SABRE-TP 4.12.2025

Genetic Markers for male sub-fertility in Brown Swiss cattle – effects on semen quality and non return rate

- Swissgenetics: evaluation of data from semen lab and field use
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Introduction

- Genetic variants for male sub-fertility in Brown Swiss cattle
  - 2 projects at ETH Zurich, Prof. Dr. Hubert Pausch:
  - 6 markers for male sub-fertility genotyped on Swiss Custom-Chip
  - Markers are not published yet, AI studs have access to results

- Swissgenetics – how to use markers?

Frequency of genotyped defects (2020-2025

Marker	Frequency
WDR19_ARS	.26
DNAH3	.02
QRICH2	.02
SPATA16	.24
VWA3A	.11
ENSBTAP	.01

Alpenbitter:

- WDR19 homozygous
- Slow producer: many ejaculates
  < 100 units
- Units sold but NRR56 of conventional semen was 8% lower than average Brown Swiss

Evaluation of sperm quality and sire conception rates

Big problems with Brown Swiss bulls in 2024 – many not producing/stop after 1500 units…

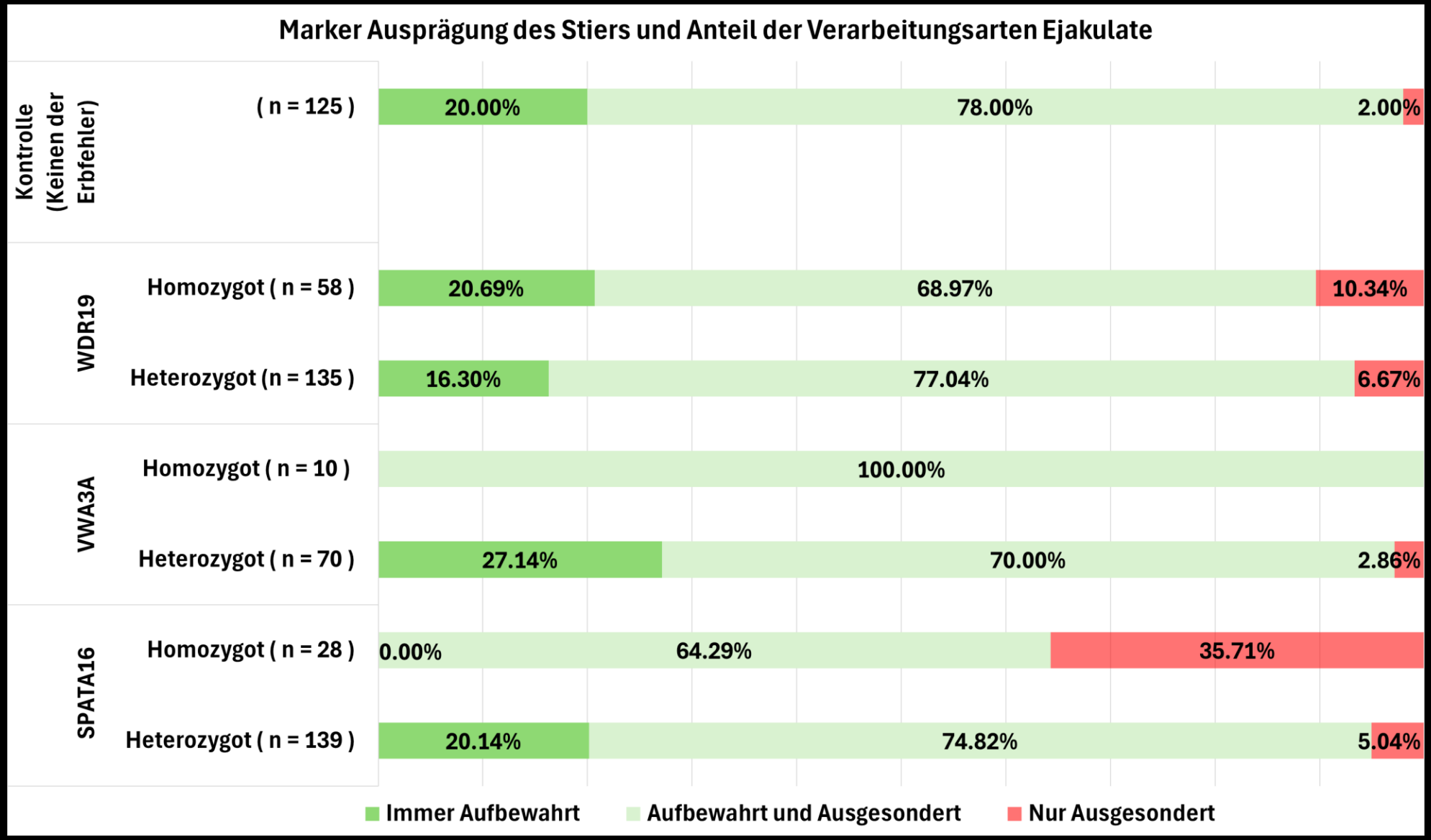
- Very "quick and dirty approach" to be able to decide on young bulls - stop buying homozygous bulls?

