

Validation of litter quality assessment by pig breeders aiming to develop a piglet vitality index

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Austrian Concepts for Pig Breeding



Background

- Revision of breeding goal for Austrian maternal pig lines (Large White, Landrace)
- Including a piglet vitality index into routine genetic evaluation
- Should comprise of piglet vitality and litter homogeneity
- High performance testing costs for exact data collection

Objectives

- Validation of a litter homogeneity score assessed by breeders based on individual birth weights
 - Calculation of Cohens-Kappa-coefficients
 - Estimation of genetic parameters of scores

Material & methods

- Definition of a homogeneity four category scoring scheme for on-farm assessment

Categories	Definition
1	Not uniform: ≥ 2 piglets with an estimated birth weight $\geq 1.8\text{kg}$ and ≥ 2 piglets with an estimated birth weight $\leq 1.0\text{kg}$
2	Not uniform: ≥ 2 piglets with an estimated birth weight $\geq 1.8\text{kg}$, all other piglets $\geq 1.0\text{kg}$
3	Not uniform: ≥ 2 piglets with an estimated birth weight $\leq 1.0\text{kg}$
4	Uniform litter: all piglets in the litter weigh between $\geq 1.0\text{kg}$ and $\leq 1.8\text{kg}$ at birth. One outlier in each direction permitted

Material & methods

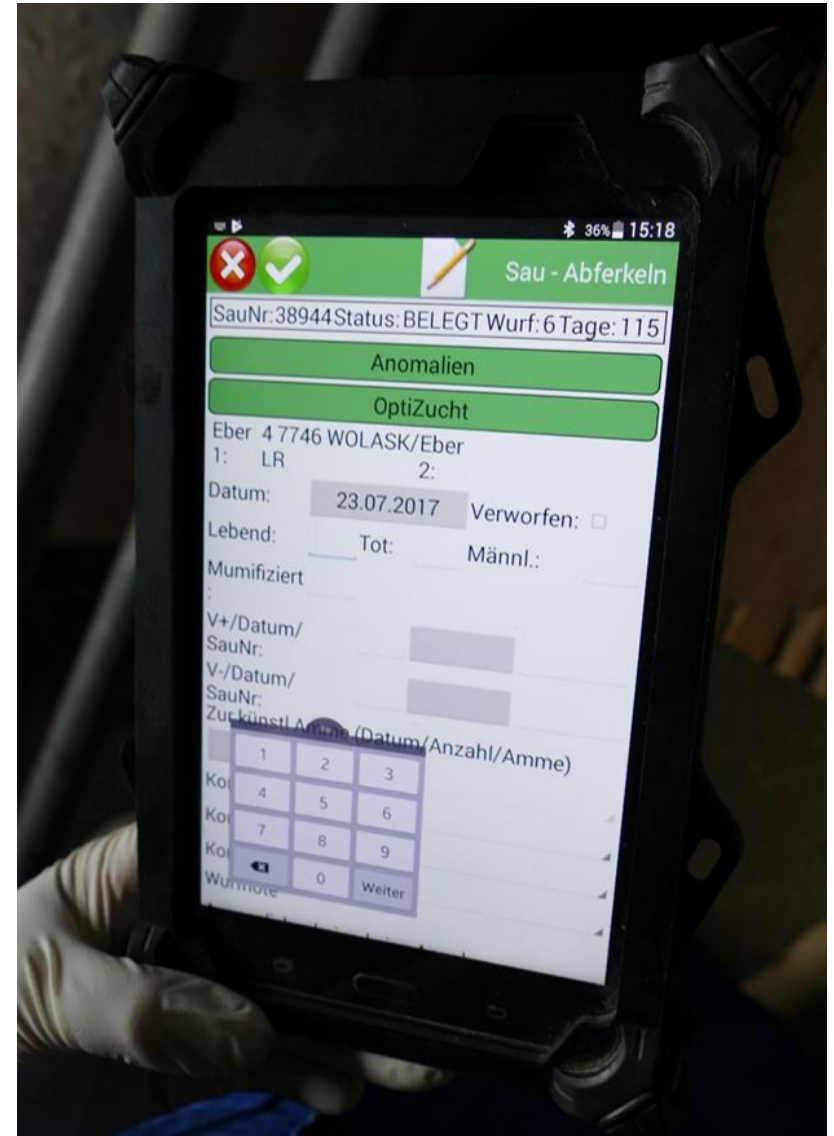
- Definition of a homogeneity four category scoring scheme for on-farm assessment
- Breeders were trained twice
 - Joint training of all breeders for all traits
 - Individual training on each farm

