Joint Nordic Genetic Evaluation of Growth and Carcass traits in Dairy Breeds

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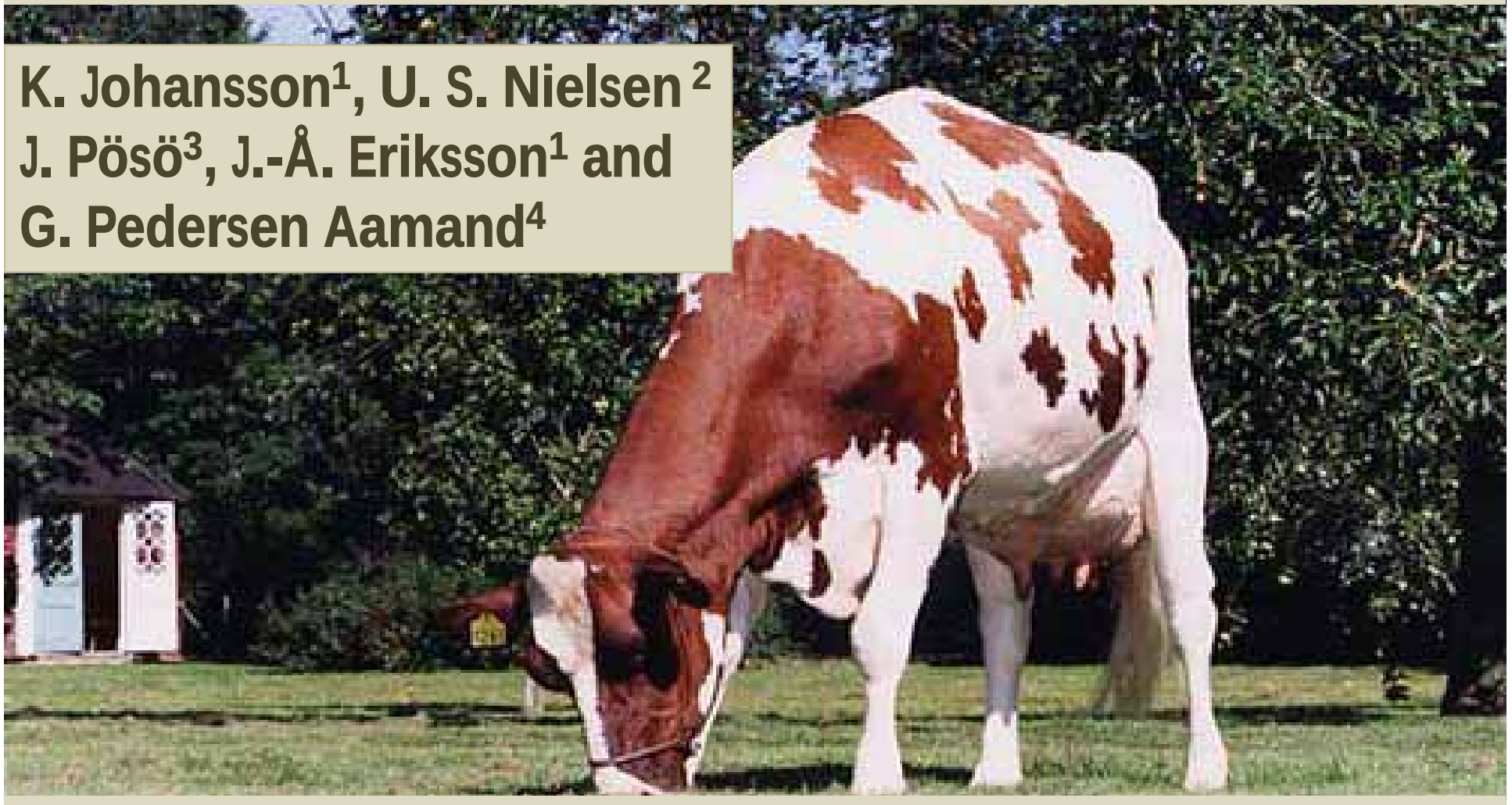


[1]Swedish Dairy Association, [2]Danish Agricultural Advisory Service, [3]FABA Breeding, [4]Swedish Dairy Association, [5]Nordic Cattle Genetic Evaluation

Growth in dairy production

- Specialized herds $\rightarrow$ dairy bull calves for beef production
- Low impact on environment
- Sexed semen
- Growth related to first calving age

Current evaluations

- Denmark:
  Carcass weight, carcass conformation
- Sweden:
  Carcass gain, carcass conformation, fat score
- Finland: no evaluation

