

Evaluation of the effects of selection on sow efficiency and robustness



By:

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Introduction

- Selection has been successful in many pig populations
- Selection may unfortunately be accompanied by detrimental effects
- E.g. an increase in piglet mortality has been shown in many populations



Objective of the study

To estimate the effects of selection on:

- Sow reproductive efficiency
- Traits related to robustness



Using an experimental design based on frozen semen

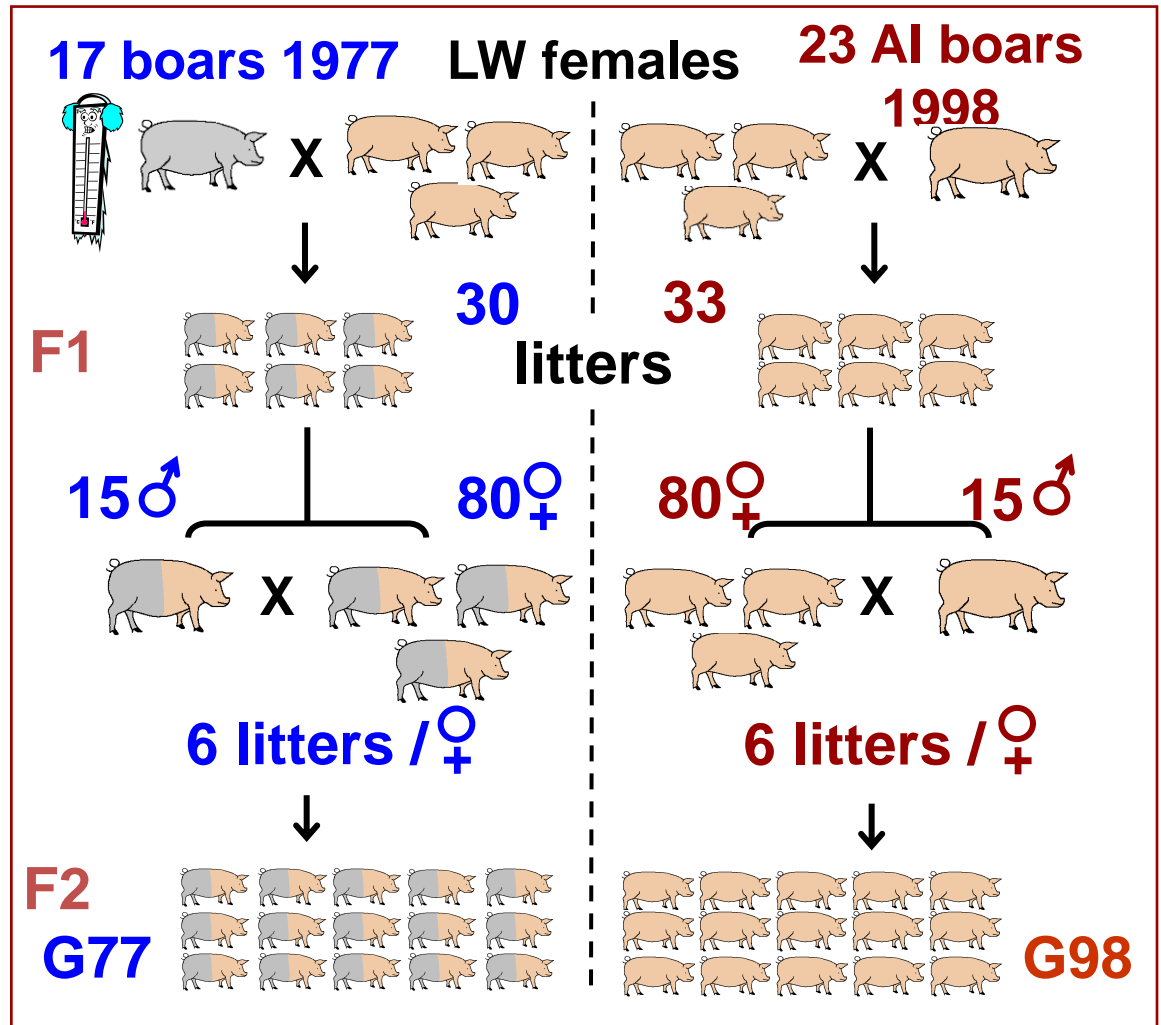
Experimental design (1/2)

