

Cow Reference Population

- Benefit for Genomic Evaluation Systems
- and Farmers

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Genotyping of German Holstein females

- 2.4 Mio. Holstein cows in milk recording
- 1.9 Mio. Holstein cows herdbook registered

- Genotyped females (07-2015 / 06-2016):
 - ca. 1,000 / month
 - in ca. 10% of all herds
 - i.e. <2% of all new females
 - → highly pre-selected females for breeding program
 - → **almost no genotyping for management purpose (whole herd genotyping)**

- Reasons ?
 - Technical reasons ? no
 - Price genotyping ? 49€ package price individual female
 - No promotion ?



Why Female reference population ?

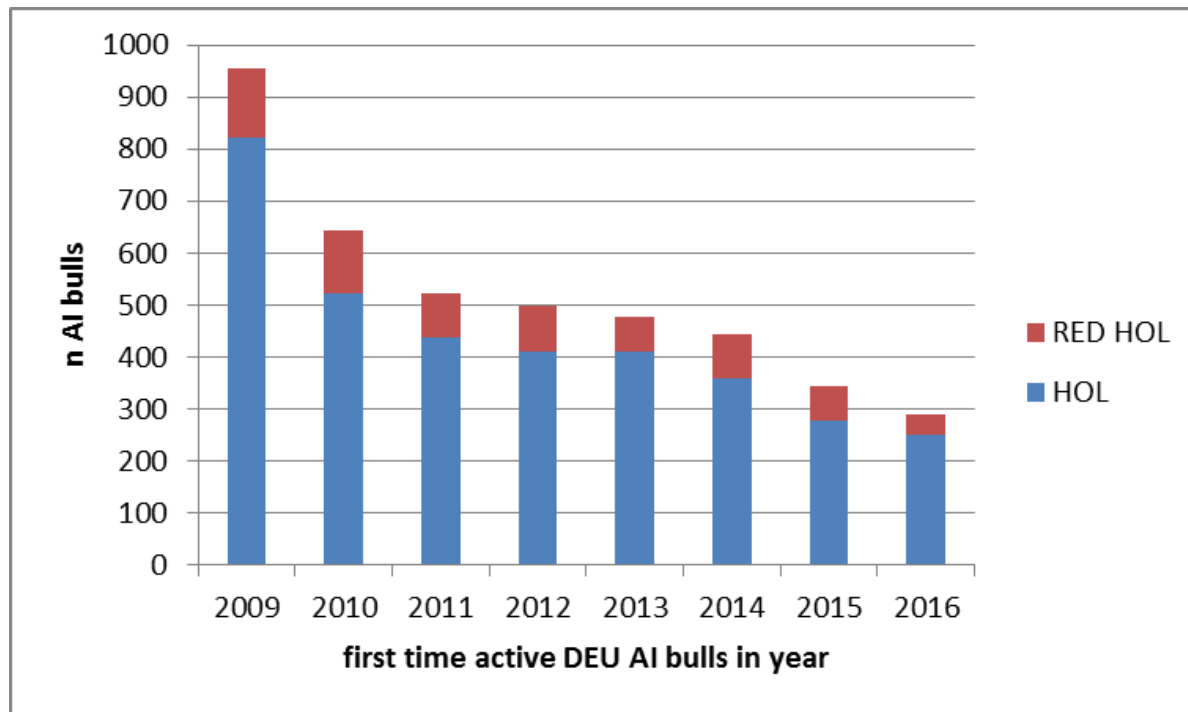
- The established bull reference populations have limitations
 - Less new bulls /year
 - More and more biased by genomic (pre) selection
 - Hard to extend to new traits

- → we need an alternative resp. enhancement
- → female reference population



Why Female reference population ?

