

No Bait! Fish May Respond to Sound



A six-month-old sea bass swims to the water surface in a tank at the Marine Biological Laboratory, in Wood's Hole, Mass., Tuesday, March 25, 2008. The fish live and grow in the tank at the laboratory until they are large enough to participate in an experiment where their behavior may be influenced by a sound broadcast into the water. (AP Photo/Steven Senne)

(AP) -- Call them Pavlov's fish: Scientists are testing a plan to train fish to catch themselves by swimming into a net when they hear a tone that signals feeding time.

If it works, the system could eventually allow black sea bass to be released into the open ocean, where they would grow to market size, then swim into an underwater cage to be harvested when they hear the signal.

What's next, teaching them to coat themselves in batter and hop inside a fryer?

"It sounds crazy, but it's real," said Simon Miner, a research assistant at the Marine Biological Laboratory at Wood's Hole, which received a \$270,000 grant for the project from the National Oceanic and Atmospheric Administration.

Miner said the specially trained fish could someday be used to bolster the depleted black sea bass stock. Farmed fish might become better acclimated to the wild if they can be called back for food every few days.

The bigger goal is to defray the costs of fish farming, an increasingly important source of the world's seafood. If fish can be trained to return to the farmer after feeding in the open ocean for several days, farms could save money on feed and reduce the amount of fish waste released in concentrated areas.

The key question for fish farmers: How many fish will actually return, and how many will be lost to predators or simply swim away?

Randy MacMillan, president of the National Aquaculture Association, said fish farmers won't be easily convinced to adopt open-ocean ranching.

"The commercial side is going to be skeptical," said MacMillan, who works on a trout farm in Idaho.

The Massachusetts project is one of several experiments funded by the federal government last year as part of aquaculture research.

"We're looking for innovations that will actually make a difference for coastal communities and the environment," said Michael Rubino, manager of NOAA Aquaculture. "It fits in both."

Previous experiments have used sound to train a fish to feed - similar to what Russian scientist Ivan Pavlov did in his famous dogs that salivated at the sound of a bell, expecting food.

In Japan, scientists have used sound to keep newly released farmed fish in certain areas, where they could be caught in traditional ways.

But no one has ever tried to get fish to leave and return to an enclosure where they can be scooped up.

The project began last summer using 6,500 black sea bass, a stout, bottom-dwelling fish that lives between Florida and Cape Cod and in the winter is generally not found north of New Jersey. The species grows up to 3 pounds and 20 inches long and has a thick, white flesh that can be filleted for broiling or cut into nuggets for frying.

Miner said the first objective was to see if the fish could truly be trained. He got his answer after keeping the fish in a circular tank, then sounding a tone before he dropped food in an enclosed "feeding zone" within the tank that the fish could enter only through a small opening.

Researchers played the tone for 20 seconds, three times a day, for about two weeks. Afterward, whenever the tone sounded, "you have remote-control fish," Miner said.

"You hit that button, and they go into that area, and they wait patiently," he said.

Miner is now trying to figure out how long the fish remember to associate the tone with food. He feeds the fish outside the feeding zone without a tone for a few days and then tests if they will still head for the feeding area when the tone sounds again.

Some fish forgot after five days. Others remembered as long as 10. Miner said the strength of memory seems tied to how long the fish are trained.

By May, researchers hope to bring about 5,000 black sea bass to a feeding station called an "AquaDome," a structure about 33 feet across and 16 feet high that will be anchored to the ocean floor in Buzzards Bay, 45 miles southeast of Boston.

The sea bass will be fed in the dome after a tone sounds. After researchers feel they've been sufficiently trained, they will be freed from the dome. A day or two later, scientists will sound the tone again and see how many bass return. They'll do the experiment again around summer's end.

The tone will have a range of about 100 meters in every direction. Miner said sea bass are a territorial fish that prefer a rocky bottom, like in Buzzards Bay, where they can forage for food. He doesn't think they will stray too far from the dome.

MacMillan is not convinced the fish won't just swim away.

"My experience with fish is they will wander far and wide," he said.

MacMillan said getting farmed fish to supplement their diets with ocean feeding is intriguing, but farmed fish now get a steady diet that produces reliable growth.

He also expects large numbers of released fish to be lost to predators.

Scott Lindell, the project leader, said losing fish is a concern. But the savings of using the trained fish and the AquaDome is potentially huge: Even if only half the fish come back after reaching market size, the operation would be more profitable than current methods. The dome, for instance, is 10 times cheaper than a standard aquaculture sea cage.

Miner said real answers won't start coming until the fish hit Buzzards Bay this spring. "There's probably 18,000 ways for it to go wrong and only one way to go right."

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