

We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

4,800

Open access books available

122,000

International authors and editors

135M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.

For more information visit www.intechopen.com



Mora Romagnola Pig

*Riccardo Bozzi, Maurizio Gallo, Claudia Geraci,
Luca Fontanesi and Nina Batorek-Lukač*

Abstract

Mora Romagnola breed, one of the Italian local pig breeds, owes its name to its colour, dark brown tending to black. Currently 31 farms are registered in the herdbook started in 2001 with about 270 breeding females and 67 boars. During the 1990s, only 18 animals were left, all concentrated in one single farm. The breed was investigated within the H2020 project TREASURE, and a collection and review of available literature data on reproductive and productive traits of Mora Romagnola pig breed were carried out. The average age of sows at first parturition was 22 months, whereas age at culling was 58 months. On average, Mora Romagnola pig breed has 8.0 piglets per parity with 1.4 parities per year. Slaughter weight was on average 163 kg with a dressing yield of 80%. Few information is available for meat quality traits. Although studies on Mora Romagnola pig are scarce, the current review gives the first insight into this local pig breed.

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

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

The Mora Romagnola is a breed of pig from Emilia-Romagna, in northern Italy [1]. The breeding of pigs in Romagna has very ancient origins, and trace of its presence dates back to the Lombard period. The Mora Romagnola was bred in the province of Forlì and Ravenna, and different types were distinguished according to the breeding areas and different shades of colour [2]. The name 'Mora' was codified in 1942 and is due to its colour, dark brown tending to black. The Romagna region belonged to different states in the past, and this is probably the reason of the different varieties of the breed, very distinct until the early twentieth century [2]. Usually the name of the varieties reflects the place of origin (forlivese, faentina, bolognese) or the characteristics of the mantle (brunette, blackberry, castagnina). In these last years, a morphotype with a blackish coat, with tints of the lighter abdomen and with the characteristic 'Sparta line', became diffused, and it was probably derived from repeated crossing of Mora and Chianina and Cappuccia (two other local pig breeds now extinct) [2]. The Mora Romagnola is one of the Italian pig breeds interested by the crossing with the Large White forming the so-called 'Fumato' very popular for the heavy weights reached. During the 1990s, the breed was very close to extinction, and only the activation of the registry, in 2001, allowed to set up the technical basis for initiatives to enhance the breed through a gradual and progressive recovery. Presently, there are 31 registered farms of Mora Romagnola pigs with about 270 breeding sows and 67 boars in the latest available status (August 2015; [3]). Census of Mora Romagnola pig breed is presented in **Figure 1**.

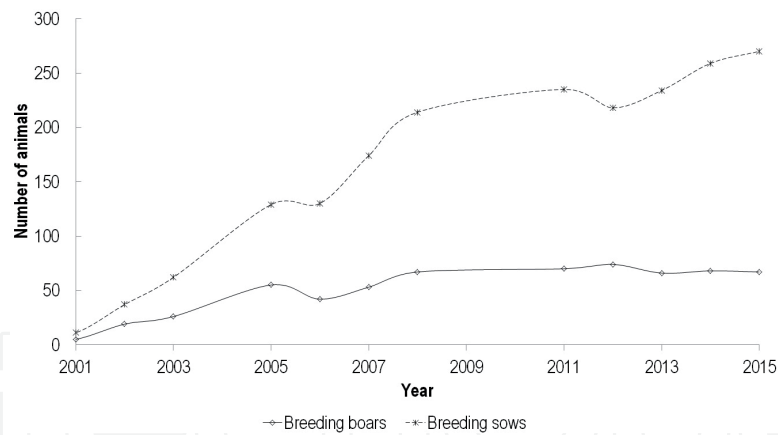


Figure 1. Census of Mora Romagnola pig breed, presenting number of sows and boars per year, starting with the year of herdbook establishment.

