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Intelligence

Pirarucu production advances in central Amazon, Brazil

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Controlled breeding needed to shore up fingerling supplies



Wild pirarucu grow to over 2.5 m in length.

The pirarucu (*Arapaima gigas*) is an obligate air-breathing, carnivorous fish species indigenous to the Amazon that is among the largest freshwater fish in the world. Wild-caught pirarucu reach up to 200 kg in live weight and over 2.5 meters in length.

The low fat content, mild taste, and white boneless fillets of pirarucu flesh combines with the species' fame as an ancient tropical fish to command high value in both domestic and international food and ornamental fish markets.

Development of culture techniques

Wild stocks of the species have been overexploited to a point where the trade of *A. gigas* is presently under the regulation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora. As a response to market demand and to discourage the continuing harvest of natural pirarucu populations, research to develop intensive culture techniques have been carried out by Instituto Nacional de Pesquisas da Amazônia (INPA) and fish producers in the central Amazon of Brazil.

During the past five years, promising results have been reported, with emphasis on the production of fingerlings and feed-trained advanced juveniles. Grow-out trials in net cages and earthen ponds with fish fed floating pellets have also been successful.

Current practices

Commercial production evaluations and research experiments in Amazonas, Brazil, have shown that some of the rearing techniques used in the intensive culture of freshwater carnivorous fish such as the largemouth bass, peacock bass, and spotted catfish can also be successfully applied to pirarucu.

Fry transfer and nursery

Generally, pirarucu broodfish are stocked in 400- to 800-square-meter earthen ponds and allowed to breed naturally, which occurs mainly between midspring and midsummer. As soon as a tight school of fry is sighted, they are collected and transferred to fertilized nursery ponds. The 20-mm-long fry are stocked at 10 to 15 fish per cubic meter in the ponds.

During the nursery phase, live zooplankton is the major food source for pirarucu. Its production is stimulated by applying a combination of organic rice bran and inorganic urea fertilizers. After 20 days, 0.4- to 0.6-gram fingerlings are harvested and transferred to an indoor facility, where they are weaned and trained to feed on dry, formulated diets. Survival rates during nursery in small-scale commercial production have ranged 65 to 85 percent, depending on food availability and predator occurrence.

Feed training of juveniles

Juvenile pirarucu are confined in tanks of various shapes and sizes while they are trained to feed on artificial diets. Fiberglass vats with flowthrough water have been the most appropriate type of facility for training pirarucu, due to their efficient removal of wastes and maintenance of good water quality to prevent disease problems.

After stocking in vats, pirarucu juveniles are fed a starter diet for three or four days and weaned to dry ration using a gradual transition of diets prepared with increasing amounts of the final diet. Experiments carried out at INPA have shown that live artemia sp. or zooplankton are a more efficient starter diet than feeds with 0.5 percent monosodium glutamate, 5 percent fish silage, or 5 percent salt-dried shrimp used as attractants.

Successful transition from starter to final diet has been obtained offering a sequence of feeds containing 75, 50 and 25 percent of the starter diet for three days each (Table 1). Feed-training success after four days on the final diet has been as high as 95 percent. After the training period, juveniles are

transferred to rearing ponds or cages.

Ono, Feeding protocol used to train pirarucu, Table 1

Feeding Phase	Diet	Duration (days)	Feeding Frequency (times/day)
Starter	Zooplankton or Artemia sp. (SD)	3	10-12
Transition	75% SD + 25% FD	3	8-10
Transition	50% SD + 50% FD	3	6-8
Transition	25% SD + 75% FD	3	6
Final	Dry feed (FD)	4	6

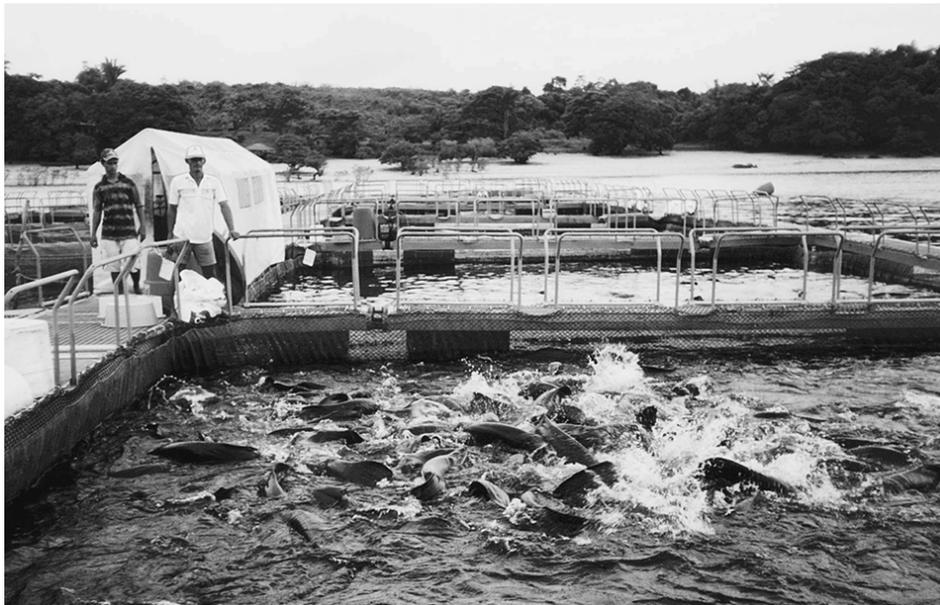
Table 1. Feeding protocol used to train pirarucu to dry feed.

Grow-out trials

Growout to market size of pirarucu fed floating pellets has been done in the Central Amazon using earthen ponds and floating cages in rivers and reservoirs. Field trials in ponds by commercial producers have resulted in growth from juveniles with a mean weight of 0.02 kg up to market size of 10 kg in a 14-month period under optimum temperature conditions. Yields in ponds with less than 5 percent daily water exchange have reached as high as 20,000 kilogram per hectare.

In floating cages installed in large rivers and reservoirs, pirarucu have been grown from 0.03 kg to 10 kg in about 12 months, with yields of 50 to 100 kilograms per cubic meter in 50- and 300-cubic-meter cages. To date, the best results have been obtained using feeds with 42 to 48 percent crude protein content.

Pirarucu have shown good tolerance to high stocking densities in cages and fast growth – even in water with low dissolved-oxygen concentrations typical in the Central Amazon's water bodies. Acceptance of artificial diets in the early life stages has also contributed to higher survival rates and reduced the use of expensive live food. On the other hand, the unpredictable harvest of fry from natural spawning ponds limits the supply of fingerlings and is a major factor that restricts large-scale production of the species.



Floating cages in the Negro River of Amazonas, Brazil, are used in the first rearing phase of *Arapaima gigas*.

Conclusion

The pirarucu is a promising species for tropical aquaculture due to its market value and good performance under intensive culture. Currently, largescale production of pirarucu is limited by the lack of fingerlings, which will only be solved with the development of controlled breeding techniques.

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