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# Influence of the feeding level on growth and carcass characteristics of Alentejano pigs

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**SUMMARY –** 24 Alentejano pigs allocated in individual pens (1 x 2 m) outdoors were used. At 40 kg of LW animals were divided into 3 groups. Group I was fed a commercial diet (15% CP, 3100 kcal DE) offered at 85% *ad libitum*. Group II was fed the same diet offered at 90% *ad libitum* between 40 and 80 kg of LW and at 70% *ad libitum* until slaughter. For group III the diet was offered at 95% *ad libitum* between 40 and 60 kg of LW, at 85% *ad libitum* between 60 and 80 kg of LW and at 70% of *ad libitum* since 80 kg LW until slaughter. All pigs were slaughtered at 100 kg LW. Feeding level affected significantly (P<0.05) daily gain and feed conversion ratio, but not carcass characteristics, commercial yield of carcass and tissue composition of ham. The results suggest that a feeding level of 85% *ad libitum* intake during all the growing period (group I) improved significantly the growth performance without affected the carcass characteristics.

**Keywords:** Alentejano pig, slaughter weight, growth, carcass characteristics.

***RESUME –*** *"Influence du niveau alimentaire sur les performances de croissance et les caractéristiques de la carcasse chez le porc Alentejano". Trente porcs Alentejano ont été utilisés. A 40 kg de poids vif les animaux ont été placés en cages individuelles en plein air et nourris avec un aliment commercial (15% PB et 3100 kcal E.D.). Les porcs ont été répartis en 3 groupes selon le régime alimentaire. Le groupe I a été nourri avec un régime à 85% de* ad libitum*. Le groupe II a reçu 90% de* ad libitum *entre 40 et 80 kg et 70% de* ad libitum *entre 80 et 100 kg de poids vif. Le groupe III a reçu 95% de* ad libitum *entre 40 et 60 kg, 85% de* ad libitum *entre 60 et 80 kg et 70% de* ad libitum *entre 80 et 100 kg de poids vif. Les porcs ont été abattus à un poids vif moyen de 100 kg. Le niveau alimentaire a affecté de façon significative (P<0,05) le gain moyen quotidien et l'indice de consommation. Les caractéristiques de la carcasse des trois groupes ont été similaires. Cette étude a montré que l'utilisation d'un niveau alimentaire de 85% entre 40 et 100 kg de poids vif permet d'optimiser les performances de croissance sans affecter significativement les caractéristiques de la carcasse.*

***Mots-clés :*** *Porc Alentejano, poids d'abattage, performances de croissance, caractéristiques de la carcasse.*

## Introduction

The Alentejano pig is an autochthonous Mediterranean breed traditionally reared under extensive conditions in the south of Portugal. This unselected breed have poor productive traits, but a very good adaptation to the environment that allows the extensive production system and the use of natural feeding sources such as the grass and the acorns. In the traditional production system pigs were slaughtered with 120-150 kg and with 18-24 months of age. Their meat was used mainly for the elaboration of dry cured meat products of high quality (Nunes, 1993).

Between 1950 and 1990 was observed a dramatic decrease in the Alentejano pig population and a strong development of exotics swine breeds and the intensification of the production systems (Freitas *et al*., 2004). However, in last years, consumers have become more concerned about questions such as sustainability of livestock production systems, environmental impact, animal welfare and quality characteristics of meat (López-Bote, 1998).

Considering the volume and the increase of fresh pig meat consumption the Alentejano pig producers are very interesting in obtaining a part of this market. However, the length of the productive system has negative effects such as the high costs, the increase of fat deposition, the lower proportion of lean cuts and the high percentage of low value fat cuts.

The present study, inserted in the Project Agro "Optimization of the Alentejano swine production in order to improve meat quality" aimed to investigate the influence of the feeding level on growth performances and carcass characteristics of Alentejano pig in order to improve fresh meat production.

## Materials and methods

A total of 24 castrated Alentejano pigs were used in this study. Following the traditional management system, all pigs (males and females) were castrated after weaning (60 days old). With 40 kg LW animals were allocated in individual pens (1 x 2 m) at outdoor and fed a commercial diet (15% crude protein, 3100 kcal DE). This feed was offered at 85% in a single daily meal (9.00 h). The animals were weekly weighed before their morning meal and each experimental group daily feed allowance was adjusted for the following week). Pigs were divided into 3 groups of 8 animals.

