



Fish By-products

- About one-third of the world catch of fish is not used for direct human consumption but for the production of fishery by-products.
- Fishery by-products are the products that are not regarded as ordinary saleable products (fillets, round, eviscerated or beheaded fish), but which can be recycled after treatment.
- Fish by products have often been regarded as fish offal or waste, but this is not how it should be.
- The term by-products indicate something that can be utilized.
- Today the most common understanding of by-products is all raw materials, edible or inedible, left during the production of the main products.
- When producing fish fillets- fillet cuts, backbone, head, liver, gonads and guts are all by-products.



Utilization of by-products

- 1. Fishery by-products as human food**
- 2. Fishery by-products as animal feed**
- 3. Industrial uses**
- 4. Fertilizer from seafood by-products**
- 5. Biochemical and pharmaceutical products**

A decorative graphic on the left side of the slide features three balloons in shades of green, blue, and purple, each with yellow triangular rays emanating from it, resembling a sun or a festive decoration.

Fish By-products

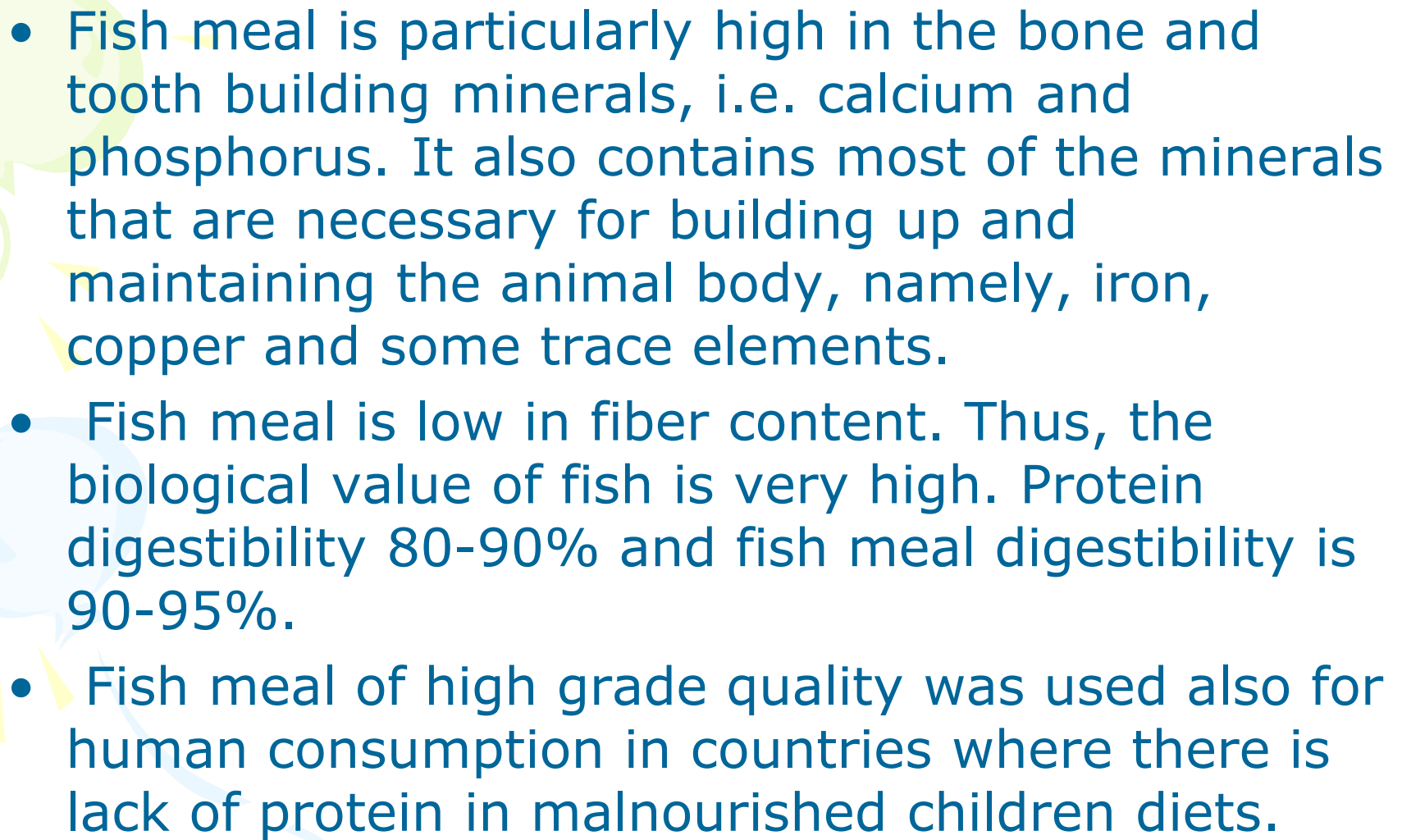
1. Fish meal
2. Fish silage
3. Fish oil
4. Fish glue
5. Fish protein hydrolyzate (FPH)
6. Fish insulin
7. Pearl essence
8. Isinglass
9. Fish skin leather
10. Crustacean waste
11. Pharmaceutical products

