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Some characteristics of dry-cured ham obtained from Sicilian Nero pig: Comparison between two different ripening techniques

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SUMMARY – In the countries of Mediterranean Europe there exists a long-standing tradition of pork products. However, the evolution of the breeding techniques and the use of genetic types capable of high productivity have considerably modified meat, pork meat products and ripening techniques. Recent experiments have reintroduced the original characteristics of these products through the revival of the local swine breed. The Region of Sicily has started a program for the enhancement of the *Nero Siciliano* pig, also through the development of some dried cured products, like the "country ham". This experimental work has been carried out towards the rationalization of the processing techniques for the preparation of the dry-cured ham, through the comparison of two ripening techniques: traditional and conditioned. The results obtained are due for further investigation, as no significant differences have been shown between the two techniques, and have raised new perspectives for the enhancement of the local dry-cured ham.

Keywords: Dry-cured ham, ripening techniques, autochthonous type genetic, Nero Siciliano pig.

RESUME – "Quelques caractéristiques du jambon sec obtenu à partir du porc Nero Siciliano : Comparaison entre deux techniques différentes de maturation". Dans les pays d'Europe Méditerranéenne on trouve une longue tradition de produits carnés issus du porc. Cependant, l'évolution des techniques d'élevage et l'emploi de types génétiques à haute productivité ont considérablement modifié la viande, les produits carnés et les modes de fabrication. Des expériences récentes ont permis de réintroduire les caractéristiques originales des produits grâce au renouveau des porcs locaux. La Région de Sicile a entrepris un programme de relance du porc Nero Siciliano, grâce aussi au développement de quelques produits carnés tels que le jambon de pays. Ce travail expérimental a été mené en vue de la rationalisation des techniques de fabrication du jambon sec, par la comparaison de deux techniques d'élaboration: traditionnelle et adaptée. Les résultats obtenus font l'objet de recherches supplémentaires, car ils n'ont pas révélé de différences entre les deux techniques et ont apporté de nouvelles perspectives pour le développement du jambon sec local.

Mots-clés : Jambon sec, méthodes de fabrication, type génétique autochtone, porc Nero Siciliano.

Introduction

In Mediterranean Europe exists a tradition of aged products made from swine meat. The profound transformations endured from the swine farm, tied above all to the employment of an allochthonous line of swine have caused substantial changes on the characteristics of the pork product and consequent modifications of the processing techniques. Therefore, the risk of loss of specificity of the traditional local productions appears; real and can be obviated with a series of recovery methods and with the revived of the autochthonous local variety and the native systems of traditional breeding and processing (Casabianca, 1997). Recent experiments have reintroduced the original characteristics of these products through the revival of the local swine (Franci *et al.*, 2004; Diaferia *et al.*, 2000). The *Nero Siciliano* pig is today declining, the population size is probably below 900 sow, distributed in a large number of small herds (Pugliese *et al.*, 2003). In purpose, the Region of Sicily has started a program for the enhancement of the *Nero Siciliano* pig and some of its aged products (Madonia *et al.*, 2001; Moretti *et al.*, 2004), of which, the raw ham. The preservation of the peculiarity of a typical products requires the identification and quantification of those properties that better describe the characteristics of this product. In fact, the consumer perception of quality of a typical product, as a complex interaction of factors: the type of breed, farming environment and local tradition.

The aim of present work has been focused on the rationalization of the process techniques for the preparation of dry-cured ham, through the comparison of two techniques: traditional and conditioned.

Furthermore, the comparison between two types of ripening, both in a traditional room, that in Sicily can be used only in winter, and in controlled plant was direct to investigate the possibility to produce in all months of the year, in order to increase the economic value of the farming of this local breed.

Materials and methods

Techniques of preparation

Two different processing techniques have been employed. Traditional: in a refrigerated cell as far as it regards the chilled phase (salting and resting) and natural conditions during ripening phases; conditioned: in a plant with controlled temperature and relative humidity. Both the techniques have previewed the phase of salting "saturate". The recording of the climatic parameters (T and UR) has been executed for both processes with portable thermohygrometers of the Escort Company with two inner sensors for humidity and temperature and a recording interval of 10 minutes.

Chemical analysis

The proximate chemical composition has been determined according to the methods of the AOAC (1990). The activity of the water (a_w) has been measured with a hygrometer of the Novasina company Eeja-3 model.

Sensory analysis

A jury of non-professional tasters evaluated dry-cured ham aged 16 months, for the following characteristics: uniformity and intensity of the color, intramuscular fat, color of the fat, cohesion of the slice, aroma and seasoning, saltiness, bad flavor, and overall acceptability. Panel tasters were chosen on the basis of previous experience in consuming traditional pork product. The attributes have been estimated on a scale comprised between 0 and 5 (0=very low, 5=very high intensity).

