Effect of feeding fermentable fibre-rich feedstuffs on chemical and sensory boar taint in entire male and female pigs

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Introduction
Boar taint in entire male pigs is caused by skatole and androstenone and other compounds such as indole. However, female pigs also produce skatole and indole. The purpose of this experiment was to minimise boar taint and increase overall impression of sensory quality of pork by feeding entire male and female pigs with fibre-rich feedstuffs (dried chicory roots and lupine seeds) short time prior to slaughter.

Materials and Methods
2 experimental replicates of 24 Danish crossbred pigs (DLY) half of entire male and half of female pigs have been fed three organic diets for either 1 or 2 weeks prior to slaughter of which two diets contained different fermentable fibre-rich feedstuffs - 10% dried chicory roots (DC) or 25% blue lupines (LUP). These two treatments were compared with pigs fed with an organic control diet (CON) for either 1 or 2 weeks prior to slaughter.

Results
Chicory feeding lowered the skatole level but not to a significant level compared to the control feeding. However, the lupine fed pigs of both genders had significant lower skatole levels in plasma and backfat at slaughter (P<0.001) after both one and two weeks feeding time (P<0.01) (see Table 1).

Table 1: Skatole concentrations in plasma and backfat for the three treatments (CON, DC and LUP) and two genders (entire male and female pigs)

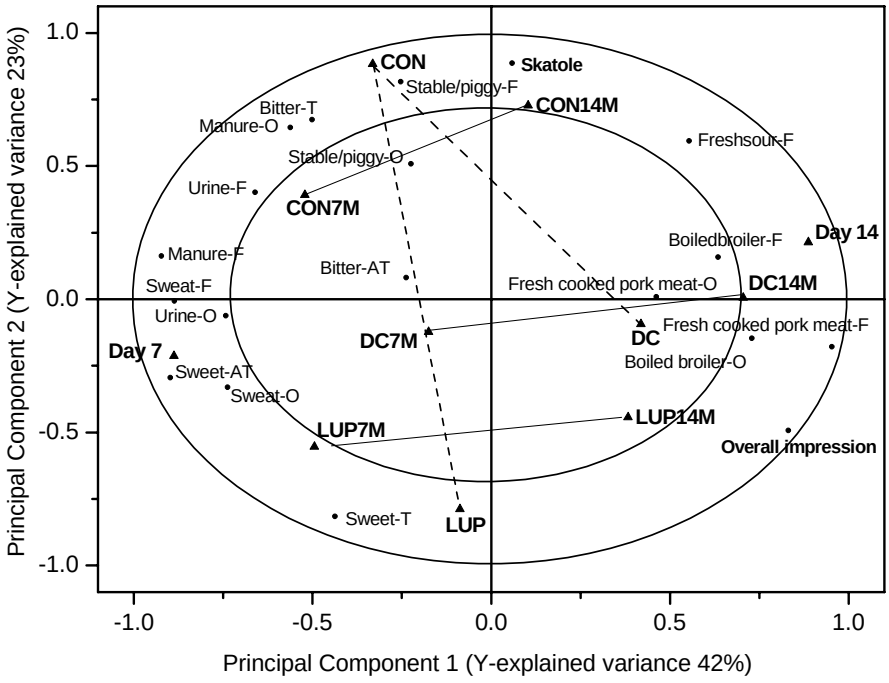
		CON	DC	LUP	s.e.	Significance of treatment
Skatole in plasma (µg/l)	**Day 0**	1.87	1.95	2.00	0.22	Ns
	7 days	2.24^{a}	2.25^{a}	0.63^{b}	0.38	**
	14 days	2.56^{d}	1.65^{dc}	0.28^{c}	0.38	**
	At slaughter[1]	2.43^{b}	1.95^{b}	0.43^{a}	0.31	***
Skatole in backfat (µg/g)	**7 days**	0.12^{e}	0.12^{e}	0.04^{f}	0.02	**
	14 days	0.14^{g}	0.10^{gh}	0.03^{h}	0.02	**

[a,b,c,d] Least-squares means that do not share a common superscript letter, within the row, differ significantly (P<0.05). (*), P<0.1, *; P<0.05, **; P<0.01, ***; P<0.001, ns; non-significant. There was no interaction between treatment and gender and treatment and replicate. [1]Average of 7 days and 14 days.

