EFFECTS OF DIETARY RESTRICTION ON THE FATTY ACID COMPOSITION OF SUBCUTANEOUS FAT FROM BARROWS AND GILTS

García Pilar Teresa & Silva Patricia[1]
Instituto Tecnología de Alimentos, CA, INTA CC 77 (1708) Morón Argentina
[1] Part of a Master Thesis. Instituto de Genética Experimental. Santa Fe 3100(2000) Rosario, Sta Fe. Argentina

BACKGROUND

Most of the lipids of the pig carcass are deposited in the subcutaneous adipose tissue. The backfat contains 70-95% of lipids mostly of them triglycerides. The fatty acid composition of pork fat can be influenced by season of the year, growth rate, age, sex, diet and carcass fatness (Garcí et al., 1986). The fatty acid composition influences also pork flavor, consistency of adipose tissue and the quality of meat products (Enser et al.,1984; Rhee et al. 1988). Dietary restriction then can alters the fatty acid composition and consequently the technological and nutritional properties of pork fat.

OBJECTIVES

To study the effects of a pig diet given *ad libitum* or restricted (25%) on the inner and outer layer of subcutaneous fatty acid composition fro barrows and gilts.

MATERIAL AND METHODS

Samples from subcutaneous fat at 4-5th sternebrae from crossbreed pigs, barrows (B) and gilts (G) were used as experimental samples. They were fed an isocaloric and isonitrogenous standard diet from 70 kg to slaughter live-weigh and given *ad libitum* and with a restriction of 25%. The subcutaneous fat samples were separated in inner (IL) and outer (OL) layer and each of them minced, melted and aliquot samples used for fatty acid determinations by analysis of methylesters by capillary GLC using a WCOT 50m fused Silica CP-Sil88 column. Data were analyzed by a Statistica Program (1993). The animal distribution was as follows:

	Barrows n	Gilts n
Ad libitum	14	8
Restricted	14	8

Tabla 1. Fatty acid composition of the subcutaneous fat in barrows and gilst *ad libitum* or restricted

IL % FA	Ad lib B	Restricted B	Ad lib G	Restricted G
14:0	1.67±0.22a	1.72±0.26a	1.53±0.08a	1.68±0.21a
15:0	0.29±.0.16a	0.28±0.18a	0.33±0.16a	0.29±0.14a
16:0	28.23±1.62a	28.60±1.74a	26.87±1.47a	28.27±1.31b
16:1	2.73±0.35a	2.66±0.31a	2.58±0.22a	2.47±0.77a
17:0	0.39±0.05a	0.38±0.06a	0.35±0.05a	0.40±0.12a
17;1	0.32±0.07a	0.33±0.14a	0.29±0.04a	0.31±0.06a
18:0	16.29±1.56a	16.88±1.36a	15.78±1.29a	16.71±1.39a
18:1	39.38±1.87a	39.17±1.74a	40.78±0.88a	38.98±1.58b
18:2	6.78±2.12a	6.85±2.32a	8.38±1.46a	7.05±1.71a
18:3	0.23±0.06a	0.27±0.11a	0.23±0.09a	0.21±0.07a

Tabla 2. Fatty acid composition of the subcutaneous fat in barrows and gilts *ad libitum* or restricted

OL % FA	Ad lib B	Restricted B	Ad lib G	Restricted G
14:0	1.78±0.18a	1.73±0.20a	1.64±0.11a	1.84±0.15b
15:0	0.38±.0.18a	0.36±0.16a	0.47±0.21a	0.61±0.22a
16:0	27.49±1.40a	27.06±1.84a	26.89±1.46a	28.42±0.99b
16:1	3.20±0.31a	3.25±0.32a	3.26±0.32a	3.63±0.62a
17:0	0.47±0.11a	0.47±0.05a	0.47±0.16a	0.48±0.09a
17:1	0.43±0.09a	0.44±0.09a	0.45±0.14a	0.46±0.06a
18:0	14.11±0.94a	13.86±1.43a	13.31±0.71a	14.08±1.18a
18:1	41.20±0.95a	41.52±1.48a	42.78±1.44a	41.21±1.71b
18:2	7.60±2.44a	7.65±2.51a	7.34±2.26a	5.54±1.35b
18:3	0.16±0.14a	0.27±0.22a	0.26±0.10a	0.28±0.02a

Mann-Whitney Test a b Means in the same row with different letters differ ($p<0.05$)

Tabla 3. SFA, MUFA and PUFA % in subcutaneous fat according to diet in barrows and gilts.

