Does selection on Estimated Breeding Values work?
Results from 20 years of selection

Izaan du Plooy

16 October 2020

LEWENDEHAWE REGISTRERENDE FEDERASIE
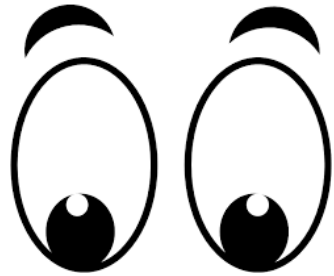LIVESTOCK REGISTERING FEDERATION

Does selection on Estimated Breeding Values work?

- ▶ Can I trust EBVs?

- ▶ This animal's EBV is wrong

- ▶ Can I trust the science?

- ▶ Will I make genetic progress within my herd if I select my replacement animals on EBVs?

- ▶ Breeders are often very skeptical about breeding values and if it really works

- ▶ NB!!! EBVs are a powerful tool, but just like any other tools you need to know how to use it properly
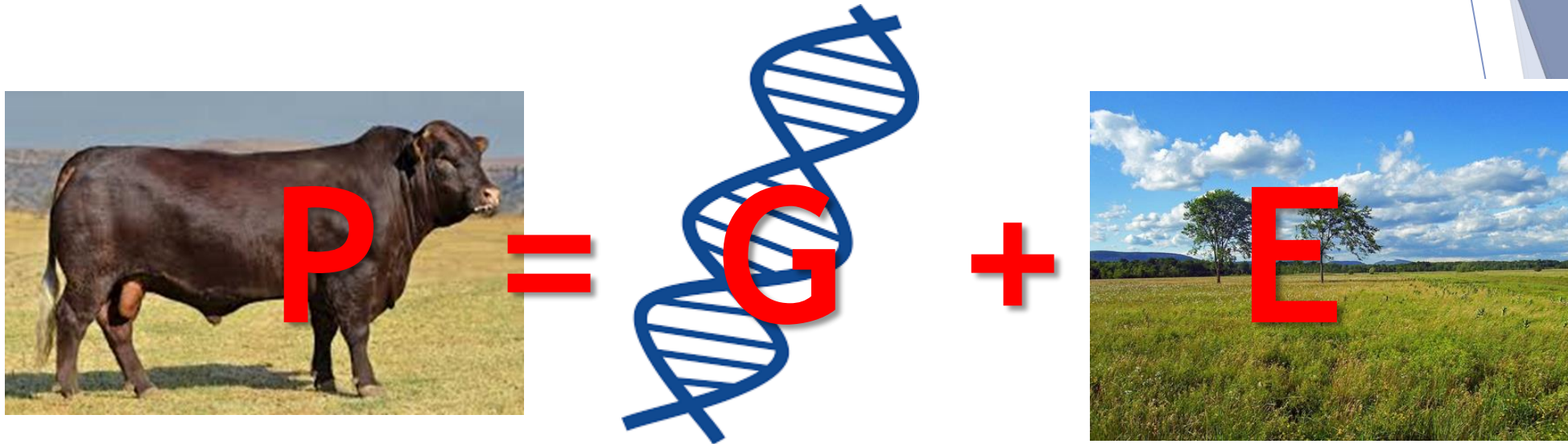
What is the alternative?

Phenotypes???

