INSTRUMENTAL AND SENSORIAL EVALUATION OF DRY CURED HAM TEXTURAL PROPERTIES

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Bagkground.

Spanish dry-cured ham accounts for nearly one half of all pork products manufactured each year in Spain. This product is widely accepted by consumers because of its peculiar sensory properties (basically texture and flavour), which is acquired via a complex sequence of chemical and biochemical reactions during manufacturing (Toldrá, 1998; García-Garrido *et al.*, 2000).

A defective texture significantly detracts from the quality of ham as the end product is too soft and greasy to the touch, and exhibits strange aroma and flavour (Parolari *et al.*, 1994) .

Traditionally, food texture has been evaluated by sensory and instrumental measurements (Texture Profile Analysis (TPA) and a Warner-Bratzler (WB) shear test). The correlations between sensory and instrumental measurements have been extensively studied (Kokini and Cussler, 1987; Drake *et al.*, 1999; Rosenthal, 1999). Sensory and instrumental hardness consistently correlate very well (Mathevon *et al.*, 1995; Szczesniak, 1998).

Objectives.

The evaluation of textural properties of dry cured hams with and without texture defects (pastiness).

Materials and methods.

Raw material and curing.

Refrigerated hams weighting (10-12 kg) were processed 3-5 days after slaughter and curing procedure was tipical of that used to produce Spanish dry-cured ham.

Texture.

- **Sensory analysis.**

Panelists were trained and had participated in sensory evaluation of dry-cured ham for various months. The samples were cut into cubes of 1.5 cm and two replicates were used for each dry-cured ham.

A test with 7 questions was presented to 22 judges for evaluating 21 hams. The sensory atributes were assesed using an unstructured 10 cm line, ranging from less (0 cm) to more (10 cm). The intensity rating s were recorded and converted into numbers by a computerised system (FIZZ BP7, version 1.01. Biosistemes, Couternom, France).

- **Instrumental analysis.**

Texture measurements were performed, with a TA-XT2i ® Texture Analyser, with a 5 Kg load cell.

- Experimental A.

A Warner-Bratzler shear test (Bratzler, 1932) was carried out with rectangular cross-section samples of the *Biceps femoris* muscle, using a WB shear blade with a angular triangular slot cutting edge. From the WB force-distance curve one parameters was measured: maximum force (Moller, 1980)

- Experimental B.

An uniaxial compression was performed on dry cured hams cubes of 1.5 cm, which were cut of the *Biceps femoris* muscle. Texture measurements in form of TPA (Bourne, 1978; Henry *et al.*, 1971) of the obtained samples were performed. From the TPA curves, the following texture parameters were measured: hardness and adhesiviness.

Results and discussion.

The results obtained after the analysis of the samples, showed that hams with pastiness were harder and less juicy than those with normal texture. Concernig adhesiviness our judges did not appreciate any differences (figure 1).

The same results were obtained in TPA analysis. Figure 2 shows that hams with pastiness tended to show cut resistance, softness (hardless to the compression, crushness in the second bite) and adhesiviness.

According to these results, the sensory analysis exhibits a high correlation with the instrumental analysis. In fact, the highest score of hardness agrees with the high values in pastiness and adhesiveness by the WB technique.

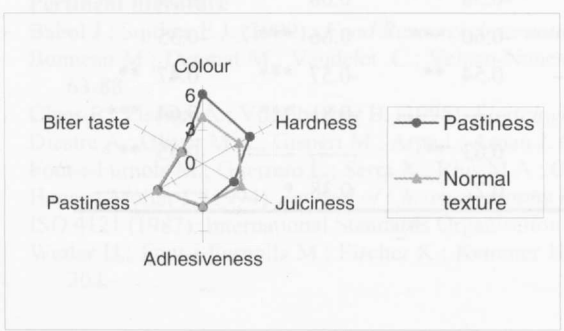

Figura 1. Results from the sensorial analysis

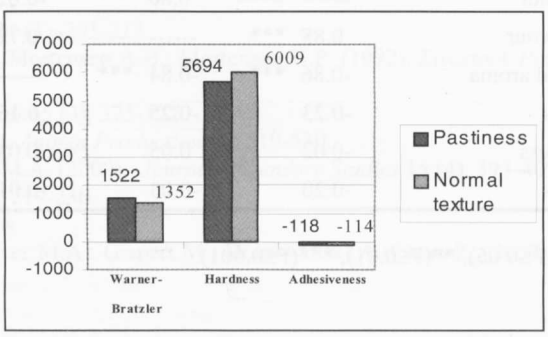

Figura 2. Values obtained in TPA and WB analysis.

References

- Bourne, M.C. (1978). Texture profile analysis. Food Technol., 32 (7), pp 62-66 and 72.
- Bratzler, L.J. (1932). Measuring the tenderness of meat by means of a mechanical shear. Ms. Thesis, Kansas State College, USA.

- Drake, M.A.; Gerard, P.D.; Truong, V.D. & Daubert, C.R. (1999). Relationship between instrumental and sensory measurements of cheese texture. J. Texture Stud. 30: 451-476.
- García-Garrido, J.A.; Quiles-Zafra, R.; Tapiador, J. & Luque de Castro, M.D. (2000). Activity of cathepsin B, D, H and L IN Spanish dry-cured ham of normal and defective texture. Meat Science, 56, 1-6.
- Henry, W.F.; Katz, M.H.; Pilgrin, F.J. & May, A.T. (1971). Texture of semi-solid foods: sensory and physical correlates. J. Food Sci., 36, 155-161.
- Kokini, J.F. & Cussler, E.L. (1987). The psychophisics of fluid food texture. In: Moskowitz HR, editor. Food Texture: Instrumental and sensory measurements. New York: Marcel Dekker. 97-127.
- Mathevon, E.; Mioche, L.; Brown, W.E. & Culidi, J. (1995). Texture analysis of beef cooked at various temperatures by mechanical measurements, sensory assesment and electromyography. J. Text Stud. 26. 175-192.
- Moller, A.J. (1980). Analysis of Warner-Bratzler shear pattern with regard to myofibrillar and connective tissue components of tenderess. Meat Science, 5, 247-260.
- Parolari, G.; Virgili, R. & Schivazappa, C. (1994). Relationship between cathepsin B activity and compositional parameters in dry-cured hams of normal and defective texture. Meat Science, 38, 117-122.
- Rosenthal, A.J. (1999). Relation between instrumental and sensory measures of texture. In: Rosenthal A.J., editor. Food texture, Measurementsand Percepcion. Maryland: Aspen Pub., 1-17.
- Szczesniak, A.K. (1998). Sensory texture profiling. Historical and scientific perspective Food Technology. New York: Lavoisier Publishing Inc., 489-498.
- Toldrá, F. (1998). Desarrollo de las características de textura y flavor: Contribución enzimática. In Special Symposium – 44 th JCOMST (42-54), 1-5 September 1998, Barcelona, Spain.

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