- List of genetic markers from Qualitas
  - All new bulls have information
  - Older bulls/Import bulls are retyped with 150K-Chip

- Semen lab data :
  - Percentage of ejaculates that meet quality standard (January 2018 – May 2025)
  - Sperm morphology date (May 2009 – May 2025)

- Field data:
  - Non-return-Rate 56 days, highest rate per bull (rolling evaluation, 12 months data)

Part of Bulls (by marker) with ejaculates:
all frozen; partly rejected, partly frozen; all rejected



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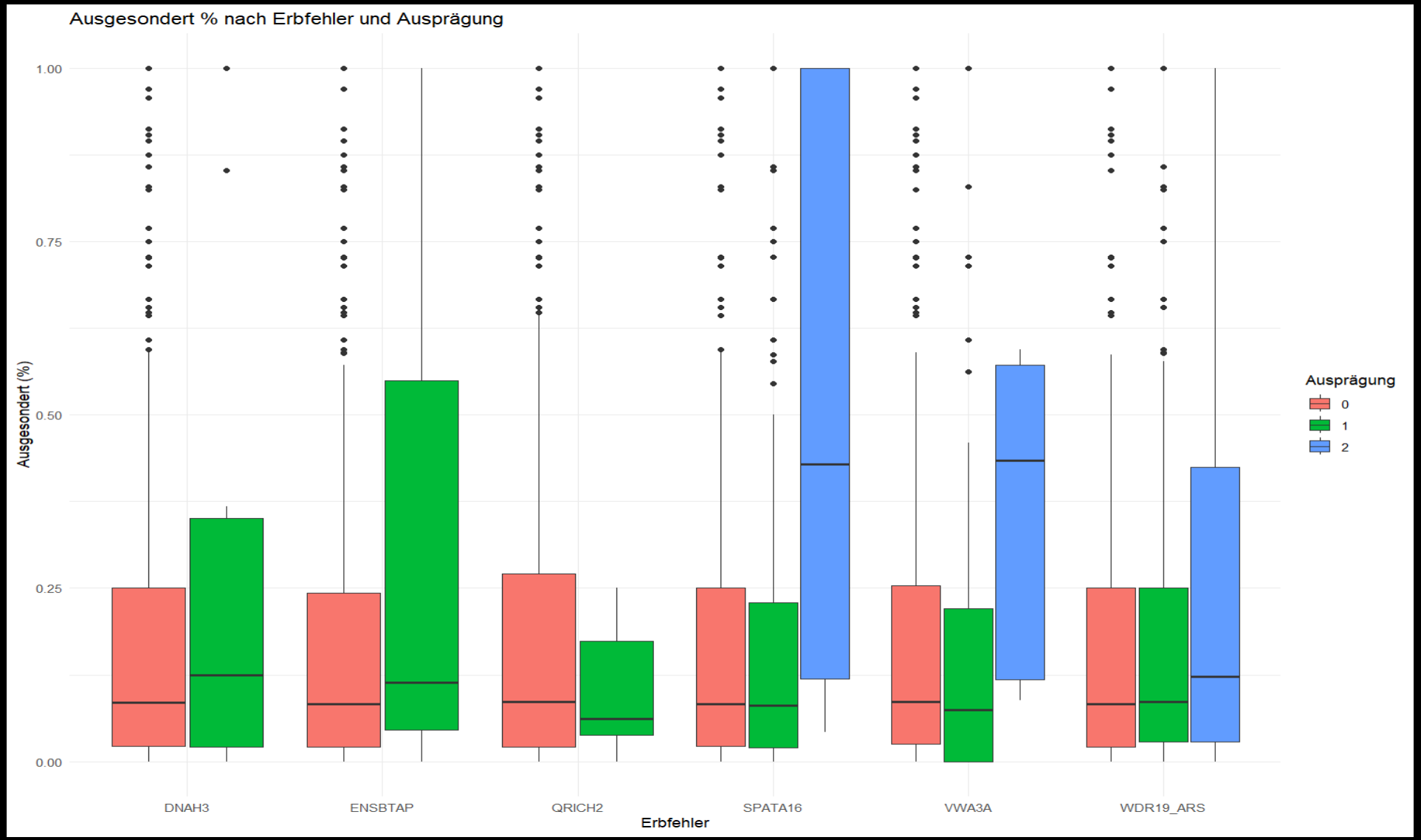
Bulls: % of ejaculates below limit per bull