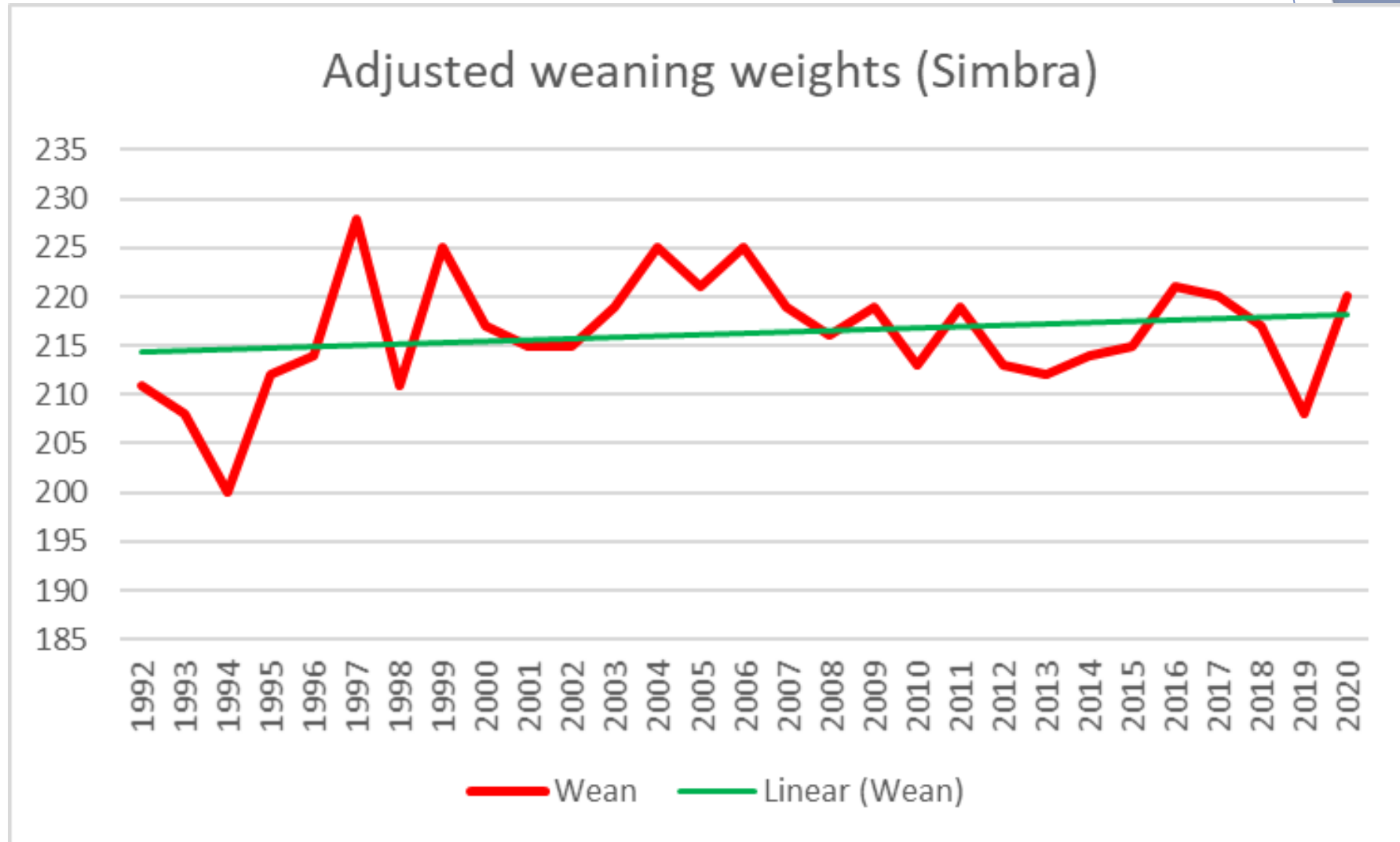# Which is genetically the better bull?
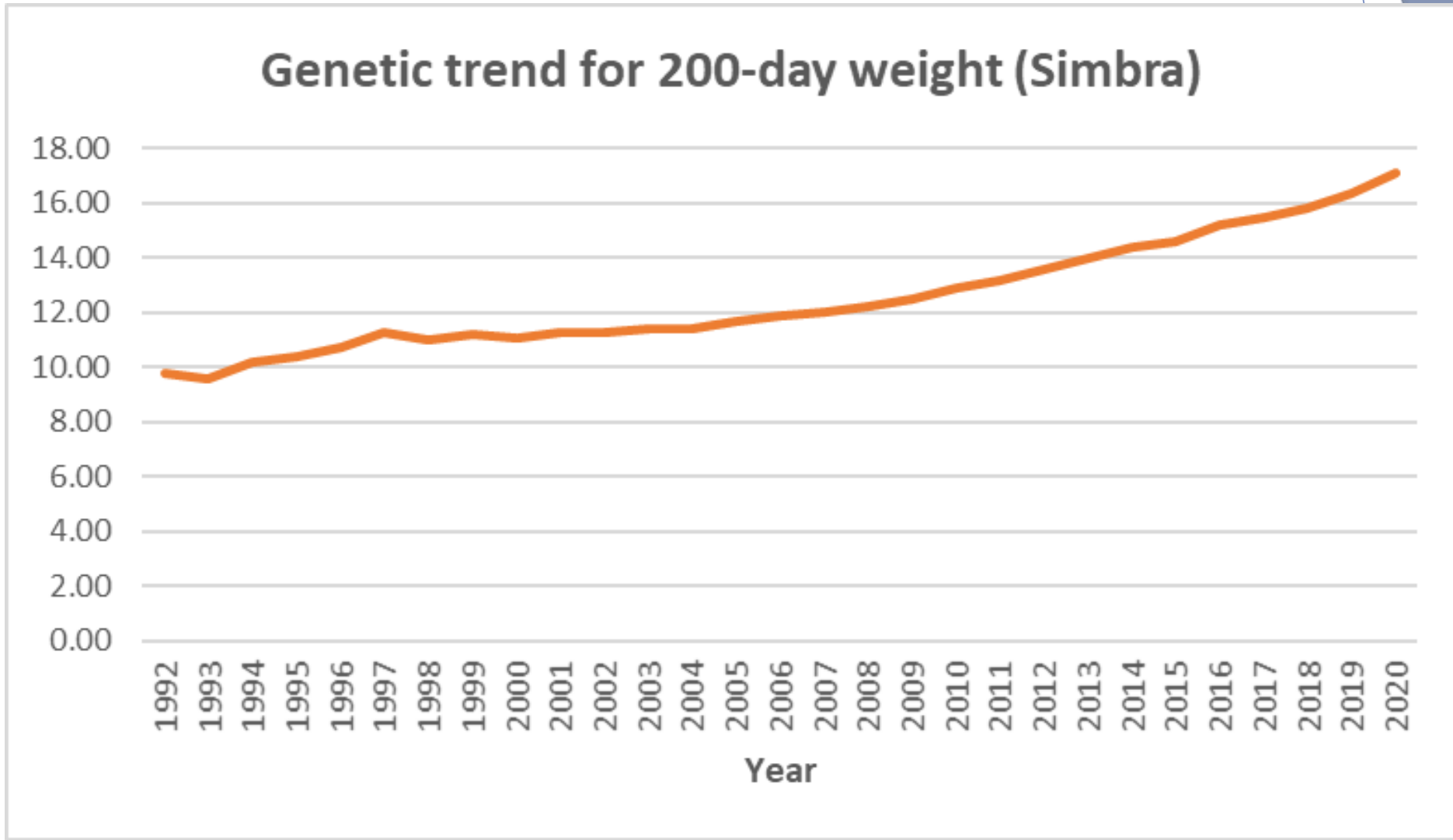
Difficult to select on Phenotype

