

## Barramundi

Barramundi, commonly known as 'Asian seabass' in Asian countries, is a fish of relatively large commercial importance. It is fished internationally and farmed in various countries around the world, including Australia, Indonesia, Thailand, Israel, Papua New Guinea and Vanuatu, among others. It is a hardy, highly fecund species, with simple hatchery and grow-out production techniques. These attributes make barramundi an ideal candidate for aquaculture.

# BARRAMUNDI



Barramundi fingerlings being harvested  
(Photo courtesy of Paul Ryan, Vate Ocean Gardens Ltd Vanuatu).

## General information

The barramundi, which is also called sea perch, giant sea perch, Asian sea bass and Australian sea bass (*Lates calcarifer*) can be reared in tanks, earthen ponds and cages using fresh water, brackish water and full strength sea water. Barramundi is a very robust species, able to withstand a wide range of salinities.

Barramundi matures sexually at three to four years of age. Most of the fish mature initially as males and participate in one or more spawning seasons before undergoing a sexual inversion (protandry) and becoming functional females by the next breeding season.

This species is widely distributed in tropical and subtropical areas of the western and central Pacific Ocean and the Indian Ocean (from 50°E–160°W and from 24°N–25°S).

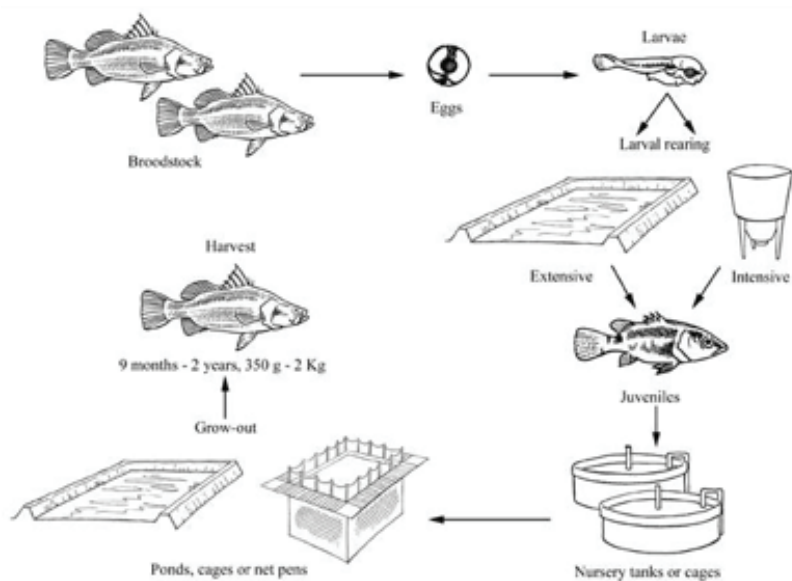
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Barramundi are opportunistic predators, with crustaceans and fish predominating in the diet of adults.

Most seed supply for barramundi aquaculture comes from hatchery production, although some barramundi fingerlings are still collected from the wild in parts of Asia. Hatchery production technology is now well established in most producer countries.

## Production cycle



Top: Barramundi fingerlings (Photo courtesy of Paul Ryan, Vate Ocean Gardens LTD Vanuatu).

Left: Barramundi production cycle (Source: FAO cultured species factsheets).

## Spawning

Barramundi broodstock are held in floating cages or in tanks; they may be maintained in either fresh water or sea water, but must be placed in sea water (ranging 28–35‰) prior to the breeding season to enable final gonadal maturation to take place. Barramundi broodstock have been induced to spawn by manipulation of environmental parameters (salinity and temperature) and by hormonal induction.

During spawning, sperm and eggs are released into the water column and fertilisation occurs externally. Fertilised eggs undergo rapid development and hatching occurs 12–17 hours after fertilisation at 27–30°C. Newly-hatched larvae have a large yolk that is absorbed rapidly over the first 24 hours after hatching.

## Hatchery

Barramundi fingerlings can be produced at different concentrations. In intensive methods, barramundi are generally reared using 'green water' in circular or rectangular tanks. A microalgae culture is added to rearing tanks at densities ranging from  $8\text{--}10 \times 10^3$  to  $1\text{--}3 \times 10^5$  cells  $\text{ml}^{-1}$ . Intensively reared barramundi are fed on rotifers from day 2 until day 12, and on brine shrimp from day 8 until day 35–40.

Earthen ponds, ranging in size from 0.05 to 1 ha, are normally used for extensive larval rearing of this species. Ponds are relatively shallow (<2 m) in order to promote maximum production of phytoplankton and to prevent stratification. Inorganic and organic fertilisers are applied to produce a 'bloom' of suitable zooplankton concomitant with the introduction of the newly hatched barramundi larvae, which are stocked at densities of 400,000–900,000  $\text{ha}^{-1}$ .

