

Pig housing affects the fatty acid profile of back fat and belly fat in growing pigs

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The fatty acid composition of pig tissue is largely a reflection of the fatty acid pattern of the diet, however age and ambient temperature can also have an effect. Meat quality attributes are influenced by the fatty acid composition of subcutaneous, intermuscular and intramuscular fat. Fatty acid concentration influences the firmness of the fat, which in turn affects the appearance and cutting of fresh and processed pork (Tume and D'Souza, 1999). In addition, fat colour and flavour can be affected by the fatty acid profile. Lambooij *et al.* (2004) investigated the effects of housing conditions on pork quality characteristics and concluded that differences in pork quality can be substantial when differences in housing conditions are large. In this study we hypothesised that the environmental differences between conventional and deep litter housing would affect the fatty acid profile of pig fat tissue and that these differences may influence carcass quality and eating quality.

One hundred and fifty two Large White x Landrace female pigs were stratified at weaning by weight into two housing treatments, conventional or deep-litter. Within each treatment, eight pigs were selected randomly as sample pigs. Pigs were phase-fed the same commercial, cereal-based diets *ad libitum*. At 24 weeks of age, pigs were slaughtered in a commercial abattoir. Fat was collected from the hot carcass at the dorsal midline in line with the last rib (subcutaneous back fat) and from the ventral midline in line with the last rib (belly) and stored at minus 80°C until fatty acid profiles were determined via gas chromatography. Data were analysed by ANOVA using Genstat v6.

Table 1. Effect of housing on fatty acid proportions in subcutaneous and belly fat of 24-week old gilts.

	Subcutaneous back fat				Belly			
	C	DL	lsd ¹	P	C	DL	lsd ¹	P
C12:0 (%)	0.090	0.104	0.001	0.019	0.108	0.120	0.013	0.062
C14:0 (%)	1.49	1.67	0.152	0.022	1.72	1.90	0.177	0.048
C16:0 (%)	24.51	25.08	1.121	0.298	25.86	26.75	0.900	0.052
C16:1 (%)	2.41	2.98	0.636	0.074	3.28	3.61	0.722	0.350
C17:0 (%)	0.573	0.432	0.067	<.001	0.459	0.383	0.095	0.108
C18:0 (%)	13.22	12.78	1.592	0.568	12.38	12.64	1.29	0.676
C18:3n3 (%)	1.320	1.392	0.191	0.432	1.115	1.191	0.271	0.559
Saturated (%)	40.71	40.93	2.57	0.853	41.35	42.66	1.904	0.161
Unsaturated (%)	59.29	59.07	2.576	0.853	58.65	57.34	1.904	0.161
Sat:Unsat	0.688	0.696	0.073	0.831	0.707	0.745	0.056	0.173

¹LSD = Least significant difference

Housing treatment did not affect the percentage of saturated and unsaturated fatty acids or their ratio (Table 1). Belly fat had higher ($P < 0.005$) levels of 12:0, 14:0, 16:0, 16:1 and 17:0 than back fat, however the overall percentage of saturated and unsaturated fatty acids, as well as the ratio between the two, did not differ between sites ($P > 0.05$). The back fat and belly fat of pigs housed conventionally, had significantly lower percentages of 12:0 (lauric), 14:0 (myristic), 16:0 (palmitic) and 16:1 (palmitoleic) than pigs housed on deep litter and higher levels of 17:0 (margaric). Myristic, palmitic and palmitoleic acids have been positively associated with firmer fat and palmitoleic acid has also been positively associated with pork flavour, flavour liking and overall acceptability. Increased fat yellowness has been associated with reduced levels of palmitic and palmitoleic acids (Maw *et al.*, 2003). The results indicate that there is a difference in the fatty acid profiles of the back fat and belly fat of pigs raised either conventionally or in deep-litter systems. The fatty acids that differ contribute to aspects of fat quality such as firmness, flavour and colour. The results suggest that the effect of housing on fat characteristics may result in differences in carcass fat quality for pigs raised conventionally or on deep litter.

References

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