Genetic parameters for litter quality traits of Austrian Large White and Landrace sows

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Background

Large litters

Heterogeneous birth weights

Vitality ⬇️

Piglet losses ⬆️

Functional longevity sow ⬇️

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⬇️ **Performance**

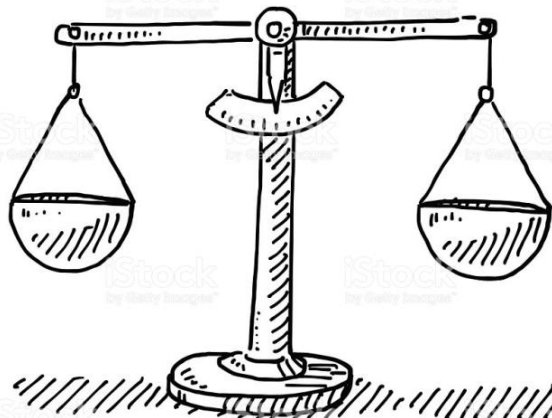⬆️ **Birth monitoring management labour/cost**

⬇️ **Animal welfare sow and piglets**

Common revision of breeding objectives

Where to go …

- **Robust sows** with **good maternal abilities**
- **Appropriate** litter size with **vital** and **homogeneous** piglets
- Ideal **piglet birth weight**

Economics

**Sustainability
Animal welfare**

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Objectives

- Estimation of genetic parameters
  - Heritabilities
  - Repeatabilities
  - Genetic (and phenotypic) correlations

Traits

Litter quality traits (24h pp)

- Individual birth weight in kg (IBW)
- Litter weight in kg (LW)
- Average birth weight in kg (ABW)
- Standard deviation of birth weight in kg (SDB)
- Percentage of piglets ≤1 kg birth weight (NB1P)

- Scoring of litter homogeneity (1 to 4) **next presentation**
- Scoring of litter vitality (1 to 4) **not presented today**
- Litter weight at weaning **not presented today**

Fertility traits

- Number of live born piglets (LBP)
- Number of stillborn piglets (SBP)
- Number of total born piglets (TBP)
- Number of weaned piglets (WP)

Data

- **2,002** sows (Large White, Landrace, F1)
  - Service sire Large White, Landrace
- **3,307** litters and **43,195** individual birth weights
- **24** breeders (Ø herd size 84 sows)
- Pedigree **12,433** pigs
- Software
  - ASReml 3.0

Model – uni- or bivariate animal model

$$y_{ijklmnopqrst}$$
$$= farm_i + season_j + year_k + season * year_l$$
$$+ parity_m + categories\ farrowing\ age_n$$
$$+ parity * categories\ farrowing\ age_o$$
$$+ breed_p + service\ sire\ _q + PE\ sow_{rs} + sow_t$$
$$+ e_{ijklmnopqrst}$$

$y_{ijklmnopqrst}$ record of traits

Results and Disussion

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Description of traits

Trait	mean±SD	min - max
Live born piglets (n)	13.1±3.04	1-24
Still born piglets (n)	1.12±1.54	0-17
Total born piglets (n)	14.2±3.34	0-34
Weaned piglets (n)	11.2±2.20	0-20
Litter weight (kg)	18.37±4.41	1.74-35.3
Average individual birth weight (kg)	1.42±0.37	0.10-3.00
Standard deviation of individual birth weight (kg)	0.28±0.10	0.05-0.78
Piglets ≤1 kg birth weight (%)	12.9±15.3	0-100

Heritabilities & repeatabilities

Trait	h^2	t
Live born piglets (n)	0.13±0.04	0.15±0.04
Still born piglets (n)	0.03±0.04*	0.17±0.03
Total born piglets (n)	0.09±0.03	0.11±0.04
Weaned piglets (n)	0.07±0.03	0.19±0.03
Individual birth weight (kg)	0.14±0.02	0.17±0.01
Litter weight (kg)	0.13±0.04	0.31±0.03
Average birth weight (kg)	0.32±0.04	0.40±0.02
Standard deviation of individual birth weight (kg)	0.16±0.03	0.19±0.03
Piglets ≤1 kg birth weight (%)	0.15±0.03	0.25±0.03

Genetic correlations

	LBP	SBP	TBP	WP	LW	ABW	SDB	NB1P
LBP		0.62± 0.26	0.92± 0.05	0.49± 0.23	0.27± 0.21*	-0.38± 0.16	0.14± 0.23*	0.37± 0.21*
SBP								
TBP								
WP								
LW								
ABW								
SDB								
NB1P								

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LBP		0.62± 0.26	0.92± 0.05	0.49± 0.23	0.27± 0.21*	-0.38± 0.16	0.14± 0.23*	0.37± 0.21*
SBP			0.86± 0.10	-0.32 ±0.22*	0.37± 0.21*	-0.20 ±0.14*	-0.05± 0.17*	-0.04 ±0.18*
TBP				0.17± 0.23*	0.24± 0.17*	-0.36 ±0.13	0.079± 0.18*	0.20± 0.18*
WP					0.06± 0.23*	-0.14± 0.18*	0.13± 0.21*	0.02± 0.22*
LW						0.79± 0.10	0.48± 0.15	-0.71± 0.12
ABW							0.32± 0.13	-0.96± 0.03
SDB								-0.09± 0.16*
NB1P								

Conclusion

- h^2 and t for litter quality traits are **low** to **moderate**

- Genetic correlations between litter quality traits and fertiliy are **moderate**

- Moderat common genetic background exists

- Need to implement one of the traits
  - Animal welfare
  - Farm management

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Thank you for your attention!
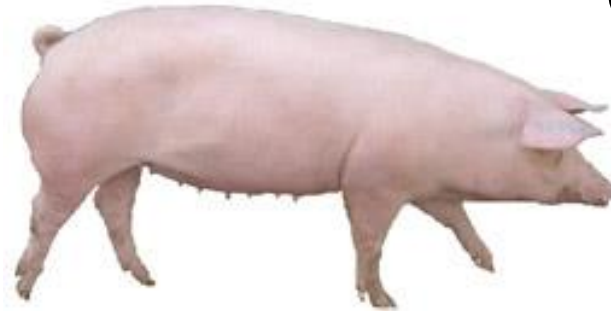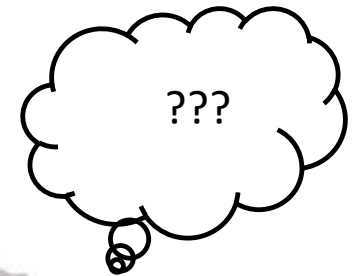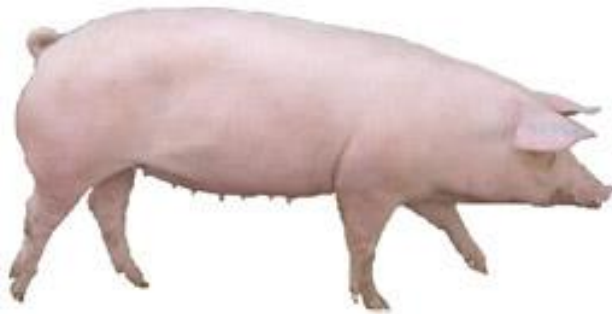
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Special thanks to the breeders for data collection and high motivation to be part of the project!