

Casertana Pig

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Abstract

The present chapter aims to present the history, current status and information of Casertana pig breed investigated in the project TREASURE. As for most of the other Italian local pig breed conservation program started in 2001 and in 2015, 20 farms of Casertana pigs with about 545 breeding sows and 20 boars were registered. The average age of sows at the first parturition is 16 months, whereas age at culling is 59 months. On average Casertana pigs have 1.2 litters per year with 7.6 piglets. The farrowing interval (305 days on average) is prolonged compared to modern pig breeds. The fattening phase of Casertana pigs is generally characterised by slower growth, and the animals were slaughtered at around 375 days of age, with an average live weight of 154 kg and a dressing yield of 81%. The breed is characterised by a high level of backfat thickness. The breed is traditionally raised with the semi-extensive system, and the most recognised trait of the Casertana pig is the ‘marbling’ of the meat. This current review provides a comprehensive insight into the information for this local pig breed.

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

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

The Casertana pig is a breed of domestic pig from Campania, in Southern Italy [1]. The census of Casertana pig breed is presented in **Figure 1**. Presently there are 20 registered farms of Casertana pigs with about 545 breeding sows and 20 boars in the latest available status (August 2015 [2]). The presence of hairless pigs in Campania with a short and broad head, resembling the Asian pigs, is already documented in Roman times. Casertana breed originated from the repeated crossing of these pigs with those of Central European origin [3]. Already at the end of the eighteenth century, the Casertana pig was raised in one of the most populated areas of the Bourbon Kingdom, where it was appreciated for its great ability to produce fat. In the nineteenth century, the Casertana pig was present in the province of Caserta, its area of origin. Starting from its area of origin, the breed spreads in the provinces of Naples, Benevento, Avellino, Salerno and Potenza, and during the early decade of the twentieth century was one of the largest populations of the country [3]. After World War II, the consistency contracted drastically, and only the start of the conservation programme in 2001 facilitated the opening and development of numerous small breeding nuclei [3–5].

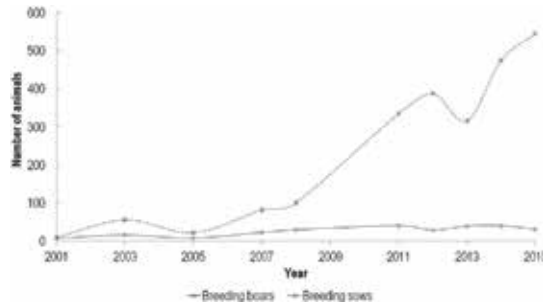


Figure 1. Census of Casertana pig breed, presenting a number of sows and boars per year, starting with the year of herdbook establishment.

2. Exterior phenotypic characteristics

The Casertana pig is a medium-sized breed with two unusual physical traits: it is virtually hairless, which gives rise to its alternative name Pelatella, ‘hairless one’, and it has two wattles or cylindrical appendages hanging from the lower part of the throat. Animals present light but solid skeleton with pigmented skin (black or slate grey) and sparse and thin bristles, sometimes grouped especially on the neck, on the head and at the end of the tail. The head is of medium development and truncated conical shape, with a rectilinear or slightly concave profile and long and thin snout. Ears are of medium-sized close together and bending forward (**Figures 2 and 3**). The Casertana pig breed morphology information is summarised in **Table 1**.

3. Geographical location and production system

Casertana breed is raised in different Italian regions: Campania, Molise, Lazio and Umbria [3]. The traditional breeding technique foresees a wide use of grazing in beech, chestnut or oak woods, with poor feed integration and with large spaces where the Casertana pig can freely graze [5]. Currently, most of the animals are fattened according to modern breeding techniques, with the use of protein nuclei and integrated feed even if breeding with extensive and semi-extensive management is still present, usually in the oaks. When animals are intensively raised, they are kept continuously confined with basic heat protections available even if the environment is not completely climate controlled.



Figure 2. Casertana sow with piglets.



Figure 3.
Casertana boar.

