conversion factor

Random residual with heterogeneous variance

Variance of residual = $R^2_{CA} \cdot \sigma^2_a (1 - R^2_{FR}.R^2_{CA})$

Conversion Models
Model 2

Models (2) – derived from Goddard(1985) and Wilmink(1986)

2. Conversion formula : Canadian EBV = b × Foreign EBV + μ*

Assumption : Foreign and Canadian scales are not equal

Model used : $C = \mu + b.F + e$

Deregressed Canadian EBV = $(EBV_{CA} - \bar{x}) / R^2_{CA}$

intercept

Scale conversion factor

Foreign EBV

Random residual with heterogeneous variance

Variance of each residual = $\sigma^2_a (1 - R^2_{FR}.R^2_{CA}) / R^2_{CA}$

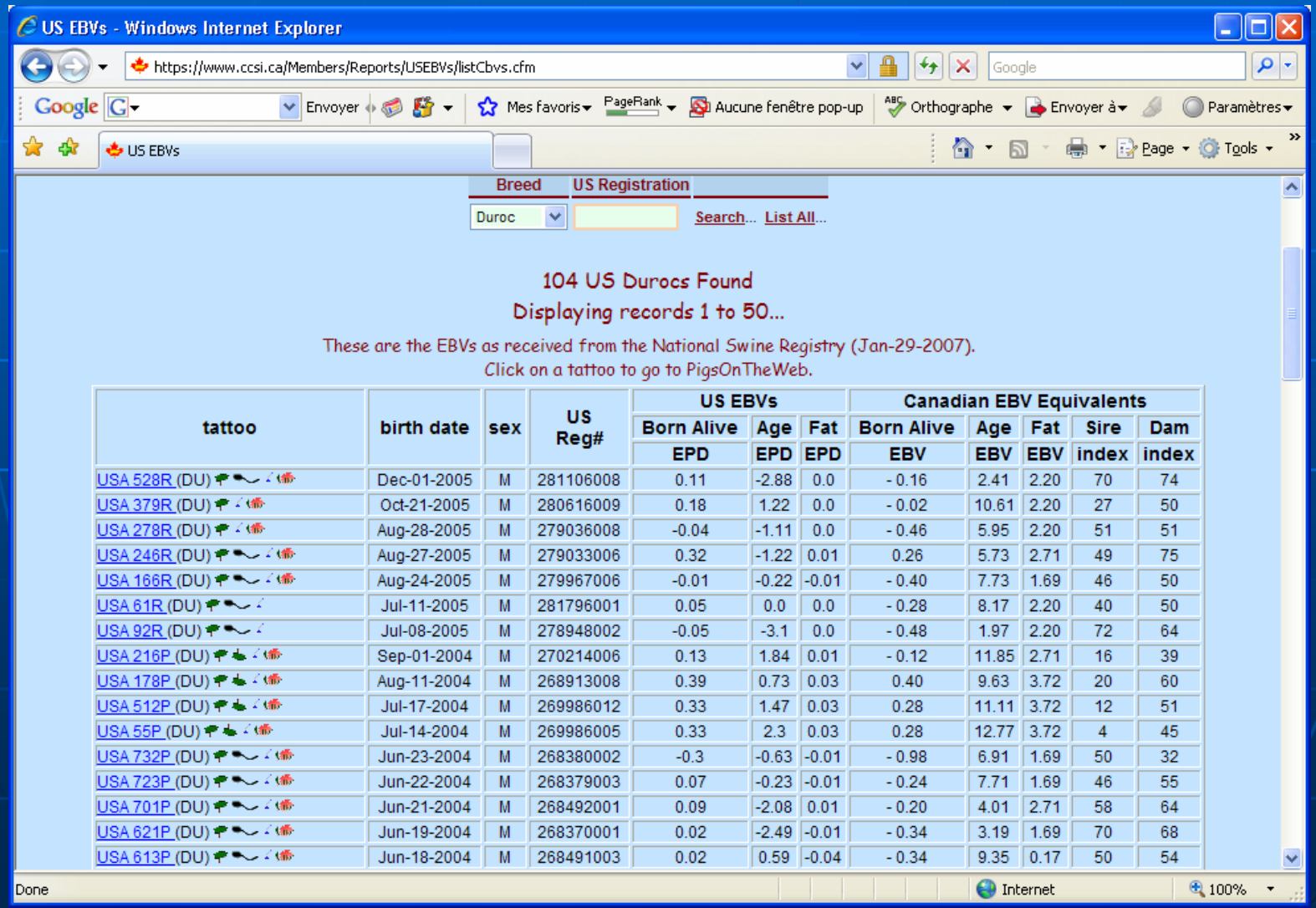
Comparison of conversion models

General conclusions

- In model 2, the slope was non significantly different from 1.
- Model 1 seems acceptable and simple to use
- Conversion factors from model 1 are used currently
- Information provided to users through web based tools

