

Development of international beef genetic evaluations for calving traits

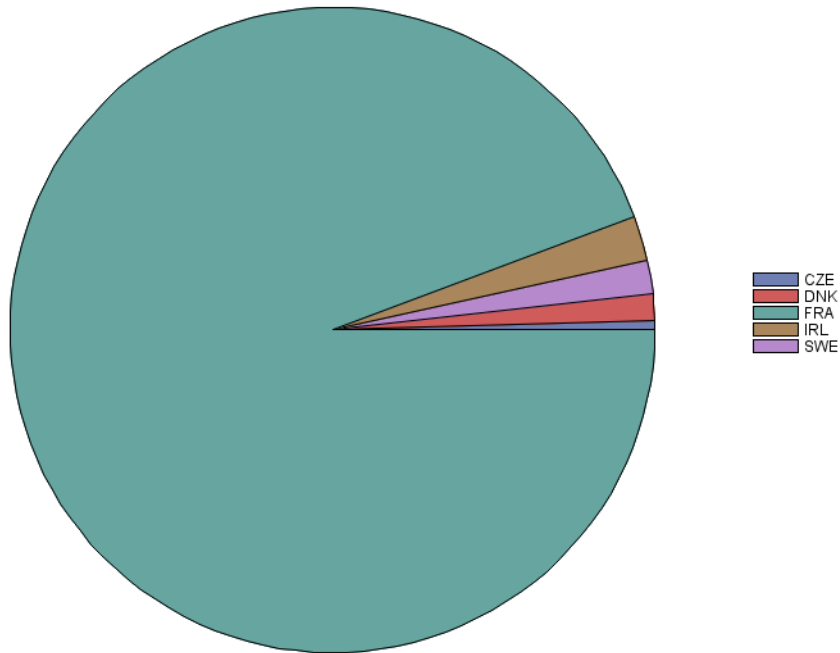
Interbeef Technical Group Meeting
Salzburg, 8th March 2016

ITB EBVs for calving ease test run

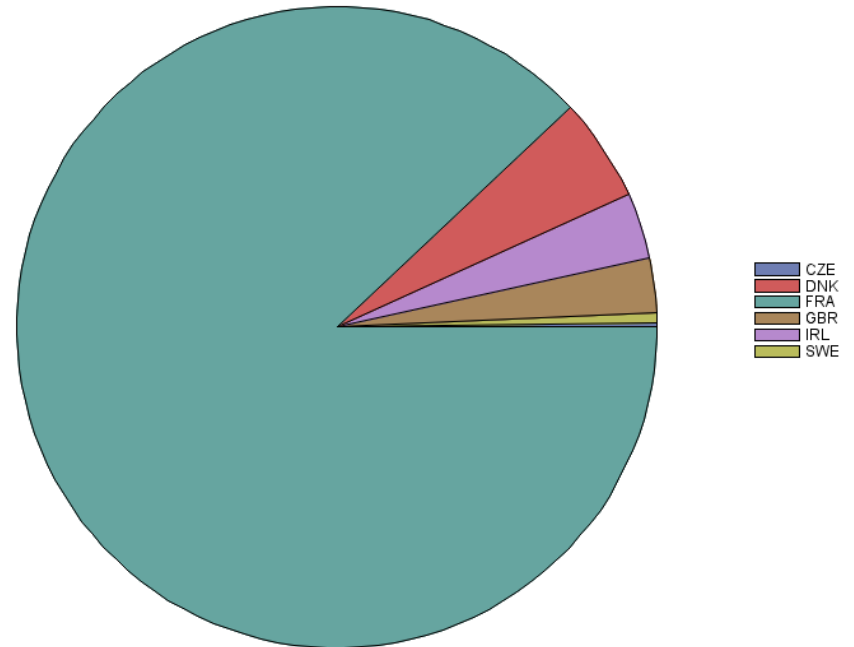
- Data call September 2015
- Data from Interbull December 2015
- Interbeef Code of Practice for calving traits has to be updated before next data call!

