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Assessment of the "recebo with postre" system

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Abstract. The aim of this work is to assess the quality of carcass and meat of pigs fed in free range with feed supplemented (system called "recebo" with "postre"). 205 pure Iberian pigs (18 months old with and an average weight of 111.6 kg at the beginning of the experiment) were used. A group of 102 pigs remained in free range for 85 days on a farm of 126.8 ha (Montanera: MN). Another group of 103 pigs were fed in other farm of 122.5 ha in free range and supplemented with concentrates (with 6.44% of crude fat and 59.3% of oleic acid) at a rate of 983 g per animal/day, for 69 days (Recebo: RC). Once slaughtered, measures were taken in the carcass and composition studies were performed on subcutaneous and intramuscular tissue (20 pigs per group). RC animals have better yields of primal cuts (32.2% for total of hams, shoulders and loins) than MN (28.9%). The *longissimus dorsi* intramuscular fat is the same statistically in RC (8.41%) than in MN (8.55%). The meat tocopherol composition reflects the diet: α-tocopherol: 4.78 and 2.02 mg/kg and γ-tocopherol: 0.47 and 1.07 mg/kg for RC and MN, respectively. The subcutaneous fatty acids are similar except oleic acid (54.07% in RC and 56.16% in MN).

Keywords. Iberian pig – Quality – Free range – Feed.

Evaluation du système de "recebo" avec "postre"

Résumé. *L'objectif du travail est d'évaluer la qualité de la carcasse et de la viande des porcs nourris en plein air avec des aliments supplémentés (système appelé "recebo" avec "postre"). 205 porcs purs Ibériques (18 mois et un poids moyen de 111,6 kg au début de l'expérience) ont été utilisés. Un groupe de 102 porcs est resté en plein air pendant 85 jours sur une ferme de 126,8 ha (Montanera: MN). Un autre lot de 103 porcs a été nourri dans une ferme de 122,5 ha en plein air et complémenté avec des concentrés (avec 6,44% de matières grasses brutes et 59,3% d'acide oléique) à un taux de 983 g par animal / jour, pendant 69 jours (Recebo: RC). Une fois abattus, des mesures ont été prises dans la carcasse et des études de composition sur les tissus sous-cutanés et intramusculaires ont été réalisées (20 porcs par groupe). Les animaux RC ont présenté de meilleurs rendements pour les parties nobles (32,2% pour l'ensemble des jambons, épaules et côtes) par rapport aux MN (28,9%). La graisse intramusculaire du* Longissimus dorsi*, est la même sur le plan statistique chez RC (8,41%) et MN (8,55%). La teneur de la viande en tocophérol reflète l'alimentation: α-tocophérol: 4,78 et 2,02 mg / kg et γ-tocophérol: 0,47 et 1,07 mg / kg pour les RC et MN, respectivement. Les acides gras sous-cutanés sont semblables, sauf l'acide oléique (54,07% chez RC et 56,16% chez MN).*

Mots-clés. *Porc Ibérique – Qualité – Libre parcours – Alimentation animale.*

I – Introduction

In the traditional way of raising Iberian pigs under free range conditions (called "montanera"), the fattening period is completed with only the natural resources offered by the dehesa (mainly grass and acorns). Sometimes, it supplements the diet of these animals is supplemented with compound feed, and the system becomes “recebo”. In the called "recebo" with "postre" the compound feed is added while animals remain in free range. In the other type, it is added when dehesa resources are depleted and continues until slaughter weight is reached. With “recebo” can be increased the number of pigs per hectare and primal cuts percentages. But this practice can result in a decreased quality of Iberian product. This paper compares the carcass and meat quality of montanera against "recebo" with "postre".

II – Materials and methods

A total of 205 Iberian pig (male and female castrated) and 18 months old was used. The pigs were divided in two groups: Montanera (MN) with 102 animals remaining in a farm of 126.8 hectares, fed on grass and acorns mostly and Recebo (RC) with 103 animals that were raised under free-range conditions with partial replacement of acorns and grass of concentrate (983 g/animal/day; 6.44% crude fat content and 59% of oleic acid) in another farm of 122.5 hectares.

