A management tool for breeders

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What's that?

- Kuh*Vision* is a new genomic service of the German breeding organizations for their members.

- It's a new management tool for Holstein cattle breeding and herd optimization.

- Kuh*Vision* provides the opportunity to German Holstein farmers to get genomic breeding values of their females.

- In addition, the project enables the development of new genomic breeding values for health and claw health traits.

- Last not least, it supports the establishment of a cow-reference population that will replace the bull-reference population to guarantee the high reliability of genomic breeding values in future.
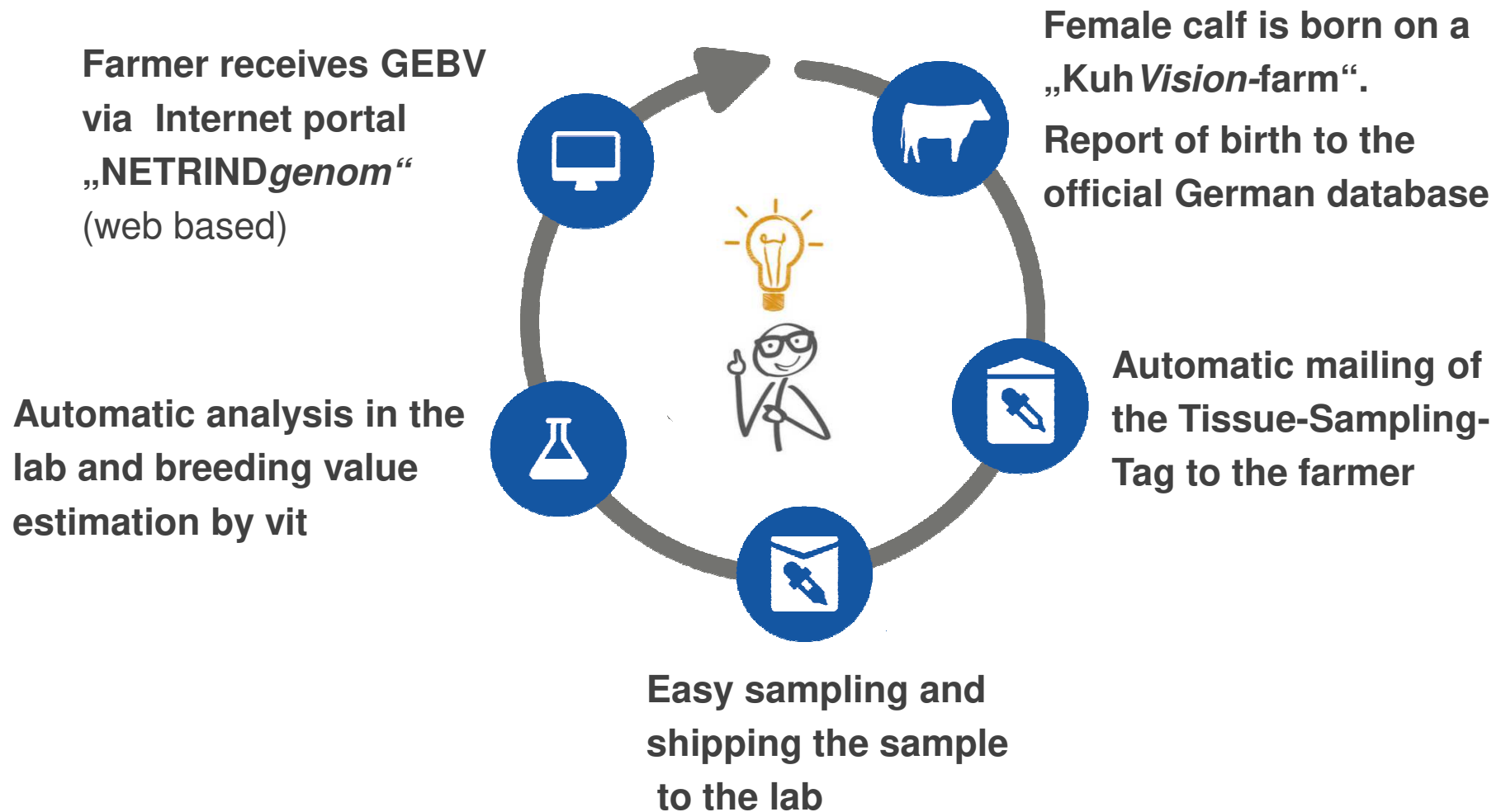
- The program started in summer 2016.

The **herd owner** and the **breeding organisations**

signing a contract

where rights and obligations are agreed.

The herd owner

- to **genotype** all female calves, the female young stock and cows in 1st lactation.
  - There was the opportunity to genotype only cows in 1st lactation (<3%)
  - The females must not be selected (entire contemporaries)
  - Continuous genotype of new born calves is obligatory!

- to **collect** all data of milk recording, AI, calving, herd entries and leavings, and pedigree information.

- to **classify** all females in 1st lactation.

- to **document** diagnoses on health and hoof trimming of the livestock in a herd management program.
  - Basis of data entry are the simplified diagnosis codes (ICAR disease codes).

- to **use** al least 75% artificial insemination.

The Breeding Organisation

- **provides** regular analysis and results the collected data
  - full set of all GEBV

- **provides** operational comparisons with other farms participating in the program
  - benchmarking

- **provides** full information on genetic traits (recessives).

- **carries** out parentage verification or parentage discovery *(if necessary).*

- **offers** breeding advice and mating service.

- **gives** assistance on the farm at the first inventory

- **supports** the program financially and offers a reduced fee
  - All cows in first lactation (max 200 days in milk) for free

How does it work?

Farmer receives GEBV
via Internet portal
„NETRIND*genom*"
(web based)

Female calf is born on a
„Kuh*Vision*-farm".
Report of birth to the
official German database

Automatic mailing of
the Tissue-Sampling-
Tag to the farmer

Automatic analysis in the
lab and breeding value
estimation by vit

Easy sampling and
shipping the sample
to the lab

Results on Internet portal

Monthly results (first Tuesday)

- List of each animal
  - Full set of GEBV and standard linear traits,
  - Parentage and pedigree information,
  - Fertility information,
  - Calvings,
  - Mating advice,
  - Genetic traits (polled, red carrier, casein, CD, HH, BLAD, BY, Variant Red),


Stall-Liste
Verteilung genetischer Merkmale (266)

Ohrmarke	Name	Stall-Nr.	Status	RZG	Hornstatus	Rotfaktor	KappaKasein	CDH	HH1	HH2	HH3	HH4	HH5	BLAD	Brachyspina	VariantRed
DE	Alexa	230	Färse	112	P	RDC	BB	CDN	H1F	H2N	H3F	H4F	H5N	BLF	BYN	VRN
DE	Oria	4	Kuh aktiv	113	pp	RDN	AA	CDN	H1F	H2N	H3F	H4F	H5N	BLF	BYN	VRN
DE	Lorena	10	Kuh aktiv	107	pp	RDN	AA	CDN	H1F	H2N	H3C	H4F	H5N	BLF	BYN	VRN
DE	Tiffy	22	Kuh aktiv	114	pp	RDN	AA	CDN	H1F	H2N	H3F	H4F	H5N	BLF	BYN	VRN
DE	Mila	25	Kuh aktiv	126	pp	RDN	AA	CDP	H1F	H2N	H3F	H4F	H5N	BLF	BYN	VRN
DE	Litt-sun	36	Kuh aktiv	103	pp	RDN	ABI	CDN	H1F	H2N	H3F	H4F	H5N	BLF	BYN	VRN
DE	Janin	37	Kuh aktiv	107	pp	RDN	AA	CDN	H1F	H2N	H3F	H4F	H5N	BLF	BYN	VRN
DE	Beata	42	Kuh aktiv	107	pp	RDN	AA	CDP	H1F	H2N	H3F	H4F	H5N	BLF	BYN	VRN

