

Scandinavian co-operation in dairy evaluation

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Nordic Cattle Genetic Evaluation (NCGE)

a tool for practical breeding with red breeds

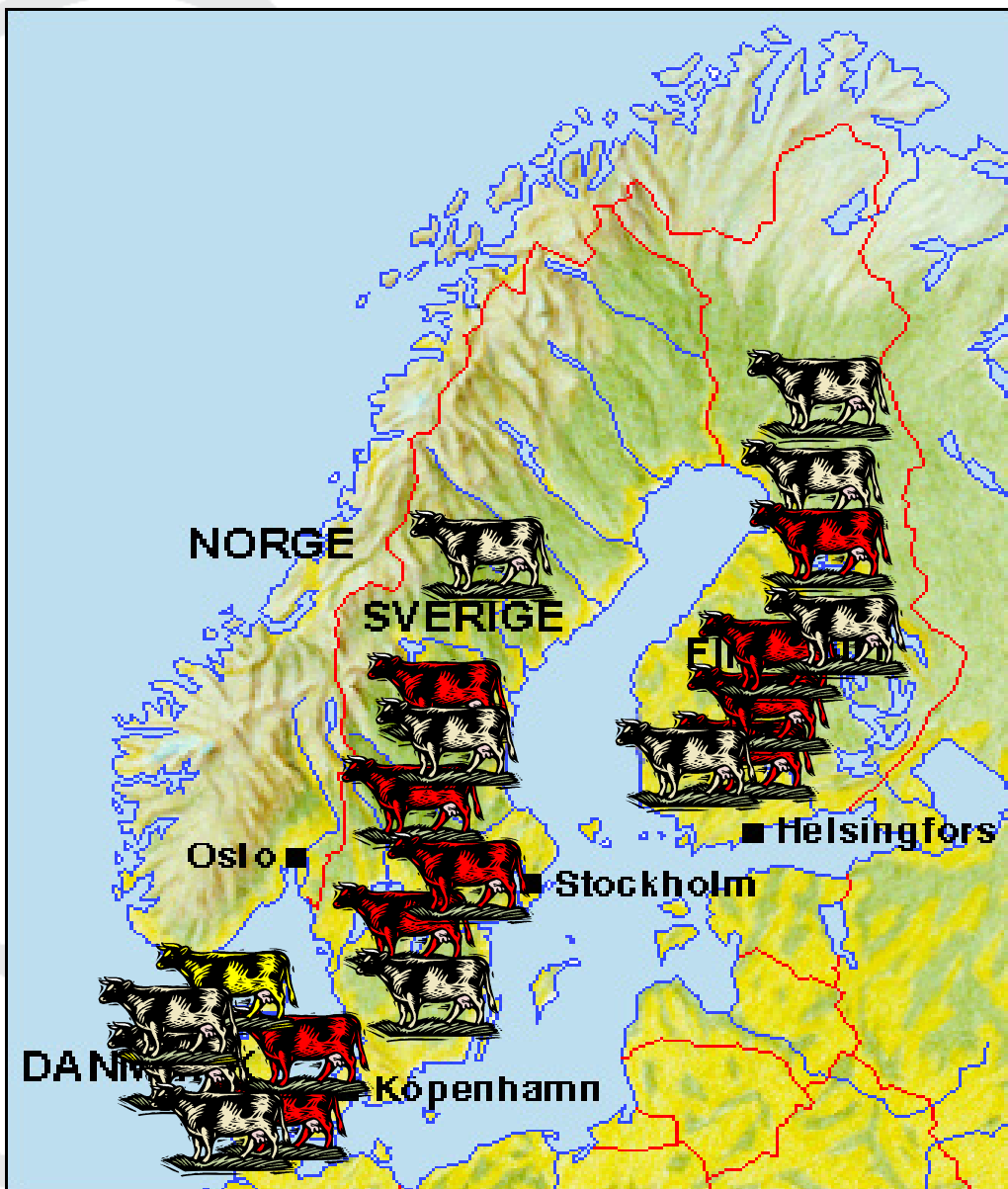
- 1. Introduction**
- 2. Breeding structure**
- 3. Data collection**
- 4. Genetic evaluation**
- 5. Publication of EBVs**
- 6. Breeding goal**
- 7. Future plans**
- 8. Final remarks and conclusion**

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Nordic Cattle Genetic Evaluation



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Established 01.01.2002 by:

Faba breeding

Swedish Dairy Association

Danish Cattle

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Nordic Cattle Genetic Evaluation - history

- 2002 - Established
- 2002 – Development has started
- 2005 – first EBVs published – type, milk ability, temperament and fertility
- 2006 – Yield and mastitis
- 2007 – Calving (Holstein)

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NAV – Goal

- To use international accepted methods for estimation of BVs
- To focus on development of methods within the “Nordic traits” – mastitis, fertility etc.
- To improve the breeding work using new registrations

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Perspectives - Joint Nordic estimation of breeding values

- Use resources more efficient:
 - Development of new method
 - Routine evaluation
- Simultaneously use of all data and relationships between Nordic animals
 - All cows and sires can be directly compared
 - Joint platform for practical breeding work