ITB EBVs for calving ease test run

CHAROLAIS

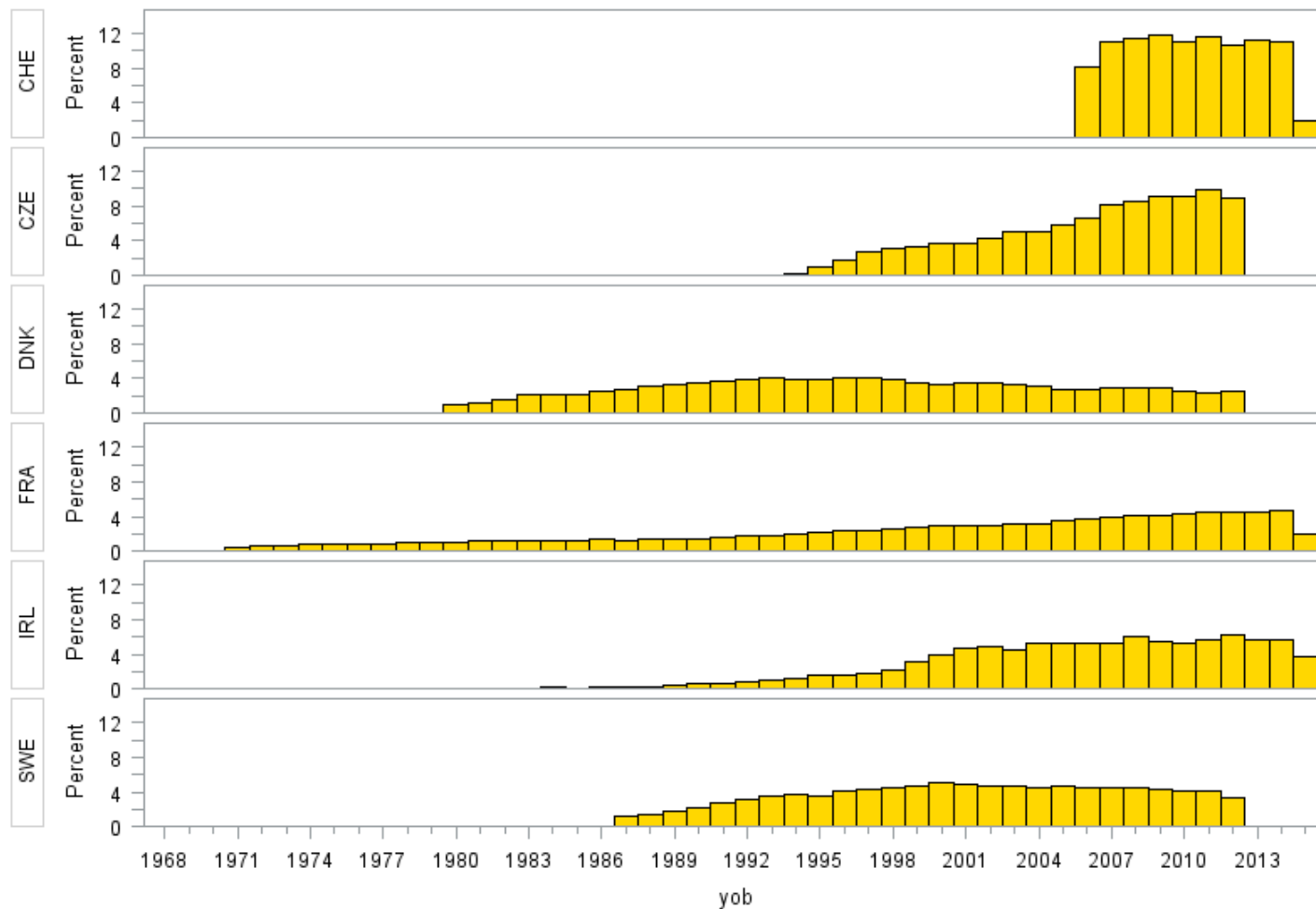


LIMOUSINE



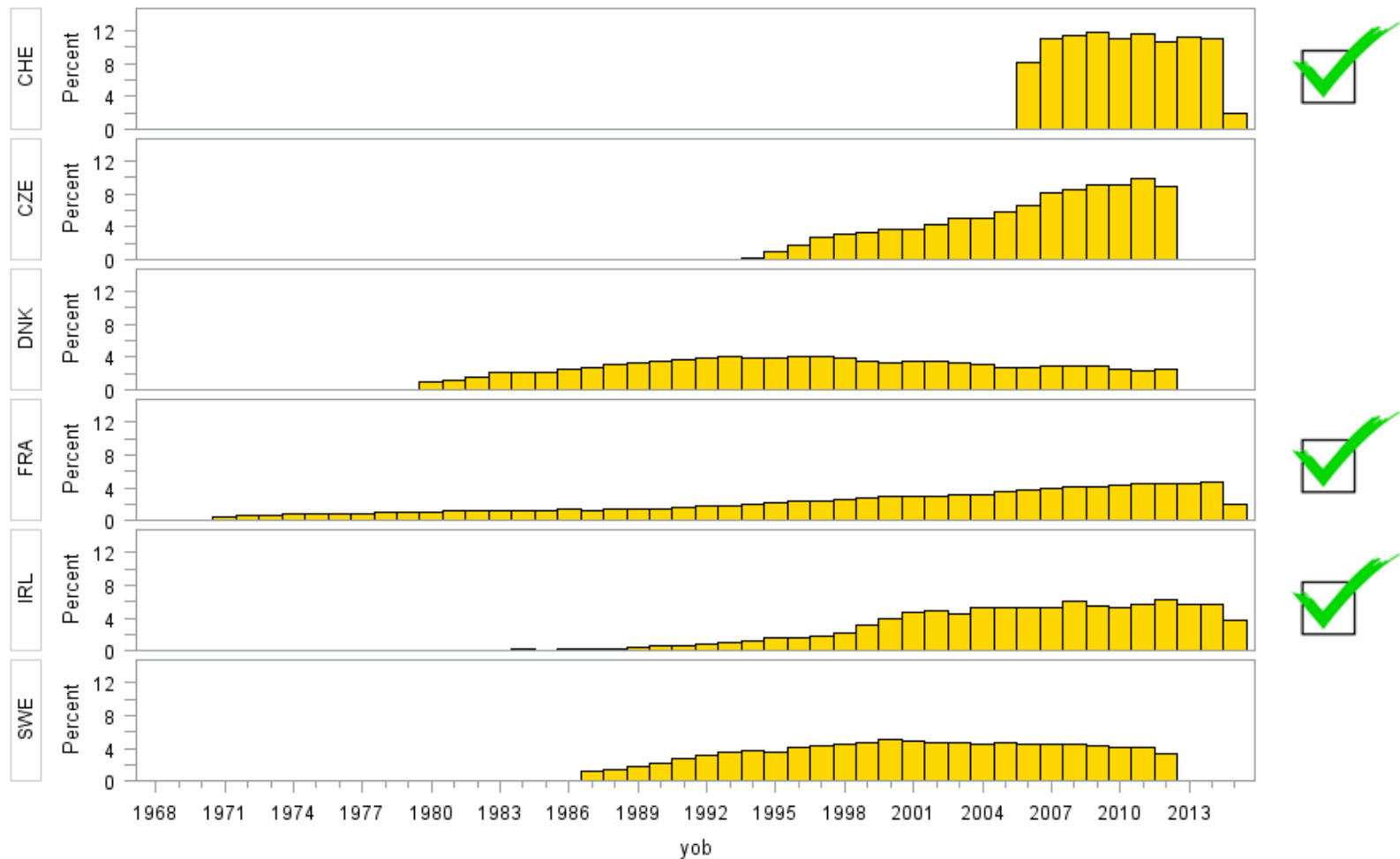
CHAROLAIS

PROPORTION OF ANIMALS BY BIRTH YEAR



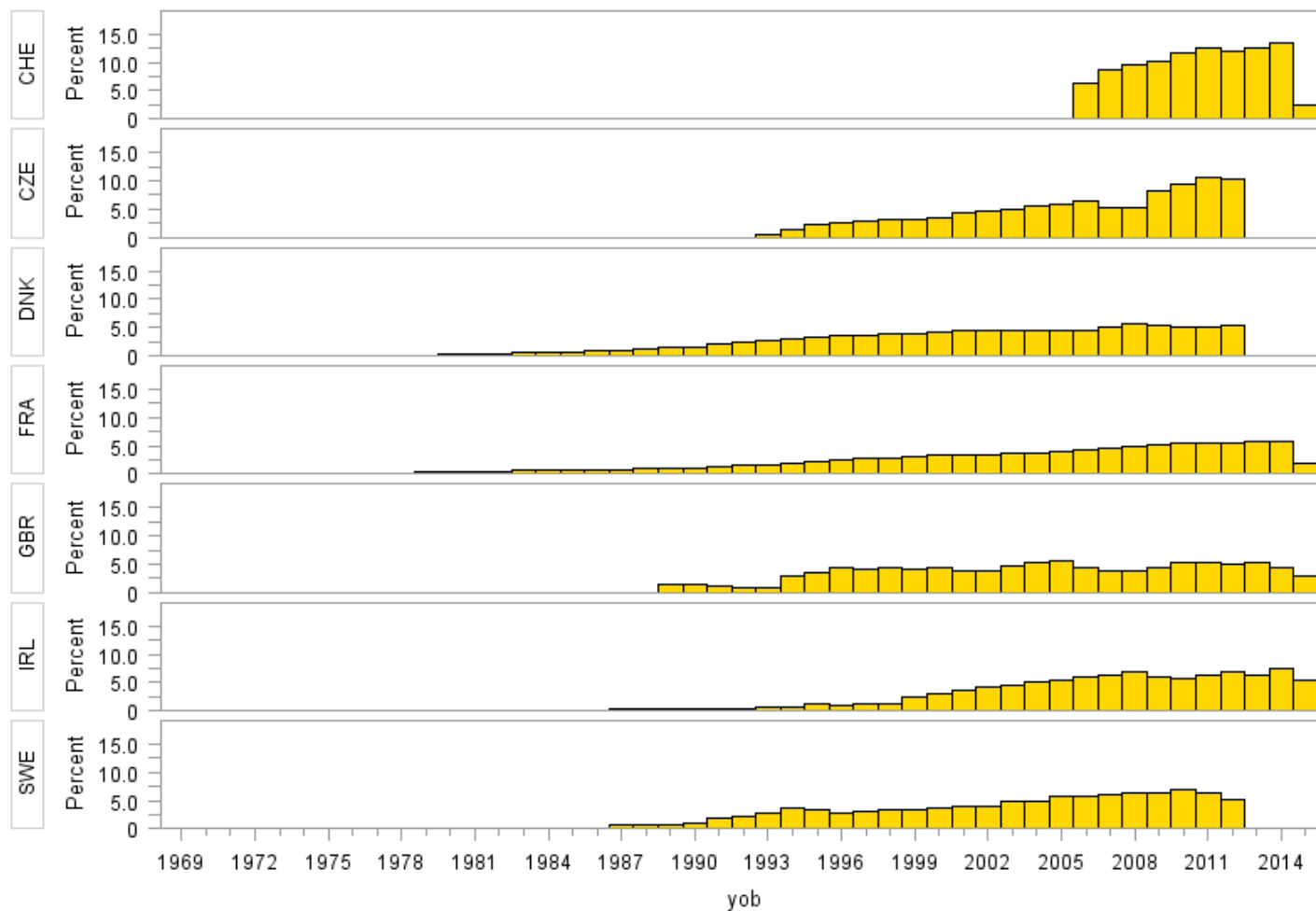
CHAROLAIS

PROPORTION OF ANIMALS BY BIRTH YEAR



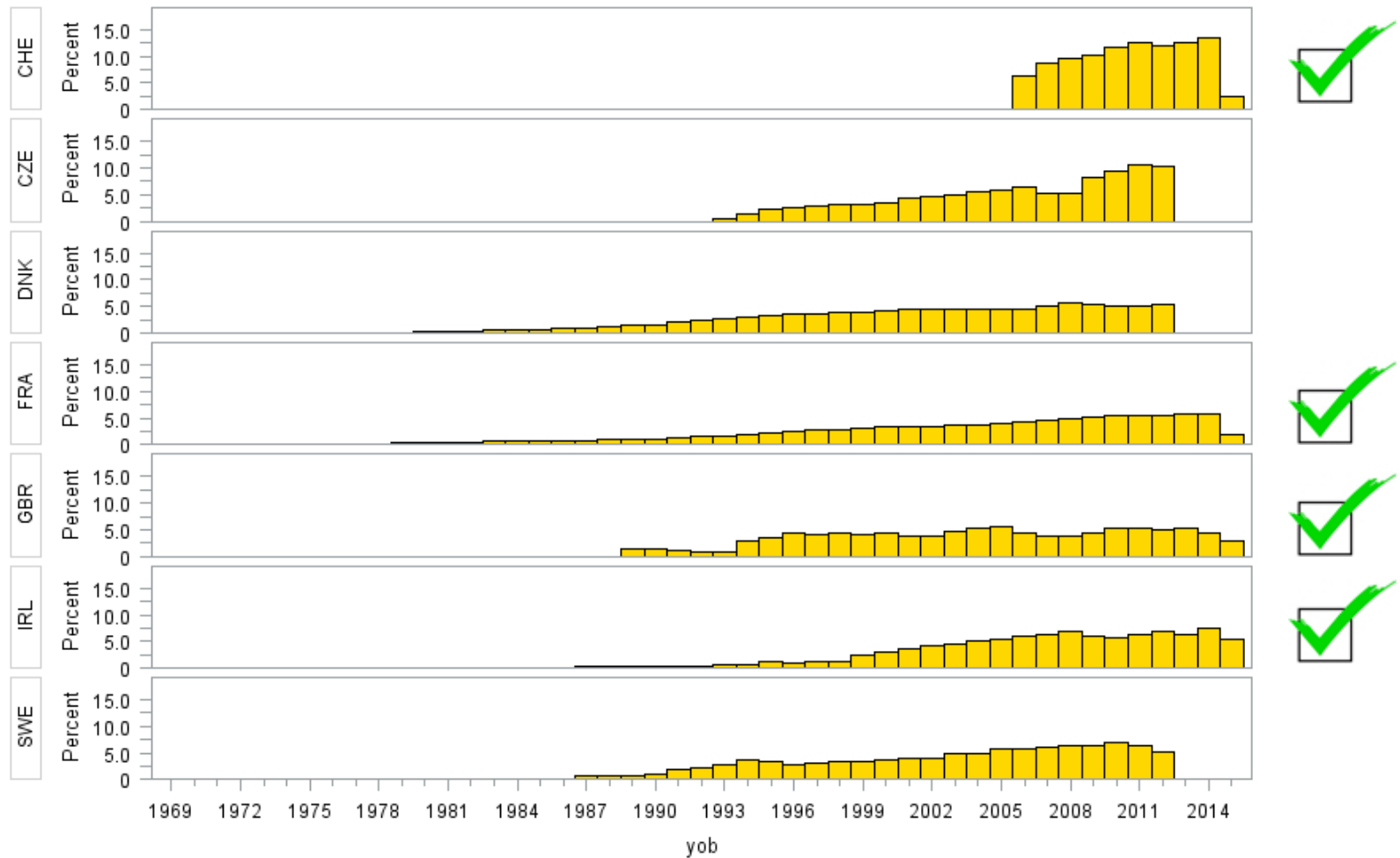
LIMOUSINE

PROPORTION OF ANIMALS BY BIRTH YEAR



LIMOUSINE

PROPORTION OF ANIMALS BY BIRTH YEAR



Animals successively edited

- ET
- Double records

CHAROLAIS

RCOU	all	ET	DUPL	EDIT
CZE	39,667	1,810	.	37,857
DNK	114,095	9	.	114,086
FRA	7,932,562	.	.	7,932,562
IRL	191,380	47	1,175	190,158
SWE	136,423	.	.	136,423
ALL	8,414,127	1,866	1,175	8,411,086
Pedig.				9,428,901

LIMOUSINE

RCOU	all	ET	DUPL	EDIT
CZE	9,520	641	.	8,879
DNK	258,444	24	.	258,420
FRA	4,345,157	.	.	4,345,157
GBR	137,729	4,082	.	133,647
IRL	164,059	4	1,456	162,599
SWE	24,863	.	.	24,863
ALL	4,939,772	4,751	1,456	4,933,565
Pedig.				5,439,896

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CHAROLAIS

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Pedig.				5,439,896

Correction of pedigree

- Sires registered as Female in pedigree

obs	AID	SID	DID	bdate
1	CHADNKF1760637	CHADNKF1728313	CHADNKF1744338	20010314
2	CHADNKF1760638	CHADNKF1728313	CHADNKF1704169	20010311
3	CHADNKF1760639	CHADNKF1728313	CHADNKF1704159	20010312
4	CHADNKF1761099	CHADNKF1728313	CHADNKF1704196	20010318
5	CHADNKF1761103	CHADNKF1728313	CHADNKF1704179	20010317
6	CHADNKF1761516	CHADNKF1728313	CHADNKF1704166	20010327
7	CHADNKM1760640	CHADNKF1728313	CHADNKF1704178	20010313
8	CHADNKM1760641	CHADNKF1728313	CHADNKF1704165	20010224
9	CHADNKM1760643	CHADNKF1728313	CHADNKF1704184	20010315
10	CHADNKM1761098	CHADNKF1728313	CHADNKF1704183	20010318
11	CHADNKM1761100	CHADNKF1728313	CHADNKF1704193	20010317
12	CHADNKM1761101	CHADNKF1728313	CHADNKF1704229	20010320
13	CHADNKM1761515	CHADNKF1728313	CHADNKF1704215	20010328
14	CHADNKM1761517	CHADNKF1728313	CHADNKF1704212	20010324
15	CHADNKM1761518	CHADNKF1728313	CHADNKF1704162	20010324
16	CHADNKM1761520	CHADNKF1728313	CHADNKF1704214	20010326
17	CHADNKM1761525	CHADNKF1728313	CHADNKF1704154	20010330
18	CHADNKM1764778	CHADNKF1750239	CHADNKF1735905	20010714

ITB EBVs for calving ease test run

- Animal model
 - Direct genetic effect
 - Maternal genetic effect
 - Maternal permanent environmental effect
- Pedigree
 - Phantom parent groups -> country + year

Variance and covariance components

- Within country
 - From national evaluations
- Genetic correlations between countries
 - From last VCE

Genetic correlations

CHAROLAIS

		DIRECT					MATERNAL				
		CZE	DNK	FRA	IRL	SWE	CZE	DNK	FRA	IRL	SWE
DIRECT	CZE										
	DNK	0.41									
	FRA	0.42	0.86								
	IRL	0.83	0.45	0.70							
	SWE	0.70	0.85	0.62	0.52						
MATERNAL	CZE	-0.18	0.04	0.00	-0.03	-0.04					
	DNK	0.02	-0.20	-0.09	0.02	-0.06	0.47				
	FRA	0.05	-0.16	-0.40	-0.12	0.03	0.69	0.39			
	IRL	-0.06	0.01	-0.05	-0.16	0.03	0.56	0.59	0.36		
	SWE	-0.05	-0.02	-0.01	0.03	-0.13	0.51	0.51	0.51	0.51	

Average direct genetic correlation = 0.64, average maternal genetic correlation = 0.51

Genetic correlations

LIMOUSINE

		DIRECT						MATERNAL					
		CZE	DNK	FRA	GBR	IRL	SWE	CZE	DNK	FRA	GBR	IRL	SWE
DIRECT	CZE												
	DNK	0.76											
	FRA	0.52	0.78										
	GBR	0.84	0.67	0.71									
	IRL	0.62	0.64	0.90	0.80								
	SWE	0.59	0.45	0.62	0.55	0.83							
MATERNAL	CZE	-0.18	0.00	-0.04	-0.03	0.03	-0.01						
	DNK	-0.02	-0.20	-0.15	0.04	0.05	0.02	0.53					
	FRA	0.08	-0.24	-0.56	-0.15	-0.29	-0.06	0.53	0.63				
	GBR	-0.09	0.06	-0.14	-0.35	-0.07	0.08	0.53	0.53	0.63			
	IRL	0.01	0.05	-0.16	-0.05	-0.16	-0.04	0.52	0.53	0.55	0.46		
	SWE	-0.01	0.02	-0.07	0.03	0.00	-0.13	0.52	0.38	0.55	0.52	0.52	

Average direct genetic correlation = 0.68, average maternal genetic correlation = 0.53

