

Genomic Selection in Germany and Austria

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Genetic Evaluation Germany-Austria

- Breeds: Dual Purpose Fleckvieh, Braunvieh
- Since 2002: genetic evaluation across country borders
 - Based on raw data
 - Division of work for R&D and routine application



Bavaria

- » Dairy traits, somatic cell score, milkability, conformation traits



Baden-Württemberg

- » Beef traits



Austria

- » Functional traits (longevity, calving ease, stillbirth, fertility) and calculation of total merit index



Genomic Selection in Dual Purpose Fleckvieh

- Officially introduced: August 2011
- Extensive logistics concept comprising Germany and Austria
- Partners in the system
 - Breeders associations
 - LKV-Bayern, ZuchtData-Wien, ASR-Deutschland:
 - genomic data base
 - logistics (e.g. web portal, sample tracking, conflict feedback)
 - Central lab for DNA preparation and DNA backup
 - Central lab for genotyping
 - Central genotype checking and preparation

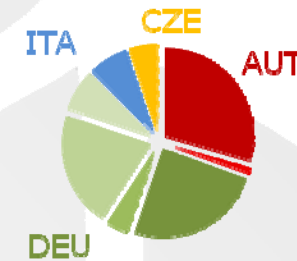
Joint Evaluation Germany-Austria (DE-AT)

- Data in joint evaluation
 - Dual Purpose Fleckvieh from Germany and Austria
- Integration of Czech Fleckvieh population
 - Aim: full member in joint evaluation DE-AT
 - Beef and conformation traits already estimated jointly
 - Direct integration in genomic evaluation
- Participation of Italian Fleckvieh population
 - Conformation traits (conventional and genomic evaluation)

Genotype Pool

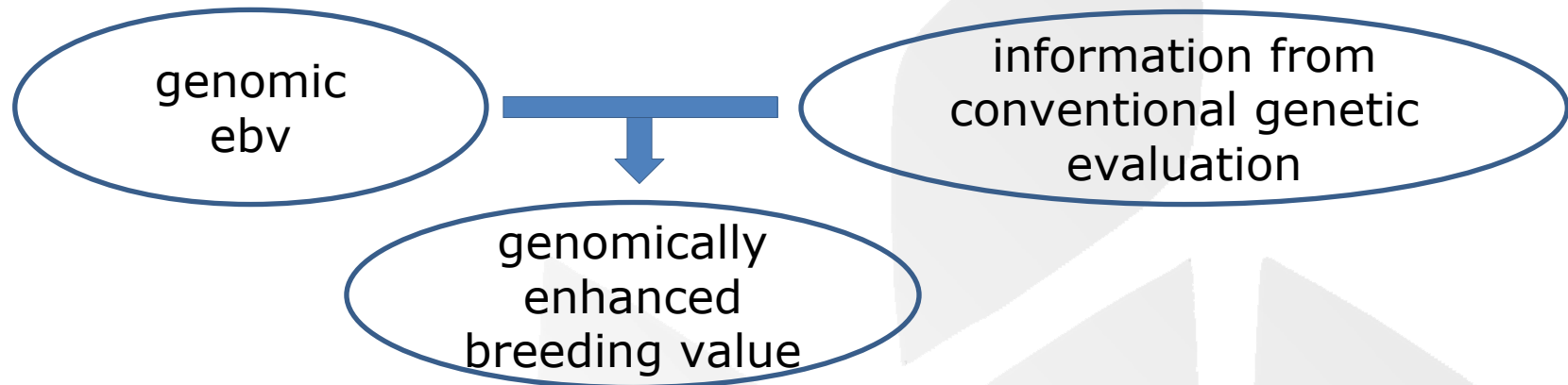
- Jointly for Germany, Austria, Czech Republic, Italia
 - Fleckvieh: 19.953 genotypes
- Calibration set for genomic evaluation
 - Only bulls
 - AI-bulls genotyped: n=10.062
 - Progeny tested bulls with EBV
 - Size of cal. set is trait specific, e.g.:

Trait	Proven Bulls
milk traits	6.401
somatic cell count	6.563
maternal fertility	5.816
longevity	5.790
overall udder score	7.161



Result of Genomic Evaluation

- genomically enhanced breeding value, so called "goZW"
 - Combination of information



- Official breeding value: "goZW"
 - For all 44 traits
 - Update of genomic system and goZW
 - 3 times a year with new conventional breeding values
 - Monthly evaluation for new candidates