After slaughtering, the hot carcass weights were recorded. The backfat thickness was measured in the middle line at the last and tenth rib level. The carcasses were cut and hams, shoulders and loins were weighed after trimming. The rest of the carcasses were separated into lean, bone, head, ribs, spine and fat. In 20 animals of each group was taken a subcutaneous tissue sample and a piece of *longissimus dorsi* muscle.

The intramuscular fat was calculated by the method of Bligh and Dyer (1959) (with minor modifications). The fatty acid composition was determined by gas chromatography after acid transesterification in the presence of sulphuric acid (5% sulphuric acid in methanol) (Cava *et al*., 1997). The results are expressed as percentage of total fatty acids and analyzed a total of 11 fatty acids. α-tocopherol and γ-tocopherol in muscle were determined following the method described by Rey *et al*., 1996.

The chemical, fatty acids and vitamin E composition of the grass and acorns are presented in Table 1. Throughout the fattening period, oak acorns were collected randomly and samples of grass were cut. The lipids were extracted with chloroform/methanol (1:2) according to the method described by Bligh and Dyer (1959) (with minor modifications). The food was analysed in fatty acid composition and vitamin E content with same methods than samples from animals. The chemical composition of acorns and grass was performed according to standard methods (AOAC, 1990).

Table 1. Chemical (g/100g dry matter), fatty acids (g/100g fatty acids) composition and vitamin E (mg/kg) content of the grass and acorns

	Acorn		Grass	
	Montanera	**Recebo**	**Montanera**	**Recebo**
Chemical composition, (g/100g dry matter)				
Crude fat†	8.41	7.87	4.62 (34.5)	4.34 (37.9)
Crude fiber	1.40	2.23	25.42	22.30
Crude protein	5.13	4.24	17.82	19.48
Fatty acids, (g/100g fatty acids)				
Palmitic (C16:0)	15.01	15.02	26.8	26.5
Estearic (C18:0)	3.99	4.38	5.3	6.1
Oleic (C18:1 n-9)	61.10	60.69	8.1	13.1
Linoleic (C18:2 n-6)	16.12	15.87	14.3	11.3
Linolenic (C18:3 n-3)	1.02	0.98	38.4	36.3
Vitamin E, (mg/kg)				
α-tocopherol	6.37	8.24	533.1	330.6
γ- tocopherol	41.85	39.82	-	-

†In parentheses % true fat.

All data were analyzed by one-way analysis of variance using the General Linear Model of SPSS, 2008 statistical software (v.15.). An individual pig was the experimental unit for analysis

of all data. Data were expressed as the mean and deviation standard of each group together with the significance levels of the effect.

III – Results and discussion

Table 2 contains the information about growth performance obtained in pigs and all data yields and carcass composition of slaughter.

Despite having lower weight at slaughter, the hams, shoulders and loin of RC pigs have higher weights than those of MN. This is because the percentage of primal cuts increases as decreases carcass fat. Feeding in free range fattening phase is very unbalanced, with a large deficit of protein (Nieto *et al*., 2002). MN carcass are fatter than RC carcass.

Table 2. Growth performance, yields and carcass composition

	Recebo		Montanera		Significance
	Means	**sd**	**Means**	**sd**	
Initial weight, kg	112.6	12.56	110.7	10.26	ns
Final weight, kg	162.4	15.89	172.0	16.75	*
Weight gain, kg	49.8	8.75	61.3	11.01	*
Fattening days	69		85		
Average daily gain, g	721.8	126.81	722.1	149.73	ns
Hot carcass weight, kg	130.0	12.72	139.0	13.52	*
Fat depht, cm					
Last rib	5.6	0.76	6.9	0.93	*
Tenth rib	7.2	0.92	8.4	0.88	*
Primal cuts weight, kg					
Ham	22.8	2.36	22.1	1.89	ns
Shoulder	15,3	1,54	14,4	1,37	*
Loin	3.77	0.28	3.45	0.15	*
Carcass components, %					
Ham	17.5	0.85	16.0	0.85	*
Shoulder	11.8	0.53	10.4	0.66	*
Loin	2.9	0.31	2.5	0.26	ns
Lean	6.6		6.1		-
Bone, head, spine y ribs	5.9		5.7		-
Fat	55.3		59.3		-
Carcass composition†					
Lean, %	21.08		18.97		-
Fat, %	69.92		72.56		-

