

FISH BYE PRODUCT

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Dr.Ranajit Kr. Khalua

Assistant Professor

Dept. Zoology



Narajole Raj College
Paschim Medinipur

(1) **Fish liver Oil** : This is one of the most important products of fish and is of high medicinal value because of its vitamin contents. Astonishingly it is obtained from such an organ which are discarded during dressing of landing fish. Huge amount of otherwise waste liver of fish form a very economic raw material for many cottage and large scale industries engaged in the manufacture of fish liver oil. An added advantage of simultaneous production of a by-product the fishmeal.

The fish liver contains protein, fat and water. The fat content is 55-75% in an average. Also contains considerable amount of vitamin A and D. The fat is the source of A-D rich vitamin in liver oil and represents the proportions of A and D vitamins most suitable for human needs. Because of its high vitamin A and D contents can cure or prevent occurrence of diseases caused by the deficiency in the body of these two vitamins, such as by the rickets. Xerophthalmia, impaired vision, eye defects, abnormalities of skin, mucous membrane and vertebrae. Vitamin A and D will develop more resistance to counter bacterial attack.

The fish liver oil industry is based on the liver of **Cod fish** (*Gadus* sp.), **halibut** (*Psettodes* sp.), **tuna** (*Thunnus* sp.) and sharks (*Guleocerdo* sp. *Carcharinus* sp. *C. giganticus*, *Sphyrna* sp. *Pristis* sp. etc). Oils of various grades are formed depending on the medicinal purpose, high quality technical oil etc.

(ii) **Fish body oil** : Fish body oil is different from fish liver oil. Fish body oil is the oil obtained from the entire body of fish and not from the liver exclusively. Fish body oil is generally extracted from either oil sardines or from less edible varieties of fish or from offal and other wastes discarded from canneries or curing yards. On an average five kg of fishes yields about $\frac{1}{2}$ kg of fish body oil. Fish body oil is poor in vitamin A and D. Some of the important uses of fish body oil are—

- (i) As fish body oil is a drying oil so it is used in the manufacture of paint or varnishes.
- (ii) Fish body oil is used in the dressing of leather and tanning of skin.
- (iii) It is used in the manufacture of cheap soaps such as laundry soap, insecticide soap etc.
- (iv) For tempering of steel in steel factory.
- (v) It is used in the manufacture of alkylhalides.
- (vi) It is used in the manufacture of cosmetics, lubricants, candles and cutting oils.
- (vii) It is also used in the manufacture of printing ink, water proofing and linoleum
- (viii) It is used as fungicide specially for citrous group of fruits.
- (ix) It is used for smearing the surface of boat for longer duration.

(3) **Fish meal** : The ground, cooked and dried preparation of the body of fresh fish is known as fish meal. After fish oil this is the next most important products of fish. Fish meal is highly nutritive product and contains 55-70% protein, 2-15% fat and 10-20% minerals. It is an excellent poultry and animal feed and good for practically all classes of live stock. The protein contain

Fish meal is prepared from waste fishes left over after extracting oil from the fish. It is also prepared from non-edible fishes of both, the small and large sizes.

Fishes are chopped and boiled to extract the oil. They are then covered with canvas and screw-pressed to form the cakes, that are then dried. Dried cakes are sometimes pressed in hydraulic presses to recover oil and are redried in steam, before being sterilized and packed for marketing. The chief fishes that are used to prepare fish meal include sardines, mackerels, sharks, rays and the silver bellies.

Chemical composition of fish meal

Protein	—	60-70%
Fat	—	2-15%
Minerals	—	10-20%
Calcium	—	5 ± 1%
Phosphorus	—	3 ± 1%
Iron	—	Trace amount
Iodine	—	Variable amount

Fish meal is also rich in fat soluble vitamins like A, D, and K along with water soluble vitamins like vitamin B₁ and B₁₂.

Fish meal constitutes a valuable source of food for pig, poultry and the cattle. Some good quality of fish meal is mixed with maize flour to form fish flour to be used by human beings specially in biscuits and cakes making factories.

[III] Fish manure

Surplus fishes or those unfit for human consumption or when the fishes get rotten due to bad preservation, are used as fertilizers for coffee, tea, tobacco, and rubber plantation because it is rich in nitrogen and phosphates. During peak season, when there is a large supply of fishes or they are landed in spoiled conditions, they are sun dried by spreading them on the beach. The dried fishes are ground and converted into manure.

Fish manure prepared from the dried and putrid fishes are of three kinds viz, the fish manure, prawn manure and the fish guano.

