MEAT QUALITY IN CROSSBRED EXPERIMENTS IN THE MEDITERRANEAN AREA

A. OLIVER[1], M. GISPERT[1], P. GOU[1], A. BLASCO[2], A. DIESTRE[1]

[1] Institut de Recerca i Tecnologia Agroalimentàries (IRTA), Centre de Tecnologia de la Carn, Granja Camps i Armet, 17121 Monells, Girona, Spain.
[2] Universitat Politècnica de València, Departament de Ciència Animal, Camí de Vera 14, 46071 València, Spain.

SUMMARY

A trial of 228 pigs representing five crosses involving Duroc (DU), Landrace (LR) and Large White (LW) for sows, and DU, Belgian Landrace (BL) and LW for boars were compared to find the best combination of breeds for different strategies of Spanish meat industry. The results of the present study demonstrate that DU*(LR*LW) cross had both a good carcass quality and also an acceptable meat quality with the highest level of intramuscular fat content.

INTRODUCTION

Pig meat production has increased in Spain more than a 50 % in the last decade. Now it represents a 50 % of the total meat consumption. The increasing demand of lean meat led to a production system based in a three way cross in wich the female was a Landrace x Large White sow and the terminal sire a Belgian Landrace. Due to a new interest in meat quality in recent years, the Duroc breed was introduced as a terminal sire. This breed has a higher intramuscular fat, which would produce a better meat quality, but also a higher backfat percentage. As the correlation between both kinds of fat is not very high, some selection programs have tried to increase the lean content of this breed, expecting to keep a part of the advantage in intramuscular fat.

The aim of this paper is to asses the differences in meat quality of different commercial breed crosses which include Duroc and Belgian Landrace components. They are also compared with crosses which use Large White as a terminal sire, a common scheme in Europe.

MATERIAL AND METHODS

The study was undertaken with 109 gilts and 119 barrows from five different crossbreds. They are distributed in the following crosses: 44 DUx(LRxLW), 45 LWx(DUxLW), 44 LWx(LRxLW), 51 BLx(DUxLW) and 44 BLx(LRxLW). They came from six fattening blocks from 1990 to 1991. The animals were fed *ad libitum* from 25 kg to 95 kg of live weight at the Central Testing Station (IRTA-CCP). Pigs were slaughtered at a live weight of 93.98 ±3.62 kg in the Carcass Evaluation Unit (IRTA-CTC), after a standarised pre-slaughter treatment (12 h in lairage, electrically stunned with 350 V and 50 Hz).

Carcass and meat quality measurements:

Following slaughter, the muscle pH and the electrical conductivity (QM) of *M. longissimus* (LD) at the level of the last rib was measured. At 24 h *post-mortem* (p.m.) we did the following

(Nakai et al. 1975) in the cut surface exposed of the LD. Also, in a subsample water hold capacity (Barton-Gade, 1984), intramuscular lipid content (IMF) by ether extraction in a soxl apparatus, water content by drying to constant weight and total protein were determined. D loss was determined by the method of Warris (1982). Fat thickness was measured at the level last rib (P2) and 3/4 last rib (G3/4) 60 mm from the mid line on the respective cut surfa exposed by transverse cuts of LD. Also the eye muscle area of the LD (cm^2) was determined at 3/4 last rib.

Statistical analyses:

Traits were analysed by the method of least squares analysis of variance. Effects were fit for crossbred, sex and block. IMF was also analysed using G3/4 as a covariate.

RESULTS AND DISCUSSION

Table 1 shows the least squares means and standard errors of carcass quality traits by cross sex. Duroc sired pigs presented the best daily live weight gain (g), and this agrees with of the previous studies (Brascamp et al. 1979 , Smith and Pearson, 1986, McGloughlin et al. 1988). The best killing out was found in the BL sired pigs. The crosses sired with LW had fat depth and less muscle area in the LD muscles than the other crosses studied. There were differences on killing out by sex. Gilts showed more eye muscle area and less fat thickness than barrows. The carcass superiority observed in our study of DU sired pigs over LW sired pigs backfat thickness and eye muscle area has not been reported before in studies comparing breeds. Brascamp et al. (1979) and Oliver (1991) found a better carcass quality for LW breed. These results could be explained by the different sources of the DU breed. In experiment the DU breed came from the actual Danish Breeding Scheme. Some studies that compare crosses involving LR*LW sows and different sire breeds including LW and DU indicate that, general, DU sired pigs have at least as good carcass characterisitics as LW sired (Sellier, 1 and Simpson et al., 1987) with the exception of Edwards et al. (1992) who found that DU progeny had more backfat thickness than LW.

Results of meat quality measurements and chemical analysis on LD muscles are shown in table There was no differences on meat quality characteristics between DU and LW sired pigs indicating a good meat quality (Barton-Gade,1988). The BL sired pigs showed a poor meat quality relation to the other crosses. As expected, crossbred pigs of BL*(LR*LW) were siignificantly inferior in meat quality criteria (QM45, L* value, colour and WHC) than pigs from BL*(DU*LW). PSE incidence (pH45 < 5.8 and L* value > 56) in the cross used was 6.8 % of carcasses of sired pigs, 11 % of LW sires, 23.5 % of BL*(DU*LW) and 31.8 % of BL *(LR*LW). Furthermore the results demonstrate a significant advantage of meat quality characteristics from DU*LW sows with respect to LR*LW when BL is the sire. The amount of drip produced for LD muscles was

nificant between crosses, but the quantity lost is in general high because the mean of pH45 below 6.1 in all crosses (Warris, 1982). The results of meat quality characteristics in lation to sex (gilts and barrows) are shown in table 3. There were no significant differences ween sexes in many characteristics expressing the PSE status of the carcass. However QMu and were significantly different ($P< 0.05$). These results did not agree with the ones of Barton- e (1986) who did not find essential differences in meat quality between sexes. As expected e IMF was significanly higher in barrows than in gilts.

