

# EFFECT OF PRE-SLAUGHTER WEIGHT AND SEX ON COMMERCIAL MEAT CUT YIELDS OF IBERIAN PIGS

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## ABSTRACT

It is very important for the Iberian swine industry to determine the optimum slaughter weight. Therefore, predicting the weights and yields of valuable meat cuts (ham, foreleg and loin) at a given pre-slaughter live weight may be very useful for management decisions. Also, sex differences in prime-cut yields should be elucidated. For this study, 300 extensively reared Iberian pigs (castrated males and females) were slaughtered at live weight (LW) ranging from 125 to 200 kg. At the packing plant, carcass and meat cuts were weighed, and meat cut yields were recorded. Increasing LW class was associated with heavier carcass and meat cuts, but also with lower carcass and prime-cut yields. Males were heavier, but females had higher carcass yield. Nevertheless, males were superior to females in the case of foreleg weight and yield and combined prime-cut yield. Sex differences within each LW class were consistent. Results suggest that in Iberian pig weight gain during finishing in extensive systems is mostly based on fat cover deposition, and also that males, despite castration, have a greater front leg development than females.

**Key words:** Iberian pig / slaughter weight / carcass yield / prime cuts / sex differences

## 1 INTRODUCTION

The weights and yields of valuable meat cuts, especially hams, forelegs and loins are of great importance for the Iberian swine industry. In traditional extensive systems, which have an acorn-based finishing phase called “*montanera*”, at the beginning of the fattening period, Iberian pigs grow more muscle than fat, but at the end of this stage, growth is mainly based on fat tissue deposition, with high daily gains in the finishing phase (963 g/day), compared to low gains (around 200 g/day) in the previous phase (Mayoral *et al.*, 1999). In Iberian pigs, Barba *et al.* (2000) obtained a carcass yield of 83.2% for a live weight of 142 kg, with ham and foreleg mean weights of 21.6 and 14.3 kg, respectively. Mayoral *et al.* (1999), with acorn-fed Iberian pigs of 153 kg of live weight at 16 months of age, obtained 80.9% of carcass yield and prime

cut, ham, foreleg and loin weights of 17.3, 9.3, 6.5 and 1.4 kg, respectively. Also, the age at the beginning (Daza *et al.*, 2007) and at the end of the fattening period are important factors for meat yield, as well as the sex, although this latter factor has not been studied in depth. The commercially optimal Iberian pig carcass composition represents an equilibrium between meat and fat deposition which is sometimes difficult to control. Determining the optimal slaughter weight (live weight at slaughter) at which finishing should be terminated for a given range of age is one of the most difficult decisions to be taken by extensive Iberian pig producers, especially if finishing is based only on natural resources, *i.e.* acorns. In consequence, the present study aimed to determine the effect of pre-slaughter weight and sex on yields of carcass and prime cuts of Iberian pigs.

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**Table 1:** Body, carcass and prime cut (ham, foreleg and loin) weights (kg) per class of live weight at slaughter (LW) in castrated Iberian pigs

Weight variable	Class 1 (LW < 140 kg; n = 22)	Class 2 (140–155 kg LW; n = 82)	Class 3 (156–170 kg LW; n = 177)	Class 4 (LW > 170 kg; n = 19)
Live weight	135.23 <sup>a</sup>	150.27 <sup>b</sup>	160.93 <sup>c</sup>	174.14 <sup>d</sup>
Carcass weight	111.60 <sup>a</sup>	125.43 <sup>b</sup>	133.95 <sup>c</sup>	145.65 <sup>d</sup>
Hams weight	24.32 <sup>a</sup>	26.46 <sup>b</sup>	28.19 <sup>c</sup>	29.99 <sup>d</sup>
Forelegs weight	16.94 <sup>a</sup>	18.28 <sup>b</sup>	19.03 <sup>c</sup>	20.08 <sup>d</sup>
Loins weight	3.60 <sup>a</sup>	3.51 <sup>b</sup>	3.57 <sup>c</sup>	3.76 <sup>d</sup>
Prime cuts weight	45.17 <sup>a</sup>	48.75 <sup>b</sup>	51.05 <sup>c</sup>	53.92 <sup>d</sup>

Values within a row having different superscripts differ ( $P < 0.05$ ).

