Testicular development, sex hormones and boar taint in pig lines divergent for residual feed intake

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Introduction

❑ Improving feed efficiency by genetic selection or better management

❑ rearing entire male pigs

are relevant strategies to reduce

✓ feed cost and

✓ environmental waste in pig production

The major constraint for rearing entire male pigs being boar taint, an experiment was performed to

❑ Determine the consequences of a divergent selection on residual feed intake on pubertal development and boar taint

Introduction

RFI = Residual Feed Intake is the difference between an animal's actual feed intake and its expected feed requirements for maintenance and growth

HRFI pigs = bad performers that "waste" nutrients

LRFI pigs = good performers that "spare" nutrients

Material and methods

Purebred French Large White male pigs from the 9th generation of a divergent selection for RFI were reared in two batches (B1 and B2):

❑ **45 LRFI** pigs from 18 litters (24 or 21/batch)

❑ **43 HRFI** pigs from 15 litters (24 or 9/batch)

✓ B1 pigs born in February 2016 and slaughtered in July 2016

✓ B2 pigs born in March 2016 and slaughtered in August 2016

✓ Pigs weaned at 28 and slaughtered at 167 ± 1 days of age (mean ± SD)

✓ From 70 days of age, pigs reared in groups of 12 on slatted floor with ad libitum access to water and feed (automatic feeder), received a standard diet containing 160 g crude proteins and 10 MJ NE/kg, a minimum of 0.8 g of digestible lysine/MJ NE

Material and methods

❑ Blood samples were drawn at 15 ± 1 days of age and the day before slaughter for T and E2 measurement (Immunoassay, *ST AIA-Pack hsE2, ST AIA-Pack testosterone, Tosoh*)

❑ Pigs were weighed at regular interval

❑ At slaughter, a backfat sample was collected in the neck area for A, S and I measurement by HPLC (according to *Batorek et al 2012*)

❑ At slaughter, the genital tract was removed for testis and epididymis weighing after tissue trimming

All data were analyzed by ANOVA using R, including line and batch and their interaction as fixed effects and litter as a random effect. When necessary, a log or sqrt transformation was applied for normalization before statistical analysis.
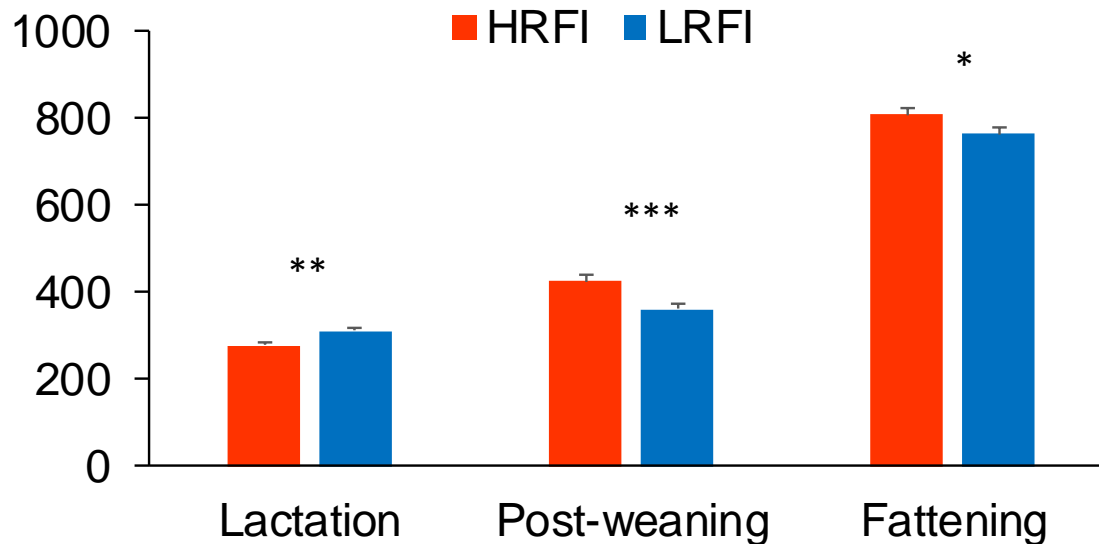
Adjusted means are presented

