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POSTER

Effect of genetic and diet on Iberian pig fresh loin (m. *Longissimus dorsi*)

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Additional keywords
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SUMMARY

This study was aimed to evaluate the effect of different genetic lines, diets and their interaction on the weight, yield, intramuscular fat content (IMF) and colour of loin (m. *Longissimus dorsi*) of Iberian pig. Ninety-six castrated male Iberian pigs were allotted into twelve groups (n=8) following a 4×3 factorial design with two Iberian genetic lines (*Retinto*, RR, and *Torbiscal*, TT) and their reciprocal crosses (R×T and T×R) fed in intensive conditions with three different oleic acid enriched diets (low, L, medium, M and high, H levels). Regarding loin weight and yield a significant effect of genetic line was observed due to the higher (P<0.05) scores in TT line compared to RR line, with intermediate levels in R×T and T×R pigs. However, when physicochemical parameters are evaluated, as fat content and meat colour, RR pigs exhibited significantly higher intramuscular fat (IMF) content, a* (redness) and b* (yellowness) values than TT, R×T and T×R pigs. None of the other factors studied, diet and genetic×diet interaction, showed significant effect on weight, yield, IMF and colour of loin.

Palabras clave adicionales
Línea genética.
Dieta enriquecida en ácido oleico.
Carne fresca.
Calidad.

Efecto de la genética y de la dieta sobre el lomo fresco del cerdo Ibérico (m. *Longissimus dorsi*)

RESUMEN

El objetivo de este estudio fue evaluar el efecto de la línea genética, la dieta y su interacción sobre el peso, rendimiento, contenido en grasa intramuscular y color del lomo (m. *Longissimus dorsi*) del cerdo Ibérico. Se utilizaron un total de 96 cerdos Ibéricos machos y castrados, que fueron divididos en 12 lotes (n=8) siguiendo un diseño factorial 4×3, con dos líneas genéticas (*Retinto*, RR, y *Torbiscal*, TT) y sus cruces recíprocos (R×T y T×R). Los cerdos fueron cebados en intensivo con tres tipos de piensos enriquecidos con tres niveles de ácido oleico (bajo, L, medio, M y alto, H). Se observó un efecto significativo (P<0.05) de la línea genética sobre el peso y el rendimiento del lomo, con valores superiores en ambos parámetros en la línea TT que en la línea RR, presentando valores intermedios los lotes R×T y T×R. Sin embargo, en relación a los parámetros físico-químicos, los lomos de los animales pertenecientes a la línea RR presentaron mayor (p<0.05) contenido en grasa intramuscular (IMF) y valores más elevados de a* (rojo) y b* (amarillo) que los cerdos TT, R×T y T×R. Ni la dieta, ni la interacción dieta×genética afectaron a los parámetros analizados en este estudio sobre el lomo del cerdo Ibérico.

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INTRODUCTION

Iberian pig sector provides meat and meat products with high quality, which are a determinant factor in the upmarket meat product sector, mainly intended for the industrial processing of dry-cured ham, shoulder, loin and sausage, which are highly appreciated by Spanish consumers (García et al. 1996). Some recent studies focused on Iberian pig meat have used the loin (m. Longissimus dorsi) due to the importance of this muscle in the Spanish fresh meat market (Morcuende et al. 2007). The adipogenic nature of the Iberian pig with high capacity to accumulate fat is one of the characteristics defining the quality of the meat and its dry-cured products (López-Bote, 1998). Therefore, it is essential to know the factors that have an important effect on the quality of Iberian pig meat, mainly diet and genetics (Ventanas et al. 2004). It is for that reason that the current study was focused on evaluating the influence of both genetic and diet on some of the pa-

rameters determining Iberian pig meat quality, such as weight, yield, intramuscular fat content and colour of loin.

Material and Methods

This study was carried out with ninety-six castrated male Iberian pigs. The pigs were divided in twelve groups of eight animals each (n=8) following a 4×3 factorial according to genotype and diet. Related to genotype, four groups of pigs, involving two varieties (*Retinto* [RR], and *Torbiscal* [T]) and their reciprocal crosses (*Retinto* × *Torbiscal* [RT] and *Torbiscal* × *Retinto* [TR]) were studied. The two varieties used in this study are recognized in Spain's official Iberian herd-book (Spanish Association of Iberian Purebred Pig Breeders [AECERIBER]). Regarding diet, three groups of pig, fed in intensive conditions, were studied according to the level of oleic acid enrichment of the diet during the fattening phase previous to slaughter (low [L], medium [M] and high [H], with 0.93, 2.28 and 3.79 g of oleic acid per 100 g of concentrate, respectively). Animals began the fattening phase with an average body weight (BW) of 102.8±6.8 kg and 242±12.0 days of age. They were fattened *ad libitum* and slaughtered at a commercial abattoir at 299.3±12.1 days of age and 153.5±10.4 kg BW. The weight and yield of loin were measured. Intramuscular fat content was determined following the method of Folch et al. (1957). Colour measurements of the loin surface were made using a Minolta CR-300 colorimeter (Minolta Corporation, Osaka, Japan). Data were taken in the CIELAB colour space: *L** (lightness), *a** (redness), and *b** (yellowness). For data descriptive analysis, the mean and the standard error of the mean have been used. The pig has been used as the experimental unit. Significance of difference (P <0.05) between genetic line and dietary treatment was determined by two-way analysis of variance (ANOVA) followed by Tukey multiple comparison test. The General Linear Model procedure of SPSS package (SPSS for Windows Ver. 19.0; SPSS Inc., Chicago, IL, 2004) was used.