Environmental effects

CZE	DNK	FRA	GBR	IRL	SWE
CG*	CG	CG	CG	CG*	CG
	Season	Season			
Birth year					
			Birth month		
Sex × twi	Sex			Sex	Sex
	TwI				
		Parity × age	Parity × sex	Parity	Parity
Age	Age			Age**	Age
			Birth type		
			Dam breed		
			ET		

* random effect

** fixed regression

ITB EBVs for calving ease test run

- EBVs
 - MIX99
- Reliabilities
 - MTEDC5
- ITB EBVs distributed
 - February 24, 2016

LIMOUSINE

- Correlations of EBVs – direct effect

Pearson Correlation Coefficients, N = 5428848
Prob > |r| under H0: Rho=0

	ebvcze	ebvdnk	ebvfra	ebvgbr	ebvirl	ebvswe
ebvcze	1.00000 <.0001	0.88227 <.0001	0.72534 <.0001	0.89626 <.0001	0.80153 <.0001	0.84699 <.0001
ebvdnk	0.88227 <.0001	1.00000	0.88439 <.0001	0.85145 <.0001	0.83562 <.0001	0.76642 <.0001
ebvfra	0.72534 <.0001	0.88439 <.0001	1.00000	0.89917 <.0001	0.94999 <.0001	0.83563 <.0001
ebvgbr	0.89626 <.0001	0.85145 <.0001	0.89917 <.0001	1.00000	0.95809 <.0001	0.92655 <.0001
ebvirl	0.80153 <.0001	0.83562 <.0001	0.94999 <.0001	0.95809 <.0001	1.00000	0.94960 <.0001
ebvswe	0.84699 <.0001	0.76642 <.0001	0.83563 <.0001	0.92655 <.0001	0.94960 <.0001	1.00000

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ebvdnk	0.88227 <.0001	1.00000				
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ebvgbr	0.89626 <.0001	0.85145 <.0001	0.89917 <.0001	1.00000		
ebvirl	0.80153 <.0001	0.83562 <.0001	0.94999 <.0001	0.95809 <.0001	1.00000	
ebvswe	0.84699 <.0001	0.76642 <.0001	0.83563 <.0001	0.92655 <.0001	0.94960 <.0001	1.00000

$r_{CZE,FRA} = 0.52 \text{ (0.129)}$

$r_{DNK,SWE} = 0.45 \text{ (0.109)}$

LIMOUSINE

- Correlations of EBVs – maternal effect

Pearson Correlation Coefficients, N = 5428848
Prob > |r| under H0: Rho=0

	ebvmcze	ebvmdnk	ebvmfra	ebvmgbr	ebvmirl	ebvmswe
ebvmcze	1.00000 <.0001	0.86982 <.0001	0.72342 <.0001	0.89333 <.0001	0.70686 <.0001	0.94625 <.0001
ebvmdnk	0.86982 <.0001	1.00000	0.84770 <.0001	0.81705 <.0001	0.75558 <.0001	0.89811 <.0001
ebvmfra	0.72342 <.0001	0.84770 <.0001	1.00000	0.79959 <.0001	0.81961 <.0001	0.76711 <.0001
ebvmgbr	0.89333 <.0001	0.81705 <.0001	0.79959 <.0001	1.00000	0.76088 <.0001	0.88126 <.0001
ebvmirl	0.70686 <.0001	0.75558 <.0001	0.81961 <.0001	0.76088 <.0001	1.00000	0.70510 <.0001
ebvmswe	0.94625 <.0001	0.89811 <.0001	0.76711 <.0001	0.88126 <.0001	0.70510 <.0001	1.00000

LIMOUSINE

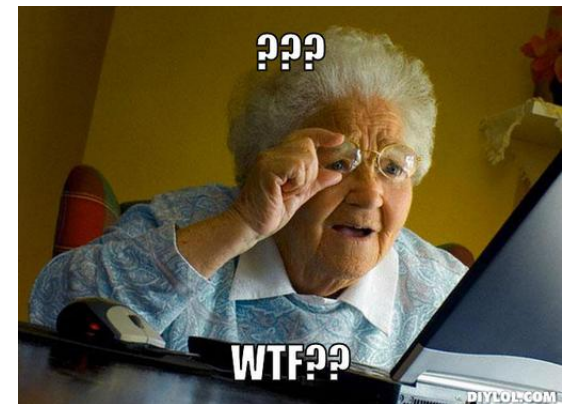
- Correlations of direct and maternal EBVs within country

	EBVs correlation	Genetic correlation
CZE	0.41	-0.18
DNK	0.01	-0.20
FRA	-0.50	-0.56
GBR	0.09	-0.35
IRL	-0.06	-0.16
SWE	0.36	-0.13

LIMOUSINE

- Correlations of direct and maternal EBVs within country

	EBVs correlation	Genetic correlation
CZE	0.41	-0.18
DNK	0.01	-0.20
FRA	-0.50	-0.56
GBR	0.09	-0.35
IRL	-0.06	-0.16
SWE	0.36	-0.13

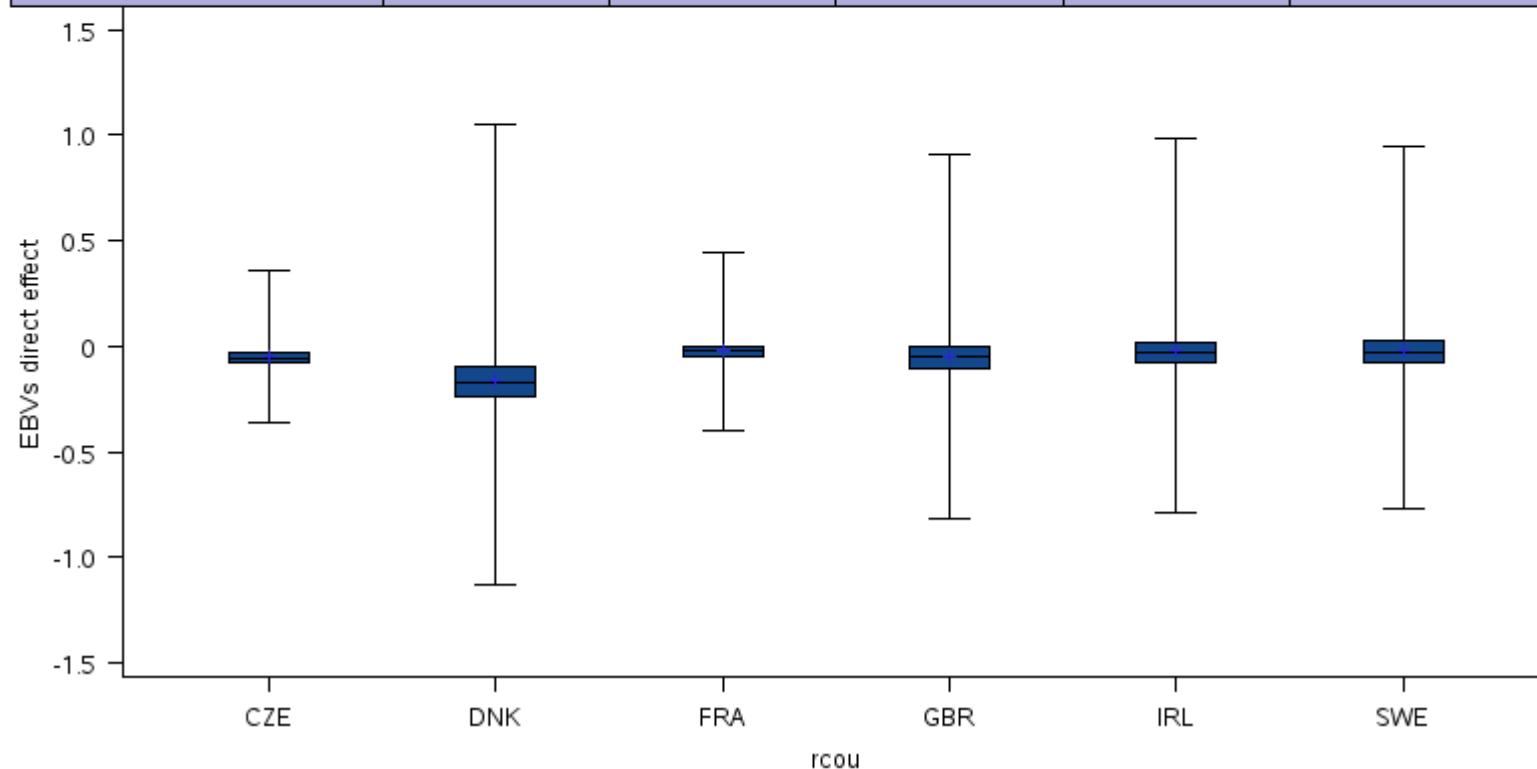


LIMOUSINE

ITB EBVs direct effect

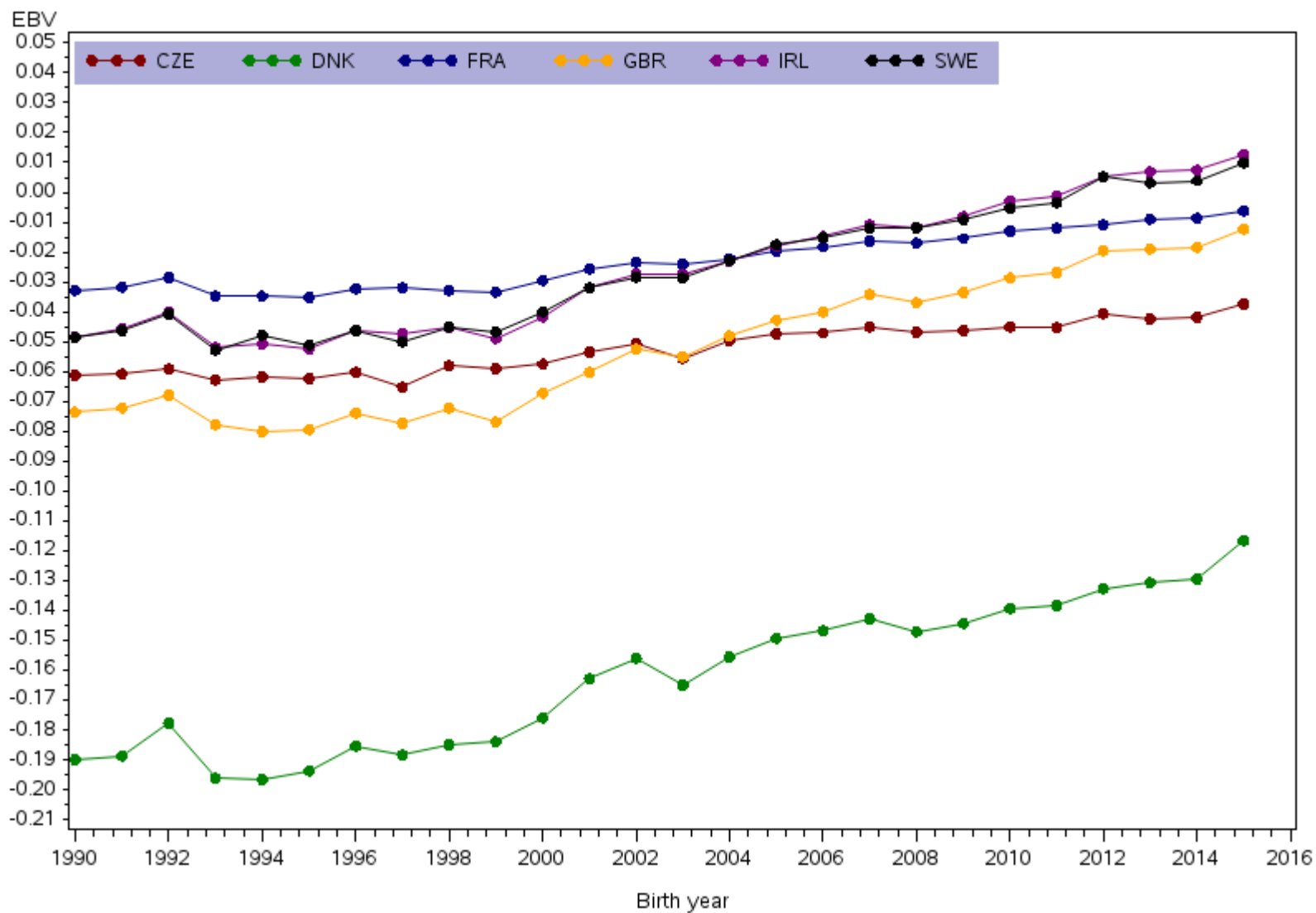
All BVs					
Mean	-0.06	Min	-1.13	Max	1.05

