

Chapter II

Pangasius djambal Transportation

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Building up a stock of sexually mature fish is a prerequisite for fingerling producers to start the process of artificial propagation. Broodfish can be caught from the wild or transported from farm to farm.

As *Pangasius djambal* is a new candidate for aquaculture, it is still difficult to find broodfish from farmers. Nowadays the two following options can be considered to obtain young *P. djambal* brooders:

- capturing fish from the wild;
- transporting young fish from JFADC (Sumatra) or RIFA (Java). These two governmental stations have bred young brooders that could be made available for farmers wanting to start culture of *P. djambal*.

In both cases, getting broodfish need preparation in order to transport fish in good condition. Recommendations for obtaining wild fish and some transportation techniques successfully used for different sized specimens of *P. djambal* are presented in this chapter.

***P. DJAMBAL* FROM THE WILD**

Surveys and field studies should be conducted first to evaluate the possibilities of collecting *P. djambal* from the wild. The presence of fishermen and of facilities to keep fish alive near the sampling location are determinant.

The first young *P. djambal* brooders used by the “Catfish Asia Project” team at the RIFA or JFADC stations originated from the Indragiri River (Riau, Sumatra) where fish were caught using gill nets or hooks. In this river fishermen generally catch fish of 50 – 1000 g body weight, and then rear them in wooden cages using cassava as the main feed source until they reach marketable size.

After adaptation to culture conditions in wooden cages, about a hundred of these fish, weighing between 200 to 1100 g each, were bought and collected for further activities (Legendre *et al.*, 2000). It was necessary to transport them for 12 hours by road and airplane from the origin to the final rearing destination. Due to appropriate methods and special care, this operation could be achieved without any fish mortality (Sudarto and Pouyaud, 2000).

PREVENTION, CONSTRAINTS AND ADVICES

General prevention

For any kind of fish transportation, the following main safety precautions

should be considered:

- fish should be in healthy condition before transportation; injured fish could die during transport leading to water spoilage and mortality of other fish;
- fish should be starved for 24 to 48-h prior to transportation in order to avoid waste that can spoil water and cause mortality;
- transport containers should be filled with clean water;
- water used for transportation should be at the same temperature as the initial rearing water;
- large variation of temperature should be avoided;
- during transportation, the water should be oxygenated.

Antibiotic use

Farmers generally use antibiotic bath during fish transportation in order to prevent development of bacteria. However, as explained in Chapter VIII, antibiotic should be used at the right dose and during a period of time long enough to ensure the total elimination of bacteria. When these rules are not followed, bacteria may become resistant to the drugs.

In the case of transportation, this rule is not respected because antibiotic treatment lasts a maximum of 48-h, corresponding to the maximum transportation time.

Therefore, it is strongly recommended to use disinfectant applied at a low dose instead of antibiotic during transportation.

***P. djambal* specific constraints**

- this species has very sharp spines (first ray of the dorsal and two pectoral fins);
- fish are difficult to handle when their individual size exceeds 1 kg;
- they are sensitive to injury, which may cause high mortality during transportation;
- they need a supply of oxygen and a good water quality during transport.

Advice:

- the dorsal and pectoral spines of *P. djambal* of 200 g and over can easily tear plastic bags used for transportation, the risk increasing with the size of fish. To avoid this problem one of the following procedures should be considered:
 - ✓ insert a thick transparent plastic sheet between two plastic bags in order to prevent the outer one from being damaged by the sharp spines. The type of thick plastic sheet generally used in Indonesia for table cloth is very convenient for this purpose;
 - ✓ insert sharp spines in a rubber pipe (Plate II.1).

- air transportation needs special packaging adapted to the air line's regulation. It is important to note that the maximal authorized box size could differ from one company to another;
- road transportation during the night is recommended in order to avoid increasing water temperature due to sunlight exposure of fish containers.

TRANSPORTATION IN PLASTIC BAG WITH OXYGEN

Air transportation

As mentioned previously, air transport needs some specific preparation. Even if fish are transported by truck from rearing structures to the airport, air packaging must be ready from the start in order to avoid supplementary handling of fish.

The closed system packaging describe below was used for fish of less than 1 kg body weight. These fish were transported by truck and plane for 12-h, including the process of packaging. This technique resulted in a 100% survival rate after transport and no mortality was observed in the month following release of fish in a new rearing pond.

Packing

After inserting a transparent plastic sheet of 200 μm of thickness between two plastic bags, each double plastic bag is placed in a Styrofoam box and filled with 15 L of river water. Then, 1 to 5 fish for a maximum weight of 1 – 2 kg are placed in the bag, depending on the weight of the fish. Each bag is inflated with oxygen under pressure and closed tightly (Plate II.2), and each box placed again inside two layers of plastic bag to prevent oxygen leaking if inner plastic bags are perforated. This packing is finally placed in a cardboard box closed firmly then covered again with two layers of plastic bag to prevent water leaking if the Styrofoam box is broken.