- The established bull reference populations have limitations
 - Less new bulls per year
 - More and more biased by genomic (pre) selection



- Number of new active DEU HOL bulls per year has decreased

Setting up a female reference population

- Requirements by genomic evaluation system
 - Not preselected females
 - Representing entire genetics of population
 - Performing in representative range of management conditions
 - Good data quality incl. new traits
 - **➔ needs cooperation of commercial dairy farmers**

- Requirements by commercial dairy farmers
 - Increase of profit and/or management benefits
 - Easy to handle



Joint project KuhVision

- Joint project by all partners in German Genomic Consortium (11 herdbook organizations, meanwhile plus LUX)



- Goals:
 - 120,000 unselected genotyped and phenotyped cows by mid 2019
 - Majority contributing data on health traits and hoof trimming data
 - In farms across whole country representing the entire Holstein population
 - After initial phase adding >35,000 additional cows per year
 - Initial spark for promoting herd genotyping as standard management tool



Foto: Pia Nilesen

KuhVision: how does it work?

- Contract farmer ⇔ local breeding organization
 - Genotyping all new females for at least 3 years
 - Recording of health and routine hoof trimming data and herd classification
 - Reduced/subsidized fee for genotyping guaranteed

- Initial genotyping assisted by breeding organization
 - All cows in first lactation (max. 200 d. in milk) for free
 - All female young stock in farm

- Continuous genotyping new born females
 - Individual tissue eartag provided automatically after registration
 - Providing data (on new traits) via herd management system => DHI => vit
 - Individual access to results by internet portal or data files for herd management system



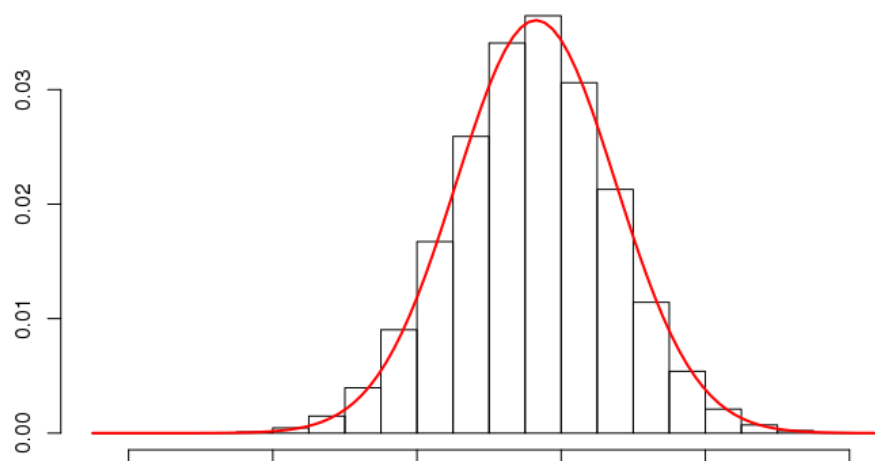
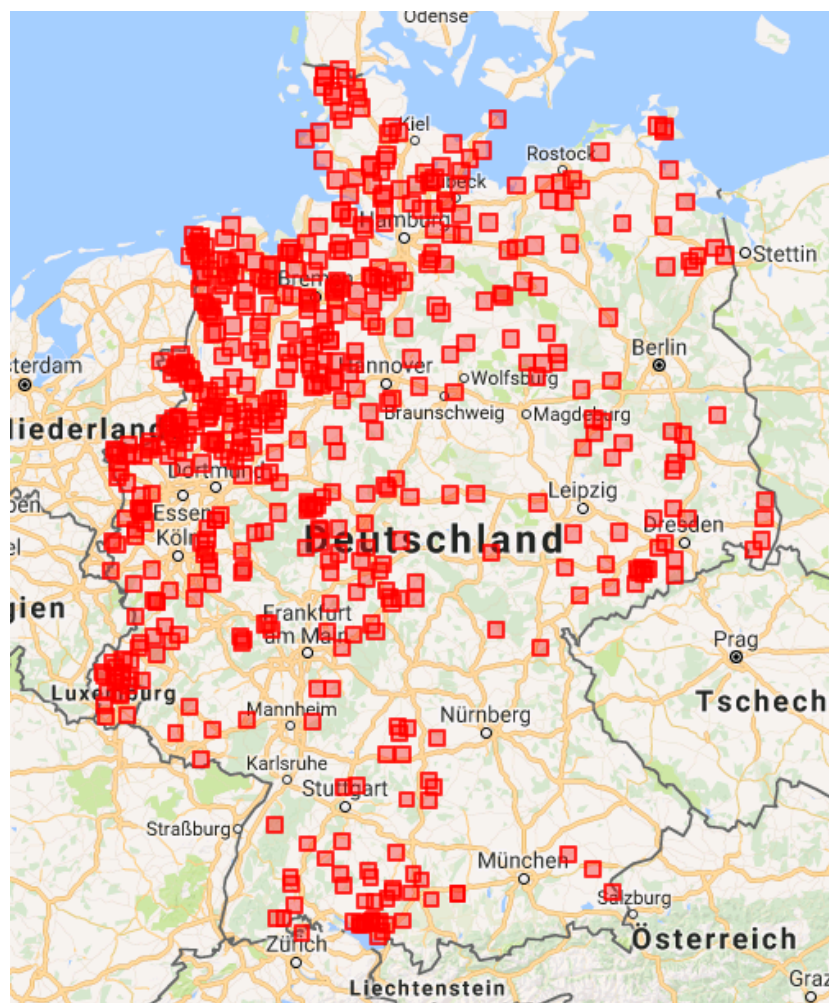
KuhVision: Where are we ?