=> different traits, different models

Fattening period

- Slaughter age 200 - 900 days
- Carcass weight 100 - 500 kg

	DNK	FIN	SWE
Age at slaughter (days)	360	603	598
Carcass weight (kg)	250	330	310

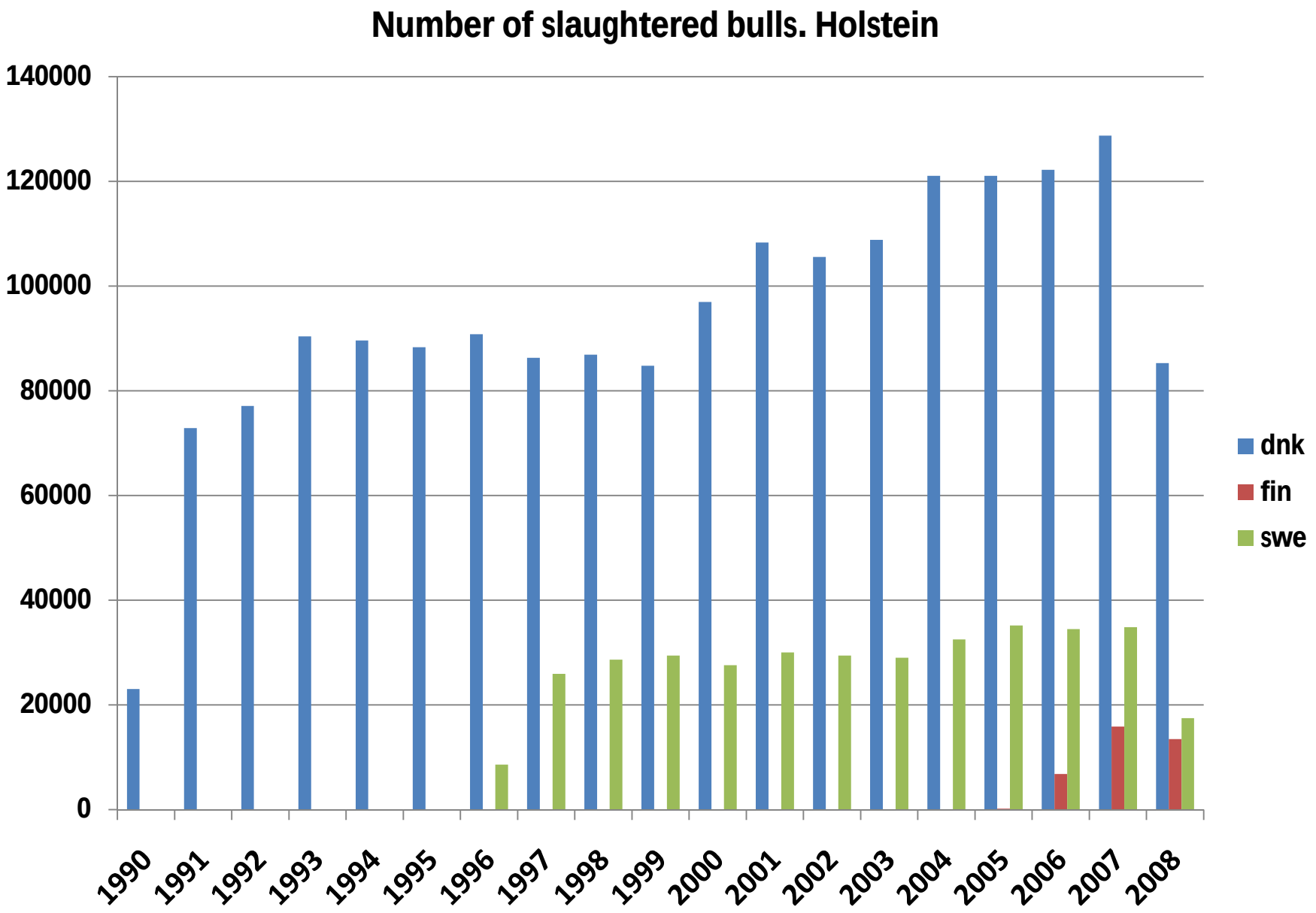
Fattening period

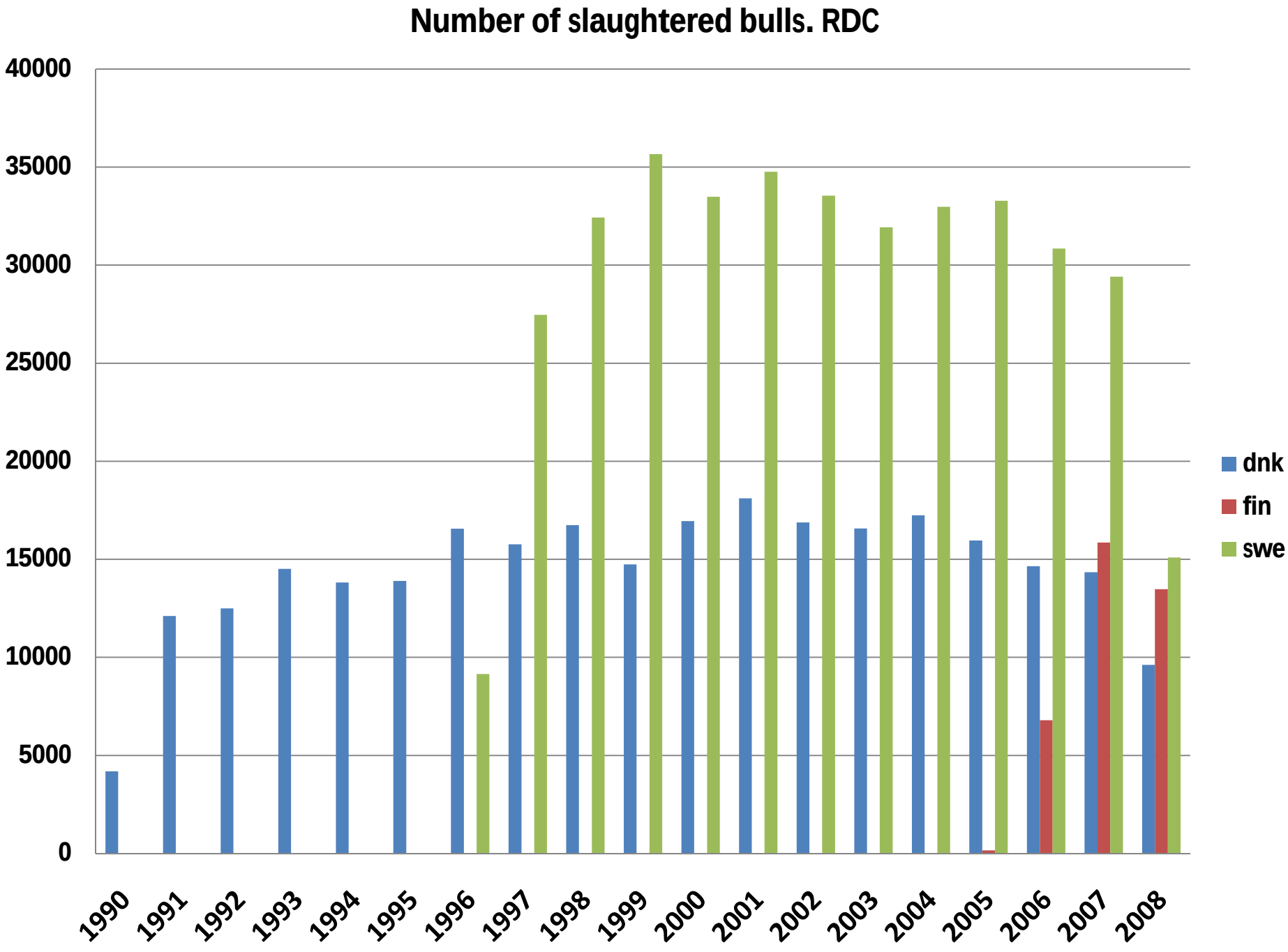
- 2 fattening periods according to age at slaughter
  - Short fattening period: <550 days
  - Long fattening period: >550 days
- Classification of herds by year