BV's for country						
N	5428848	5428848	5428848	5428848	5428848	5428848
Mean	-0.05	-0.16	-0.02	-0.05	-0.02	-0.02
Std Dev	0.04	0.11	0.03	0.08	0.08	0.09
Min	-0.36	-1.13	-0.40	-0.82	-0.78	-0.76
Max	0.35	1.05	0.45	0.90	0.98	0.95



LIMOUSINE

GENETIC TRENDS ITB EBVs direct effect

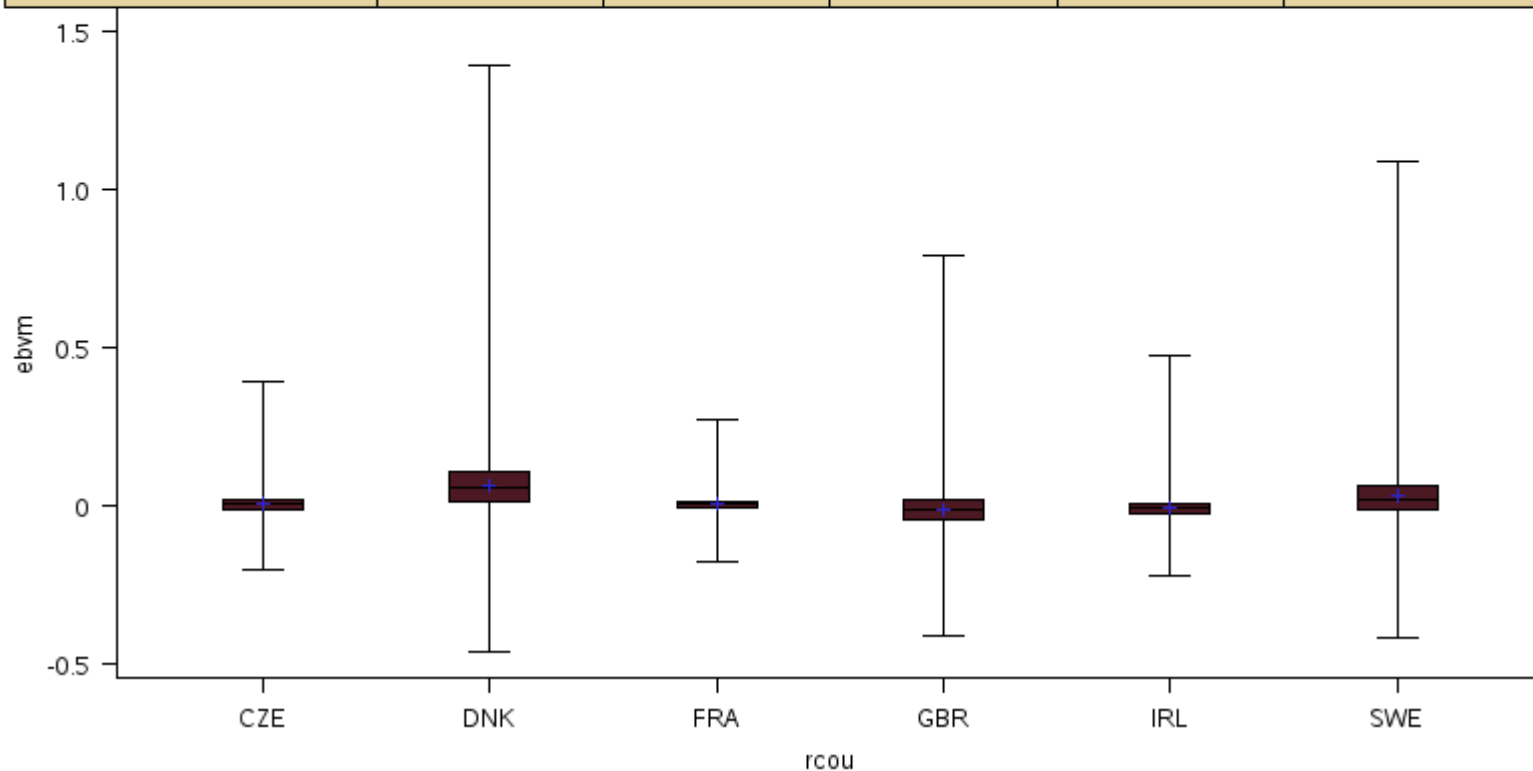


LIMOUSINE

ITB EBVs maternal effect

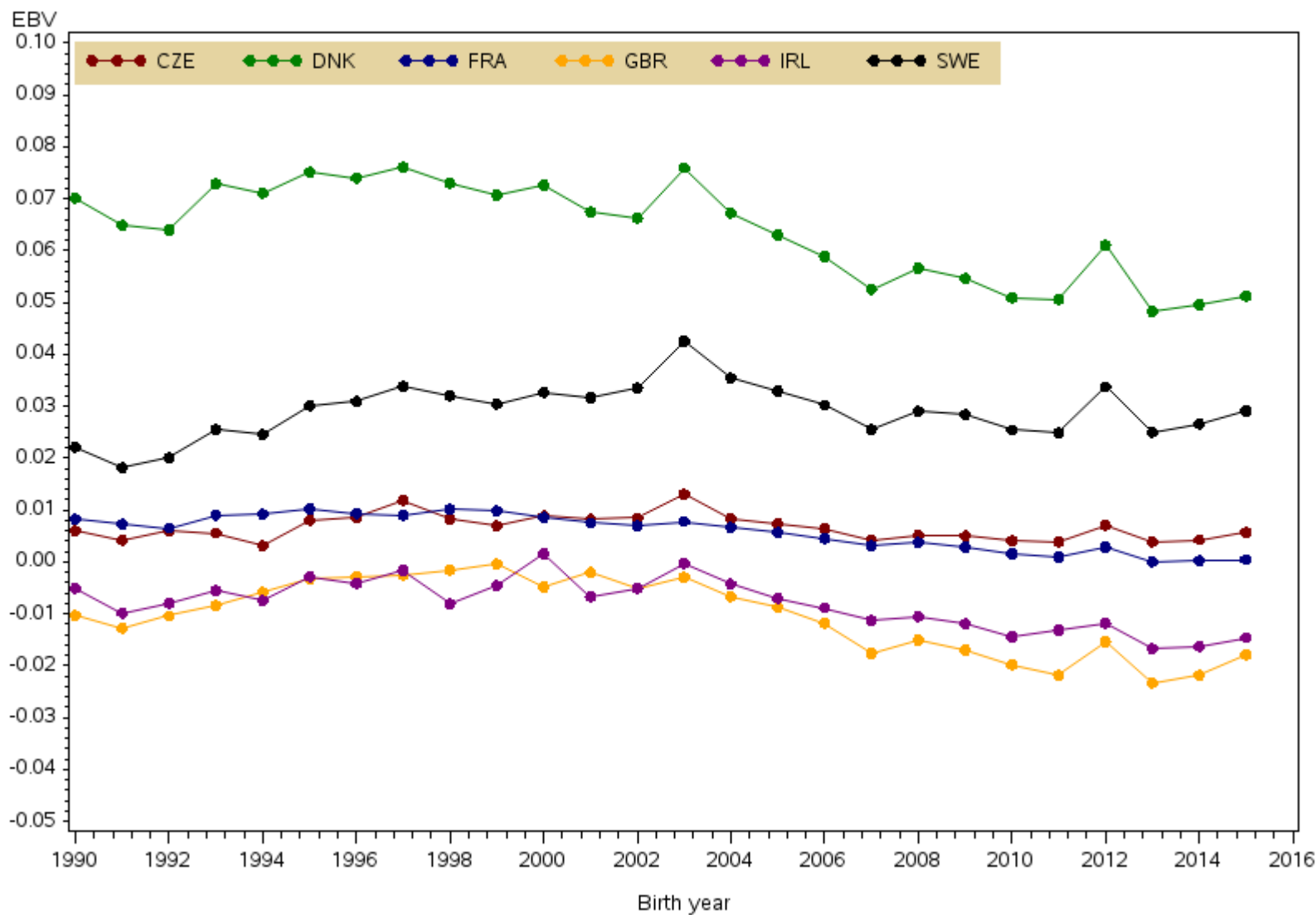
All BVs					
Mean	0.01	Min	-0.46	Max	1.39

BVs for country						
N	5428848	5428848	5428848	5428848	5428848	5428848
Mean	0.01	0.06	0.01	-0.01	-0.01	0.03
Std Dev	0.03	0.08	0.02	0.06	0.03	0.07
Min	-0.20	-0.46	-0.17	-0.41	-0.22	-0.41
Max	0.39	1.39	0.27	0.79	0.47	1.09



LIMOUSINE

GENETIC TRENDS ITB EBVs maternal effect



CHAROLAIS

- Correlations of EBVs – direct effect

Pearson Correlation Coefficients, N = 9428901					
Prob > r under H0: Rho=0					
	ebvcze	ebvdnk	ebvfra	ebvirl	ebvswe
ebvcze	1.00000	0.64717 <.0001	0.64417 <.0001	0.88400 <.0001	0.81132 <.0001
ebvdnk	0.64717 <.0001	1.00000	0.96431 <.0001	0.88127 <.0001	0.94926 <.0001
ebvfra	0.64417 <.0001	0.96431 <.0001	1.00000	0.90925 <.0001	0.87871 <.0001
ebvirl	0.88400 <.0001	0.88127 <.0001	0.90925 <.0001	1.00000	0.91156 <.0001
ebvswe	0.81132 <.0001	0.94926 <.0001	0.87871 <.0001	0.91156 <.0001	1.00000

CHAROLAIS

- Correlations of EBVs – direct effect

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	ebvcze	ebvdnk	ebvfra	ebvirl	ebvswe
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ebvdnk	0.64717 <.0001	1.00000	0.96431 <.0001	0.88127 <.0001	0.94926 <.0001
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CHAROLAIS

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Pearson Correlation Coefficients, N = 9428901
Prob > |r| under H0: Rho=0

	ebvsze	ebvdnk	ebvfra	ebvirl	ebvswe
ebvsze	1.00000	0.64717 <.0001	0.64417 <.0001	0.88400 <.0001	0.81132 <.0001
ebvdnk	0.64717 <.0001	1.00000	0.96431 <.0001	0.88127 <.0001	0.94926 <.0001
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ebvswe	0.81132 <.0001	0.94926 <.0001	0.87871 <.0001	0.91156 <.0001	1.00000

$r_{CZE,DNK} = 0.41 (0.07)$

$r_{CZE,FRA} = 0.42 (0.07)$

CHAROLAIS

- Correlations of EBVs – maternal effect

Pearson Correlation Coefficients, N = 9428901
Prob > |r| under H0: Rho=0

	ebvmcze	ebvmdnk	ebvmfra	ebvmirl	ebvmswe
ebvmcze	1.00000 <.0001	0.90494 <.0001	0.85833 <.0001	0.85545 <.0001	0.92118 <.0001
ebvmdnk	0.90494 <.0001	1.00000	0.86935 <.0001	0.89996 <.0001	0.89102 <.0001
ebvmfra	0.85833 <.0001	0.86935 <.0001	1.00000	0.77562 <.0001	0.88486 <.0001
ebvmirl	0.85545 <.0001	0.89996 <.0001	0.77562 <.0001	1.00000	0.84627 <.0001
ebvmswe	0.92118 <.0001	0.89102 <.0001	0.88486 <.0001	0.84627 <.0001	1.00000

CHAROLAIS

- Correlations of direct and maternal EBVs within country

	EBVs correlation	Genetic correlation
CZE	0.25	-0.18
DNK	0.24	-0.20
FRA	-0.13	-0.40
IRL	0.28	-0.16
SWE	0.54	-0.13

