

NOTA BREVE

SUBCUTANEOUS FAT AND LOIN DEVELOPMENT IN THE BASQUE BLACK PIED PIG BREED

DESARROLLO DE LA GRASA DORSAL Y DEL LOMO EN EL CERDO DE RAZA PÍO
NEGRO DEL PAÍS VASCO

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ADDITIONAL KEYWORDS

Backfat layers. Loin area. Swine.

PALABRAS CLAVE ADICIONALES

Capas de grasa dorsal. Área del lomo. Porcino.

INTRODUCTION

The pig industry has focussed on increasing the efficiency of muscular tissue production. In Europe, selection has been successfully conducted to obtain leaner carcasses, higher growth rate, lower feed conversion and bigger litter size, based on a limited number of breeds. Consequently, an important number of breeds, as the Basque Black Pied, have lost its productive role during the last century. After a period of critical status, this breed has been recovered since 1981 and now several farmers maintain a small permanent population (Iriarte and Alfonso, 2001). Previous works have show the higher adipose development and the higher activity of enzymes responsible for lipid synthesis of Basque breed in front of selected pig populations (Alfonso *et al.*, 2005). The aim of this work is to present this development during the fattening period with especial reference to the individual backfat layers. Weight and loin area development are also described.

MATERIALS AND METHODS

Data were available from an experiment carried out to describe the growth performances, and carcass and meat quality characteristics of animals of Basque pig breed (Alfonso *et al.*, 2005). This description was done by comparison with animals of a selected line of Large White breed, raised under the same intensive conditions and period, and slaughtered at the same age. The experiment was carried out in a farm located in the North of Navarra (Spain) and involved a total of 18 Basque and 22 Large White pigs that arrived at the end of the fattening period. Animals were slaughtered at 202 days on average.

All pigs were individually weighed and scanned every 4 weeks till the day they were slaughtered (6 measurements per animal). An ultrasound A-mode scan (Renco Lean-Meater, Renco Corporation, USA) and an ultrasound B-mode scan (Sonovet 600, Medison Co. Ltd., Korea; 120 mm, 3.5 MHz) were used. Backfat depth was measured

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by the A-mode scan at the last rib and about 5 cm lateral to the midline at each segment of body length. A perpendicular ultrasound B-mode image was recorded at the same point but only on the right side. Area of loin eye muscle and depth of outer, middle, inner and total layer backfat were then estimated in a computer using specific image analyser software (Optimas V6.5; Media Cybernetics, USA).

Data were analysed by a linear model using the GLM (General Linear Model) procedure of SPSS (v.11.5.1., SPSS Inc., USA). Model included the breed as main effect and two covariates, the age and the age nested to breed expressed with respect to the average age (136.6 days) [$y_{ij} = \mu + breed_i + b_1age_j + b_2age_j(breed_i) + e_{ij}$]. Gompertz growth functions [$Y_t = Y_0 \exp\{G(1 - \exp[-gt])\}$] where t is the age and the estimated parameters are Y_0 (hypo-

thetical weight at $t=0$) and G and g (growth parameters)] were also adjusted to data using Prager *et al.* (1989) software.

RESULTS AND DISCUSSION

A lower lean development and a noticeable higher fat development were observed for Basque in front of Large White. Loin eye area was significantly lower in Basque breed than in Large White at slaughter. Differences were observed all along of the fattening period but increased significantly with age (**table I**). As observed in other studies (Labroue *et al.*, 2000), backfat thickness differences were opposite. Basque pigs showed a higher subcutaneous adiposity. Overall backfat thickness difference was close to 0.9 cm at slaughter. Differences in

Table I. Estimated differences on linear development of weight, loin area and backfat layer's thickness of Basque Black Pied pigs expressed with respect to Large White. (Diferencias estimadas en el desarrollo lineal del peso, área de lomo y espesor de las capas de grasa dorsal en los cerdos Pío Negro del País Vasco respecto a cerdos Large White).

	Average difference ^a	Difference on daily development ^a
Weight (kg)	-26.851***	-0.298***
Loin area (cm ²)	-8.580***	-0.083***
Overall backfat thickness (cm) ^b	0.396***	0.004***
Outer backfat layer thickness (cm) ^c	0.048 [*]	ns
Middle backfat layer thickness (cm) ^c	0.215***	0.003***
Inner backfat layer thickness (cm) ^c	0.122***	0.002***

^at statistic significance of differences on average [*breed*] and daily development breed effects [*age(breed)*] estimated under the model: $y_{ij} = \mu + breed_i + b_1age_j + b_2age_j(breed_i) + e_{ij}$ (age expressed with respect to the average age of 136.6 days). ns: not significant; * $p < 0.05$; *** $p < 0.001$.