Material & methods

- Definition of a homogeneity four category scoring scheme for on-farm assessment
- Breeders were trained twice
 - Joint training of all breeders for all traits
 - Individual training on each farm
- **Feedback during data recording period**
 - Written/phone or re-training in severe cases
 - Joint breeders meeting in the middle of data recording period

Material & methods

- Data collection was done by 24 breeders using a tablet within 24 h post partum
 - A special app was programmed



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- Two to three farrowing batches were summed up for calculating Cohens-Kappa-coefficient
 - Depending on the herd size (32 to 351 litters/breeder)
 - Cohens-Kappa-coefficient for six time points

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- Genetic parameters – uni- or bivariate AM

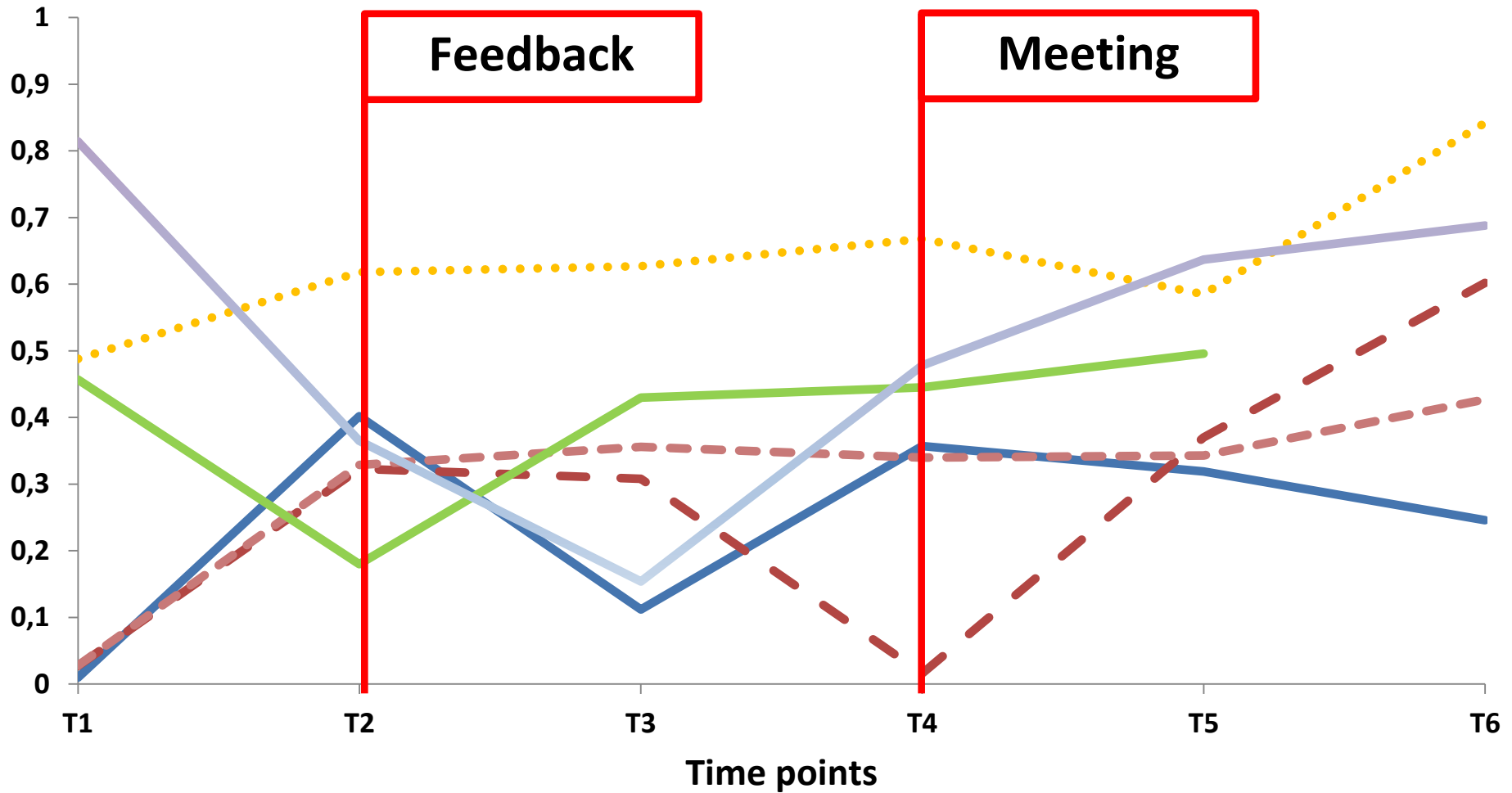
Results & discussion of 3,338 litters

Category	Scoring breeders (n)	Scoring based on individual birth weights (n)
1	388	328
2	324	1,151
3	1,075	1,093
4	1,551	759
Mean ± SD	3.14±1.00	2.69±0.93
Spearman-rank-correlation	0.253 (<0.0001)*	
Cohens-Kappa-coefficient	0.338 (0.164 – 0.648)	

