IT-Solutions for
Animal Production

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 ?

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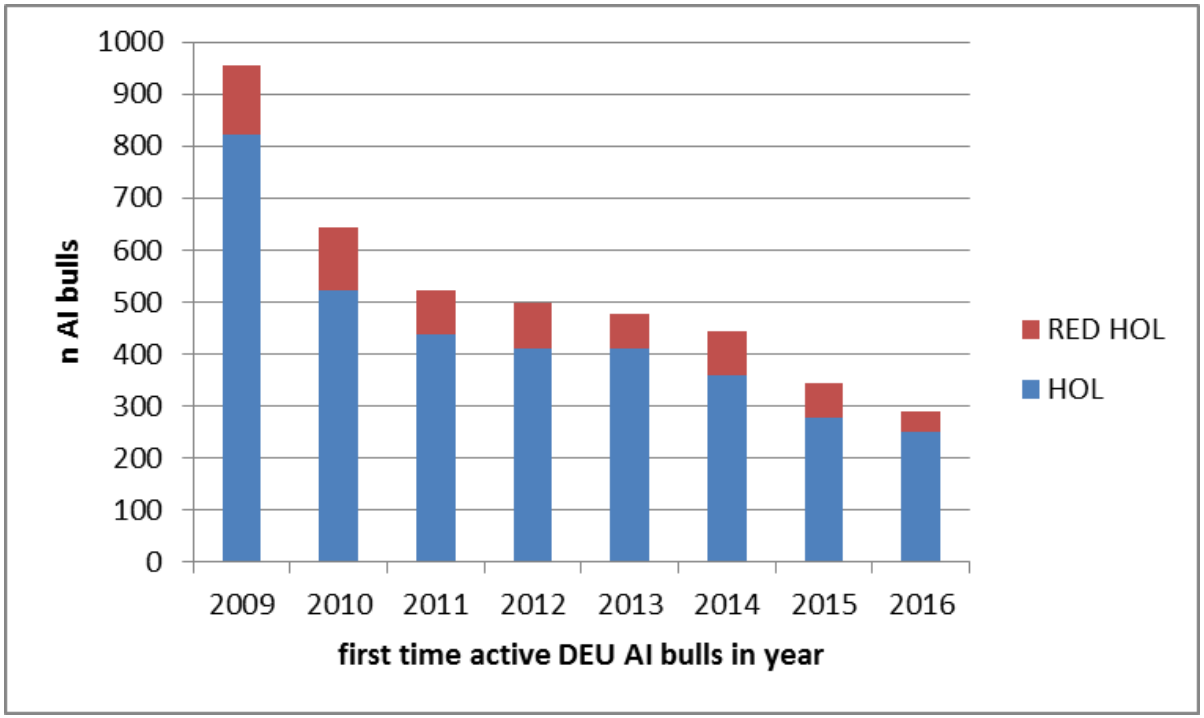


- Number of new active DEU HOL bulls per year has decreased

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

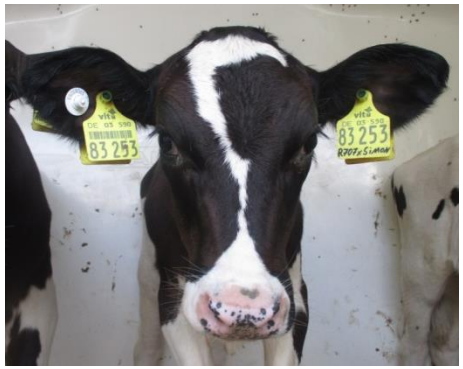
- Joint project by all partners in German Genomic Consortium (11 herdbook organizations, meanwhile plus LUX)

- 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 guarantied

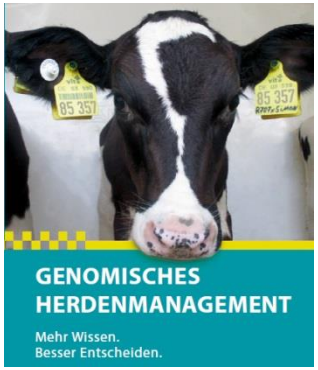


- Initial genotyping assisted by breeding organization
  - All cows in first lactation (max. 200 d. in milk) for free
  - All female young stock in farm
- Continuous genotyping new born females
  - Individual tissue eartag provided automatically after registration
  - Providing data (on new traits) via herd management system => DHI => vit
  - Individual access to results by internet portal or data files for herd management system

