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# Meat quality of pigs, $F_1$, $F_2$, reared and wild wild boars

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**Titolo**
Qualità della carne di suini, cinghiali allevati e selvatici, $F_1$, $F_2$

**Key words**
Wild boar, hybrids, meat characterization, acidic composition, quality

**Parole chiave**
Cinghiale, ibridi, caratterizzazione carne, composizione acidica, qualità

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**Summary**
The present study represents the physical parameters, the chemical composition and the fatty acid's profile of meat produced by pigs, wild boars and their hybrids, $F_1$ (wild boar x pig) and $F_2$ [wild boar x (wild boar x pig)]. For this scope, 20 animals have been used, 16 of them divided into 4 groups, one of each genotype, reared into outdoor pens and the 4 wild wild boars (S group) hunted in the "Hunting Territorial Ambit B" of the province of Matera (Italy). The chemical composition has been determined on the sample of *Longissimus dorsi* (L.D.) (raw and cooked) and on the fat extracted from it. As a result of this study, we can suggest that the wild wild boars, even if they present the lowest development of vintage commercial cuts, appears to have the best meat quality in physical characteristics as well as in chemical and acidic ones, that render their final products in high value.

**Riassunto**
La presente ricerca espone i parametri fisici, la composizione chimica e gli acidi grassi della carne proveniente da suini, cinghiali allevati e selvatici e i loro ibridi, $F_1$ (cinghiale x suino) e $F_2$ [cinghiale x (cinghiale x suino)]. All'uopo sono stati impiegati 20 soggetti, 16 di cui, suddivisi in 4 gruppi per genotipo, sono stati allevati tutti in recinti a cielo aperto e 4 cinghiali selvatici abbattuti nell'Ambito Territoriale di Caccia B della provincia di Matera (Italia). La composizione chimica è stata ricavata su un'aliquota di *Longissimus dorsi* (L.D.) (cotto e crudo) e sul grasso da esso estratto. Come risultato di questa ricerca, si può assumere che il cinghiale selvatico, pur presentando un minore sviluppo dei tagli più pregiati, presenta delle carni di qualità superiore, sia per le migliori caratteristiche fisiche, sia per quelle chimiche ed acidiche, che fanno di questa derrata un prodotto di elevato pregio.

## Introduction

Quanti-qualitative aspects of meat production depended on genotype, feeding, sex, animal age, breeding system, slauthering and, last but not least, from the dissection of carcass and domestic cooking

(1). In the last few years, the variation of socioeconomic requirements of consumers in richer countries induced a change of their alimentary demands. Nowadays, in fact, the consumers take more care of the nutrition/health relationship and require genuine and quality food and therefore meat, poor in fat and in saturated fatty acids, like $C_{12:0}$, $C_{14:0}$ and $C_{16:0}$, maybe, capable to increase the plasmatic level of cholesterol (2-4); but rich in unsaturated and polyunsaturated fatty acids, which are promoters of reduction of LDL' cholesterol (5), where the risks of heart-disease are connected. These risks can be reduced with the assumption of polyunsaturated fatty acids of $\omega_3$ series (6) whose role in the prevention of thrombosis, atherosclerosis and heart disease had been reported by (7-11).

The concept of genuiness is connected with the reduction of human interference in the productive process and the use of ecological breeding techniques, such as the outdoor pens rearing and the use of rustic animal genotypes; on the other hand, the concept of quality, instead, is due to chemical-physical and organoleptic characteristics of products, able to satisfy the implicit and not consumer's requirements.

The outdoor pens rearing is a good breeding system because, besides of furnishing a genuine image, influences favorable on animal wellness and on final product quality.

In the last 50 years, the yearly individual italian meat consume is reased from 20.5 kg/person in 1955 to 91,1 kg/person in 2002 (12), even if, in the last decade, the meat medium consume of particular species has registered sometimes a contraction and other times a standstill, often, due to sanitary problems (B.S.E., Blue Tongue, avian influence); while, in the case of pig meat, there have been no evident upsettings of market and in some cases the pig meat consume has overcome this of bovine meat. In 2008, Italy registered a yearly pig meat consume of around 39,2 kg/person (13), while in Europe this consume climbs up to 42,9 kg/person, even if in the last few yearswas it was recorded a decrease of 3-4 points in percentage (13).