Statistical analysis

Data are reported as mean values and standard deviation. Comparison among means were performed by one-way ANOVA according to test LSD. Significance was accepted at probabilities of 0.05 or less.

Results and discussion

In Table 1 the principal phases of the two techniques and processing parameters are reported.

In the traditional process, the variation of the thermohygrometer values have turned out to be influenced during ripening phases from the seasonal climatic conditions. Instead, in the conditioned process (plant) the thermohygrometer parameters were managed from the cooling system.

The results of the moisture, salt (NaCl) and a_w , determined after 16 months of ageing are reported in Table 2; the values are not significantly different. The moisture and a_w values are very low for both the techniques; the salt content is in accordance with the values of the typical Italian hams (Diaferia and Baldini, 1994).

The weight loss of hams (expressed as % of initial weight) was significantly higher for hams ripened in the traditional room compared with those ripened in a plant (26.8% vs 24.06% $P < 0.001$). This is probably due to higher temperatures in the traditional room during seasoning compared with the controlled plant, especially in the first ripening stages, during which the environmental temperatures in Sicily raised significantly.

Table 1. Seasoning techniques and thermohygrometer parameters (means T=°C – UR=%)

Conditioned	Days	Tmin	Tmax	URmin	URmax	Traditional	Days	T	UR
Salting	10	2.22	1.36	75.2	73.7	Salting	15	1.01	79.6
Pressing	10	1.91	0.79	75.1	71.9	Pressing	8	1.20	68.7
Resting	110	2.06	1.21	70.2	66.1	Resting1	56	2.92	62.6
Drying	7	14.71	14.56	n.d.	n.d.	Resting2	30	8.71	63.8
Pre-ripening	60	13.64	12.62	71.9	64.2	Drying	4	20.52	64.8
Ripening1	220	14.16	13.57	79.9	61.9	Ripening1	89	21.73	61.3
Ripening2	60	18.68	17.87	63.6	59.6	Ripening2	91	16.23	70.9
						Ripening3	122	8.16	74.3
						Ripening4	65	14.3	75.2

Table 2. Chemical analysis after 16 months of ageing (means ± S.D.)

Parameters	Ham TR		Ham CE	
Moisture (g/100g)	39.66	4.25	42.01	1.25
NaCl (g/100g)	7.80	0.66	7.18	0.81
a _w	0.826	0.03	0.832	0.04

TR=traditional, CE=plant.

Table 3 shows the results of the descriptive sensory analysis at 16 months of ageing. There were non significant differences between the indicators. The significant difference of the weight loss (Table 4) has not influenced the sensorial parameters.

Table 3. Sensory parameters (means ± S.D.) and significant of the Ham aged to 16 months

Sensory parameters	Ham CE		Ham TR		P
Color uniformity	4.10	0.10	4.33	0.15	0.84
Color shade	4.28	0.10	4.43	0.10	0.31
Intramuscular fat	4.15	0.12	4.21	0.12	0.72
Fat color	4.52	0.11	4.44	0.11	0.62
Cohesiveness	4.58	0.11	4.51	0.11	0.67
Ripening smell	4.56	0.10	4.33	0.10	0.11
Ripening taste	4.56	0.10	4.33	0.14	0.089
Saltiness	3.61	0.13	3.54	0.13	0.71
Bad flavour	2.66	0.19	2.72	0.19	0.80
Overall acceptability	4.61	0.10	4.38	0.10	0.097

Table 4. Trend of weight loss (means ± S.D.) during TR and CE seasoning

Days	Process phase	TR		CE		P
15	end salting	4.19	0.53	2.26	0.53	<0.0001
50	resting	9.40	0.53	5.70	0.53	<0.0001
110	resting	17.99	0.52	13.39	0.53	<0.0001
240	pre-ripening	24.24	0.54	21.43	0.57	<0.0004
280	ripening2	25.15	0.53	22.13	0.57	<0.0002
340	ripening3	25.81	0.50	23.88	0.57	<0.0087
480	ripening4	26.80	0.53	24.06	0.57	<0.0001

Based on the results obtained, further investigations are on course, it seems that the two different processing technologies have not influenced, neither the analytical parameters, nor the final sensory characteristics that have turned out of good level.

Conclusions

The use of a controlled room for the ripening seems to be a potential technological improvement to guarantee the salting in all months of the year, that otherwise cannot be executed in the summer period due to the higher environment temperatures. The data reported from the sensory analysis demonstrated that the hams maintained its typical characteristics and overall acceptability scores either in traditional room or in plant. Therefore, it is possible to assert that the practice of good manufacture techniques can carry over to the obtaining of products with good final characteristics.

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