Information to member breeders

Interactive Web tools

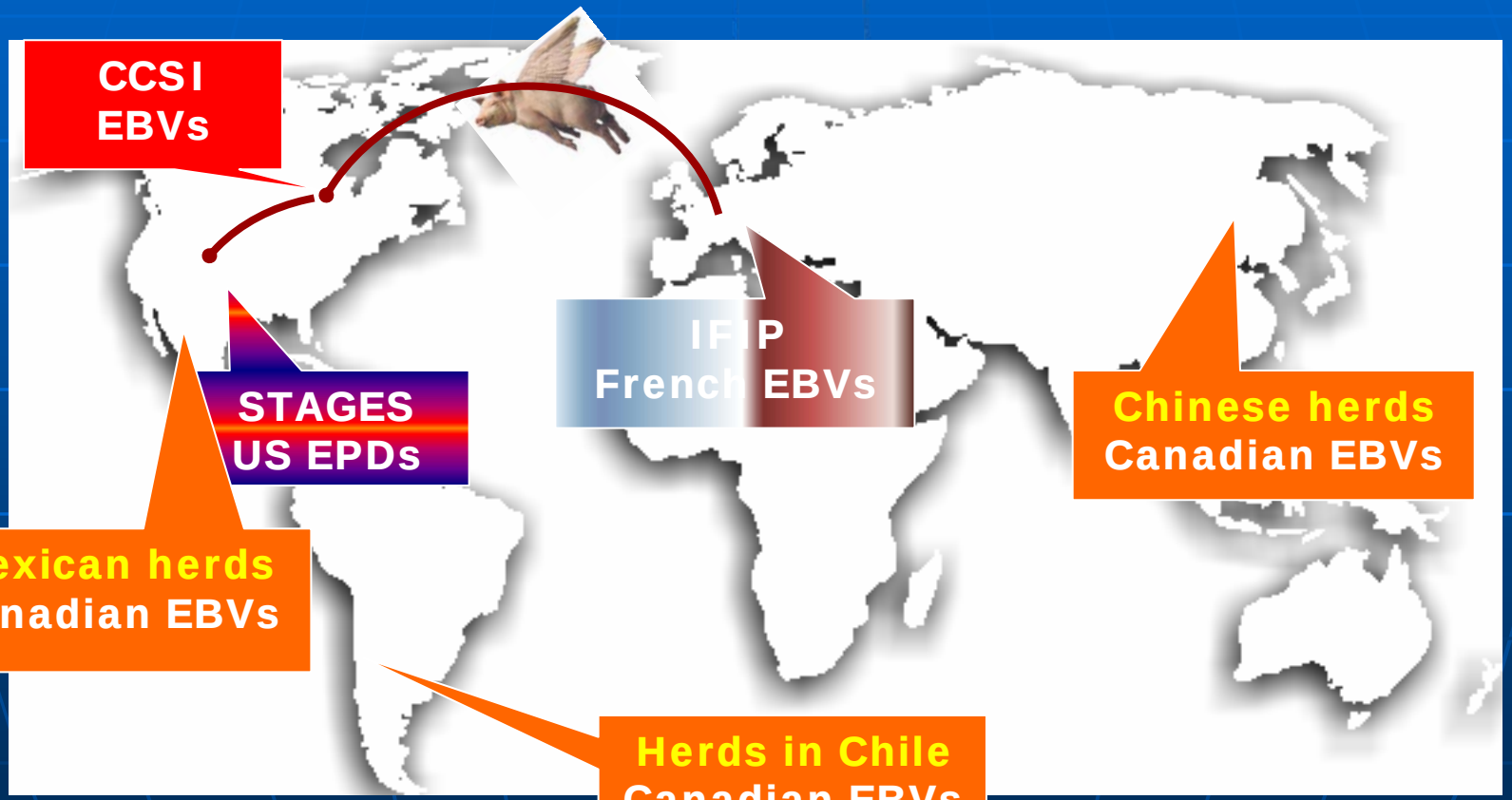


tattoo	birth date	sex	US Reg#	US EBVs			Canadian EBV Equivalents				
				Born Alive	Age	Fat	Born Alive	Age	Fat	Sire	Dam
				EPD	EPD	EPD	EBV	EBV	EBV	index	index
USA 528R (DU)	Dec-01-2005	M	281106008	0.11	-2.88	0.0	- 0.16	2.41	2.20	70	74
USA 379R (DU)	Oct-21-2005	M	280616009	0.18	1.22	0.0	- 0.02	10.61	2.20	27	50
USA 278R (DU)	Aug-28-2005	M	279036008	-0.04	-1.11	0.0	- 0.46	5.95	2.20	51	51
USA 246R (DU)	Aug-27-2005	M	279033006	0.32	-1.22	0.01	0.26	5.73	2.71	49	75
USA 166R (DU)	Aug-24-2005	M	279967006	-0.01	-0.22	-0.01	- 0.40	7.73	1.69	46	50
USA 61R (DU)	Jul-11-2005	M	281796001	0.05	0.0	0.0	- 0.28	8.17	2.20	40	50
USA 92R (DU)	Jul-08-2005	M	278948002	-0.05	-3.1	0.0	- 0.48	1.97	2.20	72	64
USA 216P (DU)	Sep-01-2004	M	270214006	0.13	1.84	0.01	- 0.12	11.85	2.71	16	39
USA 178P (DU)	Aug-11-2004	M	268913008	0.39	0.73	0.03	0.40	9.63	3.72	20	60
USA 512P (DU)	Jul-17-2004	M	269986012	0.33	1.47	0.03	0.28	11.11	3.72	12	51
USA 55P (DU)	Jul-14-2004	M	269986005	0.33	2.3	0.03	0.28	12.77	3.72	4	45
USA 732P (DU)	Jun-23-2004	M	268380002	-0.3	-0.63	-0.01	- 0.98	6.91	1.69	50	32
USA 723P (DU)	Jun-22-2004	M	268379003	0.07	-0.23	-0.01	- 0.24	7.71	1.69	46	55
USA 701P (DU)	Jun-21-2004	M	268492001	0.09	-2.08	0.01	- 0.20	4.01	2.71	58	64
USA 621P (DU)	Jun-19-2004	M	268370001	0.02	-2.49	-0.01	- 0.34	3.19	1.69	70	68
USA 613P (DU)	Jun-18-2004	M	268491003	0.02	0.59	-0.04	- 0.34	9.35	0.17	50	54

Information to member breeders

US EPD Converter

Genetic Exchange between Canada and other countries



Common Genetic Evaluations

- Currently progeny records from imported boars used in the genetic evaluations
- Accounting for gene-flow through phantom grouping
- Importing herds included in common genetic evaluation
- More data and model refinement needed