Echo-compatible rearing systems (extensive, semi-extensive or semi-intensive) are more and more found in those internal areas with marginal productivity, that, since II postwar, have been expanded more and more into our country. This fact is caused by the immigration of the population from the countryside and partly because of the concentration of agriculture into fertile and level areas. At this moment we think that the only possibility to use these marginal areas is a zootecnic – faunistic and forestal one, because the zootecnic and faunistic rear can be properly used with the echo-compatible rearing system and the autochthonous animal genotypes that can be perfectly suited with the surroundings and are capable of using with the best way the present feed resources.

According to our opinion, the use of the most widespread pig genotype for this type of rearing is less recommended because these genotypes have been created by men for intensive rearing systems, where animals are completely uncoupled from climate, habitat and feeding changes. For this reason, the use of wild boars (*Sus scropha L.*) and hybrids (wild boar x pig) seems to be more suitable in those conditions as they are able to give acceptable productive abilities and of high quality (14-36).

The literature, consulting to us, offers useful marks about quanti-qualitative aspects of pig productions in outdoor pens rearing (37-48) even if there are more studies about the comparison between the quanti-qualitative meat production of wild boars, pigs and hybrids reared in outdoor pens and wild wild boars. For all these reasons, we wanted to start this research, to study some physical parameters, the chemical composition and the fatty acid profile of meat produced by pigs, wild boars and their hybrids $F_1$ (wild boar x pig) and $F_2$ [wild boar x (wild boar x pig)].

## Materials and methods

The present research aims to study and to compare the quality of meats produced by wild wild boars (S); reared wild boars (A), pigs (P); $F_1$ (wild boar x pig) and $F_2$ [wild boar x (wild boar x pig)].
For this study, we used 20 animals, 16 of them, divided into 4 groups, one of each genotype, reared into outdoor pens and the other 4 wild wild boars (S group), hunted in the "Ambito Territoriale di Caccia B" of the province of Matera (Italy).
The reared animals have been feeded with pasture (present into the pens) and feed, its percentage and chemical composition is reported in tab. 1 and 2; while the wild animals have been fed with natural resources present into their habitat (hardwood forest with glade and grazing, etc...).
All the swine have been slaughtered approximately at 9 months of age.
After the slaughter, all the carcasses have been refrigerated for 24 hours in cell refrigerator at 4°C.
Subsequently, the right half part of each carcass has been divided into commercial cuts, following local uses and customs, but always approaching the indications of ASPA (49).
The meat color ("L", "a" and "b" indixes); the pH (at slaughtered moment and after 24 hours), the cooking loss (into microwave oven till 75°C at core); the drip loss; the hardness and the shear force (measured using a Warner Blatzler Shear) have been measured on a sample of *Longissimus dorsi* (L.D.) of each half carcass.
The chemical composition has been determinated (50) on a sample of L.D. (raw and cooked) and on the fat extracted from it (51) and the percentage composition of fatty acid has been measured with the use of gas- cromatografic with the column capillary with stationary phase in cyanopropil polysilphenylene- siloxane at 70%, previous methylation. For the identification of the single fatty acids, we had used the palmitic acid ($C_{16:0}$) as a reference, and, in cases of doubts, we had used the just known standards.

**Table 1** - Feed composition

| Nourishment | % |
|---|---|
| Yellow maize (I quality) | 58,70 |
| Oats (I quality) | 7,00 |
| Barley | 10,55 |
| Soya meal | 11,00 |
| Grape skins | 10,00 |
| Calcium carbonate | 0,85 |
| Bicalcium phosphate | 1,25 |
| Salt | 0,50 |
| Integrators (vitamins + microelements) | 0,15 |
| Total | 100,00 |

**Table 2** - Chemical composition of mixed feed (%)

| | | |
|---|---|---|
| Moisture | 10,80 | |
| Protein | 12,45 | 13,96 |
| Fat | 5,36 | 6,01 |
| Ash | 8,13 | 9,11 |
| Crude fiber | 5,02 | 5,63 |
| Unnitrogenated extractive | 22,61 | 25,35 |
| NDF | 23,01 | 25,80 |
| ADF | 7,56 | 8,47 |
| ADL | 4,30 | 4,82 |
| AIA | 0,76 | 0,85 |
| M. E. (Kcal/Kg) | 3008,00 | 3372,20 |

All the data have been analyzed for variance and the significance between the means evaluated using Student's "t" test (52).

