HYDROLYZED FISH PROTEINS

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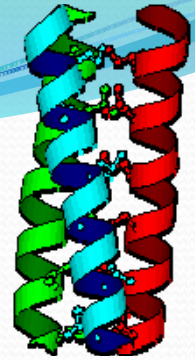
The Nutritious Value of Fish

- a well balanced protein source
- high levels of minerals and trace elements, such as selenium and iodide
- high levels of B-vitamins
- bioactive compounds for biomedicine.

Bioactive Compounds

- Protein
- Peptides
- Amino acids
- Terpenoids
- Steroids
- Enzymes
- Alkaloids
- Fatty alcohol esters
- Glycolipids etc.

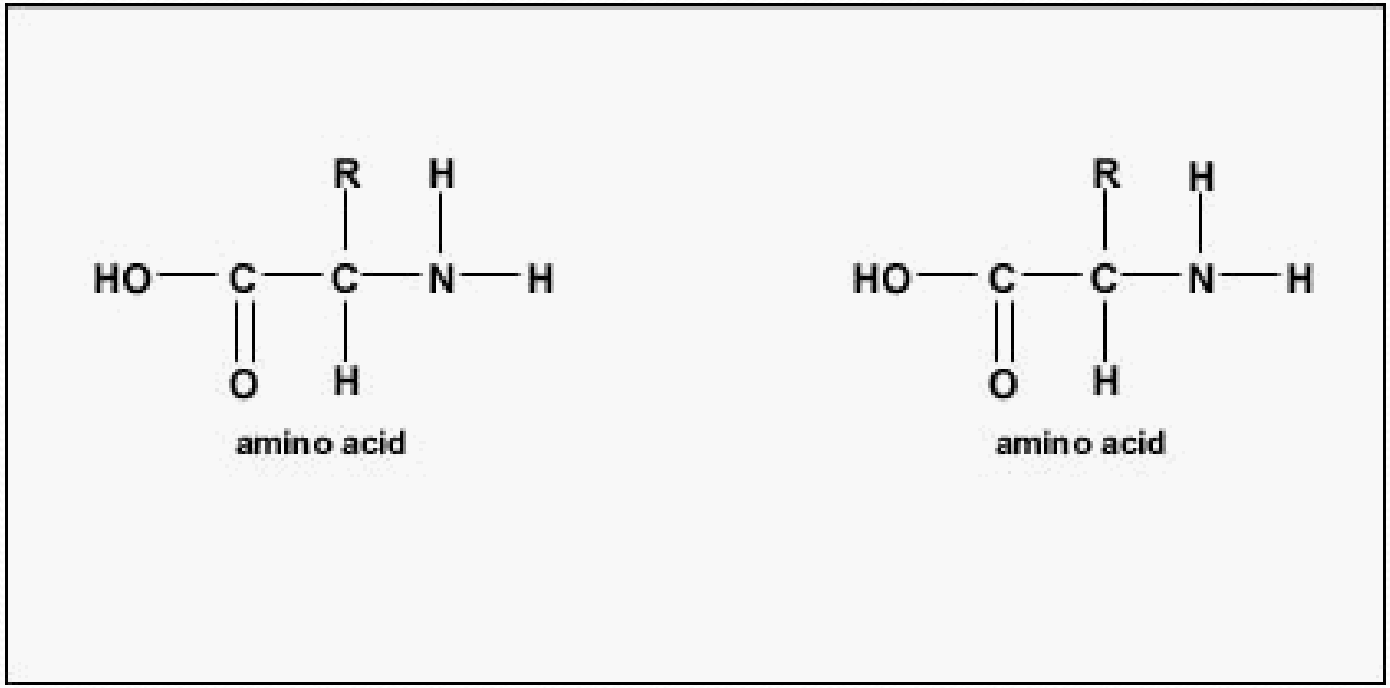
Protein



- polymer of 20 α- amino acids, with mol.wt from 5000 to1000,000 daltons.
- N is most distinguished element: among the composing elements of C,H, N, O, S, for some proteins: P, Cu, Fe, I.
- N content in different proteins ranging from 13.4% - 19.1%, and averagely 16%.
- Therefore protein coefficient is 6.25 for most proteins. 5.70 is only for wheat and its products proteins according to AOAC method.
- Most abundant component in cells: 50% of dry cells by weight