- 1st June 2016: Start of project
- February 2017: 550 herds with >100.000 milking cows signed
→ Closure list for new participants
- August 2017: 650 herds with >130.000 milking cows
180,000 animals genotyped
>75,000 cows in milk with genotypes

- Reasons for success
 - Subsidized price for genotyping + genomic evaluation (19.50 € / animal versus 49€)
 - Intensive promoting by organizations
 - Strong support to the farms:
 - With technical tools (e.g. eartag supply, recording software, ...)
 - Assistance with initial genotyping entire herd (young stock + all cows in 1st lact.)
 - Good feedback of results



Distribution of herds in KuhVision (DEU & LUX)



- (normal) distribution of gRZG (gTMI)
 - Scale relative breeding values $\approx 100 / s 12$

Benefit for the farmer

- Effective selection tool among female calves
 - and tool for precise mating of heifers and cows

- How to prove ?

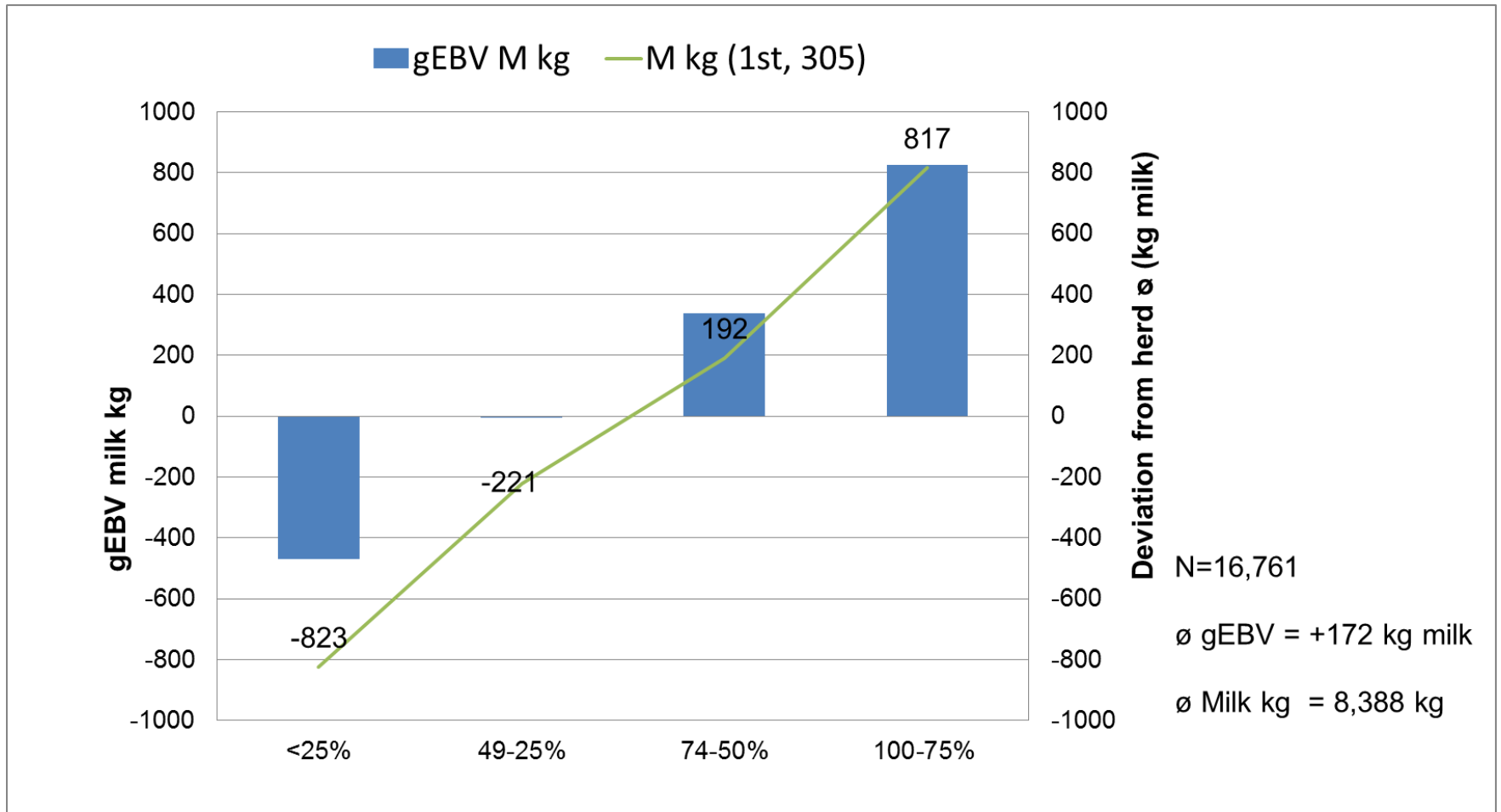
- Comparison of female gEBV with phenotypic performance within herd
 - gEBV: calculated without own performance (sire-pedigree-index + dGV)
 - Phenotypic performance: deviation from herd average

- First results
 - Including data from pilot research project KuhL (ca. 15,000 cows born 2012/2013)