## Results and Discussions

*Half carcass composition*

Pigs half carcass results, as it was expected, heavier (41,40 kg) than the other, even if with different level of statistic validity (P ≤ 0,01 e/o P ≤ 0,05) (Table 3).
The percentage composition of commercial cuts, always with different level of statistic validity (P ≤ 0,01 e/o P ≤ 0,05), underlines the lower incidence of the head on reared wild boar (5,90%) and on $F_1$ (6,49%); $F_1$ and $F_2$ register the heaviest loins (17,63% and 12,86%), while pigs and $F_2$ show a greater percentage of ham (25,83% and 25,87%), of bacon (7,37% and 10,97%) and together with $F_1$ a lower quantity of lard (1,99%; 1,76% and 1,21%) than the reared and wild wild boars (5,41% and 3,66%) that appears to have heavier trotters.

*Meat quality*

Some physical parameters of L.D., even if with a different level of significance (P ≤ 0,01 e/o P ≤ 0,05), are influenced by animal genotype (Table 4). In fact, L.D. of S group shows a lower brightness (43,62 *vs* 45,92; 47,11; 47,85 and 50,42) and, together with those of pigs a lower $pH_2$ (5,48 and 5,49 *vs* 5,94; 5,88 and 5,74) even if they present a higher redness index "a" (12,39 *vs* 10,32; 7,26; 6,37 and 5,27). Furthermore, the LD of S group shows a lower shear force (1,81 kgf/cm² *vs* 3,76 kgf/cm²; 2,99 kgf/cm²; 2,81 kgf/cm² and 2,29 kgf/cm²) than the other genotypes, and a higher tenderness expect for the $F_2$ group (2,17 cm *vs* 2,23 cm; 2,37 cm and 2,43 cm), the same data have been confirmed also after cook. The same group underlines a great cooking loss (31,22% *vs* 26,75%; 18,52%; 14,96% and 11,86%) and a lower

**Table 3** - Half carcass's composition in commercial cuts (%)

| Genotype | A | S | $F_1$ | $F_2$ | Pigs | ESD (FG=15) |
|---|---|---|---|---|---|---|
| Half carcass reconstructed weight (kg) | 25,68 Cc | 28,79 b | 34,75 B | 20,84 C | 41,40 Aba | |
| Head | 5,90 Bb | 19,90 A | 6,49 Bb | 7,42 B | 11,08 aB | 2,825 |
| Neck | 7,08 Aa | 6,64 ab | 3,68 Bc | 4,43 bc | 6,13 ab | 1,595 |
| Ham | 21,73 b | 18,65 B | 19,92 B | 25,87 Aa | 25,83 Aa | 2,170 |
| Loin | 10,61 BbC | 9,74 C | 17,63 A | 12,86 aB | 10,90 BbC | 1,197 |
| Shoulder | 15,33 a | 14,47 | 11,95 b | 14,78 | 15,73 a | 1,932 |
| Belly | 8,27 A | 3,22 B d | 11,12 Aa | 7,37 c | 10,97 Ab | 2,080 |
| Steaks | 13,95 | 12,13 | 14,39 | 14,40 | 11,40 | 2,678 |
| Breast | 8,66 A | 5,60 Bc | 10,21 Aa | 7,69 Ab | 3,35 Bd | 1,342 |
| Flare fat | 3,66 B | 5,41 A | 1,99 C | 1,76 C | 1,21 C | 0,730 |
| Kidney | 0,80 Aa | 0,71 a | 0,40 b | 0,68 a | 0,32 Bb | 0,227 |
| Tail | 0,39 B | 0,88 A | 0,29 B | 0,44 B | 0,49 B | 0,153 |
| Feet | 3,63 Aa | 2,66 b | 1,94 B | 2,30 B | 2,66 b | 0,571 |