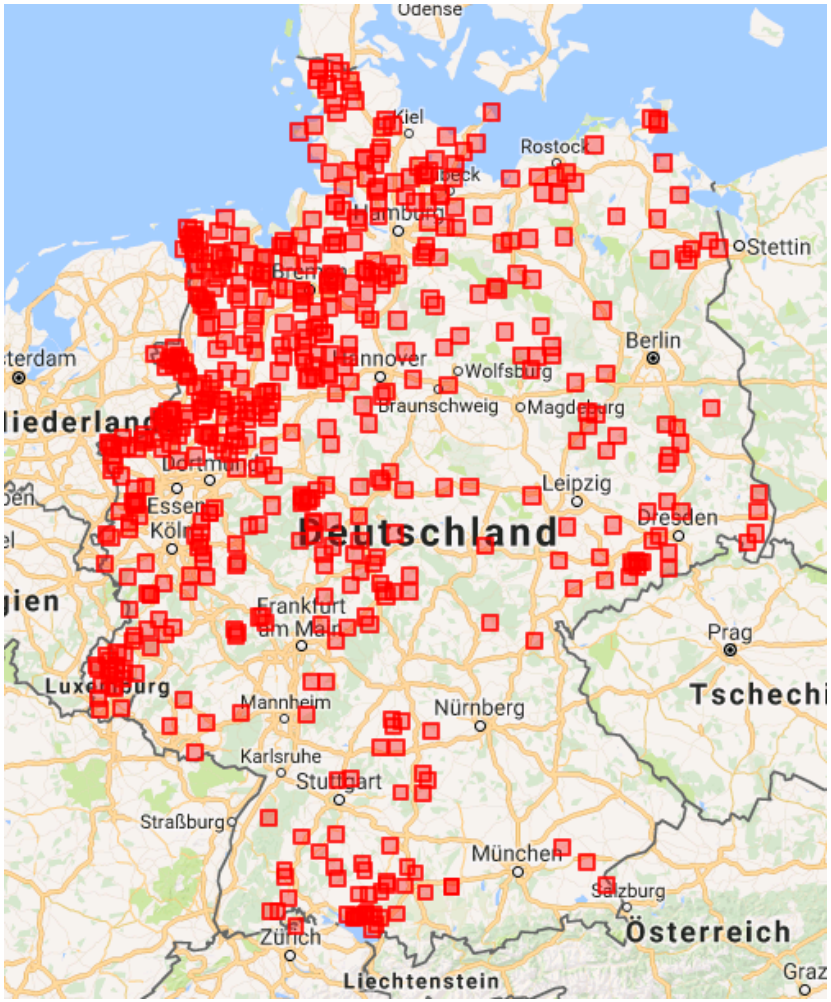
KuhVision: Where are we ?

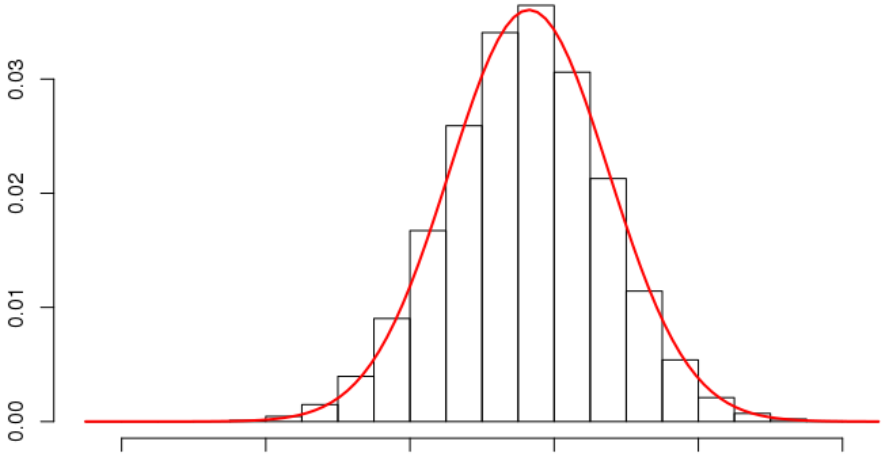
- 1st June 2016: Start of project
- February 2017: 550 herds with >100.000 milking cows signed
  ➔ Closure list for new participants
- August 2017: 650 herds with >130.000 milking cows
  180,000 animals genotyped
  >75,000 cows in milk with genotypes

