

UNIVERSITI TEKNOLOGI MARA

**EXTRACTION, PURIFICATION AND
CHARACTERISATION OF
BROMELAIN FROM PINEAPPLE
CROWNS AND ITS APPLICATION
IN TENDERISING BEEF**

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of the requirements for the degree of
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ABSTRACT

Pineapple crowns are an agricultural waste available in large quantity particularly from canned pineapple industry. Alternatives to its efficient utilisation are necessary as the crowns contain high enzyme activity which can be potentially used as a meat tenderiser. Thus, the aims of this study are to extract and purify bromelain from the pineapple crowns. The purified bromelain was freeze dried to produce bromelain powder which was later applied to tenderise the toughest Brahman part, round. The action of bromelain in tenderising beef was affected by different pHs of beef, immersion temperatures and times, and bromelain solution concentrations. Thus, response surface methodology (RSM) was used to determine the feasible optimum condition for the beef tenderisation by bromelain. The effect of bromelain treatment on the physico-chemical properties of beef and its nutritional quality was determined. The nutritional quality of beef was determined from the proximate extent between the bromelain-treated beef and the reference pattern protein and compared with the untreated beef. SDS-PAGE revealed that bromelain from pineapple crowns is a monomeric with a molecular weight of 30 kDa. The bromelain powder was less pure compared to that of standard bromelain powder. The bromelain powder stored in the frozen temperature was the most stable since it showed very little loss in bromelain activity and the lowest value in water activity compared to bromelain powder stored in the chilled and room temperatures after four weeks of storage. The beef tenderisation treated with bromelain could be optimised by 89.91% at the feasible optimum condition whereby the pH of beef was 5.6, the immersion temperature was 60°C, the concentration of bromelain solution was 0.17% and the immersion time was 10 minutes. Bromelain decreased the hardness, water holding capacity (WHC), moisture content and a^* value of beef. On the other hand, bromelain increased the pH, cooking loss, and L^* and b^* values of beef. Bromelain also fragmented and denatured the proteins in beef. The proximate extent of the bromelain-treated beef (0.57) was inclined towards the reference pattern protein (1.00) compared to the untreated beef (0.51). This indicated that beef treated with bromelain had a desirable effect on the nutritional quality of beef. This study can contribute in promoting and increasing the economic value of beef. At the same time, the extraction of bromelain from pineapple crowns can solve the waste disposal problem generated by the canned pineapple industry.

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