IMPROVING PORK QUALITY FROM PIGS INTENDED FOR SPANISH DRY-CURED HAM BY PIG DIET

L. Pérez-Ciria[1], G. Carco[2], G Ripoll[1], C. Marín[1], J. Álvarez-Rodríguez[3] and M.A. Latorre[4]*

[1]Department of Animal Production and Health, Centro de Investigación y Tecnología Agroalimentaria de Aragón, Zaragoza, Spain.

[2]Department of Agronomy, Food, Natural resources, Animals and Environment, University of Padova, Italy.

[3]Department of Animal Science, University of Lleida, 25198 Lleida, Spain.

[4]Department of Animal Production and Food Science and Technology, IA2, Universidad de Zaragoza, Spain

*Corresponding author email: malatorr@unizar.es

Abstract – A preliminary trial was carried out to evaluate if increasing the energy level in diets for gilts intended for Spanish dry-cured ham could improve pork quality. A total of 48 pigs were used and three isoproteic diets were given from 90 to 120 kg bod weight (n=12); a) 2.3% lard added, 2,385 kcal net energy (NE)/kg and 0.60% Lysine dig., b) 5.2% lard added, 2,525 kcal NE/kg and 0.64% Lys dig., and c) 4.6% soyabean oil added, 2,525 kcal NE/kg and 0.64% Lys dig. Instrumental traits and chemical composition of meat were evaluated. It can be concluded that increasing NE while maintaining the energy/Lys ratio might increase the IMF content and tenderness.

Key Words – dietary energy, fat, gilts.

I. INTRODUCTION

Decades of genetic selection for lean have resulted in a drastic reduction of fatness in pigs. It also has carried out an impairment of pork quality, mainly due to a decrease in intramuscular fat content (IMF). The lack of fat is more relevant in the case of gilts because males are castrated and they are usually fatter. Several nutritional strategies are being evaluated in the last years to increase backfat depth and also of IMF. Most of them are based on the restriction of dietary crude protein (CP) or Lysine (Lys) [1,2] as the first-limiting amino acid for growth. The aim of this study was to evaluate the impact of increasing dietary energy in gilts intended for Spanish dry-cured ham production by maintaining or increasing the energy/Lys ratio.