Animals studied

- Sows



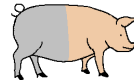
- Piglets



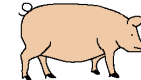
Experimental design (2/2)

Sows

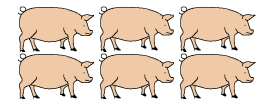
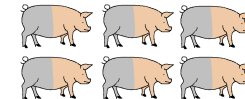
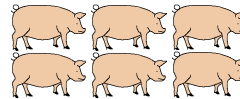
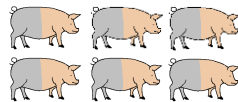
G77



G98



Piglets



Litter size standardized within 24h after birth

Cross fostering of 50% of piglets across genetic group



Traits investigated (1/2)



- **Traits related to sow reproductive efficiency**
 - Age at puberty
 - Ovulation rate, prenatal survival
 - Litter size and weight at birth and at 21d
 - Weaning to estrus interval
 - Colostrum and milk composition



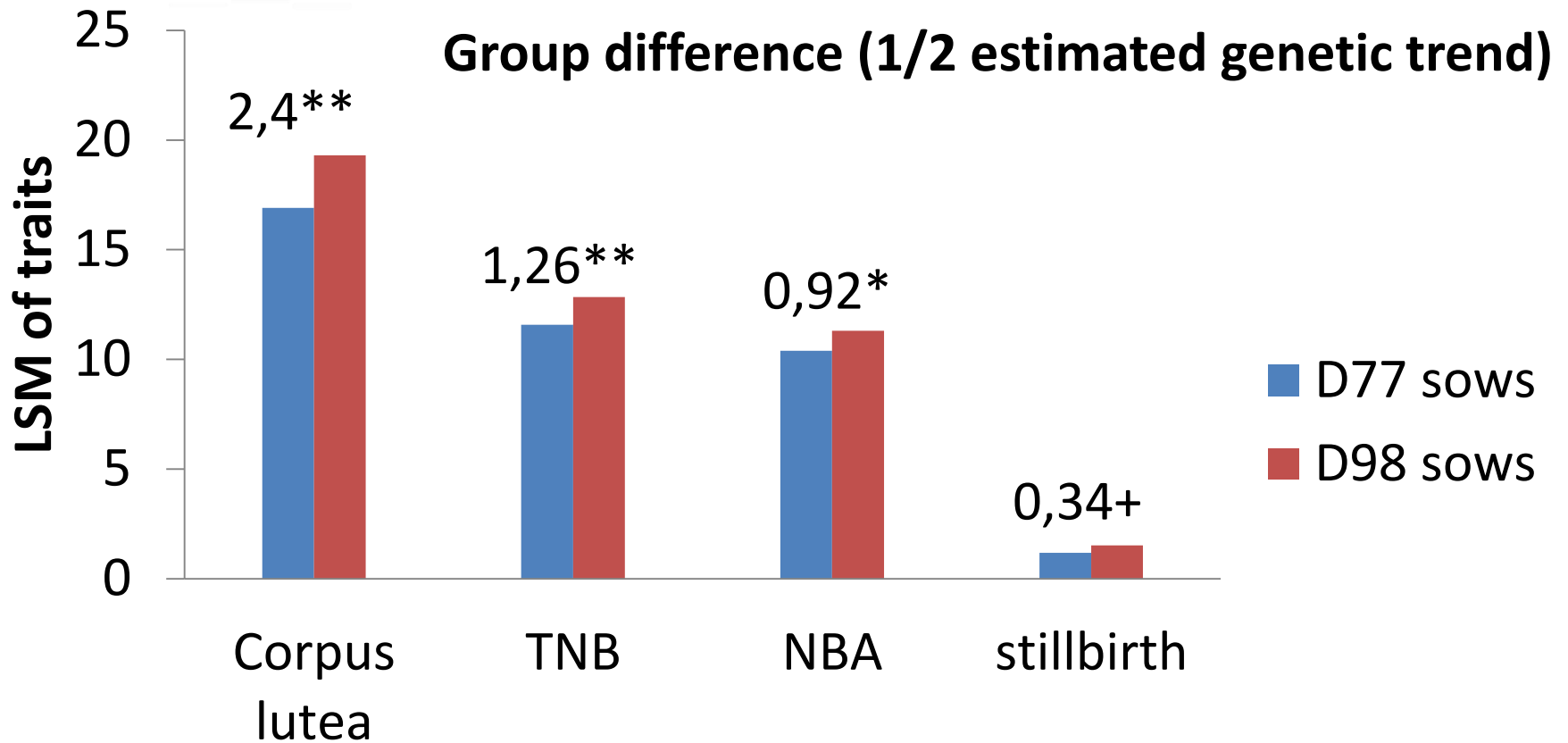
Traits investigated (2/2)