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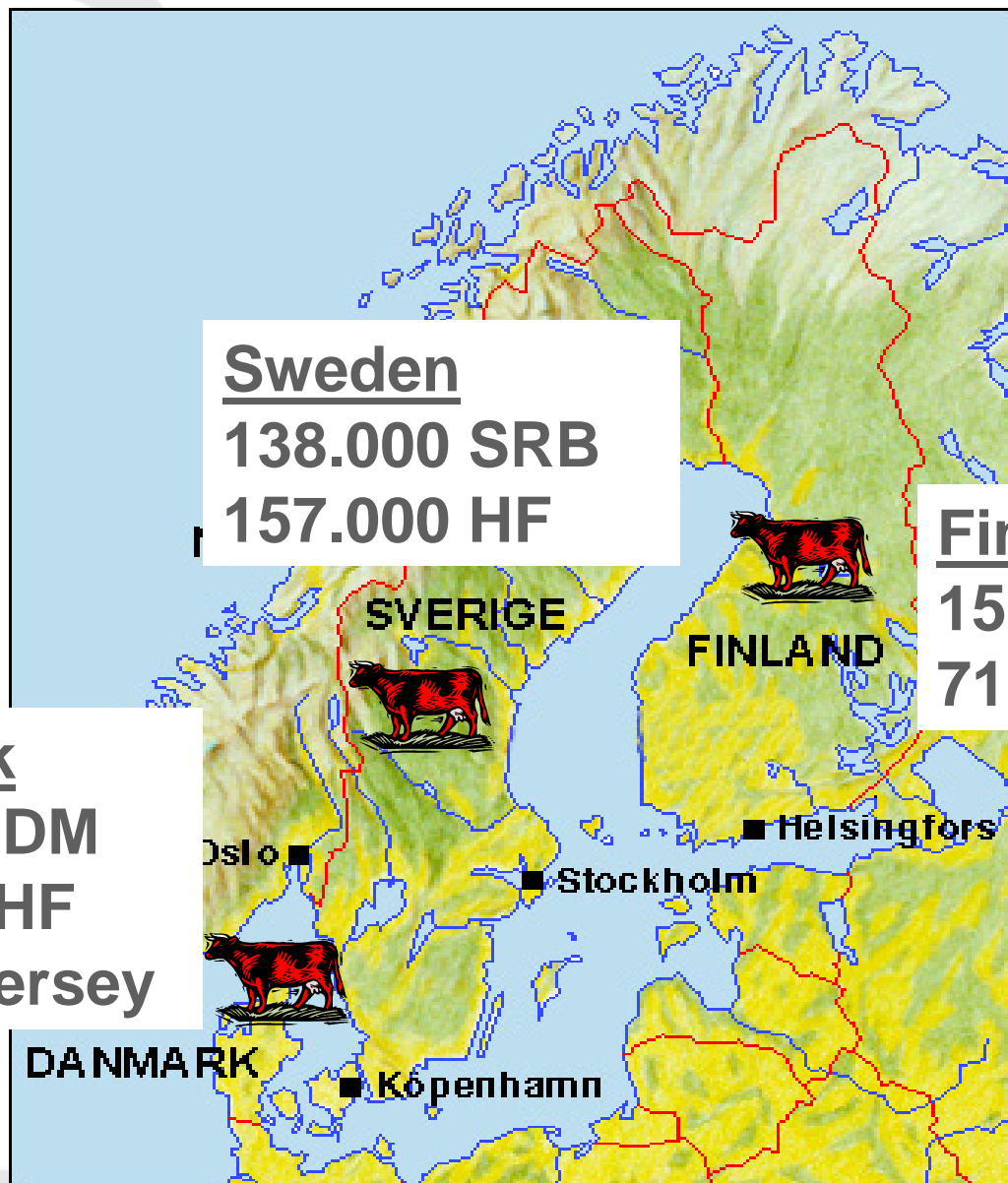
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Sweden
138.000 SRB
157.000 HF

Finland
156.000 FAY
71.000 HF

Denmark
40.000 RDM
362.000 HF
58.000 Jersey



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Tested young bulls

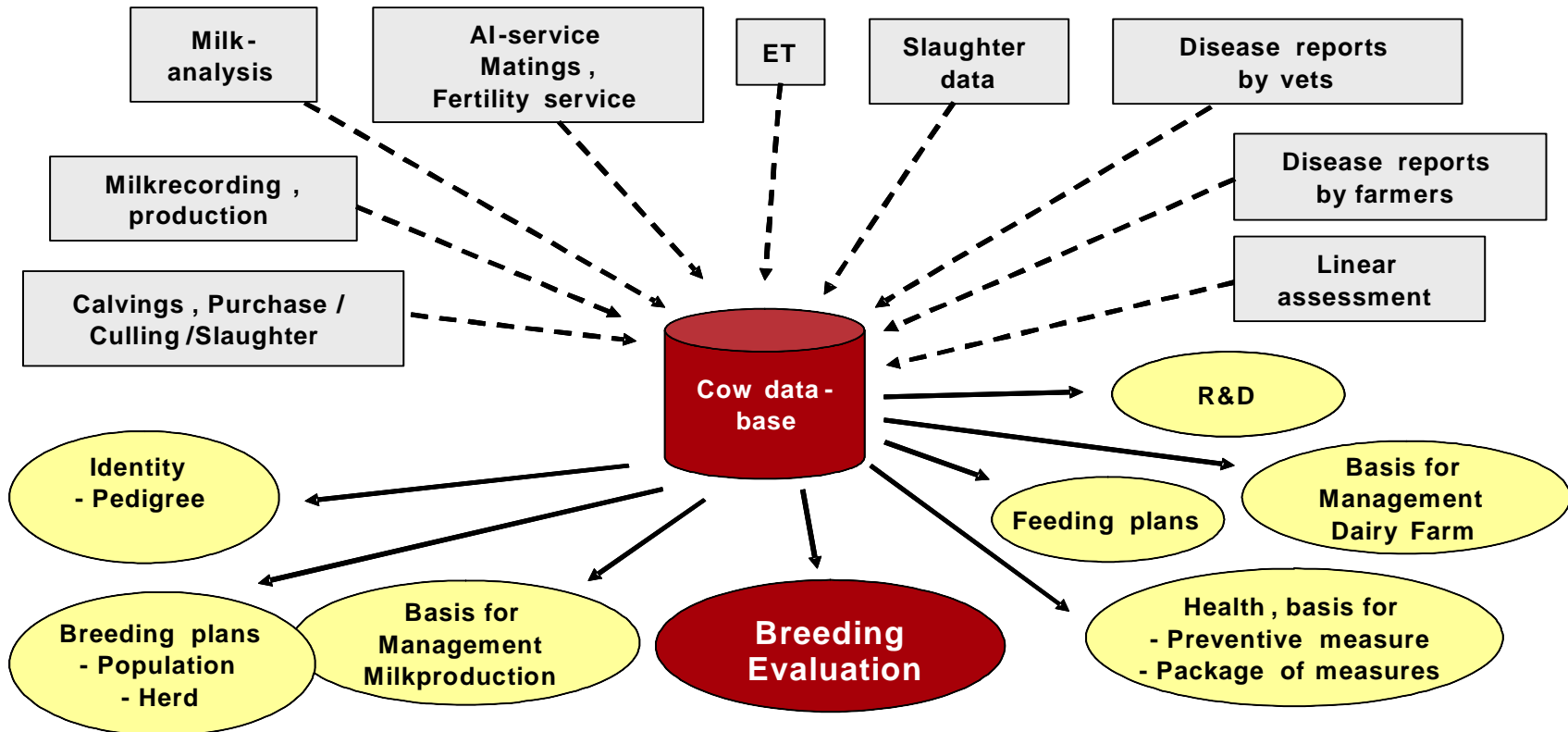
- 270 RDC bulls
 - 430 Holstein
 - 60 Jersey
-
- 30% of the females inseminated by young bulls
 - Progeny group size 90-250 (smallest DNK largest FIN)

