

Technology for diseases

Cooke Aquaculture receives funding for new salmon project



Abalone in France

One European farmer talks about raising the unusual species

The industry in Australia

Mainstream Aquaculture CEO speaks about unique challenges in Oz farming

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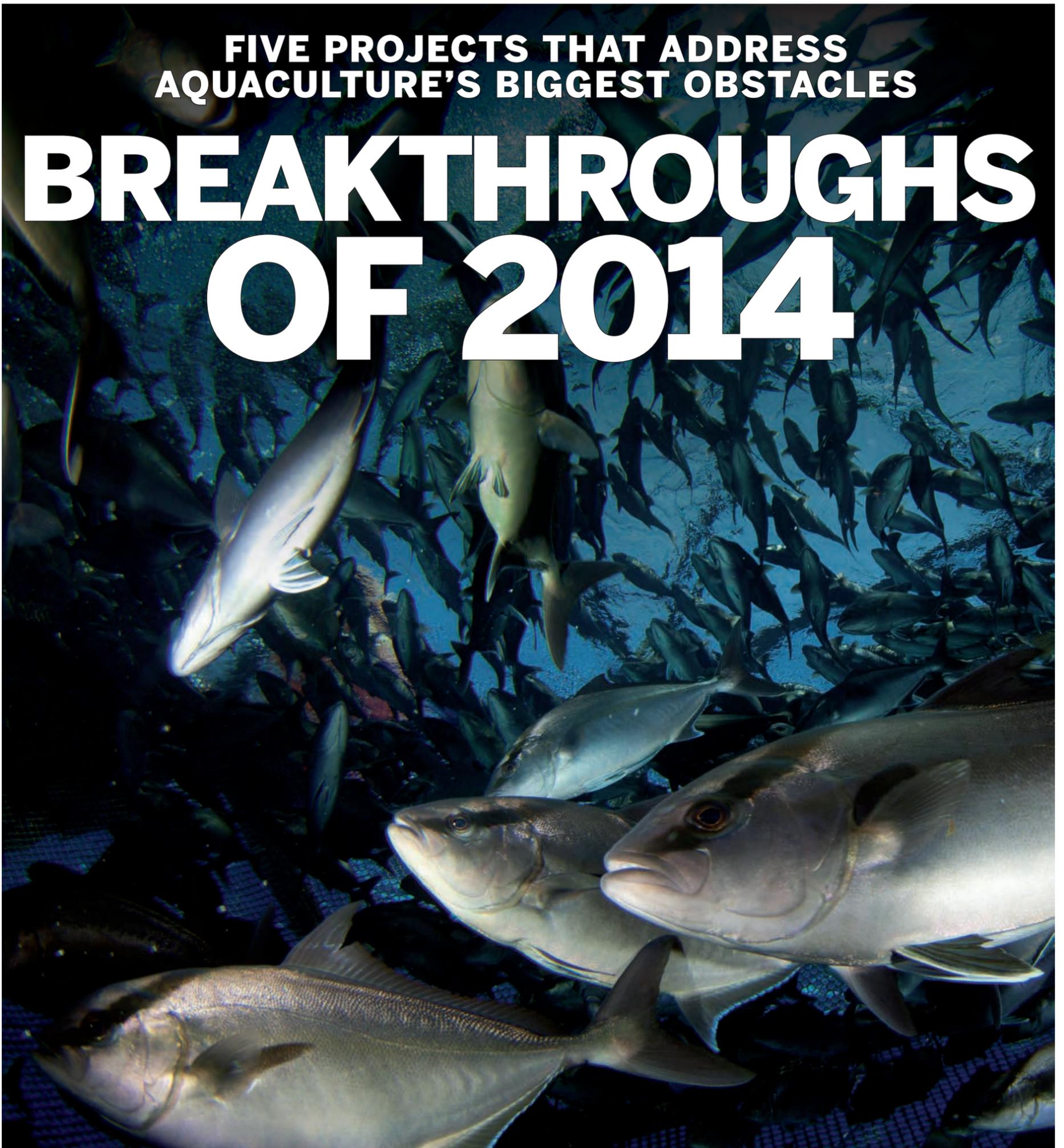
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FIVE PROJECTS THAT ADDRESS
AQUACULTURE'S BIGGEST OBSTACLES

BREAKTHROUGHS OF 2014





PRODUCING SASHIMI GRADE ALMACO JACK WITH ZERO FISHMEAL DIETS?

