Case study three

Plant-based feeds for black seabass show promise

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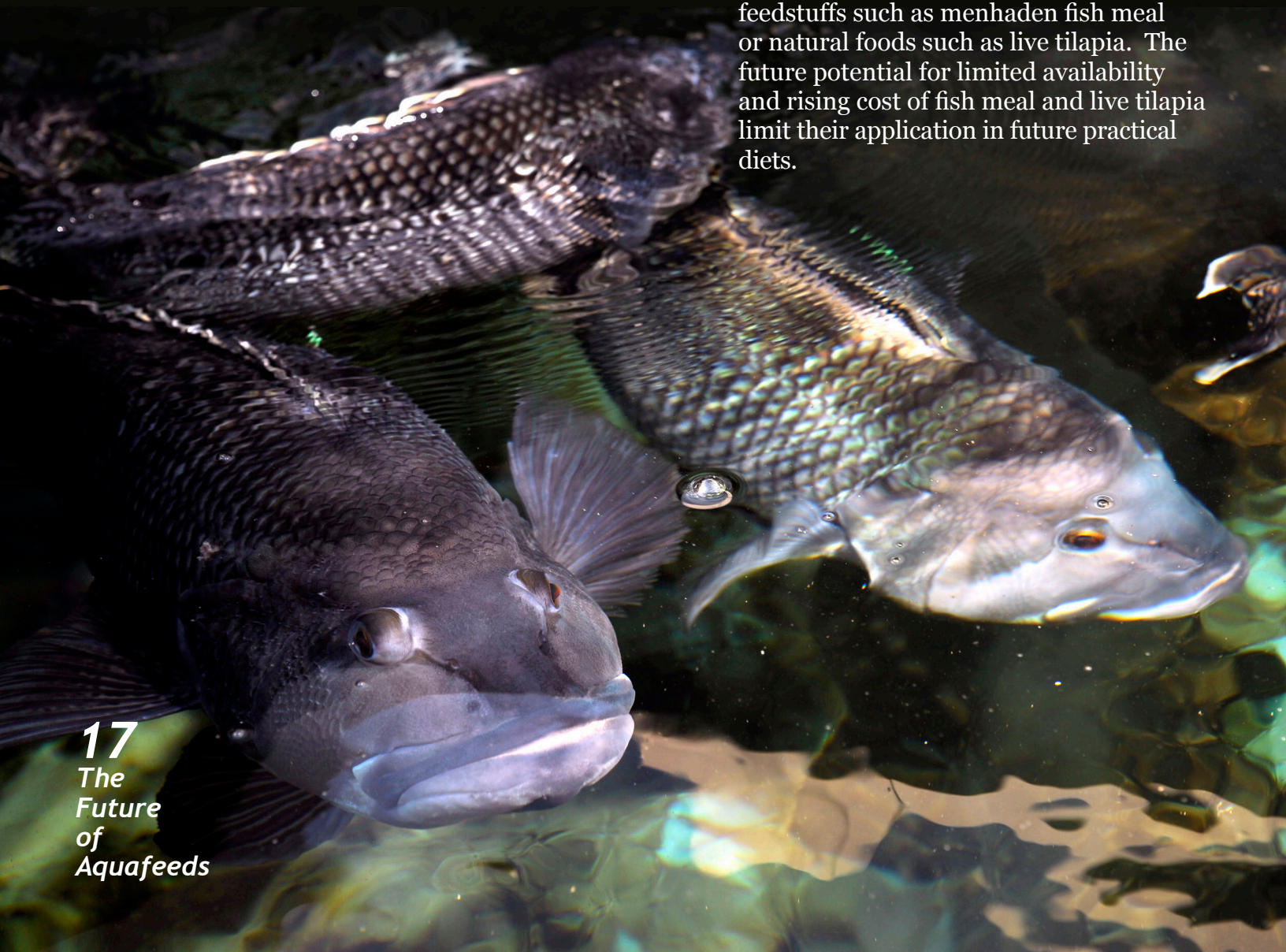
Scientists at the University of North Carolina Wilmington-Center for Marine Science (UNCW-CMS) are developing alternative plant protein based practical diets for the culture of black sea bass, *Centropristis striata*, a commercially important species found in waters along the Atlantic coast from the Gulf of Maine to northern Florida. Their wide acceptance as an excellent food fish and their high market value has led to over-harvesting of wild stocks especially in the South Atlantic U.S. coast. Increased awareness of the status of the black sea bass populations, coupled with high market value and demand, has led to an interest in the development of culture technologies for commercial production. Reliable protocols for spawning and larval rearing of black sea bass are already established. At UNCW, a team of researchers lead by Dr. Wade O. Watanabe, is developing nursery and grow-out technologies for producing marketable fish in recirculating aquaculture systems. Nutrition and diet development are critical components of their research.

Black sea bass grow rapidly when fed prepared feeds consisting largely of marine feedstuffs such as menhaden fish meal or natural foods such as live tilapia. The future potential for limited availability and rising cost of fish meal and live tilapia limit their application in future practical diets.



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Soybean meal is considered to be one of the most suitable and stable supplies of an alternative ingredient for replacing fish meal in commercial fish feeds. Compared to other grains and oilseeds, soybeans are promising because of their high protein content high digestibility and good amino acid profile. A series of experiments were conducted by UNCW fish nutritionist Dr. Md Shah Alam with the assistance of graduate student Katherine Sullivan to test the effect of varying dietary levels of solvent-extracted soybean meal supplemented with or without amino acids and attractants in the diets of juvenile black sea bass. Diets were formulated to replace menhaden fish meal protein with solvent-extracted soybean meal protein at 0 to 100 percent with or without supplementing amino acids and 1 percent attractants (taurine, betaine, glycine and alanine). All diets were formulated to have about the same crude protein and same oil level for each experiment. To enhance palatability, all diets contained 5 percent krill meal and 7.5 percent squid meal. Results of these experiments showed that the maximum level of menhaden fish meal protein replacement with solvent extracted soybean meal protein was 70 percent with 1 percent attractants, 7.5 percent squid meal and 5 percent krill meal and with or without supplementing methionine and lysine in the diets. Greater than 70 percent replacement of fish meal protein with soybean meal caused growth, whole body protein and oil to decrease. Similar trends were observed for feed efficiency, specific growth rate, feed intake and protein efficiency ratio. These short-term laboratory based studies were extended to pilot-scale grow-out conditions. An experiment to test the replacement of fish meal protein by soybean meal protein without adding squid meal, krill meal and attractants is currently in progress. UNCW scientists are also conducting research to test the flavor and nutritional value of the fish fed the high level of soybean based diets and comparison with the fish fed fish meal-based diets. Results to date indicated that black sea bass exhibited excellent growth when fed feeds containing relatively high levels of soybean meal. These results will be used to develop environmentally-sound and cost-effective plant protein-based feeds for black sea bass aquaculture.

Hatchery raised black sea bass grown to market size in a recirculating tank system at the University of North Carolina Wilmington, Center for Marine Science

Experimental feeds formulated and produced at the University of North Carolina Wilmington, Center for Marine Science