CHAROLAIS

- Correlations of direct and maternal EBVs within country

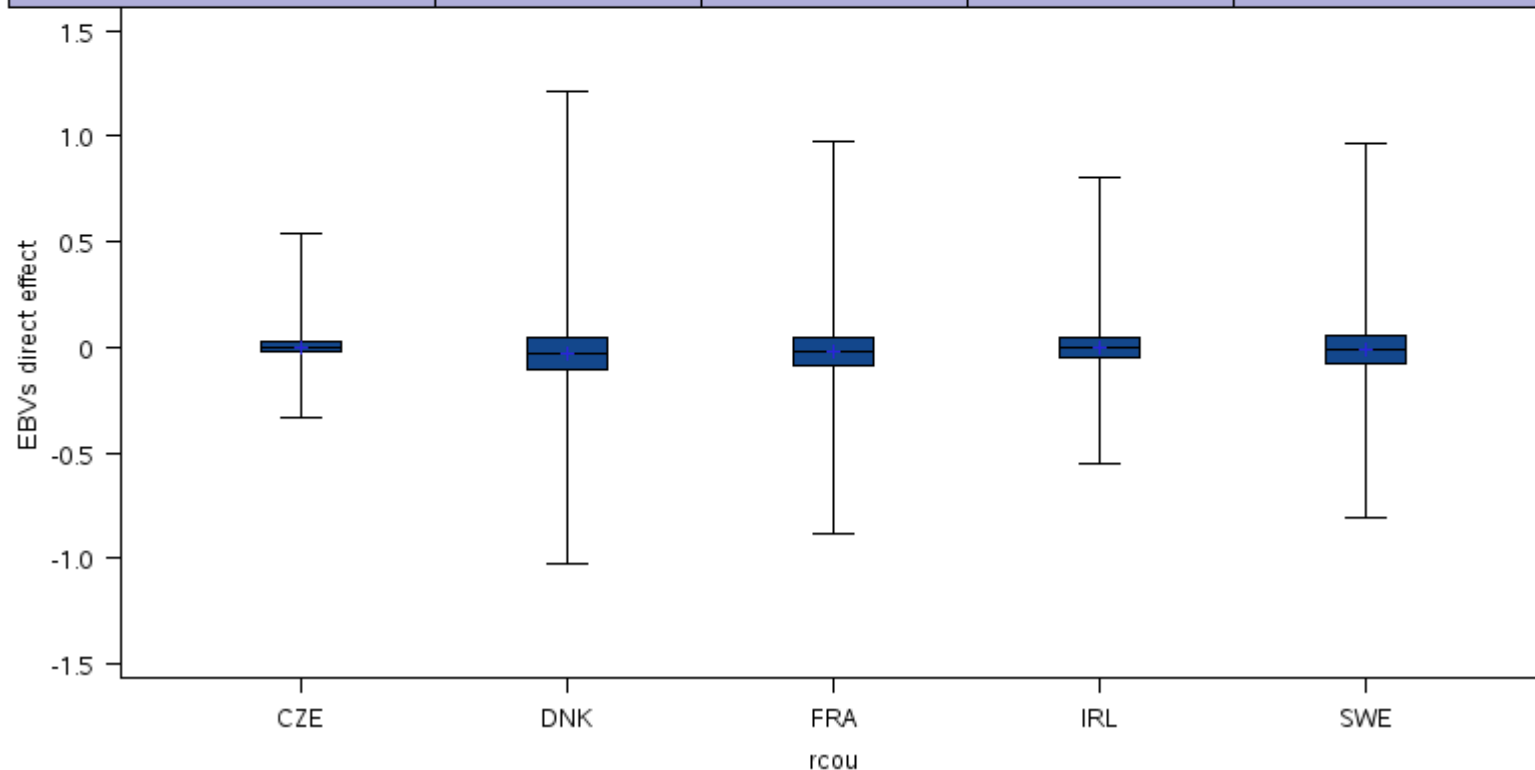
	EBVs correlation	Genetic correlation
CZE	0.25	-0.18
DNK	0.24	-0.20
FRA	-0.13	-0.40
IRL	0.28	-0.16
SWE	0.54	-0.13

CHAROLAIS

ITB EBVs direct effect

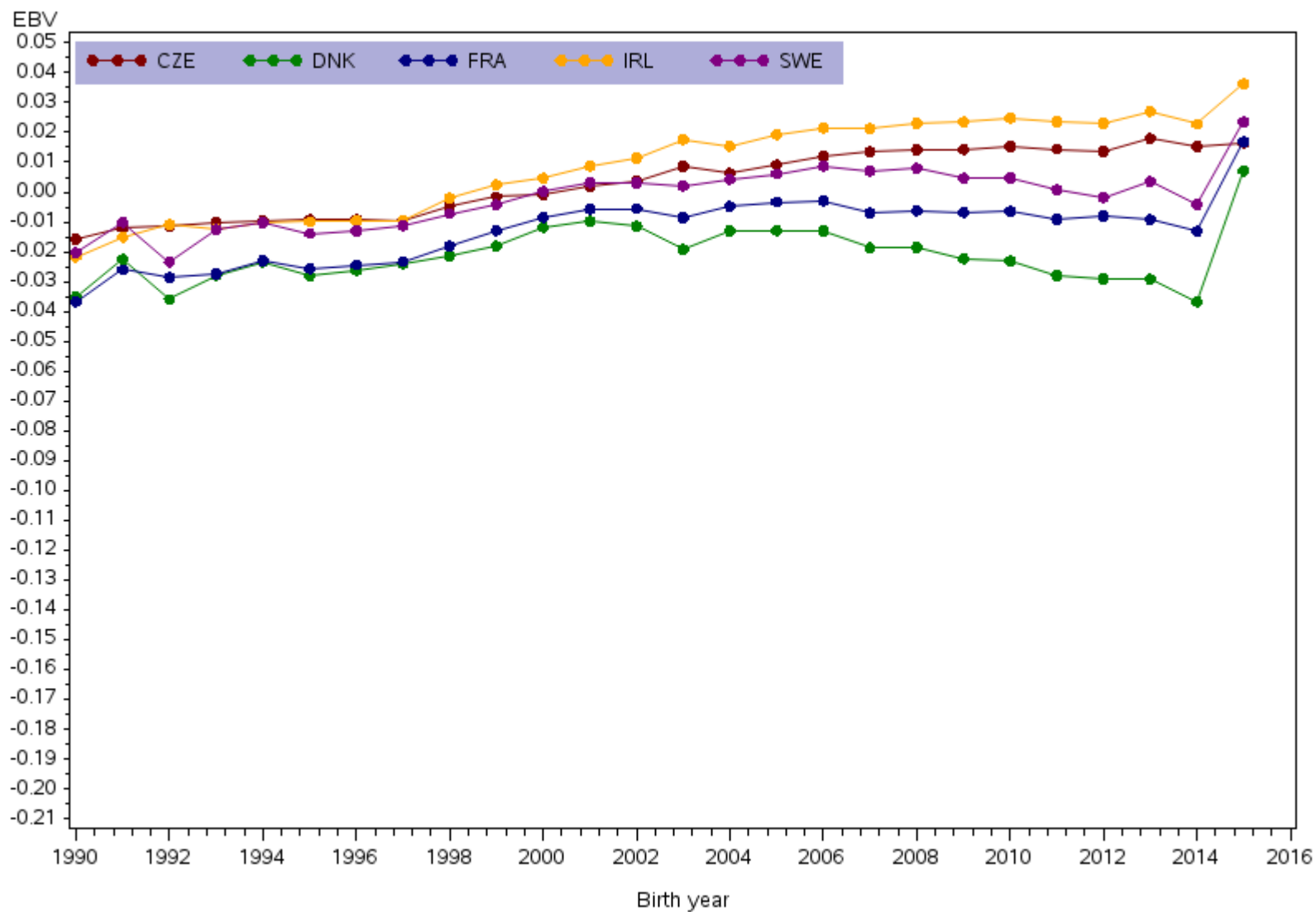
All BVs					
Mean	-0.01	Min	-1.03	Max	1.21

BV's for country					
N	9428901	9428901	9428901	9428901	9428901
Mean	0.00	-0.03	-0.02	0.00	-0.01
Std Dev	0.04	0.13	0.11	0.07	0.10
Min	-0.33	-1.03	-0.88	-0.55	-0.80
Max	0.54	1.21	0.98	0.81	0.97