Development of GEBV per birth year

Entwicklung der durchschnittlichen Zuchtwerte je Geburtsjahrgang für Rasse 1-SBT

Kennzahlen ■ Betriebsdurchschnitt ◆ Anzahl Tiere ◆ Projektdurchschnitt
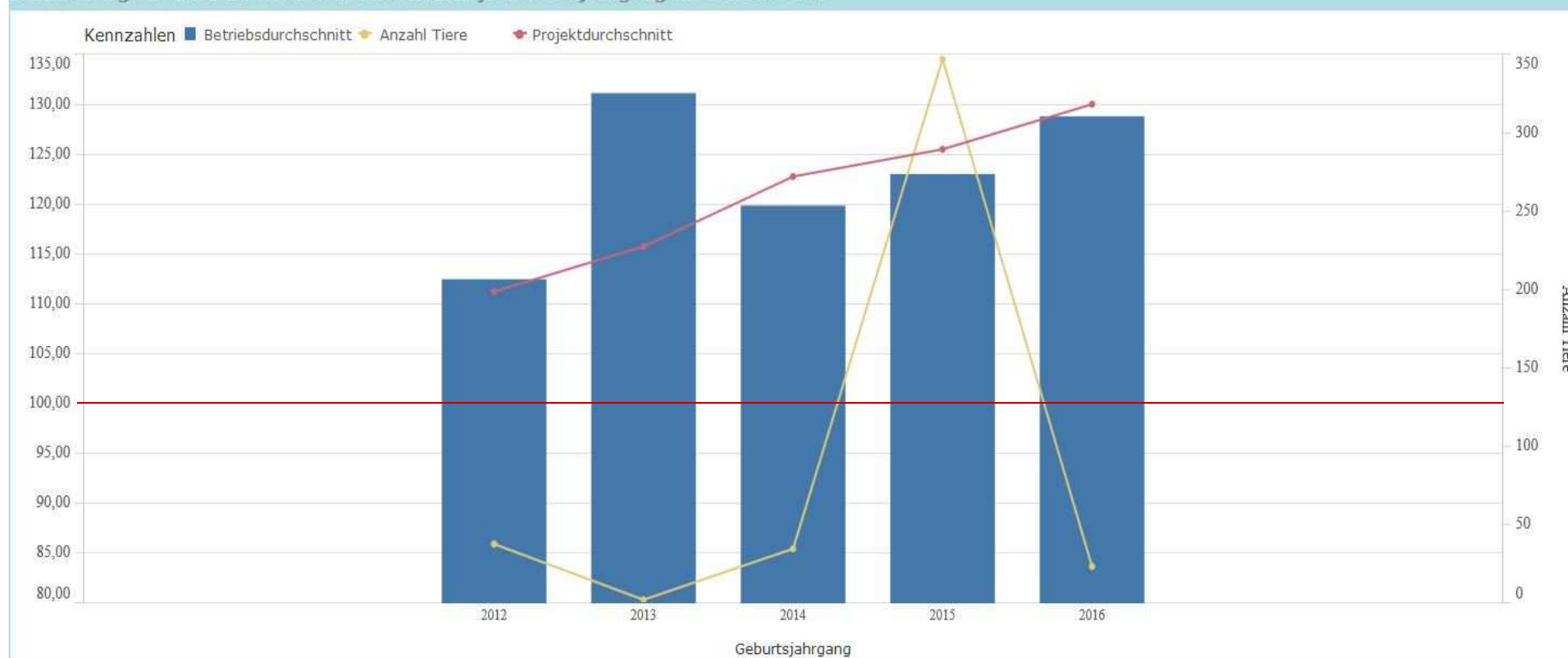
Distribution of
TOP 10 used sires per year

Benchmarking
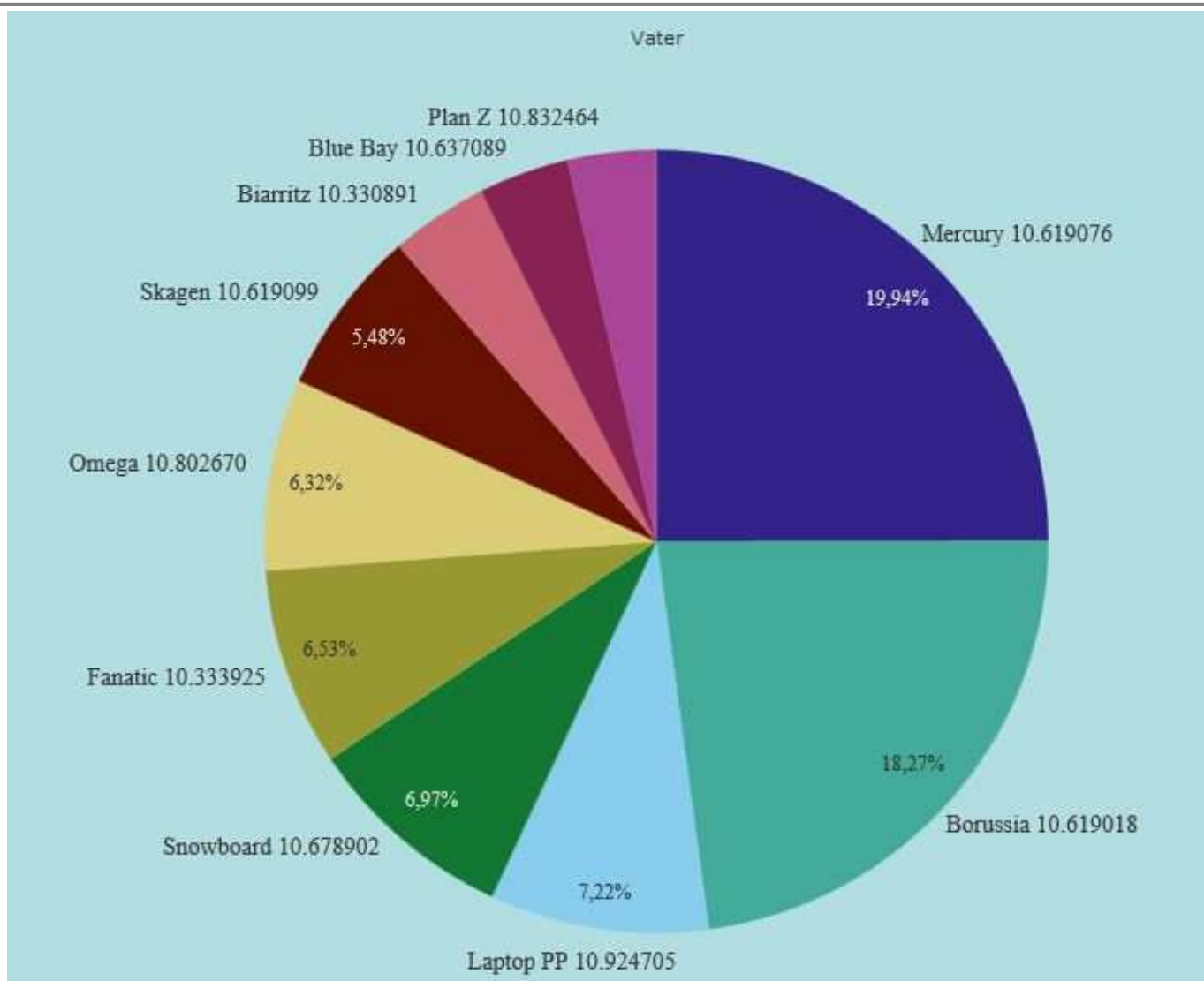
GEBV	Herd	Project	TOP 25	TOP 10
RZG	115	113	119	122
RZM	112	110	114	117
RZS	103	103	105	106
RZE	106	107	109	111
RZN	107	106	109	110
RZKm	102	102	102	102
RZR	107	103	104	105
M-kg	370	363	520	628
F-%	0.12	0.01	0.02	0.01
F-kg	24	15	22	26
P-%	0.03	0.02	0.03	0.02
P-kg	14	13	20	23
DairyType	104	104	104	104
Body	103	103	103	105
F&L	105	104	105	105
Udder	104	106	108	111
Durability	101	101	101	110