- 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)



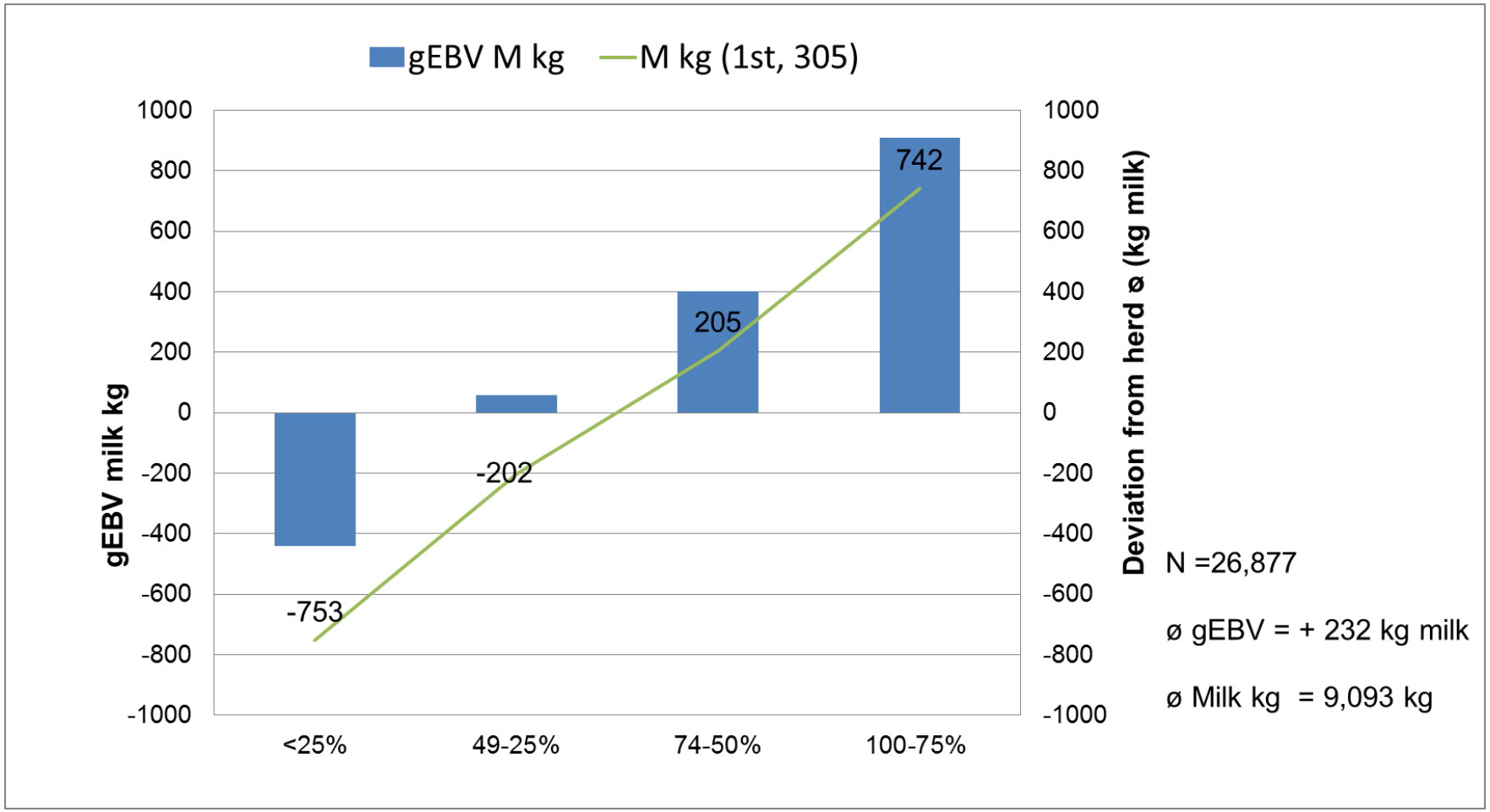


- (normal) distribution of gRZG (gTMI)
  - Scale relative breeding values ≙ 100/ s 12