CHAROLAIS

GENETIC TRENDS ITB EBVs direct effect

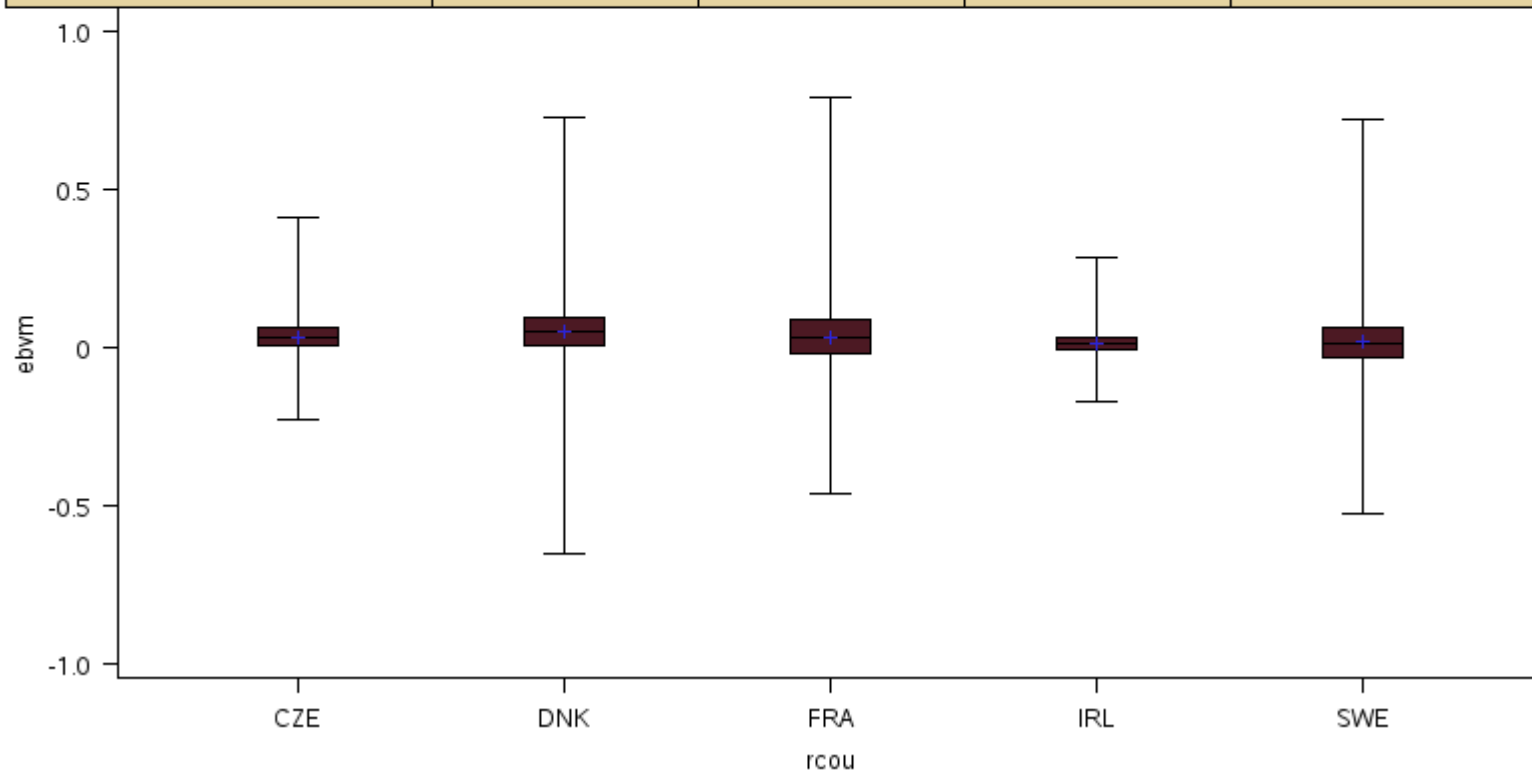


CHAROLAIS

ITB EBVs maternal effect

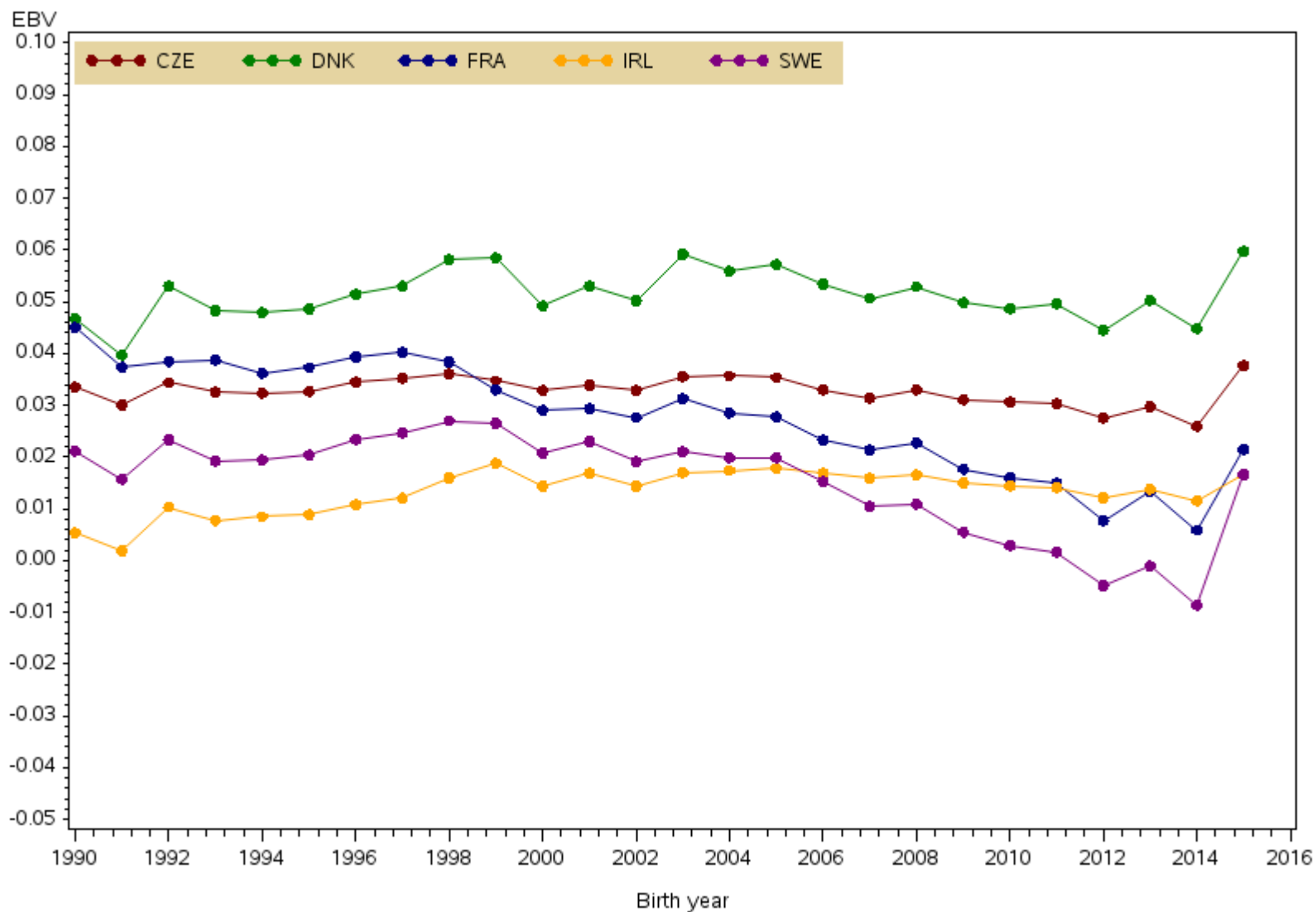
All BVs					
Mean	0.03	Min	-0.65	Max	0.79

BV's for country					
N	9428901	9428901	9428901	9428901	9428901
Mean	0.03	0.05	0.03	0.01	0.02
Std Dev	0.04	0.07	0.08	0.03	0.08
Min	-0.23	-0.65	-0.46	-0.17	-0.53
Max	0.41	0.72	0.79	0.28	0.72

