

ALENTEJANO AND BÍSARO PIGS: TRADITION AND INNOVATION – THE TREASURE PROJECT

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Review paper

Abstract: The Alentejano pig (AL) and the Bísaro pig (BI) are the two main autochthonous swine breeds of Portugal. Originated from different ancestors they have a similar history across the last century. One hundred years ago AL was the most common swine breed in Portugal, but in the second half of the 20th century both Portuguese pig breeds undertook a strong population decline that almost lead to their extinction. However, since the late 80's of last century local breeds were rescued and their populations recovered over the last 30 years. Breeding recovering led to the protection of pork itself and dry products by European protections PDO's and PGI's. In the framework of TREASURE project, a study is in progress aiming to investigate the opportunity of a crossbreeding program involving both breeds with the goal to obtain new products with potential commercial interest and to improve the knowledge on the pure breeds and to protect them against future threats. This paper includes a revision about AL and BI breeds and presents some preliminary original data from Treasure project study.

Key words: Alentejano, Bísaro, autochthonous pigs, reproduction, production.

Origin and geographical distribution

The Alentejano pig (AL) and Bísaro pig (BI) are the main local Portuguese pig breeds. The AL pig belongs to the Mediterranean group (*Porter, 1993*) and share the origin from the *Sus mediterraneus* with nowadays Iberian pig. In the southern Portugal and Spain, mainly Alentejo, Extremadura and Andalucía regions, the extensive swine production is historically associated to the use of AL and

Iberian breeds perfectly adapted to the environment and to the use of natural resources namely the Quercus forest known as Montado in Portugal and Dehesa in Spain (Freitas, 2014). The BI pig belongs to the Celtic group (Porter, 1993), originated from the Celtic wild boar. It presents similar characteristics to the Celta pig breed (Carolino *et al.*, 2009), being both breeds mainly raised in the northern regions of the Iberian Peninsula (Minho and Trás-os-Montes e Alto Douro in Portugal and Galicia in Spain).

Production systems

The AL pig is mostly raised under extensive conditions in an integrated agro-sylvo-pastoral system where the “montanheira”, the fattening period based on acorns, from Quercus forest since late October to the end of February is a strategic element of the production system. The herd size is, presently on average, of 35 sows (ANCPA, data base). Most Bísaro pig were raised in small nucleus, but the number of sows per farm has increased from 10 sows in 2003 (Alves, 2003) to 30 sows more recently (Santos Silva and Tirapicos Nunes, 2013). The animals, are reared in intensive outdoor or semi-extensive systems (Santos Silva and Tirapicos Nunes, 2013).

Traditionally, AL herds were separated in 3 categories: breeding sows, growing pigs and fattening pigs. Formerly the breeding sows (even when in lactation) and growing pigs, graze during day and were supplement with cereal grains or leguminous even seasonal agriculture by-products only when necessary (Póvoas Janeiro, 1951). Nowadays, in order to improve and to standardize performance most sows and pigs receive concentrated balanced feeds. The BI pigs feeding has always been based on the feeds produced at the farms, and nowadays the pigs diet is a mix of cereals complemented with other farm products (tubers, horticultural by-products, fruits). Some farmers use commercial complete feeds for specific phases, as lactation or weaned piglets (ANCSUB, 2017).

In AL farms, now that the old traditional concrete facilities (“malhadas”) are almost abandoned, in most cases farrowing occurs in outdoors conditions, in a “camping” environment with farrowing huts. In BI breed the farrowing and lactation were also in man-made facilities (with stone and/or wood) but there is also a tendency to increase the camping system in the last years (Santos Silva and Tirapicos Nunes, 2013). Traditionally, the AL piglets are usually weaned with 45-60 days of age and 10-14 kg of LW (live-weight) (Freitas, 2014). The weaning of the BI piglets occurs at 40-45 days of age. Traditional consumption of roast piglets is common. Seventy per cent of the weaned piglets are slaughtered at young age, weighing 8–12 kg (Santos Silva and Tirapicos Nunes, 2013).

The AL piglets born between April and September go to “Montanheira” the following year (*Santos Silva and Tirapicos Nunes, 2013*) while piglets born during Autumn and Winter season go to other markets (roasted piglets, fresh meat), either they can be used to replace cull animals in farms or, in many cases they come from crossbreed AL x Duroc. The slaughter age and weight dependents on the product/market target. Considering pork market pigs are usually slaughtered with 8-14 months of age and 90-100kg LW. For protected (IGP) dry-cured products the average age and weights are 15-24 months and 120-140kg live-weight, respectively. Finally, for the ham industry both in Portugal and also in Spain (main destination) the slaughter age and weight vary from 14-18 months and weights of 140-170kg LW (*Freitas, 2014*). Typically, Bísaro pig have two growing phases. The first one of moderate growth until 70–75 kg LW and a finishing phase with variable diets depending on the availability of food resources on each farm (flour, fruits, vegetables, chestnuts and acorns). During finishing period of Bísaro pigs, the rate of growth depends on feeding management and availability of pasture. The animals can be slaughtered from 120 to 180 kg LW, depending on tradition of each region (*Santos Silva and Tirapicos Nunes, 2013*).

