

**Physicochemical properties and tenderness analysis of bovine meat using proteolytic enzymes extracted from pineapple (*Ananas comosus*) and jackfruit (*Artocarpus heterophyllus*) by-products**

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**ABSTRACT**

Present research investigation aimed to explore the pineapple and jackfruit by-products, the core and the seed, respectively, as a meat tenderizer. The effects of beef samples treated with bromelain and *Artocarpus heterophyllus* protease in four different concentrations (0, 1%, 2%, 3% and 4%) and combination (4% bromelain and 4% *A. heterophyllus* protease) were studied. The physicochemical treated beef samples showed a  $13.30 \pm 0.30$  decrease in the water holding capacity (WHC), pH  $5.47 \pm 0.03$ , moisture content  $63.86 \pm 0.16$  and cooking yield  $75.78 \pm 0.16$  with the increased addition of crude enzyme extract ( $p < .05$ ). The cooking loss increased significantly with the concentration of extracted proteolytic enzymes ( $p < .05$ ). Microstructural analysis of the treated beef samples demonstrated the degradation of muscle fibers and the generation of numerous gaps or space. The sensory evaluation analysis also revealed the acceptance of the treated beef sample compared to the untreated sample. The results showed that the bromelain and *A. heterophyllus* protease extract from by-products could be used as an effective natural meat tenderizer. The core and seed as (pineapple and jackfruit) waste by-product could effectively improve the tenderization of tough muscle in beef without disturbing quality parameters, significantly contributing to the agricultural processing industry.

**KEYWORDS**

Artocarpus heterophyllus; Connective tissues; East Asian countries; Microstructural analysis; Processing industry; Proteolytic enzyme; Quality parameters; Water holding capacity

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