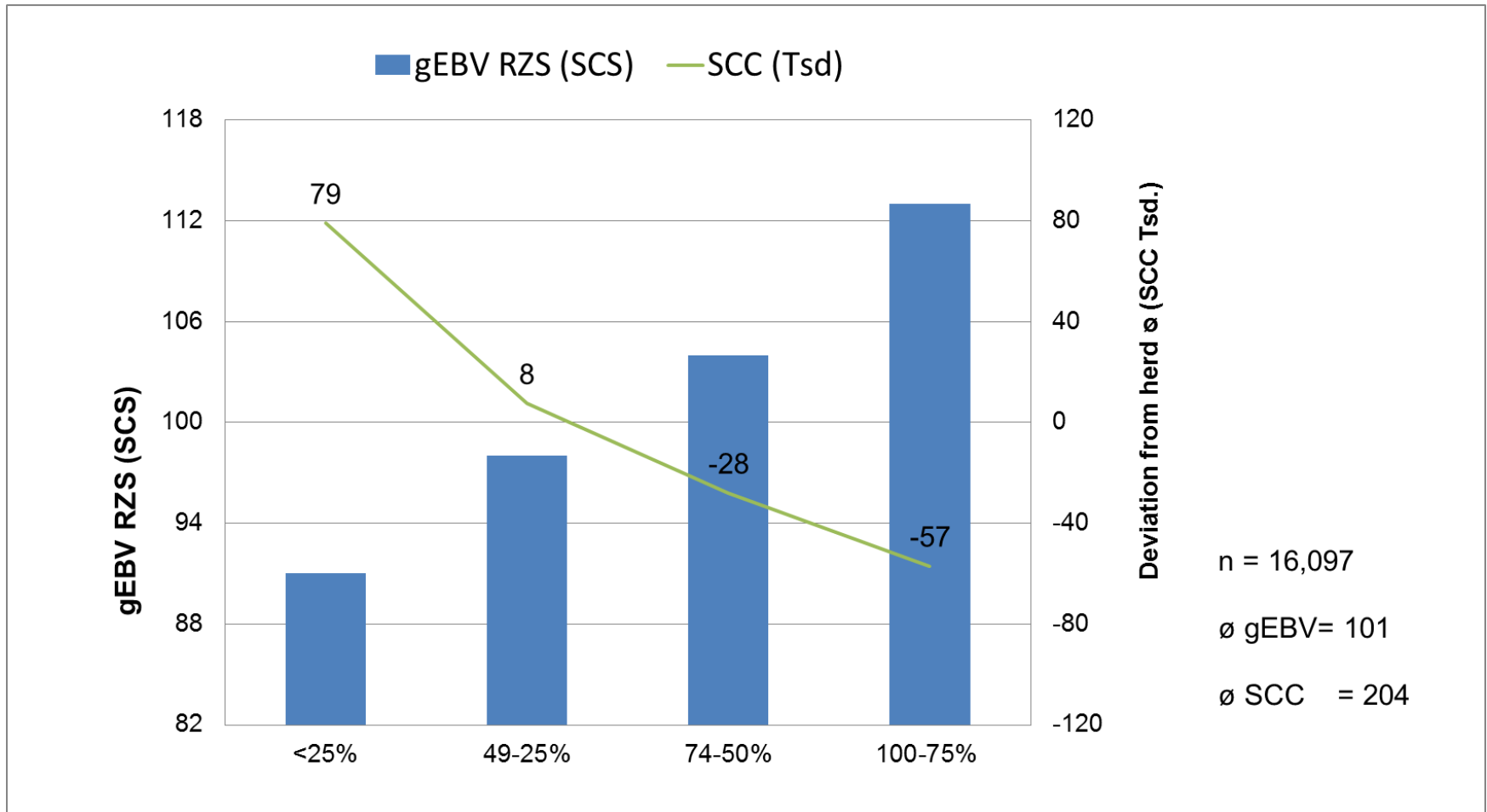
- **→ strong promotion tool to convince more commercial farmers**



