Seabass & seabream

What should we know?

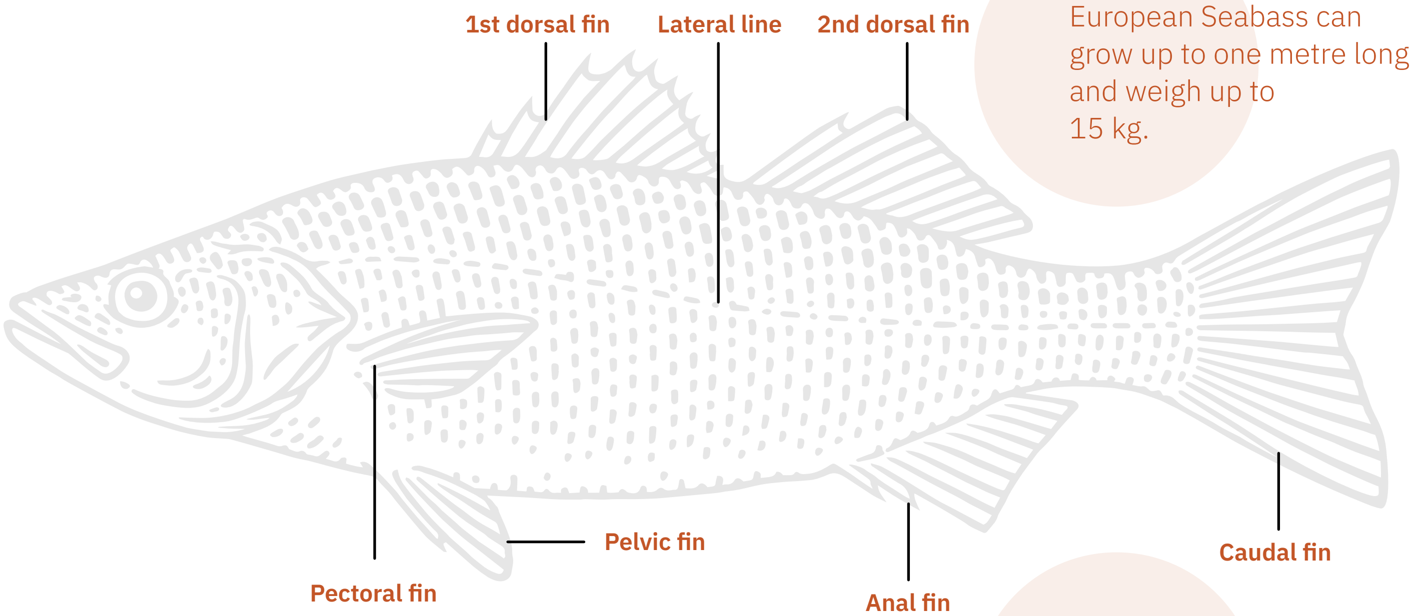
Species tool

European seabass & seabream:
What should we know?

