The effect of cereal type and enzyme supplementation on boar taint

C. PAULY[1], P. SPRING[1], J.V. O'DOHERTY[2]

[1] Swiss College of Agriculture, Länggasse 85, Zollikofen 3052, Switzerland
[2] University College Dublin, Belfield, Dublin 4, Ireland
[*] Corresponding author: peter.spring-staehli@bfh.ch

Entire male pigs can develop boar taint, a bad odour and flavour in the meat. Boar taint is mainly due to the presence of the three substances, androstenone, skatole and indole. Skatole (3-methyl-indole) and indole have a faecal like odour and are produced during the anaerobic degradation of L-tryptophan by specific bacteria in the colon. Carbohydrates such as oligosaccharides, resistant starches and non-starch polysaccharides, which have a low precaecal digestibility, have been shown to decrease skatole synthesis.

THE HYPOTHESIS

- Cereal will affect skatole and indole synthesis in the digestive tract and their concentrations in the adipose tissue
- Enzyme supplementation will have a moderate effect. Interaction with cereal might exist.

THE CONCLUSIONS

- ✓ Feeding barley-based diets in comparison to oat-based diets led to lower indole concentrations in the adipose tissue, HOWEVER feeding barley-based diets was not sufficient for efficiency controlling skatole.
- ✓ Enzyme supplementation have no effect on skatole and indole concentrations in the adipose tissue.
- ✓ Feeding other non-starch polysaccharides or resistant starch would be more efficient in reducing skatole.

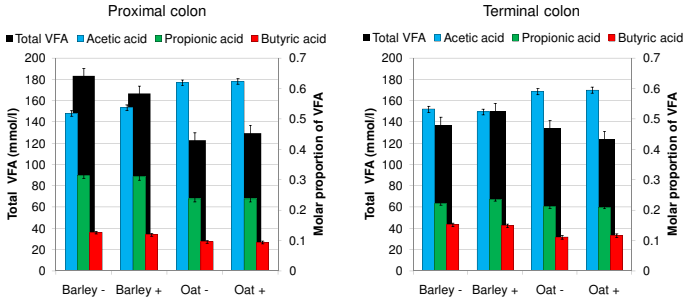
MATERIALS & METHODS

Thirty-two Irish entire male finishing pigs (progeny of meat-line boars × (Large White × Landrace sows)) were randomly allocated to one of four dietary treatments (eight entire males per treatment). The experimental treatments were as follows:

- 8 pigs fed a barley-based diet
- 8 pigs fed a barley-based diet containing an enzyme supplement
- 8 pigs fed an oat-based diet
- 8 pigs fed an oat-based diet containing an enzyme supplement

Initial BW:	76.0 ± 6.5 kg
Final BW:	113.6 ± 11.3 kg
Feeding system:	*ad libitum*
Measured parameters:	- Total volatile fatty acids (**VFA**) concentrations in the digesta, molar proportion of VFA and pH in the proximal and the terminal colon - Skatole and indole concentrations in the digesta - Skatole, indole and androstenone levels in the adipose tissue
Statistical analysis:	- As a 2 x 2 factorial arrangement of treatments with the GLM procedure in NCSS. - In case of interaction, test for 2-factors interactions (Tukey-Kramer Multiple-Comparison test; probability level: $P < 0.05$).

Figure 1 and 2: total VFA concentrations in digesta and molar proportions of VFA in the proximal and the terminal colon



Feeding barley-based diets led to higher ($P < 0.05$) VFA concentrations in the large intestine. Proportions of propionic and butyric acids were higher and that of acetic acid lower in digesta from barley-based in comparison to oat-based diets ($P < 0.001$). Consequently, pH in the large intestine was lower after feeding barley-based in comparison to oat-based diets.

RESULTS

Table 1: Effects of cereal type and enzyme inclusion on skatole and indole concentrations in the digesta and skatole, indole and androstenone levels in the adipose tissue (least-square mean ± s.e.)

	Cereal type (C)					Significance			Covariable
	Barley		Oat						
Enzyme supplementation (E)	-	+	-	+	s.e.	C	E	C x E	Carcass weight
Proximal colon									
Digesta DM (g/kg)	138	138	124	171	14.0	ns	ns	ns	
Skatole (mg/kg DM)	19.4	25.8	20.9	18.0	8.21	ns	ns	ns	
Indole (mg/kg DM)	13.2	23.1	57.2	29.5	7.99	***	ns	**	
Terminal colon									
Digesta DM (g/kg)	231	250	261	274	9.2	**	ns	ns	
Skatole (mg/kg DM)	62.2	67.9	50.3	29.9	9.22	**	ns	ns	
Indole (mg/kg DM)	14.8	22.8	33.4	33.9	3.67	***	ns	ns	
Adipose tissue									
Skatole (µg/g)	0.13	0.15	0.13	0.10	0.039	ns	ns	ns	ns
Indole (µg/g)	0.04	0.04	0.08	0.12	0.021	***	ns	ns	ns
Androstenone (µg/g)	0.9	0.8	1.0	0.2	0.28	ns	*	**	*

C: cereal type; E: enzyme supplementation; s.e.: standard error, ns: non significant ($P > 0.05$).
* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$

- Animals fed unsupplemented oat-based diet had higher ($P < 0.01$) indole concentrations in the digesta from the proximal colon than those fed barley-based diets.
- Feeding oat-based diets led to lower ($P < 0.01$) skatole and higher ($P < 0.001$) indole concentrations in the digesta from the terminal colon than barley-based diets
- Skatole concentrations in the adipose tissue did not differ between the experimental treatments
- Pigs offered the barley-based diets had lower ($P < 0.001$) indole concentrations compared with those fed the oat-based diets.

Bern University of Applied Sciences and University College Dublin
Swiss College of Agriculture SHL and College of Life Sciences

60th Annual EAAP Meeting, Barcelona
August 24th – 27th, 2009

Abstract number 4910
Poster session 40