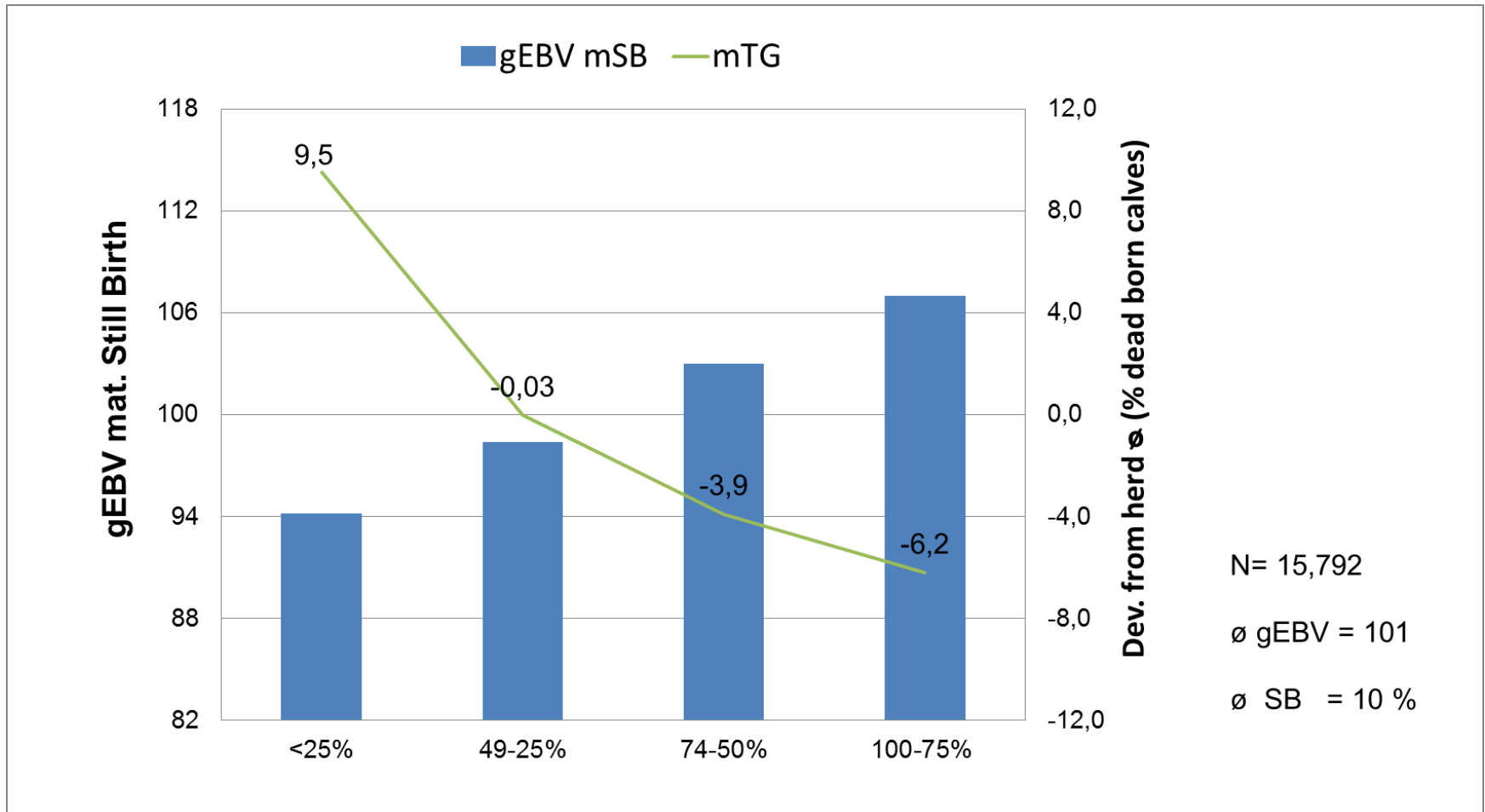
gEBV ↔ phenotype: Milk kg 1st lactation (305 d.)