2. Exterior phenotypic characteristics

The Mora Romagnola pig breed morphology information is summarised in **Table 1**. It is a medium-sized breed with a dark-coloured coat (**Figures 2 and 3**). The breed type is robust and rustic, with thin but solid skeleton. The skin is pigmented (black or dark grey) on the back and in the external areas of the limbs and rosy in the abdomen and in the inner sides of the forearm and thighs. Bristles are particularly robust in correspondence with the ‘Sparta line’ on the back (this is a peculiar characteristic of the breed). The breed presents head of medium development, concave profile, long and thin snout; medium-sized ears directed forward; eyes with characteristic almond shape with black pigmented sclera.

Measurement (average)	Adult male	Adult female
Body weight (kg)	160–200	160–200
Body length ¹ (cm)	120	120
Ear length	Medium	Medium
Height at withers (cm)	80–90	80–90
Number of teats (average)	12.8	12.8

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

Table 1. Summary of morphology information on Mora Romagnola pig breed.



Figure 2. Mora Romagnola sow.



Figure 3.
Mora Romagnola pigs on pasture.

3. Geographical location and production system

In the early 1990s, only 18 animals were left concentrated in a single farm with high levels of inbreeding. Subsequently, WWF Italy in collaboration with the University of Torino decided to implement a recovery plan for the Mora Romagnola breed, and later the ANAS established the registry of Italian native breeds to protect them. Today there are dozens of farms registered in the register of Mora Romagnola, mainly found in the provinces of Ravenna (Faenza, Brisighella, Bagnacavallo), Forlì, Bologna and Modena but also in the rest of Emilia-Romagna (Reggio Emilia, Parma). There are also few farms in other areas of Italy (Torino, Arezzo, Benevento). Animals are usually intensive raised in confined spaces by small farmers even if outdoor farming is also present. Animals are usually kept continuously confined with limited control of climate conditions but with basic heat protections.

4. Organisations for breeding, monitoring and conservation

The Italian Swine Breeders Association (ANAS) is responsible for monitoring the breed. Activity is focussed towards the maintenance of genetic variability, promoting economic exploitation. The farmers have been associated since 2005 with the COPAF, which was established as a consortium for the protection of the Mora Romagnola. COPAF also presented to the Ministry of Agriculture, Forestry and Fisheries (MIPAAF) the PDO application for the Mora Romagnola pig breed, but the process is still ongoing (**Table 2**).

Name of organisation	Address	Web address
Associazione Nazionale Allevatori Suini (ANAS)	Via Lazzaro Spallanzani 4, 00161 Rome, Italy	www.anas.it
Consorzio di tutela e valorizzazione della razza suina 'Mora Romagnola' (COPAF)	Via Masironi, 7 Brisighella (RA), Italy	

Table 2.
Contact details of breeding organisation for Mora Romagnola pig breed.

5. Productive performance

5.1 Reproductive traits

Basic data obtained on reproductive traits in this review are presented in **Table 3**. The age of sows at first parturition is between 19 and 25 months [1, 8], whereas age at culling is 58 months [3]. On average sows of Mora Romagnola pig breed have 1.4 litters per year (from 0.8 to 1.3; [1, 4, 10, 11]) with around 8 piglets [3, 4, 6, 10, 11] of approximately 0.9 kg live body weight [1, 6, 8, 9]. Stillborn percentage of piglets is low (3–3.8% [3, 6]), whereas piglet mortality rate until weaning in the considered studies ranges from 4.4 to 20.8% [3, 4, 6]. The farrowing interval is prolonged in comparison to modern intensive systems (from 209 to 435 days; [1, 4, 10, 11]).

5.2 Growth performance

Basic data on growth performance obtained in this review are presented in **Tables 4** and **5**. In the considered studies, the information on daily gain was rarely provided. Due to big differences between studies with regard to the live weight range covered, we defined the periods for growth performance as 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-slaughter, which is calculated from the data given on live weight and age of pigs). It should also be noted that the collected studies simulated practical conditions of the production systems used not aiming to evaluate breed potential for growth. Fortina et al. [12] showed that daily gain in the early, middle and late fattening stage was 517, 501, 560 and 488 g/day, whereas according to Bonanzinga et al. [11], pigs of Mora Romagnola gain only 331 g per day considering the period from birth to slaughter. The maximal growth rate observed for Mora Romagnola pigs was 600 g/day in overall fattening stage [1].