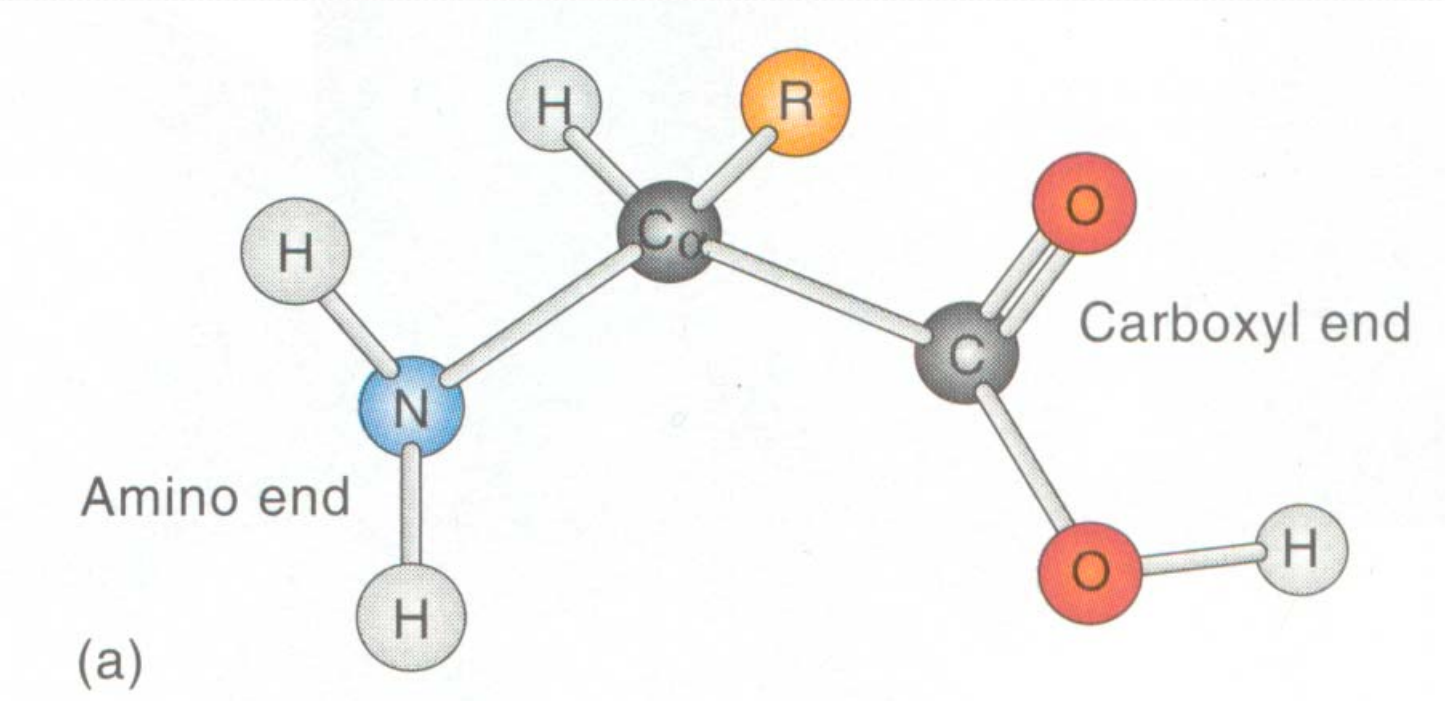
Peptid

- Aminoacid + Aminoacid ⟶ Peptid



Amino Acid

- Aminated carboxylic acid (R-COOH)



Hydrolysis of Protein

1. With Acid and Alkali

Protein + HCl + 12-48 hours ⟶ aminoacid

H_2SO_4

NaOH

BaOH

2. With Enzym

Protein + Pepsin + 30-60 min. ⟶ polypeptid

Tripsin

Papein

Enzymatic Hydrolysis

- Rapid and reproducible method
- Seperate peptide fractions, bones and oils from complex matrices with commercial proteases
- Avoid the extremes of chemical and physical treatments
- Minimize undesirable reactions which could destroy valuable components in proteins .

