Effect of the incorporation of a cheese whey hydrolyzate on the lipid oxidation of cooked ham

Roberto Bermudez, Noemi Echegaray, Paulo E.S. Munekata, Rubén Domínguez, Márcio Vargas-Ramella, Daniel Franco, Mirian Pateiro, Jose M. Lorenzo

Meat Technology Centre of Galicia, Ourense, Spain

Introduction: Large amount of wastes is generated by meat industry becoming a severe problem for sustainability. Different ways of valorizing by-products have been investigated in various industries; for example, citrus, fish, meat and dairy and most of these studies are focused on biotechnological developments and investigate the possibility of extracting various nutrients from by-products and the possibility of using (parts of) the by-products in the production of end products (Banaszewska et al., 2014). Therefore, the improvement and use of these by-products is a major goal for worldwide society. On the other hand, due to characteristics of food, the occurrence and progression of oxidative reactions generates the reactive oxygen species by means of enzymatic, chemical, and photochemical reactions and, to tackle this problem, one of the most employed strategies in food systems is the use of antioxidants (Franco et al., 2020). On the other hand, cheese whey is a rich by-product in nutritional terms, possessing components with high biological value, excellent functional properties, and an inert flavour profile (Athira et al., 2015). In this regard, cheese whey hydrolyzate can be used as natural preservative due to its antioxidant properties (Athira et al., 2015). Thus, the aim of this work was to study the effect of cheese whey hydrolyzate on the lipid oxidation of cooked ham.

Materials and methods: Cooked ham pieces were elaborated in Meat Technology Centre. They were cut in slices and stored in polystyrene tray. Samples were randomly divided into five batches. Cheese whey hydrolyzate was obatined from Queizúar S.L. (A Coruña, Spain) according to Éstevez et al. (2012). The first batch (control) was manufactured without hydrolyzed whey protein; the second batch was manufactured with 500 ppm of sodium erythorbate and the third, fourth and fifth batches were manufactured with 250, 500 and 1000 ppm of hydrolyzed whey protein, respectively. All cooked ham slices were packaged in a modified atmosphere (70% N2/30% CO2). Samples were analyzed on days 0, 21, 42 and 61. Color parameters, TBARs, chemical composition and textural parameters were evaluated according to Pateiro et al. (2013). An ANOVA using the GLM was performed for all variables considered in the study and LSM were separated using Ducan's test ($P<0.05$) using the IBM-SPSS Statistics 23.0 program.

Results: Proximate composition was evaluated on 0 days and the mean values were: 78.38% moisture, 1.55% fat, 14.66% protein and 5.20% ashes. Redness values decreased significantly ($P<0.01$) only in batch 3 from 10.07 to 7.19. Lipid oxidation was increasing in all batches through the storage period being slightly higher in batches 4 and 5 at the end of shelf life (0.22 and 0.24 mg MDA/kg, respectively) compared to control group (0.16 mg MDA/kg). Finally, hardness values decreased significantly in all batches at the end of shelf life (29.14, 17.73, 20.97, 17.66 and 19.47 N, for batch 1, 2, 3, 4 and 5, respectively).

Conclusions: Cheese whey hydrolyzate at 500 and 1000 ppm can be introduced in the formulation of cooked ham to maintain the color. However, lipid oxidation did not improve with the addition of cheese whey hydrolyzate. Thus, our cheese whey hydrolyzate did not show antioxidant activity.

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