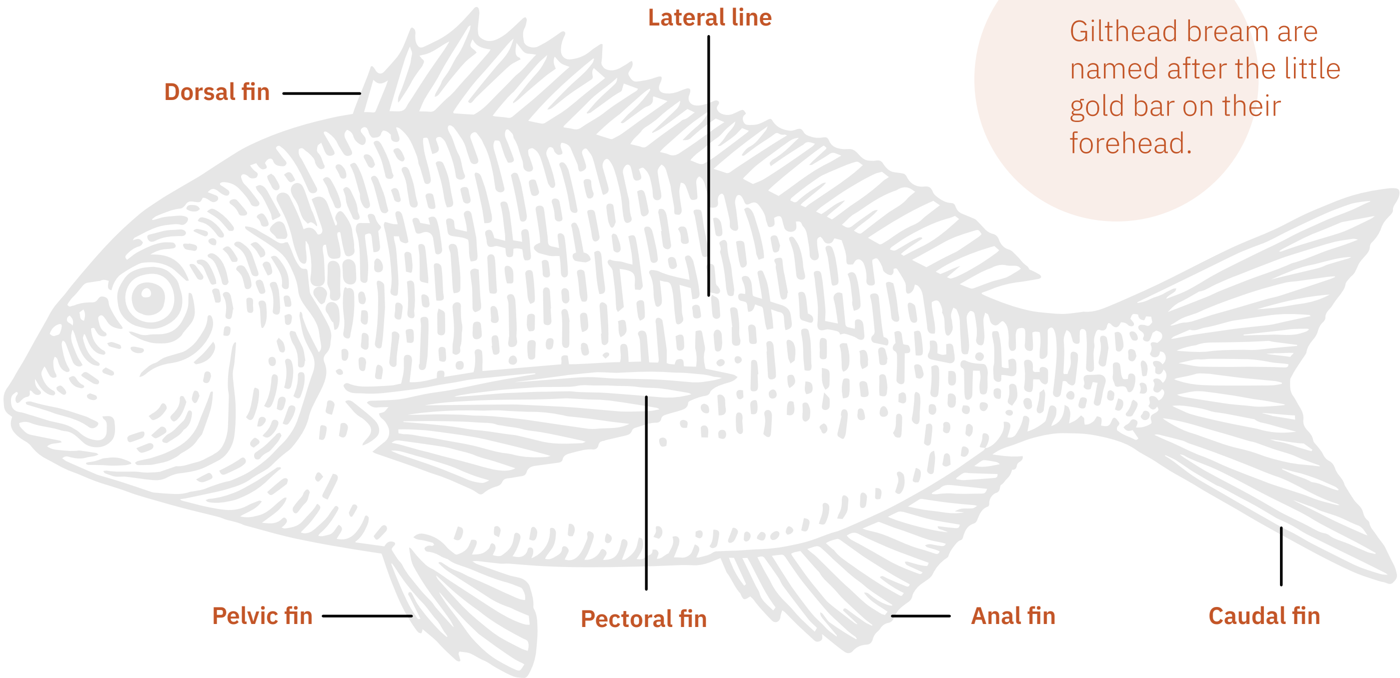
European seabass (*Dicentrarchus labrax*) and gilthead seabream (*Sparus aurata*) are two of the most important commercial fish cultured in the Mediterranean. They were traditionally cultured in coastal lagoons and tidal reservoirs, which acted as natural fish traps taking advantage of juvenile migration from the sea. These lagoon systems — "vallicoltura" in Italy, "hosha" in Egypt and the "Mesalongi" region in Greece — were areas where the fish could be extensively reared, often in association with salt production.

By the late 70s, juvenile production techniques were sufficiently developed to provide juveniles and enable the first commercial hatcheries for seabass and seabream to be established. Japan led the way with their development of the red seabream (*Pagrus major*), and today, several seabasses and breams are grown globally. The hatchery production and farming of seabasses and breams is one of the aquaculture success stories and are some of the most commercially important marine fish widely cultured globally.

European Seabass can grow up to one metre long and weigh up to 15 kg.



Gilthead bream are named after the little gold bar on their forehead.

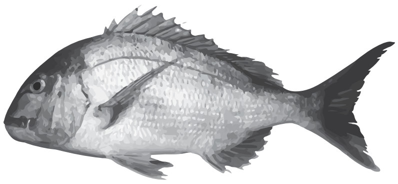


Other well-known seabass & seabream species are:

Seabasses and breams are from the *Perciformes* order, the largest group of fishes globally, representing more than 6,000 species in about 150 families.

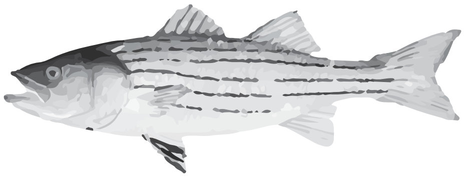
Seabass is a common name for a variety of different species of marine fish. Seabasses from the *Serranidae*, *Moronidae* and *Latidae* families cover over 450 species, including groupers. Commercially, the most commonly cultured seabass are the European seabass, Asian seabass (*Lates caclrifer*) and striped bass (*Morone saxitilis*).

Seabreams come from a *Sparidae* family. Commonly known as breams and porgies, they include about 115 species of mainly marine temperate coastal fish of high economic value. The most commonly cultured are the gilthead seabream, red seabream, Australasian snapper (*Pagrus auratus*) and the common seabream (*Pagrus pagrus*).

