



**Spoilage refers to food becoming unfit to eat. Like almost any other food, seafood must be handled and stored correctly to maintain its quality and to ensure it is safe to eat.**

**Seafood not handled correctly goes through changes due to the action of bacteria\* and enzymes\* that make it taste bad and eventually become dangerous to eat. The food is then said to have 'gone off' or 'gone bad'.**

## Spoilage by bacteria

Bacteria are the usual cause of seafood spoiling. Surface slime, gills and the gut of a living fish contain millions of bacteria. After the fish is caught, the numbers of bacteria increase dramatically and can cause illness and food poisoning. Cooking will kill bacteria but may not degrade the toxins\* that they have produced.



**What is the only natural food that doesn't go bad?**

*Most food goes 'bad' because of the growth of bacteria and fungi,\* neither of which can survive in honey. Why? Honey is a very concentrated solution of sugars which draws water out of cells such as those of bacteria by osmosis\* – the bacteria therefore shrivel up and die. The ancient Egyptians used honey for dressing wounds and some doctors have started using it again to kill bacteria.*

## Spoilage by enzymes

Enzymes are present in all living things and are important in promoting the building of tissues as well as digesting food. After a seafood species\* is caught, enzymes continue to work and start to breakdown and soften the flesh.

Histamine poisoning\* is one of the common types of non-bacterial fish poisoning. Histidine occurs naturally in many fish including tuna, mahi mahi, marlin and sardines. If the fish is not chilled immediately after capture and not kept at temperatures less than 16°C, histidine is converted to histamine.

Because histamine is not destroyed by heat, even cooked fish will cause reactions that are often severe. Symptoms include allergic responses, a metallic taste, nausea, vomiting, abdominal cramps, diarrhoea, facial flushing and dizziness. Taking antihistamines (found in many hay-fever tablets) will usually give relief.



**What does a properly handled fish look and smell like?**

*Properly handled fish have eyes that are clear and bright, scales or skin that are shiny and red gills that smell seaweed fresh. When raw, the flesh is firm and does not separate easily; when cooked, the flesh does not have a honeycombed appearance.*

## Stages of spoilage

After being caught, a fish quickly dies and goes through three stages, sometimes known as the three stages of *rigor*.\*

**Stage 1:** (immediately after death) The fish feels soft to the touch. Fish just caught is very fresh and has a pleasant, seaweedy and delicate taste. The fish flesh begins to be affected by the action of its own enzymes immediately after the fish is caught.



**Stage 2:** (several hours after death, depending on temperature) The fish becomes stiff to the touch. The action of enzymes continues and histamines develop in some types of fish. There are no bad smells but there is some loss of flavour in the flesh.



**Stage 3:** (a day or more after death) The fish becomes soft to the touch again. Bacteria and enzymes are more active in this stage. The build up of bacteria causes unpleasant smells and the flesh becomes either watery or tough and dry.

The times taken for fish to go through the above stages are highly dependent on temperature. After these stages the fish becomes rapidly spoiled and is likely to cause food poisoning if eaten.



## Twice as nice on a bed of ice

After capture, a fish should be covered with a wet bag or palm leaf, or even better, kept on ice. Ideally, fish should be kept on ice from the moment they are caught. At low temperatures between -1°C and +4°C both the action of enzymes and bacteria are greatly reduced and the edible life of fish can be extended to more than a week.

## Keep it clean

In addition to keeping fish on ice from the moment they are caught, cleanliness and hygiene are essential to ensure there is little build-up of harmful bacteria and other micro-organisms.

- Wash all fish baskets or containers.
- Wash hands frequently while gutting, gilling and preparing seafood.
- Wash all work surfaces and utensils used.
- Wash fish fillets in clean drinkable water before putting back on ice.