Fish meal

- Fish meal is the crude flour obtained after milling and drying fish flesh. Due to its poor sensory quality and its lack of functional properties, its use is almost limited to animal feed.
- Fish meal is a highly concentrated, nutritious feed supplement consisting principally of high quality proteins, minerals and B complex vitamins. It also contains other ingredients which contribute to animal growth and which are usually referred to as 'unknown growth factors' (Stansby and Dassow, 1963)
- According to EU regulation 92/87 of 1992, fish meal is defined as 'a product processed from fishes or part of them of which oil has been partly extracted and the fish soluble may be added to the product'.

Importance of fish meal

- Recently, fish meal is incorporated into compound feeds for livestock such as poultry, pigs and fish due to the high protein content. The world catch is currently about 100 million t/year, of which about one third is used for the production of fish meal.
- More recently, fish meal has become too valuable for use as a fertilizer as the high protein content makes it particularly suitable for animal feed.
- Fish meal of high grade quality was used also for human consumption in countries where there is lack of protein in malnourished children diets.
- Fish meal is exceptionally well balanced as regards the amino acid distribution of its protein and it is particularly high in lysine. Thus, fish meal is a great source of protein and essential amino acids.

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- Fish meal is particularly high in the bone and tooth building minerals, i.e. calcium and phosphorus. It also contains most of the minerals that are necessary for building up and maintaining the animal body, namely, iron, copper and some trace elements.
 - Fish meal is low in fiber content. Thus, the biological value of fish is very high. Protein digestibility 80-90% and fish meal digestibility is 90-95%.
 - Fish meal of high grade quality was used also for human consumption in countries where there is lack of protein in malnourished children diets.

Species used for fish meal preparation

- Practically all fish species as well as most other marine animal life may, in principle, be converted into fish meal. A wide variety of fish species is used for the production of fish meal in different countries. Generally low cost, under utilized fish is used. Most commercially fish meals are produced from a mixture of various fish species of herring family. Usually the species used for fish meal preparation are named below:

