EFFECT OF NUTRITION ON CARCASS AND PORK QUALITY IN TWO GENOTYPES

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Introduction

Characterisation of breeds for carcass and meat quality traits is essential to the choice of terminal boar breeds within pork production, as different pork markets or pork chains require different product specifications (Edwards *et al.*, 2003). In addition, modern society is concerned about the importance of meat in the diet, and the consequences of consuming pork fat in human health. High levels of fat consumption and particularly of saturated fatty acids have been associated with increased serum LDL-cholesterol, and increased risk of coronary heart disease in humans (Department of Health, 1994). Meats containing greater contents of the highly unsaturated lipids may be more prone to lipid oxidation than those more saturated (Yang *et al.*, 2002). Vitamin C has been used in different ways to enhance lean colour stability of meat during display. The aim of this study was to evaluate the effect of feeding a diet rich in oleic acid and supplementation with antioxidants (Biocitro®) on carcass and pork quality of two genotypes.

Materials and Methods

One hundred and sixty eight pigs from 2 sexes (barrows and gilts) and 2 genotypes were fed one of three finishing diets: 1) grain and soy diet (CONTROL); 2) grain and soy plus 3.83 % high oleic acid supplement (HO); and 3) grain and soy plus 3.83% HO plus 200 ppm Biocitro® (HO-ANTX). Animals (60 kg live weight) were fed CONTROL (n=53) and HO (n=115) diets until they reached 90 kg live weight. During the finishing period animals were fed the 3 diets (CONTROL n=53, HO n=55, and HO-ANTX n=60) until slaughter. Diets had similar nutrient content and diet composition which is shown in Table 1. Genotypes were crosses of Landrace*Large White with Pietrain (negative for the halothane gene, NN) or Large White and were slaughtered at 115 (fresh pork market) and 130 kg (processed ham market), respectively. The high oleic acid supplement is a natural byproduct of the olive industry composed of a mixture of Ca-salts rich in oleic acid. Biocitro® is a natural byproduct of the citric juice industry and a rich source of vitamin C and flavonoids. Carcass weight and fat and muscle depths measured using the Fat-O-Meat'er probe was recorded within 1 h post-mortem. At 24 h post-mortem ultimate pH and muscle colour (Minolta CR400) were recorded. The left side of each carcass was cut and the loin dissected into lean, subcutaneous and intermuscular fat and bone following the procedure of Walstra and Merkus (1995). Intramuscular fat of the *longissimus thoracis* (LT) was determined by Near Infrared Transmittance (NIT, Infratec 1265). There were no interactions (P>0.05) between sex and diet.

Table 1: Diet composition.

Composition, %	CONTROL	HO	HO-ANTX
Corn	25.0	5.0	5.0
Barley	26.9	47.2	47.2
Wheat	20.0	20.0	20.0
Soy	22.3	20.3	20.3
Fat	2.90	1.39	1.39
High oleic acid supplement	-	3.83	3.83
Biocitro®	-	-	0.02
Lysine	0.24	0.27	0.27

Results and Discussion

Dietary treatments HO and HO-ANTX had no effect (P>0.05) on carcass and pork quality of Pietrain and Large White crosses (Tables 2 and 3, respectively). Gilts showed lighter carcasses and were leaner than barrows showing greater lean percent and lower fat depth in both Pietrain and Large White crosses. Pietrain gilts had greater percent of carcass as ham and lower percent as loin and bacon than barrows. There were no differences in percent of ham and loin between males and gilts for Large White, but gilts had lower bacon percent than males. Lean percent from loin dissections was greater and subcutaneous and intermuscular fat percent lower for gilts than barrows for both Pietrain and Large White crosses. There were no differences in bone percent of the loin between barrows and gilts for Pietrain crosses while Large White gilts had greater bone percent than barrows. There were no differences in marbling percent, Minolta L* or ultimate pH between sexes for Pietrain crosses. L* and ultimate pH did not differ between barrows and gilts for Large White crosses, while marbling percent of LT was lower for Large White gilts compared with barrows.

Table 2: Carcass and pork quality characteristics for Pietrain crosses.

	Sex		Diet			
Carcass Characteristics	Barrows	Gilts	CONTROL	HO	HO-ANTX	RMSE†
Carcass weight, kg	89.2[a]	83.7[b]	86.4	86.2	86.7	3.937
Fat depth[b], mm	16.7[a]	13.1[b]	14.6	14.9	15.1	2.439
Lean %, FOM	55.9[a]	59.6[b]	58.0	57.8	57.4	2.442
Ham, % of carcass	24.2[a]	25.3[b]	24.8	24.8	24.6	0.740
Loin, % of carcass	17.7[a]	17.1[b]	17.5	17.1	17.5	0.838
Bacon, % of carcass	9.3[a]	8.7[b]	9.0	9.0	8.9	0.590
*Loin **Dissection**, %*						
Lean	55.0[a]	62.9[b]	58.7	59.5	58.7	3.794
Subcutaneous fat	28.6[a]	22.0[b]	25.6	24.3	25.9	3.608
Intermuscular fat	5.40[a]	3.94[b]	4.46	4.68	4.88	0.942
Bone	11.0	11.4	11.1	11.4	11.0	1.064
*Pork **Quality***						
Marbling LT[c], %	1.24	0.95	1.07	1.06	1.16	0.323
L*, lightness Minolta	50.3	48.8	49.7	49.3	49.8	2.956
pH ultimate LT	5.53	5.52	5.52	5.54	5.51	0.110

Table 3: Carcass and pork quality characteristics for Large White crosses.

	Sex		Diet			
Carcass Characteristics	Barrows	Gilts	CONTROL	HO	HO-ANTX	RMSE†
Carcass weight, kg	95.1[a]	92.9[b]	92.4	94.7	95.0	4.107
Fat depth[b], mm	21.5[a]	17.7[b]	20.2	19.0	19.6	3.909
LEAN % FOM**	51.3[a]	54.9[b]	52.3	53.8	53.2	3.722
Ham, % of carcass	23.5	23.7	23.8	23.5	23.5	0.827
Loin, % of carcass	17.8	17.6	17.9	17.5	17.6	0.910
Bacon, % of carcass	9.7[a]	9.3[b]	9.5	9.4	9.6	0.626
*Loin **Dissection**, %*						
Lean	49.4[a]	54.7[b]	51.4	52.3	52.4	4.748
Subcutaneous fat	34.9[a]	29.3[b]	33.0	32.0	31.2	4.823
Intermuscular fat	5.2[a]	4.6[b]	5.1	4.78	4.90	0.954
Bone	10.4[a]	11.3[b]	10.5	10.9	11.3	1.132
*Pork **Quality***						
Marbling LT***, %	1.44[a]	1.13[b]	1.30	1.27	1.28	0.110
L*, lightness Minolta	47.2	48.4	47.3	48.0	48.2	2.632
pH ultimate LT	5.50	5.47	5.51	5.48	5.47	0.315

†RMSE: root mean-square error, **Fat-O-Meat'er probe between 3-4 last ribs at 60 mm off the midline, ***NIT, Means within the same row with different letters (a,b) differ P<0.05

Conclusions

Dietary supplementation with 3.83% of high oleic acid supplement and 200 ppm of Biocitro® did not alter carcass and pork quality characteristics in Pietrain and Large White crosses. Feeding diets rich in oleic acid to finishing pigs can achieve greater content of monounsaturated fatty acids (data presented in a separate paper at ICoMST 2006) without modifying carcass traits and offering the consumer a healthier product.

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