Effect of turmeric addition on colour and lipid oxidation of beef meatballs

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Introduction: Ground meat products, such as meatballs, burgers and patties, are highly consumed worldwide. On the other hand, lipid oxidation causes a decrease in sensory quality and also reduces the shelf-life of meat (Domínguez et al., 2019). In recent years, the use of natural antioxidants has rapidly increased in order to improve the lipid stability of meat products (Munekata et al., 2020). In this regard, turmeric can be included in meat products to delay oxidation due to its antioxidant properties (de Carvalho et al., 2020). Thus, the objective of this study was to assess the effect of turmeric addition on the colour and lipid oxidation of beef meatballs.

Materials and methods: For this study, 5 batches of healthy meatballs reformulated with canola oil (lean meat (82.8 g/100g), oil emulsion (immobilized in prosella gel) (8 g/100 g), salt (1.2 g/100 g) and water (8 g/100 g) were prepared: control without antioxidant (CON); with 500 mg/kg sodium erythorbate (E500); and three batches with 25, 50 or 75 mg/kg turmeric (T25, T50 and T75). After manufacture, meatballs were packed under modified atmosphere (80% O_2 and 20% CO_2) and stored at 2 °C for 17 days. Color was measured using a portable colorimeter (CR-600d, Minolta), while lipid oxidation was evaluated by the thiobarbituric acid reactive substances (TBARS) index according to Vyncke (1975). In each sampling point, 15 meatballs of each batch were analysed on days 0 and 17.

Results: The addition of turmeric modified the meatballs color, increasing L* (from 43.86 to 49.54), a* (from 22.36 to 25.10) and b* (from 19.24 to 32.26) values. All color parameters decreased throughout the storage period for all treatments. After 17 days of storage, the highest a* values were observed in the meatballs with higher turmeric added (15.15, 13.87, 13.67, 13.55 and 8.01, for T75, T50, T25, E500 and CON, respectively). In this regard, de Carvalho et al. (2020) noticed that there was no change in a* values of sausages prepared with 500 ppm turmeric extract during storage indicated greater stability. Regarding lipid oxidation, TBARS levels increased over time in CON (from 0.13 to 5.98 mg MDA/kg on days 0 and 17, respectively) and E500 (from 0.17 to 2.13 mg MDA/kg on days 0 and 17, respectively) batches, while meatballs with turmeric presented the lowest values at end of storage period (0.51, 0.36 and 0.31 mg MDA/kg for T25, T50 and T75, respectively). Our outcomes agree with data reported by de Carvalho et al. (2020) who noticed that turmeric extract is effective against lipid oxidation and could be a good strategy to enhance the shelf-life of lamb sausage. Thus, the control and E500 samples would be perceived as rancid on the 17th day of storage, while the meatballs containing turmeric did not exceed the limit values (below 0.6 mg MDA/kg) proposed by Georgantelis et al. (2007) at the end of the storage time.

Conclusions: The inclusion of turmeric delayed the lipid oxidation of beef meatballs. However, the addition of turmeric also modified the color of meatballs, which could affect consumer acceptance.

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