

USDA-ARS Casts a Wider Net to Reel in New Ideas

Challenge Yields Six Diverse Ways to Raise Flavorful Catfish

“USDA-ARS has been looking for ways to integrate more innovation into our intramural research programs, and partnering with NASA and HeroX enabled us to conduct our very first prize challenge. Protecting the Natural Flavor of Catfish allowed us to engage a broad, international audience of solvers who provided many creative, environmentally sustainable and cost-effective ideas to ensure product quality for the benefit of farmers and consumers. This engagement and consideration of such a diverse set of ideas would not have happened within the framework of our traditional strategic planning processes.”

MCaird Rexroad
National Program Leader for Aquaculture
USDA-Agricultural Research Service

The U.S. Department of Agriculture’s (USDA) Agricultural Research Service (ARS) collaborated with the NASA Tournament Lab (NTL) to sponsor the Protecting the Natural Flavor of Catfish Challenge to develop new ways to maintain the flavor of farmed catfish. Under some conditions, farmed catfish can develop off-flavors that are unpalatable to consumers due to exposure to certain compounds arising from blue-green algae. This challenge received 85 submissions from 27 countries and awarded a total prize purse of \$60,000 to six different winners. ARS was impressed with the breadth and scope of ideas presented and sees potential for some of them to be used in other off-flavor applications, including recirculating aquaculture systems.

ARS is the chief scientific in-house research agency of the USDA. Their mission is to deliver scientific solutions to national and global agricultural challenges. The agency is committed to finding solutions to agricultural problems that affect Americans every day from field to table. They view themselves as a problem solving agency, whose teams of scientists develop cost effective and environmentally friendly solutions to challenges facing U.S. agriculture. Combating off-flavors that sometimes appear in farmed catfish is one of the industry challenges they are addressing. Although they have an active internal group that is working on this off- flavor issue, they wanted to

get more contributions to the problem from a wider range of approaches. The ARS team decided this would make a great topic for a crowdsourcing challenge.

This was the first time this team had used crowdsourcing as a problem-solving tool, and they chose to focus the crowd on two main aspects of the problem: prevention of the off-flavors through pond or fish management, and methods for removing off-flavors that have been detected after harvesting the catfish. Although the majority of competitive proposals addressed the prevention of off-flavors through pre-harvest management techniques, some proposals provided full solutions that reduced the occurrence of off-flavors while also reducing off-flavors that might already be present in catfish.

First place winner Laura Miniel proposed an approach that combines solar heating with shad co-culturing as a full solution. The solar heating keeps the catfish aquaculture ponds warm enough during winter months that shad can co-exist. Certain species of shad feed on blue-green algae, keeping the algae population in check and reducing the amount of off-flavor producing compounds released by the algae. Additionally, the warmer water boosts the metabolism of the catfish so that those off-flavor producing compounds are more quickly expelled from the catfish bodies. Laura further supported her solution with implementation strategies that use readily available, low-cost solar heating products from adjacent industries.

Several winners proposed different types of aeration, such as microbubbles or nanobubbles of air. For example, Jenna Rackovan's team was a second-place winner, and they proposed the use of air nanobubbles in a catfish pond. It is known that when air nanobubbles burst in water they can inhibit the growth of blue-green algae while generally improving the water quality. This results in enhanced fish growth rates and better overall fish health. Jenna's team proposed introducing these air nanobubbles by adapting pond aerators that are already commonly used in aquaculture and pond maintenance.

Elements in these different solutions were not necessarily all new to ARS, but the way in which they were presented made the ARS team think about them in a new light. In particular, having participants support their approaches with practical ideas for implementation demonstrated their feasibility and practicality in ways that hadn't been previously considered. Now that the challenge is over, ARS is hoping to help winning teams move onto the next steps - whether that might be collaborating with ARS scientists or connecting winners with other helpful resources to

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demonstrate the effectiveness of their ideas. This might have been ARS' first experience with external crowdsourcing, but it probably won't be their last!