Measurement (average)	Adult male	Adult female
Body weight (kg)	140–260	140–260
Body length ¹ (cm)	116	112
Head length (cm)	30–40	25–35
Ear length	Medium	Medium
Chest girth (cm)	150	138
Height at withers (cm)	90–94	82–88
Number of teats (average)	12	12

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

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

4. Organisations for breeding, monitoring and conservation

The Italian Pig Breeders Association (ANAS) is the organisation responsible for monitoring the breed, to which it is delegated for the conservation strategies of the breed, which is not interested in a selection scheme. Activities carried out by ANAS

Name of organisation	Address	Web or e-mail address
Associazione Nazionale Allevatori Suini (ANAS)	Via Lazzaro Spallanzani 4, 00161 Rome, Italy	www.anas.it
Consorzio del Casertana	Via Provinciale, 44 82,030 Faicchio (BN), Italy	info@consorzionerocasertano.it

Table 2.
Contact details of breeding organisation for Casertana pig breed.

are mainly directed towards the maintenance of genetic variability while promoting economic exploitation. Recently, as for other local Italian breeds, a consortium of Casertana breeders has been set up in the area of origin aimed to promote and enhance the production of this breed (**Table 2**).

5. Productive performance

5.1 Reproductive traits

The basic data on reproductive traits obtained in this review are presented in **Table 3**. According to the herdbook data, the age of sows at the first parturition is 24.5 months, whereas the age at culling is 46.7 months [2]. Sows of Casertana pig breed have 1.1–1.3 litters per year [1, 6] with 6.0–9.2 piglets [2, 6–9] of approximately 1.0 kg live body weight [1, 2, 8, 10, 11] and 4.2 kg weaning weight [11]. Stillborn percentage of piglets is low (around 2.7% [2, 8]), whereas piglet mortality rate until weaning is considerably higher (around 20.4% [2, 8, 12]). The duration of the farrowing interval (approximately 305 days [1, 6]) is prolonged compared to modern pig breeds.

5.2 Growth performance

The basic data on growth performance obtained in this review are presented in **Tables 4** and **5**. Due to big differences between studies with regard to the live weight range covered, we defined the stages 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 fattening stage (defined as overall) or even from birth to slaughter (defined as birth to slaughter, which is often calculated from the data given on live weight and age of pigs). It should also be noted that a big part of the collected studies simulated practical conditions of the production systems used and that only a smaller part of the studies aimed at evaluating the breed potential for growth. In the considered studies, the early, middle, late and overall fattening stage is generally characterised by slower growth (477, 464, 446 and 453 g/day, respectively), whereas no data were available for growth performance in lactation and growing period.

In the considered studies, the information on feed intake and feed nutritional value were scarce, which limits the evaluation of growth potential. In the only available study by Fortina et al. [15], the average daily feed intake reported for the overall fattening period (body weight from 33 to 200 kg) was 2.1 kg/day (declared as semi ad libitum feeding with complete feed mixture containing 13.8 MJ/metabolisable energy and 17% crude protein).

Reference	Sow age at the 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)	Farrowing interval (d)	Sow age at culling (mth)
[1]	12	1.1	—	0.83	—	—	—	330	72
[2]	24.5	—	6.7	0.75	1.5	13.2	—	—	46.7
[7]	—	—	9.1	—	—	—	—	—	—
[8]	—	—	7.1	0.76	3.9	30.0	—	—	—
[13]	—	—	—	—	—	—	—	—	—
[9]	11.2	—	6.0	—	—	—	—	—	—
[6]	—	1.3	9.2	—	—	18.1	—	281	—
[10]	—	—	—	1.21	—	—	—	—	—
[14]	—	—	—	—	—	—	—	—	—
[11]	—	—	—	1.23	—	—	4.2	—	—

No. = number, mth = month, d = days.

Table 3.
 Summary of collected literature data on reproduction traits in Casertana pig breed.

Reference	Feeding	No. of animals	ADG fattening ¹				ADG birth to slaughter
			Early	Middle	Late	Overall	
[1]	—	—	—	—	—	500	—
[7]	Semi	21	467	491	361	450	—
[15]	Semi	6	487	437	530	415	403
[16]	Semi	12	—	—	—	468	—
[17]	—	15	—	—	—	430	—

No. = number, ADG = average daily gain in g, Semi = semi ad libitum feeding regime.
¹ADG 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 4.
Summary of collected literature data on growth performance in Casertana pig breed.

