Chapter

Ibérico (Iberian) Pig

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Abstract

The main characteristics of the Iberian breed, an autochthonous pig breed of the Iberian Peninsula, are presented in this chapter along with the results of a literature review on productive traits. Reproductive performance was estimated by sow age at first parturition, litters per sow and year, piglets alive per litter, piglet weight at birth and at weaning, percentage of stillborn per litter, mortality at weaning, lactation length and farrowing interval. For growth performance, average daily gain and daily feed intake during lactation and in different growing phases are provided. Carcass traits were evaluated by age and weight at slaughter, hot carcass weight, carcass yield, backfat thickness measurements, muscle thickness and loin eye area. Meat quality traits of longissimus muscle (pH, objective colour measurements and intramuscular fat) were also assessed. The main part of the studies considered simulated practical production conditions in Iberian pig rearing although others evaluated a defined growing period, sometimes quite far from the usual commercial slaughter weight of this breed. Therefore, some figures should be interpreted with caution. Although a considerable number of studies on Iberian pig were included in the current review, scientific papers on reproductive performance and some meat quality parameters are still rather scarce.

Keywords: traditional European breed, TREASURE, productive traits, phenotype, Spain

1. History and current status of the breed (census)

The Iberian pig is an autochthonous porcine breed derived from ancestral domestic pig populations of the Iberian Peninsula. For centuries, it was widely spread all over this territory. Nowadays, it can be found in the Southwest of the Peninsula: West Andalusia, Extremadura and Salamanca province. In the Portuguese Alentejo, this porcine breed, with some minor differences, is known as Porco Alentejano.

Until the middle of the XX century, the Iberian pig was the main porcine breed reared in Spain. In the first decades of the last century, the census of reproductive sows could have surpassed 500,000 animals that widely extended all over the country. Since then, a series of sanitary challenges, changes in social and feeding habits, as well as the transformation of the dehesa territory into field crops, lead to a dramatic decline in the Iberian pig population [1] that did not stop until the middle

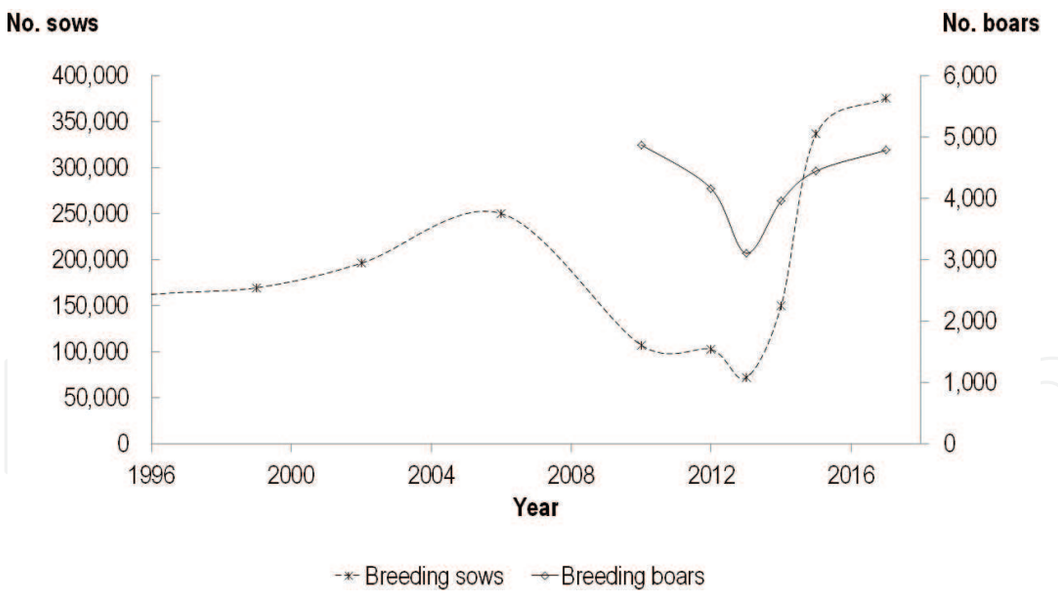

Figure 1.
Census of Iberian pig breed, presenting number of sows (No. sows) and boars (No. boars) per year, starting with the year of heard book establishment.

1980s. The most critical moments of the Iberian pig population crisis took place during the 1960s, in which the breed was at serious risk of extinction.

In the late 1980s, a new period started with the beginning of Iberian pig breeding recovery and the revalorisation of its products. To this recovery contributed not only the increasing demand for traditional food products of high organoleptic quality—a key issue for the definitive recuperation of the Iberian pig population—but also the social awareness for preservation of the genetic heritage and the natural habitat associated to this breed.

There is no official historical census of the Iberian population as the classification was based on the production system (extensive vs. intensive) and not on genetic discrimination. However, taking into account part of these data, along with own data of the Iberian pig breeders association, we can see the approximate evolution of the Iberian pig population during the last years in **Figure 1**. At present, with a reliable system of pig population registration, we know that there are 4370 registered Iberian pig farms, with 375,500 breeding sows and 4780 boars in the latest available status (November 2017). The total number of pigs slaughtered during 2017 were 3,240,000, which represent a 35% increment with respect to 2014 when the sector was suffering the effects of the global economic crisis and a specific crisis due to a production excess that led to a decrease in the census.

