PE7.03 Bivariate correlations between chemosensory characteristics and flavour compounds of Iberian ham 45.00

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Abstract—The bivariate correlations between the chemosensory characteristics and the flavour compounds (free amino acids and volatile compounds) of Iberian ham were studied. Three of the nineteen free amino acids researched significantly correlated with the taste and flavour traits of Iberian ham: proline, phenylalanine and lysine. The largest correlation involving any amino acid was found between proline and sweetness (R=0.556 P<0.05). Flavour persistence correlated with the amino acids proline and phenylalanine. In addition, a negative correlation between the cured flavour and the amino acid lysine was found. With regard to the volatile compounds, twelve of the thrirty-four volatile compounds researched were correlated with bitterness, odour intensity and the flavour traits. Most volatile compounds which showed a positive correlation with odour intensity and the flavour traits are compounds that come from Strecker and Maillard reactions (2-methylbutanal, butanoic acid, 2,6-dimethylpyrazine+dihydro-2(3H)-furanone, 5-butyldihydro-2(3H)-furanone and dimethyl disulfide). Conversely, two compounds derived from lipid oxidation reactions (1-pentanol and 2-heptanone) were negatively correlated with the cured flavour.

Index Terms—free amino acids, Iberian ham flavour, sensory characteristics, volatile compounds

I. INTRODUCTION

Iberian ham is considered a high-quality product. Its consumer acceptance is strongly influenced by the flavour characteristics [13]. The impression of flavour is due to the simultaneous stimulation of the human olfactory and the taste systems and is triggered by chemical compounds [15]. Iberian ham flavour is the result of a complex combination of odour-active volatiles and taste-active non volatiles. Most of these substances are formed by enzymatic reactions (proteolysis and lipolysis) or chemical process (lipid oxidation, Strecker degradation and Maillard reactions). It is known that some volatile compounds greatly contribute to the Iberian ham aroma [3]. Free amino acids take part directly in taste [11] and also participe indirectly in flavour development because they are precursors of many volatiles, some of them being Iberian ham odorants [3]. The purpose of the present study was to research the correlations between the chemosensory characteristics and the flavour compounds (free amino acids and volatile compounds) of Iberian ham.

II. MATERIALS AND METHODS

A. Samples Forty dry-cured hams were used (for details, see [9]). Hams were subjected to a dry-curing process which lasted 722 days [9].

B. Sensory analysis The samples were assessed by a trained panel of 18 members using a sensory descriptive test [6]. Odour (intensity), taste (saltiness, sweetness, bitterness) and flavour (intensity, persistence, cured, rancid) of Iberian ham were evaluated using an unstructured scale (10cm). The results were collected using sensory evaluation software (FIZZ, version 1.01; Biosystemes, France).

C. Amino acid analysis The free amino acids were analysed according to Córdoba et al. [4]. A liquid chromatograph composed of the two pumps (Model 110 B, Beckman, USA), a UV detector (Model 166, Beckman, USA) and a Supelcosil LC-18 column (250 mm x 46mm i.d., 5µm particle size, Supelco Bellafonte, USA) were used.

D. Volatile compounds analysis The volatile compounds were extracted by headspace-SPME [14]. A SPME fibre coated with carboxen-poly(dimethylsiloxane) (Supelco Bellofonte, PA) was used. Volatile compounds analysis was perfomed using a HP-6890-GC series II gas chromatograph (Hewlett-Packard, USA) coupled to a mass selective detector (HP-5973, Hewlett-Packard, USA). Volatiles were separated using a 5% phenyl-methylsilicone (HP-5) bonded phase fused-silica capillary column (50 m x 0,32 mm i.d, film thickness 1,05 µm (Hewlett-Packard).

E. Data analysis Pearson correlations were calculated to evaluate the bivariate interrelationships betwenn the chemosensory characteristics and the flavour compounds (free amino acids and volatile compounds). The SPSS statistical package (v.15.0) was used.

III. RESULTS AND DISCUSSION

Three of the nineteen free amino acids researched [9] significantly correlated with the taste and flavour traits of Iberian ham: proline, phenylalanine and lysine (Table 1). The largest correlation involving any amino acid was found between proline and sweetness ($R=0.556$ $P<0.05$). In fact, proline has a sweet taste [1]. Currently consumers highly value those Iberian hams which show a sweet taste. The sweet note is not easily perceived in hams and it is negatively correlated with salt content and positively with moisture content and most free amino acids [12]. In the present study, no correlation was found between free amino acids and saltiness or bitterness. However, Careri et al. [2] reported a strong relation between the saltiness and the free amino glutamic acid in dry-cured ham. The flavour persistence correlated with proline and phenylalanine (Table 1). Therefore, proline and phenylalanine are probably involved in the taste of Iberian ham. In addition, proline and phenylalanine take part in the Maillard reactions [7]. Maillard reactions yield volatile compounds which are among the most important odorants of Iberian ham [3]. In addition, a negative correlation between the cured flavour and the free amino acid lysine was found (Table 1). Lysine contributes to pyrazine generation through Maillard reactions [7, 8], and pyrazines are involved in dry-cured ham flavour [5]. Therefore, lysine could participate in flavour developement because it is a precursor of odorants. The decrease in free amino acids which takes place in the last stages of Iberian ham processing has been related to the develpment of Strecker and Maillard reactions [9], and therefore hams with lowest levels of lysine could be related to the highest levels of pyrazines and highest odour features. In fact, in the present study the 2,6-dimethylpyrazine was correlated with odour intensity (Table 1). With regard to the volatile compounds, twelve of the thrirty-four volatile compounds researched [10] were correlated with bitterness, odour intensity and some flavour traits (intensity, persistence and cured flavour) (Table 1). Most of the volatile compounds positively correlated with odour intensity and flavour traits are compounds that come from Strecker and Maillard reactions (2-methylbutanal, butanoic acid, 2,6-dimethylpyrazine+dihydro-2(3H)-furanone, 5-butyldihydro-2(3H)-furanone and dimethyl disulfide). Conversely, two compounds derived from lipid oxidation reactions (1-pentanol and 2-heptanone) were negatively correlated with the cured flavour. These results show that a weak flavour is related with higher levels of lipid oxidation compunds and lower levels of Strecker and Maillard compounds.

IV. CONCLUSION

Iberian ham flavour and odour traits are positively correlated with some free amino acids and Strecker and Maillard volatile compounds and negatively with lipid oxidation compounds.

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