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Effect of production system and sex on different carcass traits of Iberian Pigs

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Abstract. Ninety *Retintos* Iberian pigs pure breed (45 males and 45 females) with similar age (~ 12 months old), live weight (90±5 kg) and the same genetic line (Line Valdesequera), were randomly selected and distributed into three groups (*Montanera*, *Recebo* and *Intensive*, n= 15 males and 15 females in each one) and slaughter at similar weight (150±10kg) for to evaluate the effect of production system and sex on some carcass traits. The length and width of rib cage, ham's perimeter, the thickness subcutaneous backfat (I, II and III levels) and the weight of carcass, loins, hams and forelegs were determined. The results showed that the production system had a significant effect on some carcass traits. So, the width of rib cage and the carcass's weight of pigs from *Montanera* were higher than the others systems. The thickness of subcutaneous backfat only shown differences in the measure most caudal, being higher in *Recebo* system and the weight of *Longissimus dorsii* (LD) was higher in *Intensive* system. On the other hand, the sex had effect on weight of forelegs (left and right), being higher in males in both pieces. In conclusion, yield cuts of the main commercial pieces (the hams) of the Iberian pig was not affected by the variables studied and males and females castrated only were different in the yield of forelegs.

Keywords. Pig – Ibéricos – Production systems – Carcass – Cutting.

Effet du système de production et du sexe sur différentes caractéristiques de la carcasse du porc Ibérique

Résumé. *Quatre-vingt-dix porcs de race pure Retintos Ibériques (45 mâles et 45 femelles) d'âge similaire (~ 12 mois), de poids vif (90 ± 5 kg) et de la même lignée génétique (Line Valdesequera), ont été choisis au hasard et répartis en trois groupes (Montanera, Recebo et intensif, n = 15 mâles et 15 femelles pour chacun) abattus à poids similaire (150 ± 10 kg) pour évaluer l'effet du système de production et du sexe sur certaines caractéristiques de la carcasse. La longueur et la largeur de la cage thoracique, le périmètre du jambon, l'épaisseur sous-cutanée du lard dorsal (niveaux I, II et III) et le poids de la carcasse, des longes, des jambons et des pattes ont été déterminés. Les résultats ont montré que le système de production a eu un effet significatif sur certaines caractéristiques de la carcasse. Ainsi, la largeur de la cage thoracique et le poids de la carcasse de porcs en provenance de Montanera étaient plus élevés que pour les autres systèmes. L'épaisseur sous-cutanée de lard dorsal ne fait apparaître des différences que pour la mesure la plus caudale, plus élevée dans le système Recebo, et le poids du* Longissimus dorsii *(LD), qui était plus élevé dans le système intensif. D'autre part, le sexe a eu un effet sur le poids des membres antérieurs (gauche et droit), plus élevé chez les mâles pour les deux pièces. En conclusion, les réductions de rendement des principales pièces commerciales (les jambons) du porc Ibérique n'ont pas été affectées par les variables étudiées et les mâles et femelles castrés étaient différents seulement pour le rendement des membres antérieurs.*

Mots-clés. *Porc Ibérique – Systèmes de production – Carcasse – Coupe.*

I – Introduction

The Iberian pig is the most important Mediterranean swine breed, both in population and economic importance (Serra *et al.*, 1998). Most Iberian pig is consumed as high-priced cured products. However, the consumption as fresh meat pork has recently increased in importance (Ramirez and Cava, 2005).

The main production system of Iberian pigs according to Spanish legislation (BOE, 2007) are *Montanera* (the typical free-range rearing system of the Iberian pig with a nutritional strategy based on acorns and grass), *Recebo* (free-range system with nutrition based on a combination of acorn, grass and concentrate), and *Intensive* (indoor system with nutrition based on concentrate).

The carcass is the first step in the process of production of meat. Currently, most commercial transactions in the meat market are made on the carcass. Quality and composition of the carcass depend on several factors among which include the feeding, the production system employed, sex or age. So, the main aim was to study the effect of the production system and sex of Iberian pigs on some traits of the carcass.

II – Materials and methods

Ninety Retintos Iberian pigs pure breed (45 castrated males and 45 females) with similar age (~ 12 months old), live weight (90±5 kg) and the same genetic line (Line Valdesequera), were randomly selected and distributed into three groups (n= 15 castrated males and 15 females in each one): *Montanera* (extensively reared and fed on acorns and grass), *Intensive* (intensively reared and fed on concentrate) and *Recebo* (extensively reared and fed on acorn and concentrate). Animals were slaughtered at 150±10 kg and ~15 months of age by electrical stunning and exsanguinations at a local slaughterhouse. After slaughtering, the carcasses were split longitudinally and weighed (carcass weight, kg). Carcass length was measured as the distance from the first rib to the pubic symphasis (lenght rib cage, cm) and carcass width was measured as drawing a straight line from the spine to the lower edge of the sternum (width rib cage, cm). On carcass, maximum perimeter ham (cm) was measured and also thickness subcutaneous backfat at three anatomical locations: the first rib (thickness subcutaneous backfat 1), the last rib (thickness subcutaneous backfat 2) and last lumbar vertebrae (thickness subcutaneous backfat 3). The left hand side of the carcass was divided into commercial cuts and commercial pieces weight were measured (kg): *Longissimus dorsii* (LD) muscle, left and right hams and left and right forelegs.