Enzymatic Hydrolysis

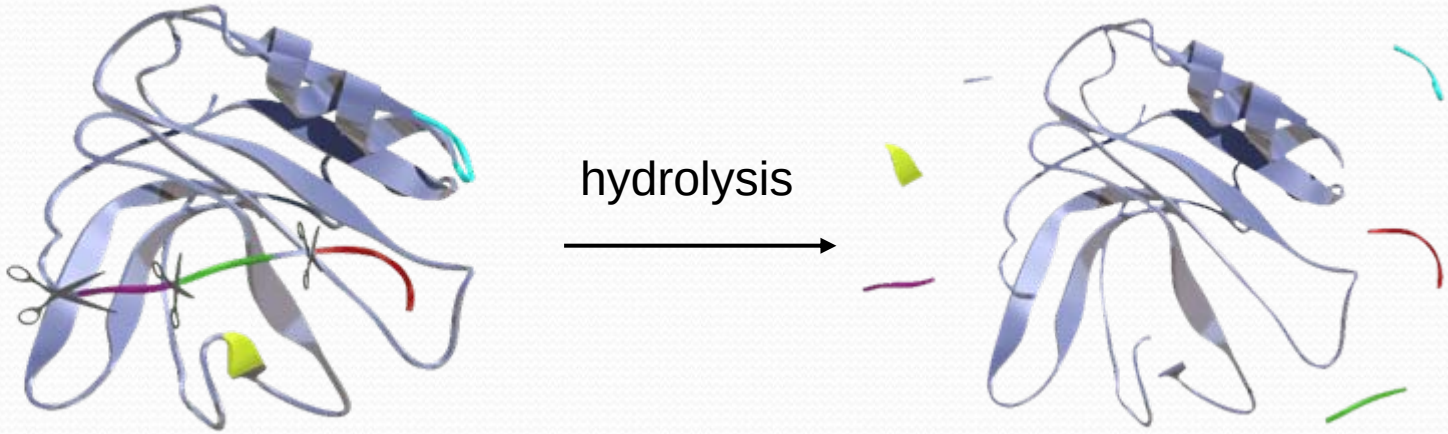
- The fish-raw material: muscle or by-products
- The fish-raw material is divided into a soluble and insoluble peptide fraction following an enzymatic hydrolysis.
- The majority of the hydrolysate liquid is captured within the fish protein hydrolysate fraction, while less is retained in the insoluble peptide fraction.

Enzymatic Hydrolysis

- The B-vitamins, many of the minerals and trace elements, and some of the amino acids are hydrophilic compounds that possibly might be enriched in the fish protein hydrolysate fraction.
- Also, species to species variation with regard to nutrient content might be present.
- So, it might be valuable to evaluate the two fractions obtained from the enzymatic hydrolysis of raw materials from different species.

Enzymatic hydrolysis to reduce antigenicity

- protein chains are broken down to peptides & amino acids
- conformational and linear epitopes are neutralised – reduced antigenicity
- nutritional quality preserved
- In non-sensitized at-risk infants, reduced allergenicity
- Infants with diagnosed CMP allergy – hypoallergenic hydrolysates



