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Sensory evaluation of dry cured coppa in some swine autochthonous genetic types

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SUMMARY – The research work aimed to assess the effect of genetic types, sex, curing plants and drying duration class on some sensory characteristics evaluated on dry cured coppa from pigs of the autochthonous Calabrese, Cinta Senese and Siciliano breeds. The results showed that cured coppa made from the Cinta Senese breed is better appreciated by the panel, judging it less rancid, with firmer and whiter fat, obtaining the best overall score. Moreover, Cinta Senese entire females showed better sensorial characteristics than castrated males, while in the other genetic types no differences were detected between gender. The drying plant in Parma produced a better coppa than the one in Benevento with regard to the sensorial profile, although this behaviour was not confirmed for all drying period classes. Finally, the worsening of the sensorial characteristics due to a long drying period, suggested that 10 months of ageing should not be exceeded in order to offer a valuable product to the consumer.

Keywords: Swine, autochthonous genetic type, dry cured coppa, sensory evaluation.

RESUME – *"Evaluation sensorielle de coppa sèche produite à partir de certains types génétiques de porcins autochtons". L'étude veut évaluer l'effet du type génétique, du sexe, de l'entreprise de transformation et de la durée d'affinage sur certaines caractéristiques sensorielles de la coppa produite à partir de porcs autochtones Calabrese, Cinta Senese et Siciliano. Les résultats ont mis en évidence que la coppa obtenue de Cinta Senese, par rapport aux deux autres types génétiques, est plus appréciée par le jury de dégustation, car elle est jugée moins rance, avec une graisse plus blanche et plus consistante et, tout compte fait, avec un jugement global meilleur. En outre, la femelle Cinta Senese présente des caractéristiques sensorielles meilleures que le mâle castré, tandis que dans les deux autres types génétiques on n'a pas trouvé de différences entre les deux sexes. La maturation effectuée dans l'usine de Parma a permis d'obtenir une coppa avec des caractéristiques sensorielles meilleures que dans l'usine de Benevento, même si ce résultat n'a pas été confirmé dans toutes les classes de durée de maturation étudiées. Enfin, la détérioration des caractéristiques sensorielles observée avec l'allongement de la période de maturation nous suggère de ne pas dépasser 10 mois de maturation pour obtenir un produit apprécié par le consommateur.*

Mots-clés : *Porcins, types génétiques autochtones, collet de cochon sec, caractéristiques sensorielles.*

Introduction

Quality of salted pork meats depends on various factors among which meat and fat play a critical role. These two characteristics, in particular, may derive from animal differing for genetic type, sex, live weight at slaughtering, housed systems, diet, etc. This diversity may affect the qualitative traits of seasoned product. Based on these considerations it becomes necessary to investigate the qualitative aspects of dry coppa obtained from autochthonous genetic types (AGT) in order to address breeding towards productive goals. It is also important to preserve AGTs, that may be considered as gene banks at risk of extinction (Matassino, 1997). This study aims to contribute to the knowledge of global acceptability of dry cured coppa from some AGT, through the evaluation of sensory characteristics.

Material and methods

The investigation was carried out on 88 dry cured coppa obtained from castrated males and entire females belonging to the Casertana, Cinta Senese and Nero Siciliano swine autochthonous genetic types. The animals were slaughtered at 171±6 kg of live weight. The right coppa of each animal was

cured in a Benevento plant, while the left one in a Parma plant. The drying time lasted from 10 to 18 months, as the distribution of this variable presented three peak values corresponding to the intervals 10-11, 13-16 and 17-18 months. It was opportune to consider this variable as a variation factor with the corresponding three drying period classes. The sensory evaluation of dried coppa was performed by a panel of 9 trained judges, whose judgements were expressed on an unstructured evaluation scale. The statistical analysis was performed by the following variance analysis model, where genetic type (α_i), sex (β_j), curing plant (γ_k), drying duration class (δ_l), taster (ϕ_m), and their relative interactions were considered as fixed factors and the effect of each of them was expressed as deviation from general average m:

$$y_{ijklmn} = \mu + \alpha_i + \beta_j + \gamma_k + \delta_l + \phi_m + (\text{first order interactions}) + e_{ijklmn}$$

On the basis of these models, estimated mean values were calculated. According to Searle (1971) an estimated mean value, represents a weighted value in relation to all factors considered individually and interactively. The significance of the differences among the estimated means was tested using Student's *t* test. The GLM procedure of the SAS (1997) statistical package was used.

