Volatile profile of dry-fermented foal sausages formulated with healthy oil emulsion hydrogels

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Objectives: The purpose of this work was to study the influence of partial replacement of animal fat by healthy oil mixtures structured in emulsion hydrogels, algal oil mixed with tiger nut (treatment 1 - T1) or sesame oils (treatment 2 - T2), on volatile profile of dry-fermented foal sausages.

Materials and Methods: Three different batches were elaborated: control (CON) - 100% of pork back fat as fat source; treatments 1 and 2 (T1 and T2) - 50% of animal fat was replaced using oil mixture emulsions, tiger nut (T1) or sesame (T2) oils (35.05 g/100 g emulsion) mixed with algal oil (2.25 g/100 g emulsion). The two types of alginatebased hydrogels (T1 and T2) were processed with Prosella powder as gelling agent (Prosella VG NF4, Coli Ingredients, Mittelhausen, France) and elaborated a day before sausages manufacture following the procedure recently described by other authors (Cittadini et al., 2021). The procedure described by Bis- Souza et al. (2019) with some modifications was followed for sausages elaboration. In brief, sausages, composed of lean meat, pork back fat, water and the "542 Salchichón" supplement (Laboratorios Ceylamix, Valencia, Spain), once elaborated, were fermented for 1 day at 20 °C and 80% relative humidity (RH) and then dried-cured for 55 days at 8-12 °C and 65-80% of RH. The same manufacturing process was repeated three times, on different months, and each batch consisted of eight replicates. The ex- traction of the volatile compounds was carried out using solid-phase microextraction (SPME), while separation, identification and quantification was performed using a gas chromatograph coupled to a mass selective detector according to López-Fernández et al. (2022). The data were examined using a one-way ANOVA with the SPSS 25.0 statistical software.

Results and Discussion: A total of 96 compounds were identified and grouped into eleven chemical families. The replacement of an- imal fat by the healthy emulsion hydrogels increased ($P < 0.001$) the total volatile compounds (VOCs) and most of individual VOCs ($P < 0.05$). Terpenes and terpenoids represented the main family in all treatments, as typical in this type of product, probably due to the spices and the vegetable oils employed. Esters was the second most abundant family, followed by aldehydes (CON and T1) and alcohols (T2). In the case of esters, which are very fragrant compounds, CON presented the greatest ($P < 0.05$) areas in comparison with the reformulated sausages. However, it was the T1 group to report the highest values ($P < 0.05$) in the major part of VOC families detected. In particular, fat degradation compounds, as acids, alcohols and aldehydes, showed the greatest amounts in T1 samples. On the other hand, T2 seemed to reduce the generation of lipid-derived VOC and minimized off-flavors. This trend could be related to the presence of higher quantity of natural antioxidant compounds in the sesame oil (Moghtadaei et al., 2018).

Conclusions: In line with the results obtained, it is evident that the type of fat source had a significant effect on the VOC profile of this product. Moreover, the T2 formulation showed encouraging outcomes and could improve the aromatic perception of the dry- fermented foal sausages.

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