2. Exterior phenotypic characteristics

The racial characteristics that identify the Iberian pig are recorded in the racial standard of the genealogical book (order APA/3376/2007). Nevertheless, even today there is a great morphological heterogeneity resulting from the historical genetic isolation of this breed that gave rise to multiple local varieties, many of them already lost or subsumed into the *Retinto* variety, which is the predominant nowadays. The Iberian breed general morphology information is summarised in **Table 1**. In general, it is a medium-sized animal with pigmented skin which colour could vary from intense black to blond or reddish. The hair is weak and rather scarce (in *entrepelado* varieties) or absent (in hairless or

Measurement (average)	Adult male	Adult female
Body weight (kg)	140.5	128.0
Body length[1] (cm)	84.1	84.6
Head length (cm)	32.1	31.1
Ear length (cm)	18.4	18.7
Chest girth (cm)	24.7	22.7
Height at withers (cm)	79.8	77.3
Number of teats	10–12	10–12

[1]*Measured from the tip of the nose to the starting point of the tail.*

Table 1.
Summary of morphology information on Iberian pig breed.

Figure 2.
Iberian sow with piglets.

Figure 3.
Iberian boar.

lampiño varieties). The legs are thin and resistant, and the hooves are dark and uniformly coloured (**Figures 2** and **3**), except for the variety *Torbiscal* which can present depigmented or whitish-striped legs.

3. Geographical location and production system

One of the characteristics of the Iberian pig production is its high diversity, both from the genetic point of view as well as for its feeding and management.

The genuine traditional production system, carried out in the wide *dehesas* found in southwestern Spain, is based on the rearing of pure Iberian pigs, which have extensive or semi-extensive management up to 95–105 kg of body weight, and a finishing period or *montanera* in which pigs graze acorns and pastures up to 155–165 kg body weight and reach between 14 and 18 months of age. However, since several years ago, the majority of fattened pigs are produced under intensive conditions using Iberian × Duroc crossed pigs. These pigs are slaughtered with only 10 months, and their production has extended to geographical areas non-traditionally related to the Iberian pig (Murcia, Catalonia). Between these two extreme situations, several combined systems can be found. From the genetic point of view, pigs can be purebred or 50 or 75% Iberian, always obtained by crossing Iberian pure sows with Duroc boars. From the feeding and management perspective, they can be either reared intensively and fed concentrates—based on cereals and legumes—during its whole life or in mixed outdoor systems in which pigs are fed concentrates plus the natural resources available (mainly pastures). On the other extreme, we found the traditional completely extensive system (*montanera)* in which pigs graze acorns and the pasture available. As an example of the numerical relevance of the different rearing systems, in 2017 the total Iberian pigs produced in *montanera* were 635,000, from which 297,000 where purebred and 338,000 crossed with Duroc. On the other hand, 664,000 were fattened in extensive or semi-extensive systems with no-acorn feeding, most of them cross-breed; finally, 1,941,000 were fattened in intensive systems, all of them cross-breed. These figures point out that only 20% of the pigs are fattened under the traditional *montanera* system and that only 10% of total slaughtered pigs are pure Iberian [2].

The Duroc crossing provides increased precocity, higher lean deposition rates and increased prolificacy and reproductive performance. However, purebred Iberian pigs have particular qualities and distribution of lipids in tissues which are responsible for the characteristic texture, aroma and juiciness of their products. The extensive management allows pigs to reach a higher age at slaughter along with continuous exercise, both contributing to higher meat quality. The traditional production system is highly linked to the valorisation of the *dehesa*, and their rural environment play an essential role in the preservation of this ecosystem.

4. Organisations for breeding, monitoring, and conservation

The Spanish Association of Iberian Pig Breeders (AECERIBER)[1] was born in 1985 in Zafra (Badajoz, Extremadura) during a critical period when the breed was at serious risk of extinction. According to non-official records, during these years the population of Iberian breeding sows could had been as low as 5000. Therefore, this was a moment that required an organisation that would join all traditional farmers to work together in the conservation and expansion of the breed. In 1987, the Spanish

[1] AECERIBER—Spanish Association of Iberian Pig Breeders; C/San Francisco, 51, 1°D, Zafra, Badajoz, Spain, 06300, E-mail address: zafra@aeceriber.es.

Ministry of Agriculture granted AECERIBER the management and development of the genealogical book, since 1992 the genetic selection programme and, more recently, the Conservation programme for several varieties in danger of extinction. Nowadays, more than 2000 breeders in Spain take part in the association.

5. Productive performance

5.1 Reproductive traits

An overview of data registered on reproductive traits is presented in **Table 2**. The recorded age of sows at first parturition is 10.0–16.5 months [7, 12, 22]. On average, sows of Iberian pig breed have 2.2 litters per year [15, 21] with around 7.5 piglets (from 6.0 to 8.3; [3–7, 9–11, 13–16, 18–21]). Mean body weight of piglets at birth varies from 1.1 to 1.4 kg [9, 17–20, 23]. Stillborn percentage of piglets and mortality rates until weaning in the considered studies are satisfactory and range from 1.7 to 20.6 [4–6, 9–11, 13, 14, 16, 19–21] and 2.5 to 22.9% [14–16, 19–21], respectively. Although there are few studies with data available for this period of Iberian pig rearing, the average duration of lactation registered in the collected studies is prolonged in comparison to modern intensive systems (up to 60 days [23], but in average to 39 days [6, 13, 14, 17–21, 23]), which leads to a longer farrowing interval (approximately 173 days [14, 15, 21]) and higher weaning weight (6.9–20.8 kg [9, 17–20, 23]). However, recent analysis shows that the trends in the last years are to reduce the duration of lactation to 25–26 days, close to the lactation periods found in conventional sows [24].

