EFFECT OF PANSALT® OR KOMBU ALGA AS SALT REPLACERS ON THE AROMATIC PROFILE OF DRY-CURED FOAL CECINA

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I. INTRODUCTION

Salt represents the undisputed protagonist in the cecina manufacturing process. Actually, it participates in developing the texture and characteristic flavor of this product influencing different chemical and biochemical reactions including lipid oxidation, lipolysis and proteolysis [1]. This ingredient plays a pivotal role also in the human body, although its excessive consumption could provoke serious health problems. In this context, NaCl reduction is one of the main lines of investigation in the meat industry. Thus, for the first time, a commercial low-salt mixture, Pansalt®, and Kombu seaweed powder have been explored as salt replacers in dry-cured foal Cecina, focusing on their effects on the aromatic profile of the final product.

II. MATERIALS AND METHODS

In this work, forty-eight knuckles from Jaca Navarra foals were employed. Raw pieces were randomly assigned to three groups and salted in a saturated brine: control (CON) – salted with NaCl (100% NaCl); Treatment 1 (T1) - salted with Pansalt® (Oriola Finland Oy, Espoo, Finland) (57% NaCl, 28% KCl, 12% $MgSO_4$, 2% lysine hydrochloride, 1% SiO_2, and 0.0036% KI) and Treatment 2 (T2) – salted with 50% NaCl and 50% of Kombu (*Laminaria ochroleuca*) seaweed powder (Porto Muiños, S.L., Cerceda, Spain). All cecinas were salted for 0.3 days/kg at 2-5 °C with relative humidity (RH) range between 85-90%. Subsequently, cecinas were washed and transferred to a post-salting room for 60 days (2-5 °C, 85-90% RH), and then smoked in a cooking-smoking chamber for 2 h (25 °C). Finally, the pieces were transferred to a dry-chamber for 105 days regulating temperature (8-14 °C) and RH (65-80%). The production was replicated following the same procedures in three different months. The analysis of the volatile compounds was performed using solid-phase microextraction-gas chromatography-mass spectrometry (SPME/ GC–MS) technique according to the procedure and conditions described by Domínguez et al. [2]. The data were examined using a one-way ANOVA with the SPSS 25.0 statistical software.

III. RESULTS AND DISCUSSION

A total of 96 volatile organic compounds (VOCs) were identified and distributed into 9 chemical families (Fig. 1). The salt replacement significantly ($P < 0.001$) affected the total VOCs, favouring a significant increase of T2 values. A similar trend was also observed in most of the singular volatile substances. Alcohols represented the most abundant family in all treatments, while acids obtained the second greatest areas, followed by aldehydes (CON and T2) and ketones (T1). As regards alcohols, samples belonging to the T2 batch reported the highest ($P < 0.001$) values, mainly due to the predominance ($P < 0.001$) of 2,3-butanediol (data not shown), which is a compound derived from the microbial

fermentation of carbohydrates. In general, our samples generated VOCs mainly originated from lipid oxidation, carbohydrate fermentation, and amino acid deterioration, as commonly observed in cecinas [2]. Fat degradation compounds, such as hexanal, an aldehyde recognized as a lipid oxidation marker, showed the highest amounts ($P < 0.05$) in CON samples (data not shown), probably owing to the pro-oxidant activity of the sodium chloride contents. Whereas, reformulated salt samples, particularly T2 cecinas, reported the greatest ($P < 0.01$) values in VOCs derived from carbohydrate fermentation or amino acid degradation. This fact could be explained by salt reduction, which generally favors increased microbial growth and proteolytic reactions [3].

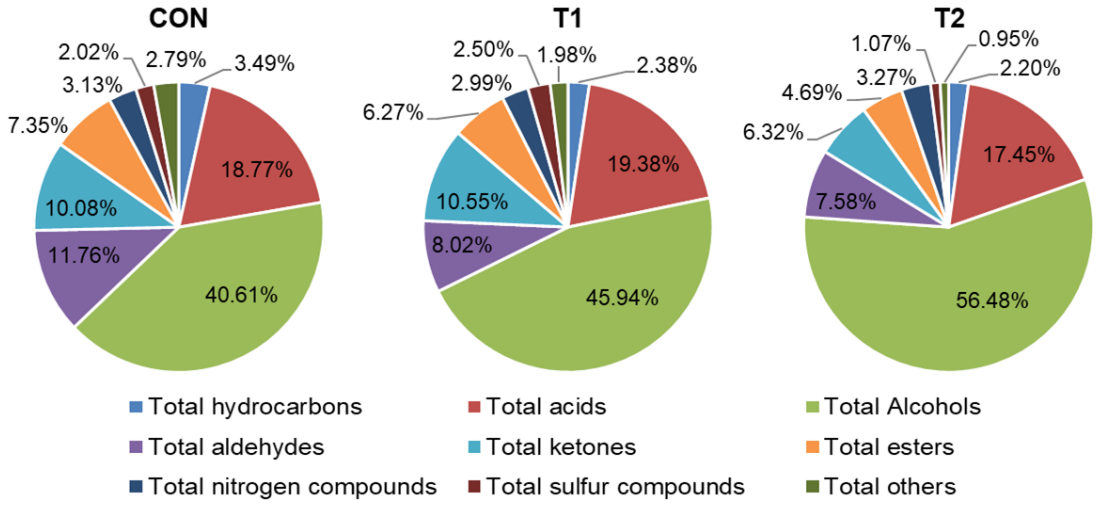

Figure 1. Volatile families (displayed as percentages) according to the three batches: CON - 100% NaCl; T1 - 100% Pansalt®; T2 - 50% NaCl and 50% Kombu seaweed.

IV. CONCLUSION

Data indicated that the use of T1 or T2 brines represents an encouraging approach, since they seemed to delay the release of VOCs derived from lipid oxidation and could improve the aromatic perception of dry-cured foal cecinas.

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REFERENCES

1. Lorenzo, J. M., Fonseca, S., Gómez, M., & Domínguez, R. (2015). Influence of the salting time on physico-chemical parameters, lipolysis and proteolysis of dry-cured foal “cecina.” *LWT* - Food Science and Technology 60(1): 332–338.
2. Domínguez, Rubén, Purriños, L., Pérez-Santaescolástica, C., Pateiro, M., Barba, F. J., Tomasevic, I., Campagnol, P. C. B., & Lorenzo, J. M. (2019). Characterization of volatile compounds of dry-cured meat products using HS-SPME-GC/MS technique. Food Analytical Methods *12*(6): 1263–1284.
3. Armenteros, M., Toldrá, F., Aristoy, M. C., Ventanas, J., & Estévez, M. (2012). Effect of the partial replacement of sodium chloride by other salts on the formation of volatile compounds during ripening of dry-cured ham. Journal of Agricultural and Food Chemistry 60(31): 7607–7615.