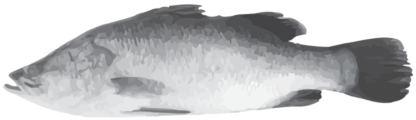


Red Seabream
Pagrus major

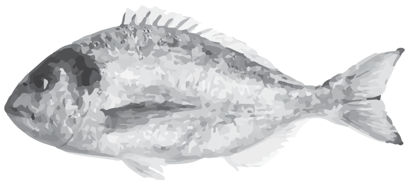
Australian Snapper
Pagrus auratus



Striped Bass
Morone saxitilis



Asian Seabass
Lates calcarifer



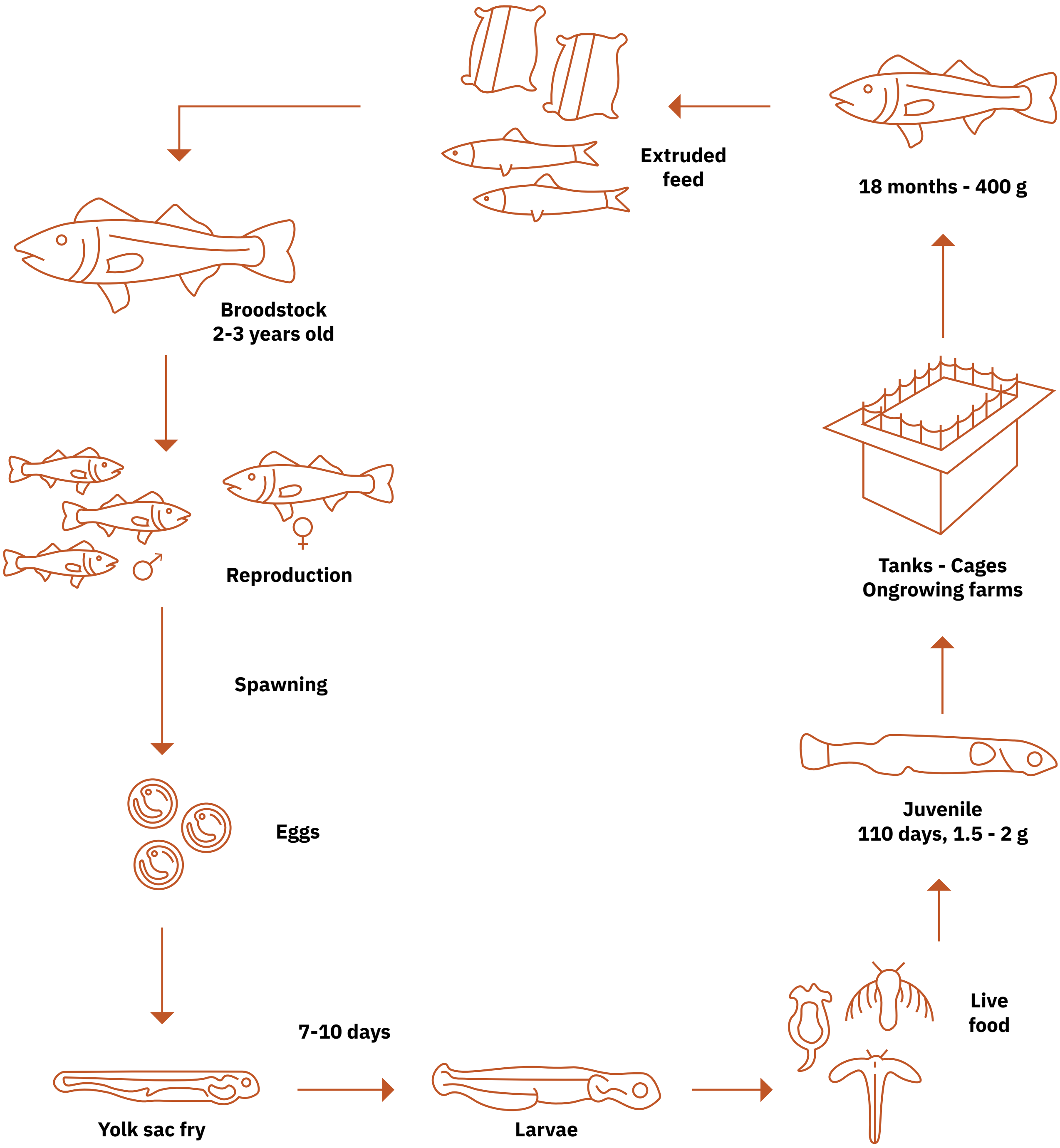
Common Seabream
Pagrus pagrus

The seabass was one of the first fish species to be farmed in Europe beginning in France in the 1970s.