Reference	No. of animals	Final age (d)	Final BW (kg)	Hot CW (kg)	Dressing yield (%)	Lean meat content (%)	Backfat thickness (mm)		
							S ¹	At withers	At the last rib
[1]	—	—	175	140	80.0	—	—	—	—
[7]	21	367	151	123	81.4	—	—	—	45
[15]	6	494	200	165	82.3	42.1	60	75	48
[16]	12	315	140	115	81.8	—	—	—	46
[17]	15	323	140	119	80.2	—	—	—	52
[18]	50	—	120	93	82.9	—	59	71	41

No. = number, BW = body weight, CW = carcass weight.
¹S backfat 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 Casertana pig breed.

5.3 Body composition and carcass traits

The basic data obtained in this review with some of the most commonly encountered carcass traits that could be compared are presented in **Table 5**. In the considered studies, pigs of Casertana breed were slaughtered at approximately 375 days of age [7, 15–17] and between 120 and 200 kg live weight (154 kg in average [1, 7, 15–18]). Dressing yield was around 81% [1, 7, 15–18]. The average backfat thickness values measured at withers were 73 mm [15, 18], at the level of the last rib 46 mm [7, 15–18] and above the *gluteus medius* muscle 60 mm [15, 18]. Muscularity measured as lean meat content was 42.1% ([15]; SEUROP classification), whereas data providing other measurements of muscularity (i.e. loin eye area or muscle thickness measured at the cranial edge of *gluteus medius* muscle) were not available in the considered studies.

5.4 Meat and fat quality

The basic data obtained in this review with some of the most commonly encountered meat and fat quality traits measured in *longissimus* muscle that

Reference	No. of animals	pH 45	pH 24	CIE ¹			IMF content (%)	Fatty acid composition ² (%)		
				L*	a*	b*		SFA	MUFA	PUFA
[15]	6	6.38	5.96	43	9.4	2.6	4.7	40.0	48.2	11.8
[16]	14	—	—	—	—	—	2.0	45.9	41.0	13.9
[17]	15	6.17	5.51	40	6.8	2.1	—	—	—	—
[12]	30	—	—	45	11.3	8.3	—	—	—	—

No. = number, pH 45 = pH measured approximately 45 minutes post-mortem, pH 24 = pH measured approximately 24 hours post-mortem, IMF = intramuscular fat, SFA = saturated fatty acids, MUFA = monounsaturated fatty acids, PUFA = polyunsaturated fatty acids.

¹CIE = 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.

²For fatty acid composition, only pigs on control diet 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 and fat quality in Casertana pig breed.

could be found are presented in **Table 6**. In the studies reporting meat quality of Casertana pigs, pH measured in *longissimus* muscle at 45 min and 24 h *post-mortem* was around 6.23 and 5.7 [15, 17], respectively. The intramuscular fat content was 2.0 and 4.7% [15, 16] and colour measured in CIE L*, a, and b colour space was 42, 9.1 and 4.3 for L*, a* and b*, respectively [12, 15, 17]. In the considered studies, SFA, MUFA and PUFA content of intramuscular fat in *longissimus* muscle was around 43, 45 and 13%, respectively. Due to big differences between studies about the feeding regime, feed composition, final body weight/age and fatness, which are all important factors influencing the fatty acid composition of meat, the results of the fatty acid composition should be interpreted with caution.

6. Use of breed and main products

Casertana breed has a good fattening attitude, and the fat tends to spread widely throughout the meat making it soft and tasty. Traditionally raised with the semi-extensive system, mainly fed with acorns, chestnuts, walnuts and wild fruits, it is slaughtered between 16 and 24 months, obtaining meat of good quality with tenderness as a special attribute. The most prized characteristic of the Casertana pig is the 'marbling' of the meat, i.e. the presence of abundant intramuscular connective tissue (noble fat), which gives flavour and softness to the meat. Meat is used both for cured products and fresh consumption. The main typical products are hams, ribs and above all different types of salami (capocollo, pancetta, and soppressata).

