

# **10. Fish transportation**

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## **Transferring fish from larval to weaning section**

Seabass and gilthead seabream can be moved to the weaning section at about 45 days of age when the rearing water temperature is 18°C. To anticipate the transfer is not advisable because the young postlarval stages are very fragile when their metamorphosis is in progress.

As the transfer operation is clearly very stressful to fish, a few precautions should be adopted:

- prepare all equipment, well cleaned and disinfected, the day before,
- train staff beforehand: everybody should know what to do, when and why,
- if possible, organize the transfer early in the morning,
- choose harvesting and transporting methods which are gentle with the young fish (see below),
- three-four days in advance fish should receive an increased amount of vitamin C (up to 10,000 mg/kg of feed) with their diet, as it has anti-stress properties
- do not feed fish before transfer,
- clean thoroughly the bottom of the larval tank to avoid polluting the transfer medium,
- receiving water quality parameters should match those of the larval rearing tank in terms of salinity and temperature,
- have an emergency oxygen supply at hand in case of some unforeseeable delay,
- try to never touch fish, and never let them jump or stay out of the water,
- never concentrate too many fish in a small container,
- never let dirty water enter the weaning tanks, and avoid that fry containers touch the floor before being immersed in the receiving weaning tank;
- try to keep the period in which fish are without aeration or water renewal to the shortest possible,
- feed fish as soon as possible when placed in the new tank in order to avoid cannibalism,
- immediately after transfer feed plenty of live feeds (artemia metanauplii) to favour a prompt recovery.

Preventive bacteriostatic treatments before and after transfer are sometimes applied to reduce the risk of disease outbreak on fish stressed by the transfer. However, since this practice can induce the appearance of drug resistant bacterial strains, it is recommended to replace this practice in favour of an anti-stress diet and a carefully managed operation.



**Fig.61.01 Gilthead seabream fry ready for transfer in larger tanks (photo STM Aquatrade)**

In some cases where it would be necessary to minimize the risk of bacterial infections caused by excessive handling, or by weak larvae, a preventive treatment lasting five days is advisable. In this case the larval tanks can be treated with Furazolidone, at a concentration of 30 ppm during two to three hours, a treatment which is repeated for three days before harvesting and two days after. The larvae should not be fed during the treatment. In order to apply the treatment:

1. dissolve the required amount of Furazolidone in a beaker (some drops of formalin will help);
2. increase DO levels in the tank to 130% saturation and then stop water exchange for the time of the treatment;
3. distribute evenly the Furazolidone solution;
4. once the time established for the treatment has expired, flush out the water, renewing it on a flow-through basis during a suitable time to eliminate the product;
5. use a skimmer to retain floating Furazolidone foam and clean the tank walls with a sponge.

Depending on the design of the larval tank, fry can be harvested either by netting them or by draining the tank through the bottom outlet while concentrating fish in a screened container (a procedure similar to the harvest of rotifers and brine shrimps, already described). The key points in the last case are the position and the dimensions of the tank outlet, as it should be sufficiently large (at least 1½") and should be placed at a minimum distance of 40 cm above the floor.

Fry transfer from in-floor larval tanks:

1. fill an adequate number of weaning tanks with water at the same temperature and salinity as that of the larval tanks; the volume of the weaning tanks will be related to the desired final fry density. Make sure that the weaning tanks have an adequate water inlet, proper lighting and aeration and a 1000- $\mu\text{m}$  water outlet screen;
2. place a soft nylon seine net with 2-mm knotless mesh inside the tank where fry have to be transferred and gently encircle part of the fry stock. Do not trap too many fish at once to avoid excessive overcrowding;
3. close the net and lift its two ends to the water surface creating a sort of bag hanging from the tank rim. Adjust the net to keep fish inside a submersed pouch;
4. dip a plastic bucket in the pouch and gently fill it with water and fry in a way that the fish do not remain exposed to air;
5. pour the bucket directly into the weaning tank or, if it is far away, into a wheeled and aerated plastic container which will be used for the transfer;
6. repeat steps 3 to 6 till completion of the harvest;
7. the very last fish which escaped capture with the seine net, typically the strongest animals, can be collected through the bottom drain or by means of a dip net
8. empty and clean the empty tank before it gets completely dry.