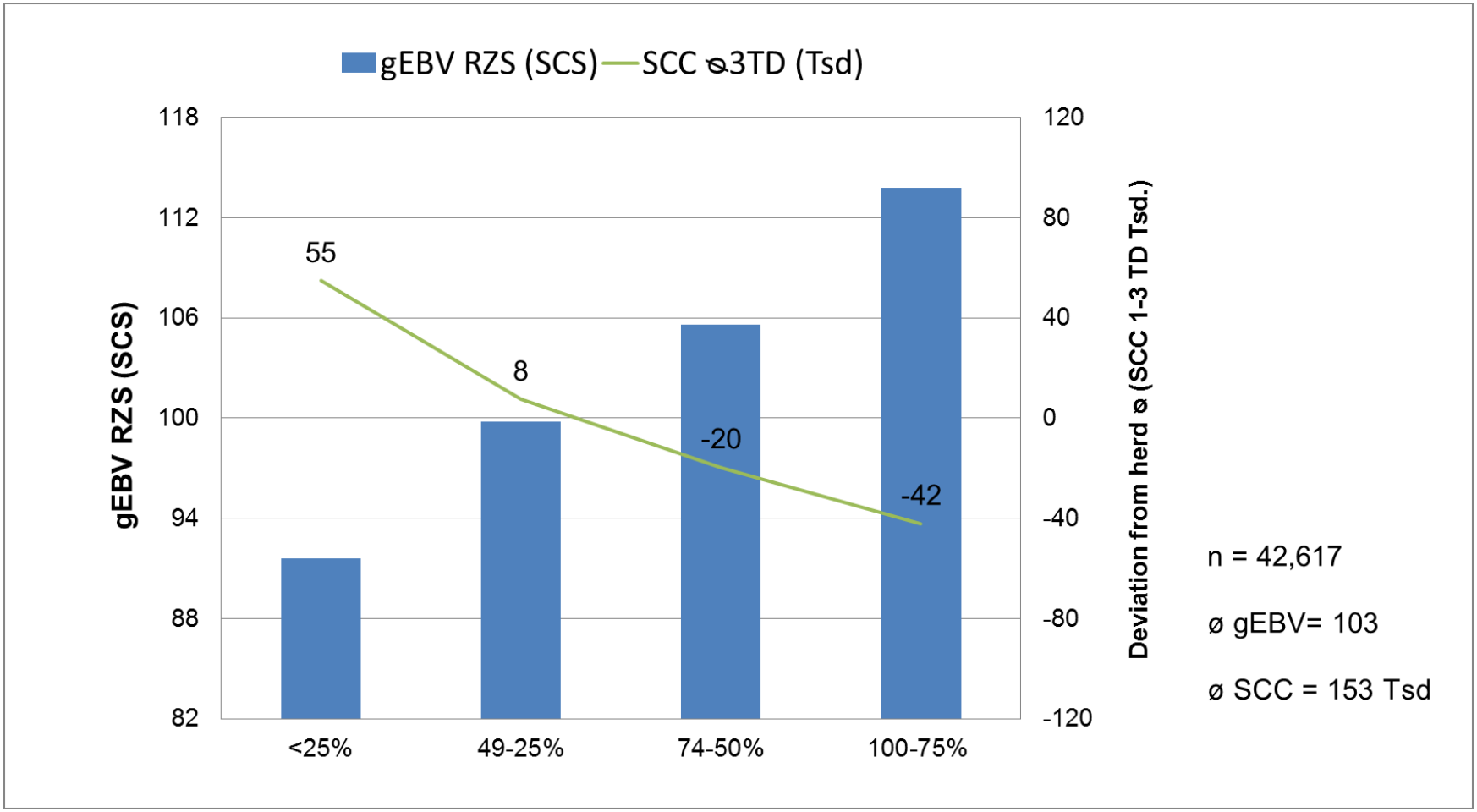
Benefit for the farmer

- 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**