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Cow database



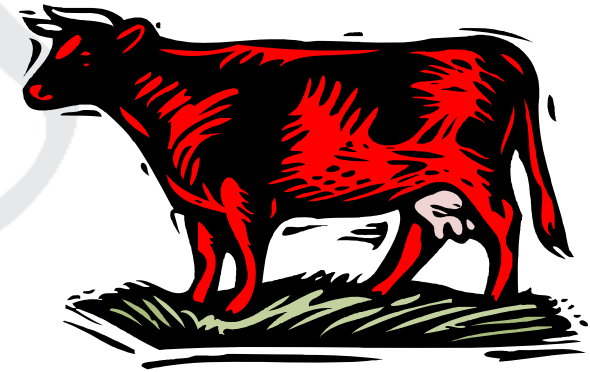
Data flow in relation to the central data base



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Registration

- Pedigree:
 - Complete pedigree (unique id)
- Traits:
 - Production
 - SCC
 - Type traits, milking speed and temperament
 - Longevity
 - Fertility traits
 - Calving traits
 - Disease treatments - mastitis



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Herd size, number of cows

	2007	2000
Denmark	116	73
Finland	25	18
Sweden	55	34

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Number of herds

	2007	2000
Denmark	4300	7600
Finland	9300	15200
Sweden	5500	9100

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Average yield, all breeds

		Milk	Fat	Protein
Denmark	2000	7610	327	264
	2007	8919	378	306
Finland	2000	7775	332	264
	2007	8795	369	306
Sweden	2000	8537	351	286
	2007	9214	382	317

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Average yield, RDC, 2007

	Milk, kg	Fat, kg	Protein, kg
Denmark	8663 (9372)	362 (380)	303 (314)
Finland	8616 (9283)	372 (368)	302 (317)
Sweden	8752 (9739)	377 (390)	309 (328)

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Average yield RDC, 2007

	Fat %	Protein %
Denmark	4.18 (4.05)	3.50 (3.32)
Finland	4.32 (3.96)	3.50 (3.42)
Sweden	4.30 (4.00)	3.53 (3.37)

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Breed characteristics RDC compared to Holstein

- Yield traits
 - 700-900 kg milk; 5-15 kg fat, 10-20 kg protein (RDC less)
- Stature
 - 4-6 cm (RDC lowest)
- Mastitis
 - 2-3% (RDC less mastitis)
- Fertility
 - Calving interval 15 days (RDC shortest)
- Live born calves
 - 3-5% (RDC less still born)

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Total Merit – RDC compared to Holstein

M. Lidfeldt (2006):

**SRB and Swedish Holstein
same level – Total Merit**

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Harmonization of registration

- Ongoing harmonization work:
 - Type traits
 - Exactly the same traits are scored (Finland 4 new, Denmark 1 new)
 - Joint manual
 - Nordic classifier workshop every 2nd year
- Hoof trimming data, other future reg.

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Mammary system- 2004

	SWE	DNK	FIN
Fore udder	X	X	X
Rear udder heigth	X	X	X
Rear udder width	X	X	X
Udder support	X	X	X
Udder depth	X	X	X
Teat length	X	X	X
Teat thickness	(X)	X	
Teat place. (front)	X	X	X
Teat place. (back)	(X)	X	X
Udder balance	X		X

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Mammary system - 2008

	SWE	DNK	FIN
Fore udder	X	X	X
Rear udder heigth	X	X	X
Rear udder width	X	X	X
Udder support	X	X	X
Udder depth	X	X	X
Teat length	X	X	X
Teat thickness	X	X	x
Teat place. (front)	X	X	X
Teat place. (back)	X	X	X
Udder balance	X	X	X

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Hoof trimmer data - Basis

- 4 categories of hoof problems as 0/1
 - Dermatitis
 - Heel Horn erosion
 - Sole Haemorrhage
 - Sole Ulcer

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Data registration and quality

- **Coming years:**
 - **Functional traits will be recorded on large scale outside the Nordic countries**
 - **Data quality need attention**
 - **Focus on easy and accurate registration – also a challenge for Nordic countries**
 - **New traits**

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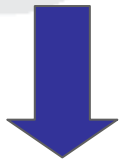
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Progeny testing

- Error in registration of pedigree or phenotype



- Less reliable EBVs



- Less accurate selection of breeding animals



- Less genetic progress



Estimation of breeding values

Use the registered data in the best possible way



Estimate accurate EBVs

- Improved statistical models
- New traits

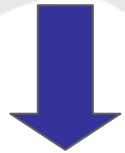
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Estimation of breeding values

- Improved statistical models



- More accurate EBVs



- More accurate selection of breeding animals



- Higher genetic progress

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Genetic evaluation

Finland, Sweden and Denmark benefits from their similar registration systems in the Joint Nordic Genetic Evaluation

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Genetic evaluation

Data

Denmark

Sweden

Finland

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NAV model

NAV- EBVs

Joint ranking of animals

- Expressed on rolling "cow base" – mean 100
- Expressed with a standard deviation of 10

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Nordic Cattle Genetic Evaluation – routine evaluation

- **2005 – First EBVs joint EBVs published – type, milk ability, temperament and fertility**
- **2006 – Yield and mastitis**
- **2007 – Calving (Holstein)**

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Nordic Cattle Genetic Evaluation – in preparation for routine evaluation

- Calving traits (RDC)
- Update of yield model
- Other diseases

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Nordic Cattle Genetic Evaluation – ongoing development work

- Total Merit index
- Update of mastitis model
- Update of yield model – genetic parameters