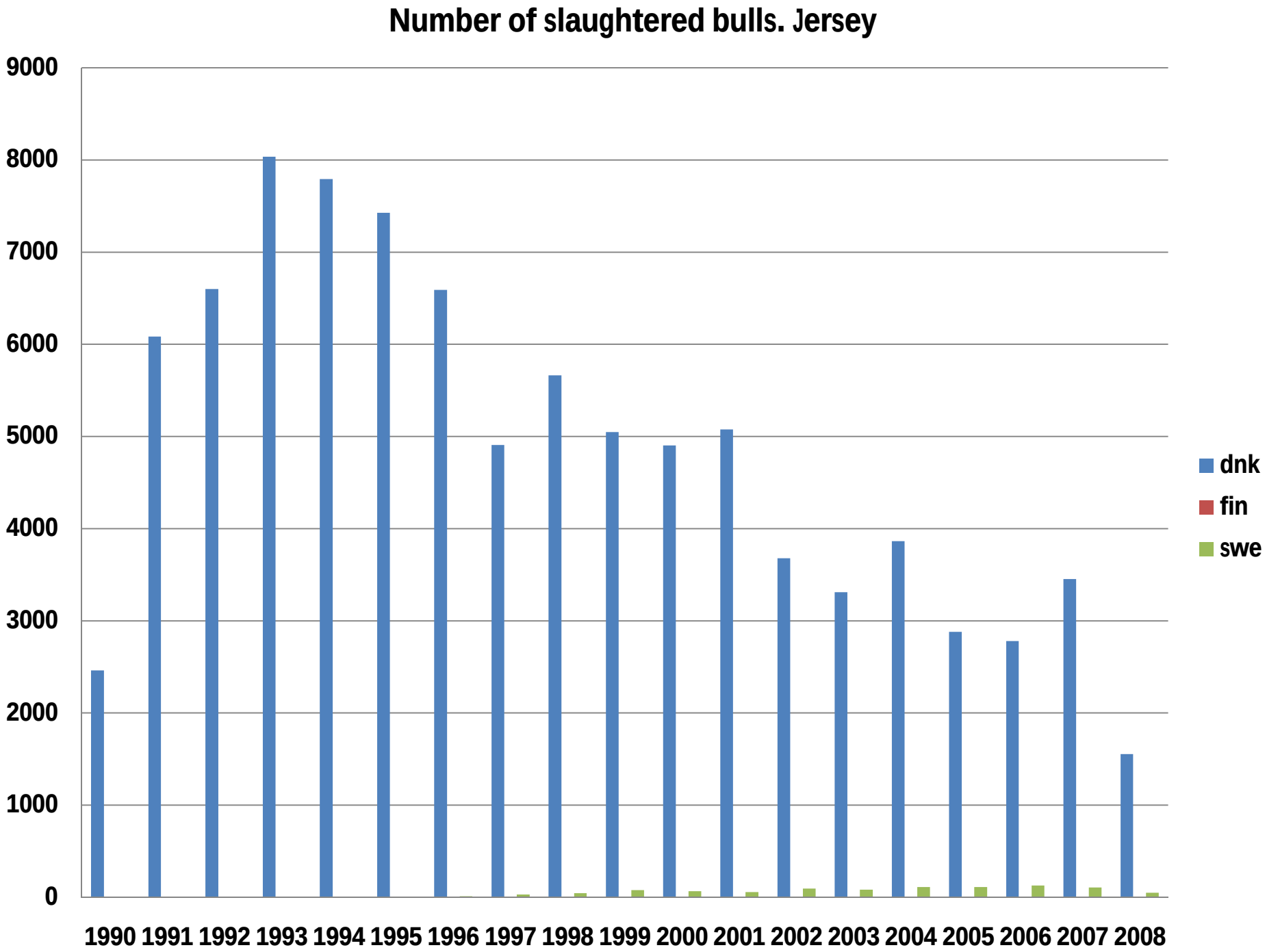
Genetic evaluation

Trait	Slaughter	Abbrev.
Carcass gain, short period	200-550 days	CGS
Carcass gain, long period	550-900 days	CGL
Conformation score		CS
Fat score	(indicator trait)	FS

- Precorrection for heterogeneous variance (country*year)


Number of slaughtered bulls. Holstein
140000
120000
100000
80000
60000
40000
20000
0
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
dnk
fin
swe


Number of slaughtered bulls. RDC
40000
35000
30000
25000
20000
15000
10000
5000
0
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
dnk
fin
swe


Number of slaughtered bulls. Jersey
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008
dnk
fin
swe

