Innovations

A Review Article

Proteolytics, Their Functional Role and Practical Applications

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Abstract

Several sources are used to produce protein decomposers, including fish, feathers, chicken waste and vegetable meat, but the use of fish in the production of this important substance is the most widespread, as fish has been used since ancient times in animal diets, especially single-stomach animals, as it is a source of good quality protein and high nutritional value because of its content of Amino acids and fatty acids, and since fish is a high protein source and contains a good combination of essential amino acids and vitamins, it can be found at cheap prices, especially in small sizes, and it can be used as a high-quality and cheap protein source, so attention turned to its use in the manufacture of protein hydrolyses.

Keywords: *1.Proteolytics, 2. Fish, 3. Practical Applications*

Introduction

The protein source is the most important element among other types of nutrients for the nutrition of living organisms as well as being the most expensive in animal diets in general, so given the importance of proteins in nutrition and their important role in building the organism, many researches aimed to find several alternatives and innovative methods Obtaining concentrated and easy-to-digest protein sources from the organism without any side effects, so attention has turned to protein decomposers as they are the main and basic source in the proper nutrition process [1], and fish is one of the important food sources for humans since ancient times. It is an important source of animal protein in most countries of the world and in some of them it constitutes 50% of the total protein consumed, and its meat helps in reducing nutritional deficiency diseases due to its high content of protein and the diversity of its essential amino acids, as well as fats that are characterized by their high content of non-fatty acids. Saturated, which helps reduce cholesterol in the blood as well as being a moderate source of energy in the human body.

Fish meat contains mineral elements such as calcium, phosphorous, sodium, magnesium and others, and a number of trace elements such as iodine, iron, copper and vitamins such as group B, A and D. Fish is the main

food for many peoples residing on the coasts of the seas and oceans[2]; Its waste is of great importance, as many studies have shown that these wastes, which include bones, viscera, skin, scales and fins, constitute approximately 50% of the weight of the fish and are a good source of protein, including enzymes, as well as fats [3] and good substrates for lactic acid fermentation. [4], and large quantities of these wastes still constitute a major environmental problem, as they are disposed of without making any efforts to recover the protein [5] or benefit from them in different fields, so many have resorted to From researchers to the possibility of exploiting these wastes and making them of vital value by converting them into protein hydrolysers using degrading enzymes [6].

Sources approved in the production of proteolytics

[2] mentioned the use of whole guts of the runner fish *Siluris glanis* to prepare proteolytes. [3] prepared a proteolytic from the guts of catla, and [7] were able to prepare a proteolytic from the guts of the Indian Ocean fish. [8] prepared a protein tolerance from grass carp skin, and [9] stated that the edible protein in silver catfish constitutes 50%, and the rest is waste and these residues cannot be used as food for fish because of their high fat content, so he resorted to a decomposing preparation protein from silver catfish *Pangasiu ssp*; Regarding local studies, [10] made peptones from the meat of *Siluris glanis* by enzymatic digestion, while [11] was able to prepare protein concentrates from the meat of *Liza abu* brine by enzymatic digestion, and [1] used *Zuri fish* (Heekel) *Liza abu* in the preparation of self-degrading fish cake. [12] indicated the use of chicken legs and shrimp heads and shells in the preparation of proteolytes by enzymatic digestion, while [13] used acid digestion. In the production of proteolytes from chicken legs and shrimp heads and shells, [14] showed that they prepared isolate and proteolytic from defatted *Helianthus annuus* L. sunflower seeds by enzymatic method. [15] using free chicken pepsin linked to acar, and both [16] prepared protein hydrolysers from shrimp residues using the enzymes Alcalase and Pepsin, while [17] indicated the possibility of producing protein hydrolysates. Treatment of the guts of *Siluris glanis* with the crude extract of serine proteases.