Fish manure is prepared by mixing ash with the dried fishes. The resulting mixture contains about 5-7% nitrogen and phosphate. It is considered ideal for manuring plants.

Prawn manure is also prepared in the same manner from the leftouts of prawn (e.g. head, tail and body exoskeletons). It contains about 5-6% of nitrogen, 3-4% of phosphate and a small amount of lime.

Fish guano is prepared from the fish materials left after the extraction of oil. It contains 7-10% of nitrogen and phosphates and considered a rich nutrient for the plants.

[V] Isinglass

It is a high grade collagen produced from the air bladder or swim bladder of catfishes, carps, sturgeons, cods, etc. It is in the form of shining powder. The Russian isinglass is prepared from the air bladder of salmon, perches and other catfishes, but it is of poor quality. For preparing isinglass, the air bladder is washed to remove blood and other matters. Outer layer is scraped and the remaining inner most layer contains pure isinglass. When dissolved in hot water, forms a gelatin having adhesive property.

Isinglass is used principally for the clarification of wines, beer and vinegar. To a limited extent, it is used for preparing jellies and special cements. Formerly, it was used as a substitute of gelatin in confectionery.

[VI] Fish glue

Fish glue is a sticky substance and is prepared from different wastes (e.g. bones, scales and fins etc.) discarded during processing. These are washed, ground and cooked with acetic acid in steam. Liquid is separated and condensed to form the fish glue. It is used as an strong adhesive for papers, files, wood, leather and glass. Glue is obtained chiefly from cods and sturgeons.

(4) **Fish flour** : This is a very superior quality of fish meal, produced under strict control and care, meant for human consumption. It is practically hydrolysed protein and produced by sophisticated process. It is considered to be an ideal source of protein for both adults and infants. It is mixed up with wheat flour to enrich the bakery products.

(5) **Fish silage** : It is a liquid or semisolid product and highly nutritive animal feed. This is also one kind of fish meal. The raw material is the fresh fish or fish offal. It is formed by mixing with H_2SO_4 5/4 (pH-2) or Formic acid (pH-4-5) or both one after the other.

(6) **Fish manure and guano** : Fish manure is the inferior quality of fish meal unfit as animal feed. It is a by-product of curing yard, and oil extracting plant where trash or spoilt fish have been employed. The residue after extraction of oil inferior quality of sundried fish, etc are used to make fish manure. It is a very useful manure for tea, coffee and tobacco crops.

Guano is a superior quality fish manure containing about 8-10% nitrogen. Raw sardine is the raw materials. After extracting oil from the sardine guano is formed as a by-product of oil extracting plants. As it is cooked during oil extraction its body decomposes very quickly and mix up with the soil easily. It is used as manure in all sorts of fruit crop.

(7) **Fish sausage and ham** : These are spiced pasted fishmeat preparation with salt and various forms of spices to add taste. Fish ham is small pieces of solid fish meats mixed with pasted fish meat and finally packed in casings and boiled. It is prepared from trash fishes. It is very tasty and a popular food in Japan. This can also be produced in our country.

(8) **Fish glue** : It is obtained from trimming, bones and skins of fish. These substances are steam heated with plenty of water and the medium is mixed with acetic acid. It is cooked for 6-10 hours. The liquor is extracted and concentrated to form the glue. It is used in smearing the back of the stamp and photo engraving, and used as an adhesive in paper boxes, shoes and other things.

(9) **Isinglass** : It is actually a collagen derived from thin shiny layer of air bladder of sturgeons, carps and catfishes. This collagen in high temperature is hydrolysed in water to produce strong adhesive gelatin the isinglass. It swells in cold water but does not dissolve in it. It is used in the confectionery and mainly used for clarification of beer and vinegar.

[VIII] Fish pearls

The material obtained by scraping the silvery coating of the scales of certain cyprinid fishes like *Alburnus* and gold fish, is used for polishing the hollow glass beads. These beads are then filled with wax and marketed as artificial fish pearls, used in jewellery.

[IX] Fish soap

The fins of sharks are dried and exported specially to China where they are used for the preparation of soaps.

[X] Fish insulin

The large sized fishes are dissected so as to remove the pancreas for obtaining insulin. Pancreas of the Sharks is rich in insulin.

[XI] Aesthetic value

As a hobby, some beautiful coloured fishes are cultured in aquaria for the decoration of houses. For *Example* : (Gold fish (*Carassius auratus*), Angel fish (*Pterophyllus*), Mollusc fish (*Macrodonus*) and different species of *Colisa*.