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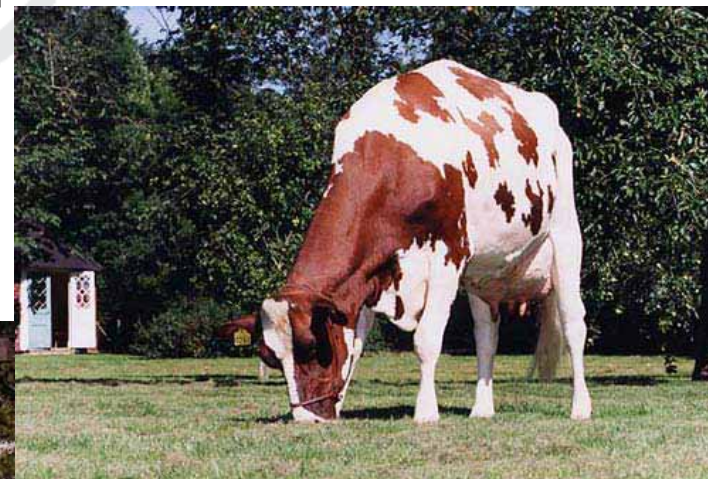


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Peterslund, SRB



Peterslund daughters
milking in Sweden,
Finland or Denmark



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Breeding values can be compared across Denmark, Finland and Sweden



Peterslund

Denmark

Sweden

Finland

Number of
daughters

Yield index

Udder health

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234

13,849

5,413

110

111



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Routine genetic evaluation

- 3 breed groups – RDC, Holstein and Jersey
- Frequency - 6 times per year for all traits

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Nordic routine evaluation

- **Presentation of breeding values**
 - Common base
 - Common standard deviation
- **Common dates for publishing EBVs**
- **Breeders in Denmark, Finland and Sweden can see the same EBVs at the same time**

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Nordic presentation of EBVs

- **Common base**
 - Cow base – 2 birth years (15.5.2003-15.5.2005)
 - Average 100 all traits
 - Same base for cows/heifers and sires
 - Base update at each routine run

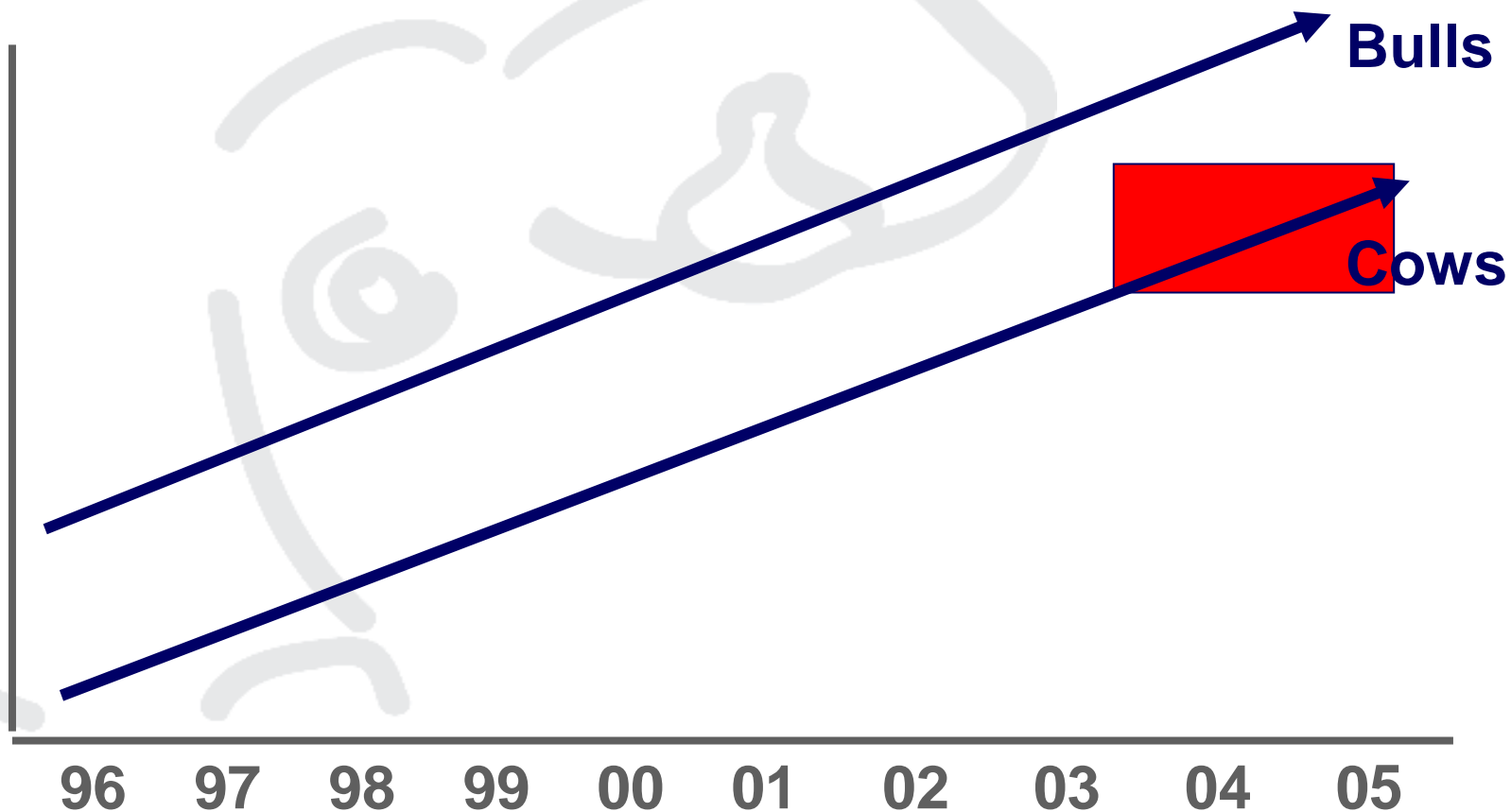
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Nordic - genetic base

EBV



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Standard deviation

- Express the variation around a mean
- Standard deviation 10
 - 67% of the sires have EBVs between 90 and 110 for traits with out genetic changes over years
 - Standardizations factors for all traits based on bulls born in 1997-98 with a Nordic 1st batch of daughters