- **Traits related to robustness**
 - Sows longevity
 - Piglet survival
 - Variability of sow performance across parities
- **Global indicators**
 - Ratio of TNB and LWB during lifespan and productive life

Statistical analysis

- Traits were analysed using mixed linear models with the SAS Mixed procedure
- **Model**
 - fixed effects of: genetic group, parity, herd, batch within herd
 - random effects: sow within genetic group
 - Covariates : litter size / individual weight at birth when appropriate
- Heterogeneous variances across groups used when appropriate

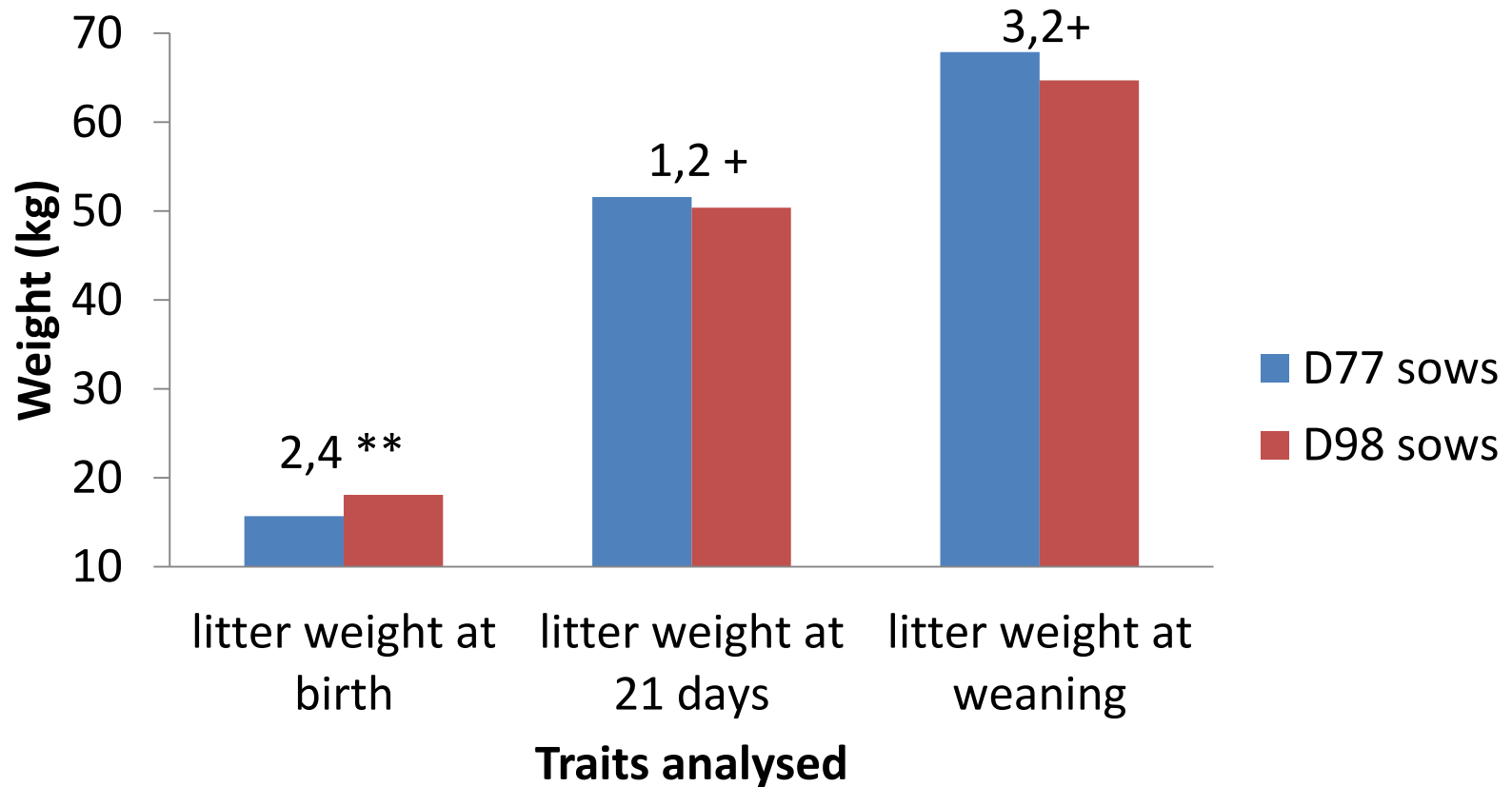
Corpus lutea and litter size



** = P-value <0,01; * = P-value <0,05; + = P-value <0,1

Litter weight performance

