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Characterisation of Buffalo (*Bubalus bubalis*) Bone Gelatin Extracted Using Acid and Papain Pre-treatment

Muhammad Yazid Samatra¹, Nor Qhairul Izzreen Mohd Noor¹, Umi Hartina Mohamad Razali¹ and Sharifudin Md. Shaarani²

¹Faculty of Food Science and Nutrition, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia, mdyazidsam@gmail.com, qhairul@ums.edu.my, umi.hartina@ums.edu.my

²Food Biotechnology Programme, Faculty of Science and Technology, Universiti Sains Islam Malaysia, 71800 Nilai, Negeri Sembilan, Malaysia, sharifudinms@usim.edu.my

Abstract: Gelatin is widely regarded as one of the unique multifunctional biopolymers, with applications in a wide spectrum of industries. Porcine is the most prevalent source of gelatin since it is abundant and cheap. There have been substantial efforts to develop gelatin alternative sources to replace porcine because eating pigs and its derivatives is strictly prohibited in Halal and Kosher diets. This study focused on the effects of various acids and papain pretreatment on gelatin extractability and properties from buffalo bone. The buffalo bone was pre-conditioned with hydrochloric acid (HCl) and citric acid (0.05M and 0.025M, respectively) with and without papain prior to hot water extraction at 70°C for 7h. The highest yield was found by 0.025M HCl treatment without papain (6.36%, dry basis). Meanwhile, the lowest yield was 3.8% using citric acid at 0.05M without papain. Papain at 100U/g was found to have no significant effect in HCl and citric acid pre-treatment. The physicochemical and functional properties of gelatin were determined. Gelatin treated by 0.025M citric acid without papain have the highest protein (84.4%), hydroxyproline (26.98mg/mL), gel strength (50.64g), and viscosity (11.32cP). It also had the highest emulsion activity index (9.52m²/g), emulsion stability (30.29min), foaming expansion (13.66%), foaming stability (10.64 to 12.47min), water holding capacity (11.68mL/g), and fat binding capacity (8.88mL/g). The pH values and isoelectric points of all gelatin range from (5.1 to 5.4) and (6.0 to 7.4), respectively. The low ash level of the gelatin revealed both acids to effectively removed minerals. All the extracted gelatin had a similar secondary structure. Buffalo bone gelatin has a potential to be used as an alternative source of halal gelatin production.

Keywords: buffalo, gelatin, physicochemical, functional, papain