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Presentation of EBVs

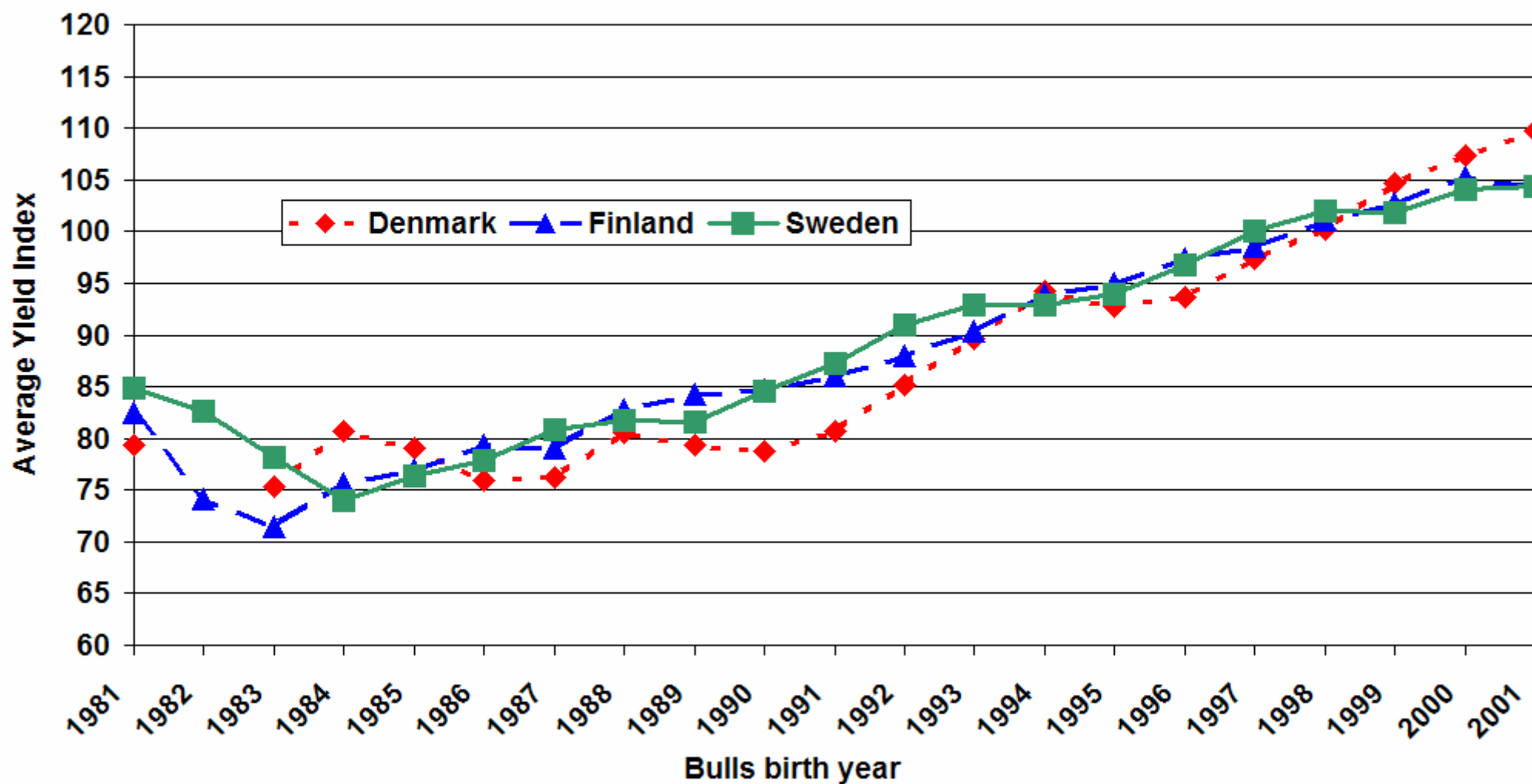
	Until 15 April 2005		Today	
	Base	Standard deviation	Base	Standard deviation
Sweden	100	7		
Finland	100	10	100	10
Denmark	100	5		
Denmark type	0	1		