Anchovy

Bream/Red fish

Cod

Conger

Carp

Chilean hake

Croaker

Haddock

Halibut

Herring

Horse mackerel

Pilchard

Pollack

Sardine

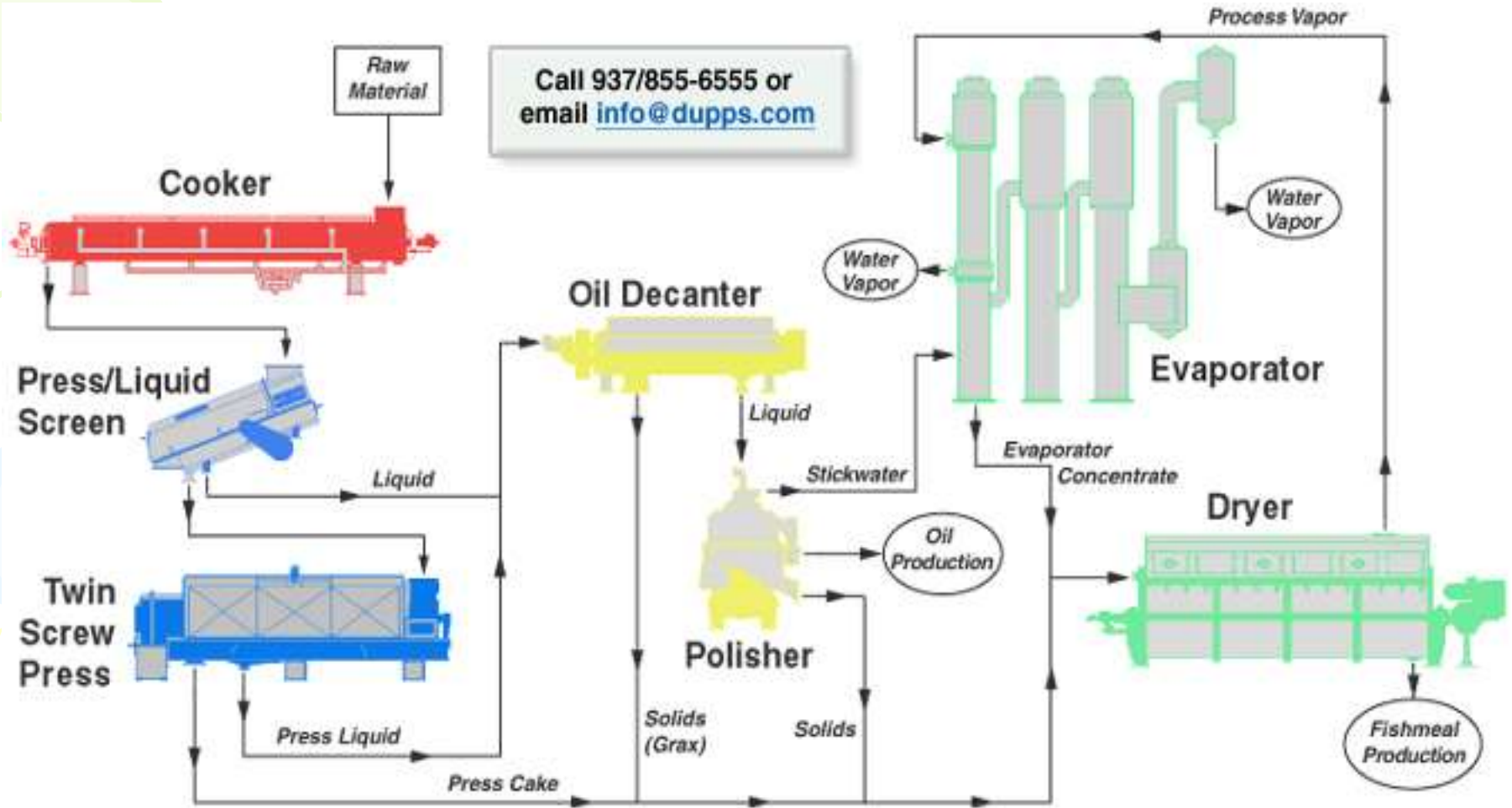
Dog fish shark

Species used for fish meal preparation

- But for the production of fish meal, Anchovy is most widely used throughout the world (about 10 m ton).
- Bombay duck, Jew fish, Mackerel are mostly used for fish meal production in Bangladesh.
- Generally if fish meal is produced using 50% of a single species then it is named after the species, e.g. herring meal.
- Usually herring meal contains 65-70% crude protein.
- Fish meal from mixed fish and offal contain slightly less protein and of lower quality.