CUTTING EDGE FOOD technology has been put to use in the aquaculture sector in Hawaii, where intensive research and development efforts have recently led to successful field trials growing “sashimi grade” Almaco jacks, *Seriola rivoliana*, using diets completely free of fishmeal.

Expert tasters were unable to distinguish the zero fishmeal reared fish from the control group.

Neil Anthony Sims, CEO at Kampachi Farms, LLC in Kailua Kona, Hawaii, laid out how, over the last seven years, Kampachi Farms has been working with Nebraska Soybean Board, NOAA, USDA, and other researchers to try to minimize the use of fishmeal and fish oil in the diets of the Kampachi (*Seriola rivoliana*).

A range of protein substitutes have been tested, including soy protein concentrate, micro-algae byproducts, single-cell proteins and fish peptide concentrates (see sidebar for details). The “Holy Grail” of this research was always to reduce the fish-in-to-fish-out ratio (FIFO), the proportion of wet forage fish required to produce the sashimi-grade kampachi to less than 1:1. “At a FIFO of one to one we would be producing more great-tasting kampachi than equivalent anchovy inputs. We would be net producers of marine protein. That seemed to us to be an admirable goal” he said.

Sims said that in a series of feed trials over the last year, the Kampachi Farms team has now far exceeded this goal. “Three

diets that were tested over the last year completely eliminated fishmeal from the feed formulation” he said, noting also that “the kampachi growth performance, fish health and product quality showed no statistical difference from fish fed with high-fishmeal controls.”

“Few of us are bold, by ourselves. We usually need some peer-group pressure,” Sims said. He was previously at a conference, he explained, discussing lower fishmeal levels in the upcoming feed trials with Dr. Rick Barrows, of USDA ARS, who is based in Montana.

“Rick turned to me and gently suggested that we could perhaps eliminate the marine proteins from the diet entirely,” Sims said that he was, at first, quite taken aback, but that Barrows instills confidence; “He has a keen grasp of the science and the subtleties of fish nutrition. How could you refuse an offer like that?”

The Kona research crew ran a series of replicated tank trials that showed that Barrow’s fishmeal-free formulations worked for this demanding species. Speaking about the results,

“For a high-value fish such as Kampachi, it is critical that product quality not be compromised,” Sims told *Fish Farming International*.

“We need ensure that the fish still has that ‘wow!’ factor. That proved to be the case, with every one of these three different formulations. We could not differentiate the fish fed on one diet from the other.”

Practicalities aside, the economic analyses of these diets left plenty of optimism for future commercialization of fishmeal-free aquafeeds.

“This all needs more testing at the commercial scale,” Sims said. “We are pushing for trials next year to run a low fishmeal diet trial using 40 percent Soy Protein Concentrate (SPC) from a commercial feed plant recently set up in Indiana. If successful, the next step with that diet would be to push it to zero-fishmeal at a commercial scale -- that would be a 48 percent SPC diet.”

INSPECTION:
Inspecting kampachi during zero fishmeal sea trials in Hawaii. Photo: Kampachi Farms

ALTERNATIVES TO FISHMEAL: MENU OPTIONS

1. Fish Processing waste (Partner: Bluewave Peru)

Bluewave uses the residual wastes from fish processing facilities as “raw materials” for new products. The company has designed a process which can recover about 97 percent of all the proteins and oils in the liquid/solid waste streams, providing marketable feedstuff products as well as reducing effluent pollution. In this study, Fish Peptide Concentrates (FPC) consisting of a combination of protein and high omega-3 lipids were used as a substitute for fishmeal in the diet of kampachi. While the price point for FPC is high when compared to fishmeal (\$3,000/ton), Bluewave claims that FPC can be used as a 1:3 substitute (that is 33kg of FPC can replace 100kg of fishmeal), because of the higher protein digestibility in the peptides of the FPC.

2. Microalgae (Partner: Cyanotech, Hawaii)

Haematacoccus algae processing byproduct from Cyanotech Corporation, based at NELHA in Kona. This algae is grown for the production of organic carotenoids. The by-product has a protein level of only around 35 percent, which made formulation challenging but still possible.

3. Single Celled Protein (Partner: Menon Feeds)

Menon International Inc. specializes in innovative microbial products. Its Menon Renewable Feed (MrFeed™) project utilizes products from fermentation to produce tailor-made amino acid profiles to fit with a specified feed regime. Its highest profile project was the successful development of a feed for *Litopenaeus vannamei*. Menon supplied a SCP feed, tailoring the amino acid profile in MrFeed™ to fit the nutritional needs of kampachi.