

Nordic genetic evaluation for purebred beef cattle

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Why go Nordic?

- Increase the accuracy of estimated breeding values
- Enable within breed comparison of cows and bulls across Nordic countries
- Is resource efficient



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Nordic purebred beef evaluation

Breeds

- Aberdeen Angus (AAN)
- Beef Simmental (SIM)
- Charolais (CHA)
- Hereford (HER)
- Limousine (LIM)

Breeding values

- Calving
- Growth and carcass

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Registrations

- Calving ease and calf survival scores (> 1998)
- Birth, weaning and post-weaning weights and carcass records since the 80's for DNK and SWE and 90's for FIN
- **From:** Farmers, technicians, test stations (SWE) and slaughterhouses

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Calving traits

3 traits (12 breeding values)

- Calf survival (up to 24h)
- Calving ease
- Birth weight

2 groups

- First calving
- Later calving



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Calving traits

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- Calf survival (up to 24h)*
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- Birth weight*

2 groups

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**maternal and direct breeding values*



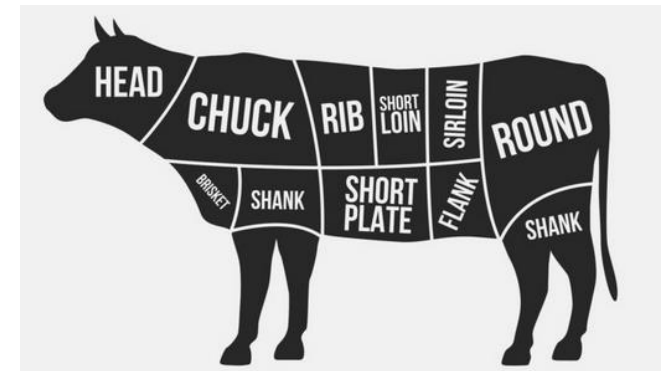
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Weight/growth and carcass traits

7 traits (10 breeding values)

- Birth weight
- Weaning weight gain
- Post-weaning weight gain (FIN&SWE)
- Yearling weight (DNK)
- Slaughter daily gain
- EUROP conformation class
- EUROP fat class



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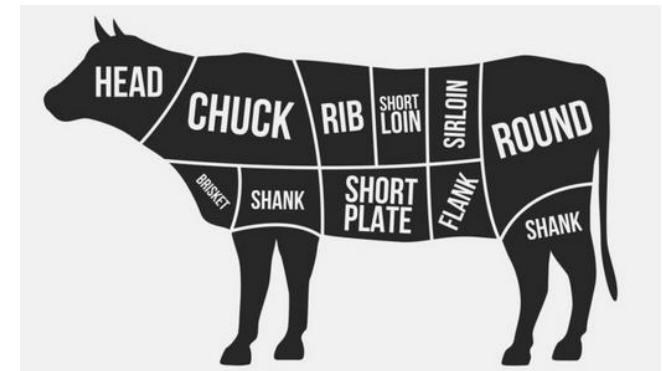
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Methods for HV adjustment

- **Growth and carcass**
 - Simple adjustment
 - Country – year – breed – sex
- **Calving ease/Calf survival**
 - Snell scores
 - Country – year – breed – sex – primi- vs multiparous calvings *

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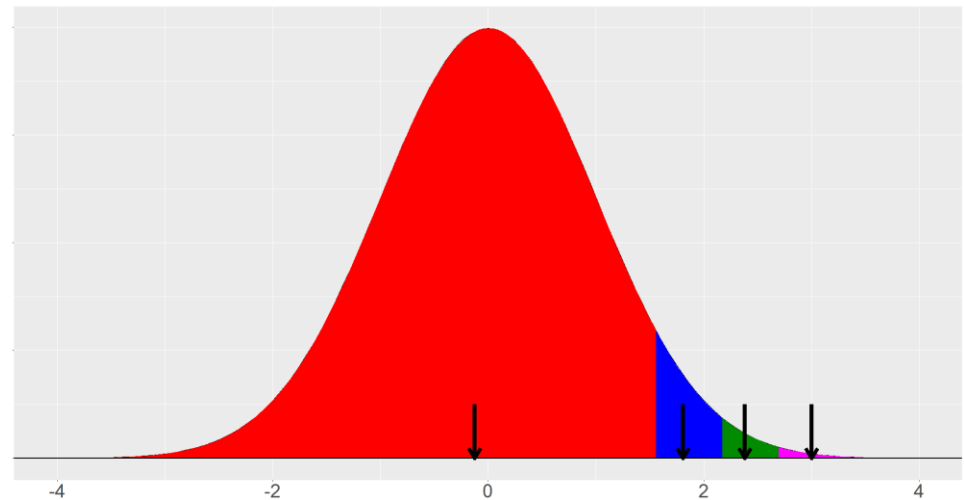