Common Genetic Evaluations

Model

$$y_i = \mu_i 1 + Z_i Q g_i + Z_i s_i + e_i$$

y_i = Sire evaluation from county i

1 = Corresponding vector of 1s

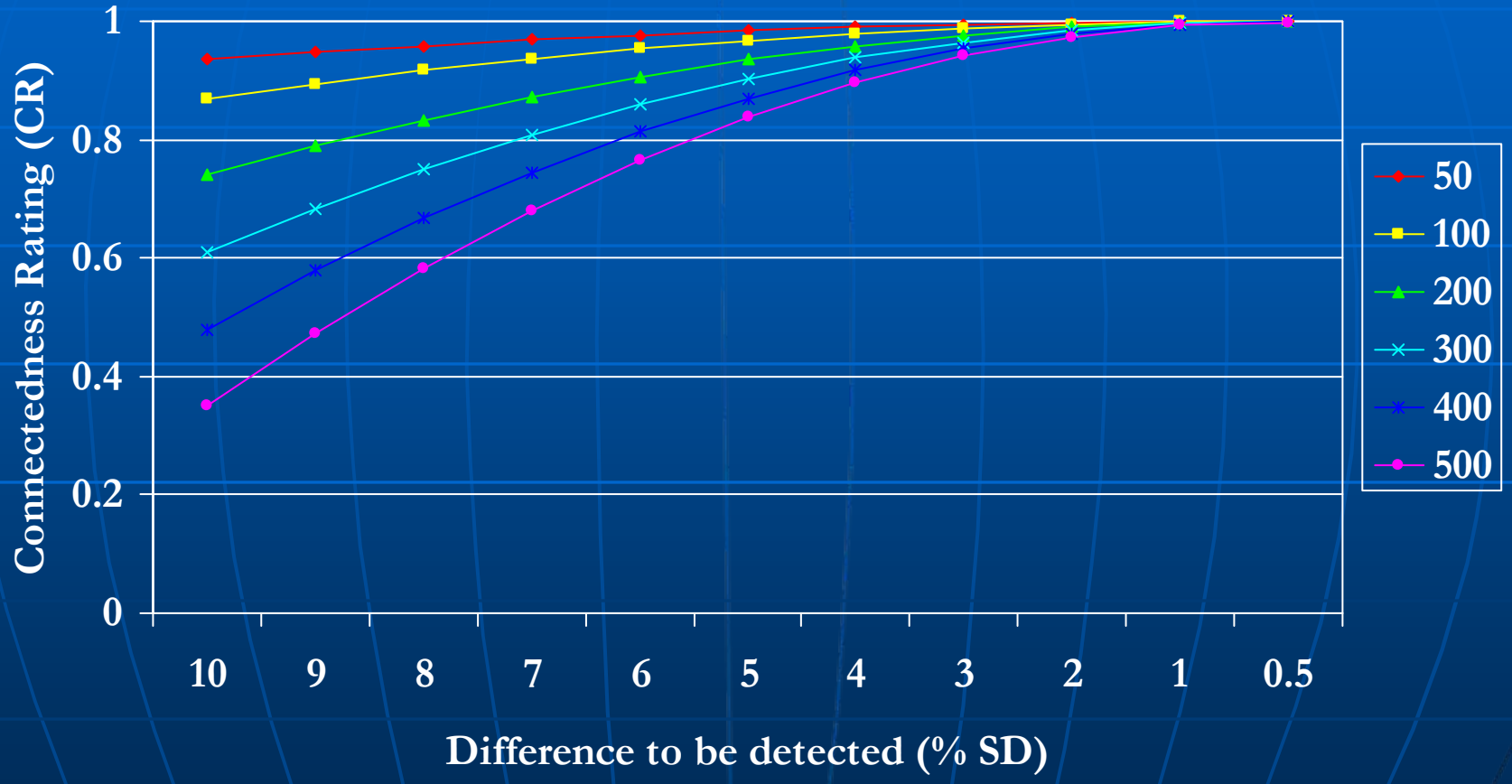
g = Phantom parent genetic group from county i