Advantage for the farmer

- Full information about the genetic level of the herd

- Possiblity to select animals in an early stage
  - Which calf to raise?
  - Which cattle to sell?
  - Which cattle to inseminate with sexted semen?
  - Which cows to breed with a beef breed?
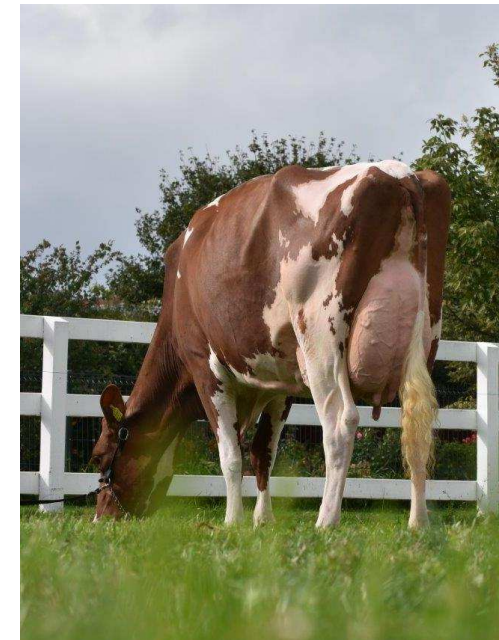
- Higher breeding progress

- Increasing the herd health

**The herd at a glance
for the genomic management!**

# Advantage for
the Breeding Organisation

➡️ **To set up a female reference population!**

Facts and figures

- **Start: July 2016**

- **Actual number of farms participating:** 648

- **Number of females genotyped:** 154,000

- **Females that already have GEBVs:** 141,000

- **Thereof**
  - Cows with 1st calving: 41,000
  - Cows already classified: 26,000
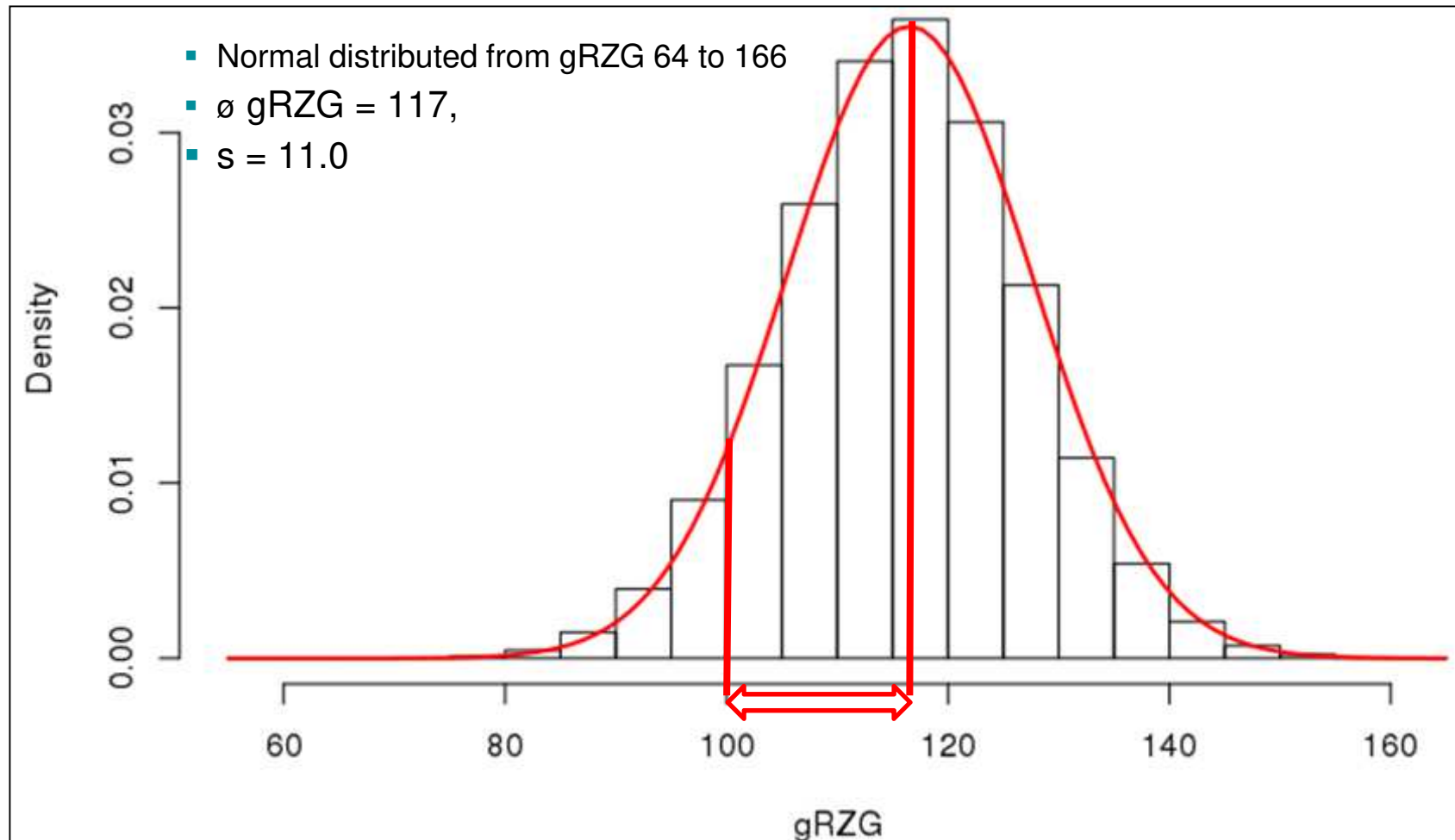 - Cows finished 1st lactation: 17,000

Distribution of herds in KuhVision (DEU & LUX)