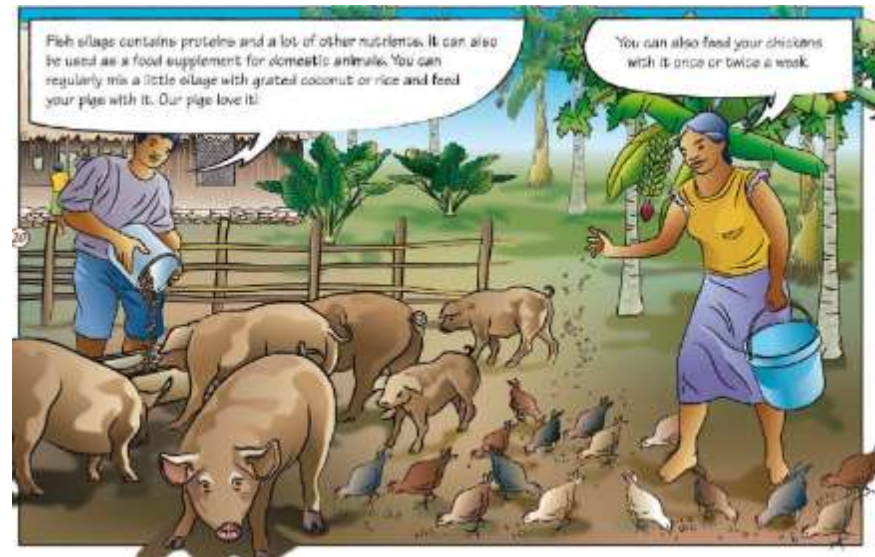
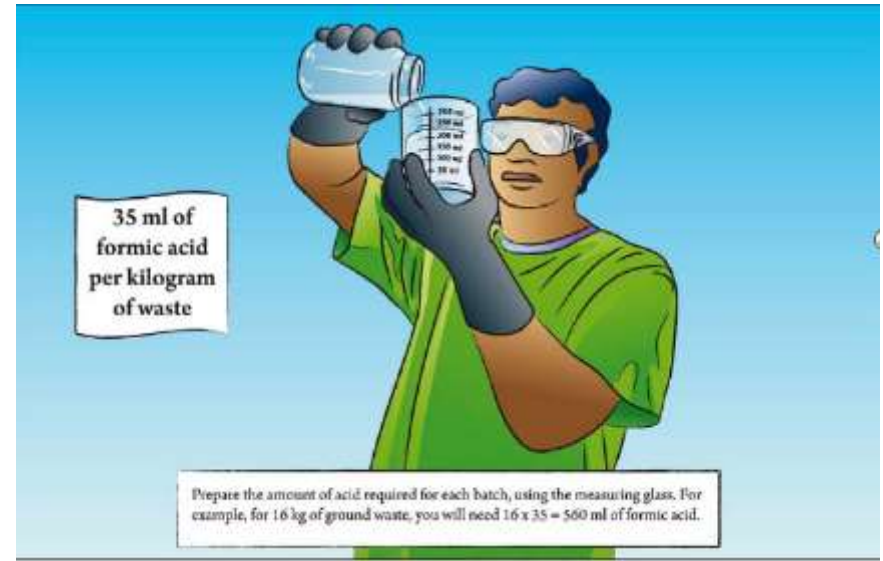
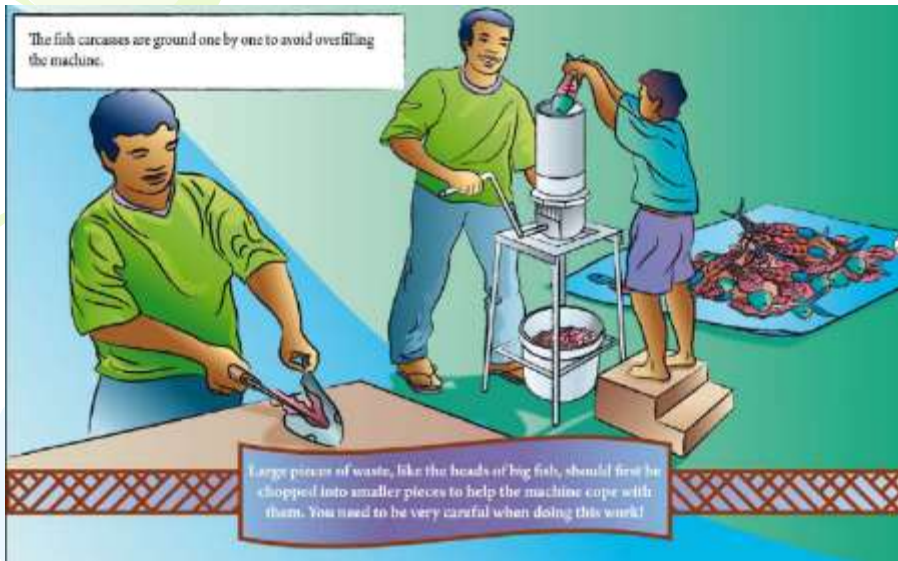
Fish meal exporting countries of the world and types of fish meal produced by these countries

Country	Types of fish meal
Canada	Herring
Chile	Anchovy and Horse mackerel
Iceland	Herring and Capelin
Norway	Herring and Capelin
Japan	Sardine
Peru	Anchovy
South Africa	Pilchard
USA	Menhaden



