

Evaluation of dynamic sensory perception of flavour in Iberian pâtés using time-intensity method.

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Abstract- Time intensity (TI) method was applied, for the first time, to study the temporal flavour perception of pâtés derived from Iberian pigs. Sensory evaluations were performed with panellist (N=11) trained for this purpose and the following flavour attributes were selected and evaluated: overall flavour intensity, saltiness, liver-like and black pepper-like. FIZZ software was used to compute the TI average curves and the following TI parameters were extracted: maximum intensity of the curve (Imax), end time (Tend), duration of the plateau phase (DurPl) and the total area under the curve (Area).

TI results revealed that overall flavour was the most intense (higher Imax and Area; $p < 0.001$) and the most persistent attribute (higher Tend, $p < 0.01$) compared to the other flavour attributes. No significant differences were found in the DurPl parameter between the evaluated attributes. Moreover, saltiness showed the lowest total Area ($p < 0.001$) compared to the other flavour attributes which corresponds to the overall intensity perception throughout the total time of sample evaluation.

The present study highlights the feasibility of applying this dynamic sensory technique to obtain additional information to that provided by static sensory methods such as the descriptive profile.

Keywords- time-intensity, Iberian pâtés, flavour.

I.INTRODUCTION

Sensory analysis techniques have been widely used to assess quality of products derived from Iberian pigs (Ruiz 1998; Carrapiso 2003; Cava 2004; Ruiz 2007). However, the methodology used in these studies (mainly descriptive quantitative analysis) is based on the assessment of the perception of the different quality attributes as "static". Sensory evaluation, mostly from attributes related to the flavor and texture, is a dynamic phenomenon that changes during the process of food consumption. Dynamic methods provide information about variations in perception intensity of different attributes with the time. These methods are closer to the reality than static sensory methods (for example descriptive quantitative analysis AQD) since the latter only provide information about the intensity of the sensory perception of an attribute in a particular moment [1].

TI methodology for sensory evaluation allows assessing variations in perception intensity of a particular attribute over time using a sensory panel trained for this purpose. The result is a sequence of very intuitive graphical representations (TI curves). The TI curves show increases and decreases of the intensity of perception [1]. Several parameters can be extrapolated from these curves (maximum intensity, time to achieve the maximum intensity etc.) which allow the evaluation of the temporary changes and the comparison between TI-curves obtained for different products, tasters, sessions etc.

TI method has been widely used for studying the dynamics of perception of flavour and texture in several products such as chocolate drink [2], beer [3] and ice-cream [4] among many others. Whereas this methodology has been applied to certain meat and meat products such as chickens [5] and pork patties [6], the knowledge on the temporal sensory perception of muscle foods is still rather limited. Iberian pigs product, for instance, are recognized as high-quality products with distinctive sensory properties. However, the sensory profile of these products has never been studied with advanced sensory techniques such as TI. The use of dynamic sensory techniques like TI represents a breakthrough in the study of sensory quality of meat products from Iberian pigs.

The aim of the present study was to apply a dynamic sensory evaluation technique such as TI to evaluate the flavor in pâtés from Iberian pigs.

II.MATERIAL AND METHODS

Iberian pâtés “Esencia Ibérica” were obtained from Dehesa Serrana Industry, Cáceres (Spain).

Eleven panellists (six males and five females, range age: 26– 54 years) with previous experience in sensory evaluation, participated in the study (training and evaluation sessions). All of them were staff of the University of Extremadura.

Prior to TI, a descriptive sensory analysis of the same samples was carried out. The development of a conventional sensory profile of Iberian pâtés can be considered as part of the TI training [7]. This training enabled to test if the selected attributes are applicable to the product under investigation and allowed panellists getting familiar with the attributes and samples subsequently used in the TI study. After discussion the panel reached an agreement and selected 4 attributes and their verbal anchors on the scale.

The protocol of samples evaluation was fixed after panel discussion and was established as follows: panellists should keep the sample in their mouths, chew for 7 seconds and then swallow. After swallowing, panellists should continue the evaluation until they did not perceive anything. Panellists were required to move the cursor along a vertical line according to the intensity of their perception. The intensity recordings started when assessors clicked on the scale and stopped automatically after 120 s (total time of evaluation) or whenever the assessors returned the marker to the lowest value in the scale within the 120 s, meaning that they did not perceive the attribute any more. In flavour attributes evaluations, the message “swallow” was displayed after 7 s of chewing. Attributes were scored on a 10 cm non-structured vertical scale anchored with “less” and “more” for overall flavour intensity, saltiness, liver-like and black pepper-like. Between samples, panellists were required to follow the rinsing protocol. The final rinsing protocol between samples was tap water and a piece of unsalted cracker. Data were collected using the FIZZ software (Sensory Analysis and Computer Test Management) (Biosystemes, France, 2002).

Samples were served on glass plates with a glass of water and a piece of unsalted cracker to follow the rinsing protocol between samples. Evaluations took place in individual booths under white fluorescence light. In each session, two Iberian pâtés samples were presented to the assessors, with the serving order of the samples randomized according to the Williams Latin Square design.

Four parameters were extrapolated from the average TI curves of flavour attributes: maximum intensity (Imax), final time (Tend), duration of the phase plate (DurPI) and area under the curve (AreaTse).

