

Estimation of genetic trends from 1977 to 2000 for stress-responsive systems in Large White and Landrace pig populations using frozen semen

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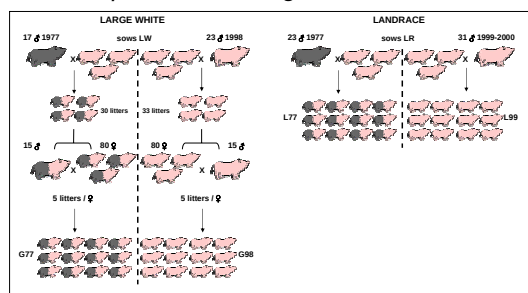
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Introduction

- Genetic selection to increase the carcass lean content (ECLC) of French LW and LR pig populations.
- Negative correlation between cortisol (stress hormone) and ECLC.
- Aim of this study: analyse the consequences of genetic selection on the evolution of the stress-responsive systems from 1977 to 2000.

Method

Animals and Experimental design



Sampling procedure and chemical analyses

- Collection of urine samples from the bladder after slaughter
- Urinary cortisol and catecholamines were assayed by HPLC.

Carcass composition measurements

- Mean backfat thickness
- ECLC
- Ultimate pH (pH24)

Genetic trends

$\Delta G = 2 \times (G98 \text{ LSM} - G77 \text{ LSM})$ and
s.e. $\Delta G = 2 \times \text{s.e.} (G98 \text{ LSM} - G77 \text{ LSM})$
LSM = Least-Squares Mean

Results

LW population between 1977 and 1998:

- ↗ ECLC
- ↘ carcass adiposity and pH24
- ↘ stress hormones levels in urine
- Negative correlation between urinary cortisol levels and ECLC in 1977 and in 1998.

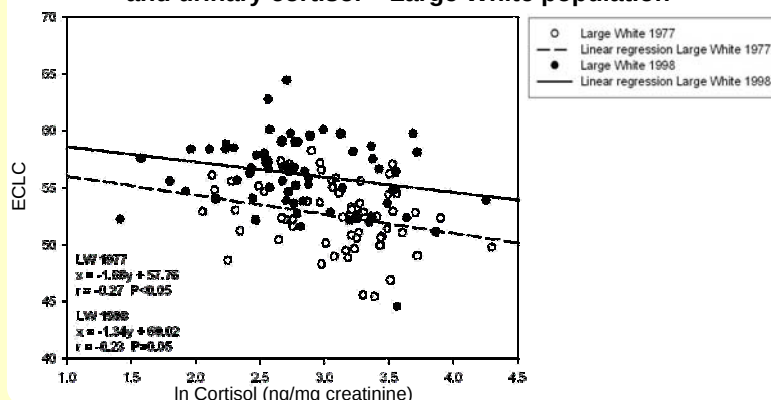
LR population between 1977 and 1998:

- ↗ ECLC
- ↘ carcass adiposity
- pH24
- stress hormones levels in urine

Least-squares means and estimated genetic trends - Large White population

Traits	G77 LSM (s.e.)	G98 LSM (s.e.)	ΔG (s.e.)	Pr > t H0 : $\Delta G = 0$
ECLC (%)	52.20 (0.30)	56.00 (0.29)	7.59 (0.82)	****
Mean backfat thickness (mm)	24.51 (0.28)	22.13 (0.28)	-4.76 (0.80)	***
pH24	5.84 (0.03)	5.76 (0.03)	-0.17 (0.07)	*
Cortisol (ng/mg creat.), ln	2.97 (0.07)	2.69 (0.07)	-0.56 (0.17)	**
Adrenaline (ng/mg creat.), ln	1.96 (0.10)	1.65 (0.10)	-0.63 (0.22)	**
Noradrenaline (ng/mg creat.), ln	2.60 (0.08)	2.39 (0.08)	-0.42 (0.18)	*

Scatter plot and regression line between ECLC and urinary cortisol - Large White population



Least-squares means and estimated genetic trends - Landrace population

Traits	L77 LSM (s.e.)	L99 LSM (s.e.)	ΔG (s.e.)	Pr > t H0 : $\Delta G = 0$
ECLC (%)	48.62 (0.33)	51.16 (0.32)	5.07 (0.92)	****
Mean backfat thickness (mm)	27.87 (0.36)	23.83 (0.35)	-8.06 (1.02)	****
pH24	5.68 (0.02)	5.69 (0.02)	0.02 (0.06)	NS
Cortisol (ng/mg creat.), ln	3.93 (0.08)	3.97 (0.08)	0.06 (0.22)	NS
Adrenaline (ng/mg creat.), ln	2.25 (0.07)	2.28 (0.08)	0.07 (0.17)	NS
Noradrenaline (ng/mg creat.), ln	2.67 (0.07)	2.68 (0.07)	0.04 (0.18)	NS

Conclusion

LW population

Selection on carcass lean content leads to:

- lower cortisol levels → lower maturity of piglets
- lower catecholamines levels → lower meat pH

LR population

Selection on carcass lean content did not affect hormones levels → limited gain in lean content