A, B, C: P<0.01; a, b, c, d: P<0,05

**Table 4** - Phisical parameters of meat

| Genotype | A | S | $F_1$ | $F_2$ | Pigs | ESD (FG=15) |
|---|---|---|---|---|---|---|
| L | 45,92 bc | 43,62 Bb | 47,85 ac | 47,11 | 50,42 Aa | 2,591 |
| a | 7,26 aC | 12,39 A | 6,37 C | 10,32 B | 5,28 Cb | 0,968 |
| b | 10,64 B | 11,97 a | 10,23 B | 14,22 A | 9,61 Bb | 1,539 |
| pH1 | 6,41 | 6,35 | 6,61 A | 6,66 A | 6,04 B | 0,251 |
| pH2 | 5,94 A | 5,48 Bb | 5,74 | 5,88 a | 5,49 Bb | 0,193 |
| W.B.S. raw: | | | | | | |
| WBS: Hardness (Kgf/cmq) | 3,76 Aa | 1,81 Bb | 2,99 ac | 2,81 | 2,29 bc | 0,717 |
| Cutting force (cm) | 2,23 Bb | 2,17 Bb | 2,37 aB | 1,64 C | 2,43 Aa | 0,119 |
| W.B.S. cooked: | | | | | | |
| WBS: Hardness (Kgf/cmq) | 2,54 b | 2,42 b | 2,85 | 3,71 | 4,39 a | 1,041 |
| Cutting force (cm) | 1,82 A | 1,44 B | 2,01 Aa | 0,98 C | 1,78 Ab | 0,142 |
| Cooking loss | 18,52 aB | 31,22 A | 14,96 B | 26,75 A | 11,86 Bb | 3,476 |
| Drip loss | 17,98 A | 9,67 B | 16,98 A | 13,47 b | 19,18 Aa | 3,084 |

A, B, C: P<0.01; a, b, c: P<0.05

**Table 5** - Chemical composition (%) raw meat

| Genotype | A | S | $F_1$ | $F_2$ | Pigs | ESD (FG=15) |
|---|---|---|---|---|---|---|
| Moisture | 73,41 A | 70,50 B | 73,65 Aa | 74,19 Aa | 71,37 b | 1,367 |
| Protein | 22,50 B | 25,87 A | 22,24 aBC | 20,46 bC | 21,35 BC | 0,893 |
| Fat | 2,00 B | 1,55 Bb | 2,15 B | 3,50 a | 4,56 A | 1,010 |
| Ash | 1,30 A | 1,23 A | 1,27 A | 1,34 A | 0,86 B | 0,127 |
| Undeterminated | 0,79 B | 0,86 B | 0,69 B | 0,51 B | 1,87 A | 0,429 |

A, B, C: P<0,01; a, b: P<0.05

free water quantity (9,67% *vs* 17,98%; 16,98%; 19,18% and 13,47%).

$F_2$'s raw meat chemical composition (Table 5) shows ($P \leq 0,01$ e/o $P \leq 0,05$) the greatest percentage of moisture (74,19%) and ash (1,34%), the lowest presence of protein (20,46%) and a quantity of fat lower than the pigs meat; while S group presents meat with lower quantity of moisture and fat and very rich in protein.

As far as concerns the cooked meat, all the wild boars, reared and wild, have meat with lower moisture (60,35% and 61,92%) and greater presence of proteins (33,03% and 34,16%), while pigs and reared wild boars have the most fatty meat (4,14% and 3,35%)

*Fatty acid composition*

In spite of the differences seen, the raw L.D. fat (Tables 7 and 8)

**Table 6** - Chemical composition (%) - cooked LD

| Subjects | 4 | 4 | 4 | 4 | 4 | ESD (FG=15) |
|---|---|---|---|---|---|---|
| Genotype | A | S | $F_1$ | $F_2$ | Pigs | |
| Moisture | 60,35 Bb | 61,92 bc | 68,78 Aa | 66,01 ac | 66,61 ac | 3,298 |
| Protein | 33,03 AaD | 34,16 A | 27,08 BC | 28,62 bCD | 25,97 BC | 2,456 |
| Fat | 3,55 a | 1,33 Bb | 1,75 b | 2,14 b | 4,14 Aa | 1,251 |
| Ash | 1,66 A | 1,46 Ab | 1,43 Ab | 1,70 Aa | 1,03 B | 0,153 |
| Undeterminated | 1,42 | 1,14 b | 0,97 b | 1,53 | 2,26 a | 0,640 |