S. Rensing, Interbull 2017
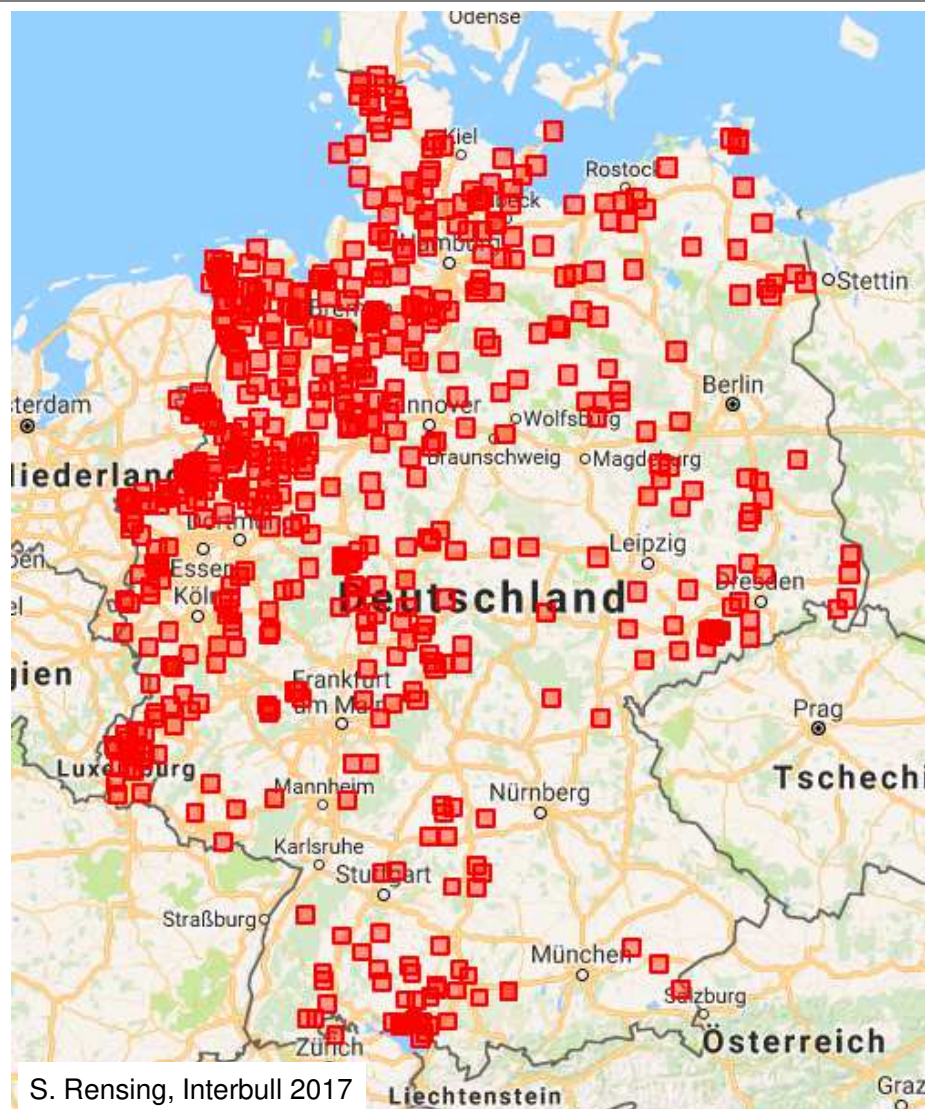
Distribution of gRZG
- all herds, Holsteins 09.2017 -

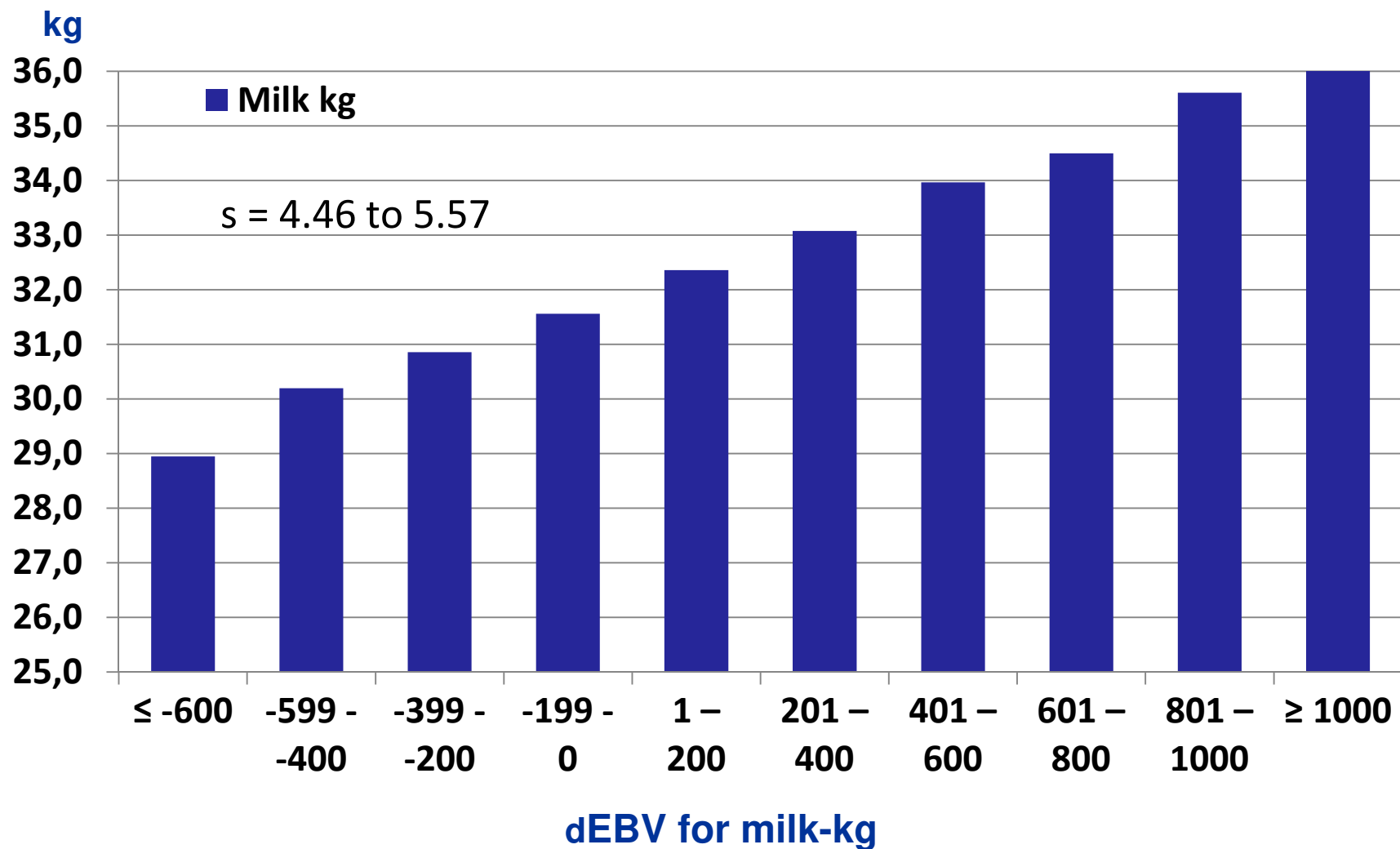- Normal distributed from gRZG 64 to 166
- ø gRZG = 117,
- s = 11.0