5.2 Growth performance

The basic data on growth performance obtained in this review are presented in **Tables 3** and **4**. Due to differences among studies concerning the live weight ranges covered and for comparative purposes, we defined the stages for growth performance as lactation (regardless of its length), growing stage (from weaning to approximately 30 kg live body weight) and early, middle and late fattening stages, estimated between approximately 30 and 60 kg, 60 and 100 kg and above 100 kg live body weight, respectively. Sometimes the source provided only the overall growth rate for the whole fattening stage (defined in this case as overall). The recorded data in **Table 3** shows heterogeneity. A big part of the collected studies simulated practical conditions of the production systems used in Iberian pig rearing so that they can be considered as field studies. On the other hand, a reduced group of the recorded papers aimed at evaluating the actual growth potential of Iberian pigs in a defined growing period. For this reason, the average growth rates were not calculated. The average daily gain in the early stage that corresponds to the lactation period (approximately 257 g/day, range from 168 to 371 g/day [9, 18, 23, 27, 28, 60, 61, 64, 67]) could be considered in the range of those described for modern sows [71, 72], although the average lactation period in the present studies (approximately 39 days; **Table 2**) is considerably greater than in sows of conventional breeds (21–28 days). The collected data show that daily gain is characterized by high heterogeneity in the growing (185–524 g/day, [28, 43, 44, 49, 50, 54, 57, 58, 60, 63]), early (228–566 g/day, [26, 49, 53, 54, 57, 68]), middle (181–800 g/day, [9, 26, 38, 42, 48, 51, 52, 57, 68]), late (387–1018 g/day, [4, 9, 25, 26, 29–31, 33–48, 55, 59, 60, 62, 65, 66, 68]) and overall (181–800 g/day, [9, 25, 26, 29, 32, 33, 38, 42–44, 48, 49, 51–54, 56, 57, 68–70]) fattening stages, which is related to the fact that this review comprises studies of a

Reference	Sow age at first parturition (mth)	Litters per sow per year	No. of piglets alive per litter	Piglet live weight (kg)	Stillborn per litter (%)	Mortality at weaning (%)	Piglet weaning weight (kg)	Duration of lactation (d)	Farrowing interval (d)
[3]	—	—	8.0	—	—	—	—	—	—
[4]	—	—	7.3	—	4.6	—	—	—	—
[5]	—	—	7.1	—	4.5	—	—	—	—
[6]	—	—	7.7	—	8.1	—	—	56	—
[7]	10.0	—	7.7	—	—	—	—	—	—
[8]	—	—	—	—	—	—	—	—	—
[9]	—	—	8.1	1.3	3.6	—	10.0	—	—
[10]	—	—	7.6	—	4.7	—	—	—	—
[11]	—	—	7.5	—	4.2	—	—	—	—
[12]	16.5	—	—	—	—	—	—	—	—
[13]	—	—	7.8	—	9.9	—	—	56	—
[14]	—	—	8.3	—	15.3	22.9	—	21	177
	—	—	7.7	—	20.6	20.8	—	31	172
	—	—	8.2	—	15.1	22.0	—	41	179
[15]	—	2.2	6.9	—	—	6.2	—	—	166
[16]	—	—	6.3	—	1.7	4.3	—	—	—
[17]	—	—	—	1.4	—	—	7.8	35	—
[18]	—	—	6.0	1.4	—	—	7.1	34	—
[19]	—	—	7.3	1.4	6.5	2.9	6.9	35	—
[20]	—	—	7.6	1.1	6.4	2.5	8.0	35	—
[21]	—	2.1	7.8	—	5.6	10.6	—	27	173

Reference	Sow age at first parturition (mth)	Litters per sow per year	No. of piglets alive per litter	Piglet live weight (kg)	Stillborn per litter (%)	Mortality at weaning (%)	Piglet weaning weight (kg)	Duration of lactation (d)	Farrowing interval (d)
[22]	10.0	—	—	—	—	—	—	—	—
[23]	—	—	—	1.4	—	—	20.8	60	—

No.—number; mth—month; and d—days.

Table 2.
Summary of collected literature data on reproduction traits in Iberian pig breed.

