

industry of fish and fish products

- **shark** [ʃɑ:k] - акула
- **dolphin** ['dɒlfɪn] - дельфин
- **whale** [(h)weɪl] - кит
- **pike** [paɪk] - щука
- **bass** [bæs] - окунь
- **eel** (**grig**) [i:l] - угорь
- **plaice** (**flounder, sole, flatfish**) [pleɪs] - камбала
- **herring** ['herɪŋ] - сельдь
- **ruff** [rʌf] - ёрш
- **fish** - рыба;
- **freshwater fish** - пресноводная рыба;
- **saltwater fish** - морская рыба;
- **tropical fish** - тропическая рыба

- The following outline is provided as an overview of and topical guide to the fishing industry:
- **Fishing industry** – includes any industry or activity concerned with taking, culturing, processing, preserving, storing, transporting, marketing or selling fish, fish products or shellfish. It is defined by the **FAO** – includes any industry or activity concerned with taking, culturing, processing, preserving, storing, transporting, marketing or selling fish, fish products or shellfish. It is defined by the FAO as including **recreational** – includes any industry or activity concerned with taking, culturing

- Fish and **fish products** are [consumed as food](#) are consumed as food all over the world. With other [seafoods](#) are consumed as food all over the world. With other seafoods, it provides the world's prime source of high-quality [protein](#): 14–16 percent of the animal protein consumed worldwide. Over one billion people rely on fish as their primary source of animal protein. [\[1\]](#)[\[1\]](#)[\[2\]](#)
- Fish and other aquatic organisms are also processed into various food and non-food products.

- Processed fish products[[edit](#)]
- [Surimi](#) refers to a Japanese food product intended to mimic the meat of lobster, crab, and other shellfish. It is typically made from white-fleshed fish (such as pollock or hake) that has been pulverized to a paste and attains a rubbery texture when cooked.
- [Fish glue](#)Fish glue is made by boiling the skin, bones and [swim bladders](#)Fish glue is made by boiling the skin, bones and swim bladders of fish. Fish glue has long been valued for its use in all manner of products from [illuminated manuscripts](#)Fish glue is made by boiling the skin, bones and swim bladders of fish. Fish glue has long been valued for its use in all manner of products from illuminated manuscripts to the[Mongolian war bow](#).
- [Fish oil](#)Fish oil is recommended for a healthy diet because it contains the [omega-3 fatty acids](#)Fish oil is recommended for a healthy diet because it contains the omega-3 fatty acids, [eicosapentaenoic acid](#)Fish oil is recommended for a healthy diet because it contains the omega-3 fatty acids, eicosapentaenoic acid (EPA), and [docosahexaenoic acid](#)Fish oil is recommended for a healthy diet because it contains the omega-3 fatty acids, eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA), precursors to[eicosanoids](#)Fish oil is recommended for a healthy diet because it contains the omega-3 fatty acids, eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA), precursors toeicosanoids that reduce [inflammation](#) throughout the body.<sup>[5]</sup>
- [Fish emulsion](#)Fish emulsion is a [fertilizer](#)Fish emulsion is a fertilizer [emulsion](#)Fish emulsion is a fertilizer emulsion that is produced from the fluid remains of fish processed for [fish oil](#)Fish emulsion is a fertilizer emulsion that is produced from the fluid remains of fish processed for fish oil and [fish meal](#) industrially.
- [Fish hydrolysate](#)Fish hydrolysate is ground up fish carcasses. After the usable portions are removed for human consumption, the remaining fish body – [guts](#)Fish hydrolysate is ground up fish carcasses. After the usable portions are removed for human consumption, the remaining fish body – guts, [bones](#)Fish hydrolysate is ground up fish carcasses. After the usable portions are removed for human consumption, the remaining fish body – guts, bones, [cartilage](#)Fish hydrolysate is ground up fish carcasses. After the usable portions are removed for human consumption, the remaining fish body – guts, bones, cartilage, [scales](#)Fish hydrolysate is ground up fish carcasses. After the usable portions are removed for human consumption, the remaining fish body – guts, bones, cartilage, scales, [meat](#), etc. – are put into water and ground up.
- [Fish meal](#)Fish meal is made from both whole fish and the bones and offal from processed fish. It is a brown powder or cake obtained by rendering pressing the whole fish or fish trimmings to remove the fish oil. It used as a high-protein supplement in [aquaculture](#) feed.
- [Fish sauce](#)Fish sauce is a [condiment](#)Fish sauce is a condiment that is derived from fish that have been allowed to [ferment](#). It is an essential ingredient in many curries and sauces.

