

Genetic evaluation – GENERAL ASPECTS

Breeds

- Dairy and dual purpose breeds:
 - Fleckvieh, Brown Swiss, Pinzgauer, Grauvieh, Gelbvieh, Vorderwälder
 - Holstein, Jersey: see description on www.vit.de
- Beef and gene conservation breeds: see own description (beefbreeds.pdf)

Frequency of genetic evaluation

complete breeding value estimation 3 times a year in April, August and December for all breeds
genomic breeding value estimation (single-step) is carried out every 2 weeks for Fleckvieh and Brown Swiss

Historical development of genetic evaluation in Austria

- 1963 Milk: Daughter population comparison
- 1985 Milk: BLUP sire model
- 1992 Milk and persistency: BLUP-animal model
- 1995 Longevity, fertility, calving ease, meat
- 1998 Somatic cell count, stillbirth, total merit index GZW
- 2000 Joint breeding value estimation with Germany for conformation Fleckvieh
Milking speed, crossbreeding index
- 2002 Joint breeding value estimation with Germany for all traits and breeds
Milk: test day model
- 2010 Health traits
Genomic breeding value estimation for Holstein
- 2011 Genomic breeding value estimation for Fleckvieh and Brown Swiss
- 2016 Rearing loss, new GZW, joint GZW with Czech Republic (Fleckvieh)
- 2017 Breeding value estimation for beef and gene conservation breeds
- 2021 Single-step breeding value estimation for Fleckvieh and Brown Swiss

Joint genetic evaluation

Since 2002, all breeding values (except for beef cattle and genetic conservation breeds) have been estimated jointly with Germany. For Fleckvieh, the Czech Republic is part of the joint breeding value estimation for all traits including the total merit index GZW. For Fleckvieh, Italy is included with the traits longevity, fertility and conformation, Slovakia with milk, persistency and somatic cell count and Hungary with meat.

The genetic evaluation for Holstein and Jersey is entirely carried out by VIT Verden (DE). For all other breeds the traits are divided between the computing centres in Bavaria (LfL Grub), Baden-Württemberg (LGL Kornwestheim) and Austria (ZuchtData Vienna) (see figure).

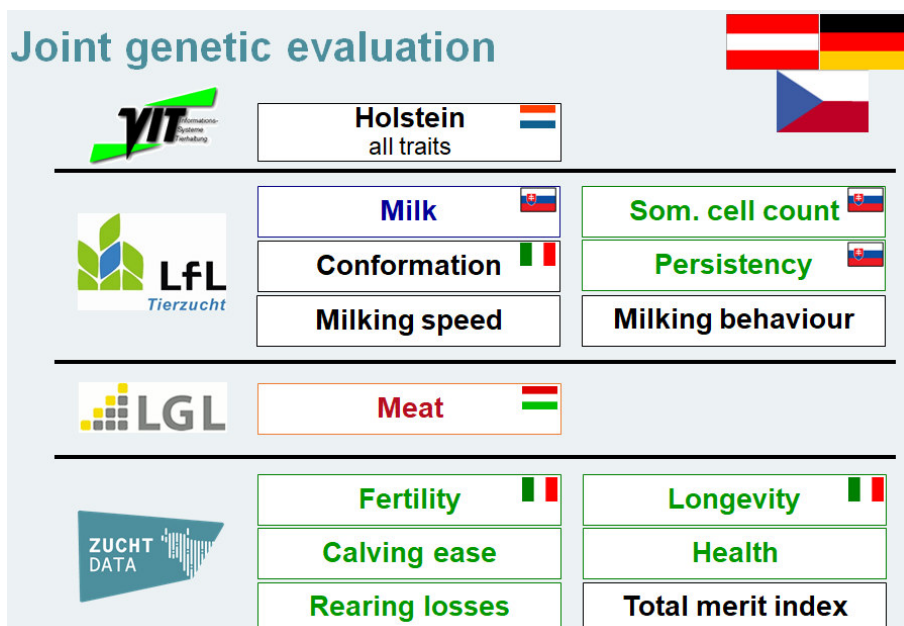


Fig.: Distribution of the breeds and traits in the joint genetic evaluation to the computing centres

Genetic reference base and standardisation

All relative breeding values are standardised to a mean of 100 and a deviation of 12 points based on the true genetic standard deviation, whereby breeding values above 100 are desirable from a breeding point of view (except for individual conformation traits).

The so-called base represents the reference point for the estimated breeding values in the breeding value estimation. This reference base is updated with every genetic evaluation, i.e. it is moved forward by approx. 4 months (rolling base).

Cows with the following ages are used as base:

- Fleckvieh: 4-6 years
- Brown Swiss, Pinzgauer, Vorderwälder: 6-8 years of age
- Grauvieh, Gelbvieh: 8-10 years of age

For the Holstein breed, the base (4-6 year old cows) is adjusted at each April evaluation. It should be noted that for Holstein (black) and Red Holstein (red) different bases are used in Germany in contrast to Austria.

Genomic evaluation

The single-step methodology was introduced in April 2021 for Fleckvieh and Brown Swiss. At the main dates of the genetic evaluation (April, August, December), a recalibration takes place including all phenotypes and genotypes available up to the cut-off date. The great strength of this method is that each animal contributes to the learning sample with its own performance and genotype information, and there is an information feedback to non-genotyped ancestors. Candidate runs take place every two weeks, with estimated marker effects being used to estimate candidate breeding values on the main dates. The genotype preparation including validation of the pedigrees takes place centrally at LfL Grub. The estimation models are based either on raw phenotypes or on environmentally corrected performance deviations (e.g. milk, calving ease, Interbull traits in Brown Swiss).