Seabass & seabream farming

The life cycles of seabass and seabream are similar but not identical. The life cycle of the European seabass is shown below.

A characteristic of a lot of these marine species is their small egg diameter (approximately ±1 mm) and their requirement for sophisticated live feed production systems and controlled larval rearing environments.



Production cycle of European sea bass – intensive system

Hatchery

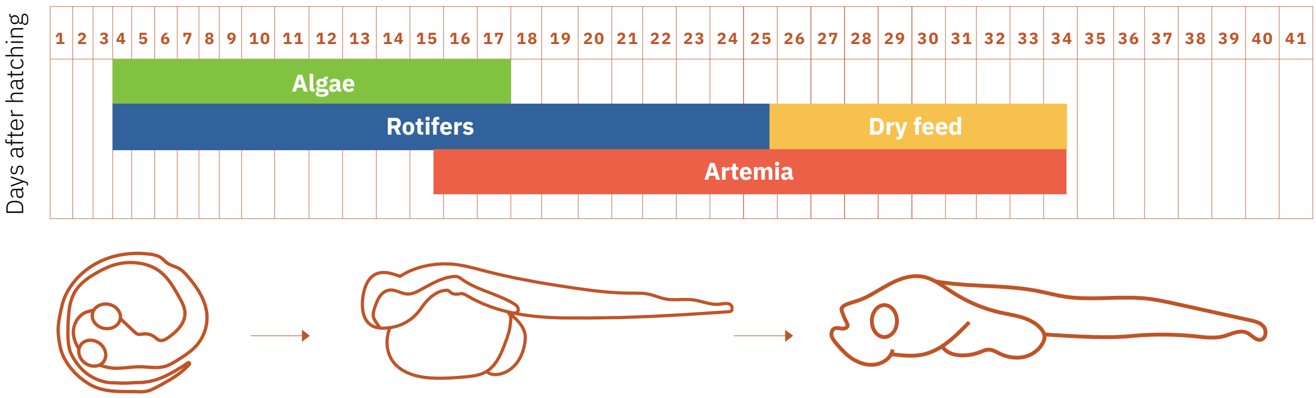
Gilthead seabream larvae generally deplete their yolk sacs after 3–4 days of endogenous feeding. At this stage, the eyes are pigmented, and the mouth developed, allowing the larvae to prey on larval organisms.

Initially, larvae are fed rotifers (*Brachionus plicatilis*). These are chosen for their appropriate size and ability to be mass-cultured in their billions. After 10–11 days, artemia (*Artemia salina*) are introduced together with the rotifers, which are subsequently withdrawn, and Artemia metanauplii are fed until the metamorphosis of the larvae.

Prior to being fed to the larvae, both rotifers and artemia are routinely enriched with commercial lipid preparations to enhance their levels of certain essential fatty acids (EPA; DHA) and vitamins that are critically important for good growth development and survival.

In Mediterranean hatcheries, microalgae (e.g., *Chlorella sp., Nannochloropsis sp., Isochrysis galbana*) are used both for rotifer production and to improve the water quality in the larval tanks, creating the so-called 'green water' that is used during the initial rearing phases.

Marine larval feeding regime



Nursery

Juveniles, at about 30–40 days old, are generally moved into dedicated weaning sections of the hatchery, where weaning takes place. Weaning occurs using dry, high-protein formulated diets and takes place from about 30 days until artemia are finally withdrawn. Modern advances in nutrition and feed manufacturing techniques enable preparation of diets that substitute prolonged artemia feeding periods for many species.

Initial fry density varies between 10–40 fry/litre and can reach over 20 kg/m³ of 2–3 g fish, depending on the species and culture tanks used. In intensive nursery systems where CO_2 management or RAS are employed, nursery culture density can increase to over 40 kg/m³ for fish of about 10 g in weight.