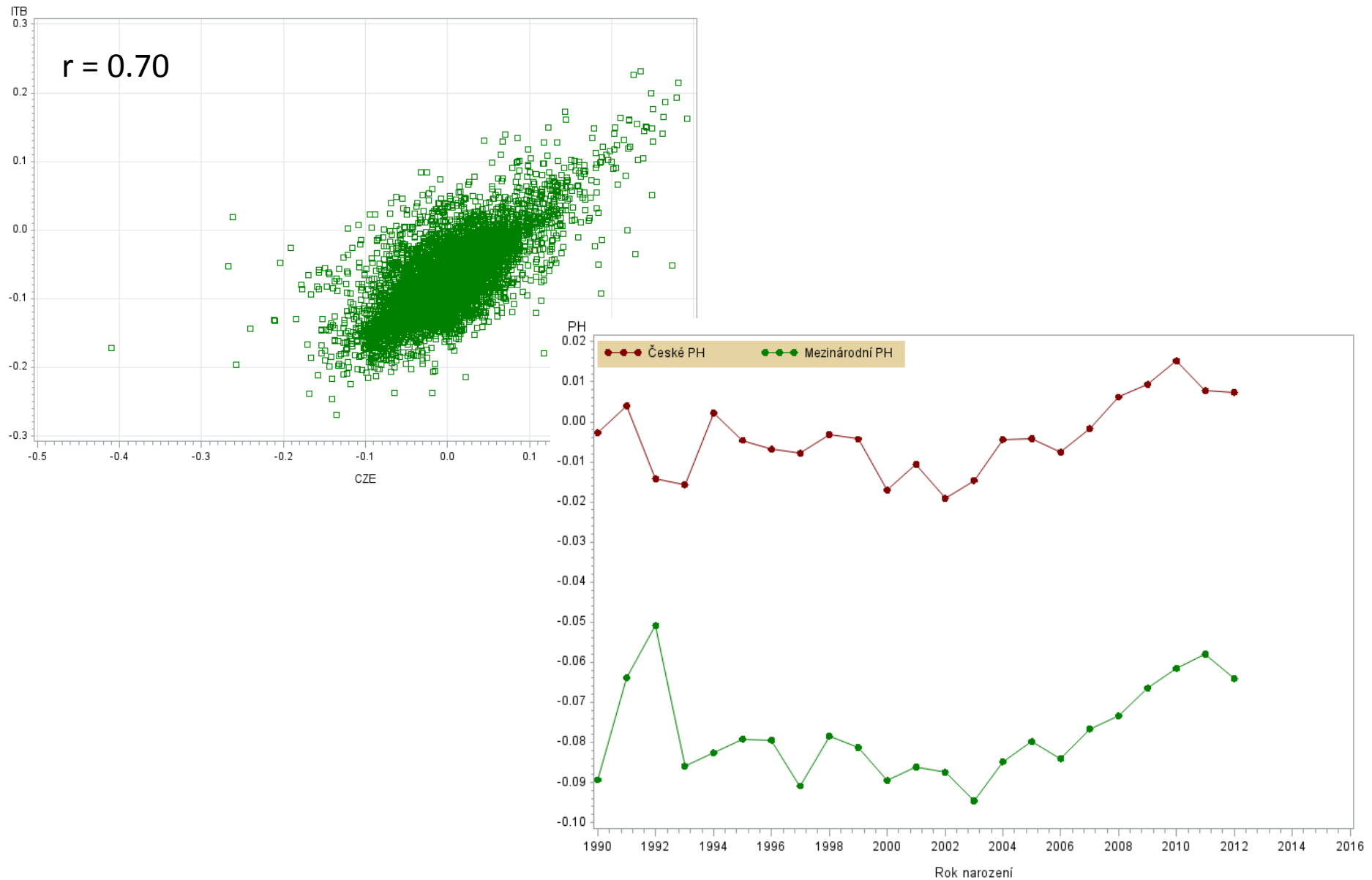


LIMOUSINE

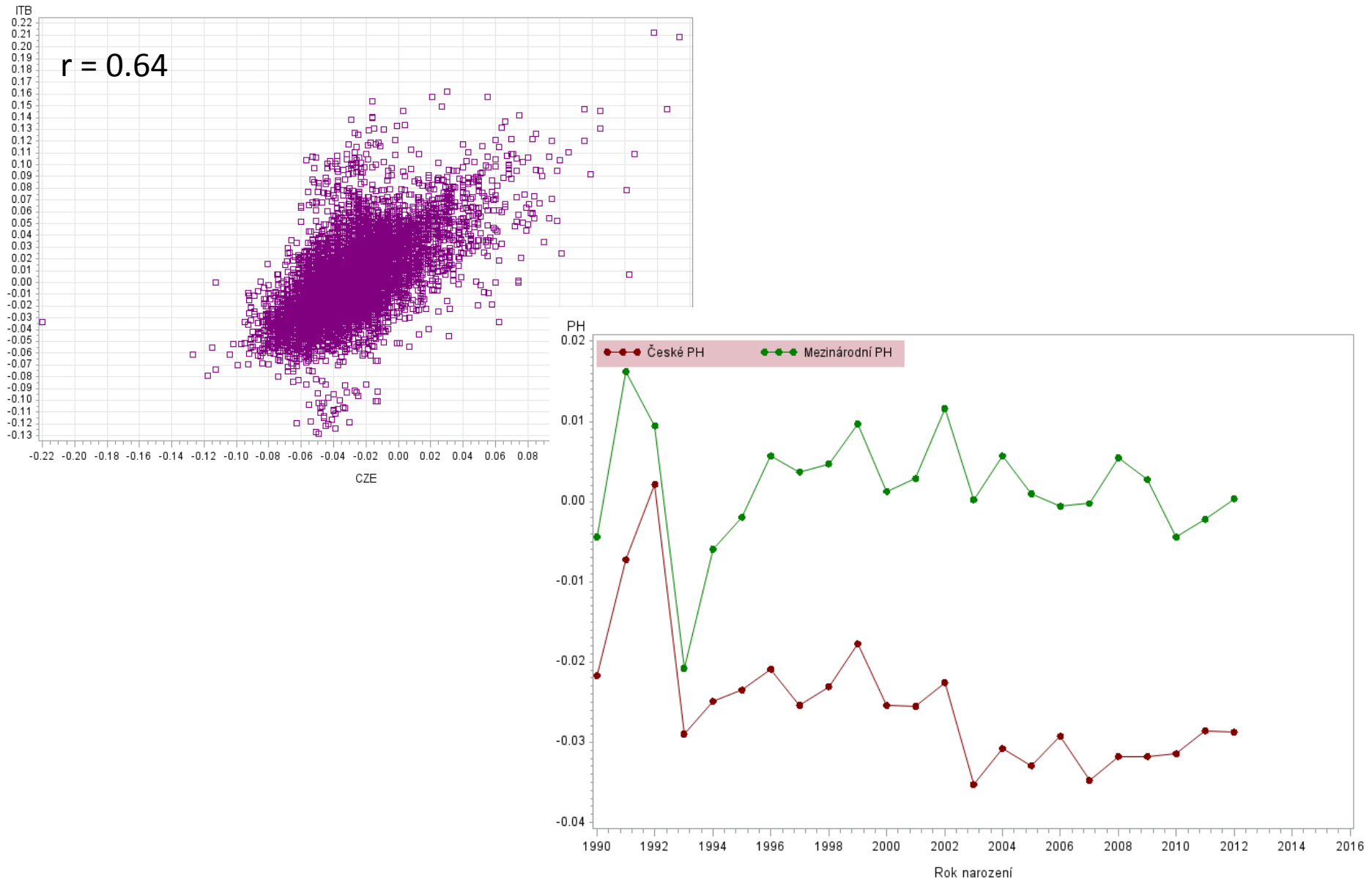
GENETIC TRENDS ITB EBVs maternal effect



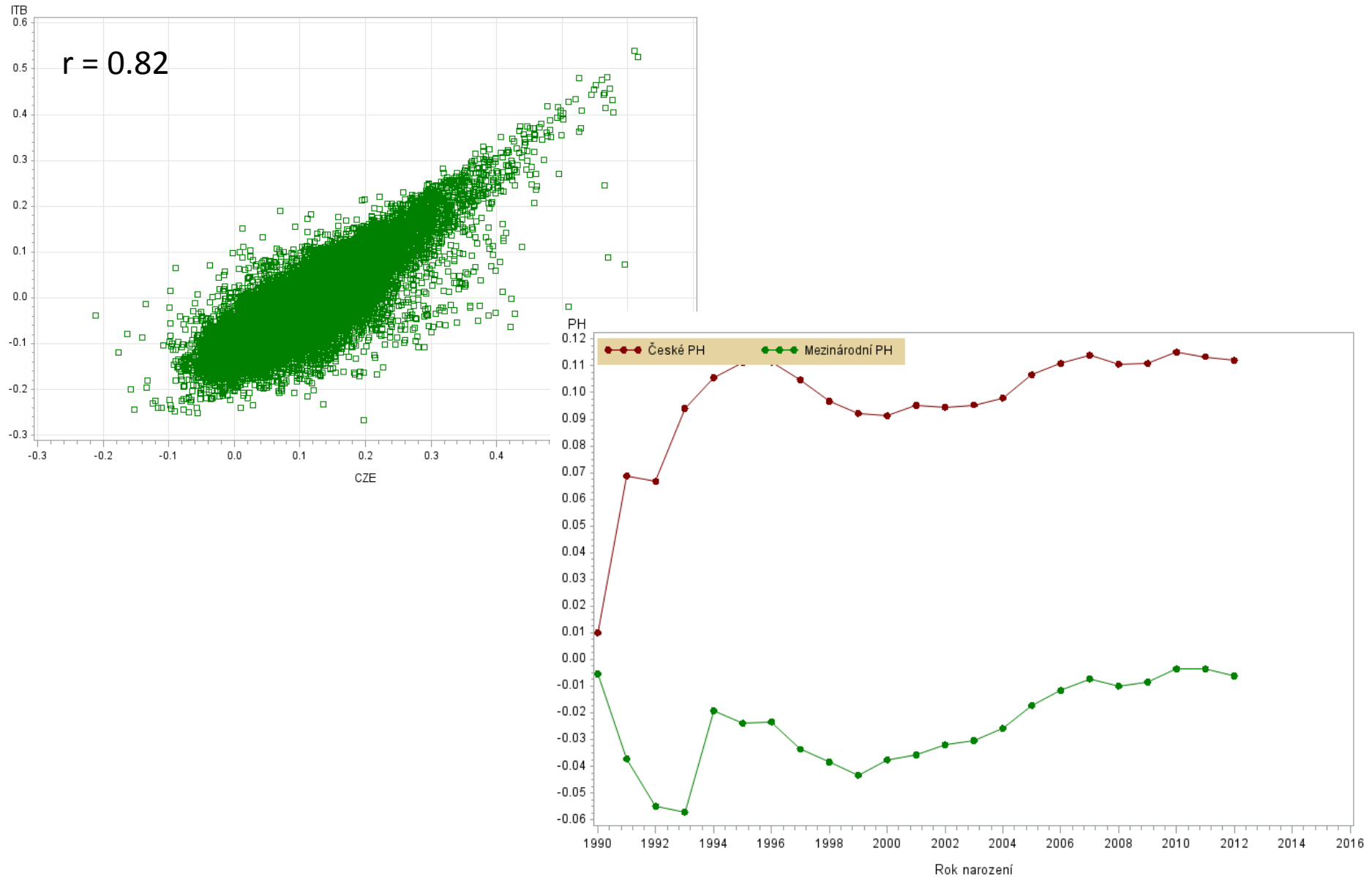
CZECH FEEDBACK – LIMOUSINE –direct effect



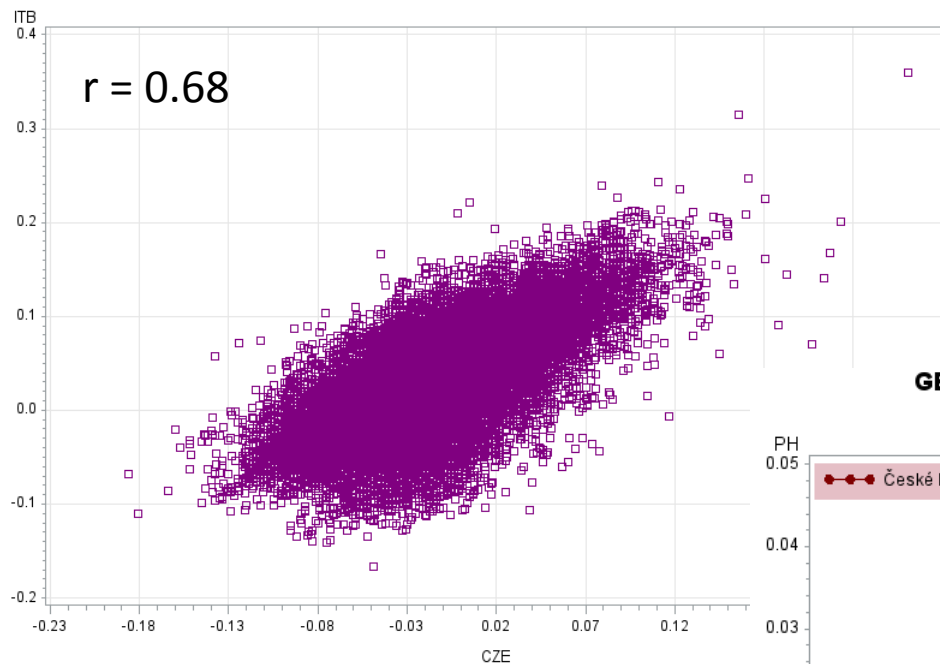
CZECH FEEDBACK – LIMOUSINE – maternal effect



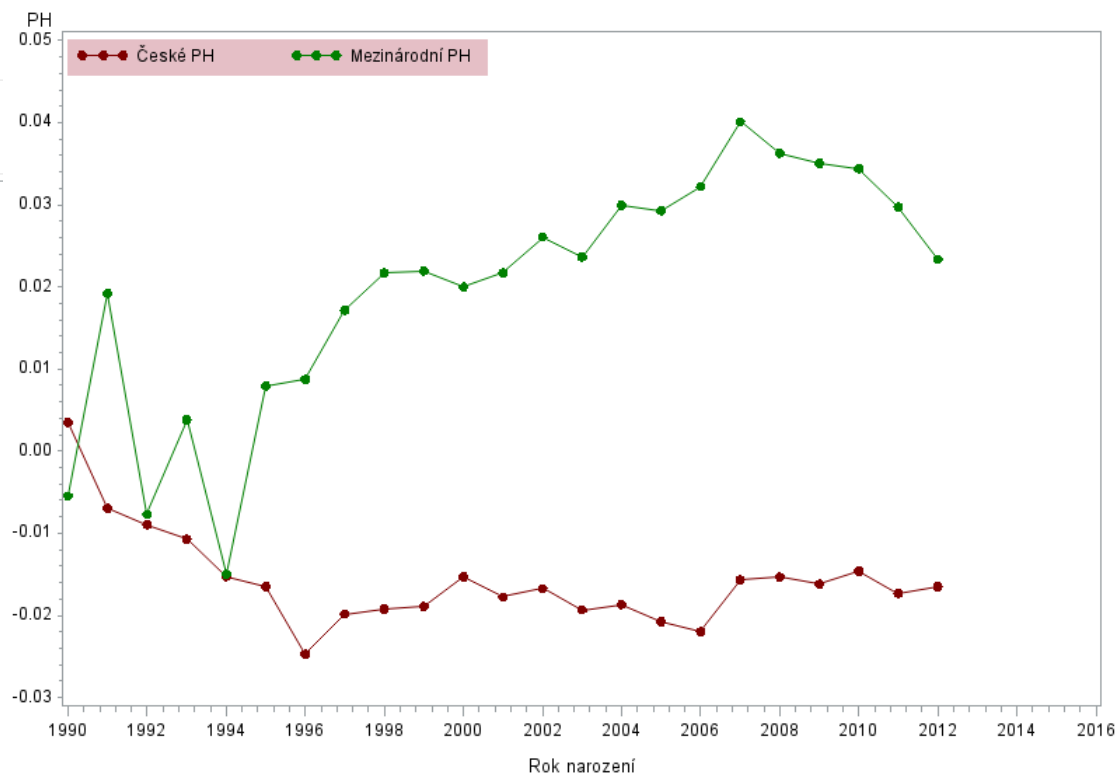
CZECH FEEDBACK – CHAROLAIS –direct effect



CZECH FEEDBACK – CHAROLAIS –maternal effect



**GENETICKÝ TREND PRO ČESKÉ JEDINCE (MATERNÁLNÍ EFEKT)
VŠICHNI ČEŠTÍ JEDINCI**



Genetic correlations for Switzerland

- National evaluation
 - Fixed effects – sex, year*month, lactation number*age quatile, breed combination
 - Random effects: herd*year (CG), sire, permanent environment
 - SIRE MODEL !
- CAE
 - Calving score – 1 / 2
 - 1 = calving ease 3, 4
 - 2 = calving ease 1, 2

Number of offspring of COMMON SIREs

CHAROLAIS							
	CHE	CZE	DNK	FRA	GBR	IRL	SWE
CHE	82,674	1,475	2,468	402,599	2,136	12,354	489
CZE		9,427	6,907	401,784	2,806	16,184	561
DNK			167,833	340,106	4,301	19,286	987
FRA				3,974,037	9,993	36,658	753
GBR					136,592	39,092	470
IRL						162,632	513
SWE							24,859

LIMOUSINE							
cou	CHE	CZE	DNK	FRA	GBR	IRL	SWE
CHE	12,770	6,493	1,988	760,529	.	2,300	646
CZE		39,486	3,127	1,123,340	.	4,823	1,187
DNK			74,052	597,278	.	15,365	3,080
FRA				7,414,562	.	36,557	1,582
GBR					.	.	.
IRL						190,787	844
SWE							136,405

Genetic correlations for Switzerland

- Editing data for VCE - LIMOUSINE

COU	all	DUPL	novar	ET	sire	CG	sirecg	edited
CHE	82,674	.	26,612	.	3,706	1,470	23,051	27,835
CZE	9,520	.	771	533	311	212	644	7,049
DNK	258,444	.	18,259	22	10,0733	1,170	2,536	135,724
FRA	4,345,157	.	72,461	.	12,17265	36,811	596,284	2,422,336
GBR	137,729	.	67	4,082	2,974	2,006	40,072	88,528
IRL	164,059	1,456	35,510	2	26,384	6,114	30,663	63,930
SWE	24,863	.	1,167	.	707	398	5,098	17,493

Genetic correlations for Switzerland

- Editing data for VCE - LIMOUSINE

COU	all	DUPL	novar	ET	sire	CG	sirecg	edited
CHE	82,674	.	26,612	.	3,706	1,470	23,051	27,835
CZE	9,520	.	771	533	311	212	644	7,049
DNK	258,444	.	18,259	22	10,0733	1,170	2,536	135,724
FRA	4,345,157	.	72,461	.	12,17265	36,811	596,284	2,422,336
GBR	137,729	.	67	4,082	2,974	2,006	40,072	88,528
IRL	164,059	1,456	35,510	2	26,384	6,114	30,663	63,930
SWE	24,863	.	1,167	.	707	398	5,098	17,493

Genetic correlations for Switzerland

- Editing data for VCE - LIMOUSINE

COU	all	DUPL	novar	ET	sire	CG	sirecg	edited
CHE	82,674	.	26,612	.	3,706	1,470	23,051	27,835
CZE	9,520		771	533	311	212	644	7,049
DNK	258				3	1,170	2,536	135,724
FRA	4,345				5	36,811	596,284	2,422,336
GBR	137				4	2,006	40,072	88,528
IRL	164				4	6,114	30,663	63,930
SWE	24				7	398	5,098	17,493

Calves from herds without variation

Genetic correlations for Switzerland

- Editing data for VCE - LIMOUSINE

COU	all	DUPL	novar	ET	sire	CG	sirecg	edited
CHE	82,674	.	26,612	.	3,706	1,470	23,051	27,835
CZE	9,520		771	533	311	212	644	7,049
DNK	258				3	1,170	2,536	135,724
FRA	4,345				5	36,811	596,284	2,422,336
GBR	137				4	2,006	40,072	88,528
IRL	164				4	6,114	30,663	63,930
SWE	24				7	398	5,098	17,493

Calves from herds without variation

FREQUENCY OF HERDS WITHOUT VARIATION (var = N) OF CALVING EASE SCORE - CHE

The FREQ Procedure

var	Frequency	Percent	Cumulative Frequency	Cumulative Percent
N	1334	55.77	1334	55.77
Y	1058	44.23	2392	100.00

Genetic correlations for Switzerland

- Editing data for VCE - LIMOUSINE

COU	all	DUPL	novar	ET	sire	CG	sirecg	edited
CHE	82,674	.	26,612	.	3,706	1,470	23,051	27,835
CZE	9,520	.	771	533	311	212	644	7,049
DNK	258,444	.	1				536	135,724
FRA	4,345,157	.	7				284	2,422,336
GBR	137,729	.					072	88,528
IRL	164,059	1,456	3				663	63,930
SWE	24,863	.					098	17,493

