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Effect of Coconut Husk and Ginger Juices on Physicochemical Properties of Minced Meat

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Structured Abstract

Background: The rapid spoilage of minced meat during refrigeration is a significant challenge for the food industry, primarily caused by lipid oxidation and microbial protein degradation. These processes lead to off-odours, moisture loss, and undesirable textural toughening. While synthetic antioxidants are widely used, there is an increasing consumer demand for natural alternatives. This study investigates the potential of upcycling agricultural by-products, specifically ginger (*Zingiber officinale*) juice and coconut (*Cocos nucifera*) husk extract, to serve as sustainable preservatives. These materials contain bioactive gingerols and tannins, which possess potent antioxidant and antimicrobial properties necessary to stabilise the meat matrix.

Methods: Coconut husk and ginger were obtained and processed to isolate their bioactive components. Ginger rhizomes were blended and filtered to obtain juice, while coconut husks underwent aqueous extraction to retrieve phenolic-rich liquid. Fresh minced meat was divided into four groups: Control (no additives), T1 (coconut husk), T2 (ginger juice), and T3 (1:1 blend). Samples were stored at 4°C for 12 days. Quality was assessed through Peroxide Value (PV) for oxidation, pH for spoilage, and Water Holding Capacity (WHC) and Hardness for texture.

Results: This study shows that the synergistic blend of ginger juice and coconut husk extract (T3) exhibited significantly greater preservative activity than the individual treatments and the control. Samples treated with the T3 blend demonstrated lower peroxide values, indicating superior inhibition of lipid oxidation during the critical early stages of storage. While prolonged storage increased pH and hardness across all samples, treated samples maintained acceptable quality and moisture retention up to Day 12. Specifically, the T3 treatment effectively slowed the rate of protein degradation and moisture loss, resulting in the highest water-holding capacity and lowest hardness levels recorded. Overall, the treatment formulation and storage time significantly influenced the chemical stability and textural integrity of the minced meat.

Conclusion: The findings of this study indicate that a synergistic blend of ginger and coconut husk effectively extends meat shelf life. Antioxidants inhibit fat oxidation, while ginger enzymes maintain tenderness. This research offers a sustainable method to reduce food waste and reliance on synthetic additives.

Keywords: Minced meat, Natural preservatives, Gingerols, Lipid oxidation

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