Model

Effect	**Type**
Age of dam x country	Fixed
Year x month x country	Fixed
Herd x period (= 5 years)	Fixed
Total heterosis	Regression
Population proportions	Regression
Herd x year	Random
Animal	Random

Heritabilities

	Holstein	RDC	Jersey
CGS	0.28	0.36	0.22
CGL	0.32	0.29	-
CS	0.29	0.29	0.16
FS	0.18	0.23	0.11

$\rightarrow$ High heritabilities

Genetic correlations

CGS:CGL 0.97-0.98

→ Low genotype x environment *within* country

CGS (DNK:SWE) 0.93

CS (DNK:SWE) 0.96

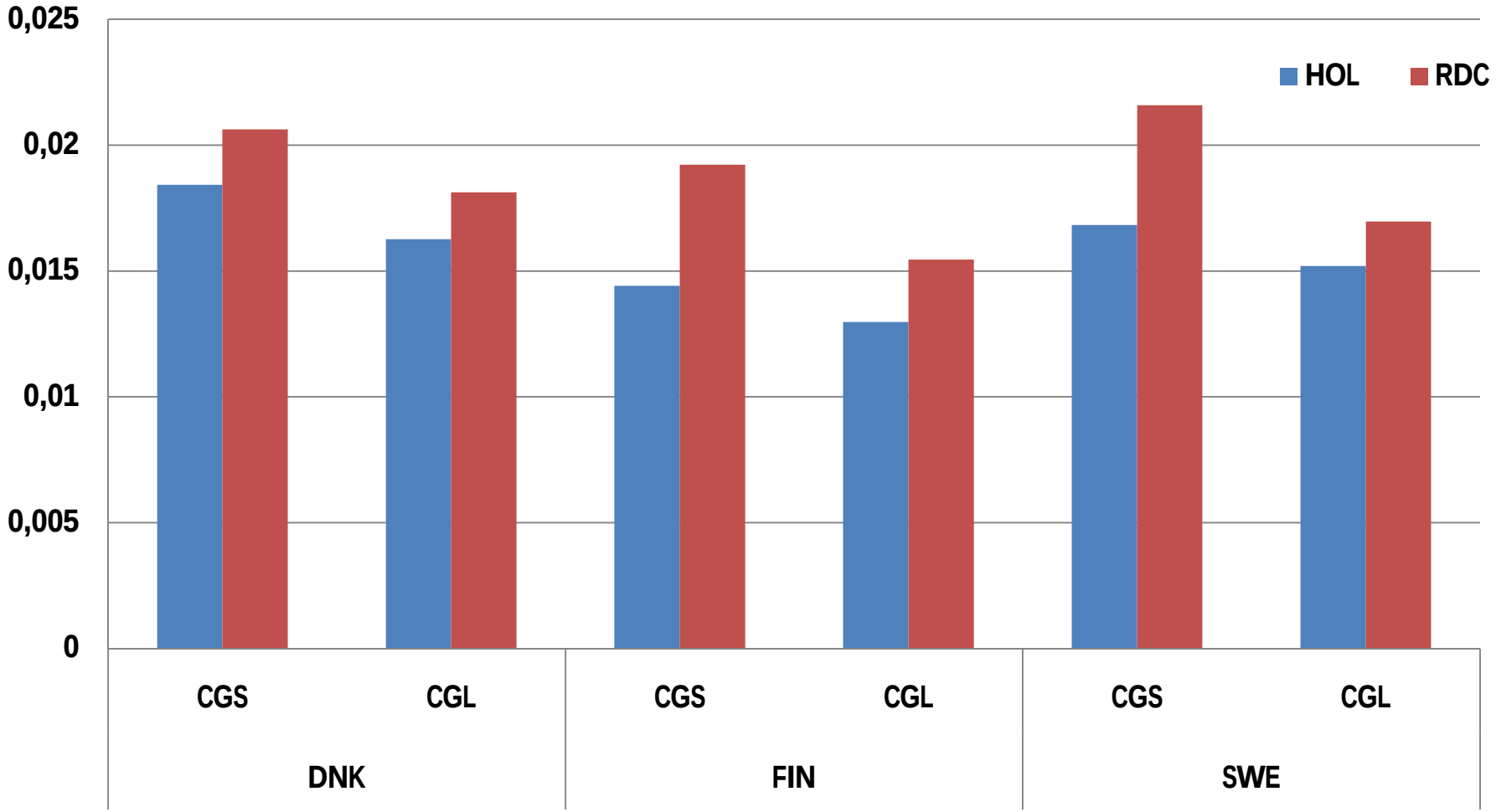
→ Low genotype x environment *across* countries