^bultrasounds A-mode

^cultrasounds B-mode

DEVELOPMENT OF BASQUE PIG

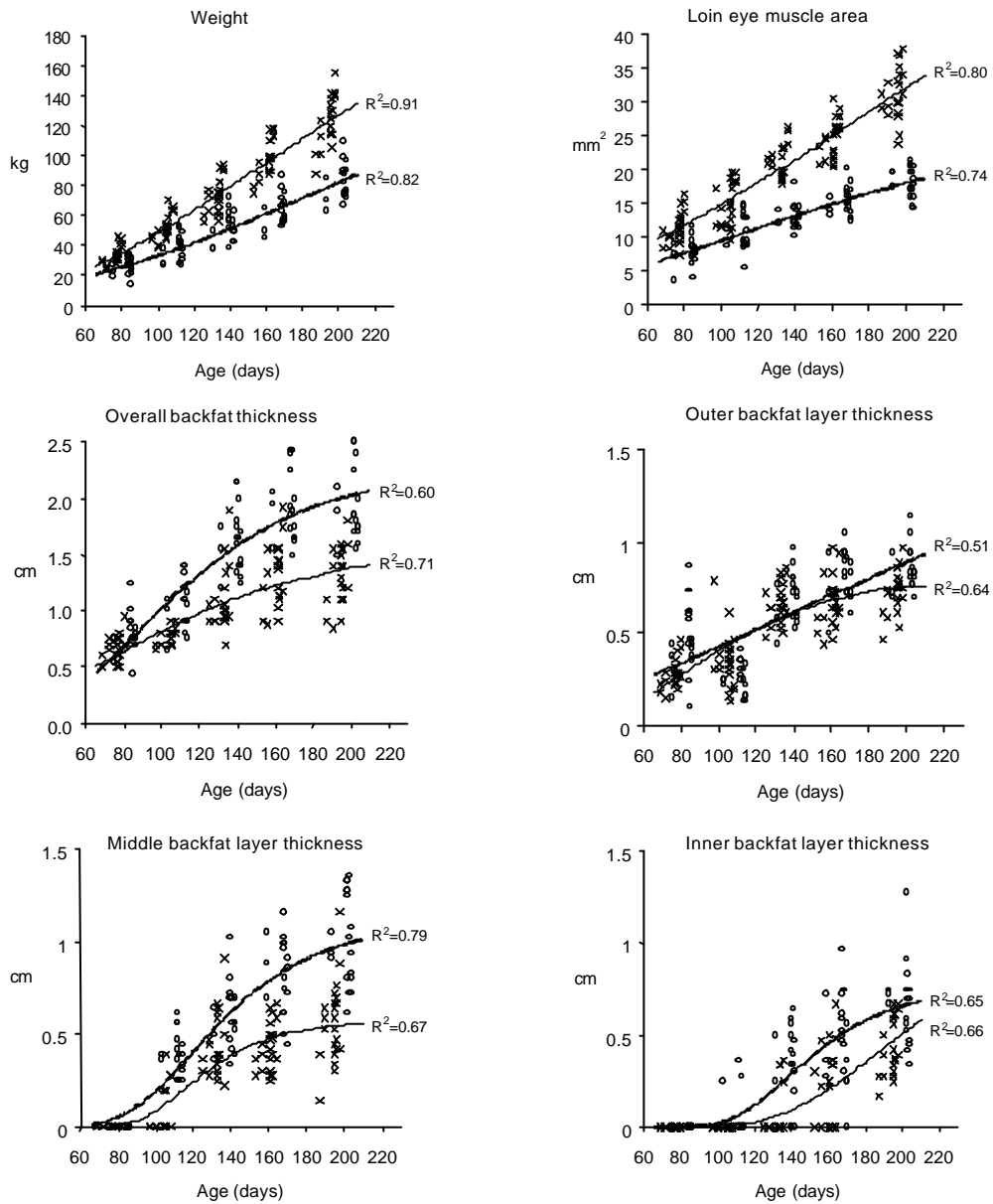


Figure 1. Development of weight, loin area, overall backfat thickness (ultrasounds A-mode) and thickness of outer, middle and inner layers of backfat (ultrasounds B-mode) in Basque Black Pied (-; o) and Large White (-; x) animals, and adjusted Gompertz curves (adjusted R^2). (Desarrollo del peso, área del lomo, espesor total (ultrasonidos modo-A) y de las capas externa, media e interna de grasa dorsal (ultrasonidos modo-B) en los animales Pío Negro del País Vasco (-; o) y Large White (-; x), y curvas de Gompertz ajustadas (R^2 ajustado)).

subcutaneous fat thickness between breeds varied among fat layers. This was in agreement with the results of the comparison between other genotypes and ages carried out by Eggert and Schinckel (1998). The middle layer explained more of 50 percent of the overall backfat differences observed at slaughter between breeds. Differences were small in the outer layer. Development all along the fattening period also differed depending on layer and breed. The middle and inner layers had a different daily development between breeds, but no differences were estimated for the outer layer (**table I**).

Gompertz curves also showed how the difference in total subcutaneous fat deposition was basically related to the different development of the middle and inner layers (**figure 1**). This result was in accordance with previous results

suggesting a greater metabolic activity of the middle layer and pointing out that selection against total backfat thickness seems to have emphasised the middle rather than the outer layer (Leymaster and Mersmann, 1991). In general, daily development of weight, loin eye and backfat was well explained by Gompertz functions. Weight and loin eye area were better adjusted than backfat thickness. R^2 ranged 0.51 – 0.79 for backfat thickness and 0.74 – 0.91 for weight and loin eye area. Gompertz function has been extensively used to predict growth in industrial lean pigs, and it should be noticed that Large White development ($R^2=0.64$ to 0.91) was better explained than Basque development ($R^2=0.51$ to 0.80). The exception was the middle backfat layer, better adjusted in Basque ($R^2=0.79$) than in Large White pigs ($R^2=0.67$).

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