RESULTS AND DISCUSSION

Loin (m. *Longissimus dorsi*) characteristics according to genetic line of Iberian pig are shown in **Table I**. The effect of genetic line on the loin traits was marked. *Retinto* pig loin (RR) exhibited significant lower (P<0.05) weight and yield than *Torbiscal* ones (TT), with intermediate values in R×T and T×R. In contrast, IMF was higher in RR than in TT, with intermediate scores in the crosses (Ibáñez-Escriche et al. 2016). Several authors have studied the effect of genetic line of Iberian pig on carcass composition (Rodríguez et al. 1993) and proximate chemical composition of muscles (Tejeda et al. 2002; Juárez et al. 2009). The absence of significant effect of Iberian pig line on loin traits has been previously reported by other authors (Estévez et al. 2003). However, these differences are marked when comparing Iberian pig with other commercial pigs (Estévez et al. 2003). Regarding colour, RR showed higher (P<0.05) scores for *a** (redness) and *b** (yellowness) than the other three genotypes (TT, RT and TR). In agreement with our data are the results of Muriel et al. (2004) who explains that these differences are probably due to differences in muscle myoglobin contents. In this sense, *Torbiscal* animals are selected by considering production parameters, which explains why, at the same age, animals from this line are less mature, which could explain their lower IMF and myglobin contents. Differences in meat colour due to the genetic line could be important, since one of the features of Iberian meat products which influence their overall quality is an intense colour (Muriel et al. 2004).

Diet had no effect on any of the traits studied on the loin **(Table II)**. Regarding lipid loin determinations, IMF content was similar to those previously reported by González & Tejeda (2007), but higher than the data published by Ventanas *et al.* (2006). In agreement with our results, Ventanas et al. (2006) reported that the level of oleic acid in concentrates did not appear to influence IMF content. In contrast, Ayuso et al. (2014) reported higher IMF content in Iberian pigs fed with high oleic enriched diets. In respect to loin colour, our results agree with other previous works, which have pointed out no significant effects of oleic acid content in diets on lightness, redness and yellowness of Iberian pig loin (Martín et al. 2008). Interaction between Iberian genetic line and diet was not significant in any of the parameters studied in loin.

Table I. Effect of genetic line on weigh, yield, intramuscular fat (IMF) and colour of fresh loin (m. *Longissimus dorsi*) (Efecto de la línea genética sobre el peso, rendimiento, contenido en grasa intramuscular y color del lomo fresco (m. *Longissimus dorsi*).

	RR[1]	TT	RT	TR	SEM	P
	n=24	n=24	n=24	n=24		
Weight (kg)	1.44^{a}	1.78^{c}	1.64^{bc}	1.59^{ab}	0.024	0.000
Yield (%)	2.47^{a}	2.83^{b}	2.64^{ab}	2.54^{a}	0.017	0.001
IMF (g/100g)	8.72^{b}	6.78^{a}	8.14^{ab}	7.06^{ab}	0.276	0.035
Colour						
*L**	46.74	45.67	47.10	45.67	0.373	0.419
*a**	13.24^{b}	11.61^{a}	12.07^{a}	11.61^{a}	0.156	0.001
*b**	5.70^{c}	4.45^{ab}	5.34^{bc}	3.91^{a}	0.170	0.001

Means in the same row with different letters (a, b, c) are different (*P*<0.05).
[1]RR: *Retinto* line; TT: *Torbiscal* line; RT: *Retinto* × *Torbiscal* line; TR: *Torbiscal* × *Retinto* line.

Table II. Effect of oleic acid enriched diet on weigh, yield, intramuscular fat (IMF) and colour of fresh loin (m. *Longissimus dorsi*) (Efecto de la dieta enriquecida en ácido oleico sobre el peso, rendimiento, contenido en grasa intramuscular y color del lomo fresco (m. *Longissimus dorsi*).

	Low	Medium	High	SEM	P
	n=32	n=32	n=32		
Weight (kg)	1.59	1.61	1.63	0.024	0.752
Yield (%)	2.58	2.58	2.70	0.017	0.199
IMF (g/100g)	7.05	8.50	7.44	0.276	0.068
Colour					
*L**	46.17	46.04	46.64	0.373	0.808
a*	12.35	12.19	11.87	0.156	0.359
*b**	4.84	4.99	4.71	0.170	0.771

In conclusion, genetic Iberian pig line affect more markedly yield and quality of fresh loin than feeding with oleic acid enriched diets. Moreover, *Retinto* Iberian pigs have better rates of fresh loin quality despite having worse yields than *Torbiscal* pigs.

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