Results and discussion

The results of this research showed that the sensorial characteristics of dried coppa significantly vary regarding the variation of the considered factor. The employed analysis model explains from 27 to 40% of variability as far as the tested characteristics is concerned, among which the judge and the drying duration class result the most important.

The genetic type significantly influences most of sensorial characteristics. The overall judgement of Cinta Senese coppa results better than Calabrese ($P<0.05$) and Nero Siciliano ($P<0.01$) (Table 1), according to the behaviour of salami supplied by the same genetic types (Zullo *et al.*, 2000). The higher score of Cinta Senese coppa comes from a lower rancidity and a higher whiteness and firmness of fat. However, the Cinta Senese coppa is slightly salty than the others ($P<0.01$). Genetic type interacts with sex for rancidity, bad flavour and the overall judgment. This result is probably due to the differences between Cinta Senese males and females ($P<0.001$), while no differences are detectable between sexes for Calabrese and Nero Siciliano genetic types.

The entire female provides a better product than castrate male, with a higher overall judgement ($P<0.01$; Table 1) resulting less acid ($P<0.05$), less rancid ($P<0.01$) and with a lower bad flavour ($P<0.05$), although it results darker and with a different shade ($P<0.01$). Sex interacts with curing plant for rancidity and the presence of bad flavour. In fact, in Benevento plant the presence of these defects can be greater in males than in females ($P<0.001$), whereas in Parma plant the opposite results are obtained.

According to the panel, the coppa cured in the Parma plant results medially better than Benevento one, scoring the highest overall judgement ($P<0.001$). In fact the Parma coppa showed lower values of acidity ($P<0.05$), saltiness, rancidity, bad flavour ($P<0.001$), and higher values of colour and consistence of fat ($P<0.001$; Table 1). In addition, curing plant significantly interacts with the drying duration class: in the first and third cured period Parma coppa results juicier and more tender than the Benevento one, but it shows opposite characteristics in the second cured period. The flavour and the presence of bitter taste do not differ in the first drying duration class between the plants but they worsen during the time, especially in Benevento coppa. The overall judgement of the latter furthermore decreases from the first to the second drying duration class ($P<0.001$), while the judgement of Parma coppa gradually decreases from the first to the third period ($P<0.05$).

The sensorial characteristics of cured coppa worsen in time (Table 1). The less cured coppa scored the highest overall judgement, but this value decreased in the second period ($P<0.001$) and slightly increased in the third ($P<0.05$). The worsening of both overall judgement and single parameters in time, suggests to dry the coppa less than 10 months.

The judgement expressed by the pool results quite univocal, as judgement coefficient of variation is under 40% for almost 90% of coppas, even if the differences among the judges result significant for most parameters. This result agrees with Zullo *et al.* (1996) and Kramer and Twigg (1970) as they assume the 50% of judgement variability is due to the judge.

Table 1. Estimated mean value (m) and coefficient of variation (cv,%) of sensory evaluation parameters in relation to the genetic type and gender