Generalized fish meal plant showing process sequence

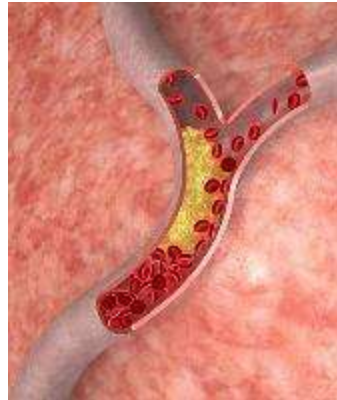
Fish silage



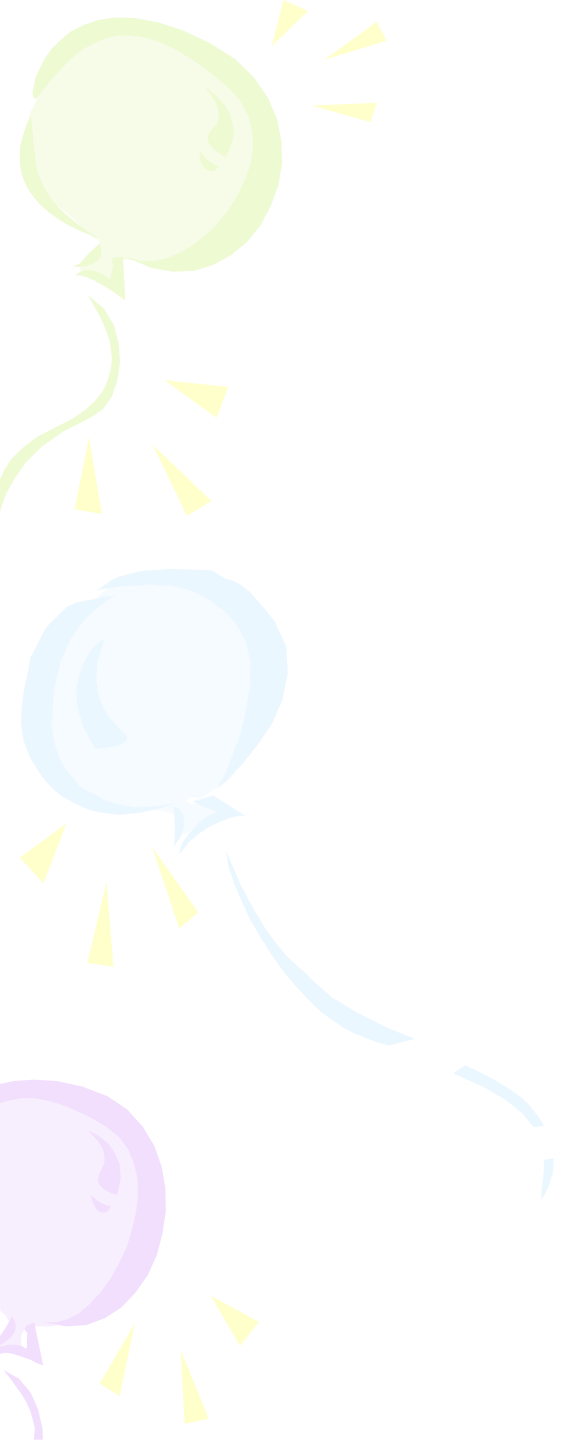
Fish oil



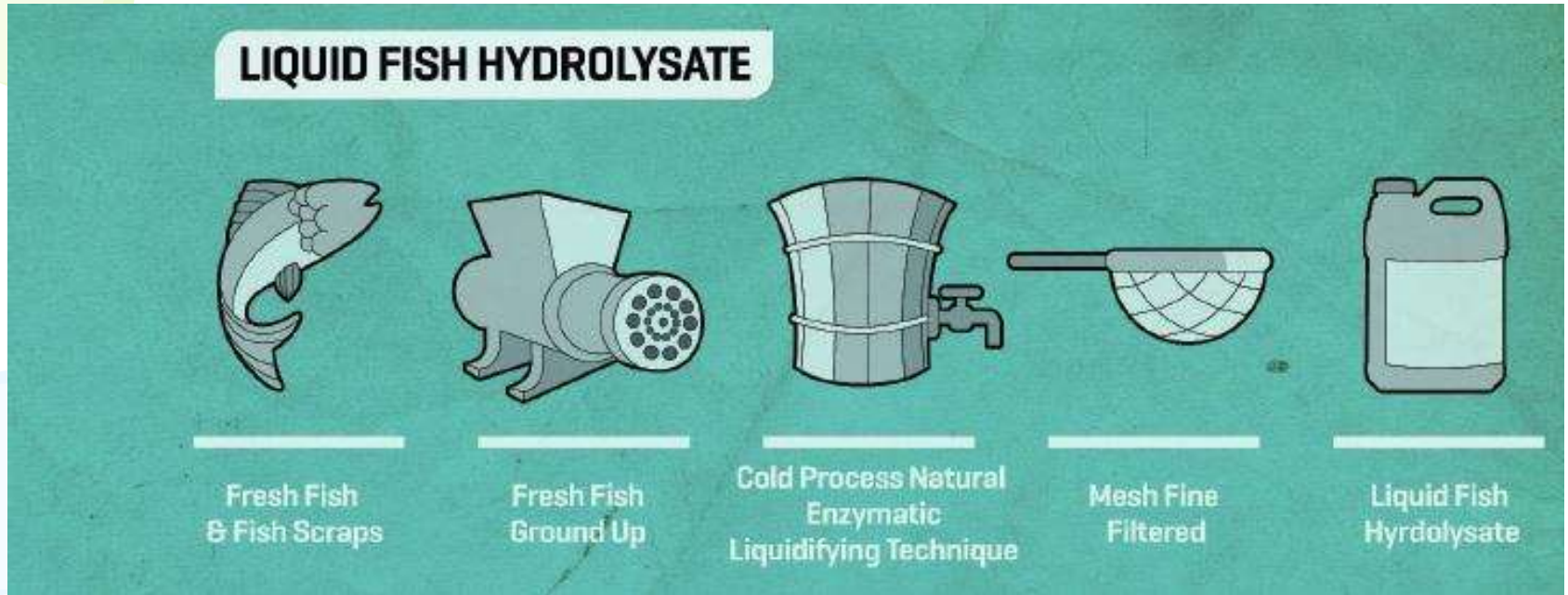
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**Reasons Why