Application of Genomic Breeding Values

1. Selection of candidates
 - Males
 - Females
2. Genomically tested young sires in AI
 - Selection of young animals for AI
 - Broad marketing of young sires
3. Selection of females
 - Embryo transfer, intra herd selection
4. Detection of hereditary diseases

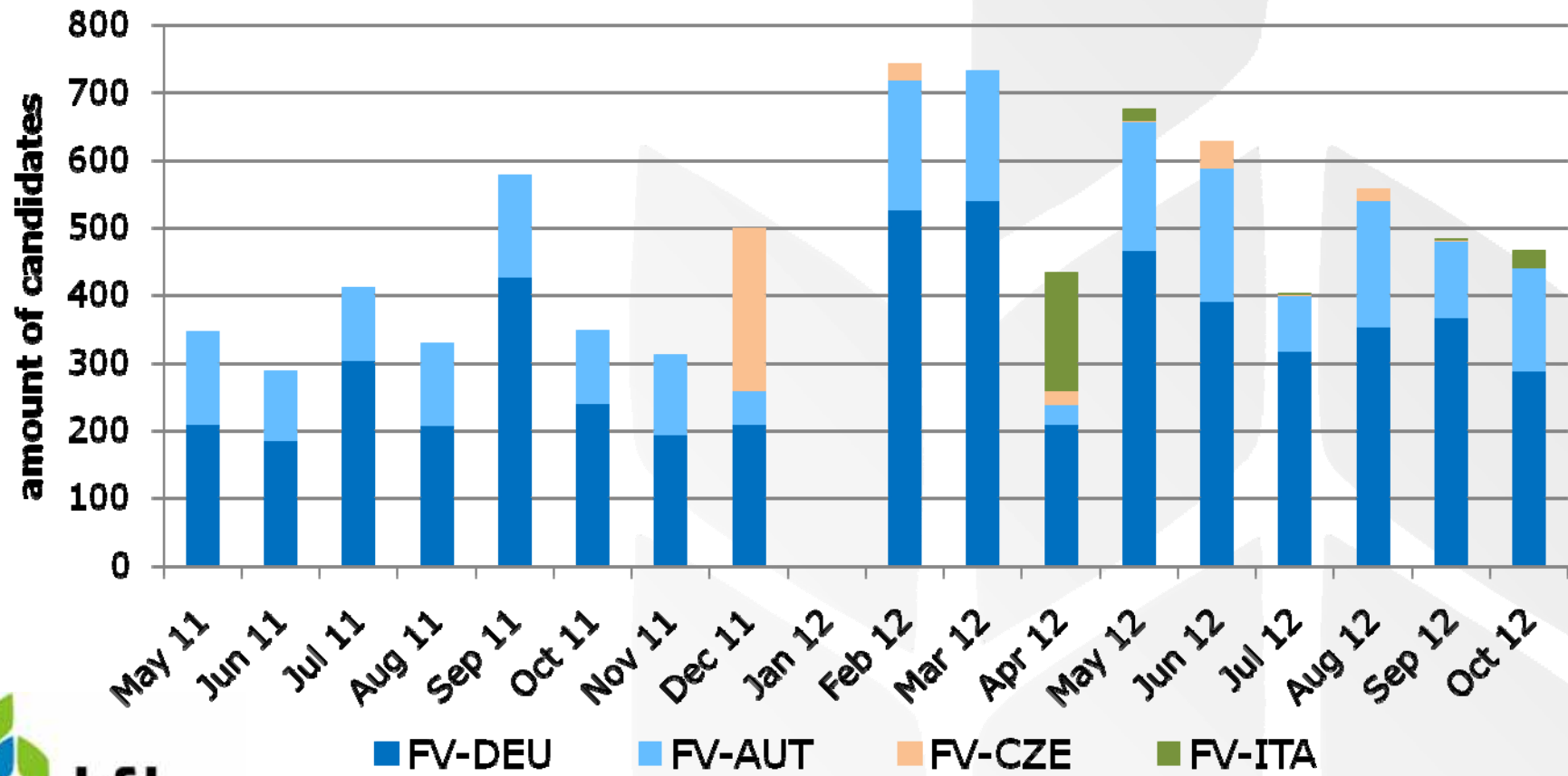
Genomic Breeding Values for Candidates

How does genotyping of candidates work?

