Effect of dietary chicory on boar taint

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Introduction Entire male pigs often have a higher incidence of odours and flavours, found unpleasant by some consumers, known as boar taint. Boar taint is due to an excessive accumulation of two major compounds, skatole and androstenone, in adipose tissue. Skatole is a product of bacterial activity in the large intestine. Its levels in fat are influenced by diet, possibly through altering the bacterial activity or availability of the substrate, tryptophan (Jensen *et al.* 1997). Additions of non-digestible oligosaccharides, for example inulin, in the diet, have reduced skatole levels in faeces, backfat and blood (Jensen and Jensen 1998). The current project was therefore undertaken to see if a short feeding period with inclusion of chicory, a source of inulin, before slaughter will be sufficient to significantly reduce the level of skatole.

Materials and methods In a preliminary study 30 farms supplying a commercial abattoir have been sampled after the pigs have been slaughtered. Each farm provided 50 samples of backfat from entire pigs that have been minced to obtain a single sample tested for androstenone and skatole levels using the procedures of Whittington *et al.* (2004). In a first feeding trial, on 7 farms, 50 g/kg dried chicory was incorporated in the finishing diet for 2 weeks, 6 farms were used as controls. The farms were tested with the same method as the preliminary study. In the main feeding trial only one of the 30 farms was tested. The pigs had been divided into 4 groups fed different levels of chicory: 0, 30, 60 and 90g/kg DM. For each group 30 entire pigs were sampled at 3 different times: a first time (called week 0) to measure the base level of skatole and androstenone in all the pigs, then the supplement of chicory was introduced and the pigs were sampled after 1 and 2 weeks on the test diet. All 360 backfat samples had been tested for skatole concentration; androstenone had been measured in 110 pigs (all 90 g/kg pigs and 20 pigs of 0 chicory, week 2). All the samples had been presented to a 10 member taste panel for "sniff" tests to determine if reducing skatole had also reduced boar taint. Data were statistically analysed using general linear models (GLM), comparing the different levels of chicory in the diet.

Results The preliminary study showed a high variation in the concentration of skatole and androstenone between farms, with levels generally high in comparison with the normally accepted thresholds for the taint compounds (0.2 µg/g for skatole and 1 µg/g for androstenone). On average the androstenone concentration was 0.71µg/g, and skatole was 0.19 µg/g. In the first feeding trial the skatole level was reduced in the farms with the chicory diet, so we proceeded to the final stage of the project. In the main trial, 90 g/kg chicory fed for 2 weeks was successful in reducing skatole to a level well below the 'threshold' for this compound, with only 1 pig with a skatole value over the threshold. In the 90 g/kg group there was a downward trend in skatole by 1 week and 0.55 of pigs had levels between 0 and 0.05, typical of levels in castrated males. The other levels of chicory (30 and 60 g/kg) were not effective (Table 1). The concentration of androstenone increased slightly in the pigs fed 90 g/kg chicory after 2 weeks. Table 2 shows the sensory results after 2 weeks feeding. However the values for abnormal odour are higher than in these other studies. There was no trend in the abnormal odour scores at 2 weeks. The 90 g/kg chicory group, in which skatole had been reduced, had values as high as in the other treatments. A clue to the reason for this is shown by the increase in the score for the term 'parsnips' used to describe the odour of androstenone.

Table 1 Effect of feeding chicory on skatole levels (µg/g)

Week	0 g/kg	30 g/kg	60 g/kg	90 g/kg	p-val
0	0.149^{a}	0.226^{b}	0.131^{a}	0.137^{a}	<0.05
1	0.111	0.085	0.080	0.108	ns
2	0.237^{b}	0.129^{b}	0.124^{b}	0.047	<0.001

Table2 Main sensory results after 2 weeks

	0	30	60	90	p-val
Pork odour^{x}	3.53	3.72	3.58	3.70	ns
Abnormal^{x}	4.30^{a}	3.90^{c}	4.22^{ab}	4.04^{bc}	<0.001
Mothballs^{y}	11.2^{a}	8.2^{b}	9.2^{ab}	7.4^{b}	<0.05
Parsnip^{y}	16.3	17.7	18.4	19.6	ns

^{x}1-8 scales, ^{y}0-100 scales

Conclusions The results show that the inclusion of dried chicory in the diet for 2 weeks before finishing reduced skatole concentrations in backfat to a level typical of castrates. However no improvement in odour scores occurred, probably because androstenone remained high. It is possible that as skatole declined, the perception of androstenone increased causing no change in overall abnormal odours.

Acknowledgements This project was funded by BPEX.

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https://doi.org/10.1017/S2040470010003249 Published online by Cambridge University Press