$$P = G + E$$

- ▶ Phenotype is influence by the environment, e.g. rainfall, temperature, availability of grass, etc.
- ▶ Thus it is difficult for a breeder to differentiate between the genetics of an animal for a specific trait and the environmental influence on the expression of the trait.
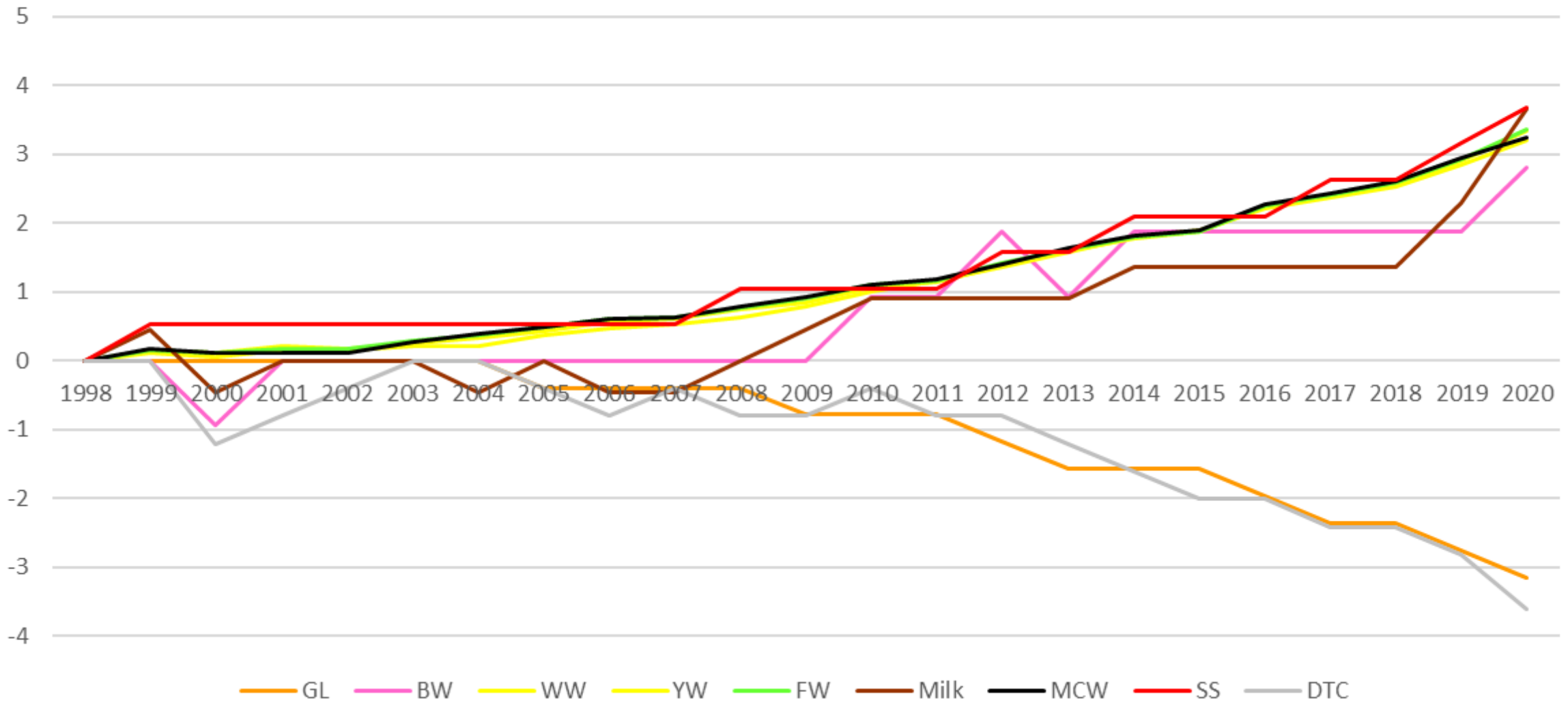
Phenotypic trend of weaning weight

