71st ICoMST
GIRONA - CATALONIA - SPAIN
3rd-8th August - 2025

IMPACT OF SPICES AND SUGARS ON DRY-CURED LOIN AROMA

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I. INTRODUCTION

The formulation of dry-cured loins usually includes curing salts (salt and nitrite or/and nitrate), but other ingredients such as carbohydrates and spices (paprika, pepper, garlic or oregano, etc.) are added depending on tradition (Morales-Partera et al., 2017) [1]. The impact of spices on product aroma and antioxidant properties is well known although few studies have revealed their impact on microbiota selection (Belloch et al., 2021) [2] and the interaction of carbohydrates and spices on aroma development. Therefore, the aim was to determine the impact of paprika and dextrose addition on the surface of dry-cured loins attending to differences in microbiota composition and aroma profile.

II. MATERIALS AND METHODS

Three different types of loins containing either dextrose (0.1 g/Kg) (D), paprika (9 g/Kg) (P) or a mixture of dextrose and paprika (DP) were manufactured [3]. Twelve dry-cured loins (4 loins per formulation) were prepared using *Longissimus thoracis et lumborum* and rubbing the ingredients (salt 2.4 %, 150 mg/kg sodium nitrite, 150 mg/kg potassium nitrate, and sodium ascorbate 0.5 g/kg) on the loin surface. Processing was performed in controlled climate chambers until reaching a weight loss of 39 % in around 68 d. Loins were analyzed at the end of the process. The analyses done were: physic-chemical parameters (pH, aw, color (CIE L*, a*, b*), moisture, and protein contents) [3], microbiological counts (lactic acid bacteria (LAB), gram positive cocci (GC+), and yeasts and molds (YM)) [2], free amino acids (gas chromatography-FID by derivatization using the Phenomenex kit (Phenomenex, Torrance, CA, USA [4]), volatile compounds (by solid-phase microextraction (SPME) with 85 µm CAR/PDMS fibre (Supelco, Bellefonte, USA) using a gas chromatograph with a quadrupole mass detector (Agilent HP 7890, series II, HP 5975C, Palo Alto, USA), and GC-FID-olfactometry) and aroma sensorial analysis by quantitative descriptive analysis (QDA) using a trained panel composed of 12 panelist who received written information about the study before the experiments and gave written voluntary consent to participate (CSIC 261/2024). Statistical analysis was done using XLSTAT 2018 software (Addinsoft, Barcelona, Spain) in a model that included the effect of loin formulation (paprika, dextrose or the combination of both) as fixed effect and loins as random effect. Means were compared using the Tukey test.

III. RESULTS AND DISCUSSION

The results are presented in Figure 1, which shows a PCA analysis of the physicochemical, microbial and volatile compounds selected from the olfactometric analysis as aroma impact compounds. The main differences were observed between the loins containing or not dextrose, as observed by Factor F1 which represented 35 % of the variability. The presence of paprika (F1 right) was related with the presence of key aroma compounds derived from thiamine degradation (2-methyl-3-methylthiofuran) and 2-acetyl-1-pyrroline characterized by their high aromatic cured impact (Li et al., 2023) [3]. In contrast, dextrose (F1 left) impacted the aroma producing aroma compounds derived from the carbohydrate degradation such as 2,3-butanedione and 3-OH-2-butanone confirming the effect of carbohydrate addition. On the other hand, the combination of dextrose and paprika explained 20 % of the variability (F2) and was related to the presence of microbial groups; coagulase negative staphylococci (CG+) and yeast and molds (YM) and related to aroma compounds derived from amino acid degradation (3-methylbutanal, methional, ethyl 3-methylbutanoate and 2-acetyl-pyrrole). In summary, P loins were distinguished from those containing dextrose, D and DP loins (Figure 1).
The main sensory differences described by QDA were linked to paprika addition, which increased the perception of paprika and smoky odors as well as cured, savory and cheesy notes (Table 1).

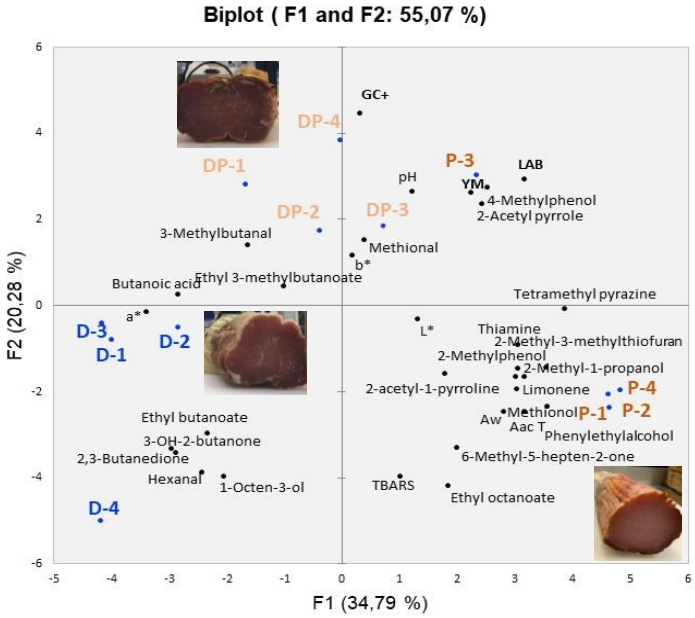


Figure 1. Principal component analysis of dry-cured loin type and physicochemical parameters, volatiles, amino acids, aromas, microbial counts

Table 1 – QDA sensory analysis of dry-cured loins aroma notes.

Aroma attributes	Sample P		Sample DP		Sample D		RMSE	*P*
Cured	6.93	a	6.38	ab	5.47	b	2.36	0.010
Paprika	5.05	a	4.26	a	2.20	b	2.87	0.003
Sour	2.84		1.98		1.95		1.99	0.219
Savoury	6.31	a	5.83	ab	4.62	b	2.59	0.042
Cheesy	2.81		2.84		1.58		2.46	0.135
Pungent	2.45		2.34		1.18		2.71	0.204
Smoky	5.13	a	4.35	a	1.74	b	2.71	0.000

IV. CONCLUSION

In conclusion, the combined effect of paprika and dextrose on dry-cured aroma was related to the activity of LAB, CN+ and YM microbial groups which modulated the aroma producing volatile compounds from amino acids, branched aldehydes and pyrroles, which imparted high desirable aroma notes like cured, savory and smoky.

ACKNOWLEDGEMENTS

We acknowledged the financial support by MCIU/AEI/10.13039/501100011033 (grant reference PID2021-122581OB-100, CEX2021-001189-S) and by 'ERDF A way of making Europe'.

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