- Fish is an extremely perishable food. For example, most fish become inedible within twelve hours at tropical temperatures. Spoilage begins as soon as the fish dies, and processing should therefore be done quickly to prevent the growth of spoilage bacteria. Fish is a low acid food and is therefore very susceptible to the growth of food poisoning bacteria. This is another reason why it should be processed quickly. Some methods of preservation cause changes to the flavour and texture of the fish which result in a range of different products. These include:
  - · Cooking (for example, boiling or frying)
  - · Lowering the moisture content (by salting, smoking and drying collectively known as curing)
  - · Lowering the pH (by fermentation)
  - Lowering the temperature with the use of ice or refrigeration also preserves the fish, but causes no noticeable changes to the texture and flavour.

- **The nutritional significance in the diet**
- Fish provides a good source of high quality protein and contains many vitamins and minerals. It may be classed as either white, oily or shellfish. White fish, such as haddock and seer, contain very little fat (usually less than 1%) whereas oily fish, such as sardines, contain between 10-25%. The latter, as a result of its high fat content, contain a range of fat-soluble vitamins (A, D, E and K) and essential fatty acids, all of which are vital for the healthy functioning of the body. The table opposite illustrates some of the main nutritional differences between oily and white fish.

- Fish and fish products **Composition**
- **White fish e.g. haddock**
- **Oily fish e.g. herring**
- Energy (KJ)
- 321
- 970
- Protein (g)
- 17
- 17
- Fat(g)
- 07
- 18
- Water (g)
- 82
- 64
- Calcium (mg)
- 16
- 33
- Iron (mg)
- 0.3
- 08
- Vitamin A (m a)
- 0
- 45
- Thiamine (mg)
- 0.07
- 0

- Types of fish products
- *Cooked fish*
- Cooking provides short-term preservation of fish and it is usually a few days before any deterioration becomes noticeable.
- A range of methods are used for cooking fish but the principle of the process remains the same. The flesh of the fish softens, enzymes become inactivated and the process kills many of the bacteria present on the surface of the fish.
- Boiling and poaching both involve cooking the fish in hot water whereas frying uses hot oil. The advantage of these techniques is they are very simple and require no more than basic household equipment and are therefore suitable for small-scale production.
- Cooked fish products are most usually for immediate consumption and require no sophisticated packaging. The shelf-life can be extended for a few days by using refrigerated storage and the product should be covered to prevent recontamination.

- *Cooled/frozen fish*
- The spoilage of fish is directly related to temperature. The higher the temperature, the faster the spoilage up to around 40°C, above which heat will destroy bacteria and enzymes. Any reduction in the temperature prior to processing will maintain the quality of the fish for longer.
- Fish can be kept cool by covering it with clean, damp sacking and placing it in the shade. Although this method is simple and requires no special equipment, the fish still begins to deteriorate within a few hours.
- An alternative is to pack the fish with ice. This is an effective method and preserves the fish for a longer period of time. Obtaining ice, however, can be difficult for the following reasons:
- · Most ice-making machines are power-operated and therefore require some kind of fuel. Obtaining fuel can often be difficult and the machines may prove expensive to operate.· A great deal of ice is required and often the cost of the ice is greater than the actual cost of the fish.
- Freezing is an alternative method for cooling fish. This technique provides long-term preservation, but it is relatively expensive in terms of equipment and operating costs. In view of this it is not recommended for the majority of small-scale fisheries.

- *Cured fish products*
  - Curing involves the techniques of drying, dry salting/brining (soaking in salt solution) or smoking. These may be used alone or in various combinations to produce a range of products with a long shelf-life. For example:
  - · Drying - Smoking - Drying
  - · Brining - Smoking - Drying
  - · Salting - Drying
  - · Salting - Drying - Smoking
- Techniques such as these reduce the water content in the flesh of the fish, and thereby prevent the growth of spoilage microorganisms.