- Application only via breeder's association
- Who can apply for genomic evaluation?
 - Breeder/owner
 - Breeders association
 - AI organisation
- Male and female candidates can be genotyped

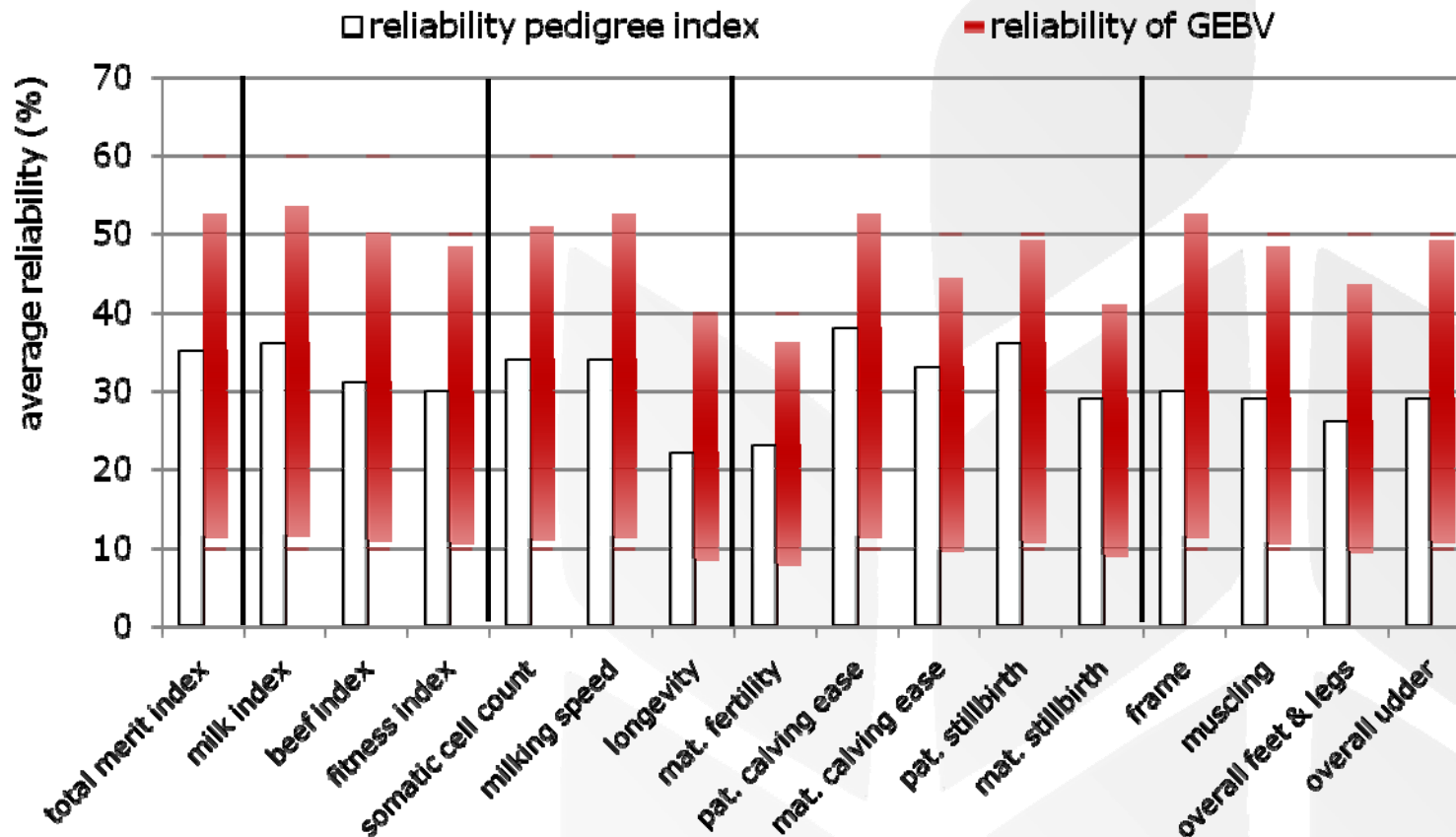
Genotyping of Candidates

- Pool of genotypes is increasing rapidly for candidates
 - Increase since May 2011: Fleckvieh n~8.200
 - Female candidates: Fleckvieh n=588