e intramuscular fat content was significantly greater in the DU sired pigs (1.88) with respect the other crosses used in this study. Similar advantages were obtained when IMF was studied ing G3/4 as a covariate. These results agree with previous works (McGloughlin, et al., 1987, neron et al., 1990 and Edwards et al., 1992). The crosses BL*(LR*LW) and LW (LR*LW) had the west values of IMF (0.93 and 0.95 respectively). When DU was included in the maternal line the increased. Furthermore these results indicate that DU*(LR*LW) would be adequate for the duction of traditional cured products of high quality, being performance and carcass quality ntageous for the producers.

t 1
rmance and carcass quality traits (least-squares means and standard errors) of five crosses and sexes.

	CROSSBREED										SEX			
	DU*(LR*LW)		LW*(DU*LW)		LW*(LR*LW)		BL*(DU*LW)		BL*(LR*LW)		Gilts		Barrows	
	LSM	SE	LSM	SE	LSM	SE	LSM	SE	LSM	SE	LSM	SE	LSM	SE
n[1]	44		45		44		51		44		109		119	
ass weight (kg)	889[a]	14	809[b]	13	843[b]	15	825[b]	13	828[b]	14	791[a]	8	886[b]	8
ng out (g/kg)	78.86	0.49	76.58	0.47	76.86	0.56	76.63	0.45	78.75	0.53	78.00	0.28	78.27	0.27
thickness P2 (mm)	828.66[bc]	3.17	824.30[c]	3.15	825.57[c]	3.65	840.67[a]	2.96	836.15[ab]	3.40	830.63	1.85	831.51	1.77
thickness 3/4 (mm)	13.37[bc]	0.76	16.36[a]	0.66	16.04[a]	0.77	13.29[c]	0.63	13.75[b]	0.74	12.70[a]	0.39	16.43[b]	0.38
muscle area (cm^2)	13.76[b]	0.67	17.20[a]	0.66	16.72[a]	0.77	13.51[a]	0.63	13.68[b]	0.75	12.87[a]	0.39	17.09[b]	0.38
	39.90[b]	1.07	37.52[c]	1.06	36.34[c]	1.21	41.25[ab]	0.99	42.70[a]	1.22	41.24[a]	0.64	37.85[b]	0.60

daily live weight gain (g)
squares means with different superscripts differ at the P<0.05 level.

t 2
quality characteristics (Least-squares means and standard errors) of five crosses using Duroc, Large White and
ish Landrace sires.

	DU*(LR*LW)		LW*(DU*LW)		LW*(LR*LW)		BL*(DU*LW)		BL*(LR*LW)		
	LSM	SE	LSM	SE	LSM	SE	LSM	SE	LSM	SE	SIG
ue	6.02a	0.05	6.07a	0.05	5.93ab	0.06	5.80b	0.05	5.77b	0.06	***
ue	4.07a	0.34	4.06a	0.34	4.39a	0.39	4.20a	0.32	5.41b	0.37	*
loss	5.72	0.03	5.66	0.03	5.65	0.04	5.72	0.03	5.71	0.04	NS
	3.95a	0.33	3.89[a]	0.33	4.07[a]	0.38	5.39[b]	0.32	5.67[b]	0.37	**
	54.06[a]	0.60	54.45[ab]	0.60	54.45[ab]	0.69	55.66[b]	0.56	57.24[c]	0.65	*
	2.59[ab]	0.11	2.69[a]	0.11	2.38[b]	0.13	2.37[b]	0.10	1.97[c]	0.12	***
	9.74	0.41	9.84	0.41	10.29	0.47	11.16	0.39	10.85	0.45	NS
	0.191[a]	0.007	0.186[a]	0.010	0.186[a]	0.011	0.139[b]	0.018	0.106[c]	0.015	***
(%)	1.88[a]	0.09	1.13[b]	0.09	0.95[b]	0.09	1.40[c]	0.09	0.93[b]	0.09	***
(%)	1.94[a]	0.13	1.07[bc]	1.19	0.81[d]	0.17	1.48[b]	0.12	1.01[cd]	0.13	***
	22.52[a]	0.23	23.60[b]	0.28	23.56[bc]	0.31	22.77[ab]	0.25	23.56[c]	0.24	***
	74.07	0.18	74.31	0.16	74.23	0.16	74.21	0.16	74.25	0.17	NS

WHC = Water holding capacity of soluble sarcoplasmic and myofibrillar proteins.
IMF = Intramuscular fat content.
ed as covariate.
ted with G3/4 as covariate.
squares means with different superscripts differ at the P<0.05 level.

TABLE 3
Meat quality characteristics (Least - squares means and standard errors) in relation to sex.

	Gilts		Barrows		
	LSM	SE	LSM	SE	SIG
pH45	5.91	0.03	5.92	0.03	NS
QM45	4.58	0.19	4.26	0.19	NS
pHu	5.70	0.02	5.68	0.02	NS
QMu	4.88	0.19	4.31	0.18	*
L*value	54.84	0.34	55.50	0.33	NS
Colour	2.42	0.06	2.38	0.06	NS
Drip loss	10.55	0.24	10.20	0.22	NS
WHC[1]	0.154	0.001	0.170	0.001	*
IMF[2]	1.12	0.06	1.36	0.06	**
Protein (%)	23.28	0.13	23.13	0.13	NS
Moisture (%)	74.37	0.12	74.19	0.12	NS

1 WHC = Water holding capacity.
2 IMF = Intramuscular fat content.
* P<0.05; ** P<0.01; NS= not significant.

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