Reference	Feeding	No. of animals	ADG lactation[1]	ADG growing[2]	ADG fattening[3]				ADG birth to slaughter
					Early	Middle	Late	Overall	
[4]	Ad lib	579	—	—	—	—	566	—	—
[9]	Rest	78	—	—	—	445	—	445	—
	Ad lib	78	207	—	—	—	515	—	—
[18]	Ad lib	32	168	—	—	—	—	—	—
[23]	Ad lib	1704	346	—	—	—	—	—	—
[25]	Rest	58	—	—	—	—	—	473	—
	Ad lib	58	—	—	—	—	720	—	—
[26]	Rest	365	—	—	228	—	—	228	—
	Ad lib	365	—	—	—	651	651	651	—
[27]	Ad lib	26,913	267	—	—	—	—	—	—
[28]	Ad lib	2633	320	320	—	—	—	—	—
[29]	Rest	182	—	—	—	—	—	241	—
	Ad lib	182	—	—	—	—	845	—	—
	Rest	231	—	—	—	—	—	250	—
	Ad lib	231	—	—	—	—	595	—	—
	Rest	226	—	—	—	—	—	307	—
	Ad lib	226	—	—	—	—	714	—	—
[30, 31]	Rest	22	—	—	—	—	—	—	277
	Ad lib	22	—	—	—	—	545	—	—
[32]	Ad lib	701	—	—	—	—	—	608	—
[33]	Rest	16	—	—	—	—	—	389	—
	Ad lib	16	—	—	—	—	471	—	—
[34]	Ad lib	43	—	—	—	—	577	—	—
[35]	Ad lib	32	—	—	—	—	559	—	—
[36]	Semi	32	—	—	—	—	387	—	—
[37]	Semi	16	—	—	—	—	396	—	—
[38]	Rest	24	—	—	—	299	—	299	—
	Rest	16	—	—	—	—	694	—	—
	Ad lib	8	—	—	—	—	800	—	—
[39]	Ad lib	16	—	—	—	—	650	—	—
[40, 41]	Ad lib	8	—	—	—	—	532	—	—
	Ad lib	16	—	—	—	—	522	—	—
[42]	Rest	16	—	—	—	181	—	181	—
	Ad lib	16	—	—	—	—	472	—	—
[43, 44]	Semi	78	—	185	—	—	—	—	—
	Semi	60	—	—	—	—	—	500	—
	Semi	60	—	—	—	—	807	—	—
[45]	Ad lib	20	—	—	—	—	880	—	—
	Ad lib	20	—	—	—	—	880	—	—
[46]	Ad lib	151	—	—	—	—	701	—	—
[47]	Ad lib	122	—	—	—	—	755	—	—

Reference	Feeding	No. of animals	ADG lactation[1]	ADG growing[2]	ADG fattening[3]				ADG birth to slaughter
					Early	Middle	Late	Overall	
[48]	Rest	1159	—	—	—	338	—	338	—
	Ad lib	1159	—	—	—	—	586	—	—
[49]	Rest	48	—	349	349	—	—	349	—
	Ad lib	24	—	506	506	—	—	506	—
[50]	Semi	18	—	524	—	—	—	—	—
[51, 52]	Ad lib	24	—	—	—	800	—	800	—
	Rest	48	—	—	—	576	—	576	—
[53]	Ad lib	20	—	—	566	—	—	566	—
[54]	Rest	12	—	415	415	—	—	415	—
	Ad lib	12	—	499	499	—	—	499	—
	Semi	25	—	485	—	—	—	—	—
[55]	Ad lib	6	—	—	—	—	917	—	—
	Rest	6	—	—	—	—	679	—	—
[56]	—	400	—	—	—	—	—	581	—
[57]	Semi	16	—	501	501	—	—	501	—
	Semi	12	—	—	—	671	—	671	—
[58]	Ad lib	26	—	391	—	—	—	—	—
	Rest	27	—	251	—	—	—	—	—
[59]	Ad lib	161	—	—	—	—	775	—	—
[60]	—	8816	193	—	—	—	—	—	—
	—	8047	—	377	—	—	—	—	—
	—	1666	—	—	—	—	662	—	—
[61]	Ad lib	120	190	—	—	—	—	—	—
[62]	Rest	16	—	—	—	—	423	—	—
[63]	Ad lib	60	—	444	—	—	—	—	—
[64]	Ad lib	38	371	—	—	—	—	—	—
[65]	Ad lib	24	—	—	—	—	1018	—	—
[66]	Ad lib	25	—	—	—	—	893	—	—
	Ad lib	100	—	—	—	—	893	—	—
[67]		14	247	—	—	—	—	—	—
[68]	Ad lib	60	—	—	465	—	—	465	—
	Ad lib	60	—	—	—	622	—	622	—
	Ad lib	60	—	—	—	—	619	—	—
[69]	Ad lib	12	—	—	—	—	—	450	—
[70]		27	—	—	—	—	—	735	—

*No.—number; ADG—average daily gain in g; Ad lib—*ad libitum *feeding regime; Semi—*semi ad libitum *feeding regime; Rest—restrictive feeding regime.*
[1]*ADG in period of lactation regardless of how long it was.*
[2]*ADG in growing period estimated from weaning to approximately 30 kg live body weight.*
[3]*ADG in a period of fattening is reported for early, middle and late fattening stages estimated between approximately 30 and 60 kg, 60 and 100 kg and above 100 kg live body weight, respectively. Sometimes the source provided only the overall growth rate for the whole studied period (in that case defined as overall).*

Table 3.
Summary of collected literature data on growth performance in Iberian pig breed.

variety of production systems and, probably more important, feeding levels. In the context of the evaluation of growth performance, it is of interest to point out the extreme values recorded as it can be assumed that the maximum figures obtained for each growing phase correspond to Iberian pig's growth potential determined in *ad libitum* or close to *ad libitum* feeding conditions (i.e. 524 g/day in growing stage [50], 800 g/day in overall fattening stage [51, 52] and 1018 g/day from 128 kg onwards [65]).