A, B, C, D: P<0,01; a, b, c: P<0.05

**Table 7** - Fatty acid composition (%) (raw LD)

| Genotype | A | S | $F_1$ | $F_2$ | Pigs | ESD (FG=15) |
|---|---|---|---|---|---|---|
| Saturated series | | | | | | |
| C 6:0 | 0,10 | tr | 0,08 | tr | 0,08 | 0,483 |
| C 8:0 | 0,03 | tr | tr | tr | 0,13 | 0,048 |
| C 10:0 | 0,10 b | 0,15 | 0,13 | 0,10 b | 0,18 a | 0,014 |
| C 12:0 | 0,10 | 0,10 | 0,10 | 0,09 b | 0,13 a | 0,023 |
| C 14:0 | 1,18 | 1,28 | 1,38 | 1,42 | 1,45 | 0,169 |
| C 15:0 | 0,10 | 0,10 | tr | 0,04 | 0,18 | 0,058 |
| C 16:0 | 23,48 | 21,88 b | 23,63 | 25,38 a | 24,83 a | 1,864 |
| C 16:r | tr | tr | tr | tr | 0,13 | 0,085 |
| C 17:0 | 0,28 B | 0,23 B | 0,20 B | 0,23 B | 0,60 A | 0,103 |
| C 18:0 | 12,55 | 10,45 b | 12,68 a | 11,70 | 11,73 | 1,403 |
| C 20:0 | 0,10 a | 0,00 Bb | 0,18 A | 0,13 A | 0,18 A | 0,052 |
| C 22:0 | 0,25 | 2,20 | 0,43 | tr | 0,35 | 0,304 |
| C 24:0 | 0,13 a | 0,03 | 0,10 | 0,00 b | 0,03 | 0,074 |
| total saturated | 38,48 | 36,40 | 38,88 | 39,09 | 39,95 | 2,925 |

A, B, C: P<0,01; a, b, c, d: P<0.05

of the different genotypes doesn't show meaningful differences on total saturated fatty acid contents, even if the fat of S group results certainly poorer in palmitic acid (21,88% *vs* 25,38% e 24,83%) than the fat of pigs and $F_2$; while results statistically poorer in stearic acid (10,45%) than the $F_1$ one (12,68%).

As far as regards the unsaturated series, we can observe that, even if with a different statistic incidence ($P \leq 0,01$ e/o $P \leq 0,05$), the fat of S group is richer in total unsaturated (63,15%), in monounsaturated (48,78%), in $\omega_3$ (2,85%) in comparison with those of other genotypes, and it has the best $\omega_6/\omega_3$ ratio (4,30). Particularly, the fat of S group is richer in $C_{20:1\omega9}$ (0,85%) and in DHA ($C_{22:6\omega3}$) (0,30%) and together with pigs, $F_1$ and $F_2$ ones shows biggest quantity of palmitoleic acid (3,08%, 2,90%, 3,19% e 2,83%) than the fat of A group.

Generally, in the fatty acid composition of cooked L.D. (Tables 9 and 10), even if with a different level of statistic signifier ($P \leq 0,01$ e/o $P \leq 0,05$), the fat of S group is certainly poorer in saturated acid (39,33%), richer in unsaturated (60,25%), in polyunsaturated (14,78%), $\omega_6$

