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POSTER

The Ribatejano pig: Rebirth of a local population? First results on growth, and carcass parameters

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ADDITIONAL KEYWORDS

Autochthonous pig breeds.
Productivity.
Average daily gain.
Carcass composition.

SUMMARY

In order to assess the productive performance of the Ribatejano (RI) pig, resulting from a cross between Alentejano (AL) and Bísaro (BI) breeds, castrated male pigs AL, BI, ALxBI and BIxAL were studied within the framework of the TREASURE project. Ten pigs from each genotype, raised in traditional free-range system and fed commercial diets ad libitum, were slaughtered at ~65 kg live weight (LW). Data obtained show that BI, ALxBI and BIxAL attained slaughter weight faster (P<0.001) than AL pigs. Overall, carcass length (P<0.001), carcass yield (P=0.06), and lean cuts weight (P<0.01) were higher in BI than AL pigs, with intermediate values for both crosses. Conversely, fat cuts weight, ZP fat depth (P<0.01) and average backfat thickness (P<0.001) were higher in AL than in BI, and ALxBI and BIxAL pigs. At 65kg LW, RI crosses presented intermediate characteristics between fatter (AL) and leaner (BI) genotypes. This cross could therefore be an alternative to the use of other (modern) breeds for crossing, helping to increase the revenue of autochthonous pig producers, and also maintain or increase the pure breed populations, contributing to animal biodiversity.

O porco Ribatejano: Renascimento de uma população autóctone? Primeiros dados de crescimento e de carcaça

PALAVRAS CHAVE ADICIONAIS

Raças suínas autóctones.
Produtividade.
Ganho médio diário.
Composição da carcaça.

RESUMO

No âmbito do projeto TREASURE e com o objectivo de avaliar o desempenho produtivo do porco Ribatejano, resultante do cruzamento entre porcos Alentejanos (AL) e Bísaros (BI), 10 machos castrados de cada um dos genótipos AL, BI, ALxBI e BIxAL, foram estudados. Os animais foram criados em sistema tradicional e alimentados com rações comerciais ad libitum, tendo sido abatidos a ~65 kg de peso vivo (PV). Os dados obtidos mostraram que os suínos BI, ALxBI e BIxAL atingiram o peso de abate mais rapidamente (P <0,001) que os AL. O comprimento de carcaça (P <0,001), o rendimento de carcaça (P = 0,06) e o peso das peças magras (P <0,01) foram maiores nos BI que nos AL, com valores intermédios para os cruzados. Por outro lado, o peso das peças gordas, a profundidade da gordura ZP (P <0,01) e a espessura média da gordura dorsal (P <0,001) foram maiores nos suínos AL que nos BI e cruzados. Aos 65 kg PV, os porcos cruzados RI apresentaram características intermédias entre o genótipo mais gordo (AL) e o mais magro (BI). Este cruzamento poderia, assim, ser uma alternativa ao uso de outras raças em cruzamentos comerciais, ajudando a aumentar a receita dos produtores de suínos autóctones e também manter ou aumentar as populações de raças puras, contribuindo para a biodiversidade animal.

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INTRODUCTION

Alentejano (AL) and Bísaro (BI) are the main local Portuguese pig breeds. The AL pig belongs to the Mediterranean group (Porter 1993) and is characterised by low prolificacy and growth rate (except under "montanheira" regime), and precociously high adipogenic activity (Neves et al. 1996). Its meat and fat are used

both for fresh meat market and to produce high grade dry cured products. BI pig belongs to the Celtic group (Porter 1993), and like the AL breed it was not submitted to genetic improvement programs (Gama et al. 2013). Therefore, their (reproductive and productive) performance is not comparable to the one obtained with modern improved genotypes. Geographically, it can be considered that the Tagus River separates the homeland of each breed: AL in the South, and BI in Northern territories (Gama et al. 2013; Janeiro 1944). Nevertheless, they cohabited in Ribatejo region for some time, were crosses between both breeds were a common practice, and the F1 result (animal, meat, and products) was rather appreciated. However, no scientific data is available about the performance of F1 animals (Ribatejano pig) or their products.

AL and BI breeds were on the edge of extinction in the 1980's due to several factors. From that decade onwards, a recovery of both breeds and their traditional production systems was recorded, enhanced by grants of several agents with the purpose of saving them. Nowadays these breeds represent an economic, ecological and social add value to their production regions. The study and possible use of the Ribatejano (RI) pig could help to increase the revenue of pig producers by creating new and economically interesting products, at the same time that it could help to maintain or increase the two pure breed populations, contributing to the conservation of animal biodiversity.

