INFLUENCE OF THE STRAIN ON MEAT QUALITY PARAMETERS OF IBERIAN PIG.

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Background

The Iberian pig breed includes a number of different strains, causing a great heterogeneity within the same breed. Several authors have reported important differences in productive, reproductive and morphologic parameters between different lines (Dobao et al., 1985; García-Casco & Silió, 1991; García Casco, 1993; Silió et al., 1994). Differences in ham and loin weight and in carcass length and growth rate between different strains of Iberian pigs have also been reported (Benito et al., 1998). In spite of these clear differences, there are few studies concerning the possible influence of the strain on the physical and chemical characteristics of Iberian pig meat, which in turn determine differences in the quality of the manufactured meat products.

Objetives

The aim of this study was to determine the influence of different Iberian pig strains (Entrepelado, Lampiño, Retinto and Torbiscal) on moisture, fat and protein content and on fatty acid composition of neutral and polar lipids of intramuscular fat in Iberian pig fresh meat *(Longissimus dorsi* muscle).

Methods

Samples were taken from *Longissimus dorsi* muscle and stored under vacuum at –80 ºC until analysis. Moisture was determined according to AOAC method (AOAC, 1984). Intramuscular fat was extracted with chloroform-methanol solution (1:2 v/v) following the procedure of Bligh and Dyer (1959). Solvent was removed under vacuum on a rotary evaporator and lipid extracts were weighted. Protein content was carried out following the procedure described by Lowry (Lowry et al., 1951). Results of the fat and protein content are expressed as percentage. For further lipid characterisation, the fatty acid methyl esters (FAMEs) of the total lipid extract were prepared by acidic-*trans*-esterification in presence of sulphuric acid (Cava et al., 1997). FAMEs were analysed by gas cromatography using a Hewlett-Packard HP-5890A gas cromatograph, equipped with a flame ionisation detector (FID). Separation was carried out on a polyethylene glycol-TPA modified fused silica semicapillary column (30 m long, 0.53 mm i.d., 1 µm film thickness) maintained at 220 ºC. Injector and detector temperatures were 230 ºC. Carrier gas was nitrogen at a flow rate of 1.8 ml min^{-1}. Individual FAME peaks were identified by comparing their retention times with those of standards (Sigma, St. Louis). Results are expressed as percentage of selected fatty acids.

Results and discussion

Moisture, intramuscular fat content and protein content of muscle *Longissimus dorsi* are shown in Table 1. No differences between the four studied strains of Iberian pig (Entrepelado, Lampiño, Retinto and Torbiscal) were detected for these parameters. These results are in agreement with those published by Tejeda (1999) and Benito et al. (1998). These authors found no significant differences in moisture and intramuscular fat content in the *Biceps femoris* muscle between different strains of Iberian pig (CENSYRA, Torbiscal, Entrepelado and Valdesequera). Fatty acid composition of neutral and polar lipids shown no differences between the four strains except for linolenic acid (C18:3 n-3) that showed significant variations between strains in the polar lipid fraction, the Retinto and Torbiscal strains showing the highest percentages, while the Entrepelado strain had the lowest values. Tejeda (1999) found slightly higher levels of linoleic acid (C18:2 n-6) in total and neutral lipids of intramuscular fat from the Entrepelado strain animals than in animals from the Torbiscal line. This fatty acid shows a surprising behaviour in the intramuscular fat of Iberian pigs (Cava et al., 1997). It has been argued that variations in linoleic acid (C18:2 n-6) content in the intramuscular fat of Iberian pigs are related not only to the feeding but to peculiarities of the Iberian pigs metabolism. In spite of this fact, no difference in this fatty acid between strains has been found in the present study.

In conclusion, neither the fatty acid composition of neutral and polar lipids, nor the chemical parameters studied in this experiment seem to be affected by the strain of Iberian pig.

Since real differences in productive and reproductive traits between strains have been previously reported, some of them concerning the carcass fat content, further studies about the influence of the strain on meat quality characteristics and especially on the fat content and composition are needed to optimise the production of Iberian pigs for achieving high quality meat products.

Pertinent literature

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Table 1: Effect of the genetic line (E: Entrepelado; L: Lampiño; R:Retinto; T: Torbiscal) on general parameters in *Longissimus dorsi* muscle, and slaughter weight of the animals.