III.RESULTS AND DISCUSSION

Results from TI evaluation are shown as means ($\pm$ SDM) of the extrapolated TI parameters (Table 1) and as average TI-curves (Figure 1) for each attribute.

Intensity (Imax and AreaTse) and total duration (Tend) of overall perception were the highest compared to the rest of attributes (Table 1 and Figure 1a). However, the intensity (Imax and AreaTse) of saltiness and black pepper-like perception (Table 1, Figure 1b and 1d) were the lower compared to other attributes. The intensity (Imax and AreaTse) of liver-like perception was not very intense (Table 1 and Figure 1c) although one would expect it could be the most intense attribute since it is the major ingredient. Total duration (Tend) and duration of the phase plate (DurPI) of black pepper-like perception were the highest (Table 1 and figure 1d) and it would be responsible for the persistence of overall perception.

Rewarding TI-curves for each pâtés are shown in Figures 1a, 1b, 1c and 1d with the purpose of testing

the repeatability panel. Results were obtained with good repeatability since the TI-curves for each pâtés are very similar and the possible variations could be cause by the manufacturing process.

V.CONCLUSIONS

The present study revealed the feasibility of applying the TI technique to evaluate the flavor of Iberian pâtés. TI is a powerful sensory technique for gaining information about the changes in flavour during consumption of Iberian pâtés.

The liver-like and saltiness flavour were the main contributors of the intense overall flavour of the Iberian pâtés. The black pepper-like flavour was the most persistent despite of having the lowest flavour intensity.

Table 1. Extrapolated TI-curves of Iberian pâtés flavour.

	IMax	TEnd	DurPI	AreaTse
Overall flavour	6,4 $\pm$ 0,44	19,2 $\pm$ 1,49	4,7 $\pm$ 0,45	74,2 $\pm$ 8,68
Saltiness	4,9 $\pm$ 0,54	16,1 $\pm$ 1,95	4,4 $\pm$ 0,54	50,2 $\pm$ 6,71
Liver-like	5,3 $\pm$ 0,53	17,9 $\pm$ 2,62	4,3 $\pm$ 0,80	60,1 $\pm$ 11,93
Black pepper-like	4,7 $\pm$ 0,41	18,5 $\pm$ 1,79	5,1 $\pm$ 0,62	55,9 $\pm$ 7,84

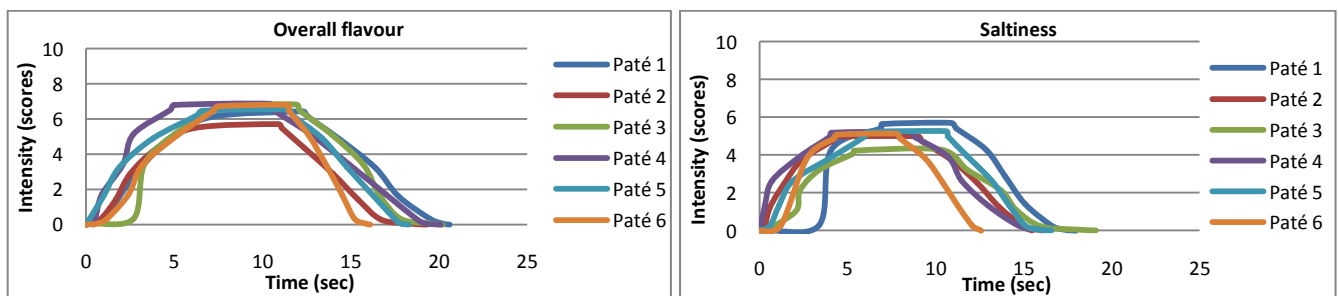


Fig 1a and 1b. Average TI-curves for overall and saltiness flavour.

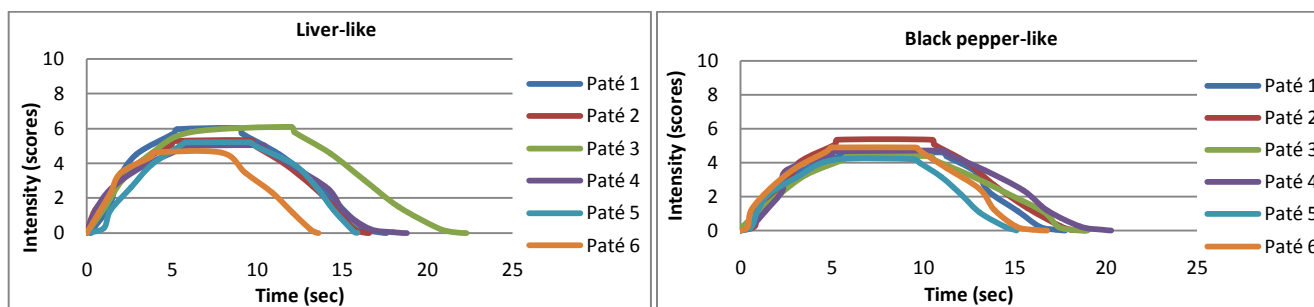


Fig 1c and 1d. Average TI-curves for liver-like and black pepper-like flavour.

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