

Influence of salt content on sensory properties of Galician ham

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Abstract- Sensory characteristics of *Semimenbranosus* muscle from 60 dry-cured hams were assessed. Hams were salted with different salt levels (0.65 and 1 day/weight) and then ripened following traditional process during 12 months. The results showed appearance, odour, flavour and texture were not significantly affected by salt content ($P>0.05$). However, taste was significantly affected by levels of salt. A more intensity taste was observed in hams with a higher salt content. Texture characteristics were not significantly ($P>0.05$) affected by salt level. *Semimenbranosus* muscles from hams with a higher salt content were harder and more fibrous than muscles from less salted hams. A decrease in salt content produces less salty hams, but the changes in texture traits should be also considered.

Keywords: Galician ham, Sensory evaluation, Salt content

I. INTRODUCTION

Galician ham is a typical meat product made in the North-west of Spain, very appreciated by consumers. Over years, Galician hams have been elaborated following a traditional method using non-controlled conditions which led to long ageing times reaching even two years.

In recent years, some technological changes have taken place in the processing of dry-cured ham. Most of these changes are prompted by the need to adapt the traditional processing to the new industrial procedures of manufacture. These changes are directed toward the attainment of a less variable and seasonal product.

Nowadays, consumers demand less salty meat products (Guerrero, Gelabert, Gou, Guardia, & Arnau, 2000) due to health recommendations to prevent hypertension (Morgan, Aubert, & Brunner, 2001). However, a decrease in salt content and/or modification of ripening conditions could seriously compromise sensory quality of dry-cured ham. Thus, the objective of this work was to evaluate the influence of different salt levels on sensory properties of Galician ham.

II. MATERIAL AND METHODS

II.1. Samples

A total of 60 hams were manufactured by Torre de Núñez de Conturiz, S.L. Raw pieces were salted with coarse salt, forming piles alternating between meat and salt. Two different salt levels were considered: a group of 30 hams was salted to 0.65 days/weight low salt batch (LS), whereas, the other 30 hams were salted 1 day/weight high salt batch (HS). The temperature of the salting room was between 0-4 °C and the relative humidity between 85%-95%. After the salting stage, the pieces were taken from the pile, brushed, washed, and transferred to a post-salting room where they stayed for 60 days at a 2-5 °C and 80-90% relative humidity. After the post-salting stage the pieces were transferred to a room where temperature was thereafter increased from 6 to 30 °C at 2°C/week, while relative humidity was progressively reduced to 60%. Finally, hams were ripened at 19±1 °C until reach 360 days of process.

II.2. Sensorial analysis

The taste panel evaluation was conducted with eight panellist selected from Meat Technology Centre of Galicia. Panellists were trained according to methodology proposed by UNE regulations (UNE 87-024-95) during one year with the attributes and the scale to be used. Twenty sensory traits of cured ham, grouped in appearance of the lean (redness, brightness and marbling), odour (intensity, rancidity, cured), texture of the lean (firmness, dryness, fibrousness, juiciness and pastiness), taste (saltiness, sweetness and bitterness), and aroma (intensity, cured, rancid, after-taste, toasted, non-pleasant) were assessed according to Andrés, Cava, Ventanas, Thovar, & Ruiz (2004). The intensity of every attribute was expressed on a structured scale from 0 (very low) to 9 (very high) in two sessions, a specific session for this samples and the evaluation session. During sensory evaluation, the panellists were situated in private cabinet illuminated with red light, according to UNE regulations (UNE 87-001-94, UNE 87-004-79). Water to clean the palates and remove residual flavours was given the panel at the beginning of the session and in between samples.

II.3. Statistical analysis

For the statistical analysis of the results of sensory quality an analysis of variance (ANOVA) using the SPSS package (SPSS 15.0, Chicago, IL, USA) was performed for all sensory descriptors considered in the study.

III. RESULTS AND DISCUSSION

Table 1 show mean scores and standard deviation for appearance, odour, taste, flavour and texture from *Semimenbranosus* muscle of dry-cured Galician hams with different salt content.

Table 1.- Mean values, standard deviation, standard error measurement and significance of dry-cured Galician hams with different salt content

Punjab Ham with different salt content				
	Salt content (days/weight)			
	0.65	1	SEM	SIG
Appearance traits				
Redness	4.66 (1.30)	4.83(1.37)	0.19	n.s.
Marbling	2.33(1.49)	2.70(1.94)	0.24	n.s.
Brightness	2.00(1.76)	2.83(2.339)	0.30	n.s.
Odour traits				
Intensity	4.45(2.14)	5.45(1.97)	0.30	n.s.
Cured	3.29(2.34)	3.04(2.25)	0.32	n.s.
Rancid	0.29(1.23)	0.41(0.97)	0.15	n.s.
Taste traits				
Intensity	4.45(2.35)	5.79(1.84)	0.31	*
Sweetness	0.04(0.20)	0.20(0.58)	0.06	n.s.
Saltiness	1.85(1.38)	3.93(1.25)	0.26	***
Bitterness	0.45(1.10)	0.16(0.81)	0.14	n.s.
Flavor traits				
Intensity	3.66(2.20)	3.29(2.61)	0.34	n.s.
Cured	2.54(1.93)	2.75(2.41)	0.31	n.s.
Toasted	0.08(0.28)	0.33(0.91)	0.09	n.s.
Rancid	0.20(0.83)	0.70(1.73)	0.19	n.s.
Textural traits				
Fibrousness	2.20(2.20)	2.50(2.04)	0.30	n.s.
Hardness	2.41(1.58)	3.00(1.69)	0.23	n.s.
Greasiness	2.08(1.90)	2.12(1.89)	0.27	n.s.
Pastiness	1.83(1.99)	1.62(1.73)	0.26	n.s.
Juiciness	2.33(2.46)	2.37(2.94)	0.38	n.s.
Chewiness	4.83(2.38)	5.12(2.50)	0.35	n.s.

Significance levels: *** P<0.001,* P<0.05; n.s.= not significant

Appearance, odour, flavour and texture were not significantly affected by salt content ($P>0.05$). However, taste was significantly affected by levels of salt. A more intensity taste was observed in hams with a higher salt content.

Texture characteristics were not significantly ($P>0.05$) affected salt level. *Semimenbranosus* muscles from hams with a higher salt content were harder and more fibrous than muscles from less salted hams. These results are agreed with those reported by Andres et al. (2004). Some texture traits are related to protein hydrolysis. Several authors have observed an inhibitory effect of salt on the activity of proteases (Sárraga, Gil, Arnau, & Monfort, 1989; Toldrá, Flores, & Sanz, 1997) which could explain the lower hardness of *Semimenbranosus* muscles from hams with a lower salt content in this work.

Texture defects are currently becoming frequent in the dry-cured ham industry because of decreasing time of salting. Soft and pasty textures are the most common texture problems (García-Garrido, Quiles-Zafra, Tapiador, & Luque de Castro, 2000). The results obtained in this study point out a possible texture alteration in hams with a lower salt content, being affected hardness and fibrousness.

Less salted hams showed less chloride content than more salted hams (4.88% vs. 5.25%, $P<0.001$). In fact, salty taste and salt content showed a significant correlation ($r=0.42$, $P<0.05$).

A more rancid aroma has been observed in samples with a higher salt content and it could be explained by the prooxidant effect of salt (Kanner, Harel, & Joffe, 1991).

IV. CONCLUSIONS

Levels of salt did not affect on appearance, odour, flavour and texture characteristics. However, taste was significantly affected by levels of salt. A more intensity taste was observed in hams with a higher salt content.

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