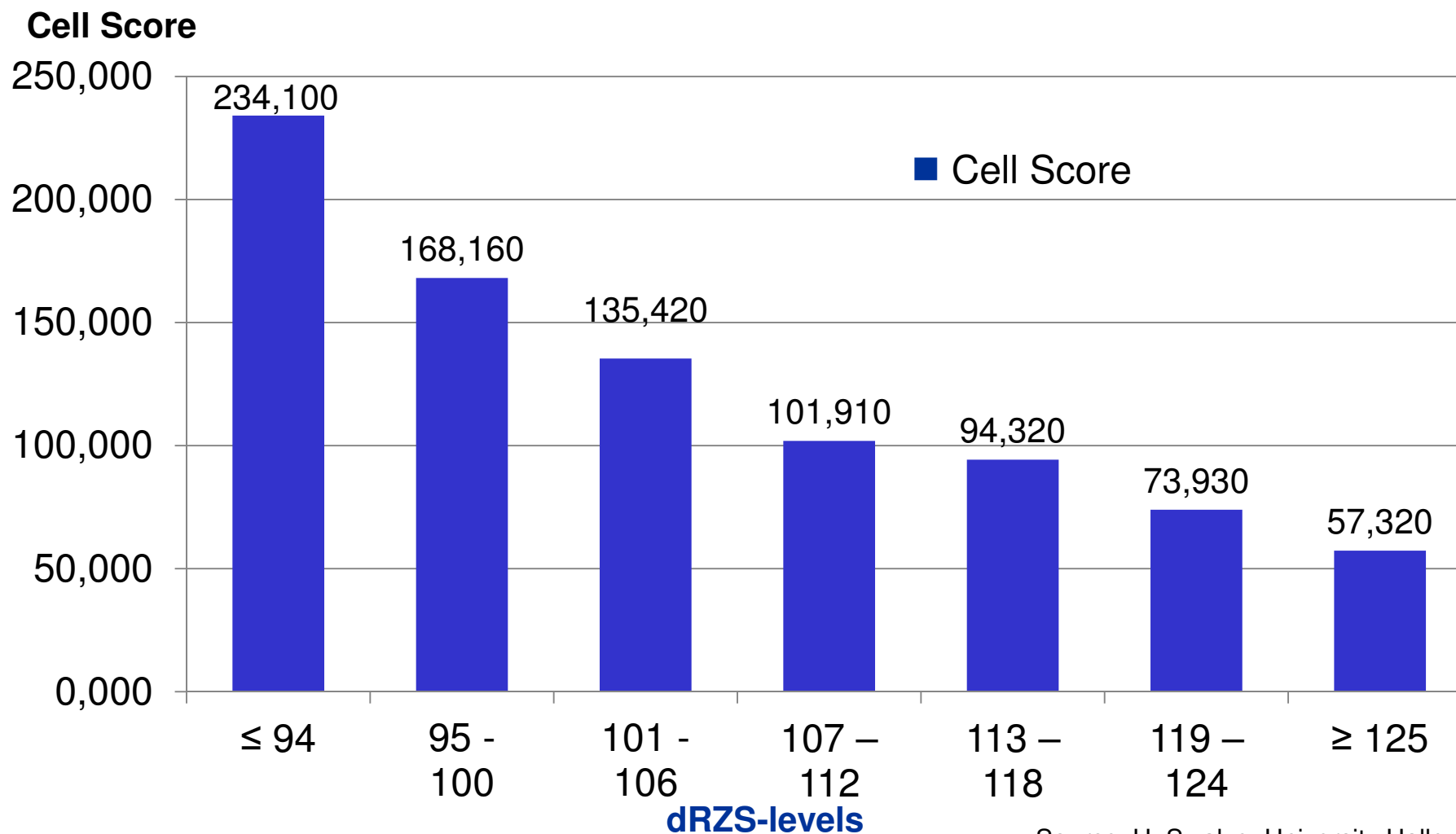# Project „Kuh-L"- prototype of KuhVision

Before KuhVision:

- **Kuh-L*** was a project to test the developing of a cow-reference population for breeding value estimation.

- So, it is the prototype of KuhVision.

- In **Kuh-L** about 20.000 cows of 1,030 different sires were genotyped in contracted herds and there phenotypes were recorded (milk performance, health, type traits, calving data, …)

- Here are first results of **Kuh-L** about the relation between genomic results and phenotypic records of the cows:
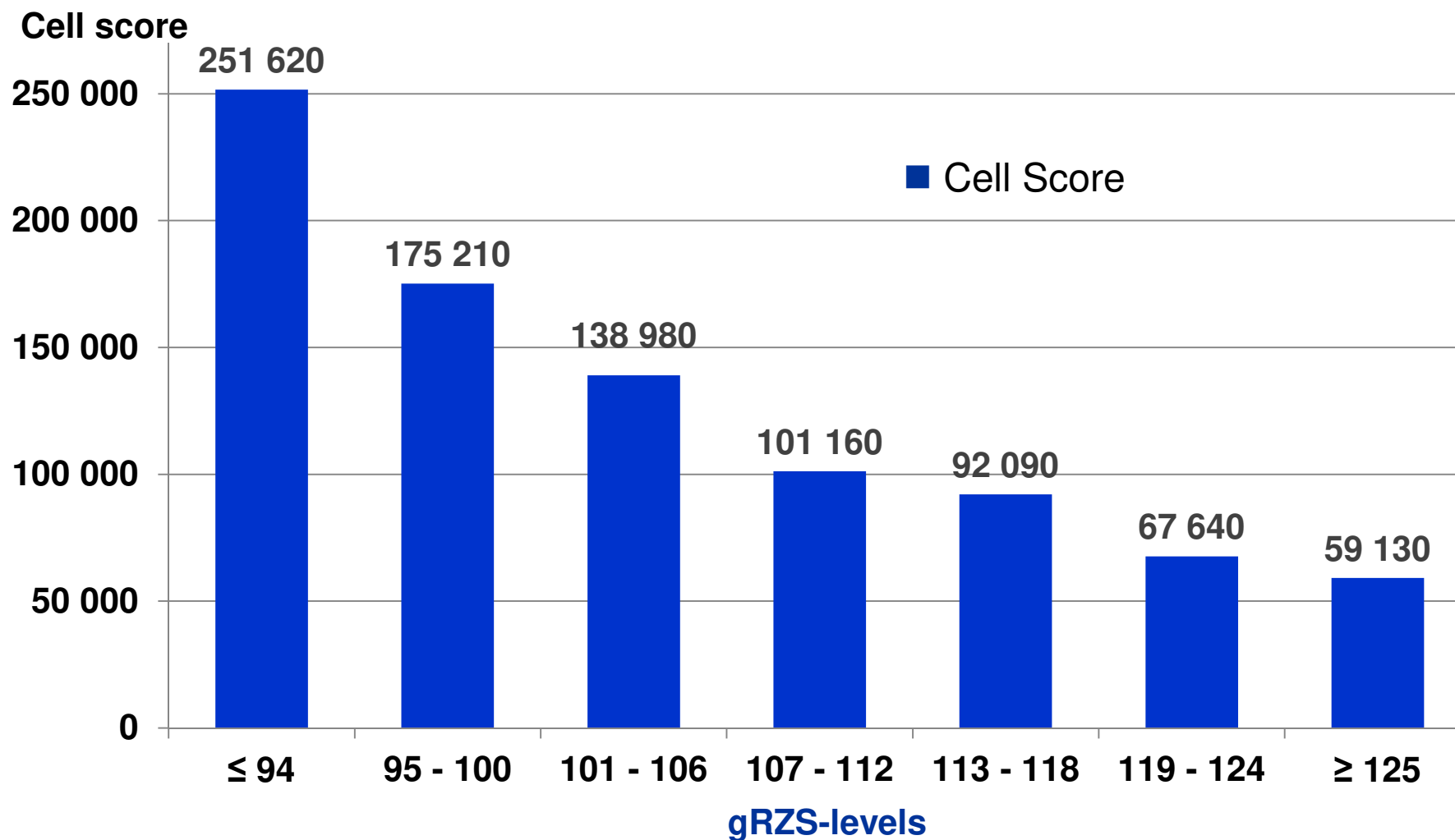
* H. Swalve, University Halle