Road transportation

Broodfish

Similar techniques were used to transfer sexually mature or immature *P. djambal* by land with a double plastic bag filled with water and oxygen under pressure as above. However, no thick plastic sheet was used because fish sharp spines were inserted in a rubber pipe as illustrated in Plate II.1 in order to avoid puncturing the plastic bag.

After inserting double transparent plastic in the plastic sackcloth (food bag) or in a Styrofoam box (Plates II.1 and II.2), each double plastic

bag was placed and filled with clean water up to the gills of the fish. Then 1 to 4 fish were added for a maximum of 8 kg of fish per bag. Each bag was filled with oxygen under pressure and put in a car.

This technique was used with success (100% survival rate) for several trips that ranged between 4 and 12-h duration.

Juveniles

Another method, using cool water as a tranquilizer, was applied to transfer *P. djambal* juveniles (100 g average weight) from ponds to floating cages in a lake.

Fish were caught by net (5 mm of mesh size) in ponds and transferred to concrete tanks (2 x 4 m in size, about 1200 litre of water volume) for 2-day of starvation.

In order to tranquilize fish during the transport, the water temperature was decreased in a tank from 29°C to 20°C using blocks of ice. Before packaging, fish were anesthetized in this cool water tank (water depth 15 cm) until they become unconscious.

Then, fish were packed in double plastic bags placed in a Styrofoam box. Bags were filled with 10 L of cool water (20°C) to which two blocks of ice for a total weight of 1 kg were added. Styrofoam boxes were closed tightly in order to maintain water temperature between 22 and 24°C during the transport. Each bag contained 25 fish and was filled with 50% water and 50% oxygen.

The duration of transportation was about 6-h by truck and the number of fish transported was around 2000. The survival rate was 100% after transportation then 97% after 2 days from arrival. No further mortality was observed after these 2 days.

TRANSPORTATION IN PLASTIC OR FIBER TANK WITH OXYGEN SUPPLY

To reduce risk during long duration transportation, another system has been tested using large fiber tanks placed on a truck, filled with clean water and fitted with slow diffusion of pure oxygen. This technique was used by the JFADC for transporting or moving young broodfish of *P. djambal* for a long distance corresponding to about 42-h travel. After transportation, the survival rate was 100% and no mortality was observed after releasing fish in their rearing structure.

Method and management of transport

Three 1 m³ plastic tanks were placed on a truck and almost filled to the brim to avoid splashing during the travel. An oxygen diffuser was placed on the bottom of each tank (Plate II.3).

Two days before transportation, fish were placed in a net cage implemented in a pond for fasting. Each transportation tank contained 25 fish of 1.6 kg average weight. Water was changed each 14-h and ice blocks were added when necessary to keep temperature between 27 and 30°C.

RELEASING FISH IN NEW REARING STRUCTURE

After release, fish should not be fed during 1 or 2 days, and then the behavior has to be observed carefully, checking for some abnormality or mortality. After the stress of the transportation, fish have to adapt to their new environment and present high risk of disease development.

Before releasing fish in their new rearing structure, special care should be given as follows.

General advice

Whatever the transportation method used, a period of adaptation should be respected to avoid stress:

- before opening the inflated plastic bags, place them floating in the final water in order to slowly equilibrate temperature between the water of transport and of the new rearing structure;
- after temperature equilibration, plastic bag could be opened and water from the new rearing structure mixed slowly with transport water;
- after this short period of adaptation, fish could be released delicately while checking their behavior.

Broodfish

Before release, each broodfish should be inspected carefully in order to detect injuries. Injuries should be disinfected with a external treatment (Betadine or alcohol) or bath (formalin, see Chapter VIII).

TRANSPORTATION EQUIPMENT

Materials for air transport

- 1 Rubber pipes (optional).
- 2 Plastic bags 80 x 100 cm.

- 3 Thick transparent plastic sheet 80 x 40 cm, thickness 200 μm .
- 4 Styrofoam box 35 x 40 x 60 cm (according to the airline restriction).
- 5 Cardboard box fitted to styrofoam box.
- 6 Oxygen.
- 7 Rubber band and adhesive tape roll.

Materials for road transport

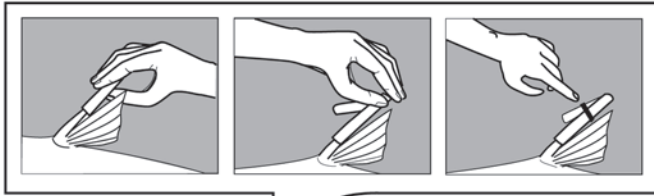
- 1 Ice blocks.
- 2 Plastic bag 80 X 100 cm.
- 3 Styrofoam box (35 x 40 x 60 cm) or plastic sackcloth (60 x 90 cm).
- 4 Oxygen.
- 5 Rubber band.