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 (%)	Farrowing interval (d)	Sow age at culling (mth)
[1]	25	0.8	—	0.6	—	—	435	—
[3]	—	—	7.7	—	3.8	20.6	—	58
[4]	—	1.3	8.7	—	—	4.4	281	—
[5]	—	—	—	—	—	—	—	—
[6]	—	—	6.9	0.7	3.0	20.8	—	—
[7]	—	—	—	—	—	—	—	—
[8]	19	—	—	1.1	—	—	—	—
[9]	—	—	—	1.3	—	—	—	—
[10]	—	1.8	8.3	—	—	—	209	—
[11]	—	1.8	8.3	—	—	—	209	—

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

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

Reference	Feeding	No. of animals	ADG fattening ¹				ADG birth-slaughter
			Early	Middle	Late	Overall	
[1]	—	—	—	—	—	600	—
[11]	—	—	—	—	—	—	331
[12]	Semi	11	517	501	560	—	—

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 Mora Romagnola pig breed.

In 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. [12], average daily feed intake reported for the overall fattening period (body weight from 42 to 193 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).

5.3 Body composition and carcass traits

Basic data obtained in this review with some of the most commonly encountered carcass traits that could be compared are presented in **Table 5**. Pigs of Mora Romagnola breed were slaughtered at approximately 514 days of age [12] and at an average live weight of 163 kg [11–14]. Dressing yield was around 80% [1, 12, 14] and lean meat content 39.2% ([12]; SEUROP classification), which corresponds to high slaughter weight. An average backfat thickness measured on the withers was 68 mm [12–14], 52 mm at the position of the last rib [12, 13] and 54 mm measured above the gluteus medius muscle [12–14]. Other data providing measurements of muscularity were not found in considered studies.

5.4 Meat quality

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

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 last rib
[1]	—	—	—	240	80.0	—	—	—	—
[11]	—	—	160	—	—	—	—	—	—
[12]	11	514	193	155	80.4	39.2	62	76	57
[13]	4	—	152	—	—	—	45	64	47
[14]	50	—	146	119	81.2	—	55	64	—

No. = number; BW = body weight; CW = carcass weight.

¹S backfat thickness measured according to ZP method (above the gluteus medius muscle (mm)).

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

Reference	No. of animals	pH 45	pH 24	CIE ¹			IMF content (%)	Fatty acid composition ² (%)		
				L*	a*	b*		SFA	MUFA	PUFA
1 [12]	11	6.57	6.15	42	8.7	2.2	6.1	41.31	47.63	11.04
2 [13]	4	—	5.79	43	—	—	7.5	—	—	—

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 quality in Mora Romagnola pig breed.

be found are presented in **Table 6**. In the studies reporting meat quality of Mora Romagnola pigs, pH measured in the *longissimus* muscle at 45 min and 24 h post-mortem was 6.57 [12] and 5.97 [12, 13], respectively. High intramuscular fat content was observed (in average 6.8%; [12, 13]) and relatively dark colour (43 for CIE L, [12, 13]). In the only available study, SFA, MUFA and PUFA content of intramuscular fat in the *longissimus* muscle were 41.3, 47.6 and 11.0%, respectively.