Procedure for the analysis

- Comparison of the genomic EBV of the cows with their actual performance
  - gEBV *(includes own performance and pedigree information)*
  - dEBV *(**d**irekt = genomic information only)*

- Division of the cows into classes for their dEBV, and formation of class mean for the phenotype values
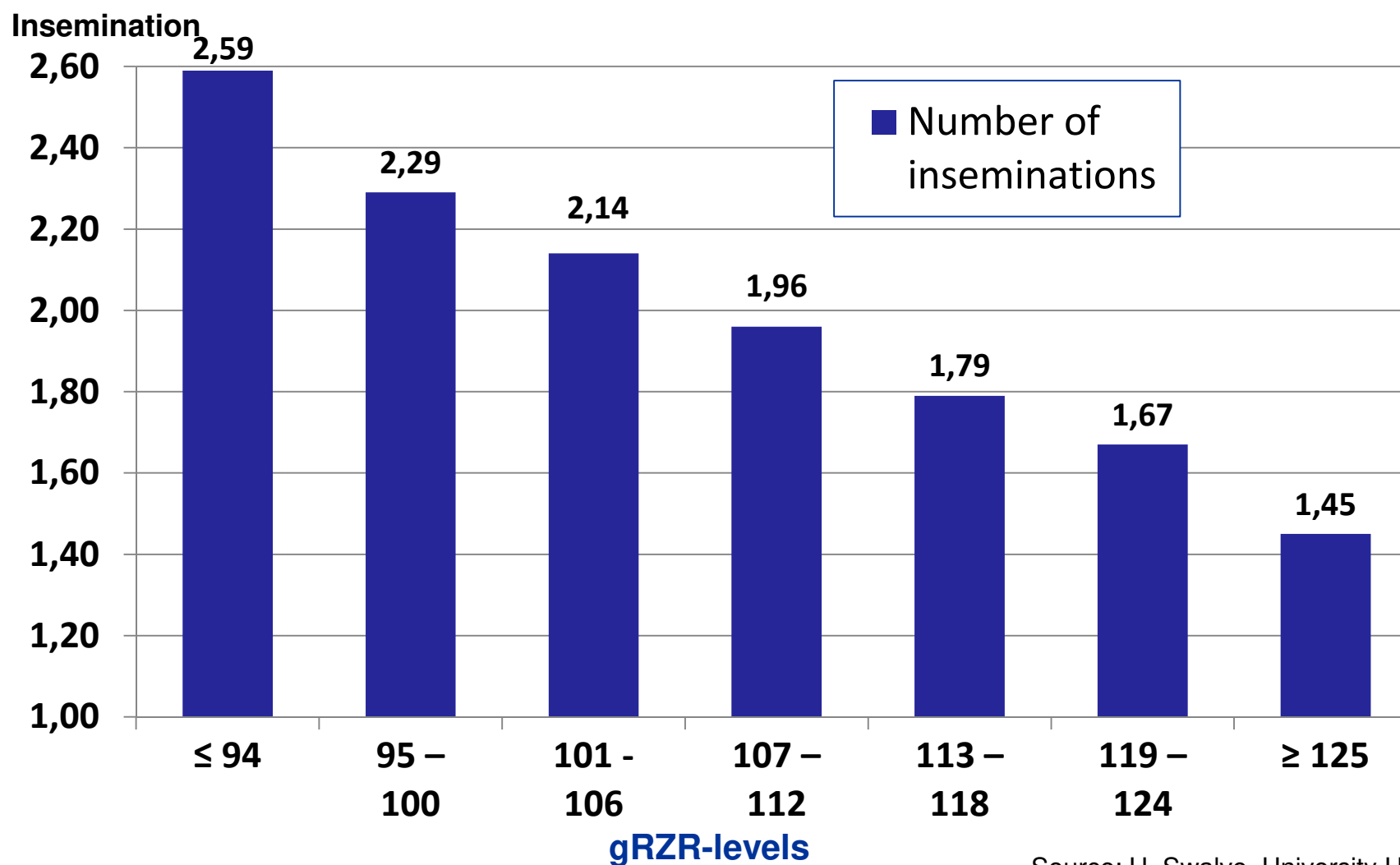
- Each class = 1,000 – 2,700 cows

directEBV for milk-kg *(genomic)* and the milk yield at 2nd test day *(phenotyp)*

s = 4.46 to 5.57

Source: H. Swalve, University Halle

dEBV for somatic cell score (dRZS) and the somatic cells at 2nd test day

Source: H. Swalve, University Halle

gEBV for somatic cell score (gRZS) and the somatic cells at 2nd test day

Cell score

Chart showing Cell Score by gRZS-levels:
- ≤ 94: 251 620
- 95 - 100: 175 210
- 101 - 106: 138 980
- 107 - 112: 101 160
- 113 - 118: 92 090
- 119 - 124: 67 640
- ≥ 125: 59 130

gRZS-levels

Source: H. Swalve, University Halle

gEBV for fertility (gRZR) and number of inseminations and

Source: H. Swalve, University Halle

gEBV for Rear Udder and classification result

Legend: Rear udder (blue bars)