Group difference (1/2 estimated genetic trend)



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Milk quality

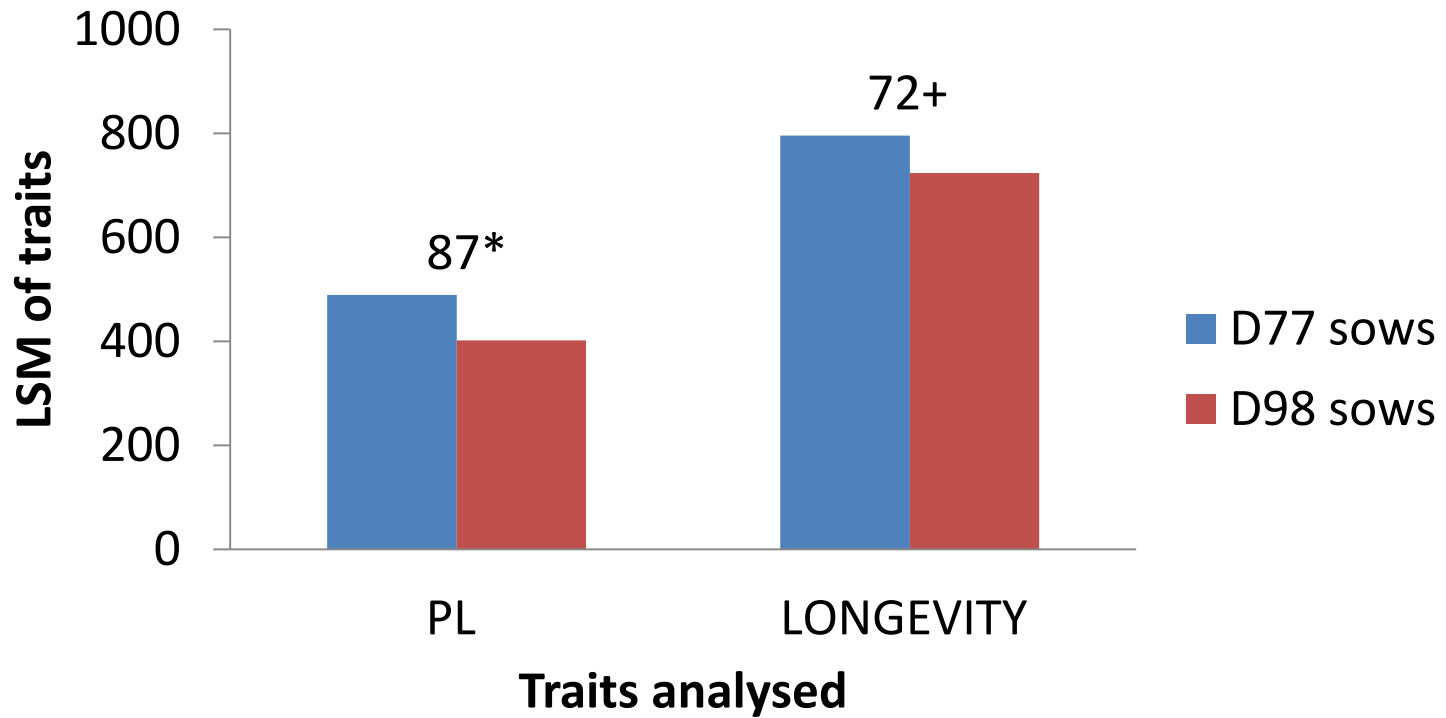
| Trait ¹ (%) | Mean | | Pr > t for H0 : $\Delta Ga = 0$ |
|------------------------|--------------------|--------------------|--|
| | D77 sows | D98 sows | |
| DM col | 22.08 ± 1.05 | 21.23 ± 0.97 | 0.55 |
| DM milk | 19.47 ± 0.38 | 19.97 ± 0.35 | 0.35 |
| PR col | 9.04 ± 0.81 | 9.03 ± 0.76 | 0.98 |
| PR milk | 5.01 ± 0.11 | 5.02 ± 0.10 | 0.92 |
| FAT col | 7.99 ± 1.07 | 7.69 ± 0.97 | 0.82 |
| FAT milk | 7.24 ± 0.40 | 8.37 ± 0.36 | 0.03 |
| Lact col | 3.5+0.39 | 3.4+0.35 | 0.83 |
| Lact milk | 4.8+0.40 | 5.7+0.58 | 0.25 |

