EFFECT OF PIG DIET RESTRICTION ON HAM LIPIDS

Garcia, Pilar Teresa*, Pensel, Norma A., Margaria, Carlos A., Pueyrredon, Silvina & Durselen, Gerardo**
Instituto Tecnología de Alimentos, CICV, INTA
CC 77 (1708) Moron, Buenos Aires, Argentina
* FICA, UNLZ, Bs As, Argentina
** EEA INTA, Pergamino, Bs As, Argentina
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INTRODUCTION

Changes in the composition of pig lipid tissues may cause problems to meat technology, mainly concerning the consistency of meat products and their stability towards the oxidation. Pig diet is able to modify dramatically the lipid pig composition. The aim of the present study was to determine the effects of 4 diets given "ad libitum" or restricted on ham lipid characteristics.

MATERIAL AND METHODS

Fifty six castrated Duroc x Yorkshire white pigs at an average live weight of 60 kg were under 4 experimental diets (Table 1) given, each of them, "ad libitum" or with a 15% of food restriction. T1 (Corn-soy. High energy); T2 (Low ratio energy/lysine); T3 (High fiber) and T4 (PUFA<1.5%). At 160 kg the pigs were slaughtered. Dry cured hams were prepared commercially and aliquot samples of lean and external fat were obtained after 6 months of storage. 10 g of ham were dried at 105°C for 6 hs for water determination. Ham intramuscular lipids were extracted with the Folch et al. (1957) procedure and external ham fat were extracted with boiling hexane. All fatty acids were analysed using GLC (Garcia et al., 1986). Melted samples of external fat, were used for Differential Scanning Calorimetry (DSC) to obtain the calorimetric curves (Garcia et al. 1994) The data were analyzed using a General Lineal Procedure (SAS Institute, 1987).

Table 1. Composition of experimental diets (%)

	Corn Grain	Sorghum grain	Soybean meal	Sunflower meal	Wheat barn	Alfalfa meal	Bone ash	Min.& Vit.
T1	80		15				2	3
T2		65		20	10		2	3
T3		65			6	8	2	3
T4		65	15				2	3

RESULTS AND DISCUSSION

The effects of diet restriction on ham water and lipid percentages are given in Table 2. The differences in ham lipids were not significant but T2 and T3 the water percentages were higher in restricted than in the "ad lib" ones. The average value for all restricted or "ad lib" shows the same differences. The fatty acid composition of ham external fat is shown in Table 3. The effects are different according to the diet but in general restricted hams have less 16:0, 18:0 and 18:2 but more 18:1 than "ad lib". In general (Table 4) restricted hams have less SFA but more MUFA. The external fat (Table 5) shows 3 well defined areas between -35 and -5; -5 and 15; and 15 and 35°C. Diet and restriction have effects on the thermal profiles of ham external fats.

CONCLUSIONS

The diet restriction used in the present study (15%) affected the ham water content and the fatty acid composition and thermal behavior of the ham external fat studied by DCS.

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Table 2. Water and lipid content in hams from the different 8 treatments. Effect of restriction within each treatment.

	T1	T1R	T2	T2R	T3	T3R	T4	T4R	Ad lib n=28	Restricted n=28
Water %	55±1.17a	55±0.60a	53±1.10a	57±0.80b	55±2.00a	59±1.40b	55±2.20a	54±1.30a	54±1.90a	56±2.20b
Lipid %	5.6±1.31a	5.0±1.64a	4.7±1.11a	4.1±1.31a	4.8±1.01a	5.1±1.02a	5.7±0.22a	5.9±1.11a	5.2±1.33a	5.1±1.43a

a, b. Means with different letters between "ad libitum" or restricted within the same diet are significantly different ($p<0.05$).

Table 3. Fatty acid composition of ham fat. Effects of restriction within each treatment

	14:0	16:0	16:1	18:0	18:1	18:2	18:3
T1	1.3a	26.7a	3.1a	11.6a	47.7a	7.7a	1.3a
T1R	1.3a	24.7a	2.4b	13.0b	48.4a	7.8a	1.5a
T2	1.3a	25.8a	2.7a	12.0a	48.1a	7.5a	1.9a
T2R	1.3a	24.9a	2.6a	10.4b	51.0b	7.2a	1.3b
T3	1.3a	26.1a	2.2a	12.3a	48.3a	7.3a	1.3a
T3R	1.2a	25.0a	2.3a	11.2a	51.2b	6.7a	1.2a
T4	1.5a	27.2a	2.9a	12.5a	49.0a	6.1a	1.4a
T4R	1.4a	25.3b	2.8a	12.2a	50.6a	5.9a	1.9b
Ad lib	1.4a	26.4a	2.7a	12.1a	48.3a	7.1a	1.4a
Restr.	1.3a	25.0b	2.5a	11.7b	50.3b	6.9b	1.4a

a, b. Means with different letters between "ad libitum" or restricted within the same diet are significantly different ($p<0.05$).

Table 4. Saturated, mono, unsaturated and 18:2+18:1/18:0 relation in ham external fat. Effects of restriction within each treatment.

	T1	T1R	T2	T2R	T3	T3R	T4	T4R	Ab lib	Restr.
SFA%	39.6±1.66	39.0±1.20	39.1±2.09	36.6±2.08	39.7±2.96	37.5±3.00	41.2±2.10	38.9±1.63	39.9±2.39[a]	38.0±2.32bb
MUFA%	50.8±2.56	50.7±1.80	50.8±2.00	53.6±2.52	50.4±2.2	53.5±1.80	51.9±2.11	53.5±3.07	51.0±2.30[a]	52.9±2.65b
PUFA%	8.9±1.02	9.3±1.65	9.3±0.95	8.5±1.01	8.5±1.23	7.9±1.03	7.5±0.58	7.6±0.91	8.6±1.19[a]	8.3±1.33a
18:1+18:2/18:0	4.8±0.26a	4.3±0.20a	4.7±0.51a	5.6±0.43a	4.6±0.51a	5.2±0.76a	4.5±0.20a	4.7±0.39a	4.6±0.51[a]	5.0±0.70b

a, b. Means with different letters between "ad libitum" or restricted within the same diet are significantly different ($p<0.05$).

Table 5. Percentages of the different areas in the melting curves obtained by DSC of external fat samples.

	Area -35 a -5°C	Area -5 a 15°C	Area 15 a 35°C
T1	21.6±1.25a	36.1±7.54a	42.3±7.30a
T1R	18.3±2.86b	38.3±2.60a	43.4±4.18a
T2	18.7±2.15a	40.6±2.39a	40.6±2.41a
T2R	27.4±4.48b	41.5±1.38a	31.1±4.90b
T3	23.5±2.40a	41.1±2.51a	35.4±3.42a
T3R	23.1±5.01a	42.9±3.52a	34.0±8.13a
T4	17.2±1.38a	39.0±2.33a	43.8±2.67a
T4R	18.4±2.37a	41.1±2.43a	40.5±4.57a

a, b. Means with different letters between "ad libitum" or restricted within the same diet are significantly different ($p<0.05$).