You Need Fish Oil**
Your Body Will Thank You!

A close-up photograph of many yellow fish oil capsules, with the text overlaid on the left side.

Fish glue



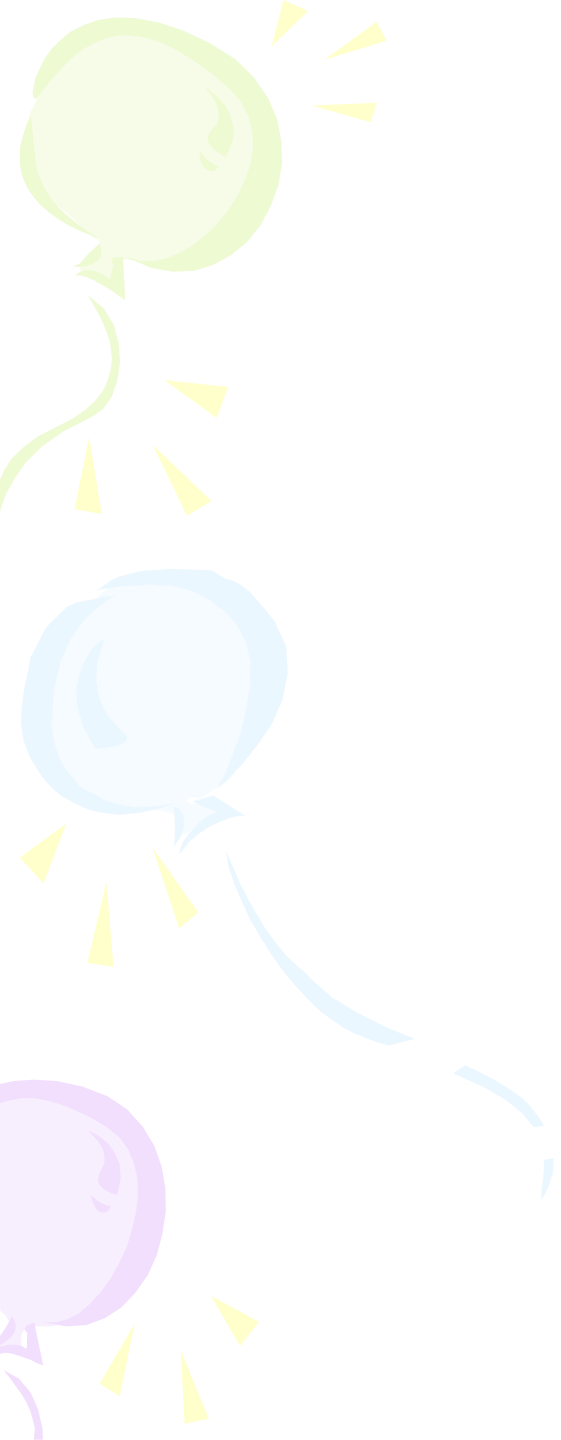
Fish protein hydrolysate (FPH)