II. MATERIALS AND METHODS

A total of 48 Duroc x (Landrace x Large White) gilts (approx. 90 kg of body weight (BW)) were used for the study. At farm, pigs were housed in 80% slatted floor pens (2.50 m x 2.50 m) in a natural environment barn and were allotted to 12 pens (4 pigs each) based on the initial BW. There were three dietary treatments (all of them formulated with 45% of barley and 35% of wheat): a) 2.3% lard, 2,385 kcal net energy (NE)/kg, 13.2% CP and 0.60% digestible lysine (Lys dig.), b) 5.2% lard, 2,525 kcal NE/kg, 13.2% CP and 0.64% Lys dig. and c) 4.6% soyabean oil, 2,525 kcal NE/kg, 13.2% CP and 0.64% Lys dig. Each diet was given to 16 pigs. The aminoacid levels were determined using an ideal aminoacid ratio [3]. Pigs had free access to pelleted feed and water throughout the trial. When the average BW was approx. 120 kg of body weight, all the animals were slaughtered on the same day. At the abattoir, a section of 400 ± 20 g of *Longissimus thoracis* muscle (LT) was excised at the last rib from each left loin of a total of 36 carcasses (12 per treatment). Meat samples were placed in individual plastic bags and vacuum-packaged and moved to the laboratory. The day after slaughter, the LT samples were removed from packages and after blooming for 15 min, color was evaluated with a chromameter (Minolta Camera, Japan). The average of three random readings was used to measure lightness (L*), redness (a*) and yellowness (b*). Additionally, chroma (C*) and hue angle (H*) were calculated as $C^* = \sqrt{(a^{*2} + b^{*2})}$ and as $H^* = \tan^{-1}(b^*/a^*) \times 57.29$, respectively. After color measurement, samples were stored at -20ºC until subsequent analyses. When required, the m. LT samples were thawed for 24 h at 4ºC, removed from packages, blotted dry for 20 min and weighed. Thawing loss was calculated taking into account the fresh and thawed weight. For the cooking loss determination, briefly, a LT slice (300 ± 20 g) was taken from each chop, weighed, placed in a plastic bag, and cooked to an internal temperature of 70ºC in a 75ºC water bath (Precisterm, J.P. Selecta S.A., Spain). Cooked samples were allowed to cool at 15ºC for 30 min, blotted dry, and weighed. The difference between pre- and post-cooking weights was divided by the pre-cooked weight to calculate cooking loss percentage. Samples were, then, cut parallel to the long axis of the muscle fibers into rectangular cross-section slices of 10 x 10 mm and 30 mm length. Slices (8/chop) were sheared perpendicular to the fiber orientation, with a Warner-Bratzler device attached to an Instron Universal testing machine attached to a PC (Instron Ltd, UK), and equipped with a 5-kg load cell and a crosshead speed of 150 mm/min. The pork chemical components analysed were moisture by the oven drying method for 48 h at 105ºC, total ash using a muffle furnace for 6 h at 800ºC, protein by a Kjeldahl MT 2300 analyser (Switzerland) and IMF using an ANKOM XT15 equipment (USA). The data were analysed with GLM procedure of SAS package by including the diet as fixed effect. Means were separated by a *t*-test. The experimental unit was the animal (n=12). A value of $P<0.05$ was used to assess the significance, whereas a *P*-value between 0.05 and 0.10 was classified as a trend.

III. RESULTS AND DISCUSSION

Results are presented in the Table 1. No color trait (L*, a*, b*, C* and Hº) was affected by diet (P>0.05) but chemical composition was indeed influenced. The loins from control pigs tended to have higher moisture content than those fed higher energy levels, independently of the NE/Lys ratio was increased or maintained (P=0.06). Also, gilts fed higher energy levels tended to show higher IMF content (P=0.09) in meat and also less hardness (P=0.04) than the control group. Marbling, determined by imaging programs, also resulted in this sense (data not shown). The treatment had no influence on water holding capacity, measured as thawing and cooking losses (P>0.1).

Table 1. Instrumental characteristics and chemical composition of pork according to the nutritional strategies studied.

	Control	=Energy/Lys, lard added	↑Energy/Lys, soy added	EEM (n=12)	Significance
Color traits					
L*	53.3	53.1	52.8	0.873	NS
a*	4.89	4.83	4.51	0.213	NS
b*	1.97	2.17	1.94	0.186	NS
C*	5.30	5.33	4.92	0.227	NS
Hº	21.9	24.0	23.3	1.889	NS
Chemical composition (%)					
Moisture	72.5	71.5	71.1	0.439	0.06
Protein	24.0	23.8	24.1	0.196	NS
Intramuscular fat	1.89	3.24	3.13	0.471	0.09
Ash	1.24	1.23	1.27	0.022	NS
Water holding capacity indicators (%)					
Thawing loss	14.5	13.7	14.1	0.684	NS
Cooking loss	28.5	28.1	28.3	0.481	NS
Warner-Bratzer shear force (kg)	2.12a	1.60b	1.89b	0.136	0.04

NS=not significant (P>0.05). Within each row, different letters indicate significant differences (P<0.1).

IV. CONCLUSION

Under our experimental conditions, we can conclude that increasing the NE level in diets for gilts intended for Spanish dry-cured ham might improve some pork characteristics, such as the IMF content and tenderness, but it seems to be more interesting maintaining the energy/Lys ratio (and adding lard) than increasing that ratio (and adding soyabean oil). More research works are needed to confirm it and to check the effect of the fat source on other meat quality traits.

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