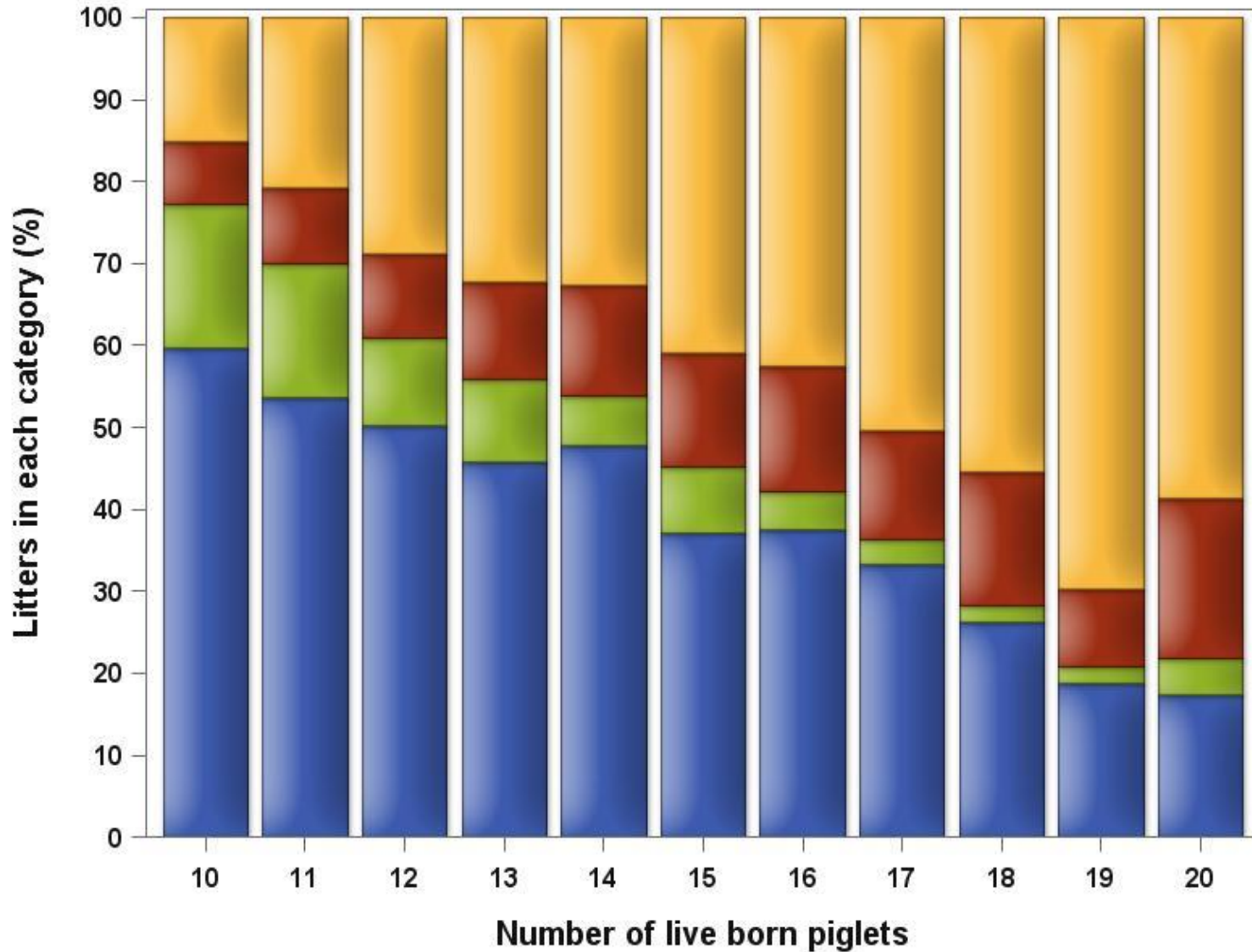
Results & discussion of 3,338 litters

Category	Scoring breeders (n) 3 categories	Scoring based on individual birth weights (n)
1	388	328
3	1,075	1,093
4	1,875	1,910
Mean ± SD	3.32±0.96	2.69±0.93
Spearman-rank-correlation	0.515 (<0.0001)*	
Cohens-Kappa-coefficient	0.475 (0.205 – 0.841)	