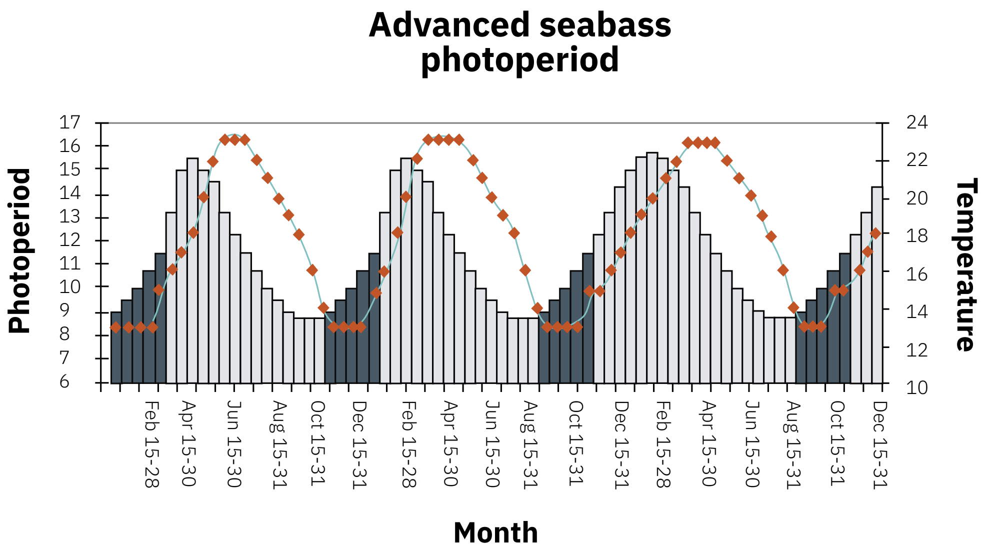
Reproduction & broodstock

Most hatcheries have established in-house broodstocks to secure a reliable supply of good quality fish eggs. The broodstock are maintained long-term in dedicated tanks with photoperiod and temperature control. These fish may come either from a farm or wild source, and genetic selection has been under development for the last 10 years.

Seabass

The optimal age for seabass females is between 5–8 years, whereas, for males, it is around 2–4 years. The management of captive broodstock allows for natural maturation through photoperiod manipulation. Hormonal treatments may be used to synchronise spawning.

An example of how stocks can be manipulated in this way is shown below. The red bars indicate the spawning period.



Seabream

Seabream are protandrous hermaphrodites in that they develop as males but can later reproduce as females. Sexual maturity develops in males at 2 years of age and females at 2–3 years. Females are batch spawners that can lay 20,000–80,000 eggs daily for a period of up to four months.

In captivity, sex reversal is conditioned by social and hormonal factors. The control of the sex ratio in spawning tanks is a very important factor for gilthead seabream, and precautions need to be taken because sex reversal is socially determined. The presence of young males at the end of the spawning period, for instance, increases the number of older fish that become females. On the other hand, the occurrence of older females reduces sex reversal in younger fish.

Harvest

Before harvesting, a starvation period is required. The length of this period, varying according to temperature and feeding rate, is normally between 1–4 days. Fish are crowded and removed by Brailer net or vacuum fish pumps and delivered directly to iced water before transport to the processing facilities.

Commercial products

Seabream and bass can be sold as live, frozen whole and gutted, frozen fillet or dried. Some common serving suggestions include:

→ Seabass and bream can be pan-fried, baked, steamed or grilled
→ Seabass ceviche
→ Seabass in salt crust
→ BBQ-grilled seabass and seabream
→ Seabream and bass served in Mediterranean restaurants are believed to be best cooked simply without many additional ingredients or processing techniques.

Ongrowing
Ongrowing units supplied with juveniles are fed commercial diets to a prescribed formulation, and the feeding tables provided act as guidelines for optimal productivity. Grading is necessary at least 2–3 times during the cage cycle to avoid growth differentiation and cannibalism. Vaccination will also take place in the cages.

Farming methods
While the traditional methods of production in extensive and semi-intensive lagoons still exist in some parts of Europe and Asia modern culture techniques are predominantly intensive cage culture and raceway pond culture systems. Some highly intensive RAS units were also developed but these as yet have not been able to compete with cage culture prodcution costs. By far the largest production of sea bass and sea bream is undertaken in the Mediterranean countries of Turkey, Greece and Spain.

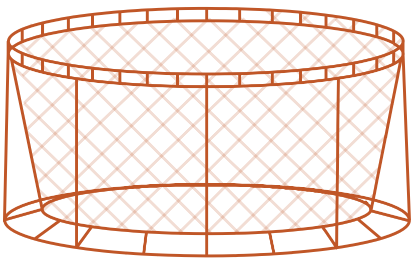
Ongrown production for the 2 species in 2019 was 407,673 metric tons (FEAP, 2020). The production of sea bass and sea bream juveniles in this area exceeds 1 billion juveniles per year.