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* Small groups are merged

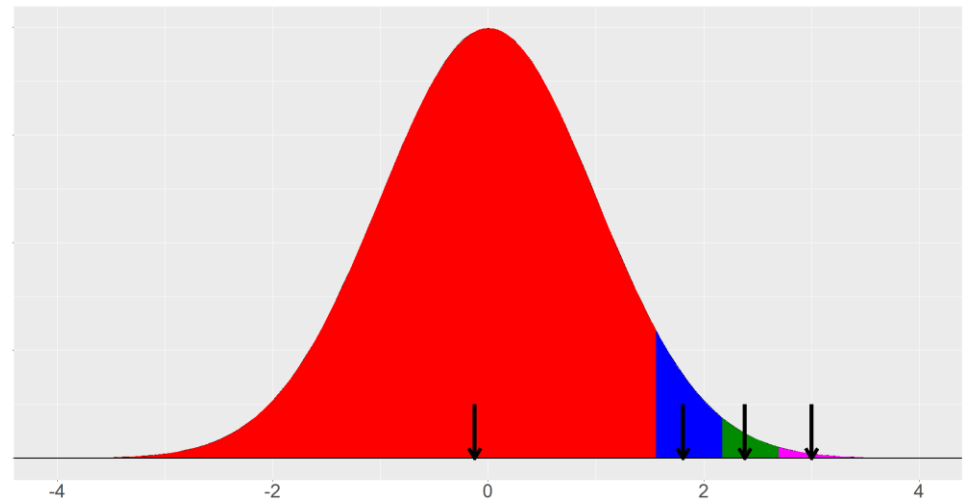
Calving, Snell scores

- Given the proportions in each category, replace category labels (e.g., 1-4) by the expected value on the underlying scale
- Distance between categories adjusted for frequency distribution



Calving, Snell scores

- Given the proportions in each category, replace category labels (e.g., 1-4) by the expected value on the underlying scale
- Distance between categories adjusted for frequency distribution
- More realistic breeding values for cows with difficult calving



Genetic parameters

- Estimated for Charolais and Hereford and applied them within breed group (Continental and British)
- Pattern of **genetic correlations** among traits was remarkably **similar for Charolais and Hereford**.
- Same principle applied in both, the calving and the growth/carcass evaluation

Breed-wise multi-trait animal model

Fixed

- Country-sex
- Country-twin (*only carcass*)
- Country-year-month
- Country-dam age-time
- CG: Herd-birth year
- Adjustment for age at weighing (*only carcass*)

Random

- Animal genetic
- Maternal genetic
- Dam permanent environmental (maternal)

The genetic model also includes:

[Genetic groups](#)

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Genetic Groups definition

- Selection path: Differences in genetic level between genders are assumed to be negligible
- Based on country of origin and year of birth
 - Danish, Finish, Swedish, European, American, Canadian and “rest” (*Non-Nordic countries and breeds other than the breed of evaluation are pooled together*).
 - 10-year groups (capture the trend)
 - GG \geq 100 animals