DM col = colostrums dry matter; DM milk = milk dry matter; PR col = colostrums protein; PR milk = milk protein; FAT col = colostrums fat; FAT milk = milk fat; Lact col = colostrums lactose; Lact milk = milk lactose.



Sow longevity

Group difference (1/2 estimated genetic trend)

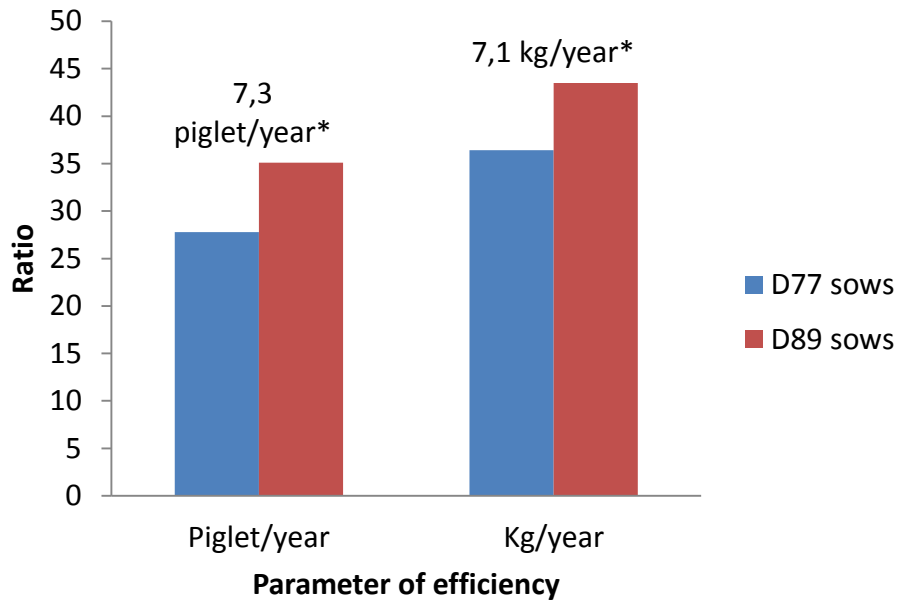


