Enzymatic hydrolysis of salmon frame proteins at different byproduct/water ratios and pH regimes

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The enzymatic hydrolysis of proteins is an interesting alternative to add value to the salmon frames by converting this by-product into protein hydrolysate and bones. The protein hydrolysates are recognized sources of bioactive peptides. In adittion, bones can be transformed into a viable calcium source through nano milling. During the hydrolysis the mixing is favored by the addition of water, meanwhile, the cost is highly increased during the drying stage. The addition of alkali avoids the pH drop causing enzyme activity to decrease, meanwhile, the operation cost is increased.
The evaluation of different by-product/water ratios was assessed using 50%, 75%, and 100% of ground salmon frames. The pH regimes were set up at controlled pH 8, initial pH 8 without control, and native initial pH without control. The hydrolysis reactions were carried out at 55 °C in an agitated batch reactor using 13 AU subtilisin per kg salmon frame. Response variables were released alpha-amino groups, mass of soluble/insoluble fraction, and nitrogen extraction.
The results showed that the released alpha-amino groups were 129, 108, and 87.9 mmol/kg of reaction mixture at 60 min for the regimes of controlled pH 8, initial pH 8 without control, and native initial pH without control, respectively. The results for the different salmon frame concentrations (native initial pH without control) yielded 189, 159, and 87.9 mmol/kg of the reaction mixture at 60 min for 100%, 75%, and 50% of salmon frames. The hydrolysis without pH control allowed to avoid the use of alkali and control system but decreasing the production of amino groups at 68% of the controlled condition. The hydrolysis at high salmon frame concentration allowed to avoid the addition of water. However, the productivity obtained was 189, 212, and 176 mmol/kg of the salmon frame at 60 min for 100%, 75%, and 50% of salmon frames. These results can be used to estimate the profitability of the process after considering the decrease in the operational cost and the effects on the product yield.