Group I was fed a commercial diet (15% crude protein, 3100 kcal DE) offered at 85% of *ad libitum*. Group II was fed the same diet offered at 90% *ad libitum* between 40 and 80 kg of LW and at 70% *ad libitum* until slaughter. For group III the diet was offered at 95% *ad libitum* between 40 and 60 kg of LW, at 85% *ad libitum* between 60 and 80 kg of LW and at 70% of *ad libitum* since 80 kg LW until slaughter (Table 1).

Table 1. Feeding levels

| | 40 → 60 kg LW | 60 → 80 kg LW | 80 → 100 kg LW |
|---|---|---|---|
| Group I | | 85% *ad libitum* | |
| Group II | 90% *ad libitum* | | 70% *ad libitum* |
| Group III | 95% *ad libitum* | 85% *ad libitum* | 70% *ad libitum* |

After 24h fasting the pigs were slaughtered with an average BW of 100 kg at the Sousel municipal slaughterhouse (Sousel, Portugal). After slaughtering, the carcasses were split longitudinally and weighed with head and flare fat and kidneys (hot carcass weight). The carcass yield was calculated as the ratio between slaughter weight and cold carcass weight. Carcass length was measured as the distance from the first rib to the pubic symphasis. Back fat thickness was measured on 6 cm of the dorsal midline at three anatomical sites: between the 3$^{rd}$ and 4$^{th}$ lumbar vertebrae, the last rib and between the 3$^{rd}$ and 4$^{th}$ ribs. To measure the area of loin, muscle was exposed by perpendicular cuts at the three related anatomical sites and muscle area traced using acetate paper. The left hand side of the carcass was divided into commercial cuts according to the Portuguese Norm (NP-2931) and commercial yield (% of high value meat cuts) calculated. Legs were further dissected into separable lean, fat bone and skin. Statistical analyses were performed by a one-way ANOVA with the statistical software SPSS for windows. Means comparison was made by SNK test and differences were considered significant when $P \leq 0.05$.

## Results and discussion

All the pigs remained in good health throughout the experimental period and no diet refusals were detected. No differences between castrated males and castrated females were found at any slaughter weight neither in growth performances nor in carcass characteristics. Therefore, both castrated males and females were considered together in results.

The effects of feeding level on growth performance are presented in Table 2. Between 40 and 60 kg live weight the growing period and daily gain were significantly affected ($P<0.05$) by feeding level. Daily gain of group III (509 g/day) was higher than those observed at group II (490 g/day) and group I (461 g/day). Between 60 and 80 kg LW only the growing period was affected by feeding level. On contrary, between 80 and 100 kg LW growing period, daily gain and feed: gain values were significantly affected by feeding level. Pigs of group I showed the best growth performances.

The results concerning the period between 40 kg and the slaughter (100 kg) showed that daily gain and feed conversion ratio were significantly affected ($P<0.05$) by feeding level. Daily gain of group I (472 g/d) was about 10% higher than the observed on groups II (428 g/d) and III (439 g/d). Feed intake was similar ($P>0.05$) between groups (297.3, 310.1 and 311.7 kg/animal, respectively for groups I, II and III). Consequently, feed conversion ratio of group I was significantly ($P<0.05$) better (4.66) than those observed in pigs of group II (4.95) and III (4.92).