Information on feed intake and feed nutritional composition was mentioned only in few of the considered studies, which limits the evaluation of maximum growth potential as this parameter is directly related to pig nutrition and management (**Table 4**). Average daily feed intake increased as pigs increased body weight from approximately 1.4 kg/day (0.80–1.81 kg/day [43, 44, 49, 57, 58]) in the growing stage, to approximately 4.1 kg/day (3.41–4.74 kg/day [55, 68]) in the late fattening stage in *ad libitum*-fed pigs. The maximum value recorded, 5.6 kg/day (determined in individually allocated animals), corresponds to pigs fed *ad libitum* on acorns in the late fattening stage (from approximately 90 to 140 kg body weight [39]) and shows high intake capacity in Iberian pigs. In comparative studies, the higher intake capacity of Iberian pigs compared to conventional pigs has been confirmed in similar experimental conditions and body weight range [73]. In this respect, according to van Lunen and Cole [74], voluntary feed intake has declined in the development of modern high-selected pigs compared to non-selected animals.

5.3 Body composition and carcass traits

The basic data obtained in this review with some of the most common carcass traits are presented in **Table 5**. As mentioned before, attention should be given to high heterogeneity of the recorded data, because slaughter body weights in the included studies ranged from 1 to 191 kg. A big part of the studies—some of them including high number of pigs—simulated practical conditions of the production systems used in Iberian pig rearing, whereas a reduced group of papers aimed at evaluating different performance and carcass composition parameters in a defined growing period [28, 49, 53, 58, 63, 64, 75, 86], in some cases quite far from the usual commercial slaughter weight of this breed (140–160 kg). In studies where final body weight was above 100 kg, pigs were slaughtered at approximate age of 407 days [25, 29, 33, 38, 40–44, 46, 64, 65, 68, 82, 85, 86] and reached around 152 kg live body weight [9, 25, 29–46, 48, 51, 52, 55, 56, 62, 64, 65, 69, 76–86]. In agreement with high slaughter weight, dressing yield in these studies was around 81%. The back fat thickness values measured in all considered studies spanned from 35 to 90 mm on the withers (in average 85 mm in studies with final body weight above 100 kg [55, 62, 85]), from 10 to 90 mm at the level of the last rib (in average 58 mm in studies with final LW above 100 kg [25, 29–31, 34, 35, 37–44, 46, 51, 52, 55, 64, 65, 68, 69, 76, 77, 82, 85, 86]) and from 48 to 65 mm when measured above *gluteus medius* muscle (in average 56 mm in studies final body weight above 100 kg [68, 76]). Similarly, muscularity measured as loin eye area span from 13 to 29 cm^2 (in average 23 cm^2 in studies with final LW above 100 kg [30, 31, 34, 35, 65, 76, 82]) and muscle thickness measured at the cranial edge of *gluteus medius* muscle from 11 to 60 mm (in average 40 mm in studies with final body weight above 100 kg [68, 76]). Percentage of lean meat content is not reported in the literature as this is not commonly estimated on Iberian pig carcass composition studies, which are focused mainly in the premium cuts obtained from these animals (hams, shoulders and loins). The variation in back fat and muscle thickness of the values recorded is also a consequence of the wide range of final live weights and different feeding

Reference	Feeding	ME content of feed (MJ/kg)	CP content of feed (%)	No. of animals	ADFI growing[1]	ADFI fattening[2]			
						Early	Middle	Late	Overall
[25]	Rest	—	13	58	—	—	—	—	1.82
	Ad lib	—	—	58	—	—	—	—	3.28
[30, 31]	Rest	12.6	16	22	—	—	—	—	1.62
[33]	Rest	12.5	14	16	—	—	—	—	2.15
[38]	Rest	12.5	14.3	24	—	—	—	1.72	—
	Rest	13.8	13.2	16	—	—	—	—	3.65
	Ad lib	13.8	13.2	8	—	—	—	—	4.00
[39]	Ad lib	—	3.5	16	—	—	—	—	5.60
[40, 41]	Ad lib	13.3	—	8	—	—	—	—	3.38
[42]	Rest	—	16	16	—	—	1.40	—	—
[43, 44]	Semi	12.6	17.8	78	0.91	—	—	—	—
	Semi	11.9	15.8	60	—	—	—	—	2.06
	Semi	13.1	13.5	60	—	—	—	3.24	—
[49]	Rest	13.1	14.4	48	1.34	1.34	—	—	—
	Ad lib	13.1	14.4	24	1.81	1.81	—	—	—
	Semi	—	13.6	18	1.52	—	—	—	—
[51, 52]	Ad lib	12.6	9.5	24	—	—	3.52	—	—
	Rest	12.6	9.5	48	—	—	2.63	—	—
[53]	Ad lib	—	11.6	20	—	1.67	—	—	—
[54]	Rest	—	—	12	—	1.43	—	—	—
	Ad lib	—	—	12	—	1.60	—	—	—
	Semi	—	—	25	—	1.39	—	—	—
[55]	Ad lib	13.0	8.4	6	—	—	—	4.74	—
	Rest	13.0	8.4	6	—	—	—	3.65	—
[57]	Semi	12.0	14.6	16	1.77	1.77	—	—	—
	Semi	12.0	14.6	12	—	—	3.09	—	—
[58]	Ad lib	13.0	14.8	26	0.80	—	—	—	—
	Rest	13.0	14.8	27	0.59	—	—	—	—
[62]	Rest	11.8	5.4	16	—	—	—	3.36	—
[68]	Ad lib	—	—	60	—	2.05	—	—	—
	Ad lib	—	—	60	—	—	3.12	—	—
	Ad lib	—	—	60	—	—	—	3.41	—

*No.—number; ADFI—average daily feed intake in kg/day; Ad lib—*ad libitum *feeding regime; Semi—*semi ad libitum *feeding regime; Rest—restrictive feeding regime; ME—metabolisable energy; and CP—crude protein.*
[1]*ADFI in growing period estimated from weaning to approximately 30 kg live body weight.*
[2]*ADFI in a period of fattening is reported for early, middle and late fattening stages estimated between approximately 30 and 60 kg, 60 and 100 kg and above 100 kg live body weight, respectively. Sometimes the source provided only the overall daily feed intake for the whole studied period (in that case defined as overall).*

Table 4.
Summary of collected literature data on average daily feed intake (in kg/day) in Iberian pig breed.