Fish Protein Hydrolysate



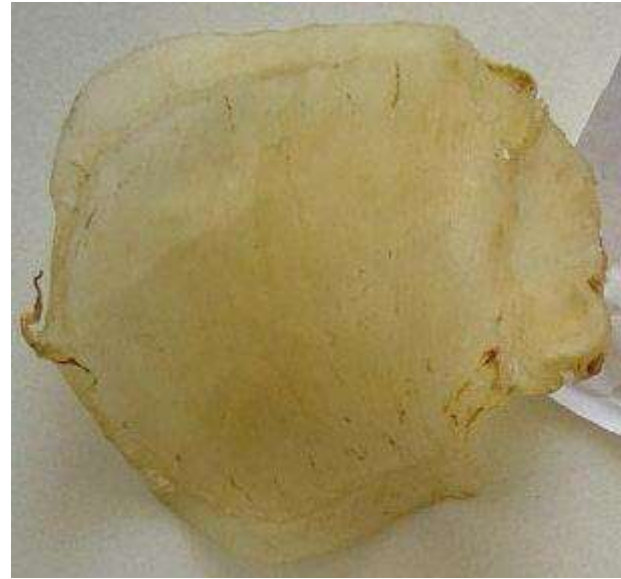
Fish insulin



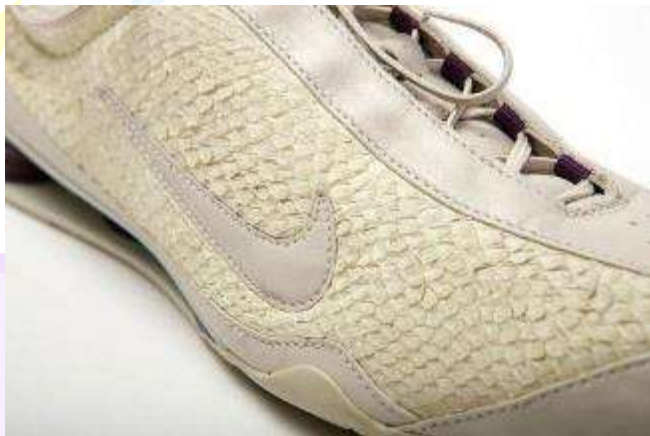
Pearl essence



Isinglass



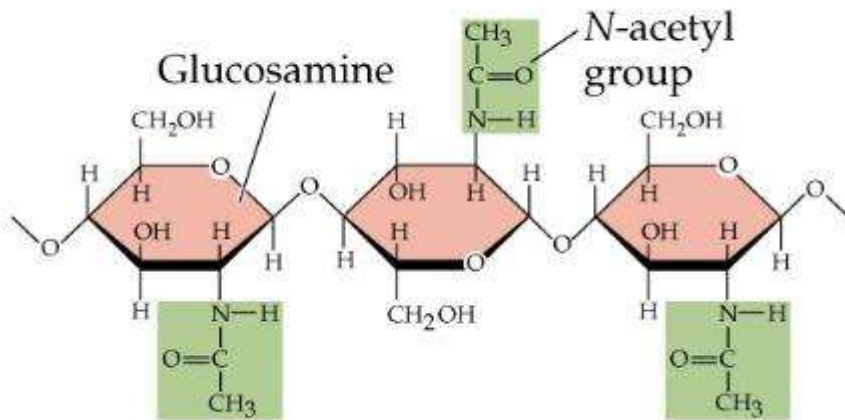
Fish skin leather



Crustacean waste



(c) Chitin



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Pharmaceutical products