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Genetic trend Yield - RDC

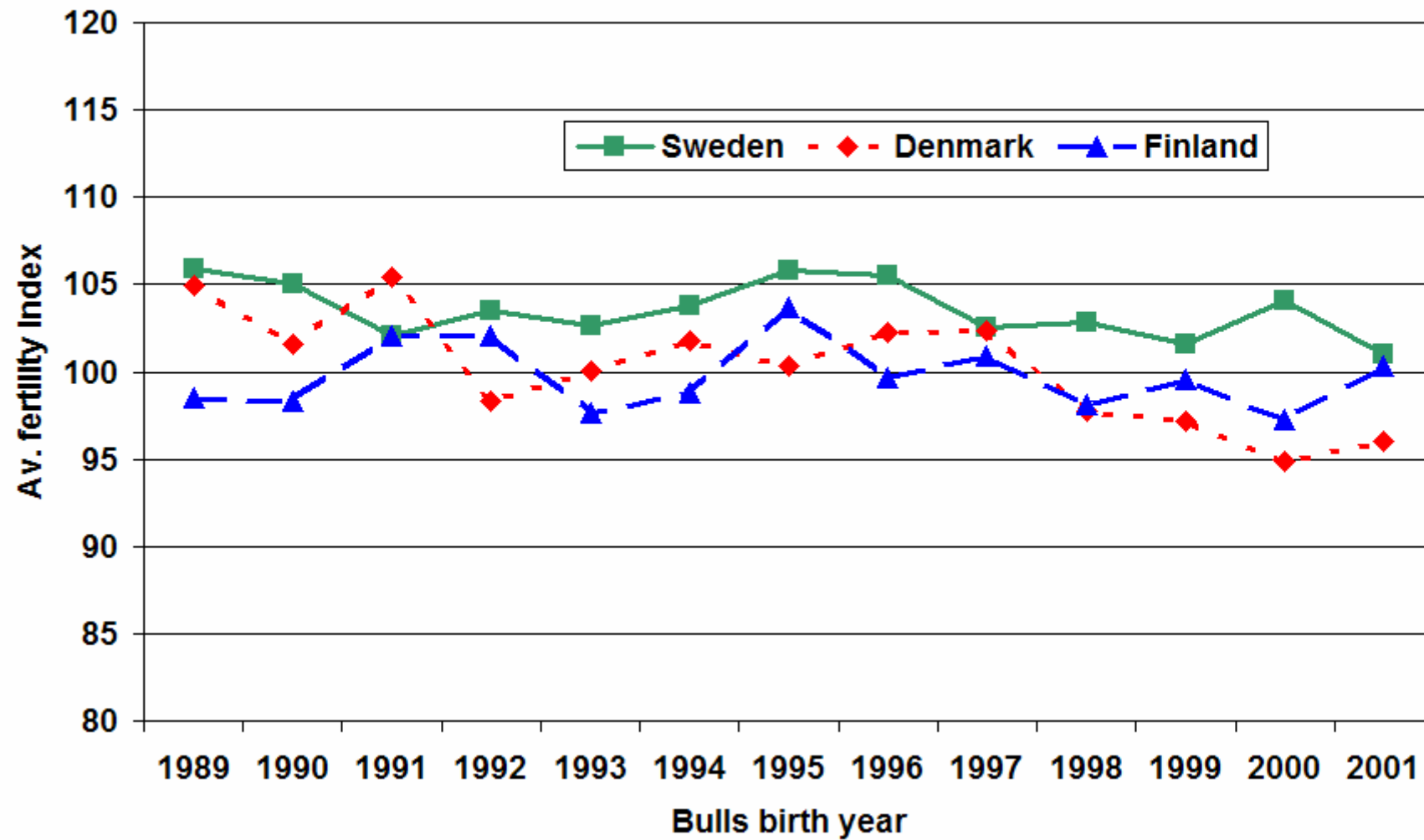


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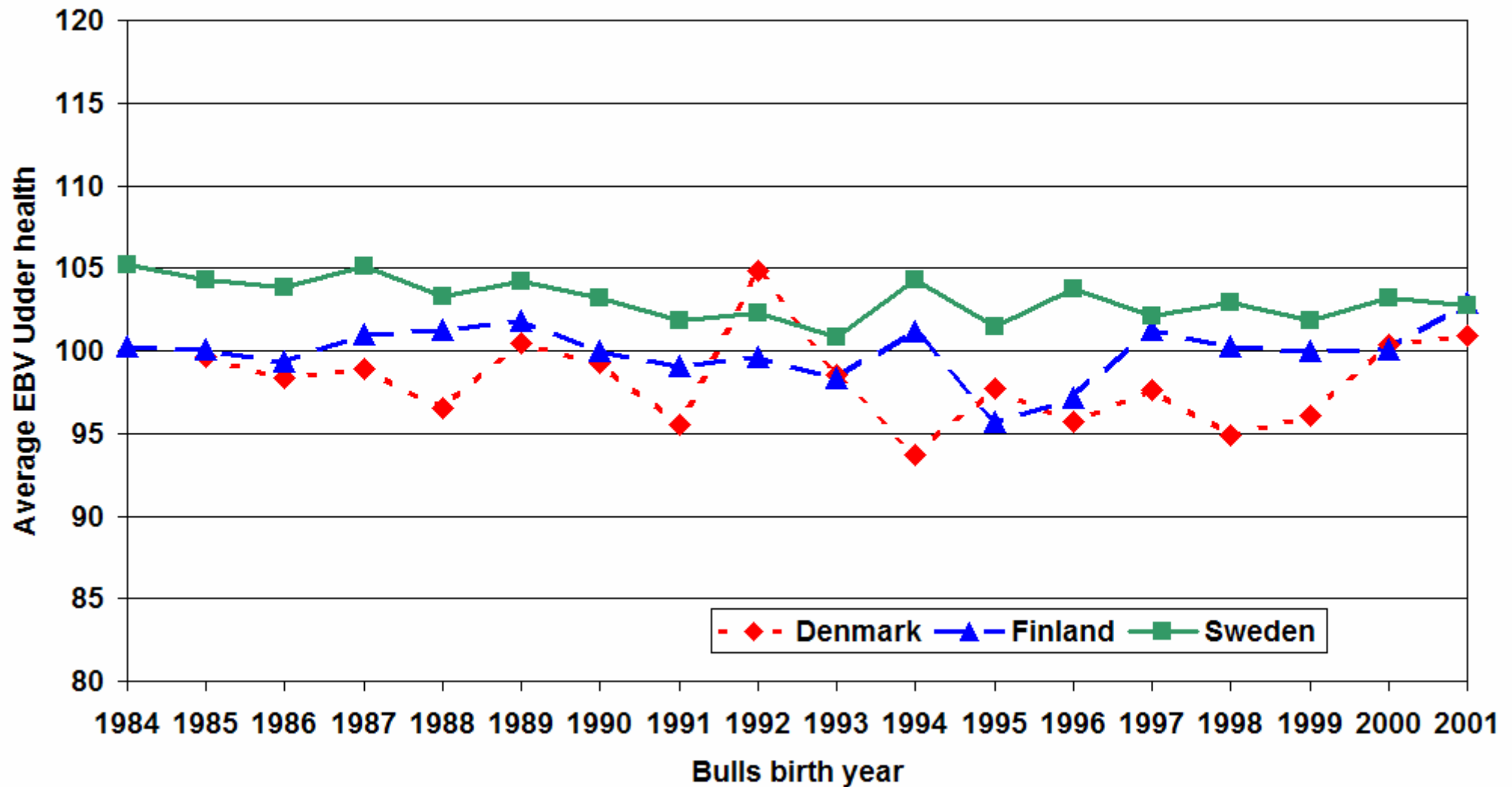


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Genetic trend Fertility index