## Nursery

Barramundi are usually acquired from a hatchery at a size of 25 mm (although larger fish are usually available depending on the farmer's requirements). At this stage, fingerlings can be purchased acclimated to the desired salinity.

Cannibalism can be a major cause of mortality during the nursery phase and during early grow out since barramundi specimens are able to cannibalise up to 61–67% of fish of their own length. Cannibalism is reduced by grading the fish at regular intervals to ensure that the fish in each compartment are similar in size. Grading should be undertaken every 4–6 days, depending upon the feeding regime.

Ideally, fish should be kept in tanks at least until they reach 60 mm in size. Efficient aeration and high water exchange or flow options should be used during this critical period. 60-mm fish should be achieved within 30 days of arrival from the hatchery. Fish over 60 mm in size can be placed within 8 mm high-density polyethylene (HDPE) oyster mesh or equivalent hapa size nets per cages of 1–6  $\text{m}^2$  in size. Common stocking densities are around 60  $\text{kg m}^{-2}$ .

## Grow out

Specimens that have attained a body length of 100 mm are ready for grow out. Most barramundi culture is undertaken in net cages. Both floating and fixed cages are used, ranging in size from 3 × 3 m up to 10 × 10 m, with depths of 2–3 m. The stocking densities used for cage culture generally range from 15–40  $\text{kg m}^{-3}$ , sometimes up to 60  $\text{kg m}^{-3}$ . Generally, increased density results in decreased growth rates, but this effect is relatively minor at densities below 25  $\text{kg m}^{-3}$ . Barramundi can also be farmed in earthen or lined ponds without cages; this technique is known as 'free ranging'.





Nursery hapas at the barramundi farm in Vanuatu (Photo courtesy of Paul Ryan, Vate Ocean Gardens LTD Vanuatu).

Inset: Farmed barramundi of 40-50 g (Photo courtesy of Paul Ryan, Vate Ocean Gardens LTD Vanuatu).

## Feeding strategies

Today most cultured barramundi are fed on compounded pellets, although 'trash' fish or 'low value fish' is still used in areas where it is cheaper or more available than pelleted diets. Barramundi fed pellets are generally fed twice each day in the warmer months and once each day during winter. Barramundi have achieved feed conversion ratios (FCRs) of 1.0–1.2:1 under experimental conditions, but in commercial farm conditions FCRs of 1.6–1.8:1 are relatively usual. FCR varies seasonally, often increasing to over 2.0:1 during winter.

## Markets and marketing

In Asia, most barramundi are marketed at 500–900 g, although small numbers of larger fish (1–3 kg) are also sold. In Australia, there are two main products from farmed barramundi: 'plate size' and fillet product. 'Plate size' fish range from 350 to 500 g, although larger (banquet) fish may be up to 800 g. Fish used for fillet product are generally in the range of 2–3 kg. Little effort has been put into developing value-added products for barramundi. In Australia, there are a few suppliers of smoked barramundi. Throughout its cultured range, live barramundi are sold to restaurants that specialise in live seafood products, but this is a relatively small proportion of the total market for barramundi.

Regarding the Pacific region, barramundi is currently being sold in retail outlets in Papua New Guinea (PNG) and Vanuatu as both fillet and whole plate size products.

## Current production status

In the Pacific Islands, there are currently two commercial farms: a private facility based in Vanuatu and another farm based in PNG — a private/public partnership located in Daru area. Both enterprises farm barramundi for exports and for the domestic market.

It should be mentioned that there is a strong interest in this species in other Pacific countries, such as Fiji and French Polynesia.



Barramundi grow out farms in Vanuatu (Photo courtesy of Paul Ryan, Vate Ocean Gardens LTD Vanuatu).





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## Comparative advantages and disadvantages of producing barramundi in the Pacific Islands region

Below is a range of comparative advantages that make the Pacific Islands region a good choice for developing barramundi farming:

- » The Pacific Islands are renowned for the pristine quality of their water, which is generally pathogen free.
- » There are many places suitable for hatcheries and offshore cages within the Pacific region.
- » There are real opportunities to produce food fish for import substitution in certain countries, such as PNG, Fiji or Vanuatu.
- » Many fish stocks are depleted in urban and suburban areas, and farmed fish may eventually replace wild-caught food fish in these places as it has in other parts of the world.

Below are some of the main limitations that the Pacific Islands region will have to address if barramundi farming is to be developed further:

- » A source of high-quality feed needs to be established. Compounded (pellet) feeds are preferable, since they are more cost-effective and less environmentally damaging than the use of trash fish.
- » The region still depends on fry and fingerlings produced abroad.
- » Neighbouring producers (Asia and Australia) are major competitors in markets for export fish commodities.
- » A hatchery is very labour intensive, requires skilled staff and is expensive to run. A proper market must be secured prior to setting up such a facility. It can be a risky investment if market conditions in the Pacific are unstable.
- » Current knowledge and skills in finfish farming techniques are still limited within the Pacific region.

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