Reference	No. of animals	Final age (d)	Final BW (kg)	Hot CW (kg)	Dressing yield (%)	Back fat thickness (mm)			M[1] (mm)	Loin eye area (cm^2)
						S[2]	At withers	At last rib		
[9]	78	—	155	125	80.8	—	—	—	—	—
[25]	58	—	—	—	—	—	—	—	31	—
	58	303	136	112	82.2	—	—	62	28	—
[28]	2633	—	—	40	—	—	—	—	11	—
[29]	182	475	160	132	82.3	—	—	76	—	—
	231	481	149	117	78.7	—	—	67	—	—
	226	476	169	140	82.9	—	—	77	—	—
[30, 31]	22	—	152	120	78.8	—	—	64	—	25
[32]	701	—	162	131	80.7	—	—	—	—	—
[33]	8	477	159	126	79.1	—	—	—	—	—
	8	355	145	116	80.5	—	—	—	—	—
[34]	43	—	156	121	77.5	—	—	55	—	29
[35]	32	—	155	125	80.5	—	—	52	—	21
[36]	32	—	144	115	80.2	—	—	—	—	—
[37]	16	—	147	116	79.4	—	—	48	—	—
[38]	16	412	151	120	79.1	—	—	46	—	—
	8	412	159	125	78.3	—	—	49	—	—
[39]	16	—	138	109	78.8	—	—	45	—	—
[40, 41]	8	481	173	140	81.3	—	—	44	—	—
	16	481	171	137	80.3	—	—	46	—	—
[42]	16	281	163	130	79.6	—	—	50	—	—
[43, 44]	60	336	158	121	76.8	—	—	62	—	—
[45]	20	—	159	131	82.2	—	—	—	—	—
	20	—	159	131	82.2	—	—	—	—	—
[46]	—	427	136	—	—	—	—	64	—	—
[48]	1159	—	164	137	83.4	—	—	—	—	—
[49, 75]	48	—	50	37	74.8	—	—	24	—	—
	24	—	50	36	73.3	—	—	24	—	—
[51, 52]	52	—	100	—	78.1	—	—	51	—	—
	26	—	100	—	79.0	—	—	52	—	—
[53]	20	—	51	34	67.4	—	35	23	—	18
[55]	6	—	150	116	77.3	—	90	64	—	—
	6	—	151	117	77.8	—	86	71	—	—
[56]	—	—	151	119	79.1	—	—	—	—	—
[58]	25	85	25	16	66.7	—	—	12.	—	—
	27	106	25	16	68.1	—	—	14.	—	—
[62]	16	—	132	111	84.1	—	77	—	—	—

Reference	No. of animals	Final age (d)	Final BW (kg)	Hot CW (kg)	Dressing yield (%)	Back fat thickness (mm)			M[1] (mm)	Loin eye area (cm^2)
						S[2]	At withers	At last rib		
[63]	42	81	25	—	—	—	—	12	—	—
[64]	18	122	36	28	77.9	—	—	16	—	—
	20	336	158	124	78.2	—	—	63	—	—
[65]	24	484	191	159	82.4	—	—	76	—	29
[68]	60	311	145	117	81.2	65	—	80	—	—
[69]	12	—	118	93	78.6	—	—	48	—	—
[41]	8	481	150	121	80.6	—	—	49	—	—
	8	481	141	113	80.1	—	—	47	—	—
[76]	83	473	156	126	80.5	48	—	54	60	13
[77]	470	340	160	—	—	—	—	90	—	—
[78]	286	256	108	88	81.2	—	—	—	—	—
	270	362	138	112	81.7	—	—	—	—	—
[79]	2553	490	131	—	—	—	—	—	—	—
[80]	319	353	159	127	79.9	—	—	—	—	—
[81]	6166	508	163	130	79.7	—	—	—	—	—
[82]	241	458	158	133	84.0	—	—	67	—	25
[83]	125	—	161	139	86.8	—	—	—	—	—
[84]	22	—	135	116	85.8	—	—	—	—	—
	82	—	150	125	83.5	—	—	—	—	—
	177	—	161	134	83.2	—	—	—	—	—
	19	—	174	146	83.6	—	—	—	—	—
[85]	90	458	150	—	—	—	88	71	—	—
[86]	8	1	1	1	83.1	—	—	—	—	—
	8	58	14	9	61.8	—	—	10	—	—
	8	234	56	34	60.0	—	—	22	—	—
	8	352	80	56	70.4	—	—	36	—	—
	8	395	83	60	72.0	—	—	38	—	—
	8	424	97	74	76.4	—	—	42	—	—
	8	482	153	124	80.9	—	—	71	—	—

No.—number; BW—body weight; and CW—carcass weight.
[1]*M is the muscle thickness measured according to ZP method (at the cranial edge of* gluteus medius *muscle (mm)).*
[2]*S is the back fat thickness measured according to ZP method (above* gluteus medius *muscle (mm)).*

Table 5.
Summary of collected literature data on body composition and carcass traits in Iberian pig breed.

regimes applied in the reported studies. Despite the body weight range considered, these parameters point out the strong tendency of Iberian pigs for depositing high rates of fat and low rates of lean tissue when compared to conventional types of pigs.