Unknown sire or MGS

Genetic correlations for Switzerland

- Editing data for VCE - LIMOUSINE

COU	all	DUPL	novar	ET	sire	CG	sirecg	edited
CHE	82,674	.	26,612	.	3,706	1,470	23,051	27,835
CZE	9,520	.	771	533	311	212	644	7,049
DNK	258,444	.	18,25				6	135,724
FRA	4,345,157	.	72,40				4	2,422,336
GBR	137,729	.					2	88,528
IRL	164,059	1,456	35,5				8	63,930
SWE	24,863	.	1,10				8	17,493

CG < 3

Genetic correlations for Switzerland

- Editing data for VCE - LIMOUSINE

COU	all	DUPL	novar	ET	sire	CG	sirecg	edited
CHE	82,674	.	26,612	.	3,706	1,470	23,051	27,835
CZE	9,520	.	771	533	311	212	644	7,049
DNK	258,444	.	18,25				6	135,724
FRA	4,345,157	.	72,40				4	2,422,336
GBR	137,729	.					2	88,528
IRL	164,059	1,456	35,51				8	63,930
SWE	24,863	.	1,10				8	17,493

< 3 sires / CG

Genetic correlations for Switzerland

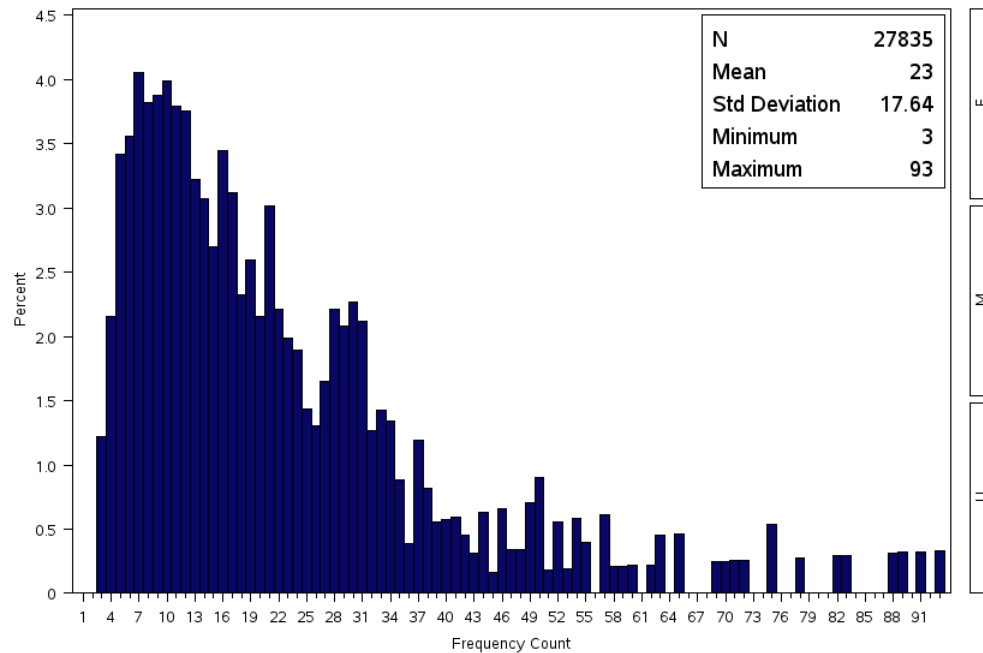
- Editing data for VCE - LIMOUSINE

COU	all	DUPL	novar	ET	sire	CG	sirecg	edited
CHE	82,674	.	26,612	.	3,706	1,470	23,051	27,835
CZE	9,520	.	771	533	311	212	644	7,049
DNK	258,444	.	18,259	22	10,0733	1,170	2,536	135,724
FRA	4,345,157	.	72,461	.	12,17265	36,811	596,284	2,422,336
GBR	137,729	.	67	4,082	2,974	2,006	40,072	88,528
IRL	164,059	1,456	35,510	2	26,384	6,114	30,663	63,930
SWE	24,863	.	1,167	.	707	398	5,098	17,493

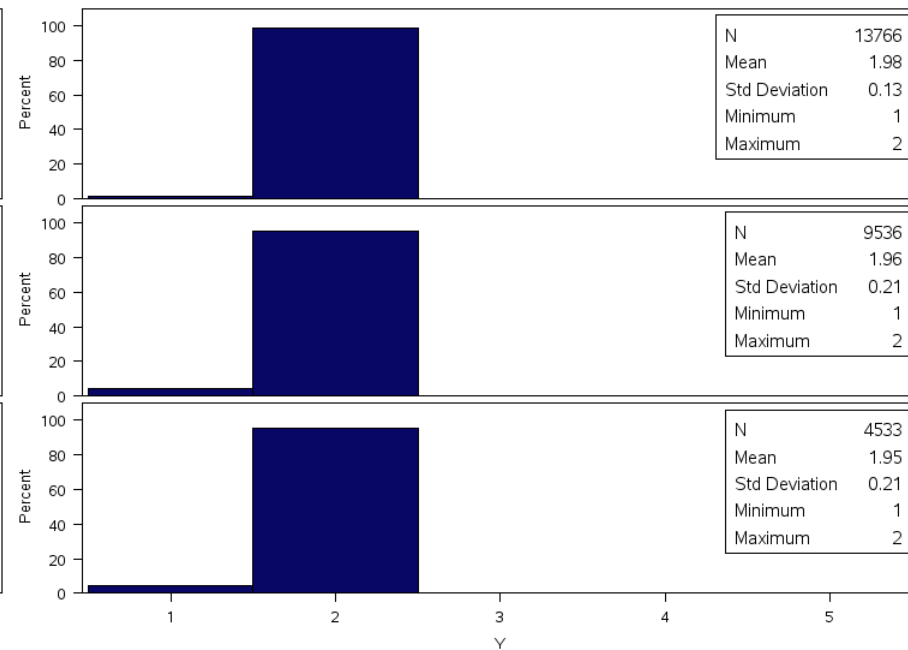
Genetic correlations for Switzerland

- Editing data for VCE - LIMOUSINE

DISTRIBUTION OF SIZE OF C. GROUPS — CHE



DISTRIBUTION OF CALVING EASE — CHE



Genetic correlations for Switzerland

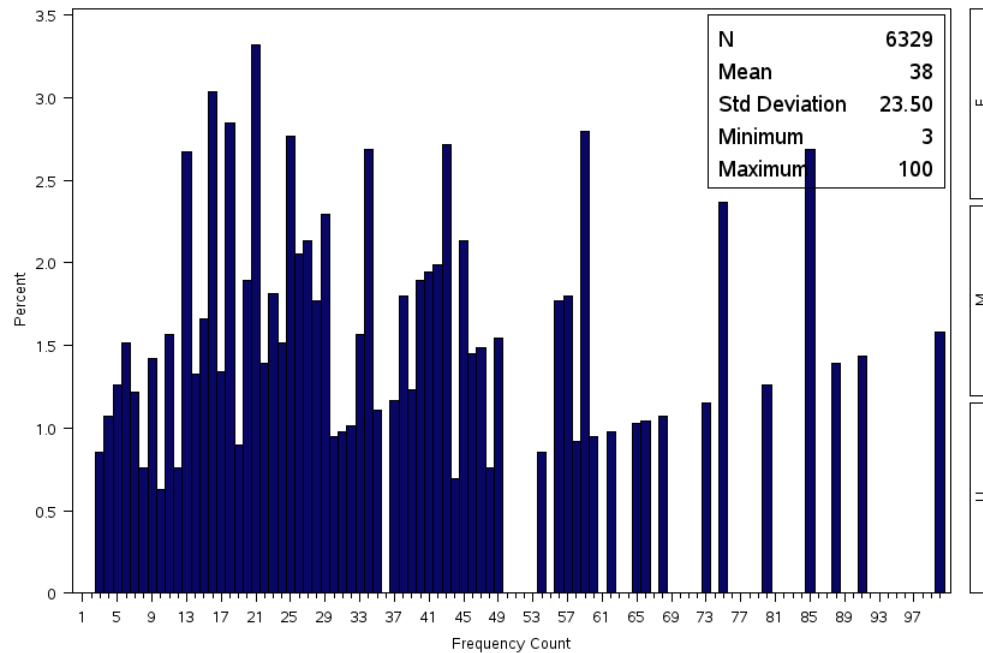
- Editing data for VCE - CHAROLAIS

RCOU	all	DUPL	novar	ET	sire	CG	sirecg	edited
CHE	12,770	.	2,711	.	140	468	2,986	6,465
CZE	39,667	.	1,052	1,700	2,794	987	3,806	29,328
DNK	114,095	.	6,178	9	43,607	538	977	62,786
FRA	7,932,562	.	24,536	.	1,920,469	73,808	819,709	5,094,040
IRL	191,380	1,179	42,004	32	30,607	4,843	26,601	86,114
SWE	136,423	.	4,642	.	4,784	1,725	24,832	100,440

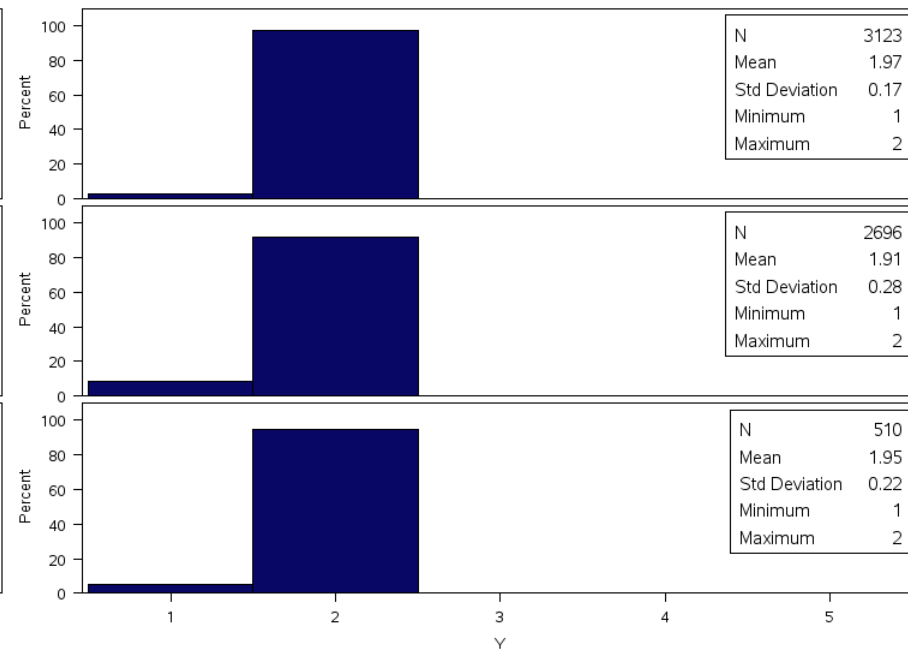
Genetic correlations for Switzerland

- Editing data for VCE - CHAROLAIS

DISTRIBUTION OF SIZE OF C. GROUPS — CHE



DISTRIBUTION OF CALVING EASE — CHE



Genetic correlations for Switzerland

- 2 x 2 country
- Airemlf90
 - AM-DE-MPE
 - AM-DE-MPE-ME

Genetic correlations for Switzerland LIMOUSINE

	Nb CHE	Nb COU2	Common sires	Common MGS	AM-DE-MPE	AM-DE-MPE-ME
CZE	24,024	4,642	35	51	-0.96*	Nc
DNK	23,651	55,525	22	39	-0.63	...
FRA	24,078	31,888	56	254	Nc	...
GBR	23,683	31,017	29	55	-0.68	...
IRL	23,544	31,252	35	56	-0.30	...
SWE	23,069	6,395	24	21	Nc	Nc

* gibbs1f90

Genetic correlations for Switzerland

CHAROLAIS

	Nb CHE	Nb COU2	Common sires	Common MGS	AM-DE-MPE	AM-DE-MPE-ME
CZE	2,892	22,602	37	42	Nc	...
DNK	4,887	21,786	21	27	-0.53	...
FRA	2,204	70,316	33	56	-0.13	...
IRL	4,474	45,982	20	29	...	...
SWE	5,586	20,910	20	23	Nc	Nc