Results - Growth

Line x Repl : P > 0.1
Replicate : P > 0.1

	High RFI	Low RFI	P value
Liveweight at birth, kg	1.65 ± 0.07	1.74 ± 0.07	>0.1
Liveweight at slaughter, kg	**106 ± 2 b**	**100 ± 2 a**	**0.02**
Age at slaughter, days	167 ± 1	167 ± 1	>0.1

Average daily gain

In agreement with previous results *(Gilbert et al 2017)*

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Results – Development of sex organs

Line x Repl : P > 0.1
Replicate : P > 0.1

Percentage of liveweight
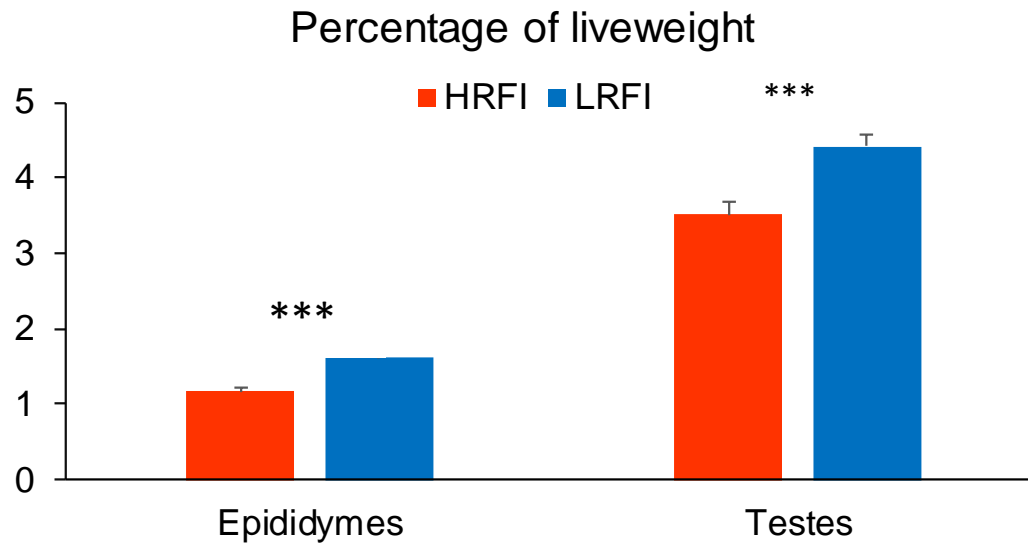
Results – Plasma testosterone

Line x Repl : P > 0.1
Replicate : P > 0.1

Plasma Testosterone, ng/ml
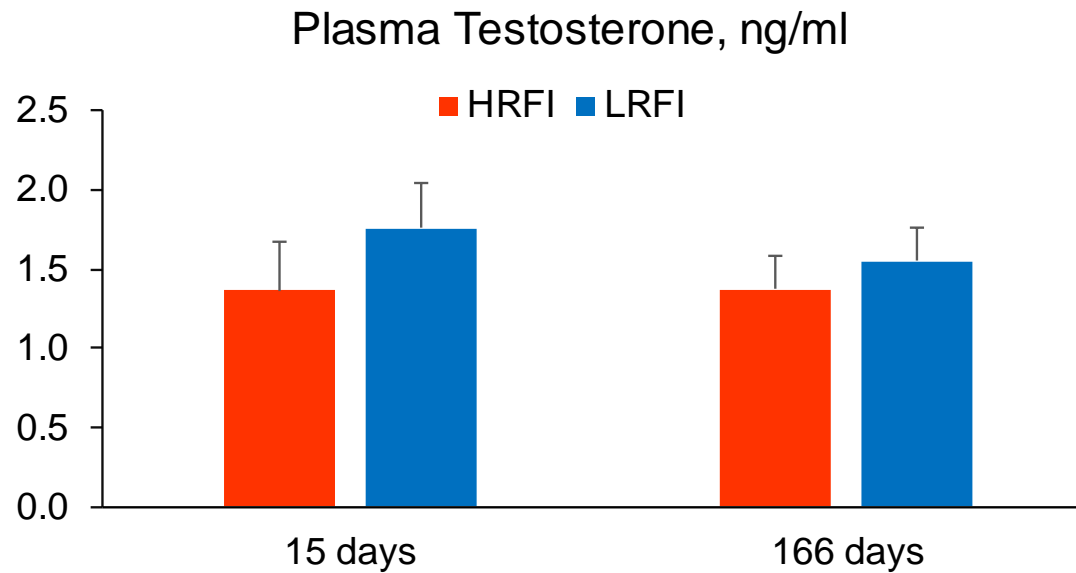
Results – Plasma oestradiol