Applied research in the field of proteolytics

Both [2] prepared proteolytics from the whole innards of *Siluris glanis* using the crude extract of serine proteases extracted from the gut of the same fish after determining the optimal conditions for their work from pH and the optimum temperature for activity and stability and studying some properties of those decomposers that included methods Preparation Four separate treatments represented in T1 and T2, which are the digestion of fish samples under the influence of endogenous enzymes in the middle of a sodium acetate buffer with a pH of 4.5 and a concentration of 0.2 M for 6 and 12 hours, while the digestion was carried out in treatments T3 and T4 using the crude extract of 120 serine proteases. An enzymatic unit with a pH of 6.5 and a concentration of 0.2 molar for 6 and 12 hours, respectively. The resulting sheets were subjected to a pasteurization process at a temperature of 80 °C for 10 minutes and cooled, then the fat layer was removed and the pH was adjusted to 6.5 and dried under vacuum at a temperature of 50 °C. The symbols were P1, P2, P3, and P4 for decomposers. The resulting moisture, ash, fat and protein percentages of the decomposers were 6, 1.10, 0.40 and 92.5%, respectively, in the laboratories. It was 6.2, 1.45, 0.45, and 99.1%, respectively, in treatment P2, and they were 5.4, 1.62, 0.48, and 92.5%, respectively, in treatment P3, and they were 5.3, 1.70, 0.5, and 92. The percentage of peptone nitrogen, total protease nitrogen, secondary protease nitrogen, primary protease nitrogen, and free amino acid nitrogen was 3.1, 1.95, 0.30, 1.65 and 0.4%, respectively, for treatment P1, and they were 5%, respectively, in treatment P4. 4.5, 3.01, 0.36, 2.65 and 0.6%, respectively, for the P2 treatment, while they were 5.1, 2.5, 0.37, 2.13 and 0.65%, respectively, for the P3 treatment, while they were 7.3, 3.5 and 3.5, respectively. and 3.1 and 0.8%, respectively, for treatment P4, and the degree of decomposition of these decomposers was 35.5, 39, 52.6 and 60.1%, respectively, The results of studying the functional properties of the protein decomposers represented by water carrying capacity showed that they were for all decomposers by 2%, and the

solubility values were 74.6 and 85.5% for each of the P1 and P2 treatments, respectively, while it was 92.2 93.3% for the P3 and P4 treatments, respectively, and with regard to the emulsifying property, it reached The volume of the emulsion layer was 22 and 20 ml for treatments P1 and P2, respectively, while it was 16 and 14% for treatments P3 and P4 respectively. [15] were able to decompose the proteins of nubia fish using free chicken pepsin linked to acar, and it was noted through the results obtained It has to increase the decomposition with the progression of time, by observing the action of the enzyme by increasing the number of milliliters of the base used in scaling, which reached a maximum at the last 180 minutes, and it was 2.8 and 2.6 milliliters of free and bound chicken pepsin, respectively, and between [14] They prepared the isolate and hydrolyzed protein from the seeds of the sunflower (*Helianthus annuus* L.) cultivar Shams after removing fat using organic hexane, then extracting and isolating the protein from the meal by the alkaline extraction method at the equilibrium point. Then the isolated proteins were treated with Flavorzyme enzyme at a concentration of 311 enzyme units and enzymatic hydrolysis was conducted for 4 hours at a temperature of 55°C until the degree of degradation reached 21.6%, then the decomposers were dried under vacuum. The results obtained indicated that the chemical composition of the cake was 50.89, 4.9 and 4 32, 4.53, 5.93, 27.14 and 1.61% for each of the protein, fat, moisture, ash, soluble sugars, fibers and total polyphenols, respectively, while the protein isolates were 85.82, 0.76, 3.62, 1.16, 2.18 and 5. 30 and 0.70% for each of the protein, fat, moisture, ash, soluble sugars, fibers, and total polyphenols, respectively, and the percentage of protein and fat in the used seeds was 37.26 and 43%, respectively, and it was noted that the percentage of protein in the proteolytes was 91.5%, which is higher than that of the meal and isolate. While the proportions of other components were lower,[16] prepared two protein hydrolysers from shrimp residues using the enzymes Alcalase and Pepsin, and they were separated by ultra-filtration, then the purification process was carried out by gel filtration. For all the resulting peaks, the peptides of the first and second peaks of each enzyme showed a higher antioxidant activity compared to the other peaks, and their inhibitory effect was tested against bacteria. Minced meat tablets with two concentrations of 50 and 100 mg.100 g of meat-1, and stored by refrigeration at a temperature of ± 1 4 °C for 10 days during which the peroxide values of minced meat tablets treated with two peak peptides were monitored, and it was noted that the decrease in the values of peroxide for minced meat tablets treated with second peak peptides Alcalase enzyme was more pronounced compared to the first peak peptides of the same enzyme and the two peak peptides. sin, and there was a decrease in the total number of bacteria, total colon bacteria, and cold-loving bacteria when treated with the second peak peptides of Pepsin enzyme at a concentration of 50 and 100 mg. Running fish *Siluris glanis* with crude extract of serine proteases in the development of microorganisms, the preparation methods included four treatments, represented by T1 and T2, which are digestion of fish samples under the influence of endogenous enzymes in the middle of a buffer solution of sodium acetate with a pH of 4.5 and a concentration of 0.2 M for 6 and 12 hours, While the digestion was carried out in treatments T3 and T4 using the crude extract of serine proteases at a rate of 120 enzymatic units, pH of 6.5 and concentration of 0.2 molar for 6 and 12 hours, respectively. to 6.5 and dried under vacuum at a temperature of 50°C and symbolized P1, P2, P3 and P4 for the resulting decomposers, and the percentage of moisture, ash, fat and protein was for the Decays were 6, 1.10, 0.40, and 92.5%, respectively, in treatment P1, while they were 6.2, 1.45, 0.45, and 99.1%, respectively, in treatment P2, and they were 5.4, 1.62, 0.48, and 92.5%, respectively. In treatment P3, they were 5.3, 1.70, 0.5 and 92.5%, respectively, in treatment P4, and the percentage of peptone nitrogen, total protease nitrogen, secondary protease nitrogen, primary protease nitrogen, and free amino acid nitrogen were 3.1, 1.95 and 0. 30, 1.65 and 0.4%, respectively, for treatment P1, and they were 4.5, 3.01, 0.36, 2.65, and 0.6%, respectively, for treatment P2, while they were 5.1, 2.5, 0.37, 2.13 and 0.65%, respectively. While they were 7.3, 3.5, 3.5, 3.1 and 0.8%, respectively for treatment P4, the protein lysates under study were included in the composition of some food media such as MRS medium prepared for the growth of *Lactobacillus acidophilus* bacteria, and Davis´s Yeast medium Salt prepared for the growth of *Kluyveormyces marxianus* yeast, and Potato Dextros Agar medium for the development of *Aspergillus nigir* mold and compared with the standard media, the result was more than the growth yield in the food media that contained protein decomposers in its composition.