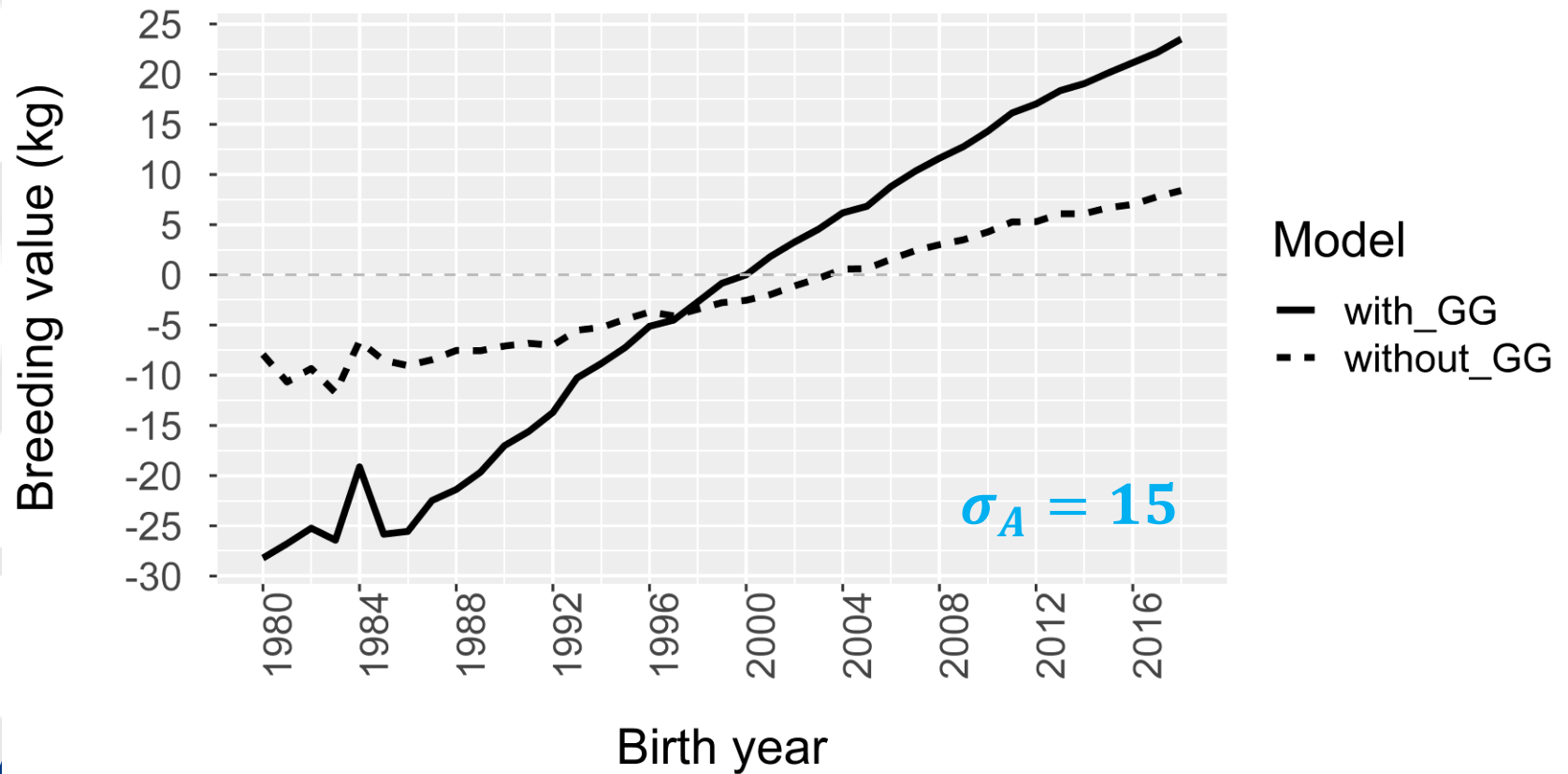
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Genetic trends

Angus, weaning weight gain, direct



Properties of the breeding values

- **Stability:** EBVs from successive evaluations (more data)
 - Correlations
 - Standardized EBV change (*as a function of reliability and genetic standard deviation*)
- **Validation:**
 - Legarra and Reverter method
 - AI sires used in more than one country

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Summary

- **First joint Nordic EBVs** for calving, weight gain and carcass traits for pure beef cattle published **in November 2021**



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Summary

- **First joint Nordic EBVs** for calving, weight gain and carcass traits for pure beef cattle published **in November 2021**
- In the **process** of establishing **joint composite EBVs**
- **Coming next:**
 - Include more breeds
 - Include fertility
 - Genomic prediction