OL	Ad lib B	Restricted B	Ad lib G	Restricted G
SFA	43.37±2.08a	42.62±3.10a	41.84±1.89a	44.35±2.05a
MUFA	44.40±1.03a	44.77±1.57a	46.04±1.33a	44.84±1.72a
PUFA	7.85±2.44a	7.93±2.69a	7.60±2.33a	5.81±1.34b
PUFA/SFA	0.18±0.06a	0.19±0.07a	0.18±0.06a	0.13±0.04b

Tabla 4. SFA, MUFA and PUFA % in subcutaneous fat according to diet in barrows and gilts.

IL	Ad lib B	Restricted B	Ad lib G	Restricted G
SFA	46.19±2.94a	47.21±3.00a	44.17±2.65a	46.66±2.52a
MUFA	42.10±2.04a	41.82±1.77a	43.13±0.98a	41.66±1.98a
PUFA	6.91±2.1a	7.13±2.45a	8.21±1.54a	7.28±1.73a
PUFA/SFA	0.15±0.05a	0.15±0.05a	0.19±0.04a	0.16±0.04a

Tabla 5. SFA, MUFA and PUFA % in subcutaneous fat according to sex in barrows and gilts.

IL	Ad lib B	Ad lib G	Restricted B	Restricted G
SFA	46.19±2.94a	44.17±2.65b	47.21±3.00a	46.66±2.52a
MUFA	42.10±2.04a	43.13±0.98b	41.82±1.77a	41.66±1.98a
PUFA	6.91±2.1a	8.21±1.54b	7.13±2.45a	7.28±1.73a
PUFA/SFA	0.15±0.05a	0.19±0.04b	0.15±0.05a	0.16±0.04a

Tabla 6. SFA, MUFA and PUFA % in subcutaneous fat according to sex in barrows and gilts.

OL	Ad lib B	Ad lib G	Restricted B	Restricted G
SFA	43.37±2.08a	41.84±1.89a	42.62±3.10a	44.35±2.05a
MUFA	44.40±1.03a	46.04±1.33b	44.77±1.57a	44.84±1.72a
PUFA	7.85±2.44a	7.60±2.33a	7.93±2.69a	5.81±1.34b
PUFA/SFA	0.18±0.06a	0.18±0.06a	0.19±0.07a	0.13±0.04b

Mann-Whitney Test a b Means in the same row with different letters differ ($p<0.05$)

RESULTS AND DISCUSSION

The fatty acid composition from subcutaneous IL and OL from *ad libitum* and restricted barrows and gilts are presented in Tables 1 and 2. No significant differences ($p<0.05$) were detected in the IL and OL between *ad libitum* or restricted barrows. Restricted gilts have more 16:0 in both layers and less 18:1 and 18:2 compared with the *ad libitum* ones. In Tables 3 and 4 are given the percentages of SFA, MUFA and PUFA in both layers. No differences were detected between barrows *ad libitum* and restricted in both layers. Gilts restricted have less PUFA % in the and a ratio PUFA/SFA lower than the *ad libitum* ones. In humans the consumption of SFA increases the concentrations of plasma low density lipoprotein (LDL) cholesterol. High levels of LDL-cholesterol are correlated with an increased risk of CHD, PUFA reduces both LDL-cholesterol and HDL_cholesterol. In Tables 5 and 6 is given the comparison between *ad libitum* and restricted diets. Gilts *ad libitum* present less SFA and more MUFA and PUFA in the Il and less MUFA in Ol than *ad libitum* barrows. Restricted gilts have less PUFA and a lower PUFA/SFA than the restricted barrows in the OL. All the treatment produce subcutaneous fat of very good quality. Ratios 18:0/18:2 above 1.2 are considered firm fat (Honkavaara,1988). Enser et al, 1984 showed that the unsatisfactory bacon was characterized by a concentration of 18:2

CONCLUSION

A restriction of 25% respect to an *ad libitum* dietary affected more the fatty acid composition of subcutaneous fat from gilts compared with barrows. Restricted gilts have more SFA and less MUFA and PUFA than the *ad libitum* ones.

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