The effect of production system, sex and interaction of both variables was determined by analysis of variance, using the statistical software SPSS for Windows. If the effects studied was significant ($p<0.05$), then Tukey's test was used at the 5% levels to make comparisons between sample means.

III – Results and discussion

Results were shown in Table 1. No differences were observed between castrated males and females into the studied variables, except in the values of weight of the forelegs (left and right) which were higher ($p<0.01$) in castrated males. Mayoral *et al.* (1999) also found no difference between different sex on carcass length, LD's weight or subcutaneous fat thickness. Although, the slaughter weight was similar for all animals, the carcass of pigs from *Montanera* were higher ($p<0.001$) than the animals from others production systems. In previous studies with other rustic breed (Alentejo pig), Oliveira (2007) not found differences in carcass weight as affected by the production systems (indoor *vs* outdoor). Carcass measured indicate that length of rib cage and perimeter of ham were not affected by the production system; while the values of width rib cage were higher ($p<0.001$) in animals from *Intensive* system. Bridi *et al.* (1997) also not found differences in the length of rib cage affected by production system.

Thickness subcutaneous backfat were only affected by the production system in the last lumbar vertebrae (Thickness subcutaneous backfat 3) and the highest thickness was found in animals from *Recebo* while the least thickness in animals from *Intensive* systems. A contrary trend was observed by Chiofalo *et al*. (2007) in previous studies with Nero Siciliano pigs in the anatomical

locations similar to our measure of thickness subcutaneous backfat 2. These differences could be due to both genetic and different production systems used.

Weight of commercial cuts (high value meat cuts) were not significantly affected by the production system except the *LD* muscle weight which was significantly greater ($p<0.001$) in the *Intensive* animals.

Table1. Effect of production system and sex on different carcass traits of Iberian pigs

	Production system			Sex		SEM	Significance	
	"Montanera" **n=30**	***"Intensive"*** **n=30**	***"Recebo"*** **n=30**	**Male n=45**	**Female n=45**		**Production system**	**Sex**
Lenght rib cage (cm)	80.83a	79.32a	78.8a	79.82	79.48	0.49	ns[1]	ns
Width rib cage (cm)	23.8a	25.81b	25.55b	24.82	25.29	0.19	***	ns
Perimeter ham (cm)	75.93a	74.65a	76.25a	77.00	74.21	0.62	ns	ns
Thickness subcutaneous backfat (cm)								
• first rib	8.97a	8.61a	8.8a	8.64	8.95	0.10	ns	ns
• last rib	6.65a	7.6a	7.03a	6.71	7.47	0.52	ns	ns
• last lumbar vert.	5.56ab	5.18a	5.84b	5.59	5.46	0.07	**	ns
Carcass weight (kg)	138.94b	131.04a	134.4a	136.40	133.18	0.79	***	ns
Longissimus dorsii muscle left weight (kg)	1.85a	2.1b	1.83a	1.90	1.95	0.02	***	ns
Ham (kg)								
• left weight	13.01a	12.97a	12.62a	13.14	12.59	0.17	ns	ns
• right weight	12.93a	12.89a	12.57a	13.05	12.54	0.16	ns	ns
Foreleg (kg)								
• left weight	9.07b	8.85a	8.84a	9.26	8.57	0.15	ns	**
• right weight	9.07b	8.84a	8.76a	9.25	8.53	0.14	ns	**

n: Number of samples. *SEM:* Standard error of the mean. ns: Not significant ($P>0.05$). Significant differences: ***: $P \leq 0.001$; **: $P \leq 0.01$; *: $P \leq 0.05$).

IV – Conclusions

According to our results, castrated males and females showed a similar trend on thickness of subcutaneous backfat, yield of carcass and main commercial pieces (loin and hams), except in forelegs, which were heavier in castrated males than females. On the other hand, the production system affected to carcass and loin yield, being higher in *Montanera* and *Intensive*, repectively. No influences were observed on others commercial pieces yield, such as hams and forelegs. Furthermore, with of rib cage was lower in animals from *Montanera* system.

The descriptive statistics are presented as means (expressed as g water/kg fresh meat); values with the same letters (a, b, c) indicate homogeneous subsets for P=0.05 according to Tukey's HSD test.

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