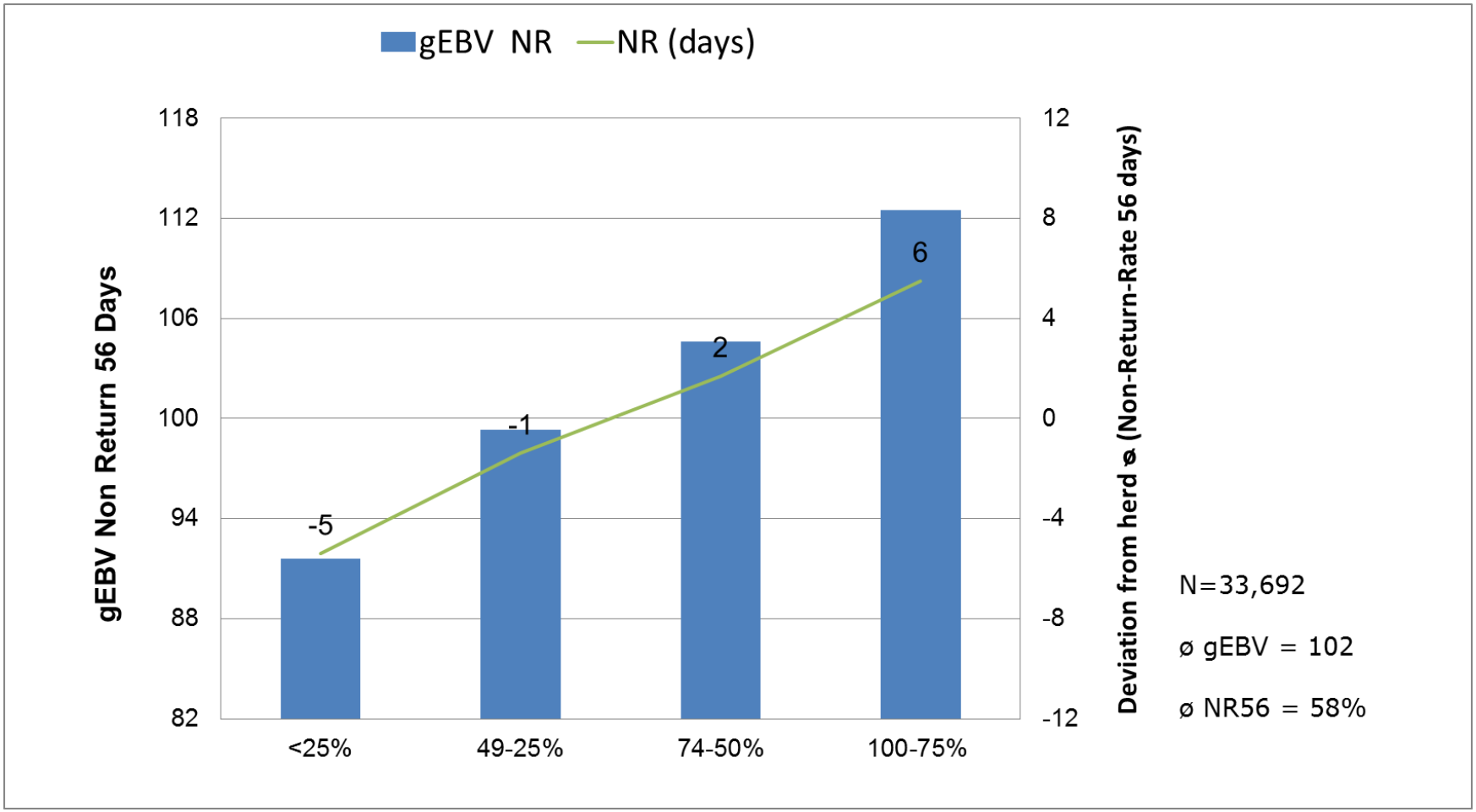
gEBV ⇔ phenotype: Milk kg 1st lactation (305 d.)