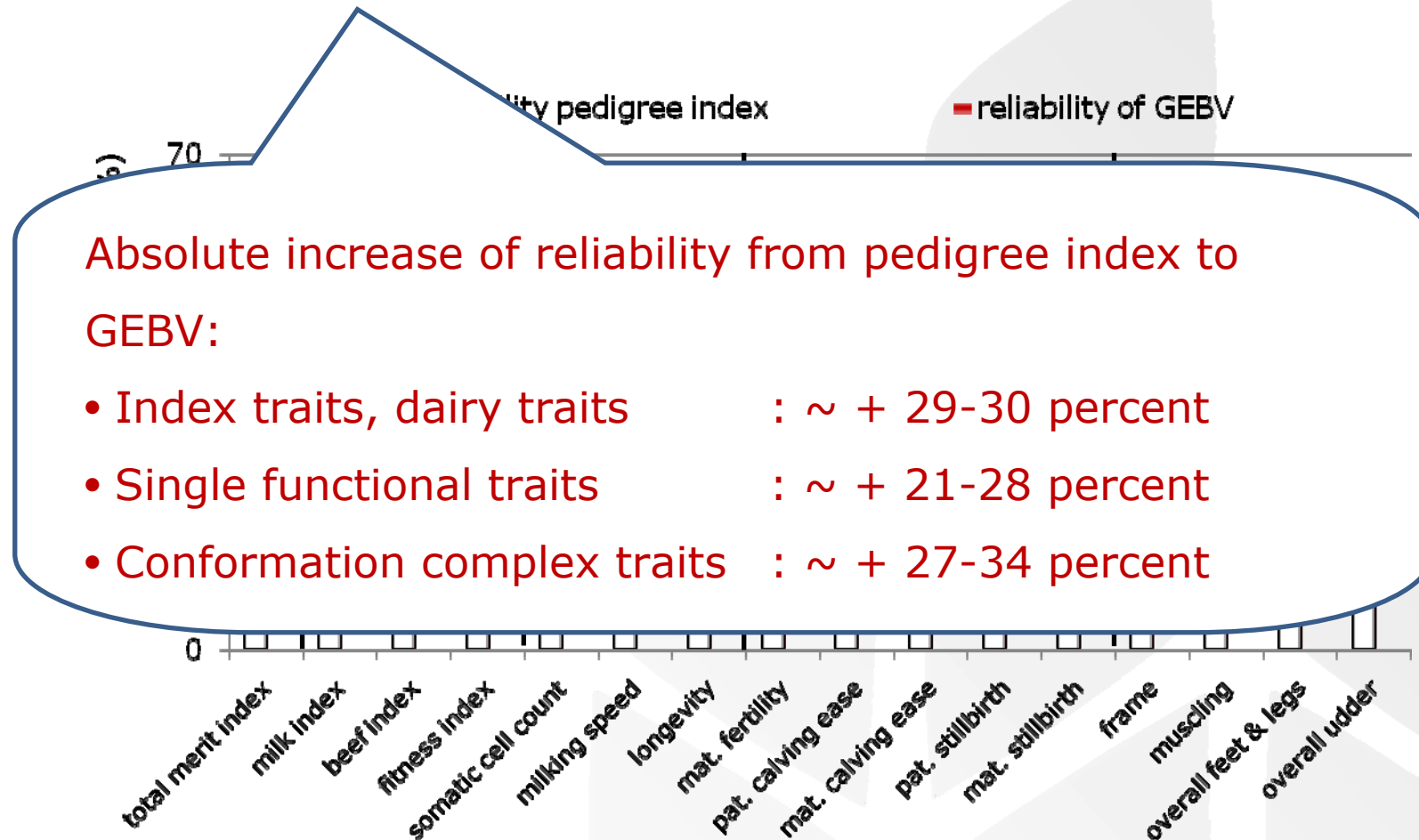
Reliability of Genomic Breeding Values

- Average reliability for candidates up to August 2012



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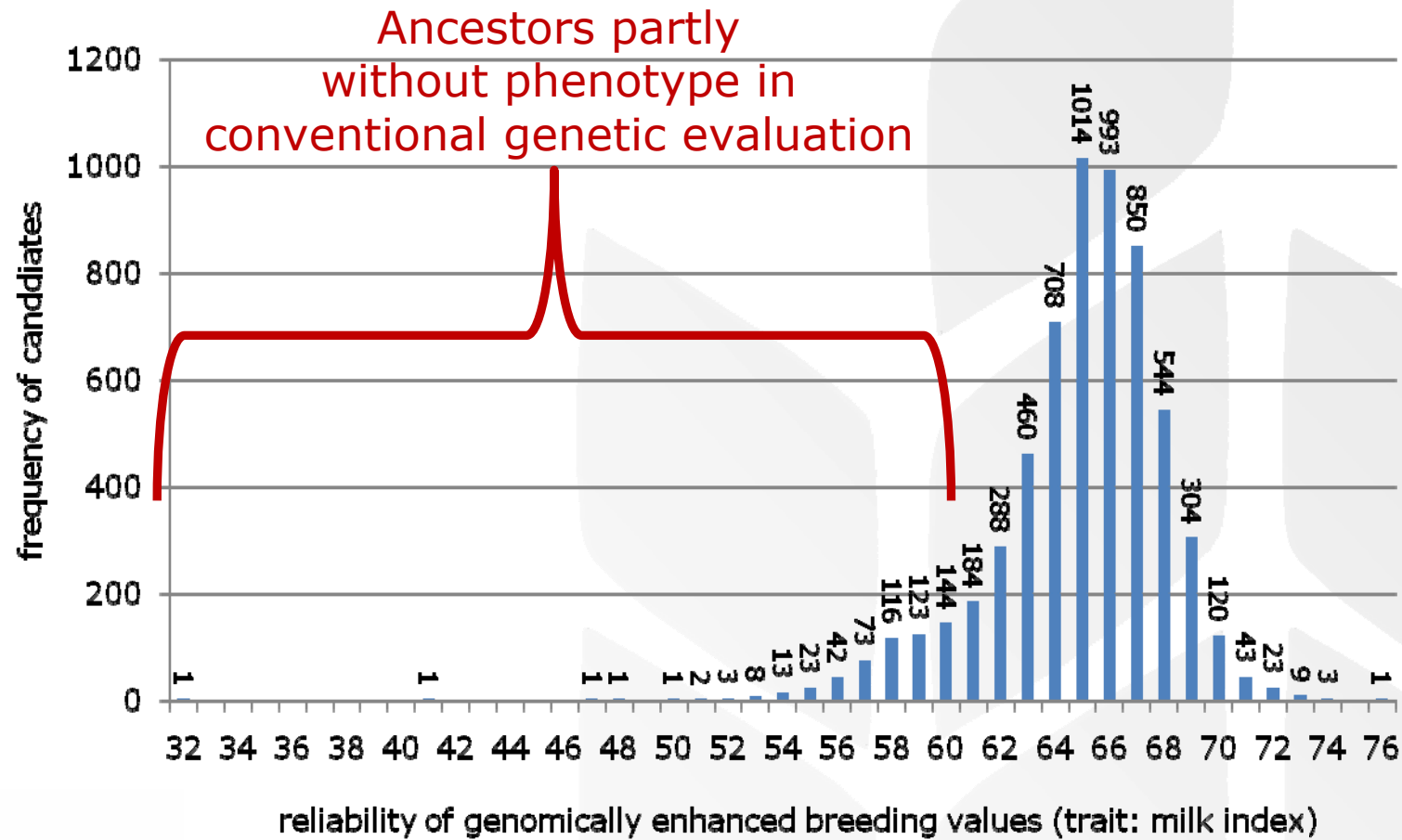


Particularities of the German-Austrian System

- Individual reliabilities for candidates
 - Depending on ancestors in the calibration pool
 - Experiences:
 - Lower reliabilities for candidates without sire and/or maternal grand sires in calibration pool
 - » E.g.: candidates from “foreign” populations (CZE, ITA, Montbéliard or Beef-Simmental)

Distribution of Individual Reliabilities

Example: Candidates from August evaluation (n=6.185):



Particularities of the German-Austrian System

- Individual reliabilities
 - Wide range of reliabilities for candidates
- Objective for estimation of candidates:
 - Ancestors should have phenotypes in the conventional genetic evaluation
 - Experiences from the collaboration with Czech and Italian Fleckvieh population:
 - Collaboration in conventional genetic evaluation should come first
 - Genomic evaluation can then be introduced with maximum reliability and without scale problems

Genomically Tested Young Sires in AI

Aquisition:

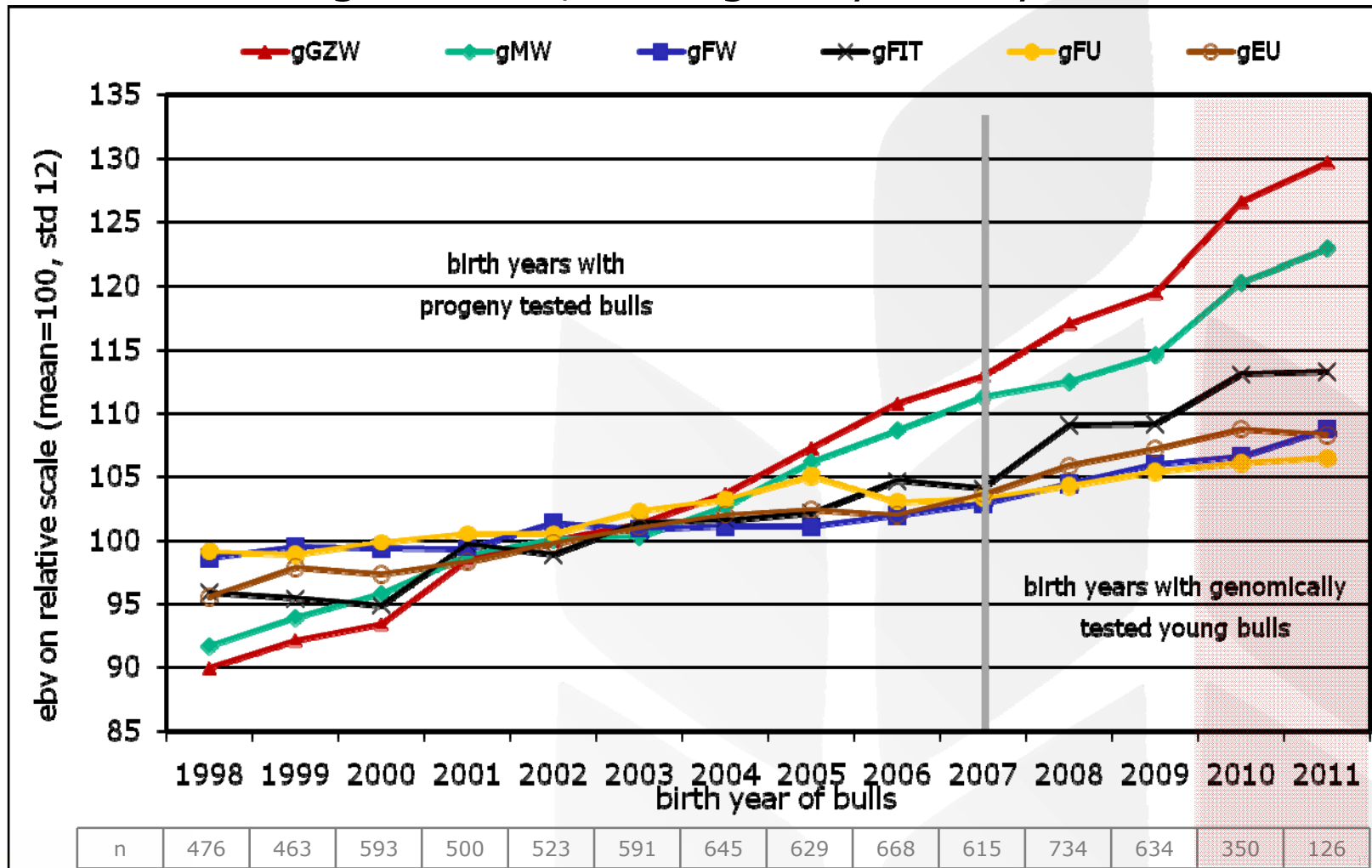
- Traditionally: auction (calves, young bulls)
- Few contracts for matings or calves

First experiences:

- Strong decrease of the number of registered young bulls at AI-centers
- Large variability in auction prices
- High selection intensity
- Clear increase in genetic trends over time