Materials for road transport in fiber tank

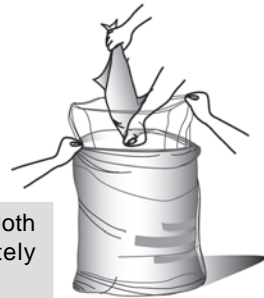
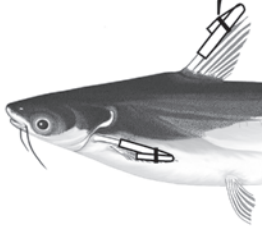
- 1 Oxygen bottle.
- 2 Rubber pipes.
- 3 Oxygen diffusers.
- 4 Plastic or fiber tank.
- 5 Ice blocks.
- 6 Rubber band.

REFERENCES

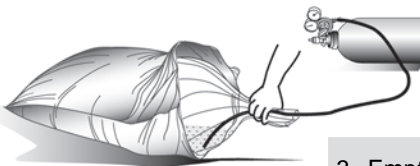
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- Sudarto and L. Pouyaud, 2000. Mengangkut ikan berduri, calon induk patin local yang aman. *Warta, Penel. Perik. Indonesia*, 6: 22-24.



1 - Insert *P. djambal* sharp spines in a rubber pipe, bend in half and tie to make sure rubber pipe could not be removed.



2 - Fill a double plastic bag fitted into sackcloth with clean water and place the fish delicately inside.



3 - Empty out air from plastic bag and replace it with pure oxygen. When lay bag down, fish head should be covered with water.

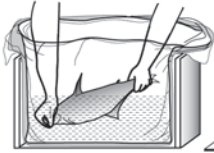


4 - Plastic bag is tied as shown in Plate II. 2.

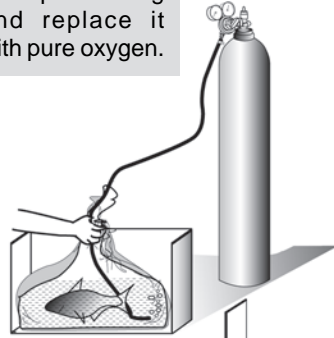
Plate II.1.

Packing in plastic bag with oxygen.

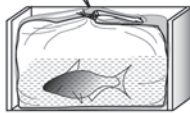
1 - Place carefully the fish in a Styrofoam box fitted with a double plastic bag filled with water.



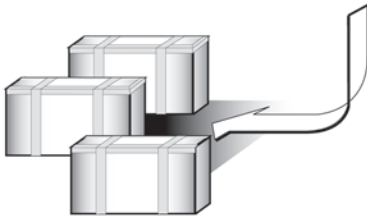
2 - Empty air from plastic bag and replace it with pure oxygen.



3 - When plastic bag has been inflated, remove the oxygen pipe, twist the top of the double plastic bag and tie it strongly using rubber band. Then fold the twist in two and tie it again making sure that no oxygen is leaking.



4 - Press the lid against plastic bag in order to exert a slight pressure on inflated bag.



5 - Shut tightly Styrofoam box with adhesive tape. Put the box in cardboard box and in plastic bag again for air transportation.

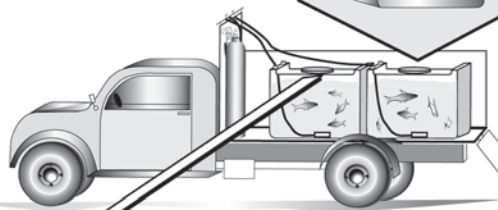
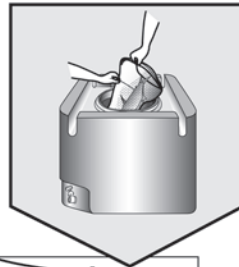
Plate II.2.

Packing in Styrofoam box with oxygen.

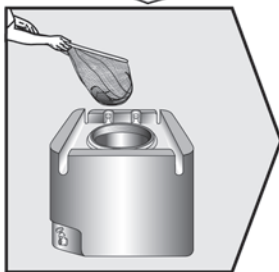
1 - After 24-h of fasting each fish is delicately netted and individually placed in a plastic bag filled with water.



2 - Fish are transferred to transportation tank almost full to avoid splashing during travel.



3 - Broodfish in tanks with oxygen supply. Ice blocks could be added to keep water temperature between 27°C and 30°C.



4 - After transportation, fish are delicately caught and placed in plastic bag as above.

5 - Release fish when water temperature in the bag has been equilibrated with that of the new rearing water.

Plate II.3.

Transportation in plastic or fiber tank with oxygen supply.

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