Larval transfer for tanks placed above the floor (typically FRP round tanks with conical bottom):

1. repeat steps 1 and 2 of the previous protocol;
2. fit in the weaning tanks the outlet screen of 1 mm;
3. dip the harvesting filter inside a large wheeled container placed near the tank to be harvested; inside it place a diffuser connected to an oxygen bottle or to the liquid oxygen distribution line;
4. connect a flexible hose, not collapsible, to the drain placed at the tank bottom and place the opposite end into the harvesting filter; to work properly, the drain must have a PVC ball valve of the same diameter of the hose;
5. siphon the bottom dirt out;

7. place a screened siphon into the tank and start draining the water into the filter container; the screen in the siphon will prevent fish from escaping;
8. once the water level inside the tank has reaches the upper level of the conical bottom, open the drain valve and the fry will move with the water into the filter container through the hose;
9. always keep the end of the hose in the filter container under water, and avoid a strong outflowing current, if necessary adjust the differences in water level to reduce the current;
10. as soon as the larval tank is empty, flush the hose with water taken from the water inlet valve of the tank to help the last fish to get out of it;
11. close the valve and disconnect from the bottom, lift it with the attached hose over the filter level and re-open it so as to drop the last fry into the filter. A bucket with some water placed under the larval tank bottom will ensure that no fish will fall on the floor;
12. dip the filter container into the tank and let fish get out. If the filter is too small to contain all the fry of the larval tank, repeat the procedure for a phased harvest;
13. clean the empty filter tank before it gets dry.



## Feeding

Feeding procedures in the weaning section differs from those of the larval rearing unit. Main changes are the end of the live feed supply and the setting up of a truly intensive rearing system based on automatic distribution of dry feed. The feeding protocol that follows applies to both species and is based on the following assumptions:

- initial fry density 10-20 fish/litre;
- water temperature of 18°C;
- salinity range 35-37 ppt;
- feed quantities refer to those supplied to one m<sup>3</sup> of rearing tank volume.

Refer to Annex 17 and Annex 18 for an indicative feeding regime during weaning, considering that in any case figures refer to a specific diet. Quantities should be adjusted during the first days of weaning according to fish behaviour and feed demand.

## **Feeding dry feed**

Strictly speaking, weaning (in the sense of shifting from live to artificial feed) commences during the larval rearing. The young fish actually receive the first feeding with inert feed at the very early age of 17-19 days, but it is much later, after the transfer into the weaning sector, that dry compounded feed become their only nutritional source. Live feed distribution is discontinued when they reach an age of sixty days.

## Feeding moist food

Even if today there is a tendency to replace moist food with by more advanced dry feeds, it still remains a useful resource to supply additional nutritional integrators and, in some cases, drugs at low cost. It can as well replace dry feed in an emergency. In this case its ration is determined according to fish size: for fry up to 1 g it is 25% of the total biomass (wet weight), between 1 and 10 g it is gradually reduced to 5%. As its distribution is not mandatory but supplementary, it is not normally included in the feeding protocols (Annexes 17 and 18). If distributed as supplement (5% of biomass), the quoted dry feed rations should be reduced by 20%.

Moist feed should be prepared fresh every day and should be totally consumed within the same day. If distributed as supplement of dry feed they should be given in three rations at 15, 17 and 19 hours. This pattern may change according to local conditions, in particular when moist feed is also a vehicle to deliver drugs.

The composition and texture should ensure its stability when placed in water, as well as assure its buoyancy for a better control of feed uptake by fish. For this purpose it can be smeared on a framed mosquito net that is kept submerged just below the water surface. Preparation and distribution have already been discussed in the previous section and can also be found in Annex 24.