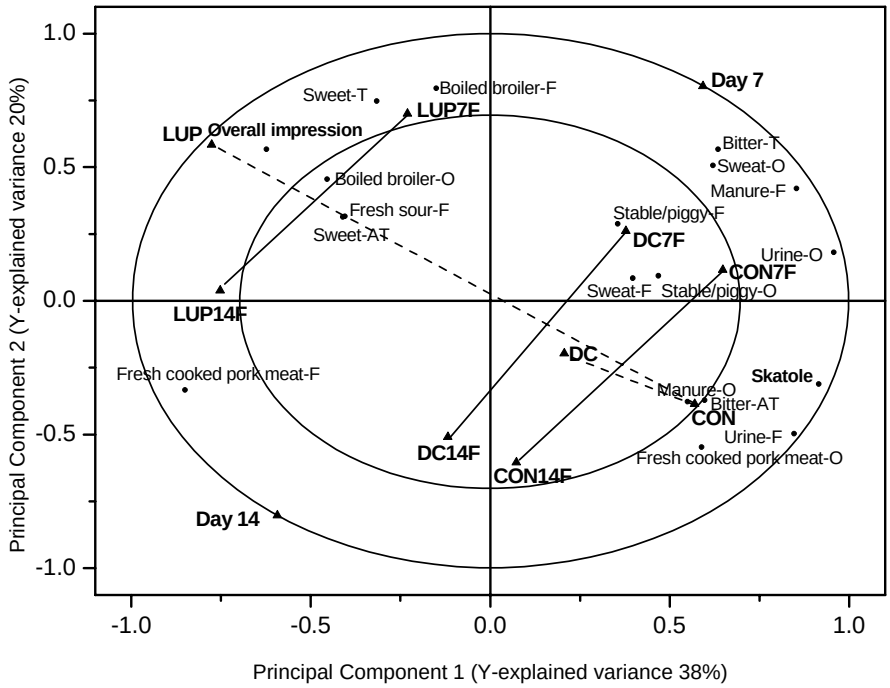
From a sensory perspective, chicory and lupine reduced boar taint since odour and flavour of manure related to skatole and urine associated to androstenone were minimised. Both feeding days and types were well- described from a sensory perspective in male pigs meaning that these both are important in regards to the level of boar taint. For the entire male pigs, the feeding days prior to slaughter had relative to the feeding types the greatest importance with respect to the reduction of the level of boar taint. This means that the level of boar taint in the entire male pigs was most effectively reduced after 14 days by both fibre-rich feeds. It was revealed since the feeding days prior to slaughter was described across PC1 which shows the main variation in the data (see Figure 1a). A systematic effect

of the feeding days was observed for all the feeding types moving from the boar taint related sensory terms to fresh_cooked_pork-O/F (odour/flavour), boiled_broiler-O/F, fresh_sour-F and overall impression.

In contrast to the entire male pigs, the main variation among the female pigs was explained by the feeding



(**a**)



(b)

Figure 1: Male (a) Female (b); ANOVA Partial Least Squared Regression correlation loadings plot of the two first Principal Components (PCs). The design variables: feeding types; control (CON), chicory (DC) and lupine (LUP), and feeding days prior to slaughtering; 7 and 14 in the X-matrix and the sensory terms and skatole levels in the Y-matrix. -O; odour, -F; flavour, -T; taste, -AT; aftertaste. The horizontal lines are added to highlight the effect of the feeding period. The dashed vertical lines are added to illustrate the differences in the feeding types.

treatments (see Figure 1b). The control feeding was significantly positively correlated to the boar taint descriptors urine-O ($P<0.01$), manure-O ($P<0.001$), urine-F ($P<0.001$) and significantly negatively correlated to the overall impression ($P<0.001$). A reduction of “boar” taint descriptors by both chicory and lupine feeding was observed involving similar sensory changes to those found in the entire male pigs. When feeding the female pigs with lupine or chicory the meat samples moved towards more positive notes such as boiled_broiler-O/F, sweet-T/AT and overall impression. Only small differences were found between the two different feeding periods. Of note in female pigs the determination was that 14 days had very little additional effect in “boar” taint reduction when compared to 7 days feeding.

Discussion

Feeding fibre-rich feeds in 14 days compared to 7 days was of greatest importance for reduction of boar taint in the entire male pigs. The reason might be reduction in androstenone first after 14 days of feeding fibre-rich feed as descriptors urine odour and flavour were significantly reduced after 14 days. The results from the lupine fed female pigs showed that 7 days of feeding was sufficient to reduce the sensoric skatole aspect to zero. This difference in feeding time for reduction of boar taint descriptors for androstenone and skatole with fibre-rich feed components need further investigation in entire male pigs.