MATERIAL AND METHODS

Animals, diets, and experimental design

Male purebred AL and BI pigs and their reciprocal crosses, RI pigs (ALxBI and BIxAL), were surgically castrated at ~6 days of age under anaesthesia and additional prolonged analgesia. From 29.8 ± 0.6 kg LW (mean ± SEM) until slaughter, pigs were raised in a traditional free-range system and fed two commercial diets: one until ~50 kg LW (15.5% crude protein, 3.4% crude fibre, 4.5% fat, and 3363 kcal/kg of digestible energy) and another from ~50 kg until slaughter (16.6% crude protein, 3.7% crude fibre, 5.1% fat, and 3413 kcal/kg of digestible energy). Diets were offered at estimated *ad libitum* consumption (daily feed allowance = 0.1 x $LW^{0,75}$) (INRA 1984), in a single daily meal (09:00 h). Animals had free access to water and shadows. Maximum and minimum temperature daily records, as well as the relative humidity to which pigs were submitted, were registered. Ten animals from each genotype were slaughtered at the end of the growing period (64.2 ± 0.3 kg) at an industrial slaughterhouse, in three batches. Carcass measures were made with a tape measure and a digital calliper on the left half carcass. Commercial cuts were performed according to the Portuguese Norm (NP-2931 2006) and their weights and those of belly and backfat were recorded.

Statistical analyses

Results are presented as mean ± SEM. Statistical analysis was performed by one-way analysis of variance (ANOVA) with the statistical software Statview 5.0 (SAS Institute, Cary, NC, USA). Differences were considered significant when P<0.05.

RESULTS

All pigs remained in good health throughout the experimental period. During the trial, the recorded maximum and minimum daily temperatures were 17 and 6.3°C, respectively, and average relative humidity was 75.6%.

These first results show that BI and RI crosses (ALxBI and BIxAL) presented higher average daily gain, attaining slaughter weight faster (P<0.001) than AL pigs **(Table I)**. Overall, although hot carcass weight was not significantly affected by the genotype, carcass length (P<0.001), carcass yield (P=0.06), and commercial yield (P<0.001) were higher in BI than AL pigs, with ALxBI and BIxAL pigs presenting intermediate values **(Table II)**. Bone cuts proportion was higher in BI and lower in AL genotypes, with intermediate values in both crosses (P<0.001). Conversely, fat cuts proportion and average backfat thickness were higher in AL than in BI, ALxBI and BIxAL pigs (P<0.001). Fat depth (at the level of *m. Gluteus medius*; ZP method) was also higher in AL, but statistically different only from BI pigs (P<0.01) (see **Table II**).

DISCUSSION

The two economically most important autochthonous swine breeds from Portugal, AL and BI, have

Table I. Growth data from Alentejano (AL), Bísaro (BI), ALxBI and BIxAL pigs slaughtered at ~65 kg LW (Dados de crescimento de suínos Alentejano (AL), Bísaro (BI), ALxBI e BIxAL abatidos a ~65 kg PV).

	AL (n = 10)		BI (n = 10)		ALxBI (n = 10)		BIxAL (n = 10)		Significance
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	
Initial weight (kg)	29.9	1.4	29.0	0.9	27.8	1.0	32.3	1.4	0.07
Final weight (kg)	64.2	0.8	63.8	0.7	64.3	0.5	64.7	0.5	NS
Days on trial (d)	100.0[a]	4.1	85.6[b]	3.0	89.9[b]	2.6	81.4[b]	2.3	***
Average daily gain (g/d)	343.8[b]	10.0	413.6[a]	16.2	408.5[a]	9.3	400.7[a]	8.1	***

Significance: *** P<0.001, NS - P≥0.05.
Note: Daily feed allowance per pig = 0.1 x $LW^{0,75}$ (INRA 1984)

Table II. Carcass, cut traits, and organ data from Alentejano (AL), Bísaro (BI), ALxBI and BIxAL pigs slaughtered at ~65 kg LW (Dados de carcaça, peças de talho e órgãos de suínos Alentejano (AL), Bísaro (BI), ALxBI e BIxAL abatidos a ~65 kg PV).