Z_i and Q=incidence matrices

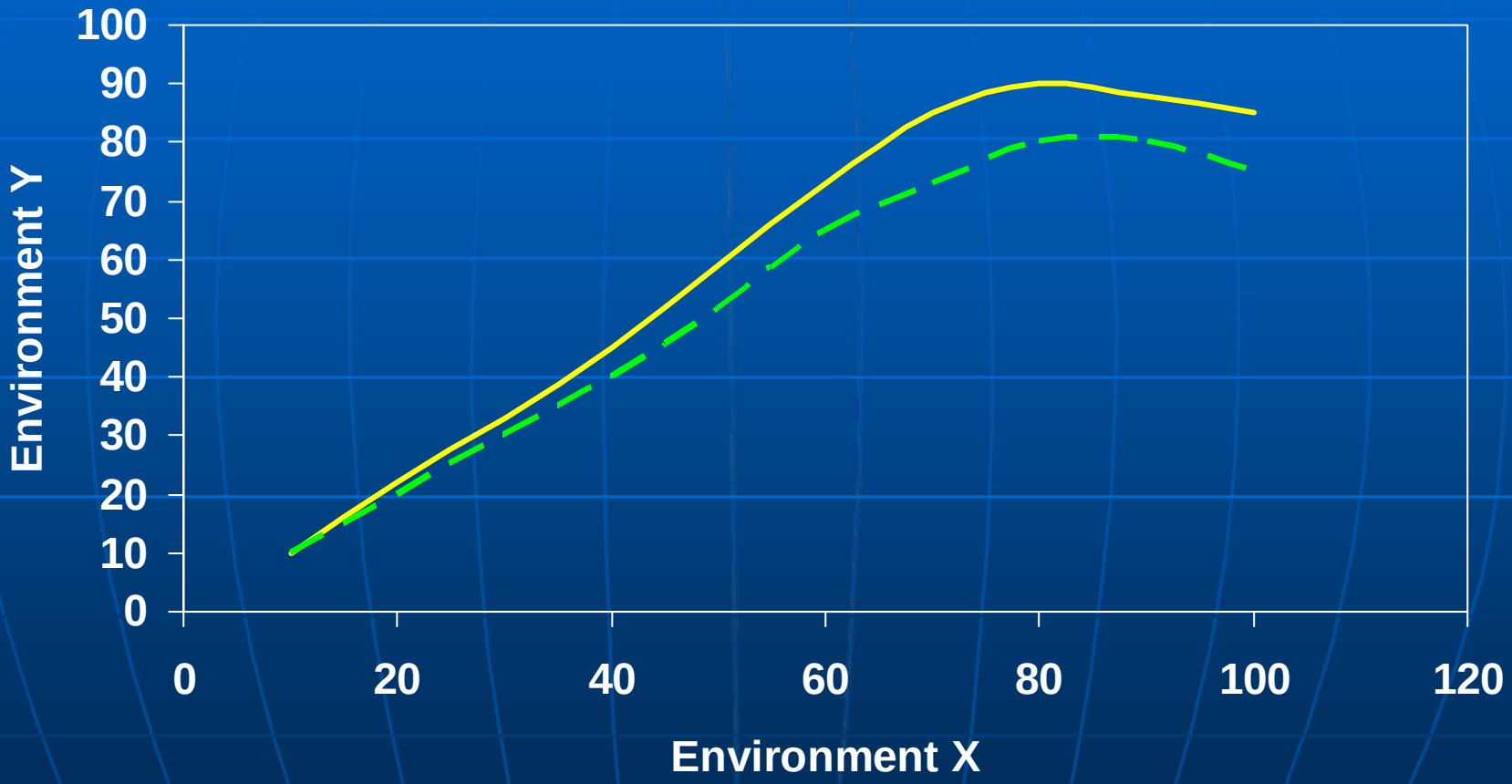
s_i =Sire transmitting abilities for county i

e_i =random residual effects from country i

Connectedness
Required levels



Genotype-environment Interactions



Relationship between breeding values

Common Genetic Evaluations

Important considerations

- Keeping track of animal identifications after importation
- Standardization/documentation of measurements and methods
- Degree of connectedness
- Genotype-environment interactions
- Multiple Trait Across Country Evaluations
- Validation and publication of results