## 2 MATERIALS AND METHODS

Carcass data came from 300 castrated Iberian pigs (146 females and 154 males) raised in years 2009 to 2012 in extensive conditions on a research farm. Pigs were slaughtered at a live weight (LW) of 125 to 200 kg. Weight of carcass, ham, foreleg, loin (cw, hw, fw and lw, respectively), as well as prime cuts weight (pcw = hw + fw + lw) were recorded. The yields (y) of carcass (cy), hams (hy), forelegs (fy), loin (ly) and prime cuts (pcy) were calculated as follows:

$$\begin{aligned} cy &= (cw / LW) \times 100 \\ hy &= (hw / cw) \times 100 \\ fy &= (fw / cw) \times 100 \\ ly &= (lw / cw) \times 100 \\ pcy &= (pcw / cw) \times 100 \end{aligned}$$

Male (M) and female (F) castrated pigs were ranked into 4 live weight (LW) classes (with similar numbers of both sexes for each class) according to the body weight at slaughter:

- Class 1: LW < 140 kg (n = 22)
- Class 2: 140–155 kg LW (n = 82)
- Class 3: 156–170 kg LW (n = 177)
- Class 4: LW > 170 kg (n = 19)

Data were analyzed with statistical package SAS using GLM procedure with model that included the effects of LW class (Class), Sex and the interaction Class  $\times$  Sex. Least-squared means were calculated to adjust for unbalanced data.

## 3 RESULTS AND DISCUSSION

Table 1 shows mean values of live, carcass and prime cut weights for the pigs in each LW class. All weight variables increased significantly as LW increased. In contrast, with respect to carcass and prime cut yields for each live weight class (Table 2), carcass yield did not increase along with LW, and, on the contrary, combined or separated prime cuts decreased in yield as LW increased, with 2 to 4 significantly different levels depending on the particular yield variable. This is consistent with results from Mayoral *et al.* (1999), because data from Table 1 and 2 suggest that carcass weight increased mostly in fat cover during finishing and to a lesser extent in muscular contents, which are the main constituents of prime cuts.

In relation to sex differences for weight variables (Table 3) and for yield variables (Table 4), when all LW classes were pooled, LW was significantly greater for males (155.8 kg) than for females (154.4 kg), but female carcasses appeared to be heavier (although not significantly) than those of males (Table 3). This is consistent

**Table 2:** Carcass and prime cut (ham, foreleg and loin) yields (%) per class of live weight at slaughter (LW) in castrated Iberian pigs

Yield variable	Class 1 (LW < 140 kg; n = 22)	Class 2 (140–155 kg LW; n = 82)	Class 3 (156–170 kg LW; n = 177)	Class 4 (LW > 170 kg; n = 19)
Carcass yield	82.54 <sup>a</sup>	83.47 <sup>a</sup>	83.23 <sup>a</sup>	83.63 <sup>a</sup>
Hams yield	21.79 <sup>a</sup>	21.09 <sup>b</sup>	21.04 <sup>b</sup>	20.60 <sup>b</sup>
Forelegs yield	15.18 <sup>a</sup>	14.59 <sup>b</sup>	14.22 <sup>c</sup>	13.79 <sup>c</sup>
Loins yield	3.22 <sup>a</sup>	2.77 <sup>b</sup>	2.66 <sup>c</sup>	2.58 <sup>c</sup>
Prime cuts yield	40.36 <sup>a</sup>	38.44 <sup>b</sup>	37.89 <sup>c</sup>	36.89 <sup>d</sup>

Values within a row having different superscripts differ ( $P < 0.05$ ).