6. The use of breed and main products

The Mora Romagnola breed is a good grazer, adaptable to difficult geographical conditions. Reproduction takes place outdoors in all periods of the year, as the Mora resists well even at low temperatures. The breeding is a closed cycle; in fact, the arable crops provide cereals and legumes necessary for feeding the animals. Strengths of the breed are the hardiness, the good resistance to diseases and the already cited excellent grazing ability (in several months of the year, it provides itself with food in the sparse woods). Weaknesses are poor prolificity, mediocre feeder and late fattening. Animals are very voracious and precocious, with a good meat quality: excellent for cured meats with firm fat and good shelf life. The slaughter of pigs takes place all year round for the production of fresh meat but preferably in the period from autumn to spring for the preparation of cured meats. The breed produces sapid, soft but compact meat, rather fatty: these are the characteristics that distinguish Mora. Excellent results have been achieved by using it for the production of high-quality salami such as 'culatello', 'cotechino', or cured shoulder.

Acknowledgements

The research was conducted within the project TREASURE, which has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 634476. The content of this paper reflects only the author's view, and the European Union Agency is not responsible for any use that may be made of the information it contains.

IntechOpen

Author details

Riccardo Bozzi^{1*}, Maurizio Gallo², Claudia Geraci³, Luca Fontanesi³
and Nina Batorek-Lukač⁴

1 DAGRI - Animal Science Section, University of Florence, Florence, Italy


2 ANAS- Italian Pig Breeders Association, Rome, Italy

3 Department of Agriculture and Food Sciences, University of Bologna, Bologna, Italy

4 Agricultural Institute of Slovenia, Ljubljana, Slovenia

*Address all correspondence to: riccardo.bozzi@unifi.it

IntechOpen

© 2019 The Author(s). Licensee IntechOpen. Distributed under the terms of the Creative Commons Attribution - NonCommercial 4.0 License (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits use, distribution and reproduction for non-commercial purposes, provided the original is properly cited. 

References

- [1] FAO. The Domestic Animal Diversity Information System [Internet]. Available from: <http://dad.fao.org/> [Accessed: 19-7-2017]
- [2] ANAS. Mora-Romagnola Standard di razza [Internet]. 2013. Available from: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwi8jZSa6KDbAhUCzKQKHbZeDzEQFggnMAA&url=http%3A%2F%2Fwww.anas.it%2Fdocumenti%2FScheda_moraromagnola.pdf&usg=AOvVaw0yFhDRi-KvFUP0X1sa1Erb [Accessed: 25-5-2018]
- [3] Gallo M. ANAS Database, Personal Communication. 2015
- [4] Leenhouders 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
- [5] Maiorano G. Swine production in Italy and research perspectives for the local breeds. *Slovak Journal of Animal Science*. 2009;42:159-166
- [6] 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
- [7] 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
- [8] Bozzi R. Personal Communication, Data Collected within TREASURE Survey 2.1. Florence, Italy: University of Florence, Department of Agro-Food and Environmental Production Sciences; 2015
- [9] 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
- [10] The Sustainable Use of Biodiversity in MED Area: The Contribution of the QUBIC Project [Internet]. Available from: http://www.programmemed.eu/uploads/tx_ausybibliomed/QUBIC_1_final_result_publication_EN.pdf [Accessed: 21-9-2017]
- [11] Bonanzinga M, Franci O, Cappè F, Sirtori F, Crovetto A, Esposito S, Pugliese C. The breeding of the main local pig breeds in Mediterranean Europe. In: De Pedro EJ, Cabezas AB, editors. *Options Méditerranéennes: Série A. Séminaires Méditerranéens*; n. 101; 14-16 October 2010; Córdoba, Spain. Zaragoza, Spain: CIHEAM; 2012. pp. 117-124
- [12] 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
- [13] Lo Fiego DP, Lelo MC, Comellini M, Volpelli LA. Carcass and meat quality traits of pigs with different blood fractions of “Mora-Romagnola” breed, reared outdoors. In: Nanni Costa L, Zambonelli P, Russo V, editors. *Proceedings of 6th International Symposium on the Mediterranean Pig*; 11-13 October 2007; Capo d'Orlando,

Italy. Bologna, Italy: AlmaDL; 2008.
pp. 302-307. DOI: 10.6092/unibo/
amsacta/2513

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

IntechOpen

IntechOpen