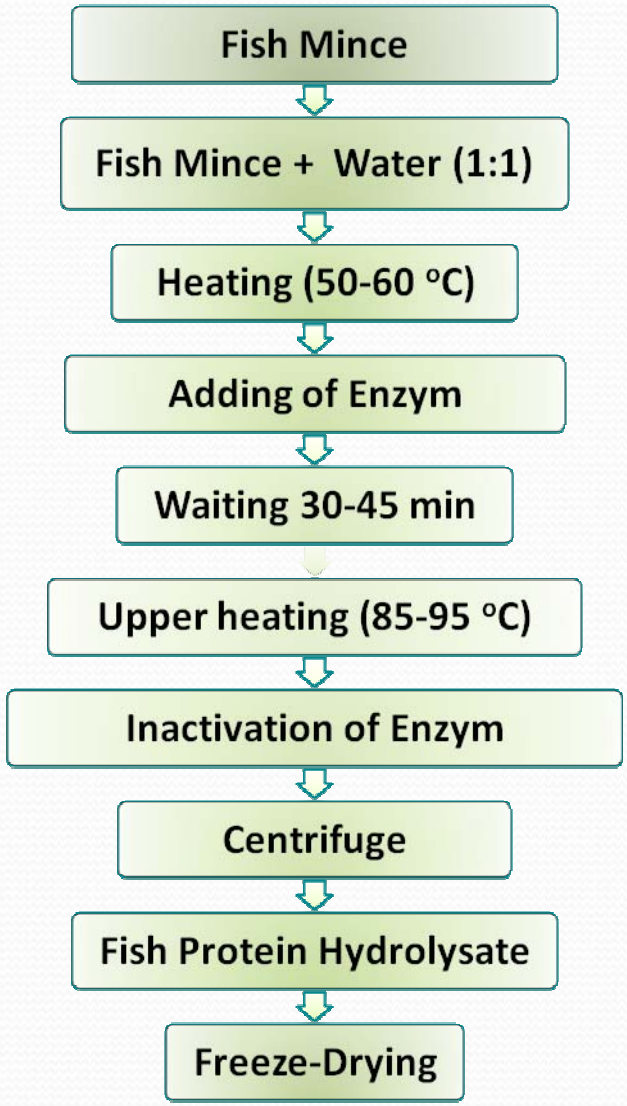
Enzymes

Enzymes	Optimum pH	Optimum T (oC)
Alcalase	8	50-60
Protamex	7-8	50
Neutrase	7	40-50
Flavourzyme	5.5-7.5	50-55

Inactivation of Enzymes

Enzymes	pH	T (oC)	Time (min.)
Alacalase	4 8	50 85	30 10
Protamex	4 8	50 85	30 10
Neutrase	4 7	50 80	50 80
Flavourzyme	6-8	90	10