**Table 3:** Body, carcass and prime cut (ham, foreleg and loin) weights (kg) per class of live weight at slaughter (LW) and sex (M: male, n = 154; F: female, n = 146) in castrated Iberian pigs

Weight variable	Sex	Class 1 (LW < 140 kg; n = 22)	Class 2 (140–155 kg LW; n = 82)	Class 3 (156–170 kg LW; n = 177)	Class 4 (LW > 170 kg; n = 19)	All classes (n = 300)
Live weight	M	135.75 <sup>a</sup>	150.41 <sup>a</sup>	161.94 <sup>a</sup>	175.29 <sup>a</sup>	155.84 <sup>a</sup>
	F	134.70 <sup>a</sup>	150.13 <sup>a</sup>	159.93 <sup>b</sup>	173.00 <sup>a</sup>	154.44 <sup>b</sup>
Carcass weight	M	110.77 <sup>a</sup>	124.72 <sup>a</sup>	134.34 <sup>a</sup>	145.41 <sup>a</sup>	128.81 <sup>a</sup>
	F	112.43 <sup>a</sup>	126.14 <sup>a</sup>	133.56 <sup>a</sup>	145.88 <sup>a</sup>	129.50 <sup>a</sup>
Hams weight	M	24.25 <sup>a</sup>	26.45 <sup>a</sup>	28.11 <sup>a</sup>	29.58 <sup>a</sup>	27.10 <sup>a</sup>
	F	24.39 <sup>a</sup>	26.47 <sup>a</sup>	28.27 <sup>a</sup>	30.40 <sup>a</sup>	27.38 <sup>a</sup>
Forelegs weight	M	17.04 <sup>a</sup>	18.72 <sup>a</sup>	19.39 <sup>a</sup>	21.08 <sup>a</sup>	19.06 <sup>a</sup>
	F	16.84 <sup>a</sup>	17.82 <sup>b</sup>	18.66 <sup>b</sup>	19.08 <sup>b</sup>	18.10 <sup>b</sup>
Loins weight	M	3.59 <sup>a</sup>	3.52 <sup>a</sup>	3.65 <sup>a</sup>	3.59 <sup>a</sup>	3.59 <sup>a</sup>
	F	3.61 <sup>a</sup>	3.50 <sup>a</sup>	3.50 <sup>b</sup>	3.92 <sup>a</sup>	3.63 <sup>a</sup>
Prime cuts weight	M	45.16 <sup>a</sup>	48.95 <sup>a</sup>	51.45 <sup>a</sup>	54.44 <sup>a</sup>	50.00 <sup>a</sup>
	F	45.18 <sup>a</sup>	48.54 <sup>a</sup>	50.65 <sup>b</sup>	53.40 <sup>a</sup>	49.44 <sup>a</sup>

Values within a LW class and a weight variable having different superscripts differ ( $P < 0.05$ ; M vs. F)

with a significantly greater carcass yield for the pooled group of females (Table 4; 83.8 vs. 82.6%).

With respect to the prime cut weights and yields for the pooled LW classes, the combined prime cut yield (for the 3 pieces together) was significantly greater for the males than females (38.7 vs. 38.1%; Table 4). However, the ham weight and yield were slightly (but not significantly) greater for the females, and the foreleg weight (19.1 vs. 18.1 kg) and yield (14.8 vs. 14.1%) were significantly greater for the males. In contrast, loin weights and yields were similar between sexes for the pooled LW classes

(Tables 3 and 4). Thus, females had greater carcass yield but males had heavier and greater-yielding front legs and greater combined prime-cut yield, hence suggesting that the increased female yield comes mainly, again, from an increased fat cover deposition.

