# production of some enzymatic from natural sources and its uses in food industry

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the proteolytic enzymes extracted from different sources are widelyused as a tenderizer of old meats especially spent hen meats. the olderlaying hens are underutilized poultry production in egypt. perhaps thetoughness of the meat is the most important characteristics contributing to its consumer acceptability, the problem at hand leads to the development of a procedure for the complet and reproducible separation of the proteolytic enzymes and shedlight on the chemical changes of meats treated with proteolytic enzymes, the objective of this investigation deals with the main following points : isolation of proteolytic enzymes from different sources such as plant sources (carica papaya and figs) and animal sources (spleen, kidneys, liver and lung). study the factors affecting the production of proteolytic enzymes. study the activity of the extracted enzymes (papain, ficin and catheptic ), determination of proteolytic activity as affected by different factors such as temperature , ph, substrate and enzyme concentrations, use of the isolated proteolytic enzymes in tenderization of some types of meats such as spent hen, camel and buffalo meats.the obtained results could be summarized in the following points : 1. chemical composition of unripe fruits, fresh and dried latex of papaya : the unnpe fruits of papaya contain 1.18 % protein, 26.97 % carbohydrates, 0.99 % ash, 0.49 % fat and 70.37 % moisture. while, fresh latex contain 14.10 % protein, 3.14 % carbohydrates, 2.91 % ash and 79.85 % moisture. however, freeze-dried latex contain 69.85 %protein, 16.71 % carbohydrates, 9.53 % ash and 3.90 % moisture, 2.papain yields as affected by different factors : the number of incisions made on the fruit play an important role in the yield of latex ; the more the incisions, the higher the yield. the bigger the fruit, the greater the yield of latex. the amount of latex collected per day was quit variable and papain was usually 20-25 % of the weight of fresh, latex. the best time of collection was in the morning from 10:00-12:00 noon. the yields of fresh and dried latex increased with the increasing the fruit age, 3.factors affecting the proteolytic activity of carica papaya : proteolytic activity of carica papaya latex extracted from different organs such as unripe fruits, leaves and skin were studied , and the obtained results indicated that the higher activity was observed in fruit latex (7.64 ulmg) compared with that extracted from leaves and skin proteolytic activity decreased as affected by different drying methods compared with the fresh latex. freeze-dried latex showed a higher activity(2.76 u/mg dry latex), while sun-dried samples showed a lower activity(1.01 u/mg dry latex) compared with other drying methods (oven andvaccum drying), chemical composition of unripe fig fruits (ficus carica) and crude ficin : unripe fig fruits contain 74.26 % moisture, 4.53 % ash, 2.32 % otein, 1.5 % fat and 17.39 carbohydrates. while, the crude ficin contain 71.83 % protein, 31.71 % carbohydrates, 0.59 % ash and 4.94 % moisture, 5. proteolytic activity of crude ficin extracted from fig fruits and leaves:proteolytic activity of extracted ficin from fig leaves was lower thanthat of fruit latex either in fresh or dried, 6. chemical composition of bovine spleen. kidneys. liver and lung : the higher protein content was found in liver (19.87 %) followed by spleen (17.13 %) and kidneys (15.97 %), while kidneys was found to contain a higher levels of fat (6.79 %) followed by liver tissues (3.94 %), on the other hand, lung contain a lower levels of ash and carbohydrates (0.98 and 1.05 %, respectively), 7. proteolytic activity of crude extract from different animal organs : data revealed that the highest activity was observed in the bovine spleen extract (5.73 u/mg protein) followed by 3.64, 2.15 and 2.01 u/mg protein in the kidneys, liver and lung extracts, respectively, 8. effect of ph, temperature, substrate and enz;yme concentrations on

theproteolytic activity : the maximum activity of papain was found at ph range of 7.5-8.0 and temperature of 80 co, crude ficin had a higher activity under the following optimal conditions: ph 6.7 and 9.5, temperature of 50 c0120 min, 15 and 20 mg casein (at ph 6.7 and 9.5, respectively), enzyme concentrationsat ph 6.7 and 9.5 was 5 and 7 mg, respectively, the optimum conditions for catheptic were as follow: ph range 5.0, to 5.5, temperature of 50 co, substrate concentration (1 mg casein) and enzyme concentration of9.1 x 10-3 mg protein/mi, 9.chemical composition of spent hen muscle, camel and buffalo meats : results show that breast meat of spent hen contained a relatively higher moisture content than leg meat. ash was lower in leg (1.17 %) than the breast (1.24 %) this is may be due to the higher content offat in leg (6.30 %). however, protein was higher in breast (21.79 %) than leg meats with respect to the camel and buffalo meats, ash, fat, protein and carbohydrates of camel meat was higher than those of buffalo meat, 10. effect of tenderization conditions on the protein fractions of tenderized meat : tenderized spent hen : data indicated that, protein :fractions (tsn, spn and npn) of spent hen meats increased gradually by increasing the concentration of proteolytic enzymes (papain, ficin and catheptic) in both breast and leg, the best concentrations of proteolytic enzymes of tenderization was 0.10,0.008 and 0.375 % (wlv) for papain, ficin and catheptic ,respectively. thesuitable temperature of tenderization was observed at 60 co for the threestudied enzymes and the optimum ph was noticed at ph 7.0. on the otherhand, the best concentrations of salt solution was found at the concentration of 1.5 % natpp + i %nacl for 45 min. while, the best cooking time of tenderized spent hen meat under the optimum conditions was observed at 60 min. moreover, papain was found to be more effective under specific conditions as a meat tenderizer than other two types of enzymes (ficin and catheptic), tenderized camel and buffalo meats : the obtained results showed that 0.10,0.008 and 0.375 % (w/v) of papain, ficin and catheptic , respectively were the best concentrations of proteolytic enzymes in both camel and buffalo meats. the best temperature of tenderization was observed at 60 co for the three studied enzymes andthe optimum ph was noticed at ph 7.0. on the other hand, the suitableconcentrations of salt solution was found at the concentrations of 1.5 %natpp + 1 % nacl and 45 min tenderization time. finally the bestcooking time of tenderized camel and buffalo meats under the optimumconditions was observed at 60 min. moreover, papain was found to bemore effective under specific conditions as a meat tenderizer than theother two enzymes (ficin and catheptic), 11. organolmtic evaluation of tenderized spent hen meats : organolyptic evaluation of tenderized spent hen meats was carried out and the obtained results indicated that, the average score of tenderness, flavor, juiciness and overall acceptability was increased by increasing the enzyme concentrations upto 0.10, 0.008, and 0.375 %(w/v) for papain, ficin and catheptic, respectively for both breast and leg meats. on the otherhand, the overall acceptability increased with increasing the cooking time of tenderized spent hen meats by proteolytic enzymes under the optimumconditions, 12. organolyptic evaluation of tenderized camel and buffalo meats:data revealed that the average score of tast-panel for tenderness, flavor, juiciness and overall acceptability of both camel and buffalo meats treated with different concentrations of proteolytic enzymes (0.10, 0.008 and 0.375 % w/v for papain, ficin and catheptic, respectively) were improved. moreover, the cooking time of 60 min had higher tenderness scores compared with that cooked at 30 , 40 and 50 min for all samples treated with the three enzymes under investigation in both camel and buffalo meats. however, as the cooking time increased the flavor deteriorated. while, juiciness and overall acceptability was found to be higher scored in the camel and buffalo meats cooked for 60 min compared with the other samples.