- *Dried fish*
- The heat of the sun and movement of air remove moisture which causes the fish to dry. In order to prevent spoilage, the moisture content needs to be reduced to 25 per cent or less. The percentage will depend on the oiliness of the fish and whether it has been salted.
- Traditionally, whole small fish or split large fish are spread in the sun on the ground, or on mats, nets, roofs, or on raised racks. Sun-drying does not allow very much control over drying times, and it also exposes the fish to attack by insects or vermin and allows contamination by sand and dirt. Such techniques are totally dependent upon the weather conditions. The ideal is dry weather with low humidity and clear skies.

- *Salted fish*
- Most food poisoning bacteria cannot live in salty conditions and a concentration of 6-10 per cent salt in the fish tissue will prevent their activity. The product is preserved by salting and will have a longer shelf-life. However, a group of micro-organisms known as 'halophilic bacteria' are salt-loving and will spoil the salted fish even at a concentration of 6-10 per cent. Further removal of the water by drying is needed to inhibit these bacteria.
- During salting or brining two processes take place simultaneously:
  - water moves from the fish into the solution outside
  - salt moves from the solution outside into the flesh of the fish.
- Salting requires minimal equipment, but the method used is important. Salt can be applied in many different ways. Traditional methods involve rubbing salt into the flesh of the fish or making alternate layers of fish and salt (recommended levels of salt usage are 30-40 per cent of the prepared weight of the fish). There is often the problem, however, that the concentration of salt in the flesh is not sufficient to preserve the fish, as it has not been uniformly applied. A better technique is brining. This involves immersing the fish into a pre-prepared solution of salt (36 per cent salt). The advantage is that the salt concentration can be more easily controlled, and salt penetration is more uniform. Brining is usually used in conjunction with drying.
- Ultimately the effectiveness of salting for preservation depends upon:
  - uniform salt concentration in the fish flesh
  - concentration of salt, and time taken for salting
  - whether or not salting is combined with other preservation methods such as drying.

- *Smoked fish*
- The preservative effect of the smoking process is due to drying and the deposition in the fish flesh of the natural chemicals of wood smoke. Smoke from the burning wood contains a number of compounds which inhibit bacteria. Heat from the fire causes drying, and if the temperature is high enough, the flesh becomes cooked. Both of these factors prevent bacterial growth and enzyme activity which may cause spoilage.
- Fish can be smoked in a variety of ways, but as a general principle, the longer it is smoked, the longer its shelf-life will be.
- Smoking can be categorized as:
  - *Cold smoking*. In this method, the temperature is not high enough to cook the fish. It is not usually higher than 35°C.
  - *Hot smoking*. In this method, the temperature is high enough to cook fish.
- Hot smoking is often the preferred method. This is because the process requires less control than cold processing and the shelf-life of the hot-smoked product is longer, because the fish is smoked until dry. Hot smoking does, however, have the disadvantage that it consumes more fuel than the cold-smoking method.
- Traditionally, the fish would be placed with smouldering grasses or wood. Alternatively, fish may be laid or hung on bamboo racks in the smoke of a fire (see below).

- *Fish paste (bagoong)*
- This is a product from Eastern Asia. It is made from whole or ground fish, fish roe, or shellfish. It is reddish brown in colour, although this will depend on the raw materials used, and is slightly salty with a cheese-like odour.

- Other processed products[[edit](#)]
- [Pearls](#)Pearls, [mother-of-pearl](#)Pearls, mother-of-pearl, and [abalone](#)Pearls, mother-of-pearl, and abalone are valued for their lustre. Traditional methods of [pearl hunting](#) are now virtually extinct.
- [Sea horse](#)Sea horse, [star fish](#)Sea horse, star fish, [sea urchin](#)Sea horse, star fish, sea urchin and [sea cucumber](#)Sea horse, star fish, sea urchin and sea cucumber are used in [traditional Chinese medicine](#).
- The Sea snails *Murex brandaris* and [Murex trunculus](#) are used to make the pigment [Tyrian purple](#).
- Some [sepia](#)Some sepia pigment is made from the inky secretions of [cuttlefish](#).
- [Kelp](#)Kelp is a major source of iodine, can be used as [fertilizer](#), and kelp ash can be used in soap and glass productions.



