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Application of raw and defatted hempseed press-cake and sweetgrass antioxidant extract in pork burger patties

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During storage and processing various (bio)chemical reactions, including oxidation of lipids and proteins, and microbiological processes occur in the meat and may adversely affect its quality. These undesirable events may be controlled by various physical means and plant origin ingredients; some of which are good sources of natural antioxidants and antimicrobial agents [1]. In addition, plant ingredients may increase the overall nutritional value of meat products by enriching them with bioactive health beneficial compounds and other valuable nutrients, such as vitamins, dietary fiber, and minerals. Finally, some plants have become popular as cheaper substitutes for animal origin proteins [2]. Hemp seeds (*Cannabis sativa* L.) are good source of various nutrients. Recently the interest in hemp seeds as an excellent source of high-value oil and proteins has remarkably increased [3]. In addition, sweet grass (*Hierochloe odorata*) extract, which has demonstrated very strong antioxidant potential [4], was used. The aim of the study was to evaluate the physicochemical properties and oxidative stability of pork burger patties produced with the addition of dried mechanically pressed hemp seeds (2%), fully defatted by supercritical CO₂ extraction hemp seed (2%), sweet grass extract (2%) and sweet grass extract with dried pressed hemp seed additive (0.5 and 1.5% respectively). The patties were compared with the control sample (without additives) during storage on days 0, 4, 8, 15, and 21 at 4 °C in modified atmosphere conditions.

Hemp seed press-cake (1.5–2.0%) and sweet grass (0.5%) had insignificant effects on the majority of the measured physicochemical characteristics of pork meat patties, both after the addition and during storage, except for lightness L* value. Grilling losses were lowest in patties with fully defatted hemp seed flour, 14.3% (24.2% in control). The highest grilling loss (26.2%) was in patties with sweet grass extract, which indicates to the decreased water-binding capacity. pH values of grilled patties ranged within 6.1 – 6.3. Slightly higher pH values were in patties with hemp press-cake, most likely due to the addition of a small amount of buffer-type compounds present in hemp [5,6]. There were no negative effects on the sensory characteristics of pork meat patties with hemp seed press-cake, while patties with sweet grass extract received lowest scores due to its dark green colour and bitter taste notes. Raw (with residual oil) hemp press-cake increased the formation of oxidation products in meat patties, while the application of sweet grass extract as natural antioxidant effectively inhibited the oxidation process, which was determined by measuring the content of malondialdehyde.

Current research showed that hemp seed press-cake ingredients may be used in the production of pork patties; the combination of raw hemp press-cake with sweet grass extract may substantially mitigate the pro-oxidative effects of residual and highly unsaturated hemp seed oil during storage. The use of selected plant-based ingredients in meat products in the study revealed their potential to improve shelf life and the yield of pork burger patties during thermal treatment.

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