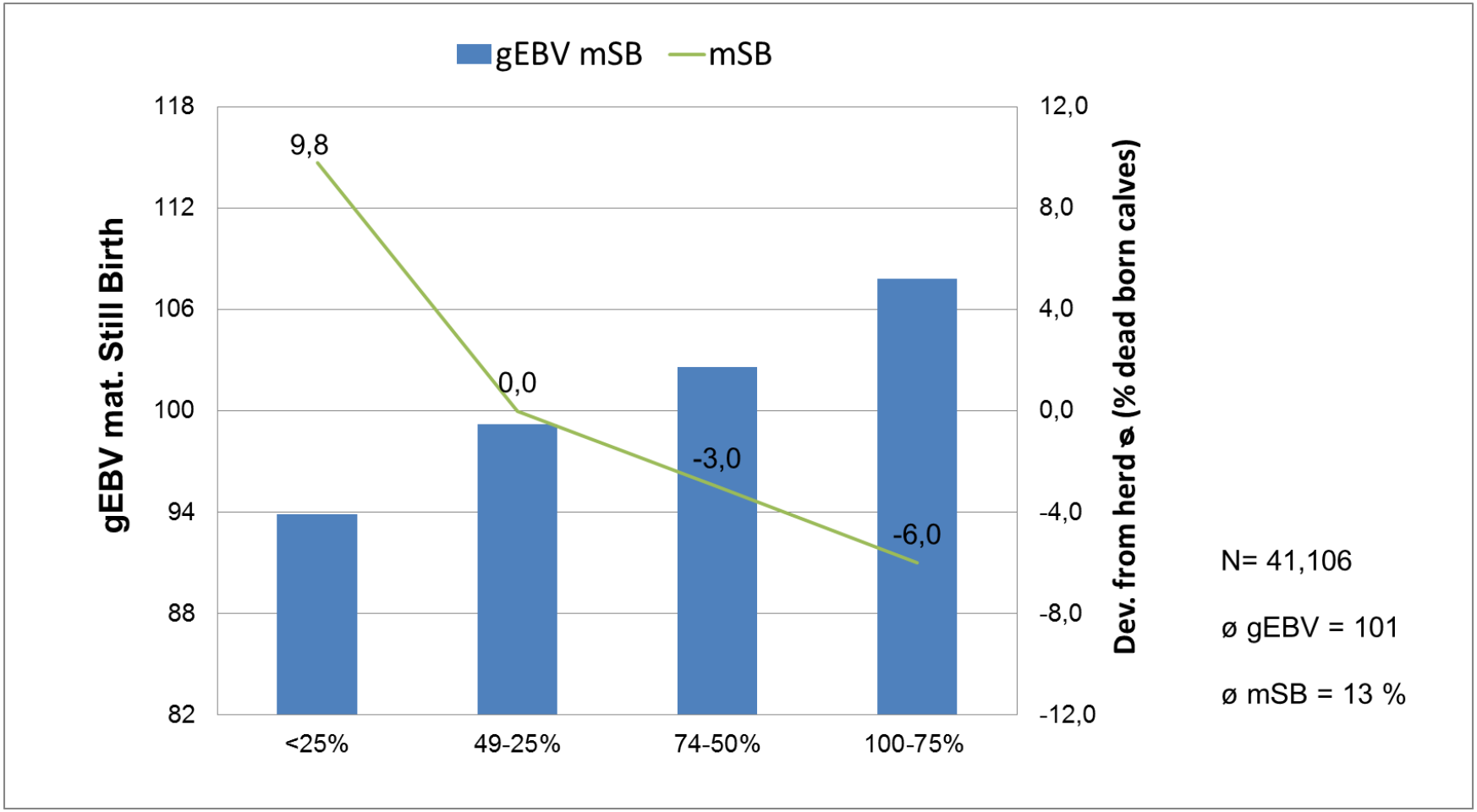
gEBV ⇔ phenotype: SCC (thousand) first 3 test days 1st lactation