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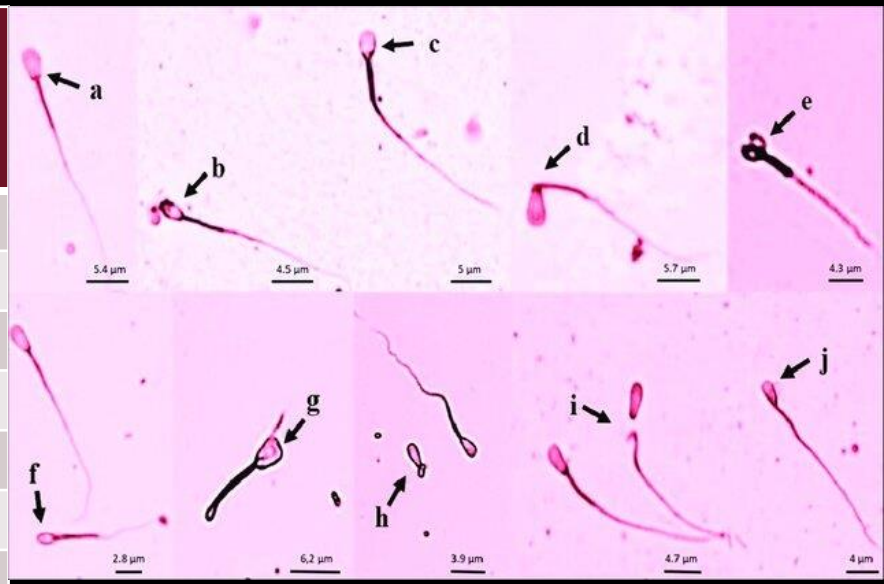
Sperm morphology

Abkürzung	Haupt/ Nebend.	Blom (1972)
Kopfformen	HD	HD - pear-shaped defect b)
Vakuolen_etc	HD	HD - Diadem defect
DNA-Kond.	HD	
knob	HD	HD - knobbed acrosome
Dag	HD	HD - strongly coiled or folded tail
Schnörkel	HD	
MS_gekerbt	HD	HD - Corkscrew defect
ZPl_prox.	HD	HD - proximal doplet
Unterentwickelt	HD	HD - underdeveloped
Micro-macroenc.	ND	ND - small normal heads
lose_Köpfe	ND	ND - free normal heads
Akrosomen Ablösung	ND	ND - detached acrosome membranes
Abax_Schw.	ND	ND - abaxial implantation
Schlingen	ND	ND - terminal coiled tail
ZPl_dist.	ND	ND - distal droplet
Doppelform	ND	HD - double forms