	E	L	R	T	SEM	Significance level
Slaughter weight	145,1	147,8	141,2	138,0		
Moisture (%)	67.42	69.77	68.75	69.89	0.461	ns
IMF[1] (%)	5.11	4.84	4.80	3.67	0.346	ns
Protein (%)	18.22	17.80	18.15	18.12	0.444	ns

[1]IMF: Intramuscular fat content.

Table 2: Effect of the genetic line (E: Entrepelado; L: Lampiño; R:Retinto; T: Torbiscal) on fatty acids composition (g/100g of total FAMEs) of neutral lipids from IMF of Iberian pigs (*Longissimus dorsi*).

	E	L	R	T	SEM	Significance level
C 12	0.06	0.06	0.05	0.06	0.003	ns
C 14	1.03	0.80	1.11	0.83	0.073	ns
C 15	0.03	0.04	0.07	0.05	0.008	ns
C 16	22.31	20.76	22.78	20.87	0.735	ns
C 16:1	4.14	4.45	4.93	4.80	0.308	ns
C 17	0.43	0.45	0.47	0.48	0.037	ns
C 17:1	0.35	0.32	0.35	0.33	0.028	ns
C 18	13.48	11.36	12.71	11.56	0.363	ns
C 18:1	47.56	51.05	48.41	50.18	1.472	ns
C 18:2	7.45	7.82	6.09	8.15	0.326	ns
C 18:3	0.78	0.78	0.69	0.66	0.050	ns
C 20	0.45	0.35	0.36	0.31	0.027	ns
C 20:1	1.30	1.14	1.29	1.15	0.079	ns
C 20:4	0.64	0.62	0.69	0.56	0.067	ns
Σ SFA	37.79	33.81	37.54	34.16	1.136	ns
Σ MUFA	53.34	56.97	54.99	56.47	1.165	ns
Σ PUFA	8.87	9.22	7.47	9.37	0.333	ns
Σ n-6	8.10	8.44	6.78	8.71	0.321	ns
Σ n-3	0.78	0.78	0.69	0.66	0.050	ns
n-6/n-3	12.26	10.80	10.26	15.97	0.948	ns

Table 3: Effect of the genetic line (E: Entrepelado; L: Lampiño; R:Retinto; T: Torbiscal) on fatty acids composition (g/100g of total FAMEs) of polar lipids from IMF of Iberian pigs (*Longissimus dorsi*).

	E	L	R	T	SEM	Significance level
C 12	0.12	0.13	0.13	0.07	0.009	ns
C 14	0.25	0.27	0.26	0.23	0.012	ns
C 15	0.10	0.10	0.12	0.11	0.005	ns
C 16	14.72	16.60	15.27	14.96	0.270	ns
C 16:1	1.17	1.02	1.10	1.16	0.030	ns
C 17	0.22	0.28	0.36	0.38	0.025	ns
C 17:1	0.84	0.71	0.42	0.28	0.098	ns
C 18	12.21	9.21	10.16	10.52	0.528	ns
C 18:1	17.35	19.88	17.11	18.20	0.429	ns
C 18:2	28.57	29.56	30.53	29.01	0.352	ns
C 18:3	0.84^{b}	0.95^{ab}	1.26^{a}	1.10^{ab}	0.057	$P<0.05$
C 20	nd	nd	nd	nd	nd	-
C 20:1	0.38	0.52	0.36	0.43	0.022	ns
C 20:3	1.34	1.23	1.35	1.37	0.056	ns
C 20:4	17.52	15.45	17.14	16.51	0.388	ns
C 20:5	1.12	0.81	1.11	1.41	0.086	ns
C 22:4	0.08	0.35	0.40	0.29	0.087	ns
C 22:5	2.77	1.88	2.30	3.09	0.163	ns
C 22:6	0.42	1.04	0.60	0.87	0.116	ns
Σ SFA	27.62	26.59	26.30	26.28	0.431	ns
Σ MUFA	19.74	22.12	19.00	20.07	0.468	ns
Σ PUFA	52.64	51.28	54.70	53.65	0.638	ns
Σ n-6	47.49	46.60	49.42	47.18	0.544	ns
Σ n-3	5.15	4.68	5.28	6.47	0.236	ns
n-6/n-3	9.39	10.32	9.56	8.04	0.344	ns

Values with different letters differ significantly.