Adjusted weaning weights (Simbra)

Genetic trend for weaning weight

Genetic trend for 200-day weight (Simbra)

Genetic trends for growth, milk & fertility traits in Simbra

Do EBVs work? – Example 1

► Compared the average raw weaning weight of the following two groups of animals:

➢ Bull calves born in 2012 with WW EBV acc of > 75%, divided between:

✓ Bulls with a WW EBV of ≥ than breed average (≥ +16kg WW EBV)

and

✓ Bulls with a WW EBV of < than breed average (< +16kg WW EBV)

Do EBVs work? – Example 1

▶ Bulls in top 50% average weaning weight = 284kg

▶ Bulls in bottom 50% average weaning weight = 246kg

Difference = 38 kg

If you select bulls with good weaning weight EBVs, you will have heavier weaners.

What about their offspring? – Example 1

▶ Will bulls with above average EBVs have genetically better offspring than bulls with below average EBVs?

❑ Offspring of group 1 (higher than breed average):

  ✓ Average weaning weight = 244.37kg (over different years)

  ✓ Average WW EBV = **18.58kg**

❑ Offspring of group 2 (lower than breed average):

  ✓ Average weaning weight = 231.38kg (over different years)

  ✓ Average WW EBV = **11.31kg**

Do EBVs work? – Example 2

Breed Z			Animals with 200-day EBV ≥ breed avg.		Animals with 200-day EBV < breed avg.		
Birth year	Total number of bulls	Number of bulls with ww acc ≥ 75%	Number of bulls with ww acc ≥ 75 & WW EBV ≥ +12	Avg. raw ww of animals with ww acc ≥ 75 & WW EBV ≥ +12	Number of Bulls with ww acc ≥ 75 & WW EBV < +12	Avg. raw ww of animals with ww acc ≥ 75 & WW EBV < +12	Diff. in ww between two groups
2008	3074	94	46	253	48	236	17
2009	3716	100	50	254	50	242	12
2010	4452	104	63	246	41	217	29
2011	4384	130	77	246	53	229	17
2012	4979	104	59	265	45	243	22
2013	5171	92	52	256	40	226	30

LRF

LEWENDEHAWE REGISTRERENDE FEDERASIE
LIVESTOCK REGISTERING FEDERATION

What about their offspring? – Example 2

▶ Breed Y

▶ Will bulls with above average EBVs have genetically better offspring than bulls with below average EBVs? Offspring of 2012 bulls.

❑ Offspring of group 1 (higher than breed average):

✓ Average weaning weight = 235.56kg (over different years)

✓ Average WW EBV = **14.52kg**

❑ Offspring of group 2 (lower than breed average):

✓ Average weaning weight = 220.38kg (over different years)

✓ Average WW EBV = **9.18kg**

Going forward…

▶ There is enough evidence that show that EBVs do work

▶ NB for breeders to use the available tools to their fullest extend

▶ Good progress has been made on the growth traits

▶ To remain relevant in die meat industry, breeders should focus on the fertility (e.g. Day to Calving), efficiency (e.g. Residual/Net feed intake) and meat quality traits.

▶ Genomics will help us to make faster progress in the above-mentioned traits, that still lag behind.

In conclusion...

▶ EBVs is a powerful tool made available by BREEDPLAN to societies and breeders that can help them to make genetic progress

▶ It is very important for breeders to know how to use EBVs optimally

▶ NB to remember that data collection is the cornerstone of any genetic evaluation