Fish cages vary in design, size and materials used as they are intended for diverse environments, ranging from relatively protected to highly exposed and dynamic sites, either as floating or submerged underwater structures and adopting several technological solutions to facilitate fish stock husbandry and management.

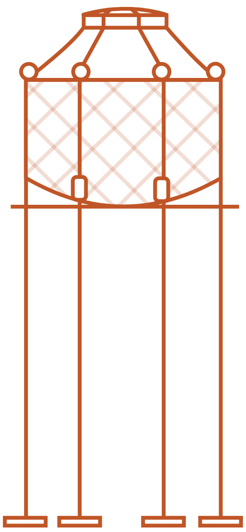
The technology and business model for large scale cage farming has been developed by the vertically integrated marine cage farming companies in northern Europe (e.g. Norway, Scotland) and South America (e.g. Chile). The selection of the cage technology is dictated by the site location and exposure to strong winds and waves.

There are generally 3 different cage technologies:

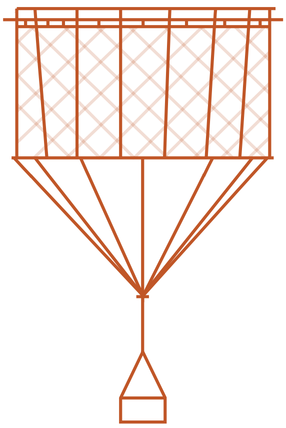
Conventional cage technology
Floating high-density polyethylene (HDPE) collars for cages are suitable for semi-exposed sites (up to 3 m wave height).



Tension leg or frameless cages
Tension leg cages are moored from below the cage and, during strong weather and currents, automatically submerge below the surface.



Submersible cages
Submersible cages operate at the surface but can be dropped below the surface to escape strong winds and waves or be submerged at night for security reasons.



Marine fish farming is characterised by a high degree of professionalism and ongoing development.
The scale of operation has increased, and husbandry, farming methods and disease control have improved considerably over the years.

Juveniles are introduced to the cages anywhere from 2–20 g at a density of ca. 2 kg/m^3 and grow up to a density of ca. 15 kg/m^3. Production time depends on the temperature conditions at the cage site. In the Mediterranean, the production cycle is approximately 140 days to 2 g from hatch and then a further grow-out period of 14–22 months, depending on the final market size (300–800 g). On average, larger pre-fattened gilthead seabream (10 g) reach first commercial size (350–400 g) in about one year, while smaller juveniles (5 g) reach the same size in about 16 months.

Challenges in marine production

Water management

Water management, especially in tank and RAS culture environments, plays a critical role in maintaining stable water parameter characteristics, which, in turn, help prevent unnecessary stressors on the fish that can lead to poor performance and the development of disease from opportunistic pathogen attack.

Fish progress through the nursery and pre-ongrowing systems, where care is taken to ensure adequate feeding and that environmental conditions are optimal. Some producers use bath vaccination during this period against certain diseases, such as Vibriosis. However, the efficiency duration is limited to several months. Injection vaccination rarely takes place in fish of less than 20 g due to the development of an adaptive immune system.

Health management

Diseases and parasites are serious threats in all aquaculture operations. Offshore, they may be less of a threat than nearshore due to better water quality conditions, though they may also be harder to control. However, it is essential that adequate treatment methods are developed and available for the inevitable occasions when they will be needed.

Providing good feed for fish minimises the transfer of diseases and parasites, impact of its surroundings — such as discharges of organic matter, phosphorus and nitrogen, which can cause eutrophication — and ultimately improves farm performance.