**Table 8** - Fatty acid composition (%) (raw LD)

| Genotype | A | S | F1 | F2 | Pigs | ESD (FG=15) |
|---|---|---|---|---|---|---|
| Unsaturated series | | | | | | |
| $C_{14:1}$ | tr | tr | tr | tr | 0,08 | 0,043 |
| $C_{15:1}$ | tr | tr | tr | tr | 0,05 | 0,045 |
| $C_{16:1}$ | 1,18 B | 3,08 A | 2,90 A | 3,19 A | 2,83 A | 0,713 |
| $C_{17:1}$ | 0,25 | 0,28 | 0,23 | 0,18 b | 0,45 a | 0,159 |
| $C_{18:1\omega9}$ | 41,15 a | 40,78 a | 41,08 a | 35,83 b | 38,43 | 2,801 |
| $C_{18:1\omega7}$ | 3,13 | 3,75 a | 3,28 | 3,32 Bb | 4,48 A | 0,897 |
| $C_{18:2\omega6c}$ | 12,60 | 10,58 | 9,83 | 13,20 | 10,23 | 2,548 |
| $C_{18:3\omega6}$ | 0,33 Aa | 0,08 b | 0,05 b | 0,01 Bbc | 0,28 ac | 0,135 |
| $C_{18:3\omega3}$ | 0,48 | 0,58 | 0,58 | 0,82 a | 0,33 b | 0,316 |
| $C_{20:1\omega9}$ | 0,10 Bbc | 0,85 AaC | 0,13 B | 0,51 Ab | 0,38 BCac | 0,178 |
| $C_{18:2}$CLA | tr | tr | 0,15 A | tr | 0,13 A | 0,050 |
| $C_{20:2\omega6}$ | tr | tr | 0,20 aB | 0,44 A | 0,15 B | 0,106 |
| $C_{20:3\omega6}$ | 0,80 A | 0,40 B | 0,80 A | 0,14 AB | 0,75 A | 0,068 |
| $C_{20:3\omega3}$ | 0,30 Aa | 0,30 Aa | 0,10 b | 0,11 b | 0,23 B | 0,118 |
| $C_{20:4\omega6}$ | tr | tr | tr | 0,98 Aa | 0,18 b | 0,429 |
| $C_{20:4\omega3}$ | tr | tr | 0,03 | tr | 0,13 | 0,114 |
| $C_{20:5\omega3}$ | 0,10 | 0,03 | 0,90 | 0,01 | 0,03 | 0,718 |
| $C_{21:5\omega3}$ | 0,55 B | 1,90 A | 0,53 B | tr | 0,38 B | 0,597 |
| $C_{22:1\omega9}$ | tr | 0,05 | tr | tr | 0,10 Aa | 0,026 |
| $C_{22:2\omega6}$ | tr | tr | tr | 0,70 | 0,13 | 0,055 |
| $C_{22:4\omega6}$ | 0,08 b | 0,18 a | 0,10 | 0,10 | 0,15 | 0,059 |
| $C_{22:5\omega3}$ | 0,05 | 0,05 | tr | 0,12 | tr | 0,055 |
| $C_{22:5\omega6}$ | 0,10 | 0,30 | 0,08 | tr | 0,03 | 0,061 |
| $C_{22:6\omega3}$ | tr | tr | tr | 0,02 | tr | 0,016 |
| $C_{24:1\omega9}$ | tr | tr | tr | 0,04 | 0,28 | 0,031 |
| Total unsaturated | 61,18 | 63,15 a | 60,93 | 58,08 b | 59,93 | 3,165 |
| Monounsaturated | 45,80 | 48,78 A | 47,60 a | 42,06 Bb | 47,05 a | 2,662 |
| Polyunsaturated | 15,38 | 14,38 | 13,33 | 16,02 | 12,88 | 3,384 |
| $\omega_6$ | 13,90 | 11,53 | 11,20 | 14,95 | 12,00 | 2,955 |
| $\omega_3$ | 1,48 | 2,85 a | 2,13 | 1,07 b | 0,88 b | 1,034 |
| $\omega_6/\omega_3$ | 13,80 | 4,30 B | 7,29 b | 13,98 | 19,42 Aa | 6,477 |
| Unsaturated/saturated | 1,60 | 1,74 | 1,57 | 1,51 | 1,51 | 0,198 |
| AI | 0,47 | 0,43 b | 0,48 | 0,54 a | 0,52 | 0,066 |
| TI | 1,10 | 0,87 a | 1,07 | 0,23 b | 0,18 b | 0,193 |
| saturated/polyunsatutated | 2,63 | 2,59 | 2,97 | 2,70 | 3,20 | 0,744 |
| PCL/PCE | 1,56 | 1,67 | 1,49 | 1,40 | 1,39 | 0,225 |

