

Improved Oxidative Stability and Sensory Characteristics of Beef Hamburgers Enriched with Phenol Extracts from Olive Vegetation Water

Mercatante D.¹, Barbieri S.², Cardenia V.³, Masotti M.¹, Balzan S.⁴, Taticchi A.⁵,
Rodriguez-Estrada M.T.^{1,2}

¹Department of Agricultural and Food Sciences, Alma Mater Studiorum-Università di Bologna, Bologna, Italy. ²CIRI-Agrifood (Interdepartmental Centre of Industrial Agrifood Research), Alma Mater Studiorum-Università di Bologna, Cesena (FC), Italy. ³Department of Agricultural, Forest and Food Sciences, University of Turin, Grugliasco (TO), Italy. ⁴Department of Comparative Biomedicine and Food Science, University of Padova, Legnaro, Italy ⁵Department of Agriculture, Food and Environmental Sciences, University of Perugia, Perugia, Italy

During the olive oil mechanical extraction process, diverse by-products are generated, which are sources of high-added value molecules for the production of new foods and/or ingredients with higher functionality. For both food industry and consumer is of great interest to replace chemical additives (i.e. nitrite/nitrate salts) and food coloring with natural compounds from agro-food by-products (such as biophenols). Moreover, the utilization of natural compounds extracted from by-products increases the food chain sustainability and promotes launching of clean label food products as well. The phenolic extract from olive vegetation water is of particular interest, as it has a high concentration of secoiridoids' derivatives and verbascoside, so its addition in fresh meat products can exert an antioxidant action towards lipids and myoglobin, as well as improve sensory profile of fresh meat products, especially flavor and color.

The aim of this study was to evaluate the effect of an extract rich in phenols obtained from olive vegetation water on the oxidative stability and the sensory characteristics of raw and cooked beef hamburgers during storage. To prepare the hamburgers, minced beef meat was added with 0.8% salt, 2 starter cultures (SafePro® and Bactoferm®) and different concentrations of phenolic extract: control (C, without phenolic extract), L1 (0.35% of spray-dried phenolic extract, equivalent to 87.5 mg of phenols/Kg), L2 (0.70% of spray-dried phenolic extract, equivalent to 175 mg of phenols/Kg). Raw hamburgers were packed under modified atmosphere and stored under alternating exposure to fluorescent light (12 h dark/12 h light) at 4±2 °C for 9 days. Hamburgers were sampled at different times (0, 6 and 9 days) and grilled at 70 °C.

The results show that both concentrations of phenolic extract proved to effectively reduce TBARs and oxysterols during the shelf-life of raw hamburgers. In fact, TBARs and oxysterols were up to 4.5- and 8.8-fold lower in phenol-enriched raw hamburgers, respectively, than in control samples; a similar trend was noted also in phenol-enriched cooked hamburgers (5.7- and 4-fold lower). Sensory analysis also confirmed the effectiveness of the addition of phenolic extract and protective cultures: they did not significantly influence the organoleptic characteristics of products and had a positive effect especially on the intensity of the red color (raw product), thus reducing hamburgers' browning during storage.