X-axis categories: ≤ 88, 89 – 94, 95 – 100, 101 – 106, 107 – 112, 113 – 118, ≥ 119
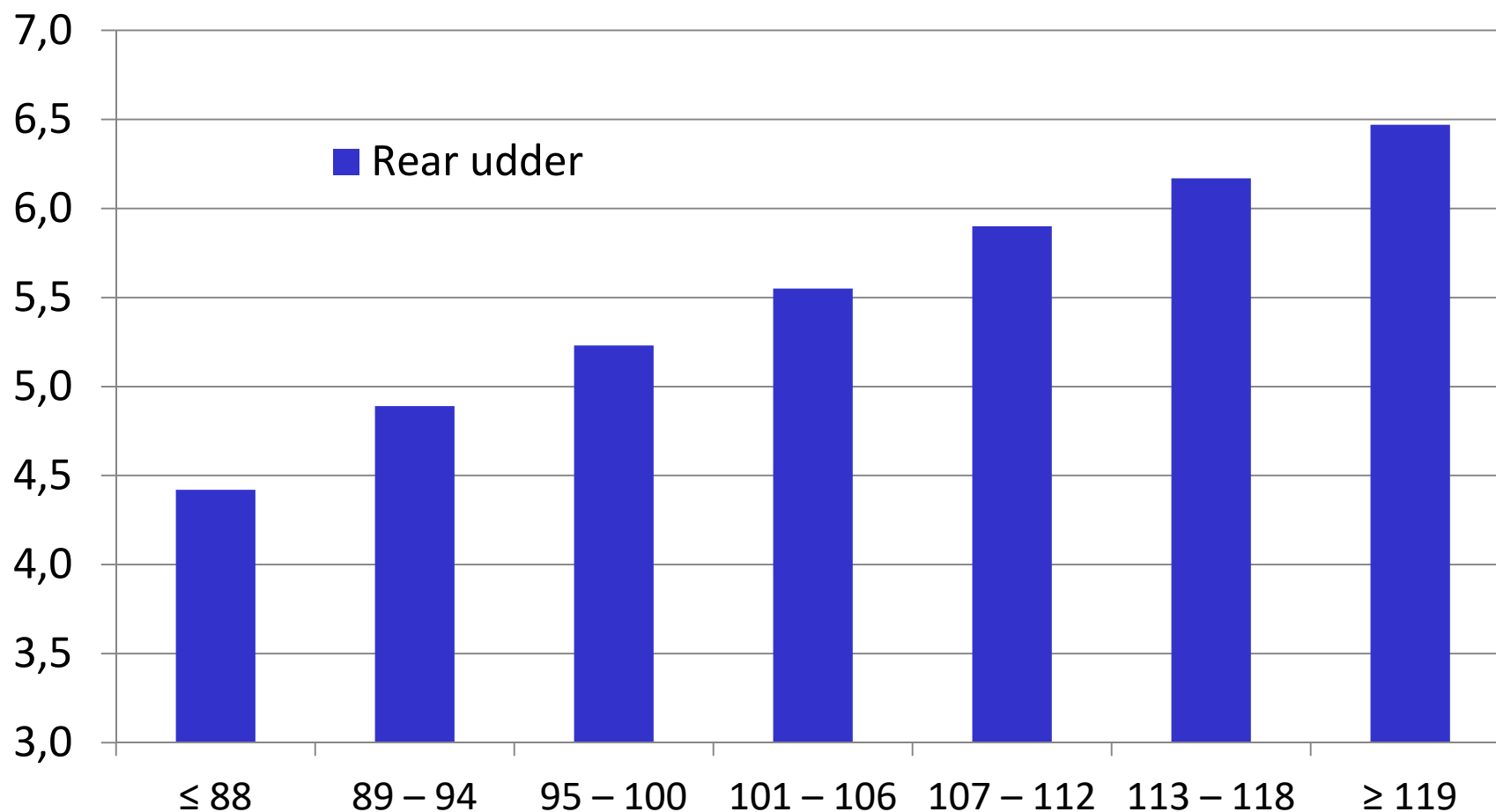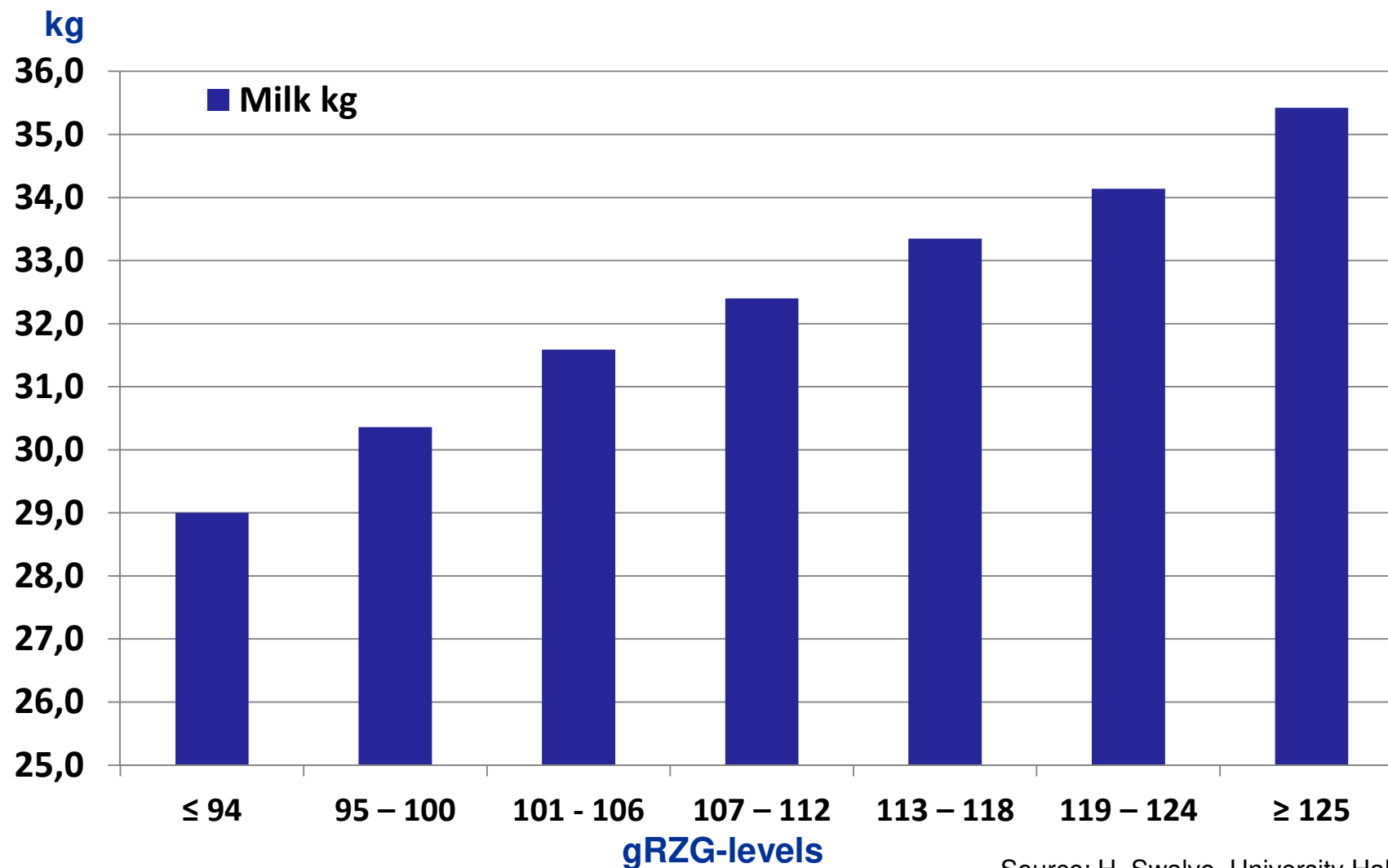
Source: H. Swalve, University Halle