Line x Repl : P > 0.1
Replicate : P > 0.1

Plasma Oestradiol, pg/ml
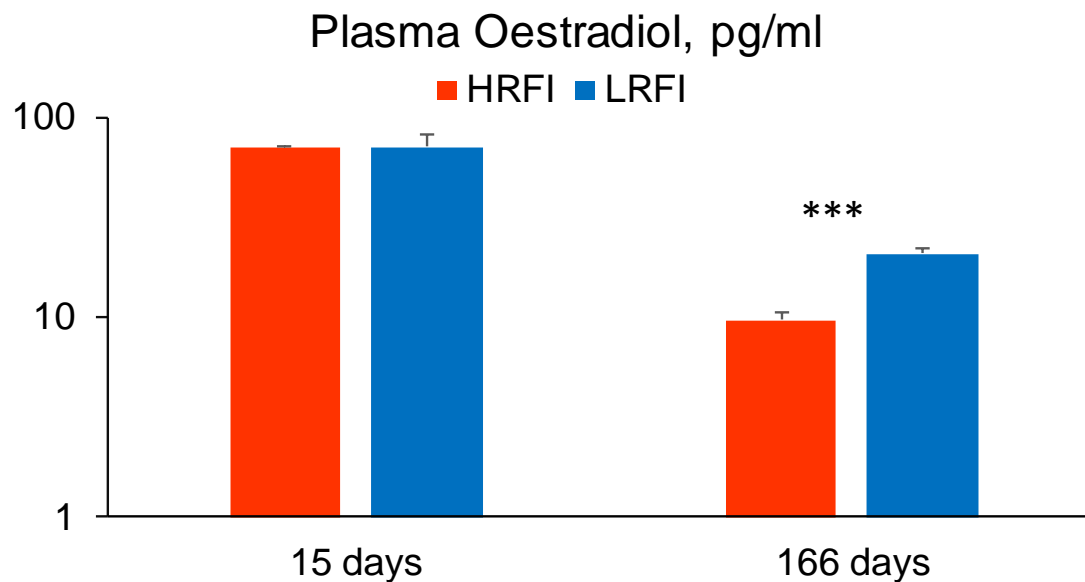
Results – Fat concentration of androstenone

Fat androstenone, µg/g pure fat

Line x Repl : P > 0.1
Replicate : P > 0.1
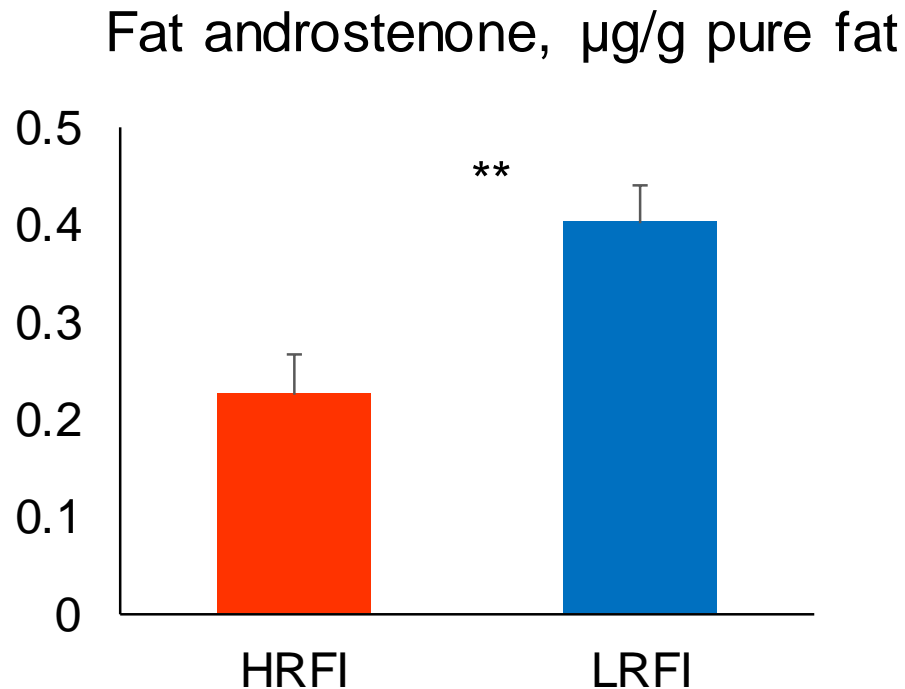
❑ Higher androstenone at slaughter in LRFI is highly coherent with greater development of sex organs and higher concentration of E2 just before