Fish Protein Hydrolysate Production

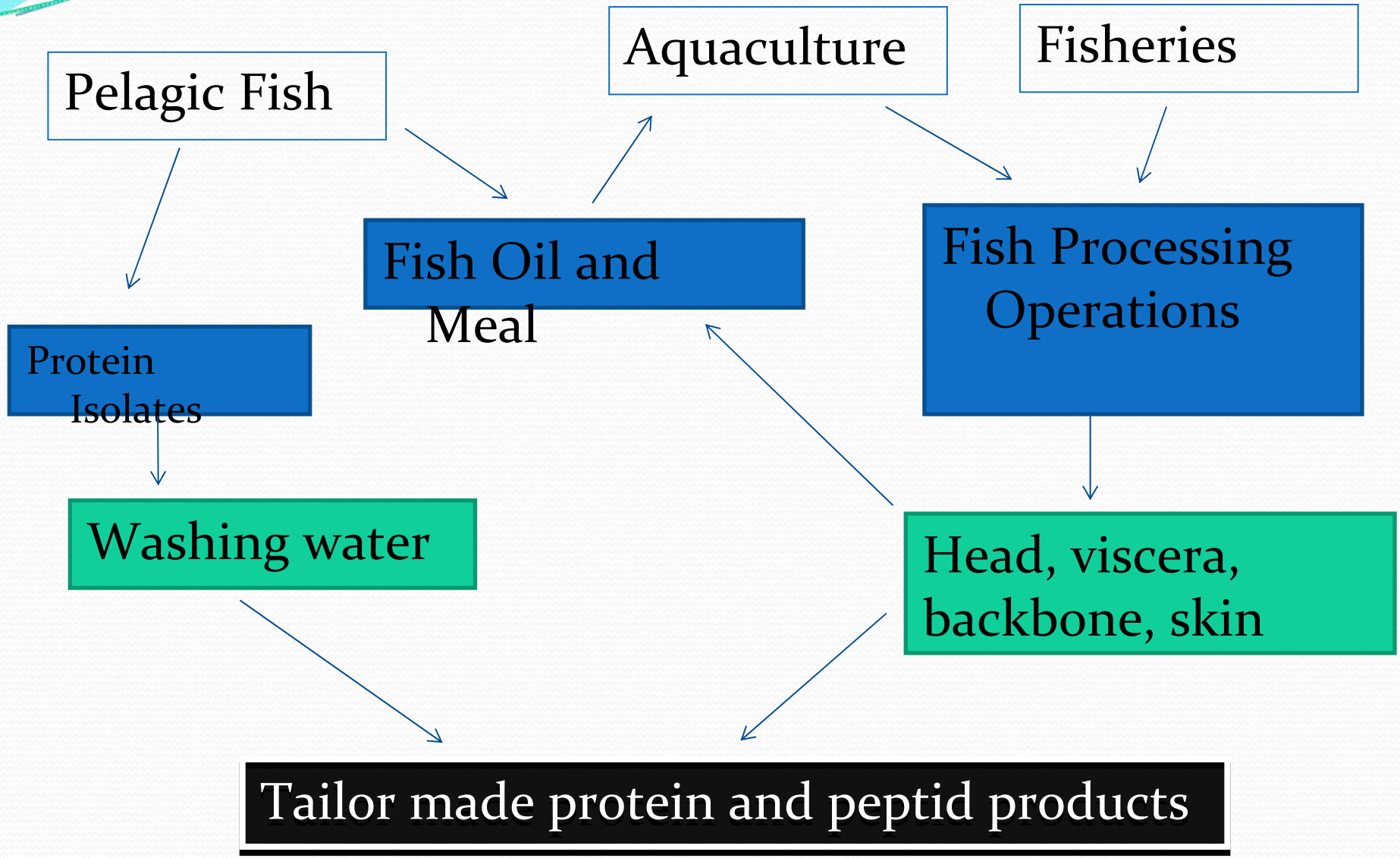


Fish Protein Hydrolysate

Hydrolysed Protein

Freeze-Dried Hydrolysed Protein

Raw Material



Products

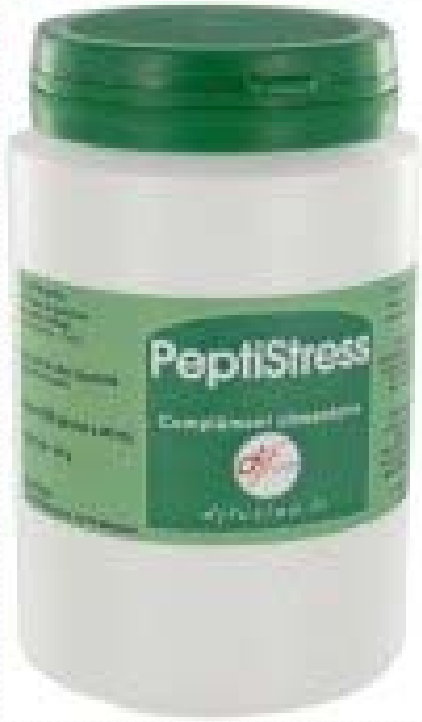
High Value Products

Pastes

Powders

Products

Nutraceutics: Antistress Effect



Contain fish protein hydrolysate prepared from sardine

The Potential Applications of Fish Protein Hydrolysates

- improved functional properties
  - Solubility
  - Gelation
  - Water holding ability
  - Emulsifying
  - Foaming

The Potential Applications of Fish Protein Hydrolysates

- improved nutritional value
- enteral diet formulations
- elderly formulations
- sports nutrition
- controlling food allergies, hyper allergic infants

The Potential Applications of Fish Protein Hydrolysates

- bioactive peptides in pharmaceutical application for especially blood pressure reduction
- peptone ingredient in microbial growth media in biotechnological applications
- aquaculture uses, animal feed and fertilizer.

Result

- Global warming and world's economic crises trigger the concern of food shortage and starving. The most challenging struggle of the modern civilization is supplying food satisfactorily for increasing population.
- The current economics of the fishing industry demand optimization at every step of a given process, including the total utilization of raw materials.

Result

- Hydrolyzed fish proteins are destined to have a widespread application and their production will allow the utilization of vast amounts of fish protein currently being wasted or underutilized.
- Research on fish or fishery by-products demonstrated that they constitute a source of promising health benefits molecules.
- The protein hydrolyzed can be add the other fish product to improve nutritional quality and extend the shelf life of product.

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