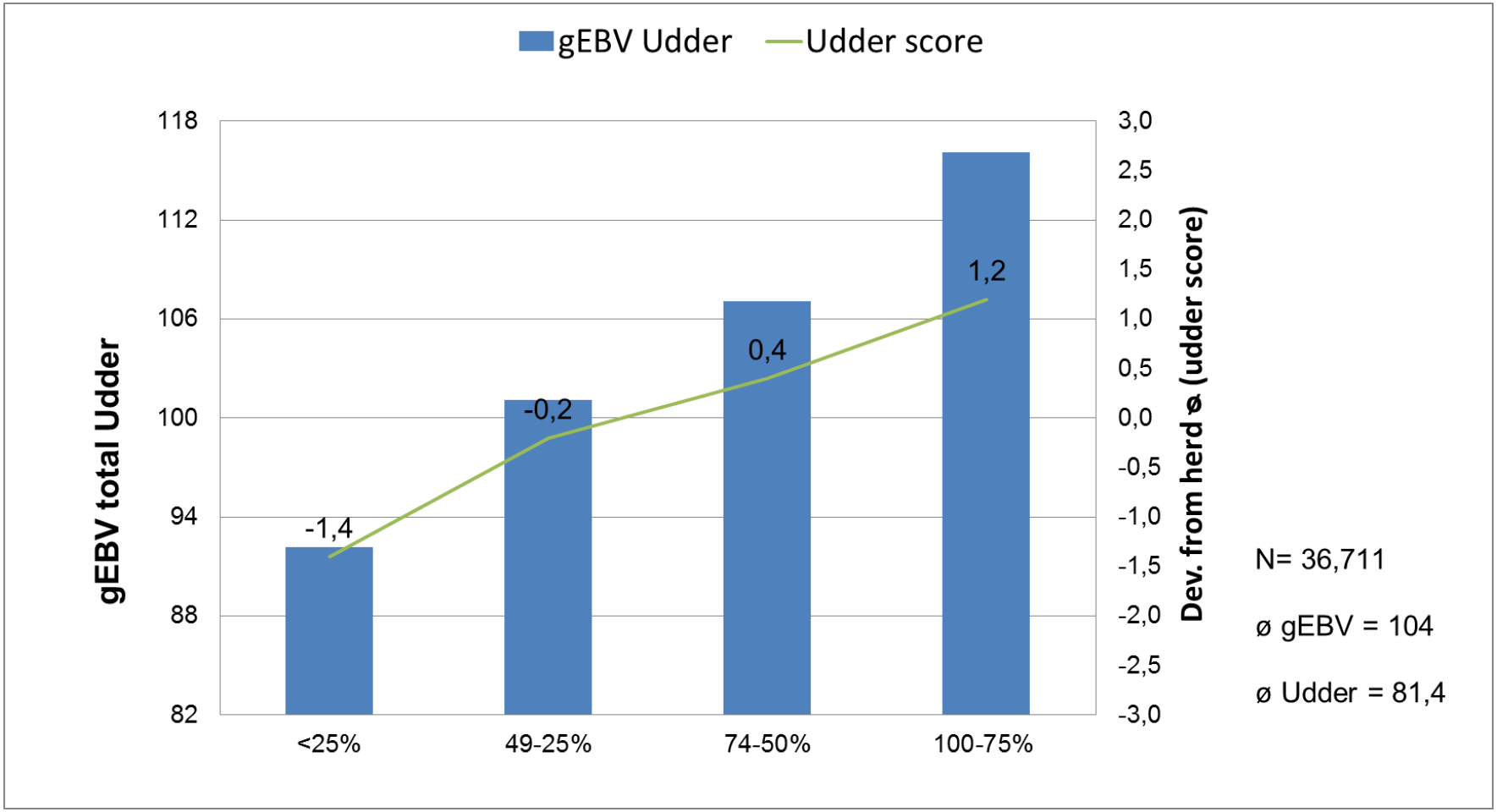
gEBV ⇔ phenotype: Non-Return-Rate 56 in 1st lactation



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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