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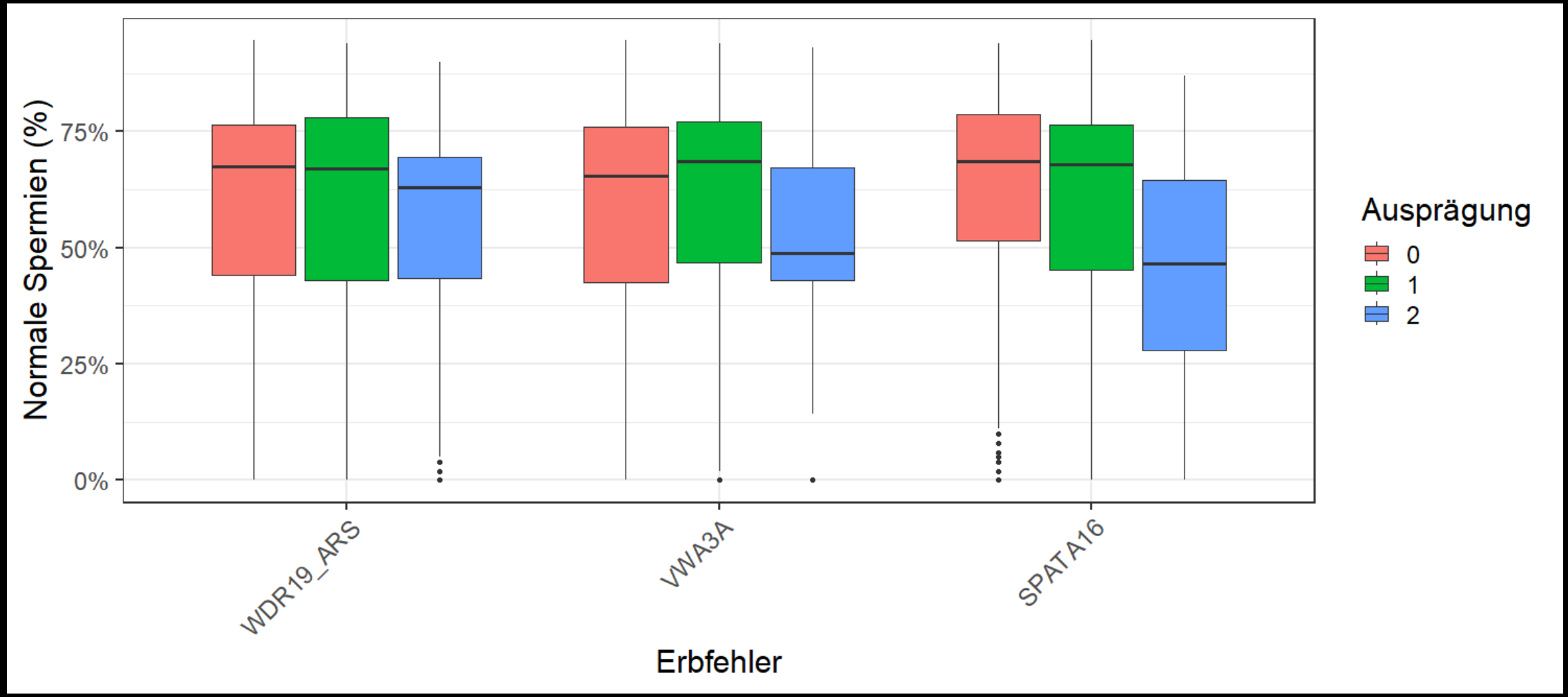
Sperm morphology: % of normal sperms per ejaculate