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References

- [1] FAO. The Domestic Animal Diversity Information System [Internet]. Available from: <http://dad.fao.org/> [Accessed: 19-7-2017]
- [2] ANAS Database, Gallo M. Personal Communication. 2015
- [3] ANAS. Casertana Standard di Razza [Internet]. 2010. Available from: https://www.google.si/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwioqISkjLLaAhVHWhQKHbSYCWkQFggnMAA&url=http%3A%2F%2Fwww.anas.it%2Fdocumenti%2FScheda_casertana.pdf&usg=AOvVaw1GY-Stfp8FipaMfhVWidCc [Accessed: 11-4-2018]
- [4] Bigi D, Zanon A. Atlante delle razze autoctone: Bovini, equini, ovicaprini, suini allevati in Italia. Milan, Italy: Il Sole 24 Ore Edagricole; 2008
- [5] Ministero delle Politiche Agricole Alimentari e Forestali. Strutture Zootecniche (Dec. 2009/712/CE—Allegato 2—Capitolo 2) (in Italian) [Internet]. 2013. Available from: <http://www.anas.it/Normative/Norme001.pdf> [Accessed: 4-4-2018]
- [6] Leenhouwers JI, Merks JWM. Suitability of traditional and conventional pig breeds in organic and low-input production systems in Europe: Survey results and a review of literature. *Animal Genetic Resources/ Resources Génétiques Animales/ Recursos Genéticos Animales*. 2013;53:169-184. DOI: 10.1017/S2078633612000446
- [7] Pietrolà E, Pilla F, Maiorano G, Matassino D. Morphological traits, reproductive and productive performances of Casertana pigs reared outdoors. *Italian Journal of Animal Science*. 2006;5:139-146. DOI: 10.4081/ijas.2006.139
- [8] Gallo M, Buttazzoni L. Ruolo del Registro anagrafico per la conservazione dei tipi genetici autoctoni. In: Nanni Costa L, Zambonelli P, Russo V, editors. *Proceedings of the 6th International Symposium on the Mediterranean Pig; 11-13 October 2007; Messina—Capo d'Orlando, Italy*. Bologna, Italy: AlmaDL; 2008. pp. 429-434. DOI: 10.6092/unibo/amsacta/2513
- [9] Peretti V, Ciotola F, Iannuzzi L. Characterization, conservation and sustainability of endangered animal breeds in Campania (southern Italy). *Natural Science*. 2013;05:1-9. DOI: 10.4236/ns.2013.55A001
- [10] Mascagni O. I suini di razza Cinta Senese ed il loro miglioramento. *Agricoltura Toscana*. 1947:337-343
- [11] Franci O, Gandini G, Madonia G, Pugliese C, Chiofalo V, Bozzi R, et al. Performances of Italian local breeds. In: Ollivier L, Labroue F, Glodek P, Gandini G, Delgado JV, editors. *Pig Genetic Resources in Europe*. Wageningen, Netherlands: EAAP Publication, Wageningen Press; 2001. pp. 151-151
- [12] Barone CMA, Castellano N, Colatruglio P, Gigante G, Matassino D, Rossetti CE, et al. Utilization of the Casertana pig to obtain traditional, typified labelled salami. II. Qualitative characteristics of meat at carcass jointing. In: Audiot A, Casabianca F, Monin G, editors. *Options Méditerranéennes: Série A*. No. 76; 16-19 November 2004; France. Zaragoza, Spain: CIHEAM; 2007. pp. 207-211
- [13] Maiorano G. Swine production in Italy and research perspectives for the local breeds. *Slovak Journal of Animal Science*. 2009;42:159-166
- [14] Franci O, Pugliese C. Italian autochthonous pigs: Progress report and

research perspectives. *Italian Journal of Animal Science*. 2007;**6**:663-671. DOI: 10.4081/ijas.2007.1s.663

[15] Fortina R, Barbera S, Lussiana C, Mimosi A, Tassone S, Rossi A, et al. Performances and meat quality of two Italian pig breeds fed diets for commercial hybrids. *Meat Science*. 2005;**71**:713-718

[16] Salvatori G, Filetti F, Di Cesare C, Maiorano G, Pilla F, Oriani G. Lipid composition of meat and backfat from Casertana purebred and crossbred pigs reared outdoors. *Meat Science*. 2008;**80**: 623-631

[17] D'Alessandro A, Marrocco C, Zolla V, D'Andrea M, Zolla L. Meat quality of the longissimus lumborum muscle of Casertana and large white pigs: Metabolomics and proteomics intertwined. *Journal of Proteomics*. 2011;**75**:610-627

[18] Salerno A. Le rese alla mattazione in alcune razze suine Italiane. In: *Annali Facoltà Di Agraria*. Bari, Italy; 1955. pp. 24-56