→ rg(between countries) assumed =1.0

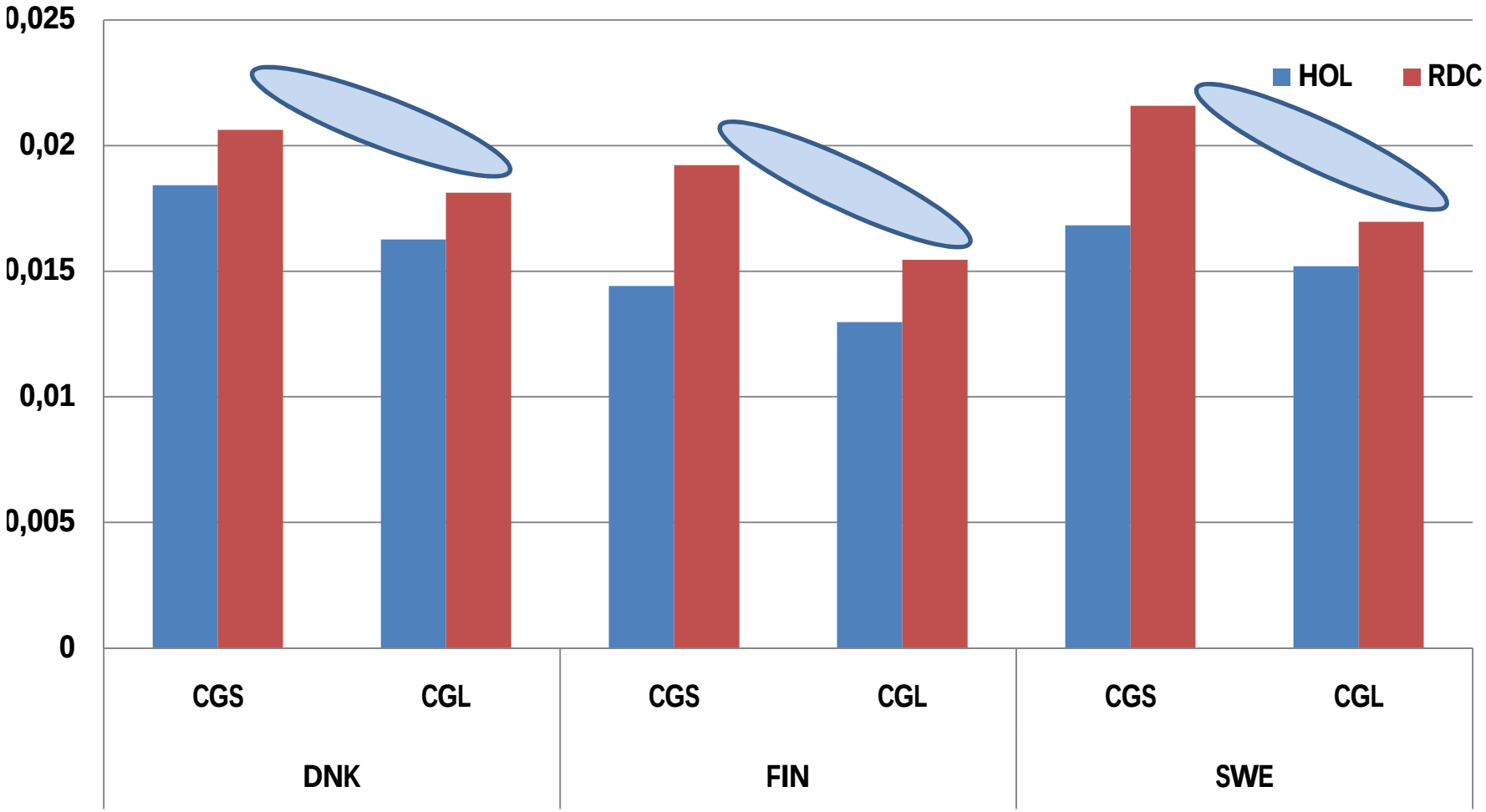
Why CGS and CGL?

- Small interactions, *but*
- Different phenotypic variation
- Different heritabilites

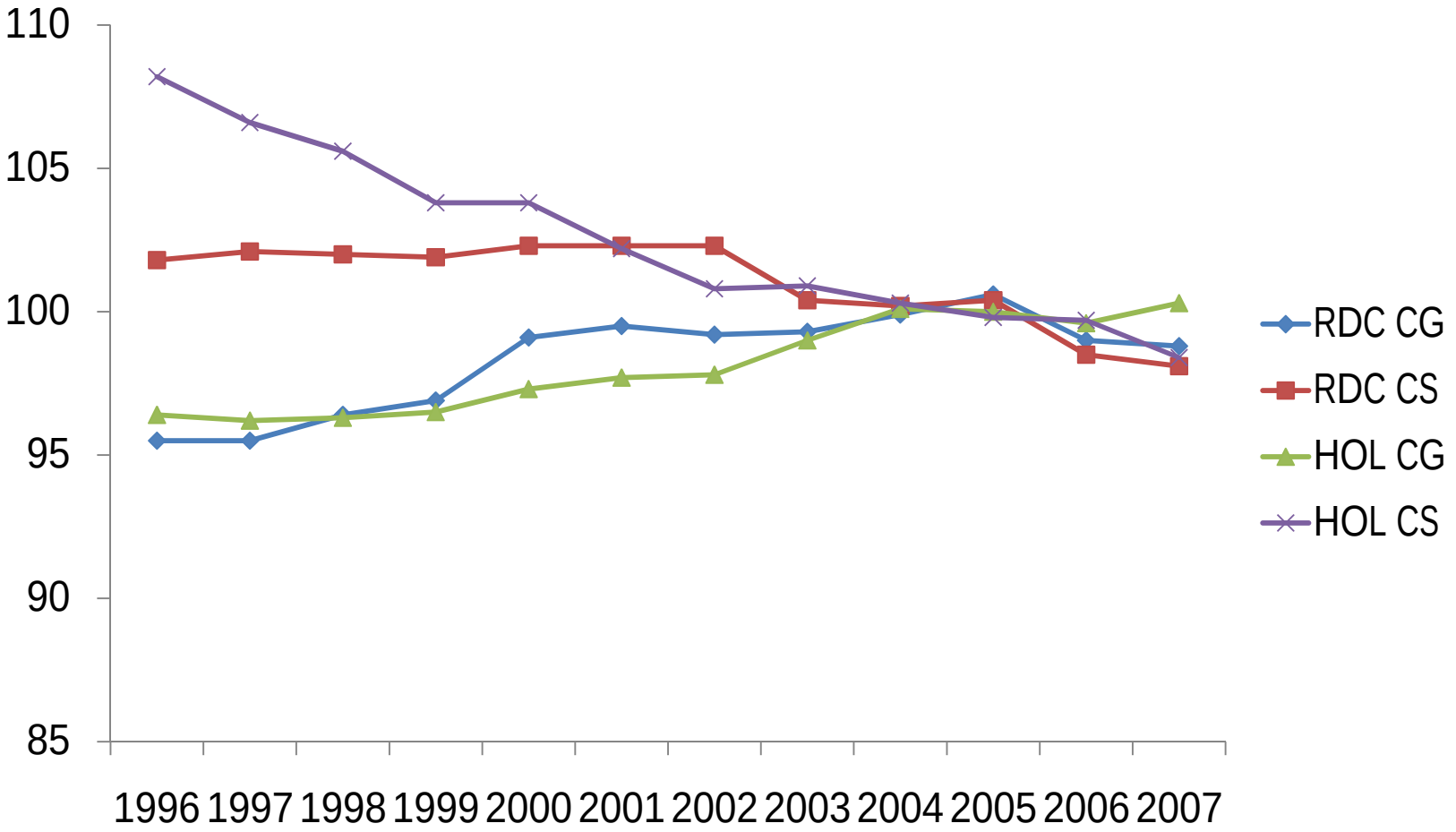
Standard deviation of Carcass gain. EBVs for bulls