5.4 Meat quality

The basic data obtained in this review concerning some of the most common meat and fat quality traits measured in *longissimus* muscle and back fat tissue are presented in **Table 6**. In the studies reporting meat quality, pH measured in *longissimus* muscle at 45 min and 24 hours *postmortem* varied from 6.29 to 6.62 [69, 76, 96] and from 5.61 to 5.75 [69, 76, 88, 89, 93, 96], respectively. Intramuscular fat content was very variable and ranged from 3.0 to 19.7% (6.9% in average) [29–33, 37–39, 42, 62, 65–69, 76, 77, 79–83, 87–92, 94]. Colour measured in CIE L, a, b colour space varied from 34 to 54, 7.5 to 14.8 and 1.7 to 13.6 for L, a* and b*, respectively [68, 69, 76, 88–93, 95, 96]. Total SFA, MUFA and PUFA content of intramuscular fat in *longissimus* muscle, reported for the control groups of animals in the considered studies, were approximately 38, 56 and 7%, with n6–n3 ratio varying from 2 to 20% [30, 31, 33, 35–39, 42, 64, 66, 67, 77, 88–92, 97]. On the other hand, total SFA, MUFA and PUFA content of back fat tissue, reported for control animals in the mentioned studies, were close to 33, 56 and 11%, with n6–n3 ratio varying from 5.6 to 20% [30, 31, 33, 35–39, 41, 42, 62, 68, 69, 77, 91, 97]. Due to wide differences between studies regarding parameters as feeding management, feed composition, final body weight or age and fatness, which are all important factors influencing the fatty acid composition of meat and fat tissue, the results of average fatty acid composition should be interpreted with caution. When comparative studies in which Iberian pigs have been contrasted either with its crosses with Duroc pigs [68] or with pigs from conventional breeds [69, 92], the pigs from Iberian genotype show redder (higher values of a*) and darker (lesser values of L) muscles and higher level of intramuscular fat in *longissimus* muscle than the other pigs types. The red tone is related to greater myoglobin content [91, 92] and is generally associated with higher intramuscular fat levels and more oxidative muscle metabolism.

6. Use of breed and main products

The Iberian pig production is mainly focussed on the elaboration of cured products, with hams, shoulders and loins being those more important, although other charcuterie pieces of lower economic relevance are also produced (chorizo, salchichón, morcón, etc.). More recently, fresh meat either for domestic consumption or for the HORECA sector has gained increasing importance being highly appreciated for its peculiarities in aroma, texture and juiciness, competing in the market with the conventional pig meat and also with specific meat pieces of lamb and beef. Nevertheless, the cured products from the Iberian pig fattened in the traditional *montanera* system are the commercially strategic products for the whole sector since their high-quality standards provide a prestige that, in a way, favours the rest of productions. All the hams, shoulders and loins produced from Iberian pig in Spain are currently under an official regulation [98] that classify the cured products detailed according to their genetic origin (pure or cross-breed and at what percentage) and system of production (intensive, semi-extensive or *montanera*), with the aim of offering the consumer a precise information of product origin which is directly related with their market prices. There are currently four protected designations of origin (DPO) for Iberian cured products (Guijuelo, Dehesa de Extremadura, Jabugo and Los Pedroches) that endorse and protect Iberian hams and shoulders. The most typical and well-known product that represents the breed is the *bellota* cured ham that reaches high prices in the market and acts as a flagship of the increasing export market (EU, Japan and the USA).

Reference	No. of animals	pH 45	pH 24	CIE[1]			IMF (%)	FA composition of IMF[2] (%)				FA composition of BFT[3] (%)			
				L*	a*	b*		SFA	MUFA	PUFA	n6/n3	SFA	MUFA	PUFA	n6/n3
[29]	182	—	—	—	—	—	5.9	—	—	—	—	—	—	—	—
	231	—	—	—	—	—	5.3	—	—	—	—	—	—	—	—
	226	—	—	—	—	—	6.9	—	—	—	—	—	—	—	—
[30, 31]	22	—	—	—	—	—	6.2	35.5	59.3	5.2	2.1	28.2	60.8	11.0	14.8
[32]	701	—	—	—	—	—	9.5	—	—	—	—	—	—	—	—
[33]	8	—	—	—	—	—	6.0	36.8	57.9	5.3	2.4	27.8	59.8	12.4	6.2
	8	—	—	—	—	—	4.6	36.9	58.1	5.0	2.6	28.3	61.0	10.7	8.0
[35]	8	—	—	—	—	—	—	35.5	59.0	5.5	2.1	29.4	59.1	11.5	11.8
[36]	8	—	—	—	—	—	—	36.9	58.1	5.0	2.6	28.3	61.0	10.7	8.0
[37]	16	—	—	—	—	—	8.5	37.5	56.7	5.8	8.8	33.3	43.6	23.1	6.7
[38]	16	—	—	—	—	—	5.4	38.5	57.4	3.6	5.4	32.3	56.4	11.2	5.7
	8	—	—	—	—	—	5.0	37.5	58.5	4.0	5.6	32.2	56.9	10.9	5.6
[39]	16	—	—	—	—	—	5.2	38.7	57.3	4.0	5.5	30.3	58.9	10.8	5.7
[42]	16	—	—	—	—	—	9.8	37.8	58.1	4.1	—	28.3	59.6	12.2	—
[62]	16	—	—	—	—	—	19.7	—	—	—	—	38.6	54.7	6.8	20.0
[64]	16	—	—	—	—	—	—	39.6	50.0	10.4	10.0	—	—	—	—
	20	—	—	—	—	—	—	38.0	58.4	3.6	10.0	—	—	—	—
[65]	24	—	—	—	—	—	4.6	—	—	—	—	—	—	—	—
[66]	25	—	—	—	—	—	9.7	37.8	58.1	4.0	6.3	—	—	—	—
	100	—	—	—	—	—	8.4	38.8	57.9	3.2	3.3	—	—	—	—

