Quality characteristics of phosphate free restructured turkey steaks formulated with eggshell calcium powder and holly oak extract

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Introduction: Nowadays rising attention has been paid to healthy natural ingredients since consumers are becoming more and more health-conscious about the foodstuff they eat. Researches on the development of healthier meat product formulations have been enhanced. Phosphate salts could enhance product yield, texture, flavor and colour, decrease cook loss, thaw loss and purge loss, as well as they act as antioxidants extending shelf life (Sebranek, 2009). In recent years, it has been found that phosphates have negative effects on health. Today incorporation of natural ingredients as inorganic phosphate replacers has come into prominence as a novel research topic due to health concerns about phosphates (Öztürk and Serdaroğlu, 2018). Various studies have been carried out on reducing the amount of phosphates in meat product formulations or substitute them with natural additives (Öztürk and Serdaroğlu, 2017). The aim of this study was to investigate the possibility of using eggshell calcium powder (ESP), low methoxy pectin (LMP) and holly oak acorn extract as phosphate replacers to meet the specific effects of phosphates in restructured turkey steaks.

Materials and methods: Acorn extract was prepared according to the modified method of Görgüç et al. (2020). Four treatment groups were prepared as follows: In control samples (C) 0.5% phosphate was added, in other formulations phosphate was substituted with 0.5 ESP (E), 0.5% ESP + 0.25% LMP (EP) and 0.5% ESP+0.25% LMP+extract (EPA). To produce restructured turkey steaks turkey breast meat (2x3x3) was mixed with 2% salt, 15% ice, and phosphate or phosphate substitute additives at 50 rpm for 30 min, afterward, the meat mixture cooked in a steam-jacketed until the core temperature reached to 75℃. The total phenolic content (TPC) was determined by the Folin–Ciocalteu method (Singleton and Rossi, 1965). Antioxidant capacity of acorn extract was evaluated by using DPPH method (Grajeda-Iglesias et al., 2016). Total moisture (AOAC, 2012), protein (LECO nitrogen analyzer), fat (Flynn and Bramblett, 1975), and ash (AOAC, 2012) contents of samples were analyzed. pH value was measured with a pH meter equipped with a penetration probe. The cooking yield of samples was determined by calculating weight differences of samples before and after cooking. The spectrometric method of Witte et al., (1970) was applied to determine TBARS. The peroxide value was determined according to (AOAC, 2012).

Results: TPC and DPPH values for extract were recorded as 15.233 mg GAE/g, 5,44 mmol Trolox equivalent/g extract, respectively. Total moisture, protein, fat and ash values for samples were in the range of 67.11-74.37%, 26.11-29.21%, 8.14-9.43%, 0.95-5.80% and 2.12-2.43%, respectively. During the storage period pH values of samples were between 6.03-6.68, EPA treatment had a higher pH value than the C treatment. When phosphates are used in meat products water holding capacity can be improved by their increasing effect on pH. The highest cooking yield was recorded in EPA treatment, the high pH value of EPA samples and the water binding property of added pectin could be the reason for this finding. Peroxide values at the end of storage were in the range of 4.57-28.81 meqO2 / kg sample. Using acorn extract showed a significant effect on peroxide values during the storage period. TBARS values of the samples at the end of storage were in the range of 0.10-1.10 mg MA/kg sample. Similar results were also found in chicken meat samples containing acorn extract (Özünlü et al., 2018). E samples had the lowest TBARS value on 21st day of storage.

Conclusions: Therefore, the results of this study showed combinative use of using egg shell powder, low methoxy pectin and acorn extract could be a potentially effective attempt for replacing synthetic phosphate in restructured turkey steaks.

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