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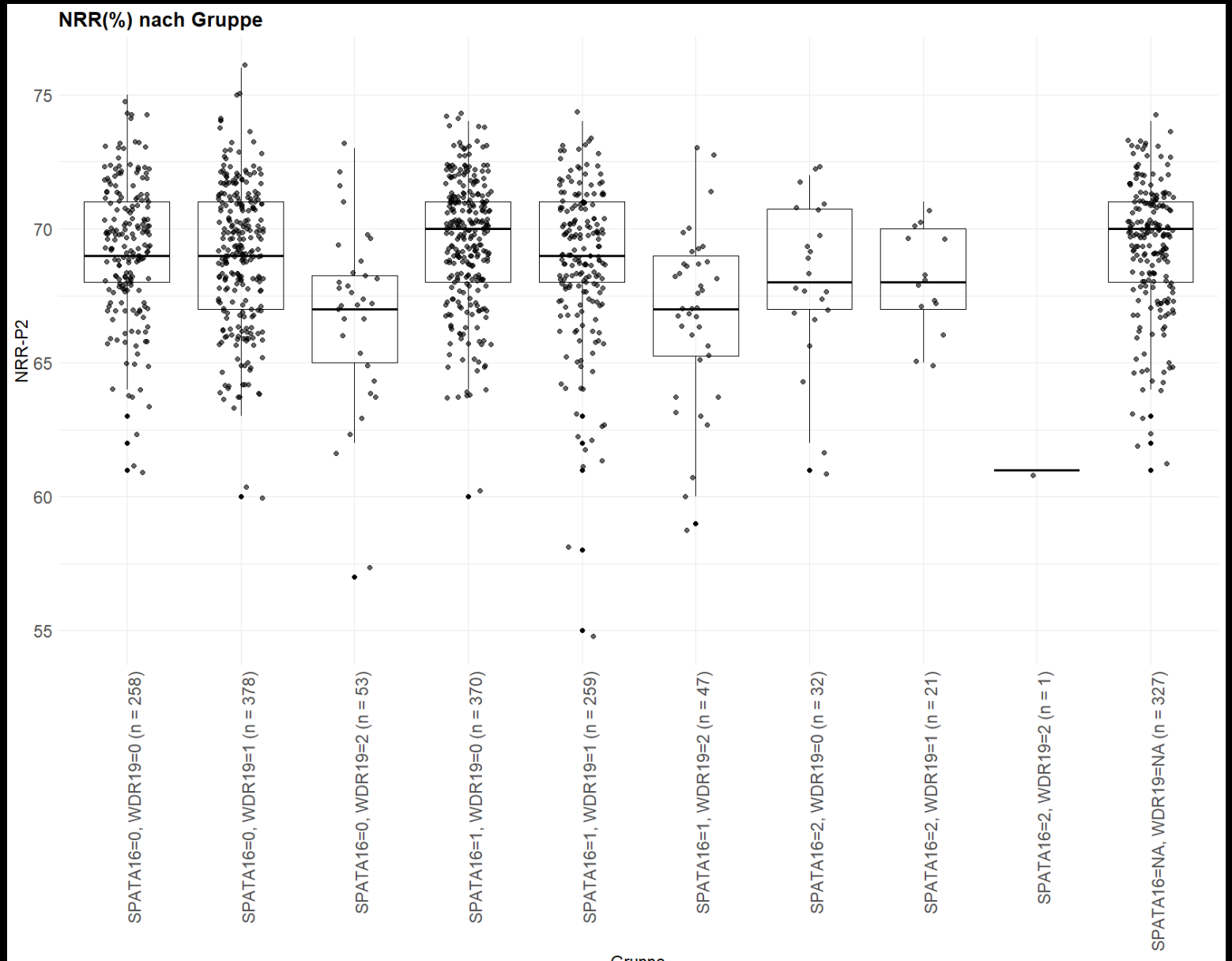
Non return rate: WDR19 and SPATA16



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What's next?

- More research needed:
  - What causes homozygous bulls to produce normally or not at all?
  - When do problems start? Very early – later on? Why? Pathology?
  - Evaluation of Non-return-rates per batch

- Handling in Swissgenetic's Brown Swiss program:
  - Swissgenetics still buys homozygous bulls (WDR19, SPATA16)
  - Frequency in youngest bull calves lower (lines, coincidence?)
  - If full brothers of similar value available, buy free or heterozygous calf
  - Long term: decrease frequency