Historical evolution, demographics and products

Alentejano and Bísaro breeds were the main pig raised in Portugal at the beginning of the XX. In fact, by the 50's of that century the AL pig represented about 45% of the total pig population in Portugal (*Carvalho, 1964*). However, due to several reasons both breeds suffered a clear decline in their populations that almost lead to their extinction on the 80's. The reasons were various and most of them common for both breeds: emigration and migration (to littoral regions) phenomena, new dietary habits and diet health concepts, sanitary problems (mostly African swine fever), introduction of exotic lean breeds (sometimes promoted by state policy) and their crosses with our breeds (*Carolino et al., 2009; Freitas, 2014; Tirapicos Nunes, 1998*). 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. Presently, there were 6559 sows and 436 boars registered in the Alentejano breed Herd book distributed by 162 breeders (February 2017, ANCPA database). The correspondent values for Bísaro breed are 5460 females, 520 boars and 189 breeders (March 2017, ANCSUB records). During last decade of XX Century tree breeders' associations were registered (AL:1990 - ACPA and 1991 – ANCPA; BI: 1994 - ANCSUB). Presently (*DGADR, 2017*), the AL breed has 27 protected products (4 PDO's and 23 IGP's) whereas the BI breed (or crosses) has 17 protected products (16 PGI's and 1 PDO).

Breeds reproductive and productive characteristics

Unlike other European pig breeds, both AL and BI breeds were not submitted to genetic improvement programs (*Gama et al., 2013*). Therefore, any performance improvement is mainly connected to empirical selection made by farmers and/or some improvement on production management (e.g. nutritional). The gestation length in BI sows is similar to the recorded in other pig breeds (115 days; *Outor-Monteiro et al., 1998*), however AL breed presents a shorter gestation length (111-112d; *Nunes, 1993; Charneca et al., 2012*).

The AL breed present low prolificacy (7-8 piglets per litter; *Marques, 2001; Charneca et al., 2012*). The BI breed can be considered a medium prolific breed with reported values for litter size from 8 to 12 (*Carolino et al., 2009; ANCSUB, 2017*). In both breeds the pre-weaning mortality is high, 24-27% in AL (*Marques et al., 1996; Charneca et al., 2012*) and higher than 20% in BI (*Outor-Monteiro et al., 1998*).

AL sows produces less colostrum than commercial genotypes but colostrum is richer in IgG (*Charneca et al., 2015*). The composition of BI colostrum and milk was reported by *Lopes et al. (1998)*.

The AL piglets born with 1,1 – 1,2kg LW (*Marques, 2001; Charneca et al., 2012*) and their growth rate (average daily gain- ADG) varies between 130 - 163g/d until 21 days (*Marques, 2001; Charneca et al., 2012*). The LW of BI piglets at birth is 1,3 to 1,4kg (*Carolino et al., 2009; Outor-Monteiro et al., 1998*). The values found for growth rate of BI piglets in nursing period (45d) range between 220-260g/d (*Outor-Monteiro et al., 1998; ANCSUB report, 2006*). In the post-weaning period, *Freitas (1998)* reported ADG values of 320 to 360g/d in AL piglets between 20 and 50kg LW.

The AL growth performance in pre-finishing phase (60-100kg) most reported values of ADG are between 400-600g/d (*Freitas et al., 2007; Martins et al., 2012; Martins et al., 2015*). During fattening period “montanheira” when the daily intake of acorns can reach 10kg, depending on the animal density and fruits production (*Santos Silva and Tirapicos Nunes, 2013*) a higher growth rate can be observed 700-950g/d (*Nunes, 1993; Freitas, 1998*). An interesting knowledge on this breed is that it presents a compensative growth when submitted to feeding restriction before finishing period (*Freitas, 1998*). In the BI pig the growth rate between 35 and 100kg LW is ~592/d in indoor facilities but it is lower (460g/d) in outdoor conditions (*Figueiredo et al., 2007*). At higher weights, between 100 - 140kg LW the observed ADG is ~530g/d (*Santos e Silva et al., 1999*). More recent results in a study concerning the type of pig facilities *Araújo et al. (2016)* reported an ADG between 25-80kg LW around 555g/d and from 80-120kg about 520g/d.