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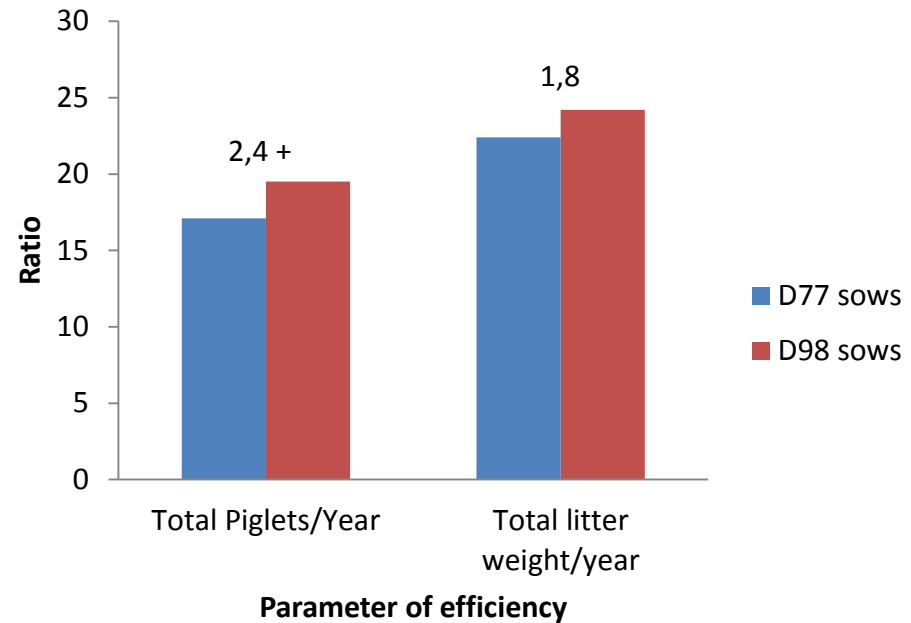
Sows lifespan efficiency

Group difference (1/2 estimated genetic trend)

Efficiency based on Productive life



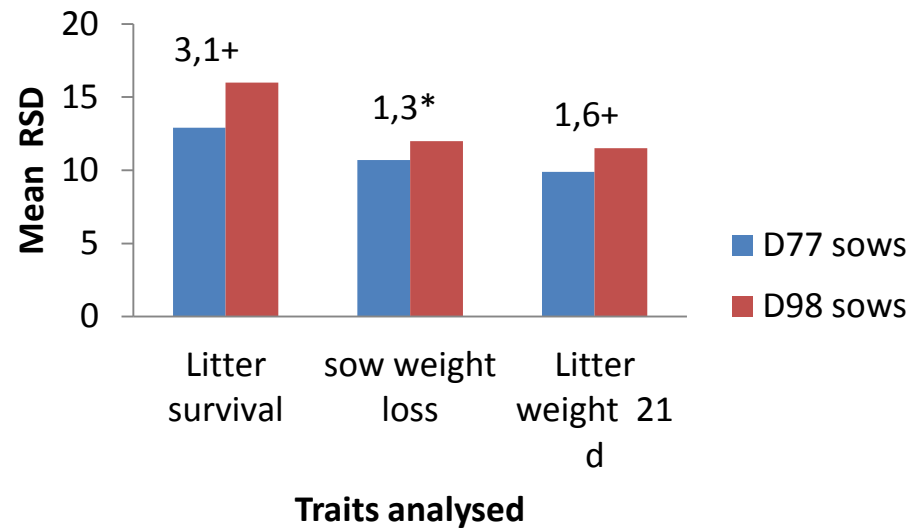
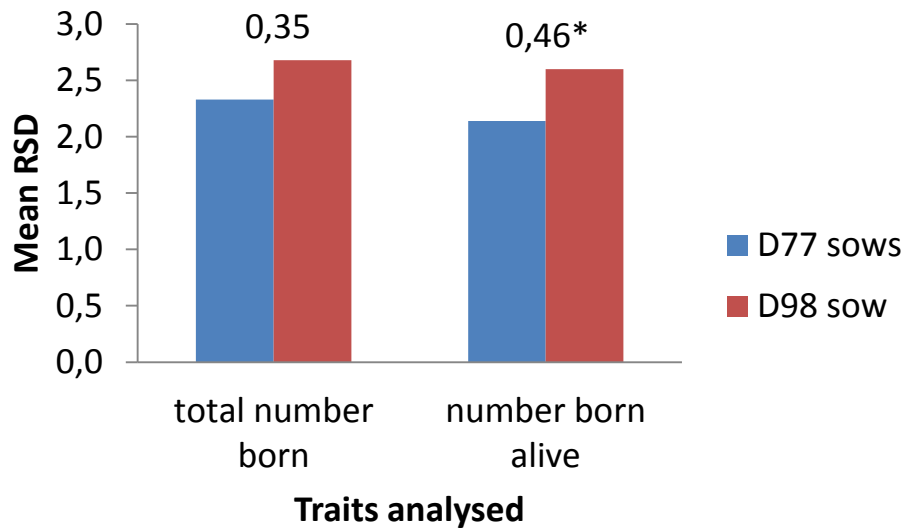
Efficiency based on longevity