Table 2. Influence of feeding level on growth performances

| | Group I | Group II | Group III |
|---|---|---|---|
| 40 → 60 Kg LW | | | |
| Growing period (days) | 51[b] | 49[a] | 49[a] |
| Daily gain (g/day) | 469[a] ± 13 | 490[ab] ± 8 | 509[b] ± 11 |
| Feed: Gain | 3.73 ± 0.1 | 3.74 ± 0.1 | 3.94 ± 0.1 |
| 60 → 80 Kg LW | | | |
| Growing period (days) | 40[b] | 42[c] | 39[a] |
| Daily gain (g/day) | 483 ± 10 | 496 ± 12 | 483 ± 10 |
| Feed: Gain | 4.60 ± 0.1 | 4.86 ± 0.1 | 4.50 ± 0.1 |
| 80 → 100 Kg LW | | | |
| Growing period (days) | 44[a] | 56[b] | 57[b] |
| Daily gain (g/day) | 446[b] ± 8 | 320[a] ± 11 | 319[a] ± 11 |
| Feed: Gain | 5.86[a] ± 0.1 | 6.77[b] ± 0.2 | 6.85[b] ± 0.1 |
| 40 → 100 Kg LW | | | |
| Growing period (days) | 135[a] ± 8 | 147[b] ± 11 | 145[b] ± 11 |
| Daily gain (g/day) | 472[b] ± 7 | 428[a] ± 6 | 439[a] ± 7 |
| Feed intake (kg) | 297.3 ± 7 | 310.1 ± 6 | 331.0 ± 7 |
| Feed: Gain | 4.66[a] ± 0.1 | 4.95[b] ± 0.1 | 4.92[b] ± 0.1 |

Different superscripts across rows indicate significant differences (P<0.05).

Carcass characteristics are presented in Table 3. As expected, hot carcass weight was not affected by feeding level. Also the yield and carcass length were not significantly (P>0.05) affected by the feeding level during the growing period. Back fat thickness (average of measurements at 3$^{rd}$ and 4$^{th}$ lumbar vertebrae, last rib and between the 3$^{rd}$ and 4$^{th}$ ribs) of groups III (4.51 cm) and II (4.54 cm) were slightly smaller than the observed in group I (4.65 cm), however the differences were not significant. Loin muscle area (average of measurements at 3$^{rd}$ and 4$^{th}$ lumbar vertebrae, last rib and between the 3$^{rd}$ and 4$^{th}$ ribs) of the three groups was similar (21.9, 22.4 and 22.0 cm$^2$). Weight of commercial cuts (high value meat cuts) and commercial yield (42.1, 42.4 and 42.2%, respectively in groups I, II, and III) were not significantly affected by the feeding level.

Table 3. Influence of feeding level on carcass characteristics

| | Group I | Group II | Group III |
|---|---|---|---|
| Slaughter Weight (kg) | 100.0 ± 0.5 | 99.1 ± 0.2 | 99.9 ± 0.3 |
| Hot carcass weight (kg) | 82.2 ± 0.7 | 82.5 ± 0.4 | 83.6 ± 0.6 |
| Yield Carcass (%) | 82.1 ± 0.5 | 83.2 ± 0.4 | 83.7 ± 0.5 |
| Carcass length (cm) | 73.0 ± 0.5 | 74.2 ± 0.6 | 72.9 ± 0.8 |
| Back fat thickness (cm) | 5.03 ± 0.2 | 4.96 ± 0.1 | 4.92 ± 0.2 |
| Loin muscle area (cm2) | 21.9 ± 0.3 | 22.4 ± 0.5 | 22.0 ± 0.3 |
| Commercial yield (%) | 42.1 ± 0.7 | 42.0 ± 0.4 | 42.2 ± 0.6 |

Different superscripts across rows indicate significant differences (P<0.05).

Also tissue composition of ham was not significantly (P<0.05) affected by feeding level (Table 4). Average percentage of lean was 43.9% and average fat percentage 33.8%.

Table 4. Effect of feeding level on tissue composition of ham

| | Group I | Group II | Group III |
|---|---|---|---|
| Ham weight (kg) | 10.1 ± 0.1 | 10.1 ± 0.6 | 10.7 ± 0.1 |
| Lean (%) | 42.8 ± 0.9 | 43.7 ± 0.5 | 43.2 ± 0.8 |
| Fat (%) | 33.9 ± 0.9 | 33.5 ± 0.5 | 34.0 ± 0.8 |

Different superscripts across rows indicate significant differences (P<0.05).

The effects of feeding level on growth performance and carcass characteristics are in agreement with many other reports (Affentranger *et al*., 1996; Freitas *et al*. 1996; Freitas, 1998; Chiba *et al*., 1990; Nieto *et al*., 2002).

## Conclusions

The present results suggest that a feeding level of 85% of *ad libitum* during all the growing period (group I) improved significantly the growth performance without affected the carcass characteristics. However, further work is needed to investigate the effects of those feeding levels on meat quality of Alentejano pig to determine the optimal feeding level for improve Alentejano pig fresh meat production.

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