Cohens-Kappa-coefficient over time

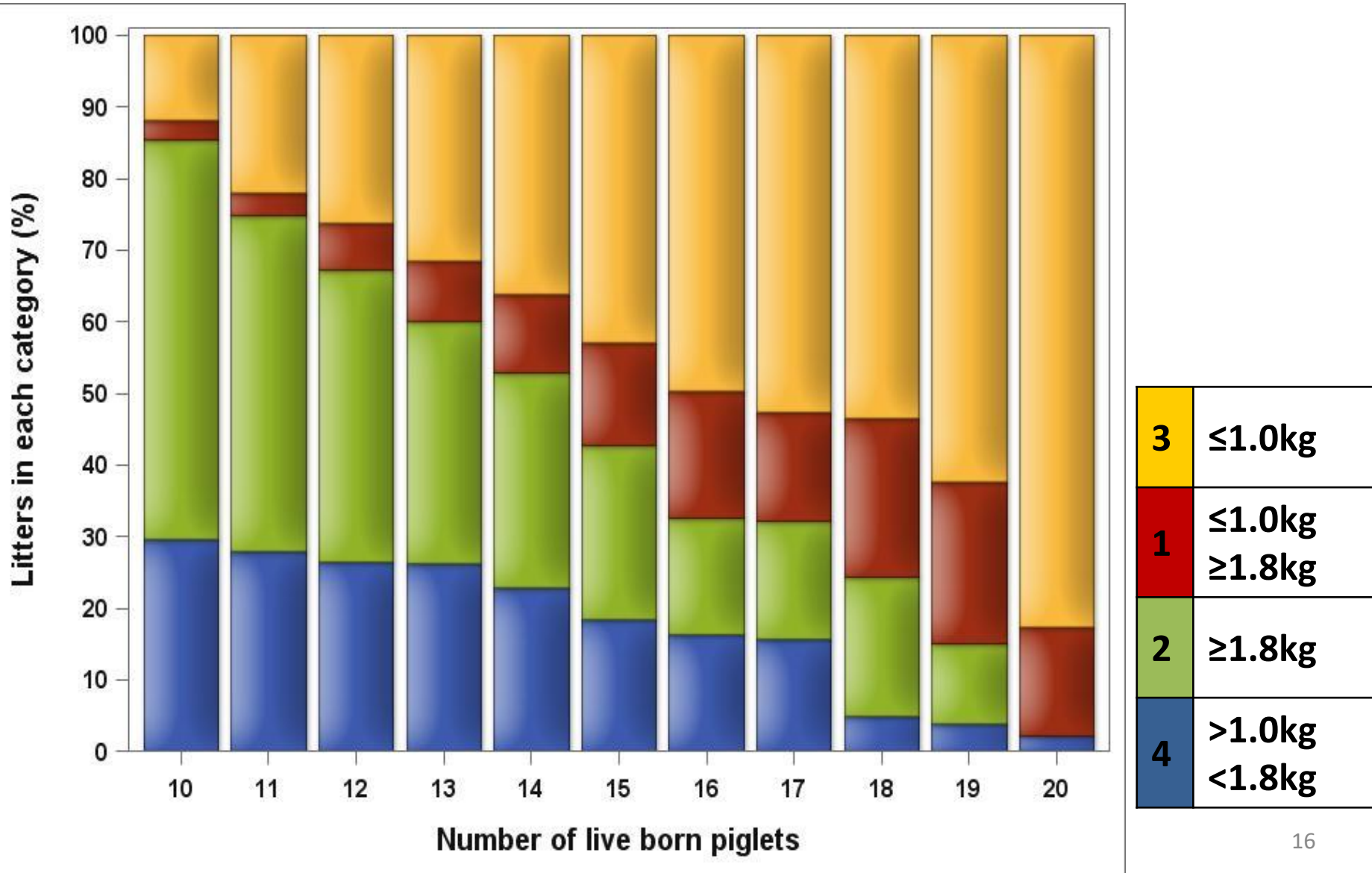


Scoring grouped by litter size - breeders



3	$\leq 1.0\text{kg}$
1	$\leq 1.0\text{kg}$ $\geq 1.8\text{kg}$
2	$\geq 1.8\text{kg}$
4	$> 1.0\text{kg}$ $< 1.8\text{kg}$

Scoring grouped by litter size – birth weights



Genetic parameters

Trait	h^2	t
Litter homogeneity score breeder (LH SB)	0.06±0.03*	0.10±0.03
Litter homogeneity score birth weights (LH BW)	0.12±0.03	0.20±0.03
Litter homogeneity score 3 categories (LH 3K)	0.03±0.02*	0.10±0.02

Genetic parameters

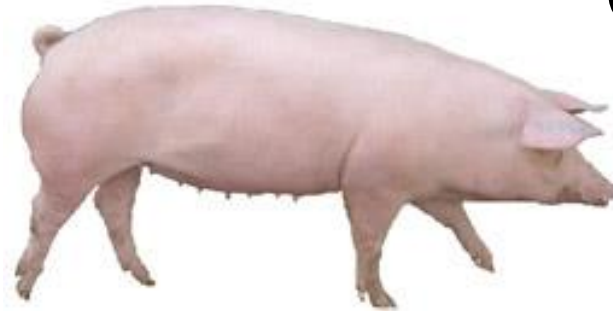
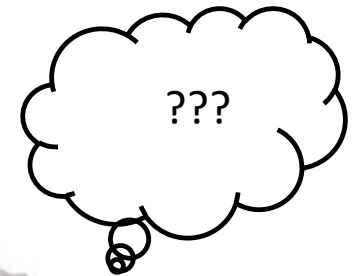
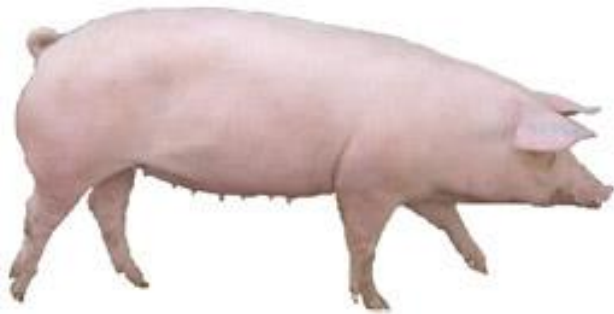
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	LH SB	LH BW	LH 3K
LH SB		0.78± 0.29	0.72± 0.24
LH BW	0.28± 0.02		-0.08± 0.37*
LH 3K	0.81± 0.01	0.16± 0.02	

Conclusion

- Scoring scheme worked **moderately**
- h^2 and t were small but still high enough to implement it into routine genetic evaluation
- More data is needed
- If breeding organisation will decide for the scoring scheme
 - Re-training is needed
 - Scoring scheme may not be suitable for all breeders
 - The four presented categories should be used

Thank you for your attention!



**Federal Ministry for
Sustainability and
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Special thanks to the breeders
for data collection and high
motivation to be part of the
project!



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