This was an indication of the viability of the protein hydrolysates under study to support microbial growth, and the results indicated by [1] showed that the follow-up of the autolysis of fish meal and its effect on the percentage of total dissolved nitrogen of protein and non-protein origin indicated There was a significant increase ($P<0.05$) in total dissolved nitrogen after four hours and 24 hours from the start of the autolysis treatment (the percentage of dissolved nitrogen in fresh fish) and no dissolved nitrogen of non-protein origin (NPN) was obtained over the time of treatment, which led to Considering the total dissolved nitrogen of protein origin only, and this is consistent with what [18] indicated in the use of autolysis to increase the decomposition of fish meal proteins and ease the separation of the meal contents from each other, regardless of the type of fish used, as noted by [1] that digestion In vitro to replace self-degraded fish meal as well as untreated fish meal when replaced with soybean meal as a source of nitrogen in ruminant diets exceeds the in vitro digestion coefficient of organic matter for soybean meal 87.89%, and the treatment of fish meal autolyzed (decomposition for 24 hours 85.36%) compared to the ration of untreated or non-self-degraded fish meal ($P<0.01$) 76.33%, and it was concluded from his study that the treatment of autolysis of fish and the effect of these treatments on the percentage of dissolved nitrogen Non protein nitrogen (NPN) of protein origin and its effect on the in vitro digestion coefficient when hydrolyzed fish meal after 24 hours and non-degraded fish meal to ruminant diets were added to the ruminant diet increased the degree of decomposition of fish meal after 4 and 24 hours from the beginning of the autolysis treatment, and the decomposers also led Self-decomposition of fish meat proteins as a result of increasing nitrogen of protein origin only, so that the autolysis process can be used to obtain fish cake that is easy to decompose in the rumen, provided that it is dried in the shade to provide an opportunity for the work of self-decomposers.

Conclusion and Recommendation

Fish is one of the sources rich in protein, in addition to the good combination of essential amino acids and vitamins it contains. Therefore, attention has turned to its use in the manufacture of protein hydrolysers, as it is a high-quality and inexpensive protein source.

Recommendation

The necessity of conducting more studies in the field of protein decomposers in order to devise effective and cheap alternatives with acceptable economic feasibility.

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