A, B, C: P<0,01; a, b, c, d: P<0.05

**Table 9** - Fatty acid composition (cooked LD)

| Genotype | A | S | F1 | F2 | Pigs | ESD (FG=15) |
|---|---|---|---|---|---|---|
| Saturated series | | | | | | |
| $C_{6:0}$ | 0,1 | tr | 0,10 | tr | tr | 0,037 |
| $C_{8:0}$ | 0,05 | tr | 0,03 | tr | 0,10 | 0,050 |
| $C_{10:0}$ | 0,10 | 0,08 | 0,13 | 0,12 | 0,13 | 0,067 |
| $C_{12:0}$ | 0,10 B | 0,10 B | 0,10 B | 0,10 B | 0,18 A | 0,026 |
| $C_{14:0}$ | 1,30 b | 1,15 B | 1,55 A | 1,58 Aa | 1,33 | 0,168 |
| $C_{15:0}$ | 0,10 A | 0,10 A | 0,03 B | 0,07 BC | 0,15 AAC | 0,034 |
| $C_{16:0}$ | 26,43 | 22,70 Bb | 27,15 a | 28,78 A | 27,25 a | 2,768 |
| $C_{16:r}$ | tr | tr | tr | tr | 0,08 | 0,043 |
| $C_{17:0}$ | 0,35 Ba | 0,23 Bb | 0,23 Bb | 0,29 B | 0,73 A | 0,074 |
| $C_{18:0}$ | 15,00 a | 11,75 b | 14,08 | 12,54 b | 14,95 a | 1,597 |
| $C_{20:0}$ | 0,15 b | 0,05 Bbc | 0,20 ac | 0,14 b | 0,30 Aa | 0,084 |
| $C_{22:0}$ | 0,28 | 3,15 | 0,18 | tr | 0,45 | 0,624 |
| $C_{24:0}$ | 0,05 | 0,03 | 0,05 | tr | 0,08 | 0,061 |
| Total saturated | 44,00 | 39,33 b | 43,80 | 43,62 | 45,70 a | 3,660 |

A, B, C, D: P<0,01; a, b, c, d: P<0.05

(12,60%), $\omega_3$ (2,18%) and shows the lowest $\omega_6/\omega_3$ (6,07) and unsaturated/saturated ratio (1,54) and the best AI index. Particularly, we observe that the reared wild boars and the hybrid's fat are certainly poorer in $C_{12:0}$, while the fat of S group is poorer in $C_{14:0}$ (1,15%), fatty acid that together with $C_{12:0}$ are accused to increase the LDL blood level, which favors the heart-disease risks. Moreover, the fat of these animals results to be certainly ($P \leq 0,01$ and/or $P \leq 0,05$) poorer in palmitic (22,70%) and stearic acids (11,75%) but richer in $C_{22:0}$ (3,15%). It's also poorer in $C_{18:1\omega9}$ (37,60%) but with a higher percentage ($P \leq 0,01$ and/or $P \leq 0,05$) in $C_{18:1\omega7}$ (3,68%); $C_{18:2\omega6}$ (11,33%); $C_{20:3\omega3}$ (0,35%); $C_{21:5\omega3}$ (1,23%); $C_{22:4\omega6}$ and $C_{22:6\omega3}$.

## Conclusions

The genotype has influenced meaningfully the cuts development as well as some quality parameters of the meat and its fat. In the first case the S group has a biggest incidence of head, neck and breast as a result of being the most developed fore carriage, characteristic of these animals and also the biggest accumulation of peri-kidney fat, peculiarity of animals that live constantly outdoors and are exposed at winter rigors. The cuts of round, shoulder and bacon are resulting to be more engraved in pigs, confirming the biggest body development and the most marked convexity of muscular profiles, characteristic of domestic pigs.
Considering the quality, wild wild boars' meat resultes to be less bright but more red and acid, low hard and resistant, both at raw and cooked meat, thanks also to the fewer quantity of free water. Moreover, the composition of both raw and cooked meat resultes more proteic, richer in minerals and poorer in fat than the other genotypes but especially towards the meat of domestic pig.