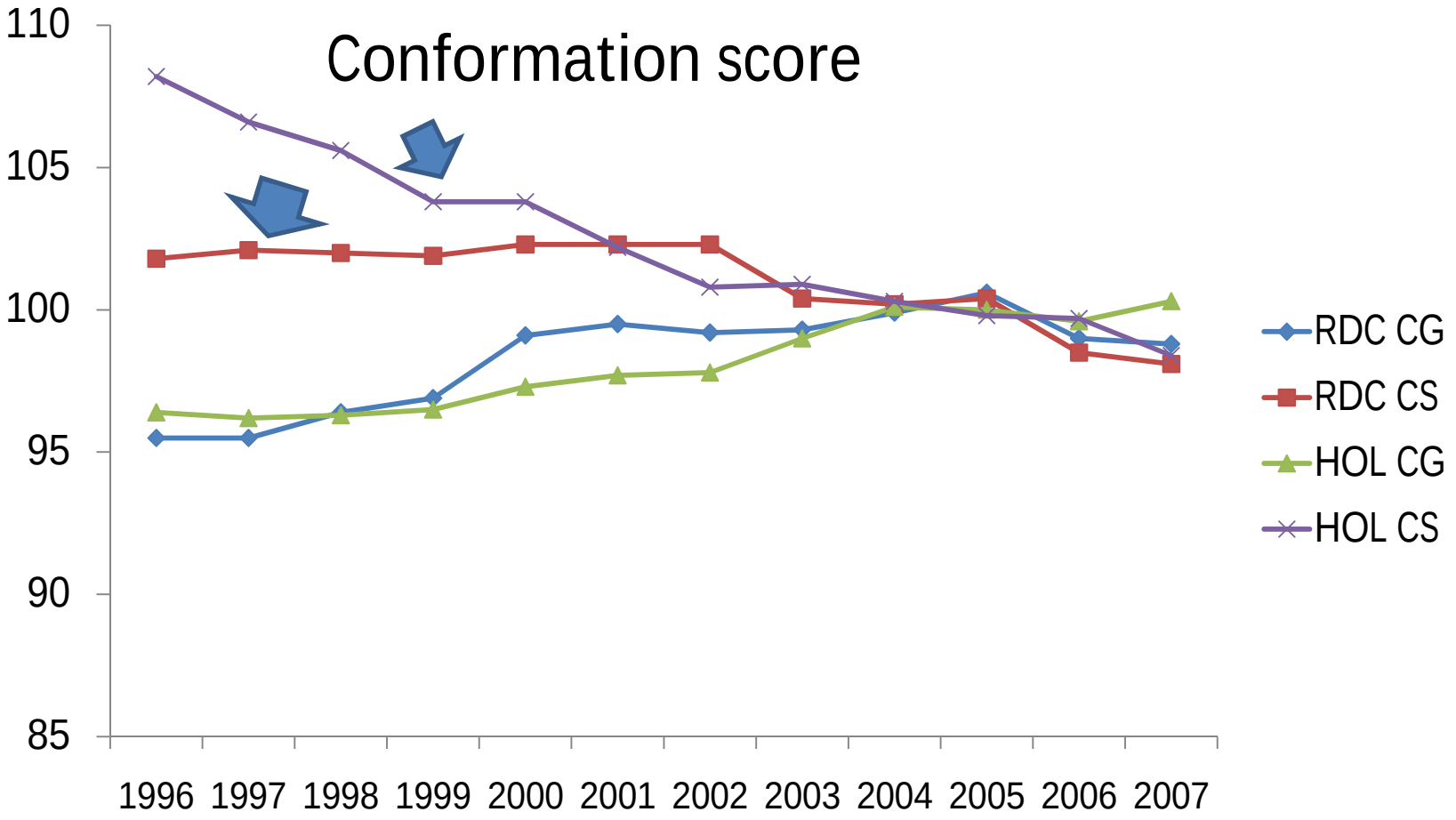
Standard deviation of Carcass gain. EBVs for bulls