Genetic Trends for AI Bulls Germany-Austria

- Evaluation August 2012, averaged by birth year

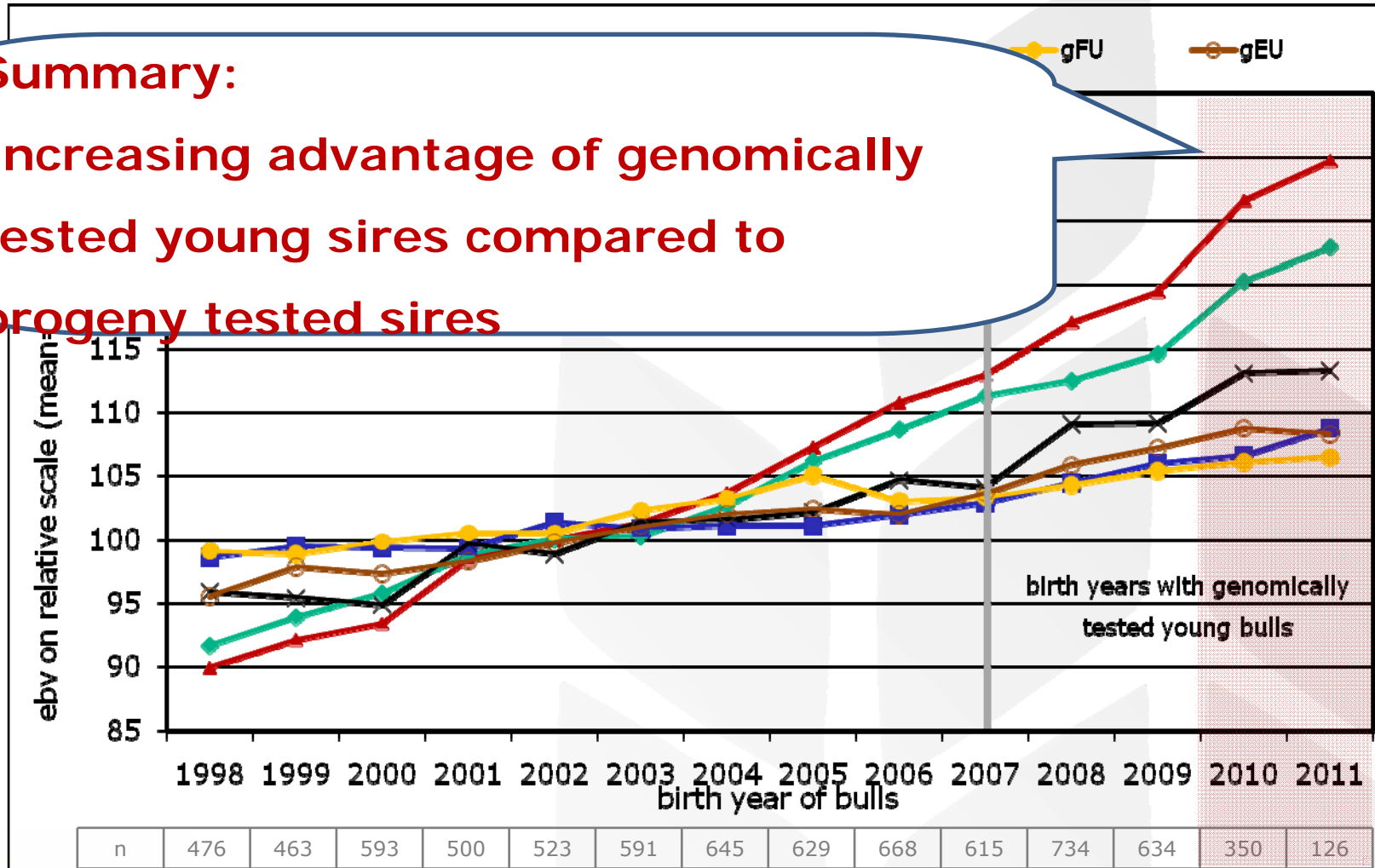


Genetic Trends for AI Bulls Germany-Austria

- Evaluation August 2012, averaged by birth year

Summary:

Increasing advantage of genomically tested young sires compared to progeny tested sires