**Table 10** - Fatty acid composition (%) (cooked LD)

| Genotypes | A | S | F1 | F2 | Pigs | ESD (FG=15) |
|---|---|---|---|---|---|---|
| Unsaturated series | | | | | | |
| $C_{14:1}$ | tr | 0,03 | tr | tr | 0,05 | 0,034 |
| $C_{15:1}$ | tr | 0,03 | tr | tr | 0,05 | 0,034 |
| $C_{16:1}$ | 1,60 Bb | 2,88 A | 3,23 A | 3,29 Aa | 2,53 ab | 0,467 |
| $C_{17:1}$ | 0,25 | 0,18 | 0,25 | 0,19 | 0,38 | 0,147 |
| $C_{18:1\omega9}$ | 40,03 a | 37,60 bc | 42,70 Aac | 35,57 Bb | 36,88 bc | 2,880 |
| $C_{18:1\omega7}$ | 2,63 B | 3,68 Aa | 3,70 Aa | 3,02 b | 3,63 A | 0,426 |
| $C_{18:2\omega6c}$ | 8,95 a | 11,33 A | 4,48 Bb | 9,41 a | 7,70 | 2,796 |
| $C_{18:3\omega6}$ | 0,18 Aa | 0,10 | 0,05 b | 0,02 B | 0,13 | 0,077 |
| $C_{18:3\omega3}$ | 0,28 | 0,48 | 0,15 | 0,44 | 0,20 | 0,252 |
| $C_{20:1\omega9}$ | 0,13 B | 0,03 CBD | 0,03 C | 0,50 A | 0,25 AD | 0,164 |
| $C_{18:2}$CLA | tr | 0,05 | 0,03 | tr | 0,10 a | 0,062 |
| $C_{20:2\omega6}$ | tr | tr | tr | 0,30 | 0,03 | 0,076 |
| $C_{20:3\omega6}$ | 0,88 A | 0,40 B | 0,70 A | 0,07 BC | 0,78 A | 0,105 |
| $C_{20:3\omega3}$ | 0,18 | 0,35 A | 0,05 B | 0,04 B | 0,03 B | 0,116 |
| $C_{20:4\omega6}$ | tr | 0,03 | tr | 0,41 | 0,13 | 0,152 |
| $C_{20:4\omega3}$ | tr | 0,05 | tr | tr | 0,13 | 0,050 |
| $C_{20:5\omega3}$ | 0,08 | 0,03 | 0,13 | tr | 0,10 | 0,074 |
| $C_{21:5\omega3}$ | 0,30 | 1,23 | 0,15 | tr | 0,43 | 0,267 |
| $C_{22:1\omega9}$ | tr | 0,05 | 0,03 | tr | 0,05 | 0,043 |
| $C_{22:2\omega6}$ | tr | 0,03 | tr | 0,36 | 0,03 | 0,095 |
| $C_{22:4\omega6}$ | 0,03 | 0,25 | tr | 0,04 | 0,15 | 0,080 |
| $C_{22:5\omega3}$ | 0,05 | 0,05 | tr | 0,05 | tr | 0,059 |
| $C_{22:5\omega6}$ | 0,05 | 0,43 | tr | tr | tr | 0,050 |
| $C_{22:6\omega3}$ | tr | tr | tr | 0,01 | tr | 0,052 |
| $C_{24:1\omega9}$ | tr | 0,03 | tr | 0,43 | 0,15 | 0,177 |
| Total unsaturated | 55,58 | 60,25 a | 55,65 | 54,20 b | 53,85 b | 3,689 |
| Monounsaturated | 44,63 b | 45,48 | 49,93 Aa | 42,99 B | 43,95 b | 2,997 |
| Polyunsaturated | 10,95 a | 14,78 A | 5,73 Bb | 11,22 a | 9,90 | 3,294 |
| $\omega_6$ | 10,08 a | 12,60 A | 5,25 Bb | 10,60 a | 9,03 | 2,995 |
| $\omega_3$ | 0,88 B | 2,18 A | 0,48 B | 0,62 B | 0,88 B | 0,401 |
| $\omega_6/\omega_3$ | 11,67 Ba | 6,07 Bb | 11,03 B | 19,86 A | 10,48 B | 3,673 |
| Unsaturated/saturated | 1,29 | 1,54 a | 1,27 | 1,26 | 1,19 b | 0,192 |
| AI | 0,58 | 0,46 Bb | 0,60 a | 0,66 A | 0,61 a | 0,094 |
| TI | 1,45 a | 1,01 Abac | 0,47 bc | 0,52 B | 0,50 bc | 0,238 |
| Saturated/polyunsaturated | 4,38 b | 2,75 B | 8,05 Aa | 4,76 b | 4,81 b | 1,839 |
| PCL/PCE | 1,22 b | 1,59 Aa | 1,07 B | 0,09 B | 1,12 b | 0,228 |

A, B, C, D: P<0,01; a, b, c, d: P<0.05

The fat of meat of S group is favorably poorer in saturated fatty acids and richer in unsaturated acids, both as total polyunsaturated and $\omega_3$ and $\omega_6$ that show also a more optimal ratio. This fat is richer in fatty acids that reduce the plasmatic level of cholesterol and have better healthness index.

Considering all these factors, we can suggest that the wild wild boars, even if they present the lowest development of vintage commercial cuts, appears to have the best meat quality in physical characteristics as well as in chemical and acidic ones, that render their final products in high value.

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