❑ Differences in plasma T just before slaughter and both hormone levels at 15 days of age are not parallel to that of androstenone

Results – Fat concentration of skatole

Line x Replicate : P = 0.009
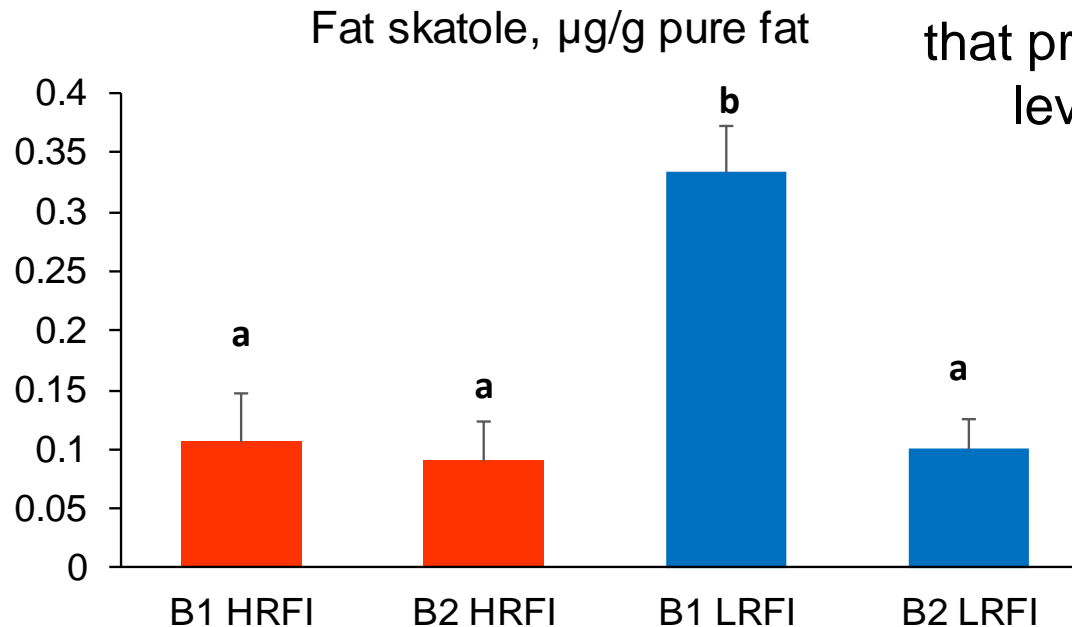
Slaughter of B1 pigs occurred during a summer heat wave that probably explains the high level in agreement with *Hansen et al 1994*

Fat skatole, µg/g pure fat

Conclusion

❑ Overall, these data indicate:

a lower testicular activity in High than in Low RFI pigs in agreement with data from the 6th generation (*Prunier et al 2016*) and from domestic fowls (*Morisson et al 1997*).

❑ It reflects more likely an impairment in High RFI than an improvement in Low RFI but the demonstration remains to be done

❑ Underlying mechanisms are not known