When analyzing sex differences within each LW class for weight and yield variables (Tables 3 and 4), sex differences reached significance for LW in the LW-Class 3 (M > F), and for carcass yield in Class 2 (F > M). Also, two sexes differed significantly in foreleg weight for the LW-Classes 2, 3 and 4 (M > F) and in foreleg yield also

**Table 4:** Carcass and prime cut (ham, foreleg and loin) yields (%) per class of live weight at slaughter (LW) and sex (M: male, n = 154; F: female, n = 146) in castrated Iberian pigs

Yield variable	Sex	Class 1 (LW < 140 kg; n = 22)	Class 2 (140–155 kg LW; n = 82)	Class 3 (156–170 kg LW; n = 177)	Class 4 (LW > 170 kg; n = 19)	All classes (n = 300)
Carcass yield	M	81.58 <sup>a</sup>	82.93 <sup>b</sup>	82.96 <sup>a</sup>	82.95 <sup>a</sup>	82.60 <sup>b</sup>
	F	83.51 <sup>a</sup>	84.01 <sup>a</sup>	83.51 <sup>a</sup>	84.32 <sup>a</sup>	83.84 <sup>a</sup>
Hams yield	M	21.89 <sup>a</sup>	21.21 <sup>a</sup>	20.92 <sup>a</sup>	20.36 <sup>a</sup>	21.09 <sup>a</sup>
	F	21.69 <sup>a</sup>	20.98 <sup>a</sup>	21.16 <sup>a</sup>	20.83 <sup>a</sup>	21.17 <sup>a</sup>
Forelegs yield	M	15.39 <sup>a</sup>	15.01 <sup>a</sup>	14.44 <sup>a</sup>	14.50 <sup>a</sup>	14.84 <sup>a</sup>
	F	14.98 <sup>a</sup>	14.16 <sup>b</sup>	13.99 <sup>b</sup>	13.09 <sup>b</sup>	14.05 <sup>b</sup>
Loins yield	M	3.23 <sup>a</sup>	2.80 <sup>a</sup>	2.70 <sup>a</sup>	2.46 <sup>a</sup>	2.80 <sup>a</sup>
	F	3.21 <sup>a</sup>	2.74 <sup>a</sup>	2.61 <sup>a</sup>	2.69 <sup>a</sup>	2.81 <sup>a</sup>
Prime cuts yield	M	40.66 <sup>a</sup>	38.94 <sup>a</sup>	38.06 <sup>a</sup>	37.16 <sup>a</sup>	38.70 <sup>a</sup>
	F	40.07 <sup>a</sup>	37.94 <sup>b</sup>	37.71 <sup>a</sup>	36.62 <sup>a</sup>	38.09 <sup>b</sup>

Values within a LW class and a yield variable having different superscripts differ ( $P < 0.05$ ; M vs. F)

for Classes 2, 3 and 4 ( $M > F$ ). The combined prime-cuts were significantly different between sexes in LW-Class 3 for weight ( $M > F$ ) and in LW-Class 2 for yield ( $M > F$ ). Finally, in relation to the loins, there were significant sex differences only for loin weight in LW-Class 3 ( $M > F$ ). Therefore, these comparisons of sexes within LW-Class provide some detail to the above stated conclusions.

#### 4 CONCLUSIONS

All weight variables (LW and carcass, prime-cut and combined prime-cut weights) were significantly affected by LW-Class and increased along with the body weight at slaughter. In contrast, carcass and prime cut yields decreased with the increasing slaughter weight, thus suggesting that weight gain during finishing in Iberian pig extensive systems is mostly based on fat cover deposition. Males were heavier, but females had greater carcass yield. However, males had greater foreleg weight and yield and a greater combined prime-cut yield, hence suggesting that the increased female yield comes mainly, again, from an increased fat cover deposition. In addition, this also shows that castrated males still exhibit superior front leg development, which constitutes a sexual dimorphic trait

for the intact animals. Finally, sex differences in weights and yields of studied variables within each LW-Class support these conclusions.

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