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Residual standard deviation of sow performance across parities

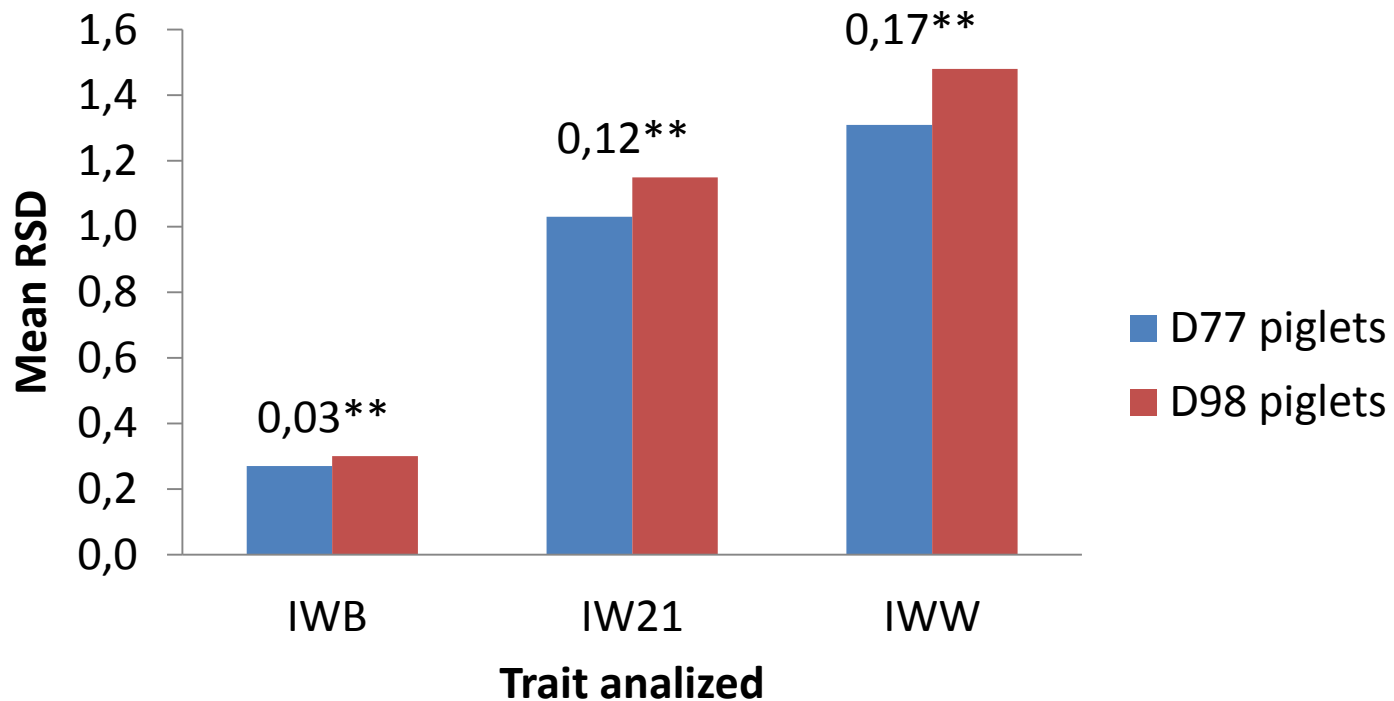
Group difference (1/2 estimated genetic trend)



** = P-value <0,01; * = P-value <0,05; + = P-value <0,1

Within litter residual standard deviation of piglet weight

Group difference (1/2 estimated genetic trend)



** = P-value <0,01; * = P-value <0,05; + = P-value <0,1



Conclusion

- Sows produced more and bigger piglets after 21 years of selection
 - Conversely, selection had unfavourable effects on:
 - Sow milk production (after litter size standardisation)
 - Longevity and productive life
 - Variability of sow performance across parities was increased
 - Within litter variability of piglet weight was increased
- ⇒ has led to changes in the selection goal
- ⇒ Integration mean and standard deviation of piglet weight in the selection goal

Acknowledgements



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