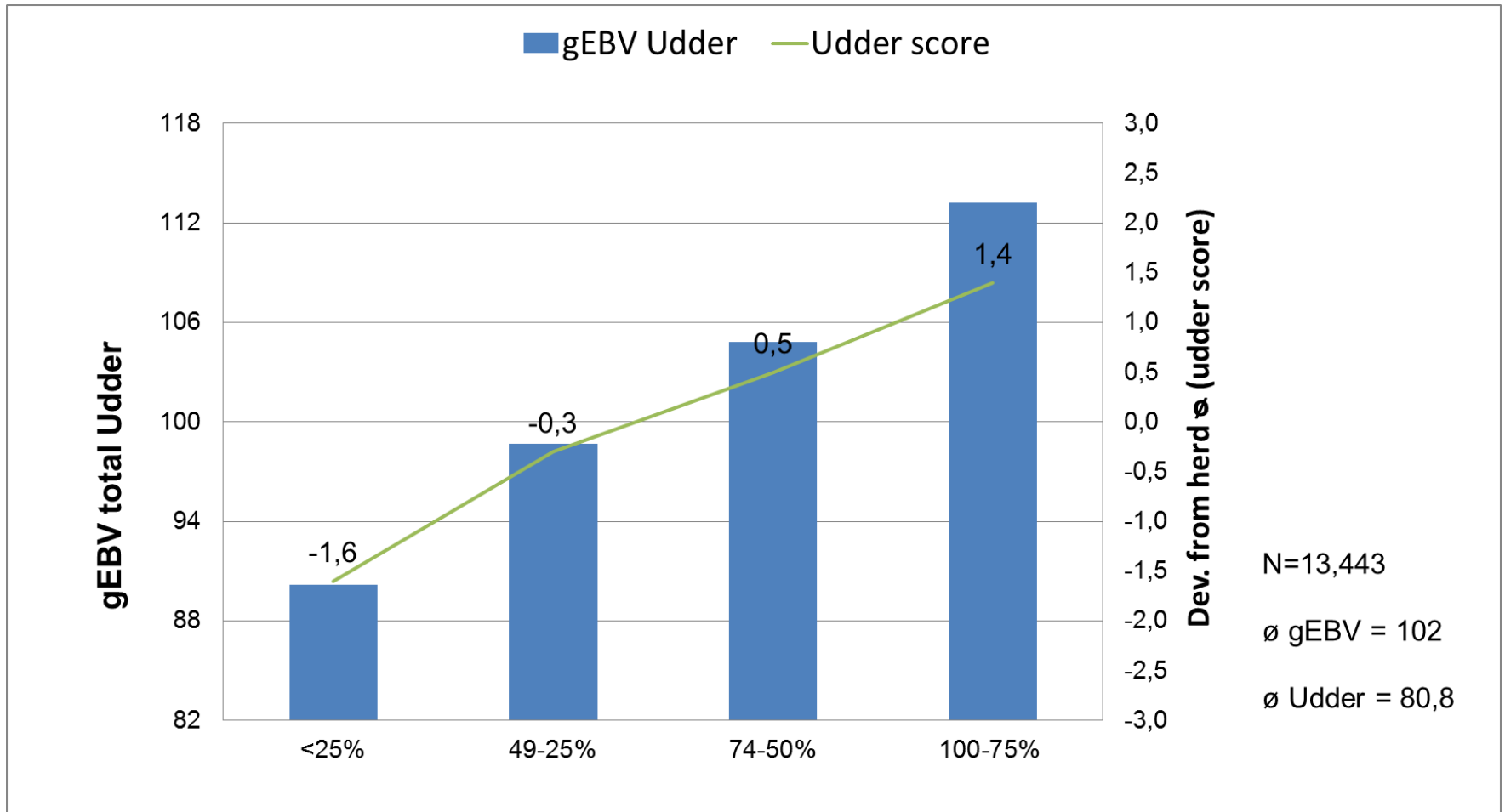
gEBV ↔ phenotype: SCC (thousand) first 3 test days 1st lactation



gEBV ↔ phenotype: maternal Still Birth 1st calving (% dead calves)



gEBV ↔ phenotype: Udder score 1st lactation



Summary and Outlook

- Project KuhVision to set up an un-selected female reference population is very successful
 - >120.000 genotyped cows with phenotypes expected mid 2019
 - Inclusion in EG bull reference population adds reliability in all traits
 - see *Alkhoder et al.* this meeting

- Next steps
 - Integration of reference cows in routine Genomics for standard traits (2018)
 - Routine Genomics for direct health traits based on female reference population (2019)

- The future ?
 - Sharing of information from cow reference population with other countries ?
 - e.g. via or SNP-MACE ?
 - see *Liu et al.* this meeting



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IT-Solutions for Animal Production