Sensory evaluation parameters†	Genetic type						Gender			
	Calabrese		Cinta Senese		Siciliano		Female		Male	
	m	cv	m	cv	m	cv	m	cv	m	cv
Lean/fat ratio	5.14^{A}	29	5.28^{A}	30	4.69^{B}	32	4.93	34	5.14	28
Cover crust	5.99^{B}	44	6.63^{AB}	36	6.85^{A}	36	6.49	40	6.49	37
Fat color	5.51^{Aba}	34	6.06^{Ab}	35	5.36^{Ba}	36	5.57	36	5.72	35
Fat consistence	5.05^{Aa}	32	5.62^{Ab}	29	4.58^{Bc}	35	5.04	33	5.13	33
Meat color	5.29^{ab}	25	5.52^{a}	23	5.13^{b}	26	5.10^{B}	27	5.52^{A}	25
Different shade	5.47	36	5.96	32	5.62	34	5.46^{B}	36	5.90^{A}	33
Blood stain	7.05	38	6.59	39	7.11	37	6.48^{B}	40	7.35^{A}	36
Intramuscular fat	4.52	43	4.65	40	4.44	41	4.62	41	4.46	41
Tenderness	5.22	28	4.94	27	5.19	29	5.22	30	5.01	27
Juiciness	5.50^{a}	26	5.08^{b}	28	5.43^{ab}	28	5.47^{a}	26	5.21^{b}	27
Saltiness	7.14^{Bb}	17	7.69^{Aa}	21	6.89^{Bc}	19	7.25	18	7.23	19
Acidity	3.08	66	2.58	72	2.94	77	2.70^{b}	80	3.03^{a}	69
Rancidity	3.74^{A}	66	2.03^{B}	76	3.66^{A}	70	2.84^{B}	78	3.45^{A}	67
Bitter taste	2.85	81	2.36	80	2.68	86	2.43^{b}	88	2.84^{a}	80
Bad flavour	3.52	75	3.02	75	3.47	78	3.06^{b}	83	3.61^{a}	72
Overall judgement	5.30^{ABa}	29	5.95^{Ab}	30	5.26^{Ba}	35	5.76^{A}	31	5.24^{B}	34
	Plants				Drying duration class, months					
	Benevento		Parma		10-11		13-16		17-18	
Lean/fat rate	4.88^{b}	34	5.19^{a}	27	5.27^{A}	34	4.68^{B}	30	5.16^{AB}	31
Cover crust	6.92^{A}	36	6.06^{B}	40	6.54^{B}	45	5.31^{C}	40	7.62^{A}	13
Fat color	4.96^{B}	38	6.33^{A}	31	6.09^{a}	33	5.51^{b}	36	5.33^{b}	35
Fat consistence	4.71^{A}	35	5.46^{B}	30	5.75^{A}	35	4.81^{B}	30	4.69^{B}	38
Meat color	5.10^{B}	27	5.52^{A}	24	5.51^{A}	27	5.52^{A}	24	4.90^{B}	29
Different shade	5.52	37	5.84	32	6.11 a	34	5.58^{b}	34	5.36^{b}	36
Blood stain	6.23^{B}	39	7.60^{A}	36	8.07^{A}	34	6.09^{B}	38	6.59^{B}	37
Intramuscular fat	4.33^{b}	40	4.75^{a}	42	4.61^{ab}	41	4.78^{a}	38	4.22^{b}	49
Tenderness	4.81^{B}	30	5.42^{A}	27	5.12^{AB}	32	5.41^{A}	26	4.83^{B}	32
Juiciness	5.07^{B}	26	5.61^{A}	27	5.33^{ab}	25	5.57^{a}	25	5.12^{b}	30
Saltiness	7.59^{A}	18	6.89^{B}	19	6.96^{B}	18	6.70^{B}	19	8.07^{A}	19
Acidity	3.09^{a}	72	2.64^{b}	75	2.29^{B}	77	2.58^{B}	76	3.73^{A}	57
Rancidity	3.67^{A}	66	3.62^{B}	74	2.44^{B}	76	3.98^{A}	71	3.01^{B}	63
Bitter taste	3.10^{A}	78	2.16^{B}	80	2.17^{B}	74	3.12^{A}	85	2.60^{AB}	76
Bad flavour	3.96^{A}	68	2.70^{B}	82	2.41^{B}	71	3.96^{A}	78	3.63^{A}	64
Overall judgement	5.07^{B}	34	5.93^{A}	30	5.99^{Aa}	19	5.19^{Bb}	36	5.33^{ABb}	31

† Different letter within the factor indicate significant difference for P<0.05 (small) or P<0.01 (capital).

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References

Kramer, A. and Twigg, B.A. (1970). Fundamentals of quality control for the food indutry. *AVI Publ. Co.,* Westport, Connecticut, XVI, 244.

Matassino, D. (1997). Biodiversità e allevamento animale. *Zoot. Nutr. Anim.,* 23 (suppl.): 13-24.

Searle, S.R. (1971). *Linear Models*. John Wiley & Sons, New York, London, Sidney, Toronto.

Zullo, A., Diaferia, C., Genovino, G., Palazzo, M. and Matassino, D. (2000). La produzione del salame Napoli da alcuni tipi genetici suini autoctoni. II. Caratteristiche sensoriali. In: Atti IV Simp. Int. sul Suino mediterraneo, Évora (Portugal), 26-28 Novembre 1998. *Options Méditerranéennes, Serie A,* No. 41: 237-240.

Zullo, A., Diaferia, C., Grasso, F., Magliano, V., Palazzo, M., Palomba, C. and Matassino, D. (1996). Il suino calabrese per la produzione del salame tipo Napoli con diversi tipi di zuccheri. IV. Caratteristiche sensoriali. In: Atti III Simp. Int. sul suino mediterraneo. *Prod. Anim. 9, III Serie*: 175-178.