†According to data from percentage of fat and lean of ham and shoulder, Mayoral *et al.* (1999). *$p < 0.05$; ns: no significant.

The fatty acid compositions of the subcutaneous adipose tissue are shown in Table 3. The fatty acid composition of subcutaneous fat is one the available parameters to classify Iberian pigs based on their food, which is especially important. RC pigs differ from MN in monounsaturated acids.

Table 3. Fatty acid composition of subcutaneous adipose tissue (g/100 g total fatty acids)

	Recebo		Montanera		
	Means	**sd**	**Means**	**sd**	**Significance**
Palmitic (C16:0)	19.05	0.72	18.93	0.89	ns
Estearic (C18:0)	9.25	0.67	874	0.96	ns
Oleic (C18:1 n-9)	54.07	1.04	56.16	1.32	*
Linoleic (C18:2 n-6)	9.96	0.56	9.26	0.51	ns
Linolenic (C18:3 n-3)	1.32	0.26	0.88	0.10	*
∑ Saturated	30.3	1.21	29.5	1.71	ns
∑ Monounsaturated	58.4	1.11	60.4	1.39	*
∑ Polyunsaturated	11.3	0.76	10.1	0.58	*

* $p < 0.05$, ns: no significant.

Since the animals begin the free range, the percentage monounsaturated fatty acid increases in detriment of polyunsaturated fatty acid, mainly due to the fat composition of the acorn. But only significant differences in oleic and linoleic fatty acids are found. The percentage of oleic acid is significantly higher in MN pigs, due to greater availability of acorns and longer fattening period. Linolenic acid is higher in RC group, surely the reduced availability of acorns caused the animals to consume more grass, the main provider of this fatty acid. We can say that there is no differences comparing the fatty acids percentages in RC pigs with those obtained by different authors in Iberian pig classified as montanera (Daza *et al*., 2005).

Table 4 shows two representative parameters of meat quality, intramuscular fat and vitamin E in muscle. Despite having more carcass fat and more time in the fatting period, MN pigs do not show a higher percentage of intramuscular fat than RC.

Table 4. Intramuscular fat and vitamin E content of longissimus dorsi muscle

	Recebo		Montanera		
	Means	**sd**	**Means**	**sd**	**Significance**
IMF, %†	8.46	2.28	8.55	3.31	ns
α-tocopherol, mg/kg	4.78	0.92	2.02	0.60	*
γ- tocopherol, mg/kg	0.47	0.08	1.07	0.27	*

†Intramuscular fat.
*$p < 0.05$, ns: no significant.

With regard to vitamin E, we can say that every type of feeding give a different amount in α-tocopherol and γ- tocopherol. RC pigs have higher α-tocopherol levels than MN pigs, while the latter have higher levels of γ- tocopherol. Although the grass eaten by RC pigs had a lower amount of α-tocopherol than that of MN pigs and the feed supplemented contained small amounts of α-tocopherol, RC pigs have higher levels of α-tocopherol. This is because they consume more grass, probably because of the scarcity of acorns they had to satisfy their appetite with grass. MN pigs have more than double the amount of γ- tocopherol than RC pigs because they consumed more acorns (acorns is the only food that could provide γ- tocopherol to pigs) (Rey *et al*., 2006).

IV – Conclusions

When supplemented with concentrate (with specific amounts and certain qualities), Iberian pigs reared under free-range conditions (called "recebo") can improve carcass composition without reducing the meat quality. The γ-tocopherol content in meat could differentiate between acorns levels of consumption.

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