Genetic trend for Udder health

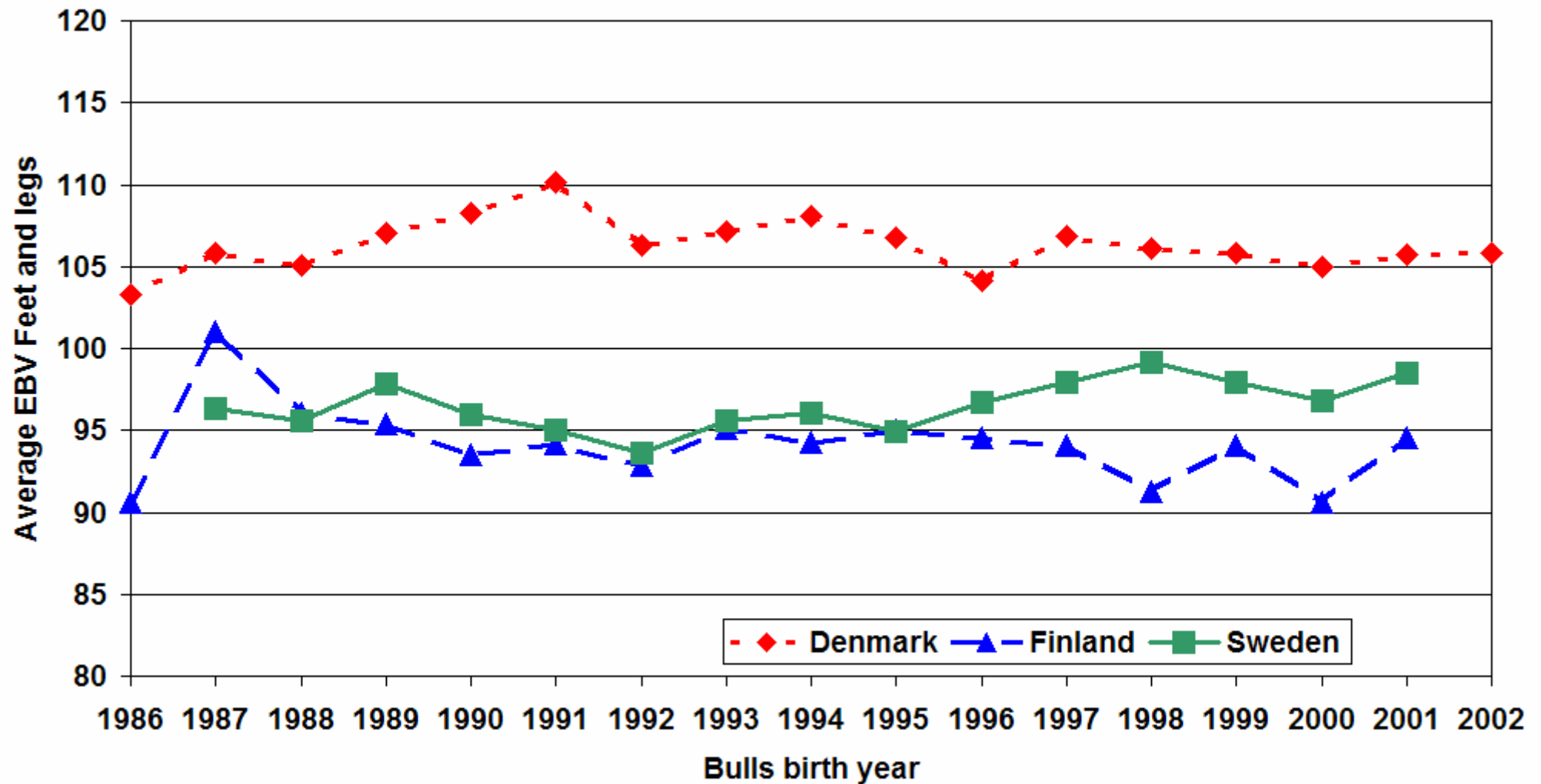


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Genetic trend Feet & legs - RDC

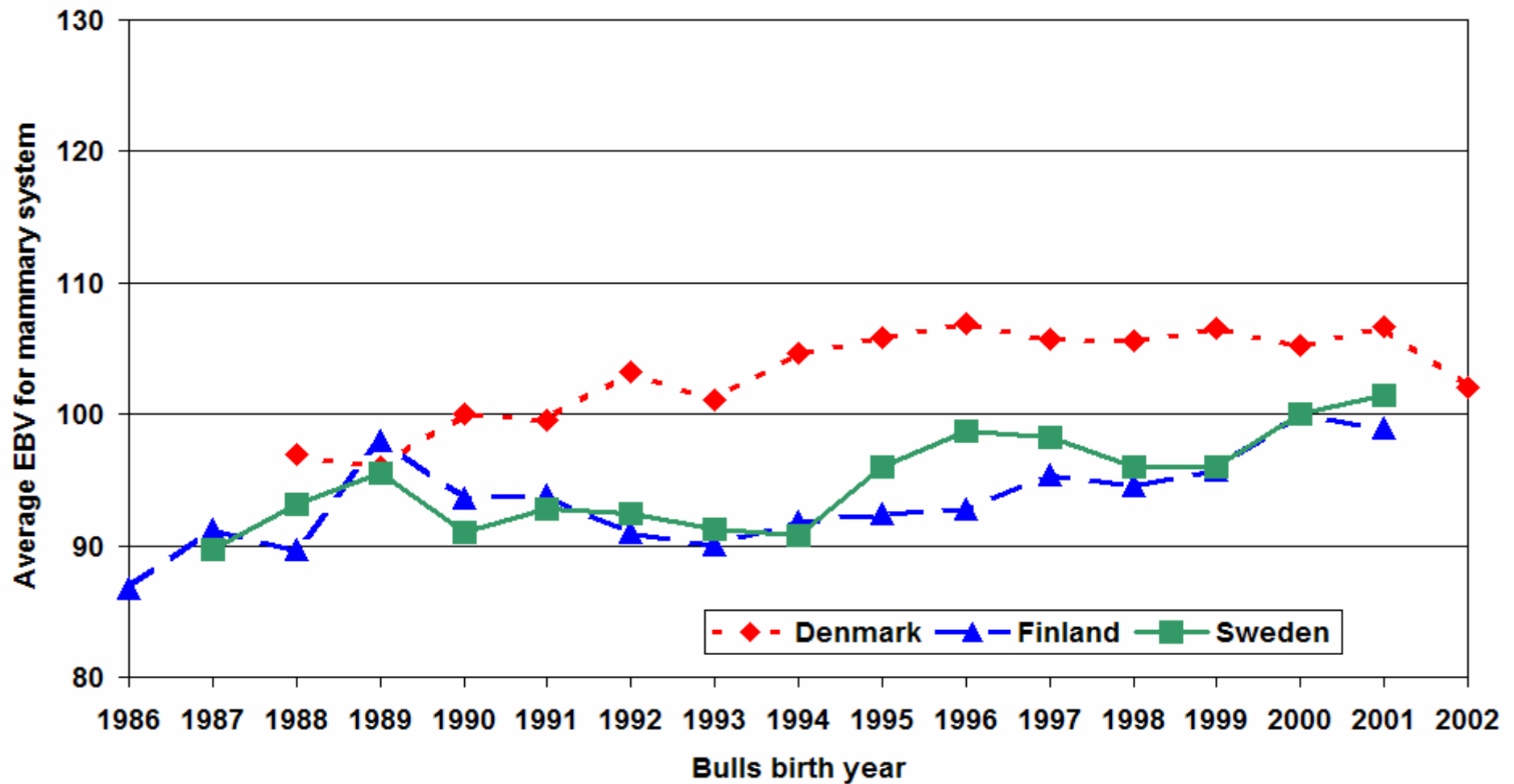


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Genetic trend mammary system - RDC