Reference	No. of animals	pH 45	pH 24	CIE[1]			IMF (%)	FA composition of IMF[2] (%)				FA composition of BFT[3] (%)			
				L*	a*	b*		SFA	MUFA	PUFA	n6/n3	SFA	MUFA	PUFA	n6/n3
[67]	14	—	—	—	—	—	6.1	33.2	47.8	19.0	—	—	—	—	—
[68]	60	—	—	40	11.3	13.6	8.8	—	—	—	—	38.7	52.5	8.7	—
[69]	12	6.49	5.75	54	7.5	—	3.9	—	—	—	—	34.8	51.7	13.5	—
[41]	8	—	—	—	—	—	—	—	—	—	—	28.1	57.7	14.2	—
[76]	83	6.62	5.74	34	13.2	1.7	8.3	—	—	—	—	—	—	—	—
[77]	470	—	—	—	—	—	8.2	39.8	53.2	7.0	—	37.0	51.5	11.5	—
[79]	1489	—	—	—	—	—	9.8	—	—	—	—	—	—	—	—
[80]	319	—	—	—	—	—	7.5	—	—	—	—	—	—	—	—
[81]	3083	—	—	—	—	—	9.5	—	—	—	—	—	—	—	—
[82]	241	—	—	—	—	—	4.8	—	—	—	—	—	—	—	—
[83]	125	—	—	—	—	—	5.2	—	—	—	—	—	—	—	—
[87]	319	—	—	—	—	—	7.5	—	—	—	—	—	—	—	—
[88, 89]	90	—	5.72	43	13.1	6.7	6.4	36.0	57.2	6.8	15.6	—	—	—	—
[90]	24	—	—	47	12.4	7.3	4.6	35.8	55.4	8.7	12.3	—	—	—	—
[91]	10	—	—	46	14.8	4.7	4.8	39.9	48.2	11.9	—	34.7	49.4	15.9	—
[92]	21	—	—	45	10.5	4.3	3.0	40.9	49.1	10.0	13.8	—	—	—	—
[93]	15	—	5.61	34	11.0	3.9	—	—	—	—	—	—	—	—	—
[94]	12	—	—	—	—	—	4.0	—	—	—	—	—	—	—	—
	12	—	—	—	—	—	4.2	—	—	—	—	—	—	—	—
[95]	21	—	—	45	10.5	—	—	—	—	—	—	—	—	—	—

Reference	No. of animals	pH 45	pH 24	CIE[1]			IMF (%)	FA composition of IMF[2] (%)				FA composition of BFT[3] (%)			
				L*	a*	b*		SFA	MUFA	PUFA	n6/n3	SFA	MUFA	PUFA	n6/n3
[96]	27	6.29	5.61	42	9.6	4.8	—	—	—	—	—	—	—	—	—
[97]	13	—	—	—	—	—	—	39.5	57.4	3.1	20.0	36.6	55.0	8.4	9.9

No.—number; pH 45—pH measured approximately 45 min postmortem*; pH 24—pH measured approximately 24 hours* postmortem*; FA—fatty acid; IMF—intramuscular fat; BFT—back fat tissue; SFA—saturated fatty acids; MUFA—monounsaturated fatty acids; PUFA—polyunsaturated fatty acids; and n6/n3—the proportion between n6 and n3 polyunsaturated fatty acids.*
[1]CIE—objective colour defined by the Commission Internationale de l'Eclairage; L greater value indicates a lighter colour; a* greater value indicates a redder colour; b* greater value indicates a more yellow colour.*
[2]For fatty acid composition of intramuscular fat tissue in longissimus muscle, only pigs on control diet were considered, and when fatty acid composition was reported separately for neutral and polar lipids, values reported for neutral lipids were considered. Control diets differed among studies, to see diet composition address to the corresponding source.
[3]For fatty acid composition of back fat tissue, only pigs on control diet were considered and when fatty acid composition was reported separately for outer and inner layers, values reported for outer layer of back fat tissue were considered. Control diets differed among studies, to see diet composition address to the corresponding source.

Table 6.
Summary of collected literature data on meat quality traits in Iberian pig breed.

The quality of the Iberian products from the sensorial and organoleptic, technological, dietetic, biosecurity, commercial and healthy point of view, is due to various meat properties that determine their essence. All of them together are responsible for their commercial success and consumer appreciation. Its sensory characteristics, such as appearance, smell, colour and above all the flavour, justify the conservation of this breed and its ecosystem and the maintenance of its ancient forms of production and processing.

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