	AL (n = 10)		BI (n = 10)		ALxBI (n = 10)		BIxAL (n = 10)		Significance
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	
Carcass length (cm)	71.8^{c}	1.6	82.1^{a}	0.4	75.4^{b}	0.6	76.0^{bc}	1.4	***
Hot carcass weight (kg)	47.0	0.6	48.0	0.6	48.1	0.5	47.8	0.5	NS
Carcass yield (%)	73.3^{b}	0.5	75.2^{a}	0.5	74.9^{a}	0.5	73.9^{ab}	0.6	0.06
Head (%)	8.5^{b}	0.3	9.8^{a}	0.4	8.9^{b}	0.1	8.8^{b}	0.2	*
Commercial yield (%)[1]	45.0^{c}	0.6	51.2^{a}	0.6	48.0^{b}	0.5	49.5^{ab}	1.6	***
Bone cuts (%)[2]	15.3^{c}	0.4	19.4^{a}	0.7	16.8^{b}	0.4	17.3^{b}	0.5	***
Fat cuts (%)[3]	35.3^{a}	0.8	24.4^{c}	0.9	28.4^{b}	1.4	27.9^{b}	1.0	***
Average backfat thickness (mm)[4]	38.1^{a}	1.3	21.1^{c}	1.9	32.5^{b}	2.8	30.4^{b}	1.4	***
Fatness: ZP fat depth (mm)[5]	25.2^{a}	1.7	16.9^{b}	1.2	22.8^{a}	1.5	24.1^{a}	1.5	**
Leanness: ZP muscle depth (mm)[6]	48.2	0.7	47.6	0.2	48.7	0.3	49.1	0.2	NS
Liver and gallbladder (kg)	1.32	0.05	1.29	0.05	1.34	0.04	1.25	0.06	NS

Significance: *** P<0.001; ** P<0.01, * P<0.05, NS - P≥0.05;
[1]Proportion of untrimmed shoulder, loin, untrimmed ham and tenderloin cuts; [2]proportion of loin (bone-in, bladeless) and ribs; [3]Proportion of belly and backfat cuts; [4]Average of measurements taken between last cervical and first thoracic vertebrae (first rib level), and last thoracic and first lumbar vertebrae (last rib level); [5]Minimal fat depth (including rind) over the muscle Gluteus medius; [6]Minimal muscle depth between the anterior extremity of the muscle *Gluteus medius* and the dorsal part of the medullar canal.

been differently studied along the years. The AL breed has already some data concerning growth, carcass and meat quality, mostly on fattening pigs (e.g. Freitas et al. 2007; Madeira et al. 2013; Martins et al. 2015; Neves et al. 1996). However, data from BI pigs are scarce, and these are the first growth, and carcass parameters from RI pigs published.

When compared to AL pigs, BI presented 14.3% longer carcasses, higher proportions of head and bone cuts (15 and 27%, respectively), confirming this genotype has different morphological characteristics of longer body and heavier bone structure. The BI genotype, also considered more corpulent than the AL breed (Janeiro 1944; Reis 1995), presented a significantly higher carcass yield. These differences between AL and BI genotypes were also observed in pigs slaughtered at 96-105 kg (Santos e Silva et al. 2000). As to RI crosses, they presented intermediate values between AL and BI genotypes.

AL pigs are considered to produce carcasses with low lean and high fat cuts proportion (Freitas et al. 2007; Neves et al. 2012; Santos e Silva et al. 2000), while the opposite is observed on BI pigs (Janeiro 1944; Reis 1995; Santos e Silva et al. 2000). At 65 kg BW and 180-190 days of age, these characteristics were already present in slaughtered animals: AL pigs had lower commercial yield and higher fat cuts proportion, whereas BI pigs had higher commercial yield and lower fat cuts proportion. Once again, RI crosses presented intermediate values between pure genotypes.

Data obtained in this trial indicate that at 65 kg LW, RI crosses presented intermediate characteristics between the fatter (AL) and the leaner (BI) genotypes. Further studies will be performed at the end of the fattening period.

Biodiversity is fundamental to efficient and sustainable food production from the wide variety of production conditions in the world and to meet the very different needs of human societies (FAO 2010). The RI crossing could therefore be an alternative to the use of other (modern) breeds, contributing to the increase of the autochthonous pig producers' revenue, and to maintain or increase the pure breed populations, therefore contributing to animal biodiversity.

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