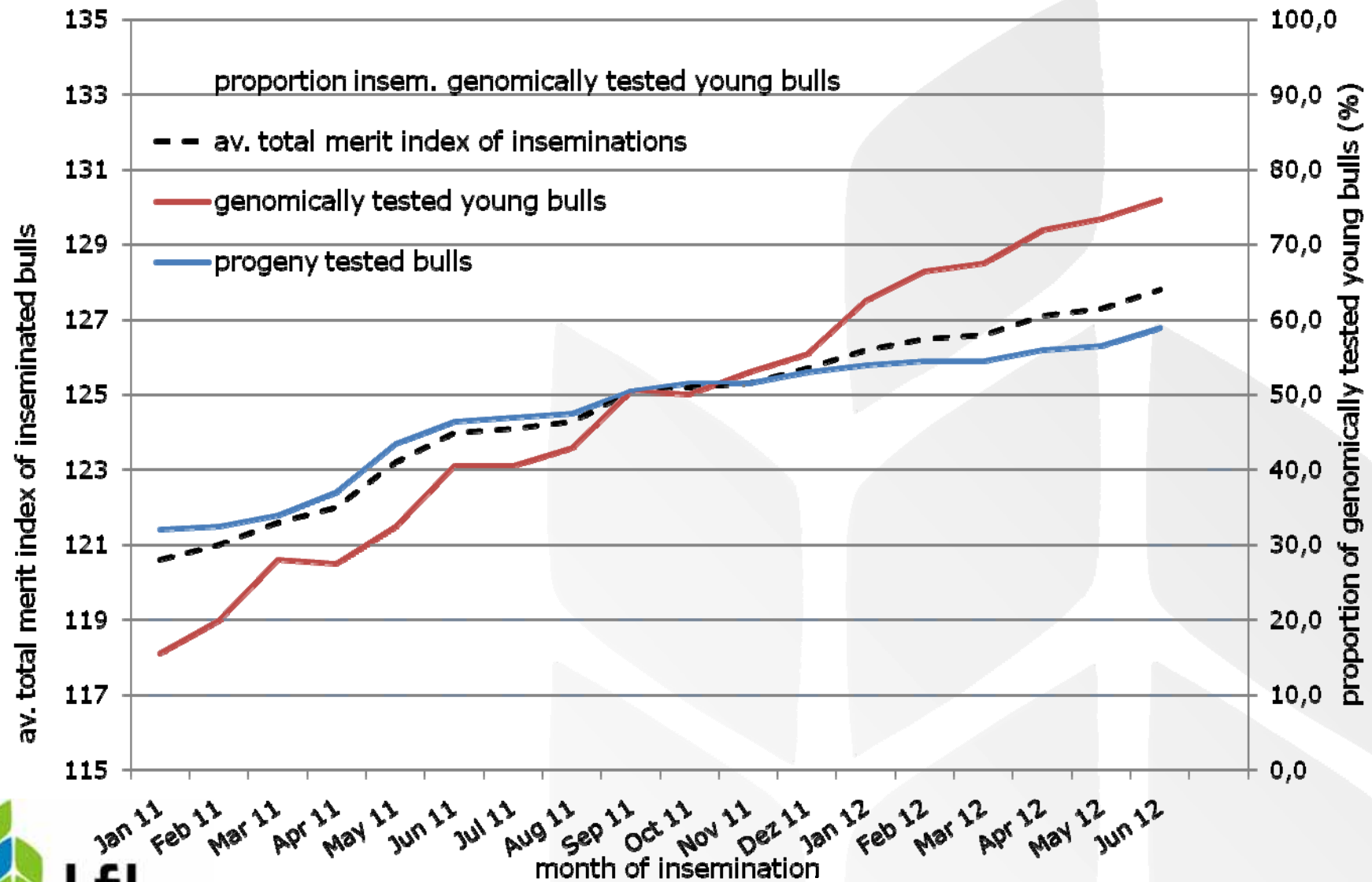


Overview of AI with Unproven Sires

Genomically tested young sires

- Partly randomized distribution of first semen doses prior to broad marketing
- First experiences
 - Clear increase of inseminations with unproven sires
 - Stronger selection of mated young sires
 - Higher proportion of young sires mated to potential bull dams
 - Clear differences between regions and organisations

Example: Inseminations in Bavaria



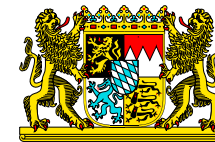
What are the Next Steps in GS for Dual Purpose Fleckvieh?

- Currently: first version of genomic selection
- Further development is important!
- Ongoing projects
 - Further development in genotyping
 - Use of high-density Genotypes
 - Use of information from sequencing
 - » Results from association studies
 - » Identification of defect loci
 - Further development of methods
 - Genomic evaluation
 - Merging of conventional and genomic evaluations
 - Monitoring of genetic diversity
 - Further development of breeding programs

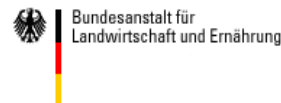


Thank you
for your attention

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