gEBV for Body Depth and classification result
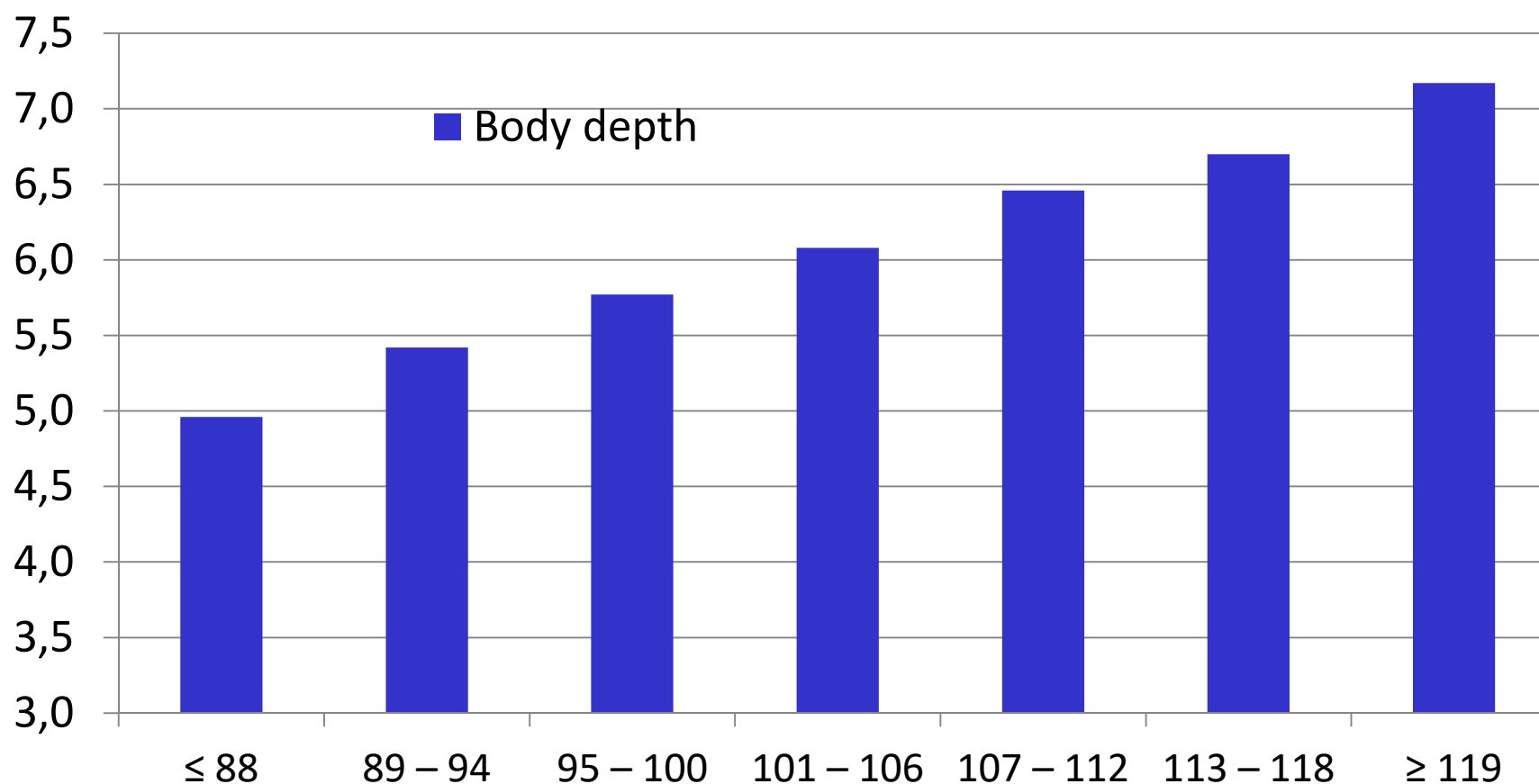
Source: H. Swalve, University Halle

gRZG of cows and the milk yield at 2nd test day

Source: H. Swalve, University Halle

Goals and Conclusions

- 120,000 unselected genotyped and phenotyped cows by mid 2019

- Extensive and good quality data on health traits and hoof trimming

- Results represents the entire German Holstein population

  - <u>CONVIS</u> joined in 4/2017, <u>Holstein Austria</u> in 10/2017

- After initial phase (3 yrs.) >35,000 additional cows per year

- Good promotion for herd genotyping as a standard management tool

- First results show: **Genomics really works**!

- Possibility to predict phenotype very well.

  - especially for functional traits (e. g. reproduction)

- **Kuh*Vision*** helps farmers to improve milk production and health traits of the herd. It supports an efficient herd management and can maximize profit.

Thank you for your attention!

Why a female reference population?

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

Rensing, vit 2017
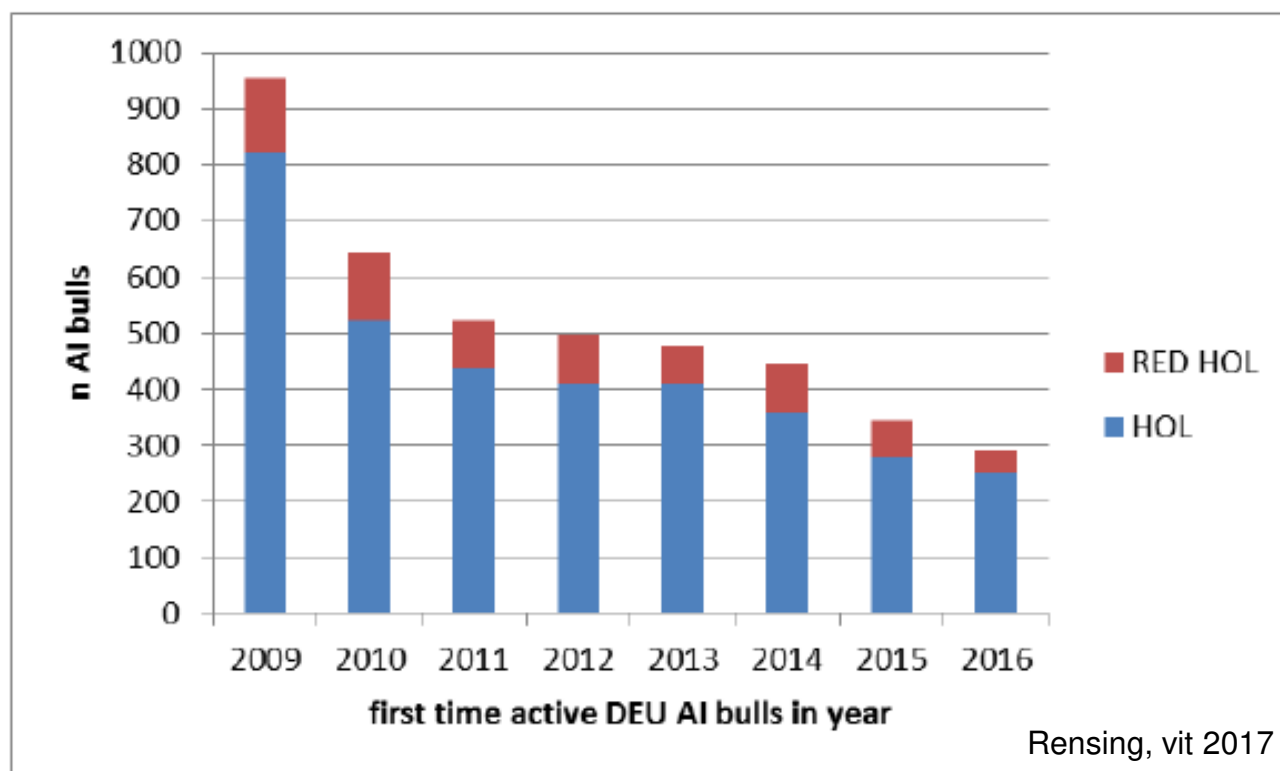
- **Number of new active DEU HOL bulls per year has decreased**