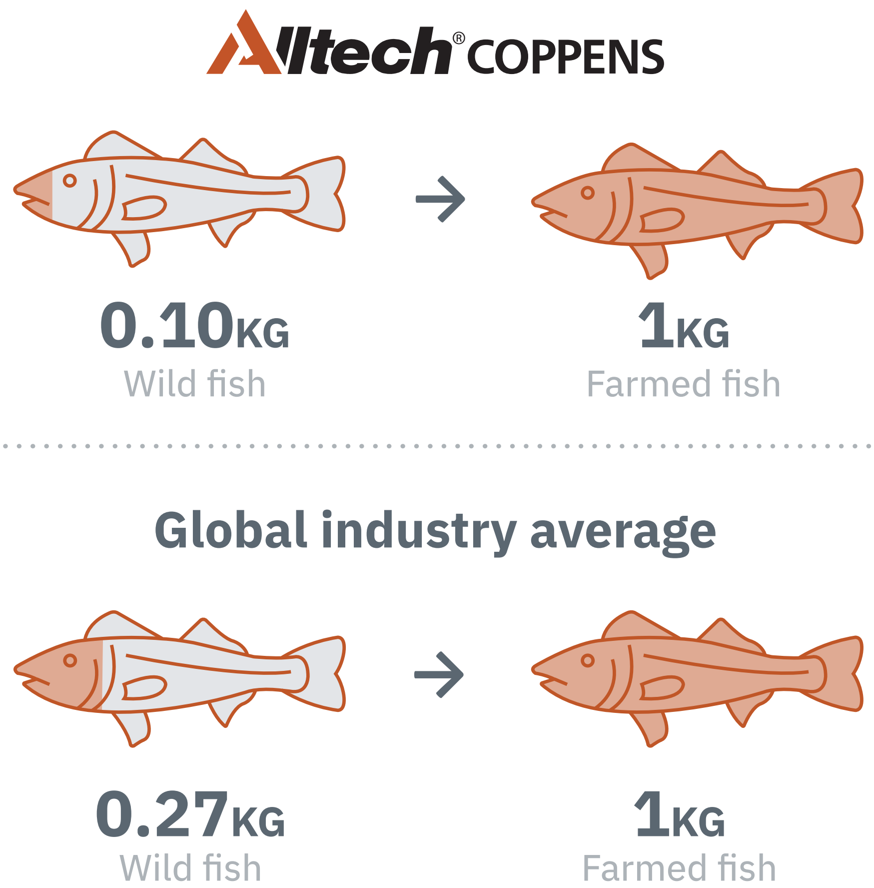
Solutions:

Feeding management for optimal water quality

Commercial intensive aquaculture employs a dry compound diet containing all the nutrients, vitamins and minerals necessary to ensure health, welfare and performance. It is estimated that up to 60% of the cost of production of fish can be attributed to feed cost.

The composition of fish feed has changed a lot during the last decades. Traditionally fish feeds for carnivorous species were formulated primarily based on fishmeal and fish oil. These two ingredients provide all the nutrients that fish require in ample amounts. However, due to the pressure on wild catch fish stocks used for fishmeal and fish oil, attempts were made to reduce the amount of marine ingredients in fish feed.

The amount of fishmeal and fish oil required to produce 1 kg of farmed fish is expressed in the FIFO factor (Fish in Fish out). A feed with a FIFO factor below 1.0 allows for a net fish production. The global fish feed industry's FIFO factor is 0.27, which means that with 270 g of fishmeal and fish oil, 1 kg of farmed fish can be produced.



Nutritionists understand that there is no requirement for any particular raw material, and so the nutrient requirement of many species has been studied. The concept of nutrient requirement allows the introduction of numerous vegetable and animal by-products to be incorporated in diets. This science is species-specific, and the level of energy, protein content and digestibility of the diet plays an important role in the cost-effectiveness of that diet. This is measured by growth and performance and by the feed conversion ratio (FCR) of the fish.

Farms should try to improve their feeding efficiency and optimize feed conversion factors to increase profits and decrease nutrient and organic matter losses. This can be achieved by using better-formulated and quality feeds (higher digestibility, better binders) and improved feeding strategy to reduce overfeeding, depending on genetics and farm management.

Research & development

With 30 years of experience researching, developing and producing high-quality sea bass and sea bream feeds, Alltech Coppens offers on-farm assistance through our dedicated sales team and technical support team, ensuring optimal farm performance.

Alltech Coppens formulates feed on the 4 Pillars of Fish Nutrition: **Palatability**, **Performance**, **Pollution Control** and **Planet**. All four pillars are important and taken into the balance of sourcing new/alternative raw materials:

Palatability
To ensure the best growth and performance of fish, optimal feed intake is vital. Fish must be attracted to the smell and taste of the feed.

Performance
Our feeds must perform well.
This means that they must generate healthy growth and ensure efficient feed utilisation. This is a decisive factor in the profits of fish farmers.

Pollution Control
To maintain water quality and secure optimal fish health and performance, it is crucial that all our feeds are highly digestible, thereby decreasing the risk of pollution.

Planet
The environmental sustainability of the feed.

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