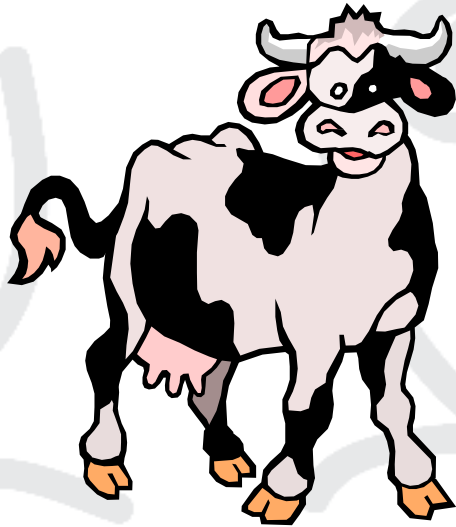
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Breeding goal

Get maximum economic gain



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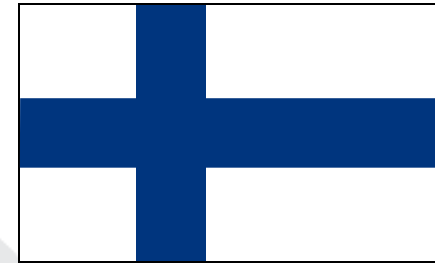
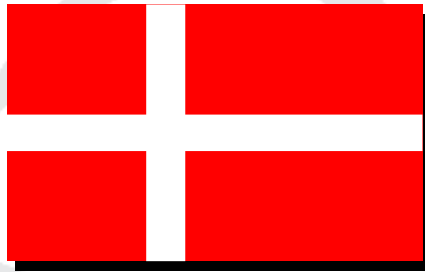
Correlation with TMI – Red breeds

	Denmark	Finland	Sweden
Yield	0.64	0.66	0.52
Fertility	0.08	0.19	0.34
Mastitis	0.55	0.32	0.38
Other disease	0.43	0.09	0.09
Longevity	0.61	0.27	0.49

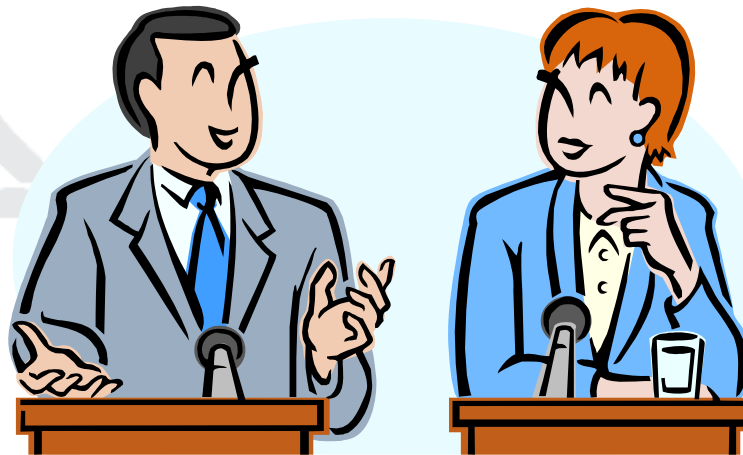
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Joint Nordic Breeding Goal
– is not decided yet, but a positive debate is going on



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Process – joint Nordic breeding goal

Economic basis 2007

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Expectations for the future – traits getting bigger/smaller
value 5-10 years ahead

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Joint Nordic Breeding Goal



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Joint Nordic Breeding Goal



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General about methods

- Use the best methods which can be handled in practice
- Update of genetic parameters
- We have to use our data as efficient as possible
- Focus on supporting the strength of Nordic cattle breeding – functional traits

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Benefits by joint Nordic evaluation

- Efficient use of resources
- More reliable EBVs
- Common platform for AI industry

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Conclusion

NAV want to give:

The practical cattle breeding the best selection tool to achieve maximal genetic progress

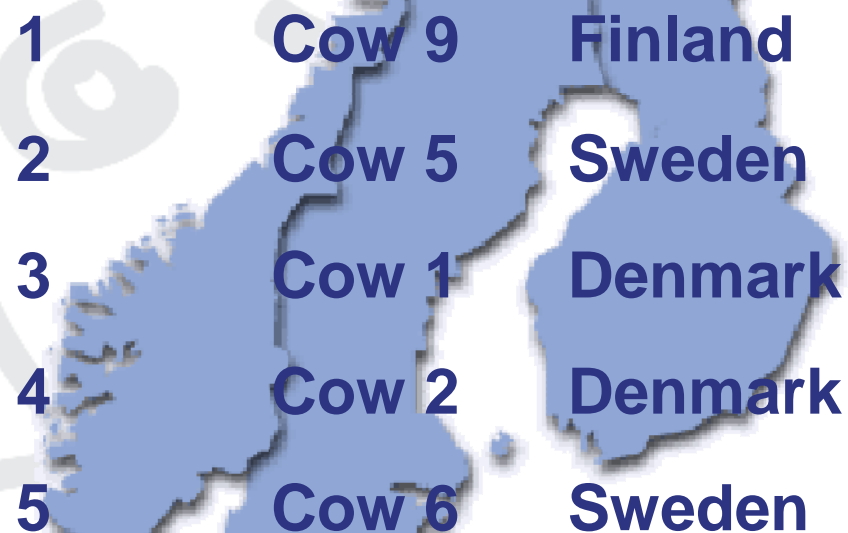
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EBVs can be compared within the Nordic countries

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1 Cow 9 Finland
2 Cow 5 Sweden
3 Cow 1 Denmark
4 Cow 2 Denmark
5 Cow 6 Sweden

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