TREASURE project study

Justification and goals

Before intensification of indoors pig production, AL and BI were the main pig breeds in Portugal. It can be considered that Tagus river, including confined fields, separate each breed homeland. In the South, AL was predominant, while the dominance of BI in Northern territories was evident. Nevertheless, for some time they cohabited in Ribatejo region. In the contact zones, according to ancient testimonies (*Bernardo Lima, 1865; Miranda do Vale 1949*) the cross between both breeds was a common practice, and the result (animal, meat and products) was rather appreciated. However, no scientific data is available about the crossed animals or their products. The study and possible use of crosses between these pig breeds, whose former name “Ribatejano Pig” (RI) we have resumed, can help to increase the revenue of pig producers by creating new and economically interesting products, but it can also help to maintain or increase the two pure breed populations, therefore contributing to the conservation of animal biodiversity. The trial aimed to study the performance, the carcasses and meat quality, and also the quality of processed dry cured products of Ribatejano (RI) pigs obtained by the cross between AL males x BI females (ALBI piglets) and between BI males x AL females (BIAL piglets). Besides the crossbred, AL and BI pure breed pigs were used as controls in the trial.

Reproductive results

The mating, gestation, farrowing and lactation supervision of AL and BI females mated on crossbreeding allowed us to observe that, as expected, AL sows had a shorter gestation (111 vs 114d) and smaller litter size (6.7 vs 10 born alive piglets) than BI (*Charneca et al., 2016*). Colostrum intake of piglets was similar between genotypes being on average of 289g for ALBI and 281g for BIAL piglets. The mortality rate until 28d averaged 12%, value much lower than the reported for both breeds in pure line (*Charneca et al., 2016*). The reasons for the low mortality rate in the study may be related to a closer supervision during the lactation period, mainly during the first days post-farrowing and/or by a heterotic effect on the piglets' viability. The BI females weaned more piglets than AL, 8.5 vs 6 piglets. The growth rate of crossbred piglets and weight at 28d of age was similar between genotypes with average values of 195g and 6.8kg, respectively (*Charneca et al., 2016*).

Productive results

First period (occurred mostly during spring season)

On this phase 20 castrated males of each genotype (AL, BI, ALBI and BIAL) were reared outdoor (similar conditions to those of observed in private farms), animals were feed *ad libitum* in group, and followed from to about 30kg to 65kg LW. The ADG of AL pigs (344g/d) was lower than all other genotypes that were similar among them (401- 414g/d). Overall, carcass length, carcass yield, and lean cuts weight were higher in BI than AL pigs, with intermediate values for both crosses. Conversely, fat cuts percentage, ZP fat depth and average backfat thickness were higher in AL than in BI, and ALBI and BIAL pigs. At 65kg LW, RI crosses presented intermediate characteristics between fatter (AL) and leaner (BI) genotypes (Neves *et al.*, 2016).

Second period (occurred mostly during summer season)

After the first slaughter, the 10 remaining pigs per genotype remained in the same outdoor system but began to be fed individually, in order to control individual feed intake. The final slaughter weight was ~150kg. The preliminary results of this period showed no differences in growth rate, and ADG varied between 550 and 601g/d. In the carcasses the only clear differences between AL and the other genotypes are fat related traits. The AL carcasses had higher percentage of fat cuts, average backfat thickness and ZP fat depth. Again, RI animals (ALBI and BIAL) present, in most cases, intermediate values between the 2 pure breeds. After animal slaughtering a traditional dry-cured product (*Alves et al.*, 2017) of pig (“paio”), was made using meat and fat of animals of each genotype.

The so far observed and analyzed results of the Treasure experiment show that the RI pig can be raised in outdoor conditions, during summer season without performance loss, the carcasses present equal or intermediate values of those from the pure breed animals what can be an advantage in some markets and/breeding seasons when the pure breed animal is not so valorized. Regarding our particular interest of the BIAL cross because most AL sows are in Alentejo region we forecast future studies of this RI pig eventually in a more comparative study with the most usual cross with Duroc made by farmers.

Alentejano i bisaro svinje: tradicija i inovacija - Treasure projekat

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Rezime

Alentejano svinja (AL) i bisaro svinja (BI) su dve glavne autohtone rase svinja u Portugaliji. Od različitih pretaka, oni imaju sličnu istoriju tokom prošlog veka. Pre sto godina AL je bila najčešća rasa svinja u Portugaliji, ali su u drugoj polovini 20. veka obe portugalske rase svinja doživele snažan pad populacije koji gotovo dovodi do njihovog izumiranja. Međutim, od kraja 80-tih godina prošlog veka, lokalne rase su spašene i njihova populacija se oporavila u posljednjih 30 godina. Oporavak uzgoja dovodi do zaštite svinjskog mesa i suvih proizvoda od svinjskog mesa pod evropskim programima zaštite PDO i PGI. U okviru TREASURE projekta, u toku je studija sa ciljem da se ispita mogućnost programa ukrštanja koji uključuju obe rase sa ciljem dobijanja novih proizvoda sa potencijalnim komercijalnim interesima i poboljšanjem znanja o čistim rasama i njihovoj zaštiti od budućih pretnje. Ovaj rad obuhvata reviziju znanja i podataka o AL i BI rasama kao i neke preliminarne originalne podatke iz studije Treasure projekta.

Ključne reči: Alentejano, Bisaro, autohtone svinje, reprodukcija, proizvodnja.

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