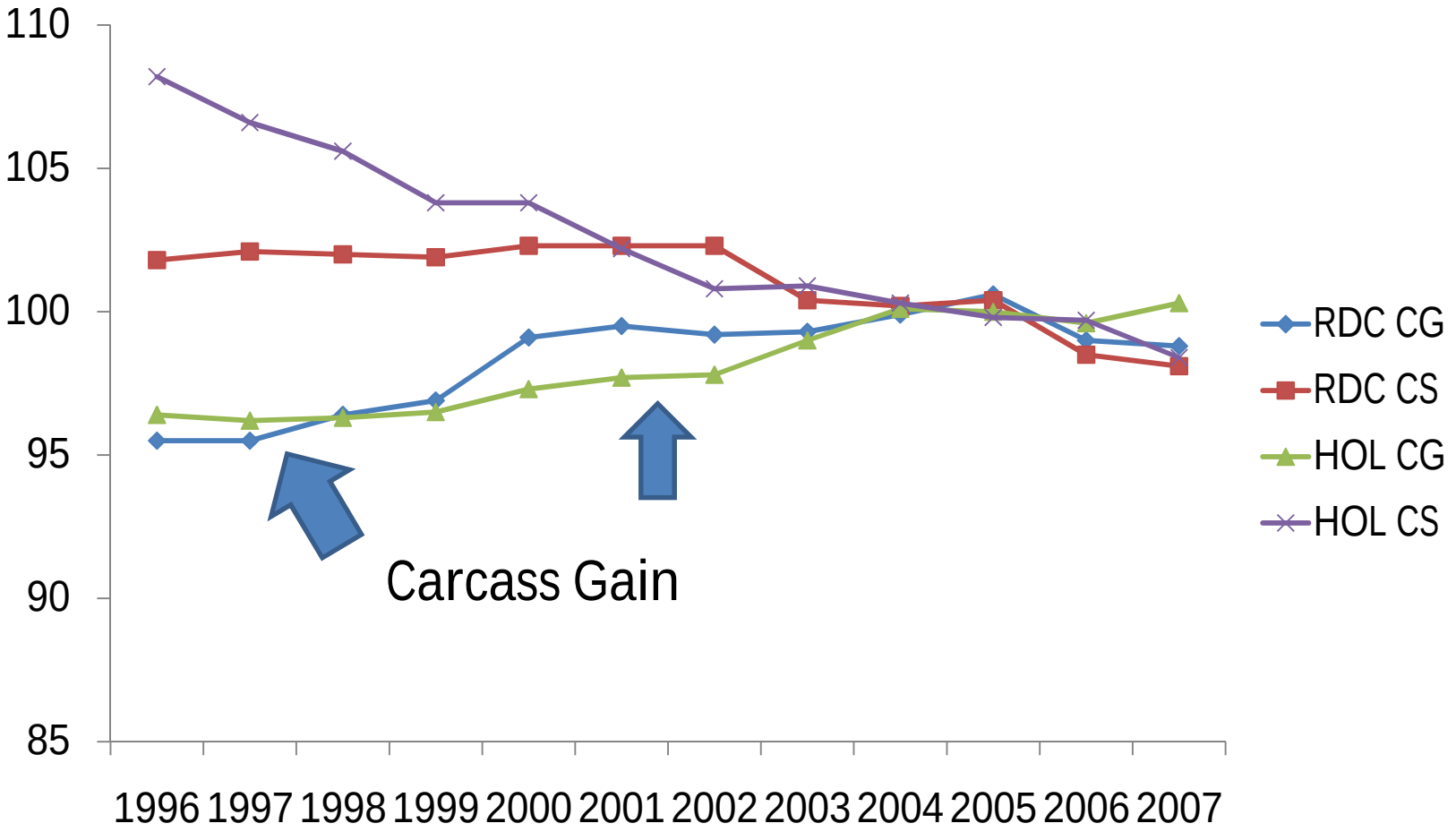
Genetic trends for bulls

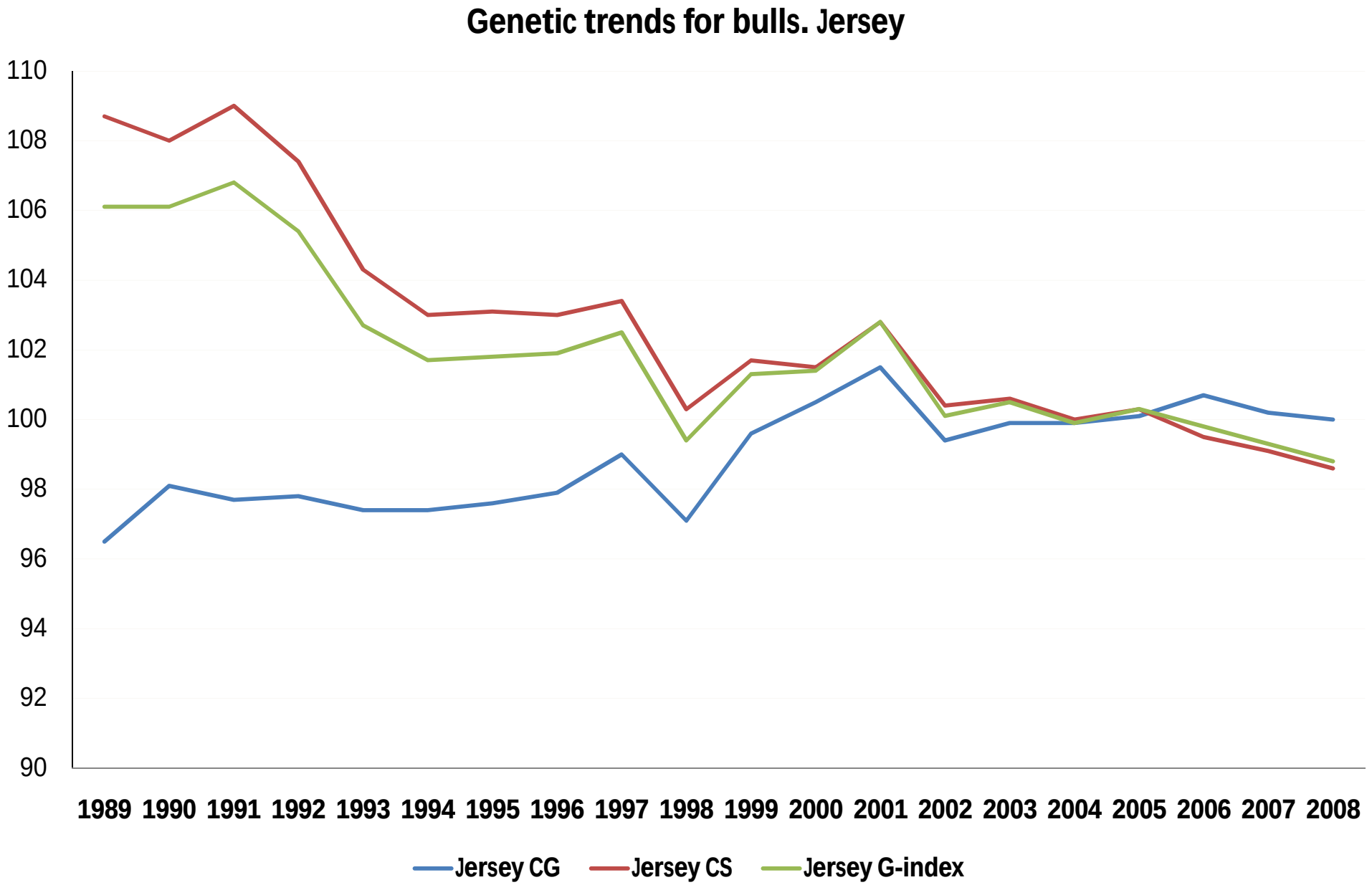


Genetic trends for bulls



Genetic trends for bulls

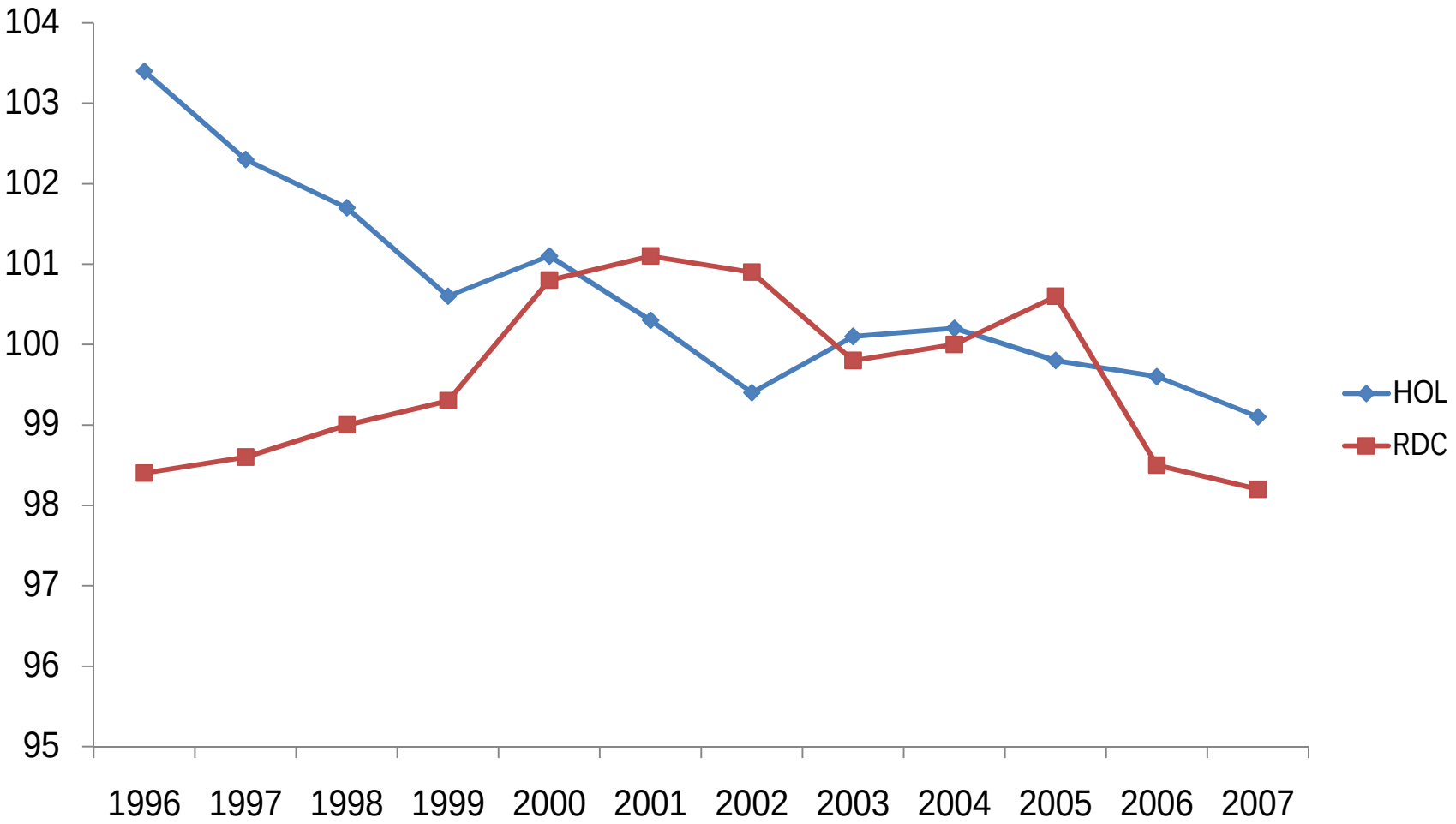



Genetic trends for bulls. Jersey
110
108
106
104
102
100
98
96
94
92
90
1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008
Jersey CG
Jersey CS
Jersey G-index

Economic weights for growth Index

	CGS	CGL	CS
Holstein	100.65	100.65	13.8
RDC	111.4	111.4	13.6
Jersey	45.6	-	10.1

Genetic development of growth index



Summing up

• A joint genetic evaluation between Denmark, Finland and Sweden is in place

